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NOTES

1.0 INTRODUCTION

The procedures contained in this manual include specifications, instructions, and graphics needed to diagnose the PCM Powertrain System. The diagnostics in this manual are based on the failure condition or symptom being present at the time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

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

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All system schematic diagrams are in Section 10.0. All charts and graphs are in Section 11.0.

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

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

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

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

1.1 SYSTEM COVERAGE

This diagnostic procedure manual covers the 2003 WJ with 4.0L and 4.7L Engines.

1.2 SIX-STEP TROUBLE SHOOTING PROCEDURE

Diagnosis of the Powertrain Control Module (PCM) is done in six basic steps:

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

2.0 IDENTIFICATION OF SYSTEM

The Powertrain Control Module (PCM) monitors and controls:

- fuel system
- ignition system
- charging system
- speed control system
- automatic transmission ("XXRE/XXRFE" transmissions)

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

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

3.2 FUNCTION OPERATION

3.2.1 FUEL CONTROL (GAS)

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

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

3.2.2 ON-BOARD DIAGNOSTICS

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

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

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

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

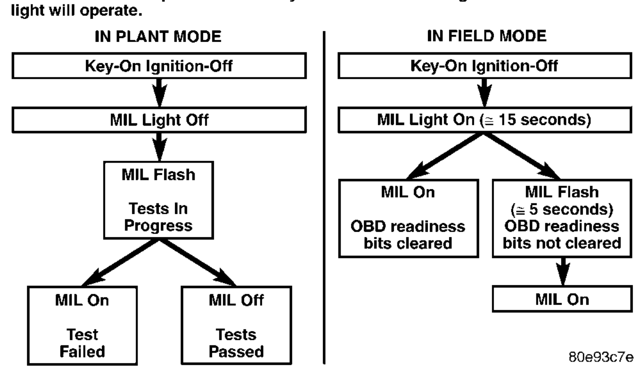
The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII/EUROIII. These OBDII/EUROIII Diagnostics control the functions necessary to meet the requirements of California OBDII/EUROIII and Federal OBD regulations. These requirements specify the inclusion of a Malfunction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

MIL Lamp Strategy

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

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

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



The following table summarizes the various OBDII monitors operation.

OBDII / EUROIII Monitor Operation

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

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

OBDII/EUROIII MONITOR RUN PROCESS, JTEC

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

NOTE:

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

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

Monitor Preliminary Checks:

1. Plug a DRB III into the vehicle's DLC.
2. Turn the ignition, KEY ON – ENGINE OFF. Watch for MIL lamp illumination during the bulb check. MIL lamp must have illuminated, if not, repair MIL lamp.
3. On the DRB III Select #1 DRB III Standalone.
4. Select #1 1998-2002 Diagnostics
5. Select #1 Engine.
6. Select #2 DTCs and Related Functions
7. Select #1 Read DTCs
   * Verify that No Emissions Related DTCs are Present.
   * If an Emissions DTC is Present, the OBD II Monitors may not run and the CARB Readiness will not update.
   *The Emissions related DTC, will need to be repaired, then cleared. By clearing DTCs, the OBD Monitors will need to be run and completed to set the CARB Readiness Status.
8. Return to Engine Select Function Menu and Select #9, OBD II Monitors.
9. Select #3 CARB Readiness Status.

Do all the CARB Readiness Status Locations read YES?

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

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

NOTE:

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

B. Specific criteria need to be met for each monitor. Each monitor has a Pre-Test screen to assist in running the monitor. For additional information, refer to the Chrysler Corporation Technical Training Workbook titled <u>On Board Diagnostics</u>, part number 81-699-97094.

The most efficient order to run the monitors has been outlined below, including suggestions to aid the process. The first two monitors have very similar enable criteria; it is possible that the Evaporative Leak Detection Monitor will run during the O2 Sensor Heater Monitor.

1. **O2 Sensor Heater Monitor**
   This monitor requires a cold start, usually an overnight soak or parked for at least 8 hours without the engine running. The engine coolant temperature must be within 10 degrees of ambient/battery temperature, and the sensed Ambient (outside) Temperature must be between approximately 0 F and 100 F. For the monitor run conditions, select the O2S HEATER MON PRE-TEST in the DRB III, OBD II Monitors Menu
2. **Evaporative Leak Detection Monitor (If the vehicle is equipped with an LDP system)**
   This monitor requires a cold start, usually an overnight soak or parked for at least 8 hours without the engine running. The engine coolant temperature must be within 10 degrees of ambient/battery temperature, and the sensed Ambient (outside) Temperature must be between approximately 40 F and 90 F. For the monitor run conditions select the EVAP LDP MON PRE-TEST in the DRB III, OBD II Monitors Menu.
3. **Catalyst Monitor**
   The vehicle will need to be driven at highway speed for a few minutes. If the vehicle is equipped with a manual transmission, using 4th gear may assist in meeting the monitor running criteria. For the monitor run conditions, select the EWMA CAT MON PRE-TEST in the DRB III, OBD II Monitors Menu.
4. **O2 Sensor Monitor**
   The vehicle will need to be driven for a period of time and brought to a stop for a short period of time with the Automatic Transmission left in Drive. The O2S Monitor will not run in Park or Neutral on an Automatic Transmission equipped

vehicle. For the monitor run conditions, select the O2S MON PRE-TEST in the DRB III, OBD II Monitors Menu.

5. **Purge Monitor**
   All the Purge Free (PF) cells must update on the ADAPTIVE MEMORY screen before the Purge Flow Monitor will run. For the monitor run conditions, select the PURGE FLOW MON PRE-TEST in the DRB III, OBD II Monitors Menu. The Purge Flow Monitor will not run in Park or Neutral on an Automatic Transmission equipped vehicle. The Purge Flow Monitor will attempt to run every **other** throttle closure. If all of the parameters are met and it still does not run, with your foot firmly on the Service Brake, slightly (1/4) open the Throttle and quickly close the Throttle. This will allow the Purge Free update to happen, and then the Purge Flow Monitor will Run.

3.2.3 TRANSMISSION CONTROL

The PCM also controls the 4 speed automatic transmissions utilizing electronic governor pressure control, eliminating the need for a separate transmission controller.

Transmission control is achieved through regulation of governor pressure using a Governor Pressure Solenoid valve. Valve position is controlled by pulse width modulation. Torque converter clutch and overdrive solenoids are also controlled by the PCM, as are the transmission relay and dashboard overdrive off lamp. PCM inputs affecting transmission operation include the throttle position sensor, output shaft speed sensor, vehicle speed, engine speed sensor (CKP), brake switch, ignition, overdrive on/off switch, torque converter clutch solenoid, transmission temperature sensor, and governor pressure sensor.

The PCM continuously checks for internal transmission problems, electrical problems, and some hydraulic problems. When a problem is sensed, the PCM stores a diagnostic trouble code. Any of these codes cause the transmission to go into “default” mode. When the PCM detects a problem, the transmission will default to third gear. When this happens, the only transmission functions are:

- PARK and NEUTRAL
- REVERSE
- THIRD GEAR
- MANUAL SHIFTING of FIRST, SECOND and THIRD GEAR

No upshifts or downshifts are allowed. The position of the manual valve alone allows the ranges that are available. Although engine performance is seriously degraded while in this mode, it allows the owner to drive the vehicle in for service. The transmission can be shifted manually by quickly downshifting into 1st to achieve 1st gear, then shifting to 2nd, then to third. However, default mode will not allow 4th gear or any EMCC operation.

Once the DRBIII® is in the RE transmission portion of the diagnostic program, it constantly monitors the PCM, updating the screens with switch, sensor, and input/output states, as well as displaying diagnostic trouble codes and default status.

TRANSMISSION IDENTIFICATION

The transmission part/identification numbers and codes are stamped on the left side of the case just above the oil pan gasket surface. The first letter/number group is the assembly part number. The next number group is the transmission serial number. Refer to this information when ordering replacement parts.

GOVERNOR PRESSURE SOLENOID VALVE

The solenoid valve generates the governor pressure needed for upshifts and downshifts. It is an electro-hydraulic device and is located in the governor body on the valve body transfer plate. The inlet side of the solenoid valve is exposed to normal transmission line pressure while in forward gears. The outlet side of the valve leads to the valve body governor circuit. The solenoid valve regulates line pressure to produce governor pressure. The average current supplied to the solenoid valve controls governor pressure. One amp current produces zero psi governor pressure. Zero amps set the maximum governor pressure. Current is regulated by modulation of the pulse width of a 512 Hz driver frequency. The transmission control relay supplies electrical power to the solenoid valve. Operating voltage is 12 volts (DC) and is provided through the relay's fused B+ contact. The solenoid is polarity sensitive. The PCM energizes the solenoid by grounding it through the power ground terminal on the PCM.

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve.

The sensor output signal provides the necessary feedback to the PCM. This feedback is needed to accurately control pressure. The unit is an absolute pressure device and the output is calibrated to be 0.35 to 0.65 volts at 14.7 psi (normal barometric pressure). Since this is an absolute pressure device, 0 psi calibration is required often to compensate for changing atmospheric pressure or altitude. This voltage measured at 0 psi is referred to as zero pressure offset.

GOVERNOR SHIFT SCHEDULES

The electronic governor has several governor curves possible as opposed to a conventional governor, which has a single governor curve with two stages. These transmissions are mechanically and hydraulically the same as the ones they replace.

As with all-hydraulic transmissions, the vehicle shift speeds are determined by balancing a hydraulic pressure signal proportional to transmission output speed (called governor pressure) against a pressure signal determined by throttle position (called throttle pressure). The four curves are used during the following operating conditions.

Low Transmission Fluid Temperature — When the transmission fluid is cold at or below 30°F, the conventional governor can delay shifts, resulting in higher than normal shift speeds and harsh shifts. The electronically controlled low temperature governor pressure curve is higher than normal to make the transmission shift at normal speeds and sooner. The PCM uses a temperature sensor in the transmission oil sump to determine when low temperature governor pressure is needed.

Transfer Case Low-Range Operation — On four-wheel drive vehicles operating in low range, the engine can accelerate to its peak more rapidly than in Normal range, resulting in delayed shifts and undesirable engine "flare." The low range governor pressure curve is also higher than normal to initiate upshifts sooner. The PCM compares the electronic vehicle speed signal to the transmission output shaft speed signal to determine when the transfer case is in low range.

Wide-Open Throttle Operation — In wide-open throttle (WOT) mode, adaptive memory in the PCM assures that up-shifts occur at the preprogrammed optimum speed. WOT operation is determined from the throttle position sensor, which is also a part of the emission control system. The initial setting for the WOT upshift is below the optimum engine speed. As WOT shifts are repeated, the PCM learns the time required to complete the shifts by comparing the engine speed when the shifts occur to the optimum speed. After each shift, the PCM adjusts the shift point until the optimum speed is reached. The PCM also considers vehicle loading, grade and engine performance changes due to high altitude in determining when to make WOT shifts. It does this by measuring vehicle and engine acceleration and then factoring in the shift time.

Normal Operation — Normal operation is refined through the increased computing power of the PCM and through access to data on engine operating conditions provided by the PCM. This facilitated the development of a load adaptive shift strategy — the ability to alter the shift schedule in response to vehicle load conditions. One manifestation of this capability is grade "hunting" prevention — the ability of the transmission logic to delay an upshift on a grade if the engine does not have sufficient power to maintain speed in the higher gear. The 3-2 downshift and the potential for hunting between gears occurs with a heavily loaded vehicle or on steep grades. When hunting occurs, it is very objectionable because shifts are frequent and accompanied by large changes in noise and acceleration.

GOVERNOR OPERATION

The electronic governor control system replaces the old centrifugal governor pressure control and is located on the valve body. The control system uses a governor pressure solenoid that can vary pressure, a pressure sensor, and the output shaft speed sensor. The electronic governor control system regulates pressure to control shifts in the first three gears. Output shaft speed and throttle position is used to determine target pressure. Actual governor pressure is read from the sensor and the difference between the target pressure and actual pressure is used to determine duty cycle correction. The duty cycle is the amount of time the governor pressure solenoid needs to be off to meet the target pressure. Output shaft speed, throttle position, controller calculations, and shift lever position, all determine different governor pressure curves. Governor pressures can be different at the same output shaft speed. The desired governor pressure is determined by many things; including the acceleration of the vehicle. There is no need for concern if the same output shaft speed has different requested pressures. There is a need for concern if the target pressure and actual pressure are not within three PSI for five seconds or more. If this occurs the control system could result in erratic shifting. The only time the governor control system stays at zero is when the gear selector is in park, neutral, reverse or drive with the vehicle at a stop. When the transmission is in park, neutral, or reverse no line pressure is supplied to the governor pressure solenoid, making governor pressure zero.

TRANSMISSION TEMPERATURE SENSOR

Transmission fluid temperature readings are supplied to the PCM by the trans temp sensor. The temp sensor is located in the governor pressure sensor connector. The temperature readings are used to control engagement of the overdrive clutch, the converter clutch, and governor pressure. Normal resistance value for the thermistor at room temperature is approximately 1000 ohms. The powertrain control module (PCM) prevents engagement of the converter clutch and overdrive clutch, when fluid temperature is below approximately 30°F. If fluid temperature exceeds 260°F, the PCM will cause a 4-3 downshift and engage the converter clutch. Engagement is according to the third gear converter clutch engagement schedule.

The overdrive OFF lamp in the instrument panel, also illuminates when the shift back to third occurs. The transmission will not allow fourth gear operation until fluid temperature decreases to approximately 230°F.

TRANSMISSION OUTPUT SHAFT SPEED SENSOR

The output shaft speed sensor is located in the overdrive housing. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed. Speed sensor signals are triggered by the park gear lugs as they rotate past the sensor pickup face. One revolution of the output shaft produces 23 pulses. Input signals from the sensor are sent to the PCM for processing.

TORQUE CONVERTER ELECTRONICS

The torque converter contains a converter clutch mechanism. The converter clutch is an electronically controlled mechanism. It is engaged in fourth gear, and in third gear only when the overdrive control switch is in the OFF position, and also, in third gear over temp mode. The torque converter is not a serviceable component. It should be replaced as an assembly when: diagnosis indicates a malfunction has occurred, or when a major malfunction allows debris to enter the converter.

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 (Generator Source +). All others, the Generator 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. Battery temperature is determined either by IAT, Ambient or Battery temperature sensor. This temperature along with sensed line voltage is used by the PCM to vary battery charging. This is accomplished by cycling the path to ground to the other generator field terminal (Generator field driver).

SPEED CONTROL

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

FUEL VAPOR RECOVERY SYSTEM (DUTY CYCLE PURGE CONTROL) GAS ENGINE

Duty Cycle Purge is a system that feeds fuel gases from the purge canister and gasoline tank into the throttle body for mixing with incoming air. Metering of the gases is performed by duty cycling the purge solenoid by the PCM.

The system is disabled during wide-open throttle conditions and while the engine is below a specified coolant temperature. When engine temperature becomes greater than a calibrated parameter, duty cycle purge is delayed for a calibrated time. Once purge delay is over, purge will be ramped in to soften the effect of dumping additional fuel into the engine.

The PCM provides a modulated 5 Hz signal (at closed throttle) or 10 Hz signal (at open throttle) to control this system. Modulation of the signal is based upon a calculated air flow (based upon known fuel flow through the injector at a given pulse width and RPM) and is adjusted to compensate for changes in flow due to varying engine vacuum.

LEAK DETECTION PUMP

LEAK DETECTION PUMP OPERATION

The evaporative emission system is designed to prevent the escape of fuel vapors from the fuel system. Leaks in the system, even small ones, can allow fuel vapors to escape into the atmosphere. Government regulations require onboard testing to make sure that the evaporative (EVAP) system is functioning properly. The leak detection system tests for EVAP system leaks and blockage. It also performs self-diagnostics. During self-diagnostics, the Powertrain Control Module (PCM) first checks the Leak Detection Pump (LDP) for electrical and mechanical faults. If the first checks pass, the PCM then uses the LDP to seal the vent valve and pump air into the system to pressurize it. If a leak is present, the PCM will continue pumping the LDP to replace the air that leaks out. The PCM determines the size of the leak based on how fast/long it must pump the LDP as it tries to maintain pressure in the system.

EVAP LEAK DETECTION SYSTEM COMPONENTS (FIGURE 1)

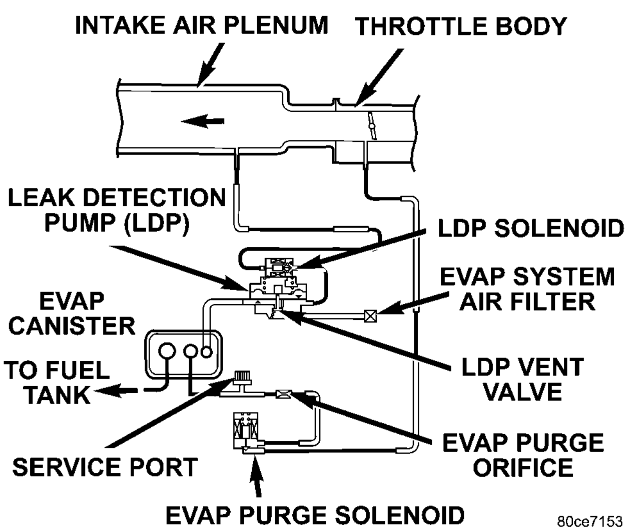
Service Port: Used with special tools like the Miller Evaporative Emissions Leak Detector (EELD) to test for leaks in the system.

EVAP Purge Solenoid: The PCM uses the EVAP purge solenoid to control purging of excess fuel vapors stored in the EVAP canister. It remains closed during leak testing to prevent loss of pressure.

EVAP Canister: The EVAP canister stores fuel vapors from the fuel tank for purging.

EVAP Purge Orifice: Limits purge volume.

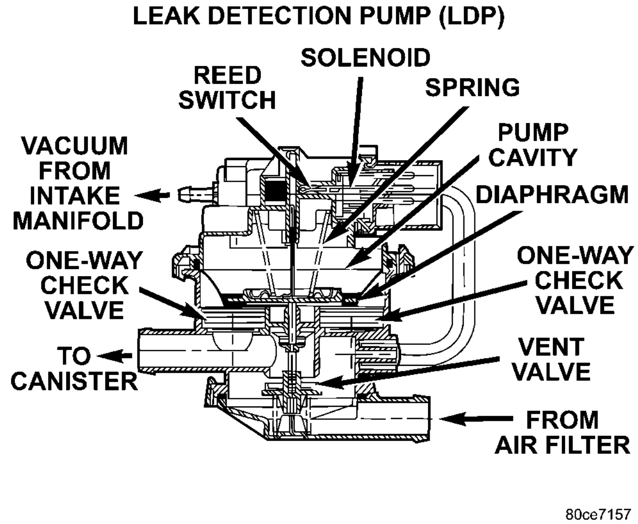
EVAP System Air Filter: Provides air to the LDP for pressurizing the system. It filters out dirt while allowing a vent to atmosphere for the EVAP system.



LEAK DETECTION PUMP (LDP) COMPONENTS

The main purpose of the LDP is to pressurize the fuel system for leak checking. It closes the EVAP system vent to atmospheric pressure so the system can be pressurized for leak testing. The diaphragm is powered by engine vacuum. It pumps air into the EVAP system to develop a pressure of about 7.5″ H_2O (1/4) psi. A reed switch in the LDP allows the PCM to monitor the position of the LDP diaphragm. The PCM uses the reed switch input to monitor how fast the LDP is pumping air into the EVAP system. This allows detection of leaks and blockage.

The LDP assembly consists of several parts (Figure 2). The solenoid is controlled by the PCM, and it connects the upper pump cavity to either engine vacuum or atmospheric pressure. A vent valve closes the EVAP system to atmosphere, sealing the system during leak testing. The pump section of the LDP consists of a diaphragm that moves up and down to bring air in through the air filter and inlet check valve, and pump it out through an outlet check valve into the EVAP system.



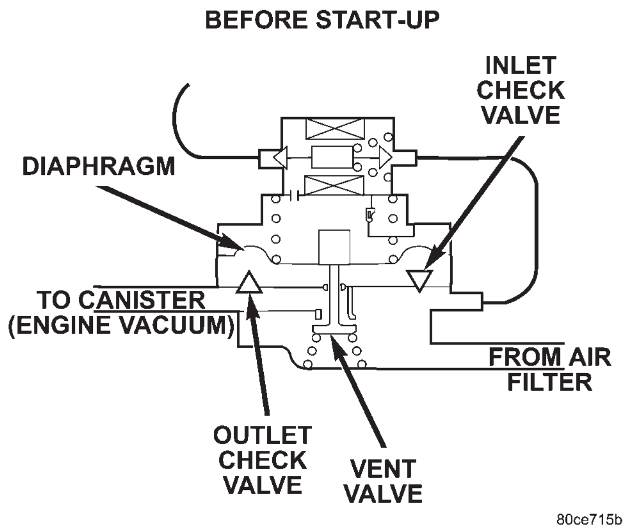
The diaphragm is pulled up by engine vacuum, and pushed down by spring pressure, as the LDP solenoid turns on and off. The LDP also has a magnetic reed switch to signal diaphragm position to the PCM. When the diaphragm is down, the switch is closed, which sends a 12 V (system voltage) signal to the PCM. When the diaphragm is up, the switch is open, and there is no voltage sent to the PCM. This allows the PCM to monitor LDP pumping action as it turns the LDP solenoid on and off.

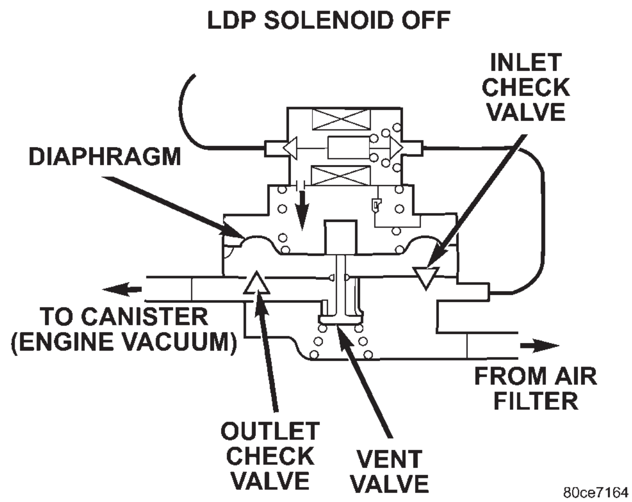
LDP AT REST (NOT POWERED)

When the LDP is at rest (no electrical/vacuum) the diaphragm is allowed to drop down if the internal (EVAP system) pressure is not greater than the return spring. The LDP solenoid blocks the engine vacuum port and opens the atmospheric pressure port connected through the EVAP system air filter. The vent valve is held open by the diaphragm. This allows the canister to see atmospheric pressure (Figure 3).

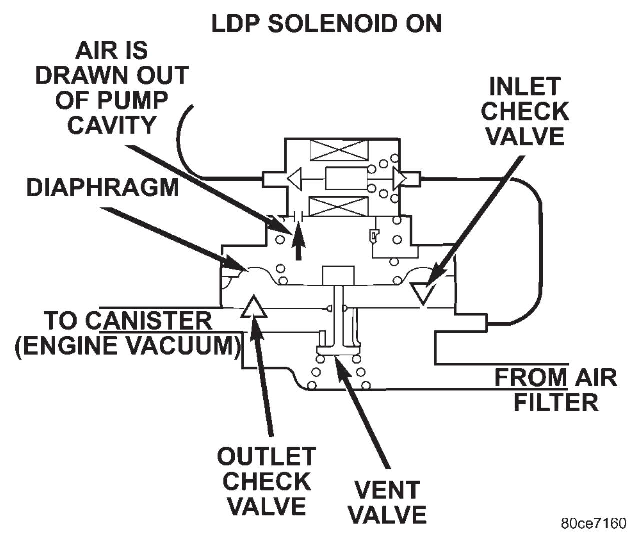
DIAPHRAGM UPWARD MOVEMENT

When the PCM energizes the LDP solenoid, the solenoid blocks the atmospheric port leading through the EVAP air filter and at the same time opens the engine vacuum port to the pump cavity above the diaphragm. The diaphragm moves upward when vacuum above the diaphragm exceeds spring force. This upward movement closes the vent valve. It also causes low pressure below the diaphragm, unseating the inlet check valve and allow-





ing air in from the EVAP air filter. When the diaphragm completes its upward movement, the LDP reed switch turns from closed to open (Figure 4).



DIAPHRAGM DOWNWARD MOVEMENT

Based on reed switch input, the PCM de-energizes the LDP solenoid, causing it to block the vacuum port, and open the atmospheric port. This connects the upper pump cavity to atmosphere through the EVAP air filter. The spring is now able to push the diaphragm down. The downward movement of the diaphragm closes the inlet check valve and opens the outlet check valve pumping air into the evaporative system. The LDP reed switch turns from open to closed, allowing the PCM to monitor LDP pumping (diaphragm up/down) activity (Figure 5). During the pumping mode, the diaphragm will not move down far enough to open the vent valve.

The pumping cycle is repeated as the solenoid is turned on and off. When the evaporative system begins to pressurize, the pressure on the bottom of the diaphragm will begin to oppose the spring pressure, slowing the pumping action. The PCM watches the time from when the solenoid is de-energized, until the diaphragm drops down far enough for the reed switch to change from opened to closed. If the reed switch changes too quickly, a leak may be indicated. The longer it takes the reed switch to change state, the tighter the evaporative system is sealed. If the system pressurizes too quickly, a restriction somewhere in the EVAP system may be indicated.

PUMPING ACTION

During portions of this test, the PCM uses the reed switch to monitor diaphragm movement. The solenoid is only turned on by the PCM after the reed switch changes from open to closed, indicating that the diaphragm has moved down. At other times during the test, the PCM will rapidly cycle the LDP solenoid on and off to quickly pressurize the system. During rapid cycling, the diaphragm will not move enough to change the reed switch state. In the state of rapid cycling, the PCM will use a fixed time interval to cycle the solenoid.

If the system does not pass the EVAP Leak Detection Test, the following DTCs may be set:

- P0442 – EVAP LEAK MONITOR 0.040″ LEAK DETECTED
- P0455 – EVAP LEAK MONITOR LARGE LEAK DETECTED
- P0456 – EVAP LEAK MONITOR 0.020″ LEAK DETECTED
- P1486 – EVAP LEAK MON PINCHED HOSE FOUND
- P1494 – LEAK DETECTION PUMP SW OR MECH FAULT
- P1495 – LEAK DETECTION PUMP SOLENOID CIRCUIT

ENABLING CONDITIONS TO RUN EVAP LEAK DETECTION TEST

1. Cold start: with ambient temperature (obtained from modeling the inlet air temperature sensor on passenger vehicles and the battery temperature sensor on Jeep & truck vehicles) between 4°C (40°F) and 32°C (90°F) for 0.040 leak. Between 4°C (40°F) and 29°C (85°F) for 0.020 leak.
2. Engine coolant temperature within: -12° to -8°C (10° to 18°F) of battery/ambient.
3. Battery voltage between 10 and 15 volts.

NOTE: If battery voltage drops below 10 volts for more than 5 seconds during engine cranking, the EVAP Leak Detection Test will not run.

4. Low fuel warning light off (fuel level must be between 15% and 85%).
5. MAP sensor reading 22 in Hg or above (This is the manifold absolute pressure, not vacuum).
6. No engine stall during test.

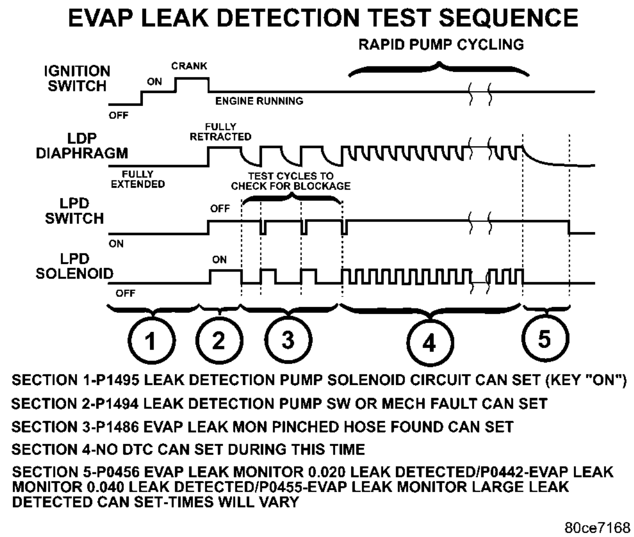
NOTE: The following values are approximate and vehicle specific. Use the values seen in pre test/monitor test screen on the DRBIII®. See TSB 25-02-98 for more detail.

A DTC will not set if a one-trip fault is set or if the MIL is illuminated for any of the following:

- Purge Solenoid
- All engine Controller Self Test Faults
- All Cam and/or Crank Sensor Faults
- MAP Sensor Faults
- Ambient/Battery Temperature Sensor Electrical Faults
- All Coolant Sensor Faults
- All TPS Faults
- LDP Pressure Switch Faults
- EGR Solenoid Electrical Faults
- All Injector Faults
- Baro Out Of Range
- Vehicle Speed Faults
- LDP Solenoid Circuit

FIGURE 6 SECTION 1

When the ignition key is turned to “ON”, the LDP diaphragm should be in the down position and the LDP reed switch should be closed. If the EVAP system has residual pressure, the LDP diaphragm may be up. This could result in the LDP reed switch being open when the key is turned to “ON” and a P1494 fault could be set because the PCM is expecting the reed switch to be closed.



After the key is turned “ON”, the PCM immediately tests the LDP solenoid circuit for electrical faults. If a fault is detected, DTC P1495 will set, the MIL will illuminate, and the remaining EVAP Leak Detection Test is cancelled.

NOTE: If battery temperature is not within range, or if the engine coolant temperature is not within a specified range of the battery temperature, the PCM will not run tests for DTC P1494, P1486, P0442, P0455 and P0441. These temperature calibrations may be different between models.

FIGURE 6 SECTION 2

If DTC P1495 is not set, the PCM will check for DTC P1494. If the LDP reed switch was closed when the key was turned to “ON”, the PCM energizes the LDP solenoid for up to 8 seconds and monitors the LDP switch. As the LDP diaphragm is pulled up by engine vacuum, the LDP reed switch should change from closed to open. If it does not, the PCM sets a temporary fault (P1494) in memory, and waits until the next time the Enabling Conditions are met to run the test again. If this is again detected, P1494 is stored and the MIL is illuminated. If the problem is not detected during the next enabling cycle, the temporary fault will be cleared.

However, if the PCM detects the reed switch open when the key is turned to “ON”, the PCM must determine if this condition is due to residual pressure in the EVAP system, or an actual fault. The PCM stores information in memory on EVAP system purging from previous engine run or drive cycles.

If little or no purging took place, residual pressure could be holding the LDP diaphragm up, causing the LDP switch to be open. Since this is not a malfunction, the PCM cancels the EVAP Leak Detection Test without setting the temporary fault.

If there was sufficient purging during the previous cycle to eliminate EVAP system pressure, the PCM judges that this is a malfunction and sets a temporary fault in memory. The next time that the Enabling Conditions are met, the test will run again. If the fault is again detected, the MIL will illuminate and DTC 1494 will be stored. If the fault is not detected, the temporary fault will be cleared.

FIGURE 6 SECTION 3

If no fault has been detected so far, the PCM begins testing for possible blockage in the EVAP system between the LDP and the fuel tank. This is done by monitoring the time required for the LDP to pump air into the EVAP system during two to three pump cycles. If no blockage is present, the LDP diaphragm is able to quickly pump air out of the LDP each time the PCM turns off the LDP solenoid. If a blockage is present, the PCM detects that the LDP takes longer to complete each pump cycle. If the pump cycles take longer than expected (approximately 6 to 10 seconds) the PCM will suspect a blockage. On the next drive when Enabling Conditions are met, the test will run again. If blockage is again detected, P1486 is stored, and the MIL is illuminated.

FIGURE 6 SECTION 4

After the LDP blockage tests are completed, the PCM then tests for EVAP system leakage. First, the PCM commands the LDP to rapidly pump for 20 to 50 seconds (depending on fuel level) to build pressure in the EVAP system. This evaluates the system to see if it can be sufficiently pressurized. This evaluation (rapid pump cycling) may occur several times prior to leak checking. The LDP reed switch does not close and open during rapid pumping because the diaphragm does not travel through its full range during this part of the test.

FIGURE 6 SECTION 5

Next, the PCM performs one or more test cycles by monitoring the time required for the LDP reed switch to close (diaphragm to drop) after the LDP solenoid is turned off.

If the switch does not close, or closes after a long delay, it means that the system does not have any significant leakage and the EVAP Leak Detection Test is complete.

However, if the LDP reed switch closes quickly, there may be a leak or the fuel level may be low enough that the LDP must pump more to finish pressurizing the EVAP system. In this case, the PCM will rapidly pump the LDP again to build pressure in the EVAP system, and follow that by monitoring the time needed for several LDP test cycles. This process of rapid pumping followed by several LDP test cycles may repeat several times before the PCM judges that a leak is present.

When leaks are present, the LDP test cycle time will be inversely proportional to the size of the leak. The larger the leak, the shorter the test cycle time. The smaller the leak, the longer the test cycle time. DTC's may be set when a leak as small as 0.5 mm (0.020″) diameter is present.

If the system detects a leak, a temporary fault will be stored in PCM memory. The time it takes to detect a .020, .040, or larger leak is based on calibrations that vary from model to model. The important point to remember is if a leak is again detected on the next EVAP Leak Detection Test, the MIL will illuminate and a DTC will be stored based on the size of leak detected. If no leak is detected during the next test, the temporary fault will be cleared.

DIAGNOSTIC TIPS

During diagnosis, you can compare the LDP solenoid activity with the monitor sequence in Figure 6. If the PCM detects a problem that could set a DTC, the testing is halted and LDP solenoid activity will stop. As each section of the test begins, it indicates that the previous section passed successfully. By watching to see which tests complete, you can see if any conditions are present that the PCM considers abnormal.

For example, if the LDP solenoid is energized for the test cycles to test for blockage (P1486), it means that the LDP has already passed its test for P1494. Then, if the PCM detects a possible blockage, it will set a temporary fault without turning on the MIL and continue the leak portion of the test. However, the PCM will assume that the system is already pressurized and skip the rapid pump cycles.

Always diagnose leaks, if possible, before disconnecting connections. Disconnecting connections may mask a leak condition.

Keep in mind that if the purge solenoid seat is leaking, it could go undetected since the leak would end up in the intake manifold. Disconnect the purge solenoid at the manifold when leak checking. In addition, a pinched hose fault (P1486) could set if the purge solenoid does not purge the fuel system properly (blocked seat). The purge solenoid must vent the fuel system prior to the LDP system test. If the purge solenoid cannot properly vent the system the LDP cannot properly complete the test for P1486 and this fault can be set due to pressure being in the EVAP system during the test sequence.

Multiple actuation's of the DRBIII® Leak Detection Pump (LDP) Monitor Test can hide a 0.020 leak because of excess vapor generation. Additionally, any source for additional vapor generation can hide a small leak in the EVAP system. Excess vapor generation can delay the fall of the LDP diaphragm thus hiding the small leak. An example of this condition could be bringing a cold vehicle into a warm shop for testing for high ambient temperatures.

Fully plugged and partially plugged underhood vacuum lines have been known to set MIL conditions. P1494 and P0456 can be set for this reason. Always, thoroughly, check plumbing for pinches or blockage before condemning components.

TEST EQUIPMENT

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

IMPORTANT

Be sure that the PCM has the latest software update. Reprogram as indicated by any applicable Technical Service Bulletin. After LDP repairs are completed, verify the repair by running the DRBIII® Leak Detection Pump (LDP) Monitor Test as described in Technical Service Bulletin 18-12-99.

3.2.5 NON-MONITORED CIRCUITS

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

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

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

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

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

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

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

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

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

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

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

3.2.6 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is an immobilizer system designed to prevent unauthorized vehicle operation. The system consists of Sentry Key Immobilizer Module (SKIM) sends a PCI Bus message to the engine controller indicating ignition key status. Upon receiving this message the PCM will terminate engine operation or allow the engine to continue to operate.

3.2.7 SKIM ON-BOARD DIAGNOSTICS

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

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

3.2.8 SKIS OPERATION

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

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

Challenge - This is a random number that is generated by the SKIM at each ignition key cycle. The secret key and challenge are the two variables used in the algorithm that produces the 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 ID message to the SKIM. The SKIM compares the transponder ID to the available valid ignition key codes in the SKIM memory (8 key maximum). After validating the key, the SKIM sends a PCI Bus message called a “Seed Request” to the engine controller then waits for a PCM response. If the PCM does not respond, the SKIM will send the seed request again. After three failed attempts, the SKIM will stop sending the seed request and store a trouble code. If the PCM sends a seed response, the SKIM sends a valid/invalid key message to the PCM. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number

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

The VIN and seed are the two variables used in the rolling code algorithm that encrypts the “valid/invalid key” message. The PCM uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by the SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for a PCM status message from the PCM. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code is stored. The SKIS incorporates a 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 PCI Bus message to the instrument cluster requesting the lamp on. The SKIM will request warning lamp illumination for:

– 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 two seconds) up to six times. After the sixth attempt the PCM will not allow engine to start.

3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

Important Notice: 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 shorted 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 ID code that is unique to each SKIS. This code is programmed and stored in the SKIM, PCM 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).

3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

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

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

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

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

3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/ neutral).
2. Use the DRBIII® and select "THEFT ALARM", "SKIM" then "MISCELLANEOUS".
3. Slect "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, the key cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRBIII® will display one of the following messages:

Programming Not Attempted - The DRBIII® attempts to read the programmed key status and there are not 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.

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

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

3.3 DIAGNOSTIC TROUBLE CODES

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

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

3.3.1 HARD CODE

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

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

3.3.2 INTERMITTENT CODE

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

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any S.T.A.R. Hotline Newsletters or technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.

3.3.3 STARTS SINCE SET COUNTER

This reset counter counts the number of times the vehicle has been started since codes were last set or erased. This counter will count up to 255 start counts.

The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRBIII® as STARTS since set.

When there are no trouble codes stored in memory, the DRBIII® will display “NO TROUBLE CODES FOUND” and the reset counter will show “STARTS since set = XXX.”

OBDII/EUROIII vehicles will also display a DTC Specific or Global “Good Trip” counter which will indicate the number of “Good Trips” since the DTC was set. After 3 consecutive “Good Trips,” the MIL is extinguished and the good trip counter is replaced by a “Warm Up Cycle” counter. 40 Warm-up Cycles will erase the DTC and Freeze Frame information.

DISTANCE SINCE MI SET (Euro III)

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

1. If the MI is illuminated due to a fault, the distance count is updated (i.e. it is counting).
2. If there is a stale MI fault (i.e. the fault is still frozen in memory but the MI has been extinguished due to 3 good trips), the distance count is held (i.e. frozen).
3. If the distance count is being held due to (Item 2.) and the fault is cleared, the distance is cleared (set to zero).
4. If the distance count is being held due to (Item 2.) and another MI occurs, the distance count is reset (to 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 is off (because it is not yet a matured fault).
8. The distance count is cleared whenever the fault is cleared. (Via 40 warm up cycles, or via scan tool).

3.3.4 NO START INFORMATION

IMPORTANT NOTE:

If the Powertrain Control Module has 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 codes in ABS and Air Bag modules.

FOR SKIM THEFT ALARM:

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

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

3.4 USING THE DRBIII®

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

3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

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

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

```
ver: 2.29
date: 1 Oct 93
file: key_itf.cc
date: Jan 12 1994
line: 544
err: 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 Oct 99
file: key HND1.CC
date: Mar 8 2000
line: 1297
err: 0x1
User-Requested COLD Boot

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

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

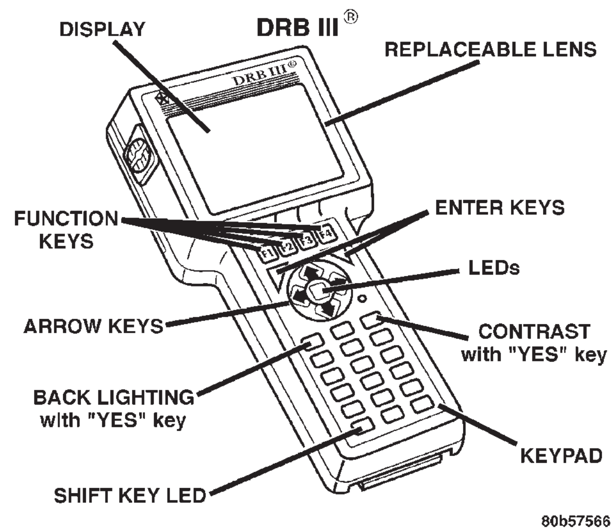
3.5.1 DRBIII® DOES NOT POWER UP

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

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of 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 sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

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

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

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

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

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- A 10A fuse or circuit breaker must be used to protect the circuit being tested.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

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

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

4.3.2 VEHICLE DAMAGE 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 end (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage the insulation and wire and eventually cause it to fail because of corrosion.

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

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool
Evaporative Emissions Leak Detector #8404
Fuel pressure kit #8978
fuel filler adapter #8382
fuel pressure adapter (C-6631) or #6539
fuel pressure kit (C-4799-B) or #5069
fuel release hose (C-4799-1)
min air flow fitting #6714
Mirco 420 battery system tester
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
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 ACRONYMS

A/C	Air Conditioning
ABS	Anti-lock Brake System
ASD Relay	Auto Shutdown Relay
APPS	Accelerator Pedal Position Sensor
Baro	Barometric Pressure
BCM	Body Control Module
BTS	Battery Temperature Sensor
CAA	Clean Air Act
CAB	Controller Antilock Brakes
CARB	California Air Resources Board
CCD Bus	Chrysler Collision Detection Bus
CKP Sensor	Crankshaft Position Sensor
CMP Sensor	Camshaft Position Sensor
CO	Carbon Monoxide
DCP Solenoid	Duty-Cycle Purge Solenoid
DLC	Data Link Connector
DRBIII®	Diagnostic Readout Box – 3rd Generation
DTC	Diagnostic Trouble Code
DVOM	Digital Volt Ohm Meter
EATX II	Electronic Automatic Transmission Controller 2nd Generation
EC	European Community
ECT Sensor	Engine Coolant Temperature Sensor
EE-PROM	Electrically Erasable Programmable Read Only Memory
EGR Valve	Exhaust Gas Recirculation Valve
EMCC	Electronically Modulated Converter Clutch
EMI	Electro-Magnetic Interference
EOBD	European OBD (based upon Euro Stage III)
EPA	Environmental Protection Agency
EPP	Engine Position Pulse
EU	European Union
EVAP	Evaporative Emission System
EVR	Electronic Voltage Regulator
EWMA	Exponentially Weighted Moving Average
FTP	Federal Test Procedure
HC	Hydrocarbons
HO2S	Heated Oxygen Sensor
Generator	Previously called “alternator”
IAC Motor	Idle Air Control Motor
IAT Sensor	Intake Air Temperature Sensor
I/M	Inspection and Maintenance Testing

JTEC	Jeep/Truck Engine Controller
LDP	Leak Detection Pump
LSIACV	Linear Solenoid Idle Air Control Valve
MAF	Mass Air Flow
MAP Sensor	Manifold Absolute Pressure Sensor
MDS_2®	Mopar Diagnostic System 2^{nd} Generation
MIL	Malfunction Indicator Lamp
MTV	Manifold Tuning Valve
NGC	Next Generation Controller
NTC	Negative Temperature Coefficient
NVLD	Natural Vacuum Leak Detection
O_2 Sensor	Oxygen Sensor
O2S	Oxygen Sensor
OBD I	On-Board Diagnostics 1^{st} Generation
OBD II	On-Board Diagnostics 2^{nd} Generation
ORVR	On-Board Refueling Vapor Recovery
PCI BUS	Programmable Communications Interface Bus (J1850)
PCM	Powertrain Control Module
PCV	Positive Crankcase Ventilation
PDC	Power Distribution Center
PEP	Peripheral Expansion Port
P/N	Park/Neutral
PPS	Proportional Purge Solenoid
PS	Power Steering
PSP	Power Steering Pressure (Switch)
PTC	Positive Temperature Coefficient
PWM	Pulse-Width Modulation
RAM	Random Access Memory
RFI	Radio Frequency Interference
RKE	Remote Keyless Entry
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SBEC	Single Board Engine Controller
SCW	Similar Conditions Window
SKIM	Sentry Key Immobilizer Module
SRV	Short Runner Valve
TCC	Torque Converter Clutch
TCM	Transmission Control Module
TDC	Top Dead Center
TPS	Throttle Position Sensor
TRS	Transmission Range Sensor
VSS	Vehicle Speed Sensor
WOT	Wide Open Throttle

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

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

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRBIII®, enter Body then Body Computer. With the DRBIII®, enter Anti-Lock Brakes. With the DRBIII®, enter Body then Electro/Mechanical Cluster (MIC). With the DRBIII®, enter Passive Restraints then Airbag. Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (PCI BUS) - GAS ONLY — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII® read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (SCI only) symptom path.** **NOTE: If the vehicle will not start and the DRBIII® displays a no response message, refer to the appropriate symptom in the powertrain diagnostic procedures.** Turn the ignition off. Disconnect the PCM C3 harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRBIII®. Attach the red and black leads and the cable to probe adapter to the scope input cable. Install DRBIII® SuperCard 2 CH8361 into DRBIII®. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCI Bus circuit in the PCM connector. Turn the ignition on. Observe the voltage display on the DRBIII® Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

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

POSSIBLE CAUSES
CHECK PCM POWERS AND GROUNDS
SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
SCI RECEIVE CIRCUIT SHORTED TO VOLTAGE
TRANSMISSION CONTROL MODULE
SCI CIRCUITS SHORTED TOGETHER
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	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the TCM harness connector (if equipped). **NOTE: If vehicle is not equipped with a TCM, answer yes to the question.** 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 Transmission Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

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

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Disconnect the TCM harness connector (if equipped). Turn the ignition on. Measure the voltage of the SCI Transmit circuit. Is the voltage above 1.0 volt? Yes → Repair the SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Turn the ignition on. Measure the voltage of the SCI Receive circuit. Is the voltage above 1.0 volt? Yes → Repair the SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Measure the resistance between the SCI Transmit circuit and the SCI Receive circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the SCI Transmit and the SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRBIII® 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 8	All
8	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRBIII® 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 9 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

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

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the PCM C3 harness connector. Disconnect the DRBIII® 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 10 No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE

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

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

*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE — Continued

TEST	ACTION	APPLICABILITY
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the SKIM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the SKIM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Go To 6 No → Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

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

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

*PCI BUS COMMUNICATION FAILURE — Continued

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

Symptom:
INTERMITTENT CONDITION

POSSIBLE CAUSES
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSBs) that may apply. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set. Turn the ignition off. Visually inspect the related wire harness. Disconnect all the related harness connectors. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals. Perform a voltage drop test on the related circuits between the suspected faulty component and the PCM. Inspect and clean all PCM, engine, and chassis grounds that are related to the most current DTC. If numerous trouble codes were set, use a wire schematic and look for any common ground or supply circuits For any Relay DTCs, actuate the Relay with the DRBIII® and wiggle the related wire harness to try to interrupt the actuation. For intermittent Evaporative Emission trouble codes perform a visual and physical inspection of the related parts including hoses and the Fuel Filler cap. For intermittent Misfire DTC's check for restrictions in the Intake and Exhaust system, proper installation of Sensors, vacuum leaks, and binding components that are run by the accessory drive belt. Use the DRBIII® to perform a System Test if one applies to failing component. A co-pilot, data recorder, and/or lab scope should be used to help diagnose intermittent conditions. Were any problems found during the above inspections? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW
P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH
P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW
P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH
P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW
P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH

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

When Monitored and Set Condition:

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW

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

Set Condition: Desired state does not match Actual state.

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH

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

Set Condition: Desired state does not equal Actual state.

P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW

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

Set Condition: Desired state does not equal Actual state.

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH

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

Set Condition: Desired state does not equal Actual state.

P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW

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

Set Condition: Desired state does not equal Actual state.

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH

When Monitored: Battery voltage above 10.6 volts, ECT below a certain Temp but within a set Temperature difference of Battery temp sensor.

Set Condition: Desired state does not equal Actual state.

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

POSSIBLE CAUSES
O2 HEATER TEST
O2 SENSOR HEATER ELEMENT
(F142) FUSED ASD RELAY OUTPUT CIRCUIT OPEN
HEATER CONTROL CIRCUIT OPEN
HEATER CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, actuate the O2 Heater test. Monitor the O2 Heater Voltage for 5 minutes. Did the voltage drop down close to zero during the Heater test? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2 **NOTE: Stop the actuation before continuing.**	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Heater element at the O2 Sensor connector(component side). The resistance value for a 4.0L O2 Heater element is 4.0 to 5.0 ohms and 12.1 to 14.8 ohms for a 4.7L O2 Heater element at 70°F (21.1°C). **NOTE: The resistance value will increase with warmer temperatures.** Is the resistance within the listed specifications? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Ignition on, engine not running, and the O2 Sensor harness connector still disconnected. With the DRBIII®, actuate the O2 Heater Test. Using a 12-volt test light connected to ground, probe the voltage on the (F142) Fused ASD Relay Output/O2 Heater Supply circuit at the O2 Sensor harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open in the (F142) Fused ASD Relay/O2 Heater Supply circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Stop the actuation before continuing.**	All

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

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the O2 Heater Control circuit (PWM) from the O2 Sensor to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the excessive resistance in the PWM Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the O2 Heater Control (PWM) circuit at the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Heater Control (PWM) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0071-AMBIENT/BATTERY TEMP SENSOR PERFORMANCE

When Monitored and Set Condition:

P0071-AMBIENT/BATTERY TEMP SENSOR PERFORMANCE

When Monitored: With the ignition on and no Battery Temperature Sensor Open or Short Faults present.

Set Condition: After 5 warm cycles have occurred (coolant increases at least 22°C (40°F) to a minimum of 71°C (160°F) and the odometer mileage has increased 196.6 miles and the Battery Temperature has changed less than 4°C (7.2°F) change in temperature. One trip fault.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(K118) BATTERY TEMP SIGNAL CIRCUIT SHORTED TO VOLTAGE
BATTERY TEMPERATURE SENSOR
RESISTANCE IN THE (K118) BATTERY TEMP SENSOR SIGNAL CIRCUIT
RESISTANCE IN THE (K4) SENSOR GROUND CIRCUIT
(K118) BATTERY TEMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K118) Battery Temp Signal circuit in the Sensor connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage on the (K118) Batt Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0071-AMBIENT/BATTERY TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read the Battery Temp Sensor voltage with the Batt Temp Sensor still disconnected. Is the voltage above 4.6 volts? Yes → Go To 4 No → Go To 7	All
4	Connect a jumper wire between the (K118) Battery Temp Signal circuit and the (K4) Sensor ground circuit at the Sensor harness connector. With the DRBIII®, read the Battery Temp Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Remove the jumper wire before continuing.**	All
5	Turn the ignition off. Connect the Battery Temp Sensor harness connector. **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 the (K118) Battery Temp Sensor Signal circuit at the Sensor harness connector and the PCM harness connector with both voltmeter leads. Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 6 No → Repair the excessive resistance in the (K118) BatteryTemp Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **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 the (K4) Sensor ground circuit at the Battery Temperature Sensor harness connector and the PCM harness connector using both volt meter leads. Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 8 No → Repair the excessive resistance in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0071-AMBIENT/BATTERY TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K118) Battery Temp Signal circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0107-MAP SENSOR 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 of a volt for 2.0 seconds with the engine running.

POSSIBLE CAUSES
MAP SENSOR VOLTAGE BELOW 0.1 OF A VOLT
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO THE (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 0.1 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, monitor the MAP Sensor voltage with the ignition on and Map Sensor still disconnected. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K1) MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Measure the resistance between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground and the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance in the (K7) 5-volt Supply circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 100 ohms? Yes → Go To 7 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0108-MAP SENSOR 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 volts, 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
MAP SENSOR VOLTAGE ABOVE 4.8 VOLTS
MAP SENSOR
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K1) MAP SENSOR SIGNAL CIRCUIT OPEN
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO (K7) 5-VOLT SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit in the Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K1) MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (K1) MAP Sensor Signal circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K1) MAP Sensor Signal circuit and the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K7) 5-volt Supply circuit and the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Measure the resistance of the (K4) Sensor ground circuit from the PCM harness connector to the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Go To 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0111-INTAKE AIR TEMP SENSOR PERFORMANCE

When Monitored and Set Condition:

P0111-INTAKE AIR TEMP SENSOR PERFORMANCE

When Monitored: With the ignition on and no Intake Air Temperature Sensor open/ shorted faults present.

Set Condition: After 5 warm cycles have occurred (coolant increases at least 22°C (40°F) to a minimum of 71°C (160°F) and the odometer mileage has increased 196.6 miles and the Intake Air Temperature has had less than 5°C (9°F) change in temperature.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
IAT SENSOR
RESISTANCE IN THE (K21) IAT SENSOR SIGNAL CIRCUIT
RESISTANCE IN THE (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Intake Air Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 3 No → Go To 5	All
3	Connect a jumper wire across the IAT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the Intake Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4 **NOTE: Remove the jumper wire and connect the Sensor harness connector before continuing.**	All

P0111-INTAKE AIR TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **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** Perform a voltage drop test by back probing the (K21) IAT Sensor Signal circuit at the IAT Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 5 No → Repair the excessive resistance in the (K21) IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. **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** Perform a voltage drop test by back probing the (K4) Sensor ground circuit at the IAT Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 6 No → Repair the excessive resistance in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Turn the ignition off before continuing.**	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0112-INTAKE AIR TEMP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0112-INTAKE AIR TEMP SENSOR VOLTAGE TOO 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 of a volt.

POSSIBLE CAUSES
IAT SENSOR VOLTAGE BELOW 1.0 VOLT
IAT SENSOR
(K21) IAT SENSOR SIGNAL SHORTED TO GROUND
(K21) IAT SENSOR SIGNAL SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

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

P0112-INTAKE AIR TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K21) IAT Sensor Signal circuit and the (K4) Sensor ground circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground and the (K21) IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0113-INTAKE AIR TEMP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0113-INTAKE AIR TEMP SENSOR VOLTAGE TOO 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
IAT SENSOR VOLTAGE ABOVE 4.8 VOLTS
IAT SENSOR
(K21) IAT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K21) IAT SENSOR SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the IAT voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Connect a jumper wire between the (K21) IAT Sensor Signal circuit and the (K4) Sensor ground circuit in the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0113-INTAKE AIR TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K21) IAT Sensor Signal circuit. Is the voltage above 5.3 volts? Yes → Repair the short to voltage in the (K21) IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (K21) IAT Sensor Signal circuit from the IAT Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K21) IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance of the (K4) Sensor ground circuit from the IAT Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0117-ENGINE COOLANT TEMP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ENGINE COOLANT TEMP 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) Signal circuit voltage at the PCM goes below 0.8 of a volt for more than 3 seconds.

POSSIBLE CAUSES
ECT VOLTAGE BELOW 1.0 VOLT
ECT SENSOR
(K2) ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SENSOR SIGNAL SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

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

P0117-ENGINE COOLANT TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K2) ECT Sensor Signal circuit and the (K4) Sensor ground circuit at the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground and the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0118-ENGINE COOLANT TEMP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ENGINE COOLANT TEMP 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 4.94 volts for more than 3 seconds.

POSSIBLE CAUSES
ECT VOLTAGE ABOVE 4.9 VOLTS
ECT SENSOR
(K2) ECT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K2) ECT SENSOR SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read ECT voltage. Is the voltage above 4.9 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the ECT harness connector. Ignition on, engine not running. Connect a jumper wire between the (K2) ECT Sensor Signal circuit and the (K4) Sensor ground circuit in the ECT harness connector. With the DRBIII®, read the ECT voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0118-ENGINE COOLANT TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K2) ECT Sensor Signal circuit at the ECT Sensor harness connector. Is the voltage above 5.3 volts? Yes → Repair the short to voltage in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (K2) ECT Sensor Signal circuit from the ECT Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance of the (K4) Sensor ground circuit from the ECT Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0121-TP SENSOR VOLTAGE DOES NOT AGREE WITH MAP

When Monitored and Set Condition:

P0121-TP SENSOR 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. When the manifold vacuum is high, the TPS signal should be low. If the proper TPS voltage is not detected when the two conditions are met, a DTC will be set after 4 seconds.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
RESISTANCE IN (K7) MAP 5-VOLT SUPPLY CIRCUIT
(K7) MAP 5-VOLT SUPPLY SHORTED TO GROUND
MAP SENSOR
RESISTANCE IN THE (K1) MAP SENSOR SIGNAL CIRCUIT
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN (K4) MAP SENSOR GROUND CIRCUIT
TP SENSOR OPERATION
RESISTANCE IN (K7) TP SENSOR 5-VOLT SUPPLY CIRCUIT
(K7) TP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
THROTTLE POSITION SENSOR
RESISTANCE IN THE (K22) TP SENSOR #1 SIGNAL CIRCUIT
(K22) TP SENSOR #1 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN (K4) SENSOR GROUND CIRCUIT
PCM

P0121-TP SENSOR VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP component DTCs first before continuing.** **NOTE: If the P0500 - No Vehicle Speed Signal is set along with this DTC, refer to the P0500 diagnostics before continuing.** **NOTE: The throttle plate and linkage should be free of binding and carbon build up.** **NOTE: Ensure the throttle plate is at the idle position.** Ignition on, engine not running. **NOTE: Repair any vacuum leaks that are present before continuing.** With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Start the engine. With the DRBIII®, monitor the MAP Sensor voltage. Snap the throttle. Does the DRBIII® display MAP voltage from below 2.0 volts at idle to above 3.5 volts at WOT? Yes → Go To 3 No → Go To 10	All
3	Ignition on, engine not running. With the DRBIII®, monitor the TP Sensor voltage while slowly depressing the throttle pedal from the idle position to the wide open throttle position. Does voltage start approximately at 0.8 of a volt and go above 3.5 volts with a smooth transition? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the (K7) 5-volt Supply circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the excessive resistance in the (K7) TP Sensor 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the TPS harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) TP Sensor 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0121-TP SENSOR VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Connect the PCM harness connectors. With the DRBIII®, monitor the TP Sensor voltage. Ignition on, engine not running. Connect a jumper wire between the (K22) TP Sensor #1 Signal circuit and the (K4) Sensor ground circuit. Does the DRBIII® display TP Sensor voltage from approximately 4.9 volts to below 0.5 of a volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7 **NOTE: Remove the jumper wire before continuing.**	All
7	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K22) TP Sensor #1 Signal circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the excessive resistance in the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Measure the resistance between ground and the (K22) TP Sensor #1 Signal circuit at the TP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the short to ground in the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Measure the resistance of the (K4) Sensor ground circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the excessive resistance in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the (K7) 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 11 No → Repair the excessive resistance in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TP SENSOR VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
11	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 12 No → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Connect the PCM harness connectors. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit . Cycle the ignition switch from off to on. Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 of a volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13 **NOTE: Remove the jumper wire before continuing.**	All
13	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K1) MAP Sensor Signal 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 excessive resistance in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Measure the resistance between ground and the (K1) MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Go To 15 No → Repair the short to ground in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Measure the resistance of the (K4) Sensor ground circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the excessive resistance in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TP SENSOR VOLTAGE DOES NOT AGREE WITH MAP — Continued

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

Symptom:

P0122-THROTTLE POSITION SENSOR #1 VOLTAGE TOO LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR #1 VOLTAGE TOO LOW

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

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

POSSIBLE CAUSES
TP SENSOR SWEEP
INTERMITTENT CONDITION
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
TP SENSOR
(K22) TP SENSOR #1 SIGNAL CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR #1 SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
TCM INTERNALLY SHORTED THROTTLE POSITION SIGNAL CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 0.2 of a volt? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at the TP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All
3	Ignition on, engine not running. With the DRBIII®, monitor the TP Sensor voltage with the Sensor disconnected. Is the voltage above 4.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0122-THROTTLE POSITION SENSOR #1 VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K22) TP Sensor #1 Signal circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Measure the resistance between the (K22) TP Sensor #1 Signal circuit and the (K4) Sensor ground circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground and the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: If the vehicle is not equipped with a TCM, answer No to this test and continue.** Connect the PCM harness connectors and leave the TP Sensor disconnected. Disconnect the TCM harness connector. Ignition on, engine not running. With the DRBIII®, monitor the Throttle Position Sensor voltage. Is the voltage above 4.5 volts? Yes → Replace the Transmission Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
7	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K7) 5-volt Supply circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0122-THROTTLE POSITION SENSOR #1 VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Ignition on, engine not running. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0123-THROTTLE POSITION SENSOR #1 VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR #1 VOLTAGE TOO HIGH

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

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

POSSIBLE CAUSES
TP SENSOR SWEEP
INTERMITTENT CONDITION
TP SENSOR
(K22) TP SENSOR #1 SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K22) TP SENSOR #1 SIGNAL CIRCUIT OPEN
(K22) TP SENSOR #1 SIGNAL CIRCUIT SHORTED TO (K7) 5-VOLT SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **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. Connect a jumper wire between the (K22) TP Sensor #1 Signal circuit and the (K4) Sensor ground circuit. Ignition on, engine not running. With the DRBIII®, monitor the TP Sensor voltage. Is the voltage below 0.5 of a volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0123-THROTTLE POSITION SENSOR #1 VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Measure the voltage on the (K22) TP Sensor #1 Signal circuit at the TP Sensor harness connector. **NOTE: If the voltage reading is below 5.3 volts answer NO to this test and continue.** If the voltage is above 5.3 volts, disconnect the Clock Spring harness connectors per Service Information. With the Clock Spring harness disconnected and if the TP Sensor voltage drops to 5.0 volts, replace the Clock Spring. Is the voltage still above 5.3 volts with the Clock Spring harness disconnected? Yes → Repair the short to voltage in the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4 **NOTE: Turn the ignition off and connect the Clockspring harness connectors per Service Information before continuing.**	All
4	Disconnect the PCM harness connectors. Measure the resistance of the (K22) TP Sensor #1 Signal circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between the (K22) TP Sensor #1 Signal circuit and the (K7) 5-volt Supply circuit at the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K7) 5-volt Supply circuit and the (K22) TP Sensor #1 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Measure the resistance of the (K4) Sensor ground circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR #1 VOLTAGE TOO HIGH — Continued

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

Symptom:
P0125-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 after the engine has been running for 10 minutes. Two trips are required to set this DTC.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ECT SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
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: This test works best if performed on a cold engine (cold soak)** Ignition on, engine not running. With the DRBIII®, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F) . Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg in the 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 → Go To 4 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Ignition on, engine not running. With the DRBIII® 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 → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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

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

When Monitored and Set Condition:

P0131-O2 SENSOR 1/1 VOLTAGE TOO LOW

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 of a volt for 28 seconds after starting engine.

P0137-O2 SENSOR 1/2 VOLTAGE TOO LOW

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 of a volt for 28 seconds after starting engine.

P0151-O2 SENSOR 2/1 VOLTAGE TOO LOW

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 of a volt for 28 seconds after starting engine.

P0157-O2 SENSOR 2/2 VOLTAGE TOO LOW

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 of a volt for 28 seconds after starting engine.

POSSIBLE CAUSES
O2 SENSOR BELOW 0.16 OF A VOLT
O2 SENSOR OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
O2 SENSOR SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT

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

POSSIBLE CAUSES
O2 SENSOR SIGNAL SHORTED TO HEATER GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. Allow the engine to idle for 4 to 5 minutes. With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 0.16 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Disconnect the O2 Sensor harness connector. Start the engine. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 0.16 of a volt? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the O2 Sensor Signal circuit at the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Measure the resistance between the O2 Sensor Signal circuit and the (K4) Sensor ground circuit at the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground circuit and the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

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

TEST	ACTION	APPLICABILITY
5	**NOTE: Two types of O2 Sensor Heater Ground circuits may be used on this vehicle. One type uses an engine ground and the other type uses the PCM as a ground through the Pulse Width Modulated circuit.** * Measure the resistance between the PWM O2 Sensor Heater Control circuit and the O2 Sensor Signal circuit if it applies to the O2 Sensor being tested. OR * Measure the resistance between the O2 Sensor Signal circuit and the O2 Heater ground circuit if it applies to the O2 Sensor being tested. Is the resistance below 100 ohms? Yes → Repair the short between the O2 Sensor Signal circuit and the Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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

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

When Monitored and Set Condition:

P0132-O2 SENSOR 1/1 VOLTAGE TOO HIGH

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-O2 SENSOR 1/2 VOLTAGE TOO HIGH

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-O2 SENSOR 2/1 VOLTAGE TOO HIGH

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-O2 SENSOR 2/2 VOLTAGE TOO HIGH

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
O2 SENSOR ABOVE 1.5 VOLTS
O2 SENSOR OPERATION
O2 SENSOR SIGNAL CIRCUIT OPEN
O2 SENSOR SIGNAL CIRCUIT SHORTED TO O2 HEATER SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
O2 SENSOR HEATER CONTROL CIRCUIT OPEN
O2 SENSOR SIGNAL SHORTED TO VOLTAGE

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

POSSIBLE CAUSES
O2 SENSOR HEATER GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. Allow the engine to idle for 4 to 5 minutes. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 1.5 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Start the engine. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage below 1.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: Two relays may be used on this vehicle for the different types of Heated O2 Sensors. One uses the ASD Relay which is only used with PWM O2 Sensor Heaters and the other uses the O2 Heater Relay.** Verify which relay is used to supply power for the O2 Sensor Heater being tested. Measure the resistance between the O2 Sensor Signal circuit and the O2 Heater Supply circuit at the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the O2 Sensor Signal circuit and the (F142) ASD Relay Output or (K200) O2 Heater Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

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

TEST	ACTION	APPLICABILITY
5	Measure the resistance of the (K4) Sensor ground circuit from the O2 Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Connect the PCM harness connectors. Ignition on, engine not running. With the DRBIII® actuate the O2 Heater Test. Measure the voltage on the O2 Heater Supply circuit. Is the voltage above 11.0 volts? No → Repair the open in the O2 Sensor (PWM) Heater Control or Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the O2 Sensor Signal circuit at the O2 Sensor harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. **NOTE: The O2 Sensor Heater ground may be a Pulse Width Modulated circuit or a chassis ground depending on the type of O2 Sensor being tested.** * Measure the resistance of the PWM O2 Sensor Heater Control circuit from the O2 Sensor harness connector to the PCM harness connector if it applies to the O2 Sensor being tested OR * Measure the resistance of the O2 Sensor Heater ground circuit from the O2 Sensor harness connector to the PCM harness connector if it applies to the O2 Sensor being tested. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the O2 Sensor ground (PWM) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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

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

When Monitored and Set Condition:

P0133-O2 SENSOR 1/1 SLOW RESPONSE

When Monitored: 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 of a volt to above 0.62 of a volt and back fewer times than required.

P0139-O2 SENSOR 1/2 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 of a volt to above 0.58 of a volt and back fewer times than required.

P0153-O2 SENSOR 2/1 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 of a volt to above 0.62 of a volt and back fewer times than required.

P0159-O2 SENSOR 2/2 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 of a volt to above 0.58 of a volt and back fewer times than required.

P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
EXHAUST LEAK
RESISTANCE IN THE O2 SENSOR SIGNAL CIRCUIT
RESISTANCE IN THE (K4) SENSOR GROUND CIRCUIT
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Start the engine. Inspect the exhaust for leaks between the engine and the related 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	Turn the ignition off. Back probe the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. **NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection and are connected for positive polarity.** Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 4 No → Repair the excessive resistance in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Back probe the (K4) Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. **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** Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 5 No → Repair the excessive resistance in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Turn the ignition off before continuing.**	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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

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

When Monitored and Set Condition:

P0135-O2 SENSOR 1/1 HEATER FAILURE

When Monitored: With battery voltage greater than 10.5 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-O2 SENSOR 1/2 HEATER FAILURE

When Monitored: With battery voltage greater than 10.5 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-O2 SENSOR 2/1 HEATER FAILURE

When Monitored: With battery voltage greater than 10.5 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-O2 SENSOR 2/2 HEATER FAILURE

When Monitored: With battery voltage greater than 10.5 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.

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

P0135-O2 SENSOR 1/1 HEATER FAILURE — Continued

POSSIBLE CAUSES
HEATER CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stabilize between 0.1 and 0.3 of a volt during the Heater test? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. **NOTE: Allow the O2 Sensor to cool to room temperature.** Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. The resistance value for a 4.0L O2 Heater element is 4.0 to 5.0 ohms and 12.1 to 14.8 ohms for a 4.7L O2 Heater element at 70°F (21.1°C). **NOTE: The resistance value increases with temperature.** Is the resistance value within the listed specifications? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	**NOTE: The O2 Heater Supply circuit may be a fused ASD Relay Output or an O2 Sensor Heater Relay Output, depending on the O2 Sensor being tested.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage on the O2 Heater Supply circuit at the O2 Sensor harness connector. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open in the O2 Sensor Heater Supply cricuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-O2 SENSOR 1/1 HEATER FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Remove the O2 Heater Relay, if it applies to the O2 Sensor being tested. * Measure the resistance of the O2 Heater Control circuit (PWM) from the O2 Sensor to the PCM harness connector if it applies to the O2 Sensor being tested. OR * Measure the resistance of the (K512) O2 Heater Relay Control circuit from the O2 Heater Relay to the PCM harness connector, if it applies to the O2 Sensor being tested. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the excessive resistance in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Before beginning this test, verify what type of Heated O2 Sensor is being tested, either the PWM Heated O2 Sensor or the Heater Relay controlled Heated O2 Sensor.** * Measure the resistance between ground and the PWM circuit if it applies to the Heated O2 Sensor being tested. OR * Measure the resistance between ground and the (K512) Heater Control circuit if it applies to the Heated O2 Sensor being tested. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0136-O2 SENSOR 1/2 HEATER CIRCUIT MALFUNCTION

When Monitored and Set Condition:

P0136-O2 SENSOR 1/2 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
GOOD TRIP EQUAL TO ZERO
O2 SENSOR HEATER RELAY
(F142) FUSED ASD RELAY OUTPUT CIRCUIT
(K512) O2 HEATER RELAY CONTROL CIRCUIT OPEN
(K512) O2 HEATER RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Remove the Heater Relay from the PDC. Measurement is taken at the Heater Relay component. Measure the resistance of the O2 Sensor Heater Relay Coil. Is the resistance above 100 ohms? Yes → Replace the O2 Sensor Heater Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the (F142) Fused ASD Relay Output circuit of the O2 Heater Relay in the PDC. Does the test light illuminate brightly when the relay actuates? Yes → Go To 4 No → Repair the open or short to ground in the (F142) ASD Relay Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0136-O2 SENSOR 1/2 HEATER CIRCUIT MALFUNCTION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K512) O2 Heater Relay Control circuit from the PDC (Heater Relay) connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K512) O2 Heater Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the (K512) O2 Heater Relay Control circuit at the PDC connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K512) O2 Sensor Heater Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are not possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:
P0171-1/1 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° 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° 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
GOOD TRIP EQUAL TO ZERO
FUEL PRESSURE OUT OF SPECS
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
TP SENSOR VOLTAGE GREATER THAN 0.92 OF A VOLT WITH THROTTLE CLOSED
TP SENSOR SWEEP
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR
INTERMITTENT CONDITION
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.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49.2 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 Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **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. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49.2 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 off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor and Exhaust System to cool down before continuing the test.** Ignition on, engine not running. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 4.5 volts? 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.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay above 4.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 of a volt 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	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 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. **NOTE: Remove the vacuum gauge before continuing.**	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)** Ignition on, engine not running. With the DRBIII®, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Did the Engine Coolant Temperature 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 → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test.** Ignition on, engine not running. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 4.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the O2 Sensor Signal circuit at the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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° 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° 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
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
O2 SENSOR
O2 SENSOR SIGNAL CIRCUIT OPEN
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR HEATER OPERATION
EVAP SYSTEM OPERATION
TP SENSOR VOLTAGE GREATER THAN 0.92 OF A VOLT WITH THROTTLE CLOSED
TP SENSOR SWEEP
FUEL FILTER/PRESSURE REGULATOR
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM
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.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **NOTE: Any O2 Sensor, TPS, ECT, MAP, or EVAP DTCs must be repaired before continuing.** Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **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. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
3	Ignition on, engine not running. With the DRBIII®, read the O2 Sensor voltage. Is the O2 Sensor voltage above 4.5 volts? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4 and 5 volts.** Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay above 4.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: The engine must be at operating temperature and in closed loop to perform this test.** Start the engine. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** 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 6 No → Refer to the Driveability category and perform the appropriate Diagnostic test. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Ignition on, engine not running. With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 of a volt or less with the Throttle closed? Yes → Go To 7 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRBIII® reading within 1″ of the Vacuum Gauge reading? Yes → Go To 9 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. **NOTE: Remove the vacuum gauge before continuing.**	All

P0172-1/1 FUEL SYSTEM RICH — 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 soak)** Ignition on, engine not running. With the DRBIII®, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Did the Engine Coolant Temperature value increase smoothly and reach at least 82°C? Yes → Go To 10 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from restrictions. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 4.5 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the O2 Sensor Signal circuit from the PCM harness connector to the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 13 No → Repair the open in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Leave the O2 Sensor and PCM harness connectors disconnected. Ignition on, engine not running. Measure the voltage on the O2 Sensor Signal circuit at the O2 Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14 **NOTE: Turn the ignition off before continuing.**	All
14	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0201-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
P0207-INJECTOR #7 CONTROL CIRCUIT
P0208-INJECTOR #8 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.

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

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.

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.

P0207-INJECTOR #7 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.

P0208-INJECTOR #8 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
GOOD TRIP EQUAL TO ZERO
(F42) ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
FUEL INJECTOR CONTROL CIRCUIT OPEN
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO GROUND
PCM

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. **NOTE: Diagnose any Misfire DTCs before continuing. If a Misfire is detected for a particular cylinder, the PCM will shut down that Injectors Control circuit.** With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, backprobe the (F42) ASD Relay Output circuit at the Fuel Injector harness connector. With the DRBIII®, actuate the ASD Relay. Did the test light illuminate brightly when the ASD Relay was actuating? Yes → Go To 3 No → Repair the open or short to ground in the (F42) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Using a 12-volt test light connected to 12-volts, backprobe the Fuel Injector Control circuit. With the DRBIII®, actuate the Fuel Injector. What is the state of the test light while actuating the Fuel Injector? Brightly blinking. Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 4 OFF constantly. Go To 5	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the Fuel Injector Control circuit in the Fuel Injector harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Fuel Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the Fuel Injector Control circuit from the Fuel Injector harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the Fuel Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair. Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0300-MULTIPLE CYLINDER 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
P0307-CYLINDER #7 MISFIRE
P0308-CYLINDER #8 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 1% misfire rate is measured during two trips, or with a 6% 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 1% misfire rate is measured during two trips, or with a 6% 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 1% misfire rate is measured during two trips, or with a 6% 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 1% misfire rate is measured during two trips, or with a 6% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

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 1% misfire rate is measured during two trips, or with a 6% to 30% misfire rate during one trip.

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 1% misfire rate is measured during two trips, or with a 6% 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 1% misfire rate is measured during two trips, or with a 6% to 30% misfire rate during one trip.

P0307-CYLINDER #7 MISFIRE

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

Set Condition: When more than a 1% misfire rate is measured during two trips, or with a 6% to 30% misfire rate during one trip.

P0308-CYLINDER #8 MISFIRE

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

Set Condition: When more than a 1% misfire rate is measured during two trips, or with a 6% to 30% misfire rate during one trip.

POSSIBLE CAUSES
INTERMITTENT MISFIRE
VISUAL INSPECTION
ASD RELAY OUPUT CIRCUIT
ENGINE MECHANICAL PROBLEM
IGNITION COIL
COIL CONTROL CIRCUIT
SPARK PLUG
CHECKING FUEL PRESSURE
FUEL PUMP INLET STRAINER PLUGGED

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

POSSIBLE CAUSES
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
CHECKING FUEL LEAK DOWN
FUEL INJECTOR
INJECTOR CONTROL CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for any TSB's that apply to a Misfire condition. Review the vehicle repair history for any misfire condition repairs that have been performed.** Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is there a misfire present? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	**NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.** **NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.** - Visually inspect the engine for any of the following conditions. - Worn serpentine belt - Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump. - Misalignment Water pump, P/S Pump and A/C Compressor pulleys - Corroded PCM power and ground circuits. - Improper CKP, CMP, MAP, and TP Sensor mounting - Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc. - Vacuum leaks - Restricted Air Induction system or Exhaust system. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Ignition Coil harness connector and Fuel Injector harness connector of the cylinder being tested. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit at the Ignition Coil harness connector and Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the excessive resistance or short to ground in the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the Ignition Coil. Connect the Ignition Coil harness connector. **NOTE Before continuing, inspect the Ignition Coil for the following conditions. If a problem is found, replace the Ignition Coil. Damage or Carbon Tracking on the Coil or the spark plug insulator boot.** Install a spark tester on the Ignition Coil. While cranking the engine observe the spark coming from the spark tester. **NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.** Is good spark present? Yes → Go To 5 No → Go To 14 **NOTE: Connect the Fuel Injector harness connector before continuing.**	All
5	Turn the ignition off. Remove the Spark Plug. Inspect the Spark Plug for the following conditions. - Cracks - Carbon Tracking - Foreign Material - Gap size out of specifications - Loose or broke electrode **NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.** Were any of the above condition present? Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
6	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Start the engine and observe the fuel pressure reading. **NOTE: Fuel pressure specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 7 Below Specification Go To 12 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the Upstream gauge fall below the above specification? Yes → Replace the leaking Fuel Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.** Remove special tool #C4390. Start the engine and allow the fuel pressure to reach maximum pressure. Ignition on, engine not running. Using the DRBIII®, actuate the Fuel Injector for the cylinder that indicated the misfire. Monitor the fuel pressure gauge. Does the fuel pressure gauge indicate a drop in fuel pressure? Yes → Go To 9 No → Go To 10 **NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.**	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
9	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination CAM LOBES - must not be worn excessively CYLINDER LEAKAGE TEST - must be within specifications VALVE SPRINGS - cannot be weak or broken Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
10	Turn the ignition off. Disconnect the Fuel Injector harness connector. Ignition on, engine not running. **NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.** With the DRBIII®, erase DTCs. Using a 12-volt test light connected to 12-volts, probe the Injector Control circuit. With the DRBIII®, actuate the Fuel Injector. Does the test light blink/flicker? Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the PCM harness connectors. Check the Injector Control circuit for an open, short to ground, and short to voltage. Was a problem found with the Injector Control circuit? Yes → Repair the excessive resistance or short in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
12	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install the fuel gauge between disconnected fuel line and the fuel pump module. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → NOTE: Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Ensure the ground circuit is operating properly. Repair as necessary. Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	Disconnect the Ignition Coil harness connector. Turn the ignition off. Remove the Fuel Pump Relay. Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Control circuit. Crank the engine for 5 second while observing the test light. **NOTE: The resistance of the primary Ignition Coil on a 4.0L is 0.53 to 0.65 of an ohm and the 4.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).** Does the test light brightly blink/flicker? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the PCM harness connectors. Check the Coil Control circuit for an open, short to ground, and short to voltage. Was a problem found with the Coil Control circuit? Yes → Repair the Coil Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
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
INTERMITTENT CRANK POSITION SIGNAL
CAM POSITION SENSOR SIGNAL
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K24) CKP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K24) CKP SENSOR SIGNAL CIRCUIT OPEN
(K24) CKP SENSOR SIGNAL CIRCUIT SHORTED GROUND
(K24) CKP SENSOR SIGNAL SHORTED TO (K7) 5-VOLT SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
CRANKSHAFT POSITION SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, erase DTCs. Start the engine. If the DTC does not set right away it may be necessary to take the vehicle on a test drive. Does the DTC return? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 3 No → Go To 10	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
3	Measure the voltage on the (K24) CKP Sensor Signal circuit in the CKP Sensor harness connector with the Ignition on and Sensor harness connector disconnect. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K4) Sensor ground circuit from the CKP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**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
6	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K24) CKP Sensor Signal circuit in the CKP Sensor harness connector. Did the voltage increase above 5.2 volts with the Ignition on? Yes → Repair the short to voltage in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Measure the resistance of the (K24) CKP Sensor Signal circuit from the CKP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Measure the resistance between ground and the (K24) CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
9	Measure the resistance between the (K24) CKP Sensor Signal circuit and the (K7) 5-volt Supply circuit in the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K7) 5-volt Supply circuit and the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
10	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at the CKP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Measure the resistance of the (K7) 5-volt Supply circuit from the CKP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the CKP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
14	**NOTE: The following tests may help in identifying a possible intermittent condition with the Crank Sensor or its related wire harness.** Ignition on, engine not running. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the Crank Sensor connector and the PCM harness connector. Wiggle the related wire harness and connections. Monitor the lab scope screen. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Lightly tap on the Crank Sensor and wiggle the CKP Sensor connector and the related wire harness. Observe the lab scope screen. Look for any erratic pulses generated by the CKP Sensor. Did the CKP Sensor generate any erratic pulses? Yes → Carefully inspect the wire harness and connections, repair as necessary, if ok, replace the Crank Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	**NOTE: An intermittent failure with the Cam Position Sensor may cause the P0320 code to set.** Turn the ignition off. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP Sensor connector and the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and gently tap on the Cam Position Sensor. Monitor the lab scope screen. Start the engine. Lightly tap on the CMP Sensor and wiggle the related wire harness. Observe the lab scope screen, looking for any erratic pulses generated by the CMP Sensor. Did the CMP Sensor generate any erratic pulses? Yes → Carefully inspect the wire harness and connections, repair as necessary, if ok, replace the Cam Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:
P0325-KNOCK SENSOR #1 CIRCUIT
P0330-KNOCK SENSOR #2 CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0325-KNOCK SENSOR #1 CIRCUIT.

When Monitored and Set Condition:

P0325-KNOCK SENSOR #1 CIRCUIT

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

Set Condition: Knock Sensor #1 signal below minimum acceptable threshold voltage at particular engine speeds or above 5.0 volts.

P0330-KNOCK SENSOR #2 CIRCUIT

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

Set Condition: Knock Sensor #2 signal below minimum acceptable threshold voltage at particular engine speeds or above 5.0 volts.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(K42) OR (K142) KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K42) OR (K142) KNOCK SENSOR SIGNAL CIRCUIT OPEN
(K42) OR (K142) KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K42) OR (K142) KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO THE (K4) SENSOR GROUND
(K4) SENSOR GROUND CIRCUIT OPEN
KNOCK SENSOR

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

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: (K42) is the Knock Sensor No 1. Signal circuit and (K142) is the Knock Sensor No.2 Signal circuit.** Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K42) or (K142) Knock Sensor Signal circuit in the Knock Sensor harness connector. Is the voltage above 2.0 volts? Yes → Repair the short to voltage in the (K42) or (K142) Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Measure the resistance of the (K42) or (K142) Knock Sensor Signal circuit from the Knock Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K42) or (K142) Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between ground and the appropriate Knock Sensor Signal circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K42) or (K142) Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Measure the resistance between the (K42) or (K142) Knock Sensor Signal circuit and the (K4) Sensor ground circuit in the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K42) or (K142) Knock Sensor Signal circuit and the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Measure the resistance of the (K4) Sensor ground circuit from the Knock Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Replace the Knock Sensor. Ignition on, engine not running. With the DRBIII®, erase DTC. Attempt to operate the vehicle within the operating range of the information in Freeze Frame. With the DRBIII®, read DTC's. Does the Knock Sensor DTC return? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0340-NO CAM REFERENCE SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM REFERENCE 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 CMP SIGNAL WITH LAB SCOPE
CRANK POSITION SENSOR SIGNAL
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K44) CMP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K44) CMP SENSOR SIGNAL CIRCUIT OPEN
(K44) CMP SENSOR SIGNAL CIRCUIT SHORTED GROUND
(K44) CMP SENSOR SIGNAL SHORTED TO (K7) 5-VOLT SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
CAMSHAFT POSITION SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, erase DTCs. Start the engine. If the DTC does not set right away it may be necessary to test drive the vehicle. Does the DTC return? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at the CMP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 3 No → Go To 10	All

P0340-NO CAM REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
3	Measure the voltage on the (K44) CMP Sensor Signal circuit at the CMP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K4) Sensor ground circuit from the CMP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**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
6	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K44) CMP Sensor Signal circuit at the CMP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Measure the resistance of the (K44) CMP Sensor Signal circuit from the CMP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Measure the resistance between ground and the (K44) CMP Sensor Signal circuit at the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0340-NO CAM REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
9	Measure the resistance between the (K44) CMP Sensor Signal circuit and the (K7) 5-volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K7) 5-volt Supply circuit and the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
10	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at the CMP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Measure the resistance of the (K7) 5-volt Supply circuit from the CMP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the CMP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
14	**NOTE: The following tests may help in identifying a possible intermittent condition with the Cam Sensor or its related wire harness.** Ignition on, engine not running. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the Cam Sensor connector and the PCM harness connector. Wiggle the related wire harness and connections. Monitor the lab scope screen. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Lightly tap on the Cam Sensor and wiggle the CMP Sensor connector and wire harness. Observe the lab scope screen. Look for any erratic pulses generated by the CMP Sensor. Did the CMP Sensor generate any erratic pulses? Yes → Carefully inspect the wire harness and connections, repair as necessary, if ok, replace the Cam Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	**NOTE: An intermittent Crank Position Sensor failure may cause the P0340 code to set.** Ignition on, engine not running. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the Crank Sensor connector and the PCM harness connector. Wiggle the related wire harness and connections. Monitor the lab scope screen. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Lightly tap on the Crank Sensor and wiggle the CKP Sensor connector and wire harness. Observe the lab scope screen. Look for any erratic pulses generated by the CKP Sensor. Did the CKP Sensor generate any erratic pulses? Yes → Carefully inspect the wire harness and connections, repair as necessary, if ok, replace the Crank Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT
P0352-IGNITION COIL #2 PRIMARY CIRCUIT
P0353-IGNITION COIL #3 PRIMARY CIRCUIT
P0354-IGNITION COIL #4 PRIMARY CIRCUIT
P0355-IGNITION COIL #5 PRIMARY CIRCUIT
P0356-IGNITION COIL #6 PRIMARY CIRCUIT
P0357-IGNITION COIL #7 PRIMARY CIRCUIT
P0358-IGNITION COIL #8 PRIMARY CIRCUIT

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

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.

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.

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

P0354-IGNITION COIL #4 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.

P0355-IGNITION COIL #5 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.

P0356-IGNITION COIL #6 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.

P0357-IGNITION COIL #7 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.

P0358-IGNITION COIL #8 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.

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
CAPACITOR(S) SHORTED TO GROUND
(A142) ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
COIL ON PLUG RESISTANCE
IGNITION COIL
COIL DRIVER CIRCUIT SHORTED TO GROUND
COIL DRIVER CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero for? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8
2	Turn the ignition off. Disconnect the coil on plug harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit at the Coil on plug harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Go To 8 **Stop All Actuations**	ENGINE - 4.7L POWER TECH V8
3	Turn the ignition off. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the primary resistance of the Coil on plug. Is the resistance between 0.6 and 0.9 of an ohm? Yes → Go To 4 No → Replace the coil on plug. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Using a 12-volt test light connected to a 12-volt source, probe the Ignition Coil Driver circuit. Crank the engine for 5 seconds while observing the test light. What is the condition of the test light while cranking the engine? Brightly blinking. Replace the Ignition Coil Rail. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 5 OFF constantly. Go To 6	ENGINE - 4.7L POWER TECH V8
5	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between the Coil Driver circuit and known good ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	ENGINE - 4.7L POWER TECH V8
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the Coil Driver circuit from the Coil on plug connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, review repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8
8	Turn the ignition off. Disconnect the Ignition Coil harness connector. Remove the ASD Relay. Measure the resistance of the (A142) ASD Relay Output circuit between the ASD Relay connector and the Ignition Coil harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
9	Install the ASD Relay. **NOTE: Repeat the following test for both capacitors** **NOTE: The Capacitors are attached to the side of each valve cover.** Disconnect the Capacitor harness connector. Install a good INJ/COIL fuse. With the DRBIII®, actuate the ASD Relay. **NOTE: If the above test results in an open fuse for both capacitor tests, the problem is a short to ground in the (A142) ASD Relay Output circuit. Repair the short to ground in the (A142) ASD Relay Output circuit and refer to VER-5** Is the INJ/COIL fuse OK for both capacitor tests? Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the short to ground in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.7L POWER TECH V8

Symptom List:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT
P0352-IGNITION COIL #2 PRIMARY CIRCUIT
P0353-IGNITION COIL #3 PRIMARY CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be 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 take less than 3 seconds during cranking or up to 6 seconds while running to set.

P0352-IGNITION COIL #2 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts while cranking or greater than 12 volts with the 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.

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 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(A142) ASD RELAY OUTPUT CIRCUIT
COIL RAIL RESISTANCE
IGNITION COIL
IGNITION COIL DRIVER CIRCUIT OPEN

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

POSSIBLE CAUSES
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.0L POWER TECH I-6
2	Turn the ignition off. Disconnect the coil rail harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, check the (A142) ASD Relay Output circuit at the coil rail harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the excessive resistance or short to ground in the (A142) ASD Relay Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Stop All Actuations**	ENGINE - 4.0L POWER TECH I-6
3	Turn the ignition off. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Measure the resistance of the Primary Coil Rail. Is the resistance value between 0.53 and 0.65 of an ohm? Yes → Go To 4 No → Replace the coil rail. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.0L POWER TECH I-6
4	Using a 12-volt test light connected to a 12-volt source, probe the Ignition Coil Driver circuit. Crank the engine for 5 seconds while observing the test light. What is the condition of the test light while cranking the engine? Brightly blinking. Replace the Ignition Coil Rail. Perform POWERTRAIN VERIFICATION TEST VER - 5. ON constantly. Go To 5 OFF constantly. Go To 6	ENGINE - 4.0L POWER TECH I-6

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between the Ignition Coil Driver circuit and ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the Ignition Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	ENGINE - 4.0L POWER TECH I-6
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the Ignition Coil Driver circuit from the Coil Rail harness connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the Ignition Coil Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.0L POWER TECH I-6
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	ENGINE - 4.0L POWER TECH I-6

Symptom List:
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY
P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

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

P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 147° 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
GOOD TRIP EQUAL TO ZERO
VISUALLY INSPECT CATALYTIC CONVERTER
EXHAUST LEAK
ENGINE MECHANICAL PROBLEM
UPSTREAM O2 SENSOR OLDER THAN DOWNSTREAM O2 SENSOR
CATALYTIC CONVERTER

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

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
2	Inspect the Catalytic Converter for the following damage. Damage Catalytic Converter, dent and holes. Severe discoloration caused by overheating the Catalytic Converter. Catalytic Converter broke internally. Leaking Catalytic Converter. Were any problems found? Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start Engine and let idle. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** 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
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	Turn the ignition off. **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° 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
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
VISUAL INSPECTION
EVAP PURGE HOSE (SOLENOID TO CANISTER)
EVAP PURGE HOSE (CANISTER TO FUEL TANK)
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE SOLENOID (LEAKY/STUCK OPEN)
EVAP PURGE SOLENOID

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

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
3	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 4	All
4	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 5	All
5	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. Make sure vacuum fitting at the purge solenoid is not over installed. 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** 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 and the Evap Canister and clean out Evap lines as necessary. 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) Ignition on, engine not running. With the DRBIII®, actuate the EVAP Purge Solenoid and observe the vacuum gauge. Does the vacuum drop when the solenoid is actuated? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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

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° F and 90° F and coolant temperature within 10° 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° F and 90° F and coolant temperature within 10° F of battery/ambient.

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

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

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

Set Condition: There is a leak larger than 0.020″ and smaller than 0.040″ in the evaporative system.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION
VERIFY EVAPORATIVE EMISSION SYSTEM LEAK
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID

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

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.** **NOTE: Engine vacuum at must be present at the LDP vacuum port.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity and the fuel must be cool to properly test the Evap system.** 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. Using the DRBIII®, select Engine/System Tests and actuate the Leak Detect Pump Test (Option 3/Hold PSI). **NOTE: The above energizes the LDP solenoid and allows the constant vacuum source to apply vacuum to the LDP pump diaphragm. This lifts the diaphragm up and seals the atmospheric canister vent valve at the bottom of the Leak Detection Pump.** Connect the red power lead of Miller Tool #8404 to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Connect shop air to the #8404 EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM. Install the service port adapter #8404-14 on the vehicle's service port. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, and/or those with less fuel, may require 4 to 5 minutes to fill.** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 3 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

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

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

Symptom:
P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: Continuously after the ignition is turned on and the battery voltage is above 10.4 volts.

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
GOOD TRIP EQUAL TO ZERO
(F12) FUSED IGNITION SWITCH OUTPUT CIRCUIT
EVAP PURGE SOLENOID
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Ignition on, engine not running. Measure the voltage on the (F12) Fused Ignition Switch Output circuit at the EVAP Purge Solenoid harness connector. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the open or short to ground in the (F12) Fused Ignition Switch Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Measure the resistance between the terminals of the Evap Purge Solenoid. Is the resistance between 29.0 and 44.0 ohms? Yes → Go To 4 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Disconnect the PCM harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the (K52) Evap Purge Solenoid Control circuit from the PCM harness connector to the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K52) Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Measure the resistance between ground and the (K52) Evap Purge Solenoid Control circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K52) Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connectors for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

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.** Inspect the outside of the fuel tank for defects. 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 VOLTAGE TOO LOW

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTAGE 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 of a volt at the PCM for more than 5 seconds.

POSSIBLE CAUSES
FUEL LEVEL SENSOR VOLTAGE BELOW 0.2 OF A VOLT
FUEL LEVEL SENSOR
(K226) FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K226) FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the Fuel Level Sensor voltage. Is the Fuel Level Sensor voltage below 0.2 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Ignition on, engine not running. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from below 0.2 of a volt to above 4.0 volts? Yes → Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K226) Fuel Level Sensor Signal circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K226) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All

P0462-FUEL LEVEL SENDING UNIT VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K226) Fuel Level Sensor Signal circuit and the (K4) Sensor ground circuit. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K4) Sensor ground and the (K226) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connectors for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0463-FUEL LEVEL SENDING UNIT VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0463-FUEL LEVEL SENDING UNIT VOLTAGE 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 4.95 volts for more than 90 seconds.

POSSIBLE CAUSES
FUEL LEVEL SENSOR VOLTAGE ABOVE 4.9 VOLTS
FUEL LEVEL SENSOR
(K226) FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K226) FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the Fuel Level Sensor voltage. Is the Fuel Level Sensor voltage above 4.9 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Fuel Pump Module electrical harness connector. Ignition on, engine not running. Connect a jumper wire between the (K226) Fuel Level Sensor Signal circuit and the (K4) Sensor ground circuit at the Fuel Pump Module harness connector. With the DRBIII®, read the Fuel Level Sensor voltage. Did the Fuel Level Sensor voltage change from above 4.8 volts to below 0.4 of a volt? Yes → Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0463-FUEL LEVEL SENDING UNIT VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K226) Fuel Sensor Signal circuit at the Fuel Pump harness connector. Is the voltage above 10.0 volts? Yes → Repair the short to voltage in the (K226) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Measure the resistance of the (K226) 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 5 No → Repair the open in the (K226) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance of the (K4) Sensor ground circuit from the PCM harness connector to the Fuel Pump Module harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	**NOTE: Before continuing, check the PCM harness connectors for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0500-NO VEHICLE SPEED SIGNAL

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED 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
GOOD TRIP EQUAL TO ZERO
(G7) VEHICLE SPEED SIGNAL CIRCUIT OPEN
(G7) VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
(G7) VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **NOTE: Any VSS DTCs in the CAB Module or Body Controller must be properly diagnosed before continuing.** Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the ABS Control Module harness connector. Measure the resistance of the (G7) Vehicle Speed Signal circuit between the PCM harness connector and the ABS Control Module harness connector. Is the resistance above 5.0 ohms? Yes → Repair the open in the (G7) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Measure the resistance between ground and the (G7) Vehicle Speed Signal circuit at the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G7) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0500-NO VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. Measure the voltage on the (G7) Vehicle Speed Signal circuit at the PCM harness connector. Is the voltage above 4.8 volts? Yes → Repair the short to voltage in the (G7) Vehicle Speed Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5 **NOTE: Turn the ignition off before continuing.**	All
5	**NOTE: Before continuing, check the PCM harness connectors for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
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
GOOD TRIP EQUAL TO ZERO
(K59) IAC #1 DRIVER CIRCUIT SHORTED TO #2, #3, OR #4
(K40) IAC #2 DRIVER CIRCUIT SHORTED TO #3 OR #4
(K60) IAC #3 DRIVER CIRCUIT SHORTED TO (K39) IAC #4 DRIVER CIRCUIT
IAC DRIVER CIRCUIT SHORTED TO VOLTAGE
IAC DRIVER CIRCUIT SHORTED TO GROUND
IAC MOTOR OPERATION
IAC MOTOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. **Note: The following steps are checking for a short between the IAC Driver circuits.** Measure the resistance between the (K59) IAC #1 Driver circuit and #2, #3, #4 Driver circuits. Is the resistance below 100 ohms on any of the Drivers? Yes → Repair the short between the IAC Driver circuits. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
3	**Note: The following steps are checking for a short between the IAC Driver circuits.** Measure the resistance between the (K40) IAC #2 Driver circuit and #3, #4 Driver circuits. Is the resistance below 100 ohms on any of the Drivers? Yes → Repair the short between the IAC Driver circuits. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	**Note: The following steps are checking for a short between the Driver Circuits.** Measure the resistance between the (K60) IAC #3 Driver circuit and the (K39) IAC #4 Driver circuit. Is the resistance below 100 ohms? Yes → Repair the short between the IAC Driver circuits. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Remove the ASD Relay. Using a jumper wire, jumper between the Fused B+ circuit and ASD Relay Output circuit in the PDC. Ignition on, engine not running. Measure the voltage on each of the IAC Driver circuits. Is the voltage above 1.0 volt at any IAC Driver circuit? Yes → Repair the short to voltage on the appropriate IAC Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6 **NOTE: Remove the jumper wire and install the ASD Relay before continuing.**	All
6	Turn the ignition off. Repeat each measurement for each IAC Driver circuit. Measure the resistance between ground and each IAC Driver circuit. Is the resistance below 100 ohms at any IAC Driver circuit? Yes → Repair the short to ground in the appropriate IAC Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Connect the PCM harness connectors. Start and idle the engine. Using a test light connected to ground, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuits? Yes → Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0523-OIL PRESSURE VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0523-OIL PRESSURE VOLTAGE TOO 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
GOOD TRIP EQUAL TO ZERO
OIL PRESSURE SWITCH
(G60) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO VOLTAGE
(G60) OIL PRESSURE SIGNAL CIRCUIT OPEN
(G60) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the Oil Pressure Switch harness connector. Ignition on, engine not running. Connect a jumper wire to the (G60) Oil Pressure Signal circuit in the Sensor harness connector. With the DRBIII® monitor the Oil Pressure Switch state. Touch the other end of the jumper wire to Ground at the Oil Pressure Switch harness connector several times. Did the Oil Pressure Switch state change from High to Low? Yes → Replace the Oil Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P0523-OIL PRESSURE VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (G60) Oil Pressure Signal circuit at the Switch harness connector. Is the voltage above 5.3 volts? Yes → Repair the short to voltage on the (G60) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (G60) Oil Pressure Signal circuit from the Oil Pressure Switch harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (G60) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between (G60) Oil Pressure Signal circuit and ground at the Switch connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G60) Oil Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0601-PCM INTERNAL CONTROLLER FAILURE

POSSIBLE CAUSES
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: This DTC indicates an internal PCM problem.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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 PERFORMANCE
(K125) GENERATOR FIELD SOURCE CIRCUIT OPEN
(K20) GENERATOR FIELD DRIVER CIRCUIT OPEN
(K20) GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Record all DTCs and the related Freeze Frame data. Using a 12-volt test light connected to ground, backprobe the (K20) Gen Field Control circuit at the back of the Generator. With the DRBIII®, actuate the Generator Field Driver. Does the test light blink? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 2	All
2	Ignition on, engine not running. Carefully inspect all connectors for corrosion or spread terminals before continuing. Backprobe the (K125) Generator Field Source circuit at back of Generator with a volt meter. With the DRBIII® actuate the Generator Field Driver. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the open in the (K125) Generator Field Source circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance of the (K20) Generator Field Driver circuit from the Generator Field harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
4	Measure the resistance between ground and the (K20) Generator Field Driver circuit in the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Measure resistance across the Generator Field Terminals at the Generator. Is the resistance between 0.5 of an ohm and 15 ohms? Yes → Go To 6 No → Repair the Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	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 RELAY OPERATION
A/C CLUTCH RELAY
(F12) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay clicking? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. 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 3 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Ignition on, engine not running. Measure the voltage on the (F12) Fused Ignition Switch Output circuit voltage at the A/C Clutch Relay connection. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open or short to ground in the (F12) Fused Ignition Switch Output circuit. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (C13) A/C Clutch Relay Control circuit from the Relay connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair open in the (C13) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between ground and the (C13) A/C Clutch Relay Control circuit at the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C13) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0700-TCM CONTROLLER DTC PRESENT

POSSIBLE CAUSES
TCM DTC PRESENT SET IN PCM

TEST	ACTION	APPLICABILITY
1	This DTC is an indicator that a Trans DTC has previously been set. A code may not currently be present in the TCM if a Trans repair was made. If after reading transmission DTC's there are no codes in the TCM, this code can be erased from the PCM. Trans DTC present? Continue A DTC was registered in the Transmission Control Module. With the DRB, go to the TCM and read codes. Refer to the appropriate symptom (Diagnostic Procedure).	All

Symptom List:

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

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

When Monitored and Set Condition:

P1195-O2 SENSOR 1/1 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 of a volt to above 0.6 of a volt and back fewer times than required.

P1196-O2 SENSOR 2/1 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 of a volt to above 0.6 of a volt and back fewer times than required.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
EXHAUST LEAK
RESISTANCE IN THE O2 SENSOR SIGNAL CIRCUIT
RESISTANCE IN THE (K4) SENSOR GROUND CIRCUIT
O2 SENSOR

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

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

TEST	ACTION	APPLICABILITY
2	Start the engine. Inspect the exhaust for leaks between the engine and the appropriate 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	Turn the ignition off. Backprobe the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. **NOTE: Ensure the voltmeter leads are connected for positive polarity, 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** Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 4 No → Repair the excessive resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Backprobe the (K4) Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. **NOTE: Ensure the voltmeter leads are connected for positive polarity, 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** Start the engine. Allow the engine to idle. Is the voltage below 0.10 of a volt? Yes → Go To 5 No → Repair the excessive resistance on the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	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, Ambient Temperatur greater than 20°F, and Vacuum is less than 17″Hg.

Set Condition: The engine does not warm to 85° C (181° F) while driving for more than 3 minutes and less than 1 hour depending on Engine load and Start up Temperature.

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/SYSTEM RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1282-FUEL PUMP/SYSTEM 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 OPERATION
FUEL PUMP RELAY
(F991) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(K31) FUEL PUMP RELAY CONTROL CIRCUIT OPEN
(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay clicking? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Remove the 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 3 No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1282-FUEL PUMP/SYSTEM RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. With a 12-volt test light connect to ground, probe the (F991) Fused Ignition Switch Output circuit in the Fuel Pump Relay connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (F991) Fused Ignition Switch Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K31) Fuel Pump Relay Control circuit from the PDC terminal to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between ground and the (K31) Fuel Pump Relay Control circuit in the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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
GOOD TRIP EQUAL TO ZERO
VACUUM LEAK
AIR INDUCTION SYSTEM
THROTTLE BODY AND THROTTLE LINKAGE
IAC DRIVER CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. **NOTE: All MAP Sensor, IAC, and/or TPS codes present must be diagnosed first before proceeding.** With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	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 3	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
3	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Inspect the throttle body plate for carbon build up or other restrictions. Inspect the throttle linkage for binding and smooth operation. Ensure the throttle plate is resting on the stop at idle. Remove IAC, inspect the pintle and its seating surface inside the throttle body. Were any problems found? Yes → Clean and/or replace the throttle body as needed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the PCM harness connectors. Measure the resistance of each of the IAC Driver circuit from the IAC Motor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the appropriate IAC Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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
MAP SENSOR VOLTS BELOW 2.3 VOLTS
SHORTED SENSOR
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If the P0107 - MAP Sensor Voltage Too Low is also set, diagnose it first before continuing with P1296 - No 5-volts To MAP Sensor.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII® in Sensors, read the MAP Sensor voltage. Is the voltage below 2.35 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 4.5 volts? Yes → Go To 3 No → Go To 4	All
3	With the DRBIII® in Sensors, read the MAP Sensor voltage with the Sensor harness connector disconnected. Is the voltage above 4.5 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P1296-NO 5-VOLTS TO MAP SENSOR — Continued

TEST	ACTION	APPLICABILITY
4	Measure the voltage on the (K7) 5-volt Supply circuit in the MAP Sensor harness connector while disconnecting the remaining Sensors that share the (K7) 5-volt Supply circuit. Does the voltage return to approximately 5.0 volts with any Sensor disconnected? Yes → Replace the Sensor that pulled the (K7) 5-volt Supply circuit low. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Measure the resistance of the (K7) 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 6 No → Repair the excessive resistance in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Measure the resistance between ground and the (K7) 5-volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
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
GOOD TRIP EQUAL TO ZERO
MAP SENSOR VACUUM PORT
MAP SENSOR VOLTAGE BELOW 3.19 VOLTS
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If a MAP high or Low DTC set along with P1297, diagnose the High or Low DTC first before continuing.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Remove the MAP Sensor. Inspect the vacuum port, check for restrictions or any foreign materials. Were any restriction found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

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

TEST	ACTION	APPLICABILITY
3	Install the MAP Sensor. Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 3.19 volts? Yes → Go To 4 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit at 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	With the DRBIII®, monitor the MAP Sensor voltage with the Sensor harness connected disconnected. 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 PCM harness connectors. Measure the resistance between ground and (K1) MAP Sensor Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Measure the resistance between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground circuit and the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
8	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K7) 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 9 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
9	Measure the resistance between ground and the (K7) 5-volt Supply circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1299-VACUUM LEAK FOUND

When Monitored and Set Condition:

P1299-VACUUM LEAK FOUND

When Monitored: Ignition on and engine running.

Set Condition: PCM detects a vacuum leak with no MAP or TP Sensor faults detected.

POSSIBLE CAUSES
VACUUM LEAK
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: This code is enabled on engines with plastic intake manifolds and is intended to shut down the engine if a large crack occurs.** **NOTE: A large vacuum leak is mostly the cause of this DTC.** 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. Improperly installed MAP Sensor. Were any vacuum leaks found? Yes → Repair vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1388-ASD RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1388-ASD 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
GOOD TRIP EQUAL TO ZERO
ASD RELAY
(F991) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(K51) ASD RELAY CONTROL CIRCUIT OPEN
(K51) ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Remove the ASD Relay. Measure the resistance between terminals 85 and 86 of the ASD Relay. Is the resistance between 50 and 80 ohms? Yes → Go To 3 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F991) Fused Ignition Switch Output circuit at the ASD Relay connector in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open or short to ground in the (F991) Fused Ignition Output. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1388-ASD RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K51) ASD Relay Control circuit from the ASD Relay cavity in the PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between ground and the (K51) ASD Relay Control circuit at the PDC. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no more possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	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
GOOD TRIP EQUAL TO ZERO
ASD RELAY
(A14) FUSED B+ CIRCUIT OPEN
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
(A142) ASD OUTPUT CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Attempt to start the engine. Did the engine start? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connectors. Measure the resistance of the (A142) ASD Relay Output circuit from the ASD Relay cavity in the PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
4	Install a substitute relay for the ASD Relay. Attempt to start the vehicle. Did the engine start? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Using a 12-volt test light, probe the (A14) Fused B+ circuit at the ASD Relay connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open or short to ground in the (A14) Fused B+ circuit. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Disconnect the PCM harness connectors. Measure the resistance of the (A142) ASD Relay Output circuit from the ASD Relay cavity in the PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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
INTERMITTENT CONDITION
CHECKING INTERMITTENT CMP SIGNAL WITH A LAB SCOPE
CMP HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
CKP WIRE HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
CHECKING INTERMITTENT CKP SIGNAL WITH A LAB SCOPE
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine and run until operating temp is reached. (Closed Loop) It may be necessary to test drive the vehicle. Does the DTC reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 6	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the PCM harness connector and in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Wiggle the related wire harness and gently tap on the Cam Position Sensor. Look for any differences between the Channel 1 and Channel 2 patterns, generated by the CMP Sensor. Does the DRBIII® screen display any missing or irregular patterns? Yes → Replace the Camshaft Position Sensor or repair the wiring/ connection concern. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

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

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
11	**NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.** Turn the ignition off. With the DRBIII® as a Dual Channel Lab Scope and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the PCM harness connector and CKP harness connector. Both of the graphs should be identical. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Monitor the DRBIII® lab scope screen, both patterns should be the same. Wiggle the related wire harness and gently tap on the Crank Position Sensor. Look for any differences between Channel 1 and Channel 2 patterns generated by the CKP Sensor. Were any erratic or missing signals noticed? Yes → 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
ADAPTIVE NUMERATOR RELEARN
CMP SENSOR CONNECTOR/WIRING
CKP SENSOR CONNECTOR/WIRING
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
CRANKSHAFT POSITION SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	**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. Ignition on, engine not running. With the DRBIII® in the miscellaneous menu, choose "Clear PCM (battery disconnect)" to reset the PCM. With the DRBIII®, choose the "Misfire Pretest 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 → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Verify the Camshaft Position Sensor is properly installed.** **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 3	All
3	**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 wire harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Verify the Crank Position Sensor is properly installed.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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 5 No → Repair/replace tone wheel/flex plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the (K24) CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING..** Start the engine and observe the lab scope screen for any erratic CKP Sensor pulses. Were any erratic Crank Position signals detected? Yes. Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No. Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
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
GOOD TRIP EQUAL TO ZERO
EVAP CANISTER OBSTRUCTED
OBSTRUCTION IN HOSE/TUBE BETWEEN EVAP CANISTER AND PURGE SOLENOID
LDP PRESSURE HOSE OBSTRUCTED
LEAK DETECTION PUMP

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	Pressurize the EVAP System. On Miller Tool #8404, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. The flow meter gauge on the EELD reads 0 LPM the EVAP system completely pressurized. 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 3 No → Replace the EVAP Canister. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
3	**Note: Connect all previously disconnected hose(s).** Re-pressurize the EVAP System. On Miller Tool #8404, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. The flow meter gauge on the EELD reads 0 LPM the EVAP system completely pressurized. Disconnect the EVAP hoses at the Purge Solenoid. Did the pressure drop when the hose was disconnected? Yes → Go To 4 No → Repair or replace hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
4	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 → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Repair/replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P1491-COOLING FAN RELAY CONTROL CIRCUIT

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(A16) FUSED B+ CIRCUIT
(K173) COOLING FAN RELAY CONTROL CIRCUIT OPEN
(K173) COOLING FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
(Z307) GROUND CIRCUIT OPEN
RADIATOR FAN RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (A16) Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Disconnect the PCM harness connectors. Measure the resistance of the (K173) Cooling Fan Relay Control circuit from PDC to PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K173) Cooling Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Measure the resistance between ground and the (K173) Cooling Fan Relay Control circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the short to ground in the (K173) Cooling Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1491-COOLING FAN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Measure the resistance between the (Z307) Ground circuit and a known good Ground. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (Z307) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Connect a jumper wire between the (C23) Radiator Fan Relay Output circuit and the (A16) Fused B+ circuit in the Relay harness connector. Did the Radiator Fan actuate? Yes → Go To 7 No → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1492-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1492-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition key on.

Set Condition: The PCM senses the voltage from the Battery Temperature Sensor above 4.9 volts for 3 seconds.

POSSIBLE CAUSES
BATTERY TEMP SENSOR VOLTAGE ABOVE 4.8 VOLTS
BATTERY TEMPERATURE SENSOR
(K118) BATTERY TEMP SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K118) BATTERY TEMP SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Record all DTCs and the related Freeze Frame data. With the DRBIII®, monitor the Battery Temperature Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the Ambient/Batt Tmp Vlt value. Connect a jumper wire between the (K118) Ambient/Batt Temp Signal circuit and the (K4) Sensor ground circuit at the Sensor harness connector. Did the Battery Temp Sensor voltage change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P1492-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (K118) Battery Temp Signal circuit at the Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (K118) Battery Temp Signal circuit from the Battery Temp Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Measure the resistance in the (K4) Sensor ground circuit from the PCM harness connector to the Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1493-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P1493-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The PCM senses the voltage from the Battery Temperature Sensor below 0.5 of a volt for 3 seconds.

POSSIBLE CAUSES
BATTERY TEMP SENSOR VOLTS BELOW 0.5 OF A VOLT
BATTERY TEMPERATURE SENSOR
(K118) BATTERY TEMP SIGNAL CIRCUIT SHORTED TO GROUND
(K118) BATTERY TEMP SIGNAL CIRCUIT SHORTED TO THE (K4) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Record all DTCs and the related Freeze Frame data. With DRBIII®, monitor the Ambient/Battery Temperature Sensor voltage. Is the voltage below 0.5 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	With the DRBIII® in sensors, read the Ambient/Battery Temp Sensor voltage. Disconnect the Ambient/Battery Temperature Sensor harness connector. Did the Battery Temperature Sensor voltage change from below 1.0 volt to above 4.5 volts? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K118) Battery Temp Signal circuit at the Battery Temp Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

P1493-AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance between the (K118) Battery Temp Signal circuit and the (K4) Sensor ground circuit at the Battery Temp Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground circuit and the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1494-LEAK DETECTION PUMP SWITCH OR MECHANICAL FAULT

When Monitored and Set Condition:

P1494-LEAK DETECTION PUMP SWITCH 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
GOOD TRIP EQUAL TO ZERO
LDP VACUUM SUPPLY
LEAK DETECTION PUMP
(K107) LDP SWITCH SIGNAL CIRCUIT OPEN
(K107) LDP SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	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″ 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 SWITCH OR MECHANICAL FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect the vacuum supply hose at the LDP. Disconnect the Leak Detection Pump electrical harness connector. Start the engine. With the DRBIII® in Inputs/Outputs, read the Leak Detect Pump Switch state. Connect a jumper wire between 12-volts and the (K107) LDP Switch Signal 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 4 **NOTE: Remove the jumper wire before continuing.**	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K107) LDP Switch Signal circuit from the PCM harness connector to LDP harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K107) Leak Detection Pump Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Measure the resistance between ground and the (K107) LDP Switch Signal circuit at the LDP harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K107) LDP Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored and Set Condition:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored: Continuously when the ignition is on and battery voltage is greater than 10.4 volts.

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

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
(K125) GENERATOR SOURCE CIRCUIT OPEN
LEAK DETECTION PUMP
(K106) LDP SOLENOID CONTROL CIRCUIT OPEN
(K106) LDP SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
2	Turn the ignition off. Disconnect the Leak Detection Pump electrical harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Leak Detection Pump. Using a 12-volt test light connected to ground, check the (K125) Generator Source circuit at the LDP connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open in the (K125) Generator Source circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Connect a 12-volt test light to a good 12-volt source. Ignition on, engine not running. With the DRBIII®, actuate the Leak Detection Pump. Probe the (K106) LDP Solenoid Control circuit with the test light while the Pump is actuating. Does the test light blink? Yes → Go To 4 No → Go To 5	All
4	If there are no possible causes remaining, view repair. Repair Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K106) LDP Solenoid Control circuit from the PCM harness connector to the LDP harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K106) Leak Detection Pump Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
6	Measure the resistance between ground and the (K106) LDP Solenoid Control circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K106) LDP Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

Symptom:
P1499-HYDRAULIC FAN SOLENOID CIRCUIT

When Monitored and Set Condition:

P1499-HYDRAULIC FAN SOLENOID CIRCUIT

When Monitored: Ignition on and engine running.

Set Condition: An open or shorted condition in the Hydraulic Fan Solenoid control circuit is detected by the Powetrain Control Module.

POSSIBLE CAUSES
RADIATOR FAN INOP
(A142) FUSED ASD RELAY OUTPUT CIRCUIT
(K173) COOLING FAN CONTROL CIRCUIT OPEN
(K173) COOLING FAN CONTROL CIRCUIT SHORTED TO GROUND
HYDRAULIC FAN SOLENOID
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, perform the Hydraulic Fan Solenoid Test found under Engine Test and Systems Test. Does the Radiator Fan operate properly? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Using a 12-volt test light connect to ground, probe the (A142) Fused ASD Relay Output circuit at the fan solenoid. With the DRBIII®, actuate the ASD Relay. Does the test light illuminate brightly when the ASD Relay is actuated? Yes → Go To 3 No → Repair the open or short to ground in the (A142) Fused ASD Relay Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1499-HYDRAULIC FAN SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Hydraulic Fan Solenoid harness connector. Measure the resistance of the (K173) Cooling Fan Solenoid Control circuit from the fan harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K173) Cooling Fan Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Measure the resistance between ground and the (K173) Cooling Fan Control circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K173) Cooling Fan Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Remove the ASD Relay and connect a jumper wire between the (A142) ASD Relay Output terminal and the (A14) Fused B+ circuit to keep the ASD Output circuit powered up for this step. Connect a jumper wire to the Hydraulic Fan Solenoid PWM circuit in the PCM harness connector. Momentarily connect the (K173) Cooling Fan Relay Control circuit to ground using a fused jumper wire at the Hydraulic Fan Solenoid connector. Did the Radiator Fan actuate? Yes → Go To 6 No → Replace the Hydraulid Radiator Fan Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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
CHARGING SYSTEM OPERATION
(K20) GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD COIL SHORTED TO GROUND
BATTERY TEMPERATURE SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Battery must be fully charged and be capable of passing a load test. Note: Generator Belt tension and condition must be checked before continuing.** Ignition on, engine not running. With the DRBIII®, read DTCs and the related Freeze Frame data then clear the DTCs. Start the engine. With the DRBIII®, read DTCs. Does the Generator light illuminate and is a DTC set? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field Harness connector. Carefully inspect the related connectors for corrosion or spread terminals before continuing. Measure the resistance between ground and the (K20) Generator Field Driver circuit at the Generator harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Measure the resistance between ground and the Generator Field terminals on the Generator. Is the resistance below 100 ohms? Yes → Replace or repair the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Connect the PCM harness connectors and the Generator harness connector. Ignition on, engine not running. With the DRBIII® in Inputs/Outputs, read the Batt Temp Sensor value. Using a thermometer measure under hood temperature near Battery tray. Is the thermometer temperature within 10 deg of DRBIII® Battery temperature? Yes → Go To 5 No → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom List:

P1595-SPEED CONTROL SOLENOID CIRCUITS
P1683-SPEED CONTROL POWER CIRCUIT

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-SPEED CONTROL POWER CIRCUIT

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
SPEED CONTROL SOLENOID OPERATION
(Z307) GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
SPEED CONTROL SERVO
(V30) S/C BRAKE SWITCH OUTPUT OPEN
BRAKE LAMP SWITCH
(V32) S/C POWER SUPPLY CIRCUIT OPEN
S/C VACUUM SOLENOID
(V36) S/C VACUUM SOL CONTROL OPEN
(V36) S/C VACUUM SOL CONTROL CIRCUIT SHORTED TO GROUND
S/C VENT SOLENOID
(V35) S/C VENT SOL CONTROL CIRCUIT OPEN
(V35) S/C/ VENT SOL CONTROL CIRCUIT SHORTED TO GROUND
PCM

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. **NOTE: In the below step you will need to actuate both S/C solenoids separately. Note the operation of the each solenoid when actuated.** With the DRBIII®, actuate the Speed Control Vacuum Solenoid and note operation. With the DRBIII®, actuate the Speed Control Vent Solenoid and note operation. Choose the conclusion that best matches the solenoids operation. Vacuum Solenoid not operating Go To 2 Vent Solenoid not operating Go To 5 Both S/C Solenoids not operating Go To 8 Both S/C Solenoids operating Go To 13	All
2	Turn the ignition off. Disconnect the S/C Servo harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Speed Control Vacuum Solenoid. Using a 12-volt test light connected to 12-volts, probe the (V36) S/C Vacuum Sol Control circuit. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (V36) S/C Vacuum Sol Control circuit between the PCM harness connector and S/C Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Measure the resistance between ground and the (V36) S/C Vacuum Sol Control circuit at the S/C Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 12	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Speed Control Vent Solenoid. Using a 12-volt test light connected to 12-volts, probe the (V35) S/C Vent Sol Control circuit in the S/C Servo harness connector. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (V35) S/C Vent Sol Control circuit between the PCM harness connector and S/C Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (V35) S/C Vent Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
7	Measure the resistance between ground and the (V35) S/C Vent Sol Control circuit at the S/C Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V35) S/C Vent Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 12	All
8	Turn the ignition off. Disconnect the S/C Servo harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 9	All
9	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the (V30) S/C Brake Switch Output circuit between the S/C Servo harness connector and Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the (V30) S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Ignition on, engine not running. It may be necessary to hold the Cruise Control Switch in the on position. Using a 12-volt test light connected to ground, probe the (V32) S/C Power Supply circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 11	All
11	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (V32) S/C Power Supply circuit between the PCM harness connector and the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open in the (V32) S/C Power Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
12	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
13	Turn the ignition off. Disconnect the S/C Servo harness connector. Using a 12-volt test light connected to 12-volts, probe the (Z307) Ground circuit in the S/C Servo harness connector. Does the test light illuminate brightly? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Repair the open in the (Z307) Ground circuit. 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 ON/OFF SWITCH OPERATION
S/C ON/OFF SWITCH
CLOCKSPRING
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
(V37) S/C SWITCH SIGNAL CIRCUIT OPEN BETWEEN PCM AND CLOCKSPRING
(K4) SENSOR GROUND CIRCUIT OPEN BETWEEN PCM AND CLOCKSPRING
(V37) S/C SWITCH SIGNAL CIRCUIT OPEN BETWEEN CLOCKSPRING AND S/C SWITCH
(K4) SENSOR GROUND CIRCUIT OPEN BETWEEN CLOCKSPRING AND S/C SWITCH
PCM

TEST	ACTION	APPLICABILITY
1	Engine Running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII® in Sensors, 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 Switching off and on? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the S/C On/Off Switch 2-way harness connector only. Measure the resistance across the S/C On/Off Switch. Is the resistance between 20.3K and 20.7K ohms? Yes → Go To 3 No → Replace the On/Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1596-SPEED CONTROL SWITCH ALWAYS HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the upper and lower 6-way clockspring harness connectors per Service Information. 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) S/C Switch Signal circuit between the upper and lower 6-way clockspring harness connectors. Was the resistance above 5.0 ohms for either circuit? Yes → Replace the clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Connect the Clockspring harness connectors per Service Information. Disconnect the Speed Control On/Off Switch 2-way harness connector only. Ignition on, engine not running. Measure the voltage on the (V37) S/C Switch Signal circuit in the On/Off Switch 2-way connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (V37) S/C Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the upper and lower Clockspring harness connectors per Service Information. Disconnect the PCM harness connectors. Measure the resistance of the (V37) S/C Switch Signal circuit from the PCM harness connector to the lower Clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (V37) S/C Switch Signal circuit between the PCM and Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Measure the resistance of the (K4) Sensor ground circuit from the PCM harness connector to the lower Clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open (K4) Sensor ground circuit between the PCM and Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
7	Measure the resistance of the (V37) S/C Switch Signal circuit from the upper Clockspring harness connector to the On/Off switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (V37) S/C Switch Signal circuit, Clockspring to S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1596-SPEED CONTROL SWITCH ALWAYS HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Measure the resistance of the (K4) Sensor ground circuit from the On/Off Switch 2-way harness connector to the upper Clockspring harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K4) Sensor ground circuit between the Clockspring and S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
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 of a volt for 2 minutes.

POSSIBLE CAUSES
S/C SWITCH VOLTAGE BELOW 1.0 VOLT
S/C ON/OFF SWITCH
S/C RESUME/ACCEL SWITCH
CLOCKSPRING
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. With the DRBIII®, read the S/C Switch volts status. Is the S/C Switch voltage below 1.0 volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Disconnect the S/C ON/OFF Switch harness connector. Ignition on, engine not running. 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. 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) per Service Information. Ignition on, engine not running. With the DRBIII® in Sensors, read the S/C Switch voltage. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Connect the Clockspring harness connectors per Service Information. Disconnect the PCM harness connectors. Measure the resistance between the (V37) S/C Switch Signal circuit and ground at S/C ON/OFF Switch harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V37) S/C Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Measure the resistance between the (V37) S/C Signal circuit and the (K4) Sensor ground circuit at the ON/OFF Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K4) Sensor ground and the (V37) S/C Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

Symptom:
P1598-A/C PRESSURE SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1598-A/C PRESSURE SENSOR VOLTAGE TOO HIGH

When Monitored: With the engine running and the A/C Relay energized.

Set Condition: The A/C Pressure Sensor Signal at the PCM goes above 4.92 volts.

POSSIBLE CAUSES
A/C PRESSURE SENSOR VOLTAGE ABOVE 4.9 VOLTS
A/C PRESSURE SENSOR
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO VOLTAGE
(C18) A/C PRESSURE SIGNAL CIRCUIT OPEN
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO (K6) 5-VOLT SUPPLY CIRCUIT
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage above 4.9 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Connect a jumper wire between the (C18) A/C Pressure Signal circuit and the (K4) Sensor ground circuit in the Sensor harness connector. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Ignition on, engine not running. Is the voltage below 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **NOTE: Remove the jumper wire before continuing.**	All

P1598-A/C PRESSURE SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. Ignition on, engine not running. Measure the voltage on the (C18) A/C Pressure Signal circuit in the A/C Pressure Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Measure the resistance of the (C18) A/C Pressure Signal circuit between the A/C Pressure Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Measure the resistance between the (C18) A/C Pressure Signal circuit and the (K6) 5-volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the (K6) 5-volt Supply circuit and the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	Measure the resistance of the (K4) Sensor ground circuit from the A/C Pressure Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1599-A/C PRESSURE SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P1599-A/C PRESSURE SENSOR VOLTAGE TOO LOW

When Monitored: With the engine running and the A/C Relay energized.

Set Condition: The A/C Pressure Sensor Signal voltage at the PCM goes below 0.58 of a volt for 2.6 seconds.

POSSIBLE CAUSES
A/C PRESSURE SENSOR VOLTAGE BELOW 0.6 OF A VOLT
(K6) 5-VOLT SUPPLY CIRCUIT OPEN
(K6) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
A/C PRESSURE SENSOR
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage below 0.60 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K6) 5-volt Supply circuit in the A/C Pressure Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 6	All

P1599-A/C PRESSURE SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. With the DRBIII®, monitor the A/C Pressure Sensor voltage with the Sensor disconnected. Ignition on, engine not running. Is the voltage above 0.6 of a volt? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance between ground and the (C18) A/C Pressure Signal circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Measure the resistance between the (C18) A/C Pressure Signal circuit and the (K4) Sensor ground circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between the (K4) Sensor ground and the (C18) A/C Pressure Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the (K6) 5-volt Supply circuit between the A/C Pressure Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Measure the resistance between the (K6) 5-volt Supply circuit and ground in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
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
CHARGING VOLTAGE BELOW 15.1 VOLTS
BATTERY TEMPERATURE SENSOR
RESISTANCE IN THE BATTERY POSITIVE CIRCUIT
(K125) GENERATOR FIELD SOURCE CIRCUIT OPEN
RESISTANCE IN THE GENERATOR GROUND
(K125) GENERATOR FIELD SOURCE CIRCUIT SHORTED TO GROUND
(K20) GENERATOR FIELD DRIVER CIRCUIT OPEN
RESISTANCE IN THE GENERATOR FIELD COIL
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: Battery must be fully charged and capable of passing a battery load test.** **Note: Generator Belt tension and condition must be checked before continuing.** **NOTE: Inspect the vehicle for any aftermarket accessories that may exceed the maximum Generator output.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Record all DTCs and the related Freeze Frame data. With the DRBIII®, read the target charging voltage. Is the target charging voltage above 15.1 volts? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 2	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **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 sensors, read the Battery Temp Sensor value. Using a Thermometer, measure under hood temperature. Is the temperature within 10° F (-12°C) of Battery temperature? Yes → Go To 3 No → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
3	Ignition on, engine not running. Measure the voltage between the Generator B+ Terminal and the Battery Positive Post. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **CAUTION: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 of a volt? Yes → Repair the excessive resistance in the Battery Positive circuit between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Start the engine. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery Negative Post. Is the voltage above 0.1 of a volt? Yes → Repair the excessive resistance in the Generator Ground circuit between the Generator Case and Battery Negative side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Ignition on, engine not running. Carefully inspect all connectors for corrosion or spread terminals before continuing. With the DRBIII® actuate the Generator Field Driver. While backprobing, measure the voltage on the (K125) Generator Field Source circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 6 No → Repair the open in the (K125) Generator Field Source circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance between ground and the (K125) Generator Field Source circuit in the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K125) Generator Field Source circuit and replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Measure the resistance of the (K20) Generator Field Driver circuit from the Generator harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
8	Measure resistance across the Generator Field Terminals at the Generator. Is the resistance above 15 ohms? Yes → Replace or repair the Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1685-WRONG OR INVALID KEY MESSAGE RECEIVED FROM SKIM

When Monitored and Set Condition:

P1685-WRONG OR INVALID KEY MESSAGE RECEIVED FROM SKIM

When Monitored: With the ignition on.

Set Condition: The PCM does not receive a Valid Key message from the SKIM.

POSSIBLE CAUSES
NO COMMUNICATION WITH SKIM
SKIM TROUBLE CODES SET
NO VIN PROGRAMMED IN THE PCM
INCORRECT VIN IN PCM
INVALID SKIM KEY NOT PRESENT
PCM

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

P1685-WRONG OR INVALID KEY MESSAGE RECEIVED FROM SKIM — Continued

TEST	ACTION	APPLICABILITY
5	With the DRBIII®, display the VIN that is programmed in the PCM. Was the correct VIN programmed into the PCM? Yes → Go To 6 No → Replace and program the Powertrain Control Module per Service Information. Perform SKIS VERIFICATION.	All
6	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Ignition on, engine not running. With the DRBIII®, erase all SKIM and PCM DTCs. Attempt to start and idle the engine. With the DRBIII®, read the PCM DTCs. Does the DRBIII® display this code? Yes → Replace and program the Powertrain Control Module per Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
7	**NOTE: You must obtain the SKIM pin number.** **NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** Ignition on, engine not running. Verify the correct VIN is programmed into the PCM and SKIM. Turn the ignition off. With the next customer key turn the ignition key on and crank the engine to start. With the DRBIII®, read the PCM DTCs. Look for P1685 Does the DTC return? Yes → Replace the Ignition Key. Perform SKIS VERIFICATION. No → Test Complete. **NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.**	All

Symptom:
P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored and Set Condition:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
NO SKIM BUS MESSAGE
LOSS OF SKIM COMMUNICATION
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM
SKIM/PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the PCM DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform SKIS VERIFICATION.	All
2	With the DRBIII®, attempt to communicate with the SKIM. **NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.** Was the DRBIII® able to communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. Measure the resistance of the PCI Bus circuit between the PCM harness connector and the SKIM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the PCI Bus circuit between the PCM and the SKIM. Perform SKIS VERIFICATION.	All

P1686-NO SKIM BUS MESSAGE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
4	Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Ignition on, engine not running. Display and erase all PCM and SKIM DTCs. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRB, display PCM DTCs. Does the DRB display the same DTC? Yes → Replace and program the Powertrain Control Module per Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom:
P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: With the ignition on.

Set Condition: The PCM has not received an expected Cluster Status Bus message from the instrument cluster within the last 20 seconds.

POSSIBLE CAUSES
NO CLUSTER BUS MESSAGE
COMMUNICATE WITH CLUSTER
INSTRUMENT CLUSTER OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. 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 → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. With the DRBIII®, attempt to communicate with the Instrument cluster. Can communication be established with the Instrument Cluster? Yes → Go To 3 No → Refer to the Communication Category of the Body Diagnostic Manual and perform the appropriate symptom related to no communication with cluster. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Start the engine Allow the engine to idle. Is the correct engine speed display in the instrument cluster (Tach)? Yes → Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to the Instrument Category in the Body Diagnostic Manual and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P1696-PCM FAILURE EEPROM WRITE DENIED

POSSIBLE CAUSES
PCM FAILURE

Repair Instructions:

PCM FAILURE

Replace and program the Powertrain Control Module per Service Information.

Perform POWERTRAIN VERIFICATION TEST VER - 5.

Symptom:
P1698-NO BUS MESSAGE FROM TCM

POSSIBLE CAUSES
NO BUS MESSAGE FROM TRANS INTERMITTENT
NO BUS MESSAGE FROM TRANS
PCM PCI BUS CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform POWERTRAIN VERIFICATION TEST VER - 1. **Note: This DTC could have been set when the TCM is disconnected for transmission Diagnostics.**	All
2	Connect the DRBIII® and access Powertrain Control Module. **Note: This test checks for other PCI BUS codes. That indicates diferent circuits in the BUS.** With the DRBIII®, read DTCs. Is a DTC also set for NO SKIM BUS MESSAGE and/or No MIC BUS MESSAGE? Yes → Go To 3 No → Inspect the TCM Fused Ignition Switch circuits and ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1698-NO BUS MESSAGE FROM TCM — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRBIII® will not read PCM DTC's, follow the ″NO RESPONSE TO PCM (SCI only)″ symptom path, if vehicle will start. For NO START Conditions follow symptom ″NO RESPONSE″ in Starting category .** Turn the ignition off. Disconnect the PCM harness connectors. Connect the DRBIII® to the Data Link connector Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRBIII®. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRBIII® Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCM PCI Bus circuit Ignition on, engine not running. Observe the voltage displayed on the DRBIII® Lab Scope. What is the voltage displayed on the scope? Pulse from 0 to approximately 7.5 volts Test Complete. Steady 0 volts Repair the open PCI Bus circuit to PCM. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P1899-TRS PERFORMANCE

When Monitored and Set Condition:

P1899-TRS PERFORMANCE

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

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

POSSIBLE CAUSES
DRBIII® DISPLAYS P/N & D/R IN WRONG POSITION
TRS T41 SENSE (P/N SENSE) CIRCUIT OPEN
TRS T41 SENSE (P/N SENSE) CIRCUIT SHORTED TO GROUND
TRS ASSEMBLY (P/N SWITCH)
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. 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 DRBIII® display. Did the DRBIII® display P/N and D/R in the correct gear positions? Yes → Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the TRS (P/N switch) harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the TRS T41 Sense (P/N Sense) circuit between the PCM C1 harness connector and the TRS (P/N) switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open in the TRS T41 Sense (P/N Sense) circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
3	Measure the resistance between ground and the TRS T41 (P/N Sense) circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the TRS T41 Sense (P/N Sense) circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All

P1899-TRS PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Connect the TRS (P/N) harness connector. 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 TRS sense circuit in the PCM C1 harness connector. **NOTE: The circuit is grounded in Park and Neutral and open in the other positions.** Did the display change from above 100 kohms (open) to below 10.0 ohms (grounded)? Yes → Go To 5 No → Replace the TRS Assembly (P/N Switch) per Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

Symptom:
*A/C OPERATES WITH A/C SELECT SWITCH OFF

POSSIBLE CAUSES
CHECK FOR PCM DTCS
POWERTRAIN CONTROL MODULE
A/C CLUTCH
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
A/C CLUTCH RELAY
CHECK A/C SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND
AZC MODULE OR A/C - HEATER CONTROL MODULE
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for PCM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition on. Position the Mode switch on the AZC Module or the A/C - Heater Control Module to the Panel position. Turn the A/C Select switch off. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while turning the A/C Select switch from off to on and then back to off. Does the switch state change from ″Off″ to ″On″ and then back to ″Off″. Yes → Go To 3 No → Go To 6	All
3	Turn the ignition on. Position the Mode switch on the AZC Module or the A/C - Heater Control Module to the Panel position. Turn the A/C Select switch off. With the DRBIII®, select Engine and select Inputs/Outputs. Monitor the A/C Select Switch state while turning the A/C Select switch from off to on and then back to off. Does the switch state change from ″Off″ to ″Selected″ and then back to ″Off″. Yes → Go To 4 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*A/C OPERATES WITH A/C SELECT SWITCH OFF — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the A/C Clutch harness connector. Start the engine and observe the A/C Clutch and Compressor. Does the A/C Compressor run with the harness connector disconnected? Yes → Replace the A/C Clutch in accordance with the Service Information. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the voltage of the A/C Clutch Relay Output circuit. Is the voltage above 1.0 volt? Yes → Repair the A/C Clutch Relay Output circuit for a short to voltage. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the A/C Clutch Relay. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Measure the resistance of the A/C Switch Signal circuit between the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector and ground. Is the resistance below 10K ohms? Yes → Repair the A/C Switch Signal Circuit for a short to ground. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Make sure that the BCM harness connectors are connected to the BCM. Disconnect the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C Switch Signal circuit in the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Does the A/C Select Switch state change from ″Off″ to ″On″ when the jumper wire is connected. Yes → Replace the AZC Module or the A/C - Heater Control Module in accordance with the Service Information. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRBIII®

POSSIBLE CAUSES
DRBIII® DOES NOT SHOW BRAKE SW PRESSED OR RELEASED
(F32) FUSED B+ CIRCUIT OPEN
(Z1) GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH
(K29) BRAKE LAMP SWITCH SIGNAL CIRCUIT OPEN
(K29) BRAKE LAMP SWITCH SIGNAL CIRCUIT SHORT TO GROUND
(K29) BRAKE LAMP SWITCH SIGNAL LESS THAN 10.0 VOLTS
(V32) S/C POWER SUPPLY CIRCUIT BELOW 10 VOLTS AT BRAKE SWITCH CONN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® in Inputs/Outputs, read the Brake Switch state. While observing the DRBIII® display, press and release the brake pedal several times. Does the DRBIII® display Brake Switch PRESSED and RELEASED? Yes → The Brake Lamp Switch is operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, probe the (F32) Fused B+ circuit at the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the excessive resistance or short to ground in the (F32) Fused B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
3	Using a 12-volt test light connect to 12-volts, probe the Brake Lamp Switch ground circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open in the (Z1) Brake Lamp Switch Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRBIII® — Continued

TEST	ACTION	APPLICABILITY
4	Measure the resistance across the Brake Lamp Switch Signal terminal and the Ground terminal (measurement taken across the 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 5 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Disconnect the PCM harness connectors. Measure the resistance of the (K29) Brake Lamp Switch Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K29) Brake Lamp Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Disconnect the CAB harness connector. Measure the resistance between ground and the (K29) Brake Lamp Switch Signal circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K29) Brake Lamp Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	Connect the PCM harness connectors. Connect the CAB harness connector. Connect the Brake Lamp Switch harness connector. Brake pedal must be depressed in the next step. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (V40) Brake Lamp Switch Signal circuit at the Brake Lamp Switch harness connector. Is the test light illuminated and bright? Yes → Go To 8 No → Replace or adjust the brake switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	Turn the ignition off. Disconnect the Brake Switch harness connector. Ignition on, engine not running. With the DRBIII®, actuate the S/C Vacuum Solenoid. Using a 12-volt test light, probe the (V32) S/C Power Supply circuit in the Brake Lamp Switch harness connector. Did the test light illuminate brightly? Yes → Go To 9 No → Repair the excesssive resistance in the (V32) S/C Power Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRBIII® — Continued

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

Symptom:
*CHECKING A/C SYSTEM OPERATION WITH NO DTCS

POSSIBLE CAUSES
CHECK FOR PCM DTCS
REFRIGERATION SYSTEM NOT PROPERLY CHARGED
HIGH PRESS CUT-OFF SWITCH
LOW PRESSURE SWITCH
POWERTRAIN CONTROL MODULE
A/C CLUTCH COIL
A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN
(C2) A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C REQUEST CIRCUIT OPEN
(A17) FUSED B+ CIRCUIT OPEN
A/C CLUTCH RELAY
AZC MODULE OR A/C - HEATER CONTROL MODULE
BODY CONTROL MODULE
CHECK A/C SWITCH SIGNAL CIRCUIT FOR AN OPEN
A/C SWITCH SIGNAL CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for PCM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Verify that the Refrigerant System is properly charged per Service Procedure. Is the Refrigerant System properly charged? Yes → Go To 3 No → Properly charge the Refrigerant System per Service Information. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Verify the High Pressure Cut-Off Switch per Service Information. Is the High Pressure Cut-Off Switch OK? Yes → Go To 4 No → Replace the High Pressure Cut-Off Switch. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
4	Verify the Low Pressure Switch operation per Service Information. Is the Low Pressure Switch OK? Yes → Go To 5 No → Replace the Low Pressure Switch. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Ignition on, engine not running. Position the Mode switch on the AZC Module or the A/C - Heater Control Module to the Panel position. Turn the A/C Select switch off. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while turning the A/C Select switch from off to on and then back to off. Does the switch state change from ″Off″ to ″On″ and then back to ″Off″. Yes → Go To 6 No → Go To 13	All
6	Ignition on, engine not running. Position the Mode switch on the AZC Module or the A/C - Heater Control Module to the Panel position. Turn the A/C Select switch off. With the DRBIII®, select Engine and select Inputs/Outputs. Monitor the A/C Select Switch state while turning the A/C Select switch from off to on and then back to off. Does the switch state change from ″Off″ to ″Selected″ and then back to ″Off″. Yes → Go To 7 No → Replace and program the Powertrain Control Module per Service Information. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Ignition on, engine not running. With the DRBIII®, actuate the A/C clutch relay. Connect a test light between the ground circuit and the A/C Clutch Relay Output circuit. Does the test light illuminate brightly on and off with the relay actuation? Yes → Replace the A/C Clutch Coil. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	Turn the ignition off. Disconnect the A/C Compressor harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the A/C Compressor Clutch ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the A/C compressor clutch ground circuit. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
9	Remove the A/C Clutch Relay. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance of the (C2) A/C Clutch Relay Output circuit from the Relay to the A/C Clutch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the (C2) A/C Clutch Relay Output circuit. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
10	Install the A/C Relay and connect the A/C Compressor connector. Ignition on, engine not running. Turn the A/C system on and the fan on high. With the DRBIII® in Engine, Inputs/Outputs, read the A/C request state. Does the A/C request state change? Yes → Go To 11 No → Repair the open in the A/C Request circuit. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
11	Turn the ignition off. Remove the A/C Clutch Relay. Measure the voltage of the (A17) Fused B+ circuit at the A/C Clutch Relay connector. Is the voltage above 11.0 volts? Yes → Go To 12 No → Repair the open in the (A17) Fused B+ circuit. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
12	If there are no possible causes remaining, view repair. Repair Replace the A/C Clutch Relay. Calibration must be performed after repair is completed. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
13	Turn the ignition off. Disconnect the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Ignition on, engine not running. Measure the voltage between the A/C Switch Signal circuit and ground. Is the voltage greater than 11.0 volts? Yes → Go To 14 No → Go To 15	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Ignition on, engine not running. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C Switch Signal circuit in the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Does the A/C Select Switch state change from ″Off″ to ″On″ when the jumper wire is connected. Yes → Replace the AZC Module or the A/C - Heater Control Module per Service Information. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module per Service Information. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1.	All
15	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Measure the resistance of the A/C Switch Signal circuit between the BCM C2 harness connector and the AZC Module C2 harness connector or the A/C - Heater Control C1 harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Body Control Module per Service Information. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the A/C Switch Signal Circuit for an open. Calibration must be performed after repair is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHECKING CHARGING SYSTEM OPERATION WITH NO DTCS

POSSIBLE CAUSES
GENERATOR BELT CONDITION
DTC RESET
WIRE HARNESS INSPECTION
RESISTANCE IN THE BATTERY POSITIVE CIRCUIT
(K125) GENERATOR FIELD SOURCE CIRCUIT OPEN
GENERATOR FIELD COIL HIGH RESISTANCE
(K20) GENERATOR FIELD DRIVER CIRCUIT OPEN
RESISTANCE IN THE GENERATOR GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify that the Battery is able to pass a load test before continuing.** Ignition on, engine not running. With the DRBIII®, read the Battery voltage and record the results. Measure Battery voltage between the Battery Positive and Negative Terminals and record the results. Compare the two voltage readings. Is the voltage difference less than one volt? Yes → Go To 2 No → Go To 8	All
2	Measure the 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 of a volt? Yes → Repair the excessive resistance in the Battery Positive circuit between the Generator and Battery . Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Ignition on, engine not running. Record all DTCs 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. Measure the voltage of the (K125) Generator Field Source circuit by backprobing the back of Generator Field harness connector. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the (K125) Generator Field Source circuit for an open or short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
4	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery Negative Post. Is the voltage above 0.1 of a volt? Yes → Repair the excessive resistance in the Generator Ground circuit between the Generator Case and Battery Ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn the ignition off. Disconnect the Generator Field harness connector at back of the Generator. Measure resistance across the Generator Field Terminals at the Generator. Is the resistance above 15 ohms? Yes → Replace or repair the Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Disconnect the PCM harness connectors. Measure the resistance of the (K20) Generator Field Driver circuit between the PCM harness connector and the Generator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
8	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 9 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
9	Start the engine. Turn on all accessories. Raise engine speed to 2000 RPM for 30 seconds then return to idle. With the DRBIII®, read DTCs. Are there any ″Charging System″ Trouble Codes? Yes → Refer to Symptom list for the related Charging DTCs. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 10	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
10	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver. 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 or connector where the wiggling interrupted the voltage cycle. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:
*CHECKING ELECTRIC RADIATOR FAN OPERATION WITH NO DTCS

POSSIBLE CAUSES
(A16) FUSED B+ CIRCUIT
(K173) COOLING FAN RELAY CONTROL CIRCUIT
(C23) RADIATOR FAN RELAY OUTPUT CIRCUIT OPEN
(C23) RADIATOR FAN RELAY OUTPUT CIRCUIT SHORTED TO GROUND
RAD FAN MOTOR
RADIATOR FAN RELAY
(Z4) RADIATOR FAN GROUND CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. 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 off. Remove the Radiator Fan Relay. Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuit in the Radiator Fan Relay connector. Did the light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (A16) Fused B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Disconnect the PCM harness connectors. Measure the resistance of the (K173) Cooling Fan Relay Control circuit from the PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K173) Cooling Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Connect the PCM harness connectors. Install the Radiator Fan Relay. Ignition on, engine not running. With the DRBIII®, actuate the Radiator Fan Relay. Using a 12-volt test light connected to ground, backprobe the (C23) Radiator Fan Relay Output circuit in the Radiator Fan Motor harness connector. Does the test light cycle on and off? Yes → Go To 5 No → Go To 7	All

*CHECKING ELECTRIC RADIATOR FAN OPERATION WITH NO DTCS — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Measure the resistance between ground and the (Z4) Radiator Fan Motor ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (Z4) Radiator Fan ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Remove Rad Fan Relay. Measure the resistance of the (C23) Radiator Fan Relay Output circuit between the Radiator Fan Motor harness connector and the Radiator Fan Relay connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (C23) Radiator Fan Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	Measure the resistance between ground and the (C23) Radiator Fan Relay Output circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C23) Radiator Fan Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING HARD TO FILL WITH FUEL

POSSIBLE CAUSES
NVLD FILTER PLUGGED

Repair Instructions:

NVLD FILTER PLUGGED

Replace the plugged NVLD filter and clean out the Hoses.

Symptom:
*CHECKING THE PCM POWER AND GROUNDS

POSSIBLE CAUSES
(A7) PCM FUSED B+ CIRCUIT
(F991) PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
(Z81,Z82) PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the PCM harness connectors. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the open in the (A7) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open in the (F991) Ignition Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. 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 open in the (Z81, Z82) PCM ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*HYDRAULIC FAN OPERATION

POSSIBLE CAUSES
HARNESS INSPECTION
HYDRAULIC FAN

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® select Engine Test, Systems Test, and Hydraulic Fan Solenoid Test. Actuate the Hydraulic Fan Solenoid Test. Does the fan operate properly? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition off. Check to see if the fan wire harness is properly connected at the upper right corner of the fan shroud. Check to see if the fan wire harness is properly connected at the fan solenoid on the fan motor. Check the harness for continuity from the Hydraulic Fan Relay to the solenoid. Inspect connector terminals for proper pin fit and corrosion. Inspect the related fuse and relay. Were any problems found? Yes → Repair any defective wire harness concerns. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Inspect the hydraulic circuit for leaks and repair as necessary. Were any problems found? Yes → Repair the Hydraulic leaks and/or replace the Hydraulic Fan assembly. Perform POWERTRAIN VERIFICATION TEST VER - 2. 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 micro controller every 65.5 milliseconds.

EEPROM FAILURE

When Monitored: With the ignition on.

Set Condition: When the value written to EEPROM memory does not equal the value read back after the write operation.

INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM has detected a fault during an internal self test.

RAM FAILURE

When Monitored: With the ignition on.

Set Condition: The RAM fails a test that checks the RAM's ability to retain memory.

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM fails an internal J1850 communication self test.

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

Set Condition: The micro controller has exceeded its stack space limit.

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

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

Symptom List:
PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

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

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

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

SERIAL LINK EXTERNAL FAULT

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

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

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

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

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform SKIS VERIFICATION. No → Go To 3	All
3	**NOTE: Before proceeding it will be necessary to obtain the SKIM PIN.** Turn the ignition on. With the DRBIII®, display and erase all 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 DRBIII®, read the SKIM DTCs. 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	With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on and wait 2 minutes. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing.** Does the VIN recorded from the PCM match the VIN of the vehicle? 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 DRBIII®, display and clear all PCM and SKIM DTC's. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRBIII®, check for SKIM DTCs. Does the DRBIII® display the same DTC? 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 DRBIII®, read and record the SKIM DTCs. With the DRBIII®, erase the SKIM DTCs. **NOTE: Perform the following test several times to ensure the DTC is current.** Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 7	All
2	Are there multiple vehicle ignition keys available? Yes → Go To 3 No → Go To 4	All
3	**NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.** With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Is the DTC present for all ignition keys? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Replace the ignition key(s) that cause the SKIM DTC. Perform SKIS VERIFICATION.	All
4	With the DRBIII®, attempt to reprogram the ignition keys to the SKIM. With the DRBIII®, erase the SKIM DTCs. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC set again? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. With the DRBIII®, program the new ignition key to the SKIM. With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC set again? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom:
*CHECKING FUEL DELIVERY

POSSIBLE CAUSES
FUEL PUMP RELAY
FUEL PRESSURE OUT OF SPECIFICATION
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP
(A62) FUSED B+ CIRCUIT
(A141) FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
(Z150) FUEL PUMP GROUND CIRCUIT EXCESSIVE RESISTANCE
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 2 No → Go To 5 **Caution: Stop All Actuations.**	All
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 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 Test Complete. Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 334 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 Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test. Using a 12-volt test light connected to ground, probe the (A141) Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Go To 8 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. Using a test light connected to 12-volts, backprobe the (Z150) Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the excessive resistance in the (Z150) Fuel Pump Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Using a 12-volt test light connected to ground, backprobe the (A62) Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 9 No → Repair the open or short to ground in the (A62) Fuel Pump Realy Fused B+ circuit. Inspect the fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Measure the resistance of the (A141) Fuel Pump Relay Output circuit from the relay connector to the Fuel Pump Module connector. Is the resistance below 5.0 ohms? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the open in the (A141) Fuel Pump Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*CHECKING HARD START (FUEL DELIVERY SYSTEM)

POSSIBLE CAUSES
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FAULTY FUEL PUMP MODULE
FUEL INJECTOR(S)
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge at the engine. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49.2 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 4	All
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel supply line at the fuel pump module. Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module. Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 339 KPa +/- 34 KPa (49 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Visually and physically inspect the fuel supply lines between the fuel tank and the fuel rail. Repair/replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All

*CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	**WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove special tool #C4390. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace the leaking fuel injectors. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Check the fuel for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*ENGINE CRANKS DOES NOT START

POSSIBLE CAUSES
NO START PRE-TEST
POWERTRAIN FUSES OPEN
SECONDARY INDICATORS PRESENT
NO CKP SENSOR SIGNAL WHEN CRANKING ENGINE
NO CMP SENSOR SIGNAL WHEN CRANKING ENGINE
ENGINE MECHANICAL PROBLEM
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTCs to set that may have been erased due to a dead battery. Try to communicate with PCM if not able to communicate check fuses. Ensure the Powers and Ground to the PCM are ok. Make sure the PCM communicates with the DRBIII® and that there are no DTCs stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests. Read the PCM DTCs with the DRBIII®. If any DTCs are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM. Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and VTSS, If you are unable to establish communicate refer to the Communication category for the proper symptoms. The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTCs that may be stored in the Sentry Key Immobilizer Module (SKIM). Repair the DTC(s) before continuing. If no DTCs are found, using the DRBIII®, select Clear PCM (BATT Disconnect). Crank the engine several times. Using the DRBIII®, read DTCs. If a DTC is present perform the DTC diagnostics before continuing. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Check for any open fuses in the PDC or Junction Block that may be related to the No Start condition. Are any of the fuses open? Yes → Replace the open fuse and check the related circuit(s) for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. With the DRBIII®, under DTCs & Related Functions, read the Secondary Indicators while cranking the engine. Are there any Secondary Indicators present while cranking the engine? Yes → Refer to symptom list and perform tests related to the secondary indicator that is reported by the DRBIII®. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	With the DRBIII® in Sensors, check the Current CKP Count while cranking the engine. Does the CKP Counter change while cranking the engine? Yes → Go To 5 No → Refer to Driveability Symptom P0320-NO CRANK REFERENCE SIGNAL AT PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	With the DRBIII® in Sensors, check the Current CMP Count while cranking the engine. Does the Current CMP Count change while cranking the engine? Yes → Go To 6 No → Refer to Driveability Symptom P0340-NO CAM SIGNAL AT PCM Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Check for any of the following conditions/mechanical problems. ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connectors. Verify the ASD Relay is getting Fused B+ voltage before continuing. Measure the resistance of the (A142) ASD Relay output circuit from the ASD Relay connector to the PCM harness connector, Ignition coil, and the fuel injectors. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	Verify that the Fuel tank is not empty before continuing. Follow the diagnostics for Checking Fuel Delivery under the Driveability section of this manual. Was the No Start condition solved after following the above diagnostic procedure? Yes → Test Complete. No → Check for contamination/water in the fuel. Ensure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
*FUEL PRESSURE LEAK DOWN

POSSIBLE CAUSES
FAULTY FUEL PUMP MODULE
FUEL INJECTOR(S)

TEST	ACTION	APPLICABILITY
1	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter. Install the fuel pressure gauge. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	**WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove special tool #C4390. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 334 KPa +/- 34 KPa (49 psi +/- 5 psi).** Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure drop? Yes → Replace the leaking fuel injectors. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
*NO CRANK CONDITION

POSSIBLE CAUSES
MECHANICAL CONDITION
TRANSMISSION RANGE SENSOR
BATTERY CIRCUIT RESISTANCE TOO HIGH
(F45) IGNITION SWITCH OUTPUT CIRCUIT
TRS T41 SENSE (P/N SENSE) CIRCUIT OPEN
(T40) STARTER RELAY OUTPUT CIRCUIT OPEN
(A1) FUSED B+ CKT OPEN
STARTER
STARTER RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify the battery is fully charged and capable of passing a load test before continuing.** **WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over? Yes → Go To 2 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the TRS T41 Sense (P/N Sense) circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 3 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Connect the PCM harness connectors. Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 of a volt? Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the Starter Relay from PDC. **WARNING: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Relay B+ circuit and the (T40) Starter Relay Output circuits. Did the Starter Motor crank the engine? Yes → Go To 5 No → Go To 7 **NOTE: Remove the jumper wire before continuing.**	All
5	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (F45) Fused Ignition Switch Output circuit in the PDC. While observing 12-volt test light, hold ignition key in the start position. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open or short to ground in the (F45) Ignition Switch Output circuit. Inspect related fuses and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the PCM harness connectors. Measure the resistance of the TRS T41 Sense (P/N Sense) circuit from the Relay terminal to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the open in the TRS T41 Sense (P/N Sense) circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Disconnect the Starter Relay Output connector from the Starter Solenoid. Measure the resistance of the (T40) Starter Relay Output circuit between the Relay and the Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (T40) Starter Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Using a 12-volt test light connected to ground, probe the (A1) Fused B+ circuit at the Starter Relay terminal. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the open or high resistance in the (A1) Fused B+ circuit. Inspect related fuses and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	If there are no other possible causes remaining, review repair. Repair Replace the Starter. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM WITH A NO START CONDITION

POSSIBLE CAUSES
(A7) PCM FUSED B+ CIRCUITS
(F991) PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
(Z81,Z82) PCM GROUND CIRCUITS
5 VOLT SENSOR OPEN OR SHORTED
THROTTLE POSITION SENSOR
(K7) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(K6) 5-VOLT CIRCUIT SUPPLY SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.** **NOTE: Ensure the ignition switch was on while trying to communicate with the PCM.** Turn the ignition off. Disconnect the PCM harness connectors. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the (A7) Fused B+ circuits. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the (F991) Ignition Switch Output circuit. Inspect and replace fuses as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Using a 12-volt test light connected to battery voltage, probe the 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

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

TEST	ACTION	APPLICABILITY
4	Connect the PCM harness connectors. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. **NOTE: Connect the TP Sensor harness connector.** Ignition on, engine not running. Measure the voltage on the (K7) 5-volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 9 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Disconnect all the sensors that use (K7) 5-volt Supply circuit while monitoring the (K7) voltage in the TP Sensor harness connector. Did the voltage return to 4.5 to 5.2 volts when disconnecting any of the sensors. Yes → Replace the sensor that is pulling down the (K7) 5-volt Supply. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Measure the resistance between ground and the (K7) 5-volt Supply circuit with all the Sensor harness connectors disconnected. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 8	All
8	Disconnect all sensors that use the (K6) 5-volt Supply. Measure the resistance between ground and the (K6) 5-volt Supply circuit at the PCM harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 9	All
9	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there is no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
TP SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR OPERATION
OTHER POSSIBLE CAUSES FOR START & STALL
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read engine DTCs. Are any DTCs present? Yes → Refer to the Driveability Category and perform the appropriate diagnostics. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	**NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** With the DRBIII®, read the SKIM codes. Are there any SKIM DTCs? Yes → Refer to the Vehicle Theft category and perform the appropriate diagnostics. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	With the DRBIII®, read TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	With the DRBIII®, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 5 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
5	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** **NOTE: If the vehicle was allowed to sit over night with no engine start, coolant temperature should be near ambient temperatures.** Ignition on, engine not running. With the DRBIII®, read the ECT value. **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the Engine Temperature value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 6 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. The throttle body must be free of carbon buildup and dirt. Do any of the above conditions exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Verify that the Fuel tank is not empty before continuing. Follow the diagnostics for Checking Fuel Delivery under the Driveability section of this manual. Was the No Start condition solved after following the above diagnostic test? Yes → Test Complete. No → Check for contamination/water in the fuel. Ensure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P0836-4WD MUX SWITCH STUCK

When Monitored and Set Condition:

P0836-4WD MUX SWITCH STUCK

When Monitored: When Transfer Case in 4WD Low.

Set Condition: Four wheel drive (4WD) muxed switch input detected below minimum or above maximum acceptable voltage.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT OPEN
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO GROUND
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO VOLTAGE
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO SENSOR RETURN CIRCUIT
TRANSFER CASE POSITION SENSOR
POWERTRAIN CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transfer Case Position Sensor Input circuit. Is the resistance above 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for an open. No → Go To 3	All

P0836-4WD MUX SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transfer Case Position Sensor Input circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for a short to ground. No → Go To 4	All
4	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Transfer Case Position Sensor Input circuit. Is there any voltage present? Yes → Repair the Transfer Case Position Sensor input circuit for a short to voltage. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance above 1000.0 ohms? Yes → Go To 6 No → Repair the Transfer Case Position Sensor Input circuit for a short to the Sensor Return circuit.	All

P0836-4WD MUX SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 7 No → Replace the Transfer Case Position Sensor.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All
8	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0837-4WD MUX SWITCH PERFORMANCE

When Monitored and Set Condition:

P0837-4WD MUX SWITCH PERFORMANCE

When Monitored: Continuously with the ignition on.

Set Condition: The 4WD muxed switch input detected in an invalid range or irrational switch state.

POSSIBLE CAUSES
RELATED DTCS PRESENT
TRANSFER CASE SHIFTER OUT OF ADJUSTMENT
TRANSFER CASE POSITION SENSOR OUT OF TOLERANCE
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs. Are any other Transfer Case DTCs present? Yes → Repair all other Transfer Case DTCs before proceeding. No → Go To 2	All
2	Verify proper Transfer Case Shifter adjustment per the Service Information. Is the Transfer Case Shifter adjusted correctly? Yes → Go To 3 No → Adjust the Transfer Case shifter linkage per the Service Information.	All
3	Turn the ignition off to the lock position. Disconnect the PCM harness connector(s). **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Measure the resistance across the Transfer Case Position Sensor signal circuit and Sensor Ground circuit at the PCM harness connector. Place the transfer case in each of the following positions: 2H - resistance should be between 1124 and 1243 ohms. 4H - resistance should be between 650 and 719 ohms. N - resistance should be between 389 and 431 ohms. 4L - resistance should be between 199 and 221 ohms. Were all resistance values in each transfer case position within the specified range? Yes → Go To 4 No → Replace the Transfer Case Position Sensor.	All

P0837-4WD MUX SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All

Symptom:
P0838-4WD MODE SENSOR LOW

When Monitored and Set Condition:

P0838-4WD MODE SENSOR LOW

When Monitored: Continuously with the ignition key on.

Set Condition: When the 4WD Mode Sensor input circuit voltage falls below 0.3 volts for 5.72 seconds.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO GROUND
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO SENSOR RETURN CIRCUIT
TRANSFER CASE POSITION SENSOR
POWERTRAIN CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transfer Case Position Sensor Input circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for a short to ground. No → Go To 3	All

P0838-4WD MODE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance above 1000.0 ohms? Yes → Go To 4 No → Repair the Transfer Case Position Sensor Input circuit for a short to the Sensor Return circuit.	All
4	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 5 No → Replace the Transfer Case Position Sensor.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All
6	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0839-4WD MODE SENSOR HIGH

When Monitored and Set Condition:

P0839-4WD MODE SENSOR HIGH

When Monitored: Continuously with the ignition key on.

Set Condition: When the 4WD Mode Sensor input circuit voltage raises above 4.78 volts for 5.72 seconds.

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT OPEN
TRANSFER CASE POSITION SENSOR INPUT CIRCUIT SHORT TO VOLTAGE
TRANSFER CASE POSITION SENSOR
POWERTRAIN CONTROL MODULE
INTERMITTENT OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read Transfer Case DTCs. Is the Good Trip Counter equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transfer Case Position Sensor Input circuit. Is the resistance above 5.0 ohms? Yes → Repair the Transfer Case Position Sensor input circuit for an open. No → Go To 3	All

P0839-4WD MODE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** Disconnect the Transfer Case Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Transfer Case Position Sensor Input circuit. Is there any voltage present? Yes → Repair the Transfer Case Position Sensor input circuit for a short to voltage. No → Go To 4	All
4	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module harness connector. **CAUTION: IF EQUIPPED WITH NGC CONTROLLER, DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.** **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between the Transfer Case Position Sensor Input circuit and the Sensor Return circuit in the PCM harness connector. Is the resistance between 55 ohms and 1.3k ohms? Yes → Go To 5 No → Replace the Transfer Case Position Sensor.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform the appropriate Powertrain verification test.	All
6	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P0711-TRANS TEMP SENSOR, NO TEMP RISE AFTER START

When Monitored and Set Condition:

P0711-TRANS TEMP SENSOR, NO TEMP RISE AFTER START

When Monitored: Continuously with the key on and the engine running.

Set Condition: After 2 trips in which the trans sump temp is < 5°C (40° F) and does not rise more than 8°C (16° F) after 20 minutes of run time with Veh Spd > 48 kmh (30 MPH). It will also set if the eng temp is < 38°C (100° F) with trans temp > 127°C (260° F).

POSSIBLE CAUSES
MULTIPLE TRANSMISSION DTC'S SET
INTERMITTENT TRANSMISSION TEMPERATURE SENSOR
TRANSMISSION TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0711 displayed and equal to 0? Yes → Go To 3 No → Go To 7	All

P0711-TRANS TEMP SENSOR, NO TEMP RISE AFTER START — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. With the DRBIII®, read DTCs. Check for any Park/Neutral DTC or Transmission Temperature too Low or too High DTCs. Were there any Park/Neutral P1899 or Transmission Temperature Sensor P0712 or P0713 DTCs present? Yes → Repair all other Transmission DTC's before proceeding. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition on. **Note: To test the transmission temperature sensor, the engine and transmission temperature must be at or below 29.4°C (85° F).** With the DRBIII® read: Engine Coolant temperature and record. Transmission temperature and record. Is the transmission temperature within 5°C (9°F) of the engine coolant temperature? Yes → Go To 5 No → Go To 6	All
5	**Note: To test the transmission temperature sensor, the engine and transmission temperature must be at or below 29.4°C (85° F).** Start the engine and let it idle in Drive with parking brake on, while monitoring the Transmission Temperature Sensor with the DRBIII®. Look for the temperature to rise 8°C (15°F) within a ten minute period. Did the trans temperature increase at a steady rate and rise 8°C (15°F) over a 10 minute period? Yes → Go To 7 No → Go To 6	All
6	Turn the ignition off to the lock position. Remove the Transmission pan. Disconnect the Governor Pressure Sensor/Transmission Temperature Sensor connector. **Note: Check connectors - Clean/repair as necessary** Measure the resistance of the Transmission Temperature Sensor. **Note: Acceptable Sensor Resistance Ranges in OHMS** Sensor Temperature compared to min to max ohm reading. -40°C (-40°F) - 1094 to 1176 ohms 0.00°C (32°F) - 1587 to 1672 ohms 25.0°C (77°F) - 1960 to 2040 ohms 70.0°C (158°F) - 2709 to 2860 ohms 100°C (212°F) - 3284 to 3500 ohms 120°C (120°F) - 3684 to 3950 ohms 150°C (302°F) - 4110 to 4450 ohms Is the resistance within the specified range when the sensor is at the given temperature? Yes → Test Complete. No → Replace the Governor Pressure/Transmission Temperature Sensor in per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0711-TRANS TEMP SENSOR, NO TEMP RISE AFTER START — Continued

TEST	ACTION	APPLICABILITY
7	The conditions to set this DTC are not present at this time. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins that may apply.** Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set if the Transmission Temperature Sensor Signal circuit voltage goes below 1.55 volts for 2.2 seconds.

POSSIBLE CAUSES
5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
INTERMITTENT TRANSMISSION TEMPERATURE SENSOR
5-VOLT SUPPLY CIRCUIT SHORT TO THE SENSOR GROUND CIRCUIT
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO GROUND
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO THE SENSOR GROUND CIRCUIT
5-VOLT SUPPLY CIRCUIT SHORT TO GROUND INSIDE TRANS
5-VOLT SUPPLY CIRCUIT SHORT TO THE SENSOR GROUND CIRCUIT INSIDE TRANS
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO GROUND INSIDE TRANS
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO THE SENSOR GROUND CIRCUIT INSIDE TRANS
TRANSMISSION TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Is the Specific Good Trip Counter for P0712 displayed and equal to 0? Yes → Go To 2 No → Go To 13	All

P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary. Measure the resistance between ground and the 5-volt Supply circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the 5-volt Supply circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary. Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary. Measure the resistance between ground and the Transmission Temperature Sensor Signal circuit in the of the Transmission Solenoid Assembly harness connector. Is the resistance above 100 kohms? Yes → Go To 6 No → Repair the Transmission Temperature Sensor Signal circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary. Measure the resistance between the Transmission Temperature Sensor Signal circuit and Sensor Ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Transmission Temperature Sensor Signal circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary. Measure the resistance between ground and the 5-volt Supply circuit at the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance above 100 kohms? Yes → Go To 8 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary. Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance above 100 kohms? Yes → Go To 9 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary. Measure the resistance between ground and the Transmission Temperature Sensor Signal circuit at the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance above 100 kohms? Yes → Go To 10 No → Replace the Transmission Solenoid Assembly in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary. Measure the resistance between the Transmission Temperature Sensor Signal circuit and Sensor Ground circuit at the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance above 100 kohms? Yes → Go To 11 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	Turn the ignition off. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. **Note: Check connectors - Clean/repair as necessary** Measure the resistance of the Transmission Temperature Sensor. **NOTE: Acceptable sensor resistance ranges in ohms.** Sensor Temperature compared to min to max ohm readings -40°C (-40°F) - 1094 to 1176 ohms 0°C (32°F) - 1587 to 1672 ohms 25°C (77°F) - 1960 to 2040 ohms 70°C (158°F) - 2709 to 2860 ohms 100°C (212°F) - 3284 to 3500 ohms 120°C (120°F) - 3684 to 3950 ohms 150°C (302°F) - 4110 to 4450 ohms Is the resistance below the minimum specification for the sensor temperature? Yes → Replace the Governor Pressure/Transmission Temperature Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 12	All
12	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0712-TRANS TEMP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 14	All
14	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 there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set if the Transmission Temperature Sensor Signal circuit voltage goes above 3.76 volts for 2.2 seconds.

POSSIBLE CAUSES
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO 5-VOLT SUPPLY CIRCUIT
INTERMITTENT WIRING AND CONNECTORS
TRANS TEMP SENSOR SIGNAL CIRCUIT OPEN
5-VOLT SUPPLY CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE INSIDE TRANS
TRANS TEMP SENSOR SIGNAL CIRCUIT SHORT TO 5-VOLT SUPPLY CIRCUIT INSIDE TRANS
TRANS TEMP SENSOR SIGNAL CIRCUIT OPEN INSIDE TRANS
5-VOLT SUPPLY CIRCUIT OPEN INSIDE TRANS
SENSOR GROUND CIRCUIT OPEN INSIDE TRANS
TRANSMISSION TEMPERATURE SENSOR
PCM - TRANSMISSION TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0713 set at 0? Yes → Go To 3 No → Go To 15	All
3	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Turn the ignition on. Remove the Transmission Control Relay from the PDC. Connect a jumper wire between Transmission Control Relay cavity 30 and cavity 87. Measure the voltage of the Transmission Temperature Sensor Signal circuit in the PCM C2 harness connector. Is the voltage above 0.5 volt? Yes → Repair the Transmission Temperature Sensor Signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM C1 and C2 harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between the Transmission Temperature Sensor Signal circuit and the 5-volt Supply circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 100k ohms? Yes → Go To 5 No → Repair the Transmission Temperature Sensor Signal circuit for a short to the 5-volt Supply circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Measure the resistance of the Transmission Temperature Sensor Signal circuit between the PCM C2 harness connector and the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Transmission Temperature Sensor Signal circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Measure the resistance of the 5-volt Supply circuit between the PCM C2 harness connector and the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the 5-volt Supply circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Disconnect the PCM C1 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Measure the resistance of the Sensor Ground circuit between the PCM C1 harness connector and the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Sensor Ground circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. **Note: The Transmission Solenoid Assembly harness connector must be connected before proceeding.** Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. Check connectors - Clean/repair as necessary Turn the ignition on. Measure the voltage of the Transmission Temperature Sensor Signal circuit in the Governor Pressure/Transmission Temperature Sensor harness connector. Is the voltage above 10.0 volts? Yes → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	Turn the ignition off. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Disconnect the Transmission Solenoid Assembly harness connector. Measure the resistance between the Transmission Temperature Sensor Signal circuit and 5-volt Supply circuit in the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance above 100 kohms? Yes → Go To 10 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. Check connectors - Clean/repair as necessary Measure the resistance of the Transmission Temperature Sensor Signal circuit between the Transmission Solenoid Assembly connector (transmission side) and the Governor Pressure/Transmission Temperature Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary Measure the resistance of the 5-volt Supply circuit between the Transmission Solenoid Assembly connector (transmission side) and Governor Pressure/ Transmission Temperature Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
12	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. Check connectors - Clean/repair as necessary Measure the resistance of the Sensor Ground circuit between the Transmission Solenoid Assembly connector (transmission side) and the Governor Pressure/ Transmission Temperature Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 13 No → Replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0713-TRANS TEMP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor connector. **Note: Check connectors - Clean/repair as necessary** Measure the resistance of the Transmission Temperature Sensor. **NOTE: Acceptable sensor resistance ranges in ohms** Sensor Temperature compared to max to min ohm reading. -40°C (-40°F) - 1094 to 1176 ohms 0°C (32°F) - 1587 to 1672 ohms 25°C (77°F) - 1960 to 2040 ohms 70°C (158°F) - 2709 to 2860 ohms 100°C (212°F) - 3284 to 3500 ohms 120°C (120°F) - 3684 to 3950 ohms 150°C (302°F) - 4110 to 4450 ohms Is the resistance above the maximum specification for the sensor temperature? Yes → Replace the Governor Pressure/Transmission Temperature Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 14	All
14	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
15	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0720-LOW OUTPUT SPEED SENSOR - RPM ABOVE 15 MPH

When Monitored and Set Condition:

P0720-LOW OUTPUT SPEED SENSOR - RPM ABOVE 15 MPH

When Monitored: Continuously with the key on, engine running, and gear selector NOT in park or neutral.

Set Condition: This code will set if the vehicle speed (from the CAB module) is above 24 kmh (15 MPH), and the Output Shaft Speed sensor is below 60 RPM for 2.6 seconds.

POSSIBLE CAUSES
PARK/NEUTRAL DTC PRESENT
INTERMITTENT WIRING AND CONNECTORS
OUTPUT SPEED SENSOR GROUND CIRCUIT OPEN
OUTPUT SPEED SENSOR SIGNAL CIRCUIT OPEN
OUTPUT SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND
OUTPUT SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
OUTPUT SPEED SENSOR
PCM - OUTPUT SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P0720-LOW OUTPUT SPEED SENSOR - RPM ABOVE 15 MPH — Continued

TEST	ACTION	APPLICABILITY
2	Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0720 displayed and equal to 0? Yes → Go To 3 No → Go To 12	All
3	Ignition on, engine not running. With the DRBIII®, read the Powertrain Control Module DTC's. Is there a Park/Neutral DTC present? Yes → Repair the Park/Neutral DTC before proceeding. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the Output Speed Sensor Signal circuit between the PCM harness connector and the Output Speed Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Output Speed Sensor Signal circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. **NOTE: Check connectors - Clean/repair as necessary** Measure the resistance of the Output Speed Sensor ground circuit between the PCM harness connector and the Output Speed Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Output Speed Sensor Ground circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
6	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the Output Speed Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the Output Speed Sensor Signal circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All

P0720-LOW OUTPUT SPEED SENSOR - RPM ABOVE 15 MPH — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the Output Speed Sensor ground circuit. Is the resistance below 5.0 ohms? Yes → Repair the Output Speed Sensor Ground circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. Ignition on, engine not running. Measure the voltage of the Output Speed sensor Signal circuit in the Output Speed Sensor harness connector. Is there any voltage present? Yes → Repair the Output Speed Sensor Signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Output Speed Sensor harness connector. **Check connectors - Clean/repair as necessary** Ignition on, engine not running. Measure the voltage of the Output Speed Sensor ground circuit in the Output Speed Sensor harness connector. Is there any voltage present? Yes → Repair the Output Speed Sensor ground circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 10	All
10	Turn the ignition off. Disconnect the Output Speed Sensor harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between the terminals of the Output Speed Sensor. Is the resistance between 300.0 and 1200.0 ohms? Yes → Go To 11 No → Replace the Output Speed Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0720-LOW OUTPUT SPEED SENSOR - RPM ABOVE 15 MPH — Continued

TEST	ACTION	APPLICABILITY
12	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 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 as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS

When Monitored and Set Condition:

P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS

When Monitored: Continuously with the key on.

Set Condition: This code will set if the voltage detected on the Torque Converter Clutch Solenoid Control circuit at the PCM is different than the expected voltage.

POSSIBLE CAUSES
TCC SOLENOID CONTROL CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
TCC SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION RELAY OUTPUT CIRCUIT SHORT TO GROUND
TCC SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
TCC SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
TORQUE CONVERTER CLUTCH SOLENOID
TRANSMISSION CONTROL RELAY - POOR CONTACTS
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0743 set to 0? Yes → Go To 3 No → Go To 13	All
3	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the DRBIII®, actuate the Transmission Control Relay. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light cycle on and off and illuminate brightly? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Ignition on, engine not running. With the DRBIII®, actuate the TCC Solenoid. Using a 12-volt test light connected to 12-volts, check the TCC Solenoid Control circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light cycle on and off and illuminate brightly? Yes → Check all internal wiring pertaining to the TCC Solenoid for an open, short, and bent or broken terminals. If no internal wiring problems are found, replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connectors. Disconnect the PCM harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance of the TCC Solenoid Control circuit between the Transmission Solenoid Assembly harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the TCC Solenoid Control circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the TCC Solenoid Control circuit in the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TCC Solenoid Control circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off to the lock position. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Ignition on, engine not running. Measure the voltage of the TCC Solenoid Control circuit. Is the voltage above 0.5 volt? Yes → Repair the TCC Solenoid Control circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. **Check connectors - Clean/repair as necessary** Measure the resistance between the TCC Solenoid Control circuit and all other circuits in the Transmission Solenoid Assembly harness connector. Is the resistance between the TCC Solenoid Control circuit and any other circuit below 5.0 ohms? Yes → Repair the TCC Solenoid Control circuit for a short to other circuit(s). Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off to the lock position. Remove the Transmission Control Relay. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Transmission Control Relay connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 11 No → Repair the Fused B+ circuit for an open. If the fuse is open make sure to check for a short to ground or high resistance in the Fused B+ circuit and repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. Measure the resistance between ground and the Fused Transmission Relay Control Output circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transmission Control Relay Output circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 12	All
12	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Ignition on, engine not running. Connect a jumper wire between the Fused Transmission Relay Output circuit and the Fused B+ in the Transmission Relay connector. Using a 12-volt test light connected to ground, check the Fused Transmission Relay Control Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Replace the Transmission Control Relay. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Repair the Fused Transmission Control Relay Output circuit for an open. If the fuse is open make sure to check for a short to ground or high resistance in the Fused Transmission Relay Output circuit and repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0743-TORQUE CONVERTER CLUTCH SOLENOID/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
13	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0748-PRESSURE SOL CONTROL/TRANS RELAY CIRCUITS

When Monitored and Set Condition:

P0748-PRESSURE SOL CONTROL/TRANS RELAY CIRCUITS

When Monitored: Continuously with the key on.

Set Condition: This code will set if the voltage detected on the Governor Pressure Solenoid Control circuit at the PCM is different than the expected voltage.

POSSIBLE CAUSES
FUSED B+ CIRCUIT OPEN
GOVERNOR PRESSURE SOLENOID CONTROL CIRCUIT OPEN
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
GOVERNOR PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION RELAY OUTPUT CIRCUIT SHORT TO GROUND
GOVERNOR PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
GOVERNOR PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
GOVERNOR PRESSURE SOLENOID
TRANSMISSION CONTROL RELAY - POOR CONTACTS
INTERMITTENT WIRING AND CONNECTORS
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P0748-PRESSURE SOL CONTROL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0748 set to 0? Yes → Go To 3 No → Go To 13	All
3	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the DRBIII®, actuate the Transmission Control Relay. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light cycle on and off and illuminate brightly? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connectors. Disconnect the PCM harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance of the Governor Pressure Solenoid Control circuit between the Transmission Solenoid Assembly harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Governor Pressure Solenoid Control circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the Governor Pressure Solenoid Control circuit in the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Solenoid Control circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 6	All

P0748-PRESSURE SOL CONTROL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the PCM harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Ignition on, engine not running. Measure the voltage of the Governor Pressure Solenoid Control circuit. Is the voltage above 0.5 volt? Yes → Repair the Governor Solenoid Control circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. **Check connectors - Clean/repair as necessary** Measure the resistance between the Governor Pressure Solenoid Control circuit and all other circuits in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms on any other circuit(s)? Yes → Repair the Governor Pressure Solenoid Control circuit for a short to other circuit(s). Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Remove the Transmission Oil Pan per the Service Information. Check all internal wiring pertaining to the Governor Pressure Solenoid for an open, short, and bent or broken terminals. If no internal wiring problems are found, replace the Governor Pressure Solenoid per the Service Information. Drive the vehicle performing multiple upshifts and downshifts. With the DRBIII®, read Transmission DTCs. Does the DTC reset? Yes → Go To 9 No → Test Complete. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
9	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0748-PRESSURE SOL CONTROL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off to the lock position. Remove the Transmission Control Relay. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Transmission Control Relay connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 11 No → Repair the Fused B+ circuit for an open. If the fuse is open, make sure to check for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. Measure the resistance between ground and the Transmission Control Relay Output circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transmission Control Relay Output circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 12	All
12	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Ignition on, engine not running. Connect a jumper wire between the Fused Transmission Relay Output circuit and Fused B+ in the Transmission Relay connector. Using a 12-volt test light connected to ground, check the Transmission Relay Control Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Replace the Transmission Control Relay. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Repair the Transmission Control Relay Output circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
13	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0751-O/D SWITCH PRESSED (LO) MORE THAN 5 MINUTES

When Monitored and Set Condition:

P0751-O/D SWITCH PRESSED (LO) MORE THAN 5 MINUTES

When Monitored: The engine must have been running for a minimum of 10 seconds. The test for this code is executed every 440ms.

Set Condition: This code will set if the Overdrive Off switch is held low for 5 minutes or more from the time of switch closure or ignition on.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
O/D OFF SWITCH SENSE CIRCUIT SHORTED TO GROUND
OVERDRIVE OFF SWITCH
PCM - O/D OFF SWITCH

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	With the DRBIII®, read DTCs. Is the Good Trip Counter for P0751 displayed and equal to 0? Yes → Go To 3 No → Go To 6	All

P0751-O/D SWITCH PRESSED (LO) MORE THAN 5 MINUTES — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the O/D Off Switch harness connector. Measure the resistance between ground and the O/D off switch sense circuit in the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the O/D OFF switch sense circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM C3 harness connector. Measure the resistance between ground and the O/D off switch sense circuit in the PCM C3 harness connector. Press the O/D Off switch button. Does the resistance change from above 5.0 ohms to below 5.0 ohms while pressing the O/D Off Switch? Yes → Go To 5 No → Replace the O/D Off Switch in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
6	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P0753-TRANS 3-4 SHIFT SOL/TRANS RELAY CIRCUITS

When Monitored and Set Condition:

P0753-TRANS 3-4 SHIFT SOL/TRANS RELAY CIRCUITS

When Monitored: Continuously with the key on.

Set Condition: This code will set if the voltage detected on the 3-4 Shift Solenoid Control circuit at the PCM is different than the expected voltage.

POSSIBLE CAUSES
P1765 DTC PRESENT
3-4 SHIFT SOLENOID CONTROL CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
3-4 SHIFT SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION RELAY OUTPUT CIRCUIT SHORT TO GROUND
3-4 SHIFT SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
3-4 SHIFT SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
3-4 SHIFT SOLENOID
TRANSMISSION CONTROL RELAY - POOR CONTACTS
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P0753-TRANS 3-4 SHIFT SOL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTCs. Is the DTC P1765 present? Yes → Refer to symptom P1765 in the Transmission category. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, read DTCs. Is the Good Trip Counter for P0753 displayed and equal to 0? Yes → Go To 4 No → Go To 14	All
4	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the DRBIII®, actuate the Transmission Control Relay. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light cycle on and off and illuminate brightly? Yes → Go To 5 No → Go To 11	All
5	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Ignition on, engine not running. With the DRBIII®, actuate the Overdrive (3-4) Solenoid. Using a 12-volt test light connected to 12-volts, check the 3-4 Shift Solenoid Control circuit in the Transmission Solenoid Assembly harness connector. **NOTE: Does the test light cycle on and off and illuminate brightly?** Does the test light cycle on and off and illuminate brightly? Yes → Check all internal wiring pertaining to the 3-4 Shift Solenoid for an open, short and bent or broken terminals. If no internal wiring problems are found, replace the Transmission Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition off to the lock position. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connectors. **Check connectors - Clean/repair as necessary.** Measure the resistance of the 3-4 Shift Solenoid Control circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the 3-4 Shift Solenoid Control circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0753-TRANS 3-4 SHIFT SOL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the 3-4 Shift Solenoid Control circuit in the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Repair the 3-4 Shift Solenoid Control circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the PCM C2 harness connectors. Disconnect the Transmission Solenoid Assembly harness connector. Ignition on, engine not running. Measure the voltage of the 3-4 Shift Solenoid Control circuit. Is the voltage above 0.5 volt? Yes → Repair the 3-4 Shift Solenoid Control circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the PCM C2 harness connector. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. **Check connectors - Clean/repair as necessary** Measure the resistance between the 3-4 Shift Solenoid Control circuit and all other circuits in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms on any circuit? Yes → Repair the Governor Pressure Solenoid Control circuit for a short to other circuit(s). Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
11	Turn the ignition off to the lock position. Remove the Transmission Control Relay. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Transmission Control Relay connector. **NOTE: The test light must illuminate brightly. Compare the brightness to when connected directly to the battery.** Does the light illuminate brightly? Yes → Go To 12 No → Repair the Fused B+ circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P0753-TRANS 3-4 SHIFT SOL/TRANS RELAY CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
12	Turn ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Remove the Transmission Control Relay. Measure the resistance between ground and the Fused Transmission Relay Control Output circuit. Is the resistance below 5.0 ohms? Yes → Repair the Fused Transmission Control Relay Output circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 13	All
13	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Check connectors - Clean/repair as necessary Ignition on, engine not running. Connect a jumper wire between the Fused Transmission Relay Output circuit and the Fused B+ in the Transmission Relay connector. Using a 12-volt test light connected to ground, check the Fused Transmission Relay Control Output circuit in the Transmission Solenoid Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to when connected directly to the battery.** Does the test light illuminate brightly? Yes → Replace the Transmission Control Relay. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Repair the Fused Transmission Control Relay Output circuit for an open. If the Fuse is open, make sure to check for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
14	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1740-TCC O/D SOL PERFORMANCE

When Monitored and Set Condition:

P1740-TCC O/D SOL PERFORMANCE

When Monitored: The Torque Convertor Clutch (TCC) and Overdrive Clutch (O/D) will be tested each time the PCM requests TCC engagement in 3rd gear and O/D.

Set Condition: The code will set if the expected RPM drop is not achieved while attempting to engage TCC or O/D. This indicates a malfunctioning torque convertor or overdrive clutch.

POSSIBLE CAUSES
P1765 DTC PRESENT
ENGINE DTCS PRESENT
PTO ENGAGED (IF EQUIPPED)
TRANSMISSION DTCS PRESENT
TRANSMISSION TEMPERATURE TOO COLD
FUEL LEVEL LOW
TRANSFER CASE IN LOW RANGE (IF EQUIPPED)
CHECK TRANSMISSION FLUID LEVEL
CHECK TRANSMISSION FLUID-STALL
OIL PAN CONTAINS EXCESSIVE DEBRIS
3-4 SHIFT SOLENOID
SHAFT OR SEAL DAMAGE
TCC SOLENOID
TORQUE CONVERTER
INTERMITTENT WIRING AND CONNECTORS

P1740-TCC O/D SOL PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	With the DRBIII®, read Engine and Transmission DTCs. Is the Good Trip counter for P1740 displayed and equal to 0? Yes → Go To 3 No → Go To 23	All
3	With the DRBIII®, read Transmission DTCs. Is the DTC P1765 present? Yes → Refer to the Transmission category and perform the appropriate symptom. Repair this DTC first before proceeding. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	With the DRBIII®, read Engine DTCs. Are any Cam, Engine RPM, Misfire, P/N, or TPS DTC's present? Yes → Refer to the Driveability category and perform the appropriate symptom. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 5	All
5	With the DRBIII®, read Transmission DTCs. Is P0720, P0743 or P0753 transmission DTCs present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition on. Check the vehicles Fuel level. Is the fuel level below 1/4 tank? Yes → The diagnostic monitors will not run, if the fuel level is low. Correct the fuel level in the vehicle. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All

P1740-TCC O/D SOL PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Make sure the Transfer Case is not in LOW range Is the Transfer Case in Low range? Yes → Move the Transfer Case out of LOW range. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All
8	Make sure the PTO is not engaged. Is the PTO engaged? Yes → Disengage the PTO. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	With the DRBIII® in Sensors, read the Transmission Fluid Temperature. Is the Transmission Fluid Temperature below 0 ° Celsius or 32 ° Fahrenheit? Yes → Warm the transmission fluid temperature to above 0° C (32° F). Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 10	All
10	With the DRBIII®, build a custom display. Display Engine RPM, Output Shaft Speed, TCC Solenoid, O/D Solenoid and TPS. **NOTE: This display will monitor the operation of the components.** Turn off Overdrive. Test drive the vehicle. Attain a steady speed of 88.5 Km/h or 55 MPH with a minimum of 1.15 volts throttle opening for 20 seconds. **NOTE: Check the Shift pattern as the vehicle upshifts to 88.5 Km/h or 55 MPH.** Is the Engine RPM within 60 RPM of the Output Shaft Speed RPM? Yes → Go To 11 No → Go To 17	All
11	Is the Output Shaft Speed greater than Engine RPM? Yes → Go To 12 No → Go To 17	All
12	Test drive the vehicle. Attain a steady state speed of 88.5 Km/h or 55 MPH. **NOTE: Use this formula, Output Shaft Speed x 0.69 = expected Engine RPM** Did the Engine RPM drop to 0.69 of the Output Shaft Speed? Yes → Go To 17 No → Go To 13	All

P1740-TCC O/D SOL PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Connect a 0 to 2068 Kpa or 0 to 300 PSI pressure gauge to the Overdrive Clutch Test Port. Connect a 0 to 2068 Kpa or 0 to 300 PSI pressure gauge to the Governor Test Port. Start the engine. **NOTE: Allow the transmission temperature to rise to normal operating temperature.** While observing both pressure gauges, select 4th Gear from Gov and 3-4 System Test. **NOTE: The Governor pressure should rise to above 137.8 Kpa or 20 PSI, shortly after this the OD pressure should rise to above 275.7 Kpa or 40 PSI.** Did the pressure act as described? Yes → Go To 14 No → Go To 16	All
14	Check the transmission fluid level per the Service information. Is the fluid level OK? Yes → Go To 15 No → If the Transmission Fluid is low, inspect the Transmission and cooler lines for any leaks and repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
15	Remove the transmission oil pan per the Service information. Is the oil burnt or does the pan contain excessive debris? Yes → If the Transmission Fluid is in a contaminated or burnt condition, refer to the Service Information for the proper repair procedure. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 23	All
16	Replace the 3-4 shift solenoid per the Service information. Connect a 0 to 2068 Kpa or 0 to 300 PSI pressure gauge to the Overdrive Clutch Test Port. Connect a 0 to 2068 Kpa or 0 to 300 PSI pressure gauge to the Governor Test Port. Start the engine. **NOTE: Allow the transmission temperature to rise to normal operating temperature.** While observing both pressure gauges, actuate the 3-4 Shift Solenoid with the DRBIII®. **NOTE: The Governor pressure should rise to above 137.8 Kpa or 20 PSI, shortly after this the OD pressure should rise to above 275.7 Kpa or 40 PSI.** Did the pressure act as described? Yes → Test Complete. No → Overhaul the transmission per the Service information. Carefully inspect the seals and clutches related to the OD Clutch. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
17	Check the transmission fluid level per the Service information. Is the fluid level OK? Yes → Go To 18 No → Repair the incorrect fluid level in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1740-TCC O/D SOL PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
18	Turn the ignition on. With the DRBIII®, perform the Torque Converter Clutch test. Did the engine stall? Yes → Go To 19 No → Go To 21	All
19	Start the engine. Perform the Governor and 3-4 Shift Valve System Test, select 4th gear. Did the vehicle stall? Yes → Go To 20 No → Go To 23	All
20	Replace the TCC solenoid. Perform the Gov and 3-4 Shift Valve System test, select 4th gear. Did the vehicle stall? Yes → Repair internal transmission problem. Check for blocked passages. Refer to Transmission Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All
21	Remove the Transmission Oil Pump per the Service information. Inspect the Reaction shaft, Input Shaft and Input seal. Are any of the parts damaged or worn? Yes → Repair as necessary, also replace the Torque Converter. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 22	All
22	If there are no possible causes remaining, view repair. Repair Replace the Torque converter. NOTE: Inspect the Reaction Shaft, Input Shaft and Input Seal. Replace as necessary if any of the parts are damaged or worn. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
23	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom List:

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI
P1756-GOV PRESS NOT EQUAL TO TARGET @ 35 - 40 PSI (DIESEL)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI.

When Monitored and Set Condition:

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI

When Monitored: Continuously with the key on and the engine running.

Set Condition: This DTC will set if the Governor Pressure Sensor output is less than 103 KPa or 15 PSI or greater than 207 KPa or 30 PSI when the requested pressure is 138-172 KPa or 20-25 PSI for 2.2 seconds. Two trips of five consecutive bad 2.2 second tests with a Transmission temperature between 10 - 127°C or 50 - 260°F.

P1756-GOV PRESS NOT EQUAL TO TARGET @ 35 - 40 PSI (DIESEL)

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set if the gov press sensor output is < 241 KPa (35 PSI) or > 276 KPa (40 PSI) when the requested pressure is 241-276 KPa (35-40 PSI) for 2.2 seconds. Two trips of five consecutive bad 2.2 second tests with sump temp 10-127°C (50-260°F).

POSSIBLE CAUSES
5 VOLT SUPPLY CIRCUIT OPEN
GOV PRESSURE SENSOR SIGNAL CIRCUIT OPEN
GOV PRESS SENSOR SIGNAL CKT SHORT TO GND
GOV PRESS SENSOR SIGNAL CKT SHORT TO SENSOR GND
GOV PRESS SENSOR SIGNAL CKT SHORT TO VOLTAGE
OIL BURNT OR OIL PAN HAS EXCESSIVE DEBRIS
VALVE BODY
INTERNAL TRANSMISSION
GOVERNOR PRESSURE SENSOR
GOVERNOR PRESSURE SOLENOID
PCM - 5 VOLT SUPPLY
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	Turn the ignition on. With the DRBIII®, read DTCs. Is the Trip Counter for P1756 set to 0? Yes → Go To 3 No → Go To 18	All
3	**Caution: Apply the parking brake.** Start engine. Warm the transmission to normal operating temperature. **Caution: Apply the brakes.** Place the gear selector in Drive with the engine at idle. With the DRBIII®, read the governor pressure. Is the governor pressure above 21 KPa or 3 PSI? Yes → Go To 4 No → Go To 5	All
4	Turn the ignition off. Install a pressure gauge at the governor pressure test port. **NOTE: Use the appropriate pressure gauge for the pressure range measured.** **Caution: Apply the parking brake.** Start the engine. Warm the engine to normal operating temperature. **Caution: Apply the brakes.** Place the gear selector in Drive with the engine at idle. Read the governor pressure on the gauge in Drive. Is the governor pressure on the gauge below 21 KPa or 3 PSI? Yes → Go To 8 No → Go To 16 **NOTE: If you answered Yes, the Governor Pressure Solenoid is functioning properly.**	All

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

TEST	ACTION	APPLICABILITY
5	**Caution: Apply the parking brake.** Place the gear selector in Park. Start the engine. Warm the transmission to normal operating temperature. With the engine still running, remove the Transmission Control Relay from the PDC. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Relay removal may set various codes. Disregard any DTC that may set due to relay removal.** **Caution: Apply the brakes.** Place the gear selector in Drive allow the engine to idle for 30 seconds. With the DRBIII® read the Actual Governor Pressure at idle. Is the governor pressure on the DRBIII® 276 - 379 KPa (40 - 55 PSI)? Yes → Go To 6 No → Go To 7	All
6	Turn the ignition off. Replace the Governor Pressure Solenoid per the Service Information. Warm the engine to normal operating temperature. With the DRBIII®, monitor the target governor pressure and actual governor pressure. Drive the vehicle at a constant speed 40 - 48 Km/h or 25 - 30 MPH. **NOTE: The Actual Governor Pressure should be within 21 KPa or 3 PSI of the Target Governor Pressure with in 3 seconds.** Is the Actual Governor Pressure within 21 KPa or 3 PSI of the Target Governor Pressure? Yes → Test Complete. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Repair internal transmission leak. Inspect all components pertaining to the Governor Pressure Sensor and/or Governor Pressure Solenoid. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Install a pressure gauge at the governor pressure test port. **Caution: Apply the parking brake.** Place the gear selector in Park. Start the engine. Warm the engine to normal operating temperature. With the engine still running, remove the Transmission Control Relay from the PDC. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Relay removal may set various codes. Disregard any DTC that may set due to relay removal.** **Caution: Apply the brakes.** Place the gear selector in Drive with the engine at idle. Read the governor pressure on the gauge. Is the governor pressure on the gauge 276 - 379 KPa or 40 - 55 PSI? Yes → Go To 8 No → Go To 16 **NOTE: If gauge reading is within 21 KPa or 3 PSI of DRBIII reading, the sensor and wiring are functioning properly.**	All
8	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. **Check connectors - Clean/repair as necessary** Turn the ignition on. Measure the voltage of the 5 volt supply circuit at the Transmission Solenoid Assembly harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 9 No → Go To 15	All
9	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the Governor Pressure Sensor Signal circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the Governor Pressure Sensor Signal circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 11	All
11	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C1 and C2 harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance of the Governor Pressure Sensor Signal circuit to the Sensor Ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 12	All
12	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the voltage above 0.5 volt? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 13	All
13	**Caution: Apply the brakes.** Place the gear selector in Neutral. With the DRBIII®, read the Governor Pressure Sensor voltage. While backprobing, measure the voltage of the governor pressure sensor signal circuit at the PCM. Compare the voltmeter reading of the governor pressure sensor signal circuit to the DRBIII® Governor Pressure Sensor voltage. Start the engine. Does the DRBIII® Governor Press Sensor voltage match the voltage on the voltmeter ± 0.2 volts? Yes → Go To 14 No → Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

<table>
<tr><th>TEST</th><th>ACTION</th><th>APPLICABILITY</th></tr>
<tr><td>14</td><td>Remove the Transmission Oil Pan per the Service information.
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.
NOTE: Check connectors and wiring - Clean/repair as necessary.
If no wiring or connector problems were found, replace the Governor Pressure Sensor per the Service Information.
With the DRBIII®, erase DTCs.
Drive the vehicle to the DTCs set conditions.
Did the DTC return?

Yes → Replace the Powertrain Control Module per the Service Information.
Perform TRANSMISSION VERIFICATION TEST VER - 1.

No → Test Complete.
Perform TRANSMISSION VERIFICATION TEST VER - 1.</td><td>All</td></tr>
<tr><td>15</td><td>Turn the ignition off.
Disconnect the Transmission Solenoid Assembly harness connector.
Disconnect the PCM C2 harness connector.
Check connectors - Clean/repair as necessary
Measure the resistance of the 5 volt supply circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector.
Is the resistance below 5.0 ohms?

Yes → Replace the Powertrain Control Module per the Service Information.
Perform TRANSMISSION VERIFICATION TEST VER - 1.

No → Repair the 5 volt supply circuit for an open.
Perform TRANSMISSION VERIFICATION TEST VER - 1.</td><td>All</td></tr>
<tr><td>16</td><td>Turn the ignition off.
Remove the transmission oil pan and inspect for burnt oil and excessive debris.
Is the transmission oil burnt or does the transmission oil pan contain excessive debris?

Yes → Repair the internal transmission per the Service Information.
Perform TRANSMISSION VERIFICATION TEST VER - 1.

No → Go To 17</td><td>All</td></tr>
<tr><td>17</td><td>Turn the ignition off.
Replace the Governor Pressure Solenoid per the Service Information.
Install a pressure gauge at the governor pressure test port.
Start the engine.
Warm the transmission to normal operating temperature.
Caution: Apply the brakes.
Place the gear selector in Drive and allow the engine to idle.
Read the governor pressure on the pressure gauge in Drive.
Is the governor pressure on the gauge below 21 KPa or 3 PSI?

Yes → Test Complete.

No → Repair or replace the valve body per the Service Information.
Perform TRANSMISSION VERIFICATION TEST VER - 1.</td><td>All</td></tr>
</table>

P1756-GOV PRESS NOT EQUAL TO TARGET @ 15-20 PSI — Continued

TEST	ACTION	APPLICABILITY
18	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH

When Monitored and Set Condition:

P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH

When Monitored: Continuously with the key on and engine running.

Set Condition: This code will set if the Governor Press Sensor output is > 21 kPa (3 PSI) when requested pressure is 0 kPa (0 PSI) with Governor Press Solenoid Duty cycle at 95% for 2.65 seconds. Two trips of two consecutive bad 2.65 second tests are required to set the code.

POSSIBLE CAUSES
5 VOLT SUPPLY CIRCUIT OPEN
GOV PRESSURE SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
GOV PRESS SENSOR SIGNAL CKT SHORT TO GND
GOV PRESS SENSOR SIGNAL CKT SHORT TO SENSOR GND
GOV PRESS SENSOR SIGNAL CKT SHORT TO VOLTAGE
OIL BURNT OR OIL PAN HAS EXCESSIVE DEBRIS
OD/TCC SOLENOID ASSEMBLY
VALVE BODY
INTERMITTENT WIRING AND CONNECTORS
PCM - 5 VOLT SUPPLY
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read Transmission DTCs. **Note: You may be removing the Transmission Control Relay during this test, this will set other codes. They can be disregarded.** Is the Good Trip Counter for P1757 displayed and equal to 0? Yes → Go To 3 No → Go To 17	All
3	Start the engine. Warm the engine to normal operating temperature. With the DRBIII®, read the governor pressure. Place the gear selector in Drive with the engine at idle. Is the governor pressure above 21 kPa or 3 PSI? Yes → Go To 4 No → Go To 17	All
4	Turn the ignition off. Install a pressure gauge at the governor pressure test port. **Caution: Apply the parking brake.** Start the engine. Warm the engine to normal operating temperature. **Caution: Apply the brakes.** Place the gear selector in Drive with the engine at idle. Read the governor pressure on the gauge in Drive. Is the governor pressure on the gauge below 21 kPa or 3 PSI? Yes → Go To 5 No → Go To 15 **NOTE: If you answered Yes, the Governor Pressure Solenoid is functioning properly.** **NOTE: If you answered No, the wiring and Governor Pressure Sensor are functioning properly.**	All
5	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. **Check connectors - Clean/repair as necessary** Turn the ignition on. Measure the voltage of the 5 volt supply circuit at the Transmission Solenoid Assembly harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 6 No → Go To 14	All

P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the governor pressure sensor signal circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Governor Pressure Sensor Signal circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C1 harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground circuit between the Transmission Solenoid Assembly harness connector and the PCM C1 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Sensor Ground circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Sensor signal circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C1 and C2 harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance of the Governor Pressure Sensor Signal circuit to the Sensor Ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 10	All

P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the voltage above 1.0 volt? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 11	All
11	Remove the Transmission Oil Pan per the Service information. 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. **NOTE: Check connectors and wiring - Clean/repair as necessary.** If no wiring or connector problems were found, replace the Governor Pressure Sensor per the Service Information. With the DRBIII®, erase DTCs. Place the gear selector lever in drive with the engine at idle. Did the DTC return? Yes → Go To 12 No → Test Complete.	All
12	**NOTE: All wiring must be operational for the result of this test to be valid.** Start the engine. Place the gear selector in Neutral. With the DRBIII®, read the Governor Pressure Sensor voltage. Measure the voltage of the Governor Pressure Sensor Signal circuit by back probing at the PCM. Compare the voltmeter reading of the Governor Pressure Sensor Signal circuit to the DRBIII® Governor Pressure Sensor voltage. Does the DRBIII® Gov Press Sensor voltage match the voltage on the voltmeter? Yes → Go To 13 No → Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
13	If there are no possible causes remaining, view repair. Repair Replace the OD/TCC Solenoid Assembly per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1757-GOV PRESS ABOVE 3 PSI IN GEAR WITH 0 MPH — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the 5 volt supply circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Repair the 5-volt supply circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
15	Turn the ignition off. Remove the transmission oil pan per the Service Information and inspect for burnt oil and excessive debris. Is the transmission oil burnt or does the transmission oil pan contain excessive debris? Yes → Repair the Internal Transmission per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 16	All
16	Turn the ignition off. Replace the Governor Pressure Solenoid in accordance with the Service Information. Install a pressure gauge at the governor pressure test port. Start the engine. Warm the engine to normal operating temperature. **Caution: Apply the brakes.** Place the gear selector in Drive with the engine at idle. Read the governor pressure on the gauge in Drive. Is the governor pressure on the gauge below 21 KPa or 3 PSI? Yes → Test Complete. No → Replace the Valve Body per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
17	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1762-GOV PRESS SEN OFFSET VOLTS TOO LO OR HIGH

When Monitored and Set Condition:

P1762-GOV PRESS SEN OFFSET VOLTS TOO LO OR HIGH

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set if the governor pressure is out of range in park or neutral for 1.3 seconds for three consecutive bad 3.0 second tests and sump temp > 10°C (50°F) and < 127°C (260°F) are required to set the code.

POSSIBLE CAUSES
GOVERNOR PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
5 VOLT SUPPLY CIRCUIT SHORT TO SENSOR GROUND
5 VOLT SUPPLY CIRCUIT SHORT TO GROUND
GOVERNOR PRESSURE SENSOR
GOVERNOR PRESSURE SENSOR - BELOW 3 PSI
INTERNAL TRANSMISSION PROBLEM
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	Turn the ignition on. With the DRBIII®, read PCM DTCs. Is the Good Trip counter for P1762 equal to 0? Yes → Go To 3 No → Go To 11	All

P1762-GOV PRESS SEN OFFSET VOLTS TOO LO OR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	**CAUTION: Apply the parking brake.** Start the engine. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Place the gear selector in Neutral. With the DRBIII®, read the governor pressure voltage. Measure the voltage of the Governor Pressure Sensor Signal circuit by back probing at the PCM. Compare the voltmeter reading of the Governor Pressure Sensor Signal circuit to the DRB Governor Pressure Sensor voltage. **NOTE: The voltmeter reading should be within 0.25 volts of the DRBIII® Gov Pressure Sensor voltage reading.** Does the DRBIII® Gov Press Sensor voltage match the Gov Press Sen voltage on the voltmeter? Yes → Go To 4 No → Replace the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
4	**CAUTION: Apply the parking brake.** Start the engine and allow the engine to idle. With the DRBIII® in Sensors, read the Governor Pressure with the Transmission Shift selector in Park. Is the Governor Pressure reading on the DRBIII® above 21 kPa or 3 PSI? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Connect the DRBIII® and a 700 kPa (100 PSI) Pressure Gauge to the Governor Pressure test port. Start the engine and allow the engine to idle. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Allow the transmission to reach normal operating temperature. With the DRBIII® in Sensors, record the Governor Pressure. With the DRBIII®, read the Governor Pressure Gage reading. Compare the DRBIII® Governor Pressure reading with the Pressure Gauge reading. Does the DRBIII® Governor Pressure reading match the Pressure Gauge reading within 6.9 kPa or 1 PSI? Yes → Repair internal transmission as necessary. Pay particular attention to internal transmission fluid leakage in the valve body or the Governor Pressure Solenoid. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 6 **NOTE: IF you answered Yes, the Governor Pressure sensor is functioning properly. If the gauge reading is below 21 KPa or 3 PSI, the Governor Pressure Solenoid is functioning properly.**	All

P1762-GOV PRESS SEN OFFSET VOLTS TOO LO OR HIGH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM harness connectors. **Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage of the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the voltage above 0.5 volt? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Check internal transmission wiring pertaining to the Governor Pressure Sensor. If wiring is suspect, replace the internal wiring harness. If the internal wiring is OK, replace the Governor Pressure Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between ground and the 5-volt Supply circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Go To 9 No → Repair the 5 Volt Supply circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
9	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
10	If there are no possible causes remaining, view repair. Repair Check internal transmission wiring pertaining to the Governor Pressure Sensor. If wiring is suspect, replace the internal wiring harness. If the internal wiring is OK, replace the Governor Pressure Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1762-GOV PRESS SEN OFFSET VOLTS TOO LO OR HIGH — Continued

TEST	ACTION	APPLICABILITY
11	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI

When Monitored and Set Condition:

P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set when the voltage from the governor pressure sensor is above 4.89 volts for 8.5 seconds.

POSSIBLE CAUSES
OTHER TRANSMISSION DTC'S PRESENT
PARK NEUTRAL DTC PRESENT
5 VOLT SUPPLY CIRCUIT OPEN
GOV PRESSURE SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
GOV PRESS SENSOR SIGNAL CKT SHORT TO VOLTAGE
5 VOLT SUPPLY CIRCUIT OPEN INSIDE TRANS
GOV PRESS SENSOR SIGNAL CKT OPEN INSIDE TRANS
GOV PRESS SENSOR GROUND CKT OPEN INSIDE TRANS
GOV PRESS SENSOR SIGNAL CKT SHORT TO VOLTAGE INSIDE TRANS
GOVERNOR PRESSURE SENSOR (HIGH)
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All

P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read transmission DTCs. Is the Good Trip Counter for P1763 displayed and equal to 0? Yes → Go To 3 No → Go To 15	All
3	Turn the ignition on. With the DRBIII®, read transmission DTCs. Are any other transmission DTCs present? Yes → Repair all other transmission DTCs before proceeding. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition on. With the DRBIII®, read engine DTCs. Is a Park/Neutral DTC present? Yes → Repair the Park/Neutral DTC before proceeding. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the 5 volt supply circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the 5 volt supply circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the governor pressure sensor signal circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the governor pressure sensor signal circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C1 harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance of the sensor ground circuit between the Transmission Solenoid Assembly harness connector and the PCM C1 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the sensor ground circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the governor pressure sensor signal circuit in the Transmission Solenoid Assembly harness connector. Is the voltage above 1.0 volt? Yes → Repair the governor pressure sensor signal circuit for a short to voltage. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 9	All
9	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. Measure the resistance of the 5 volt supply circuit between the Governor Pressure/Transmission Temperature Sensor harness connector and the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Replace the Transmission Solenoid Assembly in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
10	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the governor pressure sensor signal circuit between the Transmission Solenoid Assembly harness connector and the Governor Pressure/Transmission Temperature Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Replace the Transmission Solenoid Assembly in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI — Continued

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the sensor ground circuit between the Transmission Solenoid Assembly harness connector and the Governor Pressure/Transmission Temperature Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Replace the Transmission Solenoid Assembly in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
12	Turn the ignition off. **Note: The Transmission Solenoid Assembly harness connector must be connected before proceeding.** Remove the transmission oil pan. Disconnect the Governor Pressure/Transmission Temperature Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the governor pressure sensor signal circuit in the Governor Pressure/Transmission Temperature Sensor harness connector. Is the voltage above 1.0 volt? Yes → Replace the Transmission Solenoid Assembly in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 13	All
13	**NOTE: All Governor Pressure Sensor wiring must be operational for the result of this test to be valid.** Start the engine. **CAUTION: Set the parking brake.** Place the gear selector in Neutral. With the DRBIII®, read the governor pressure voltage. Measure the voltage of the governor pressure sensor signal circuit by back probing at the PCM connector. Compare the voltmeter reading of the governor pressure sensor signal circuit to the DRBIII® Governor Pressure Sensor voltage. Does the DRBIII® Gov Press Sensor voltage match the Gov Pressure Sensor voltage on the voltmeter? Yes → Go To 14 No → Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
14	If there are no possible causes remaining, view repair. Repair Replace the Governor Pressure/Transmission Temperature Sensor in accordance with the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1763-GOVERNOR PRESSURE SENSOR VOLTS TOO HI — Continued

TEST	ACTION	APPLICABILITY
15	The conditions necessary set this DTC are not present at this time. 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. 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. Refer to any technical service bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1764-GOVERNOR PRESSURE SENSOR VOLTS TOO LOW

When Monitored and Set Condition:

P1764-GOVERNOR PRESSURE SENSOR VOLTS TOO LOW

When Monitored: Continuously with the key on and the engine running.

Set Condition: This code will set if the voltage from the Governor Pressure Sensor is below .10 volt for 8.5 seconds.

POSSIBLE CAUSES
OTHER TRANSMISSION DTC'S PRESENT
PARK NEUTRAL DTC PRESENT
5 VOLT SUPPLY CIRCUIT OPEN
GOVERNOR PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND
GOVERNOR PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO SENSOR GROUND
GOVERNOR PRESSURE SENSOR
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	Turn the ignition on. With the DRBIII®, read DTCs. Is the Good Trip Counter for P1764 set to 0? Yes → Go To 3 No → Go To 9	All

P1764-GOVERNOR PRESSURE SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, read DTCs. Are any other transmission DTCs present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 4	All
4	Turn the ignition on. With the DRBIII®, read DTCs. Is there a Park/Neutral DTC present? Yes → Refer to the Driveability category and perform the appropriate symptom. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance of the 5 volt supply circuit between the Transmission Solenoid Assembly harness connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the 5 volt supply circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary** Measure the resistance between Ground and the Governor Pressure Sensor Signal circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Governor Pressure Sensor Signal circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the Transmission Solenoid Assembly harness connector. Disconnect the PCM C1 and C2 harness connectors. **Check connectors - Clean/repair as necessary** Measure the resistance of the governor pressure sensor signal circuit to the sensor ground circuit in the Transmission Solenoid Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the governor Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Go To 8	All

P1764-GOVERNOR PRESSURE SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Start the engine. Place the gear selector in Neutral. With the DRBIII®, read the Governor Pressure Sensor voltage. Measure the voltage of the governor pressure sensor signal circuit by back probing at the PCM. Compare the voltmeter reading of the governor pressure sensor signal circuit to the DRBIII® Governor Pressure Sensor voltage. Does the DRBIII® Governor Pressure Sensor voltage match the voltage on the voltmeter ± 0.2 volts? Yes → Remove the Transmission Oil pan and inspect the Sensor wiring for open, shorts, pinched or frayed wiring. Check connectors for bent, broken and/or pushed out pins. If no problem are found, replace the Governor Pressure Sensor per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
9	The conditions necessary to set this DTC are not present at this time. 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. 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. Refer to any Technical Service Bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1765-TRANS 12 VOLT SUPPLY RELAY CTRL CIRCUIT

When Monitored and Set Condition:

P1765-TRANS 12 VOLT SUPPLY RELAY CTRL CIRCUIT

When Monitored: Continuously with the key on.

Set Condition: This code will set if the voltage detected on the Transmission Relay Control circuit at the PCM is different than the expected voltage for 3 seconds.

POSSIBLE CAUSES
TRANSMISSION CONTROL RELAY
GENERATOR SOURCE CIRCUIT OPEN
GENERATOR SOURCE CIRCUIT SHORT TO GROUND
TRANSMISSION RELAY CONTROL CIRCUIT OPEN
TRANSMISSION RELAY CONTROL CIRCUIT SHORT TO GROUND
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

TEST	ACTION	APPLICABILITY
1	**NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** **NOTE: Low fluid level can be the cause of many transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the service information.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing transmission symptom diagnostics. Check the TV linkage adjustment per the Service Information. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. **NOTE: Verify the flash level of the Powertrain Control Module. Some problems are corrected by software upgrades. Check for any applicable TSB's related to this condition.** Perform these procedures prior to Symptom Diagnosis. Continue Go To 2	All
2	Turn the ignition on. With the DRB III®, read the DTCs. Is the Good Trip Counter for P1765 displayed and equal to 0? Yes → Go To 3 No → Go To 10	All

P1765-TRANS 12 VOLT SUPPLY RELAY CTRL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, actuate the Transmission Control Relay. Is the Transmission Control Relay clicking? Yes → Go To 10 No → Go To 4	All
4	Turn the ignition off. Remove the Transmission Control Relay from the PDC. **Check connectors - Clean/repair as necessary.** Install a substitute relay in place of the Transmission Control Relay. Turn the ignition on. With the DRBIII®, erase DTCs. Start the engine. With the DRBIII®, read PCM DTCs. Does the DRBIII® display the DTC P1765? Yes → Go To 5 No → Replace the Transmission Control Relay. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Remove the Transmission Control Relay from the PDC. **Check connectors - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Generator Source circuit in the Transmission Control Relay connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Generator Source circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Remove the Transmission Control Relay from the PDC. Disconnect the PCM harness connectors. **Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Generator Source circuit in the Transmission Control Relay connector. Is the resistance above 100k ohms? Yes → Go To 7 No → Repair the Generator Source circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All

P1765-TRANS 12 VOLT SUPPLY RELAY CTRL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the Transmission Control Relay from the PDC. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance of the Transmission Control Relay Control circuit between the Transmission Control Relay connector and the PCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Transmission Control Relay Control circuit for an open. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
8	Turn the ignition off. Remove the Transmission Control Relay from the PDC. Disconnect the PCM C2 harness connector. **Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transmission Control Relay Control circuit in the Transmission Control Relay connector. Is the resistance above 100k ohms? Yes → Go To 9 No → Repair the Transmission Control Relay Control circuit for a short to ground. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
9	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform TRANSMISSION VERIFICATION TEST VER - 1.	All
10	The conditions necessary to set this DTC are not present at this time. 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. 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. Refer to any Technical Service Bulletins that may apply. Were there any problems found? Yes → Repair as necessary. Perform TRANSMISSION VERIFICATION TEST VER - 1. No → Test Complete.	All

Verification Tests

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. **2. NOTE: If the SKIM or PCM/ECM was replaced, refer to the service information for proper programming procedures.** 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds before attempting to start (to learn VIN). 4. If the vehicle is equipped with VTSS, use the DRBIII® and enable VTSS. 5. Program other options as necessary. 6. (Export only) If the Intrusion Transceiver Module (ITM) was replaced, use the DRBIII® to enable the ITM and Program Interior type. 7. (Export only) If the Siren was replaced perform the DRBIII® Siren Replacement procedure. 8. If the Passenger Door Module was replaced, use the DRBIII® and program all RKE transmitters used with this vehicle. 9. If any repairs were made to AZC HVAC System, turn ignition on, set AZC to automatic mode, turn ignition off, remove IOD fuse from PDC, wait several seconds and reinstall IOD fuse, turn ignition on, do not touch AZC controls for at least one minute. 10. Ensure all accessories are turned off and the battery is fully charged. 11. With the DRBIII®, record and erase all DTC's from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern. 12. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTC's from ALL modules. Are any DTC's present or is the original condition still present? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

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 oil contamination is suspected, change the oil and filter. 3. If the PCM was not replaced skip steps 4 through 6 and continue the verification. 4. If the PCM was replaced the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with 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. Is the vehicle still unable to start or are there any DTCs or symptoms remaining? Yes → Check for any related Technical Service Bulletins and/or refer to the appropriate Symptoms list (Diagnostic Procedure). No → Repair is complete.	All

Verification Tests — Continued

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 no trouble codes 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 13. 6. Connect the DRBIII® to the data link connector. Using the DRBIII® erase any diagnostic trouble codes and reset all values. 7. If the PCM was not replaced, skip steps 8 through 10 and continue with the verification. 8. If the PCM was replaced the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with 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 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 11. Road test the vehicle. If the test is for an A/C DTC, ensure it is operating during the following test. 12. Drive the vehicle for at least 5 minutes at or around 64 Kmh (40 mph). Ensure the transmission shifts through all gears. At some point stop the vehicle and turn off the engine for at least 10 seconds. 13. With the DRBIII®, read DTCs. Are there any DTC(s) present? Yes → Check for any related Technical Service Bulletins and/or refer to the appropriate Symptom list (Diagnostic Procedure). No → Repair is complete.	All

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 was not replaced, skip steps 4 through 6 then continue the verification. 4. If the PCM was replaced, the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with 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. Perform the generator output test per service manual information. 8. Raise the engine speed to 2000 rpm for at least 30 seconds. 9. Allow the engine to idle. 10. Cycle the ignition key off then on. 11. With the DRBIII®, read DTCs. Are any DTC(s) or symptoms present? Yes → Check for any related Technical Service Bulletins and/or refer to the appropriate Symptom list (Diagnostic Procedure). No → Repair is 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 was not replaced, skip steps 4 through 6, then continue with the verification. 4. If the PCM was replaced, the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with 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 when the vehicle speed is greater than 35MPH. The speed control should engage and hold the selected speed. 9. Depress and hold the RESUME/ACCEL Switch. The vehicle speed should increase by at least 2 mph. 10. Press and hold the COAST switch. The vehicle speed should decrease. 11. Using caution, depress and release the brake pedal. The speed control should disengage. 12. Bring the vehicle speed back up to 35 MPH. 13. Depress the RESUME/ACCEL switch. The speed control should resume the previously set speed. 14. Hold down the SET switch. The vehicle should decelerate. 15. Ensure vehicle speed is greater than 35 mph and release the SET Switch. The vehicle should adjust and set a new vehicle speed. 16. Depress and release the CANCEL switch. The speed control should disengage. 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). The speed control should disengage. 19. NOTE: OVERSHOOT/UNDERSHOOT FOLLOWING SPEED CONTROL SET. 20. 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). 21. It may also decelerate to less than the desired set speed, before finally achieving the desired set speed. 22. The Speed Control System has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths. 23. 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. 24. If the ″lift foot sets″ are continually used, a speed control overshoot/undershoot condition will develop. 25. 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). 26. Then turning the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. 27. 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 → Check for any related Technical Service Bulletins and/or refer to the appropriate Symptom list (Diagnostic Procedure).	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 the appropriate 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. If the PCM was not replaced skip steps 6 through 8 and continue the verification. 6. If the PCM was replaced, the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with 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 connectorto 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 the Catalyst was replaced, with the DRBIII® go to the miscellaneous Menu Option ″Catalyst Replaced″ and press enter. 10. If a Comprehensive Component DTC was repaired, perform steps 11 and 13. If a Major OBDII Monitor DTC was repaired skip step 11 and continue the verification. 11. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 12. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running). 13. If the conditions cannot be duplicated, erase all DTCs with the DRBIII®. Did the OBD II monitor run successfully and has the Good Trip Counter changed to one or more? Yes → Repair is complete. No → Check for any related Technical Service Bulletins and/or refer to the appropriate Symptoms list (Diagnostic Procedure).	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 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. 3. If the PCM was not replaced, skip steps 4 through 6 then continue with the verification. 4. If the PCM was replaced, the correct VIN and mileage must be programmed or a DTC will set in the ABS and Air Bag modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Airbag Systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Airbag 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. 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 DTCs 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. Are any DTCs or symptoms remaining? Yes → Check for any related Technical Service Bulletins and/or refer to the apopropriate Symptom list (Diagnostic Procedure) No → Repair is complete.	All

Verification Tests — Continued

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 PINs are entered, the SKIM will Lock Out the DRB 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, select Theft Alarm, SKIM and Miscellaneous. Then, select the 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 customer, perform a module scan to be sure that all DTCs are erased. Erase any DTCs that are found.** 8. With the DRB, erase all DTCs. Perform 5 ignition key cycles leaving the key on for at least 90 seconds per cycle. 9. With the DRB, read the SKIM DTCs. Are there any SKIM DTCs? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

TRANSMISSION VERIFICATION TEST VER - 1	APPLICABILITY
1. Inspect the vehicle to ensure that all engine and transmission 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 a DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Start and run the engine until the transmission temperature is above 43°C (110°F). 6. Check the transmission fluid level per the Service Information. Adjust if necessary. 7. Road test the vehicle. Make 15 to 20 1-2, 2-3 and 3-4 up shifts. Perform these shifts from a standing start to 72 km/h (45 MPH) with a constant throttle opening of 20-25%. 8. Below 40 km/h (25 MPH), make 5 to 8 wide open throttle kick downs to 1st gear. Allow at least 5 seconds each in 2nd and 3rd between each kick down. 9. For a specific DTC, drive the vehicle in accordance with the Symptom's When Monitored and Set Conditions to verify the DTC repair. 10. If a DTC sets during the road test, return to the Symptom List and follow the path. If no DTC sets, the repair is complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

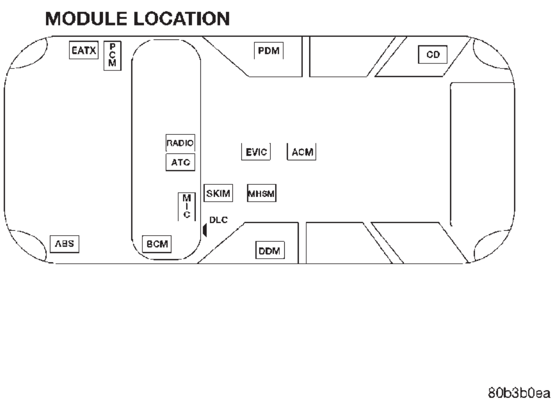
Verification Tests — Continued

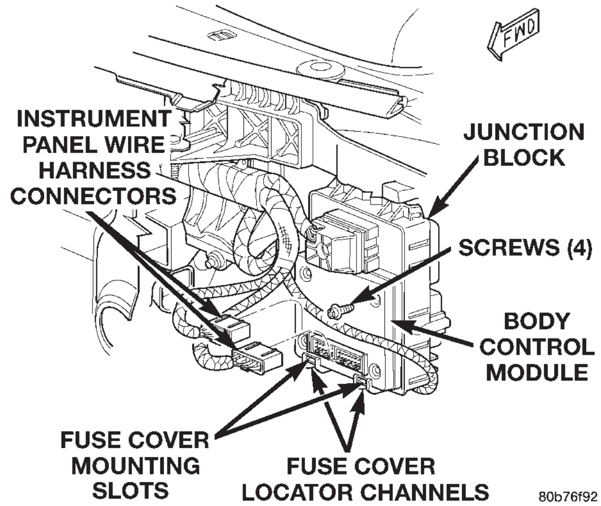
TRANSMISSION VERIFICATION TEST VER - 1	APPLICABILITY
1. Inspect the vehicle to ensure that all engine and transmission components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If any existing diagnostic trouble codes have not been repaired, go to Symptom List and follow path specified. 3. Connect a DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Start and run the engine until the transmission temperature is above 43°C (110°F). 6. Check the transmission fluid level per the Service Information. Adjust if necessary. 7. Road test the vehicle. Make 15 to 20 1-2, 2-3 and 3-4 up shifts. Perform these shifts from a standing start to 72 km/h (45 MPH) with a constant throttle opening of 20-25%. 8. Below 40 km/h (25 MPH), make 5 to 8 wide open throttle kick downs to 1st gear. Allow at least 5 seconds each in 2nd and 3rd between each kick down. 9. For a specific DTC, drive the vehicle in accordance with the Symptom's When Monitored and Set Conditions to verify the DTC repair. 10. If a DTC sets during the road test, return to the Symptom List and follow the path. If no DTC sets, the repair is complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

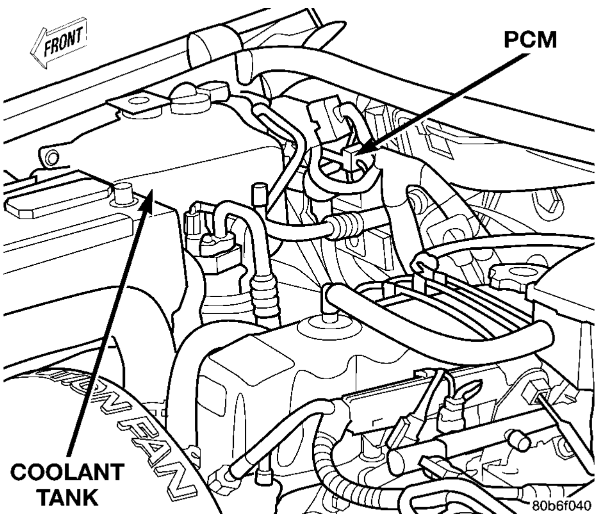
NOTES

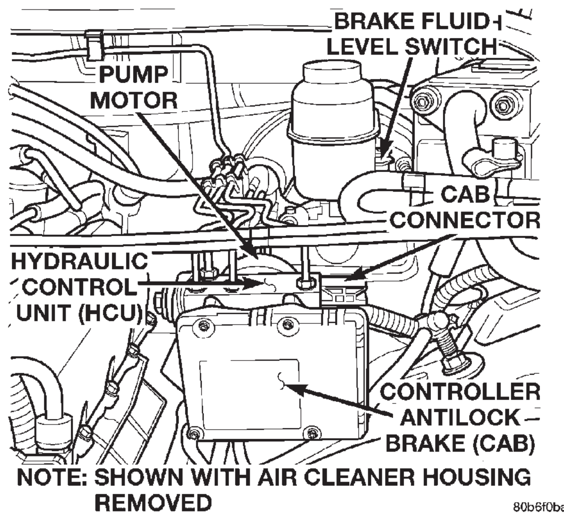
8.0 COMPONENT LOCATIONS

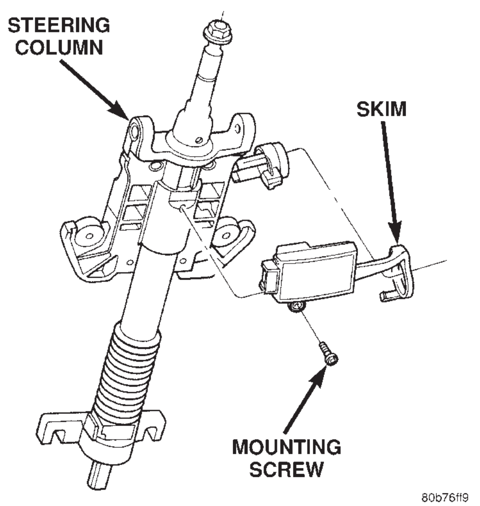
8.1 CONTROL MODULES AND PDC

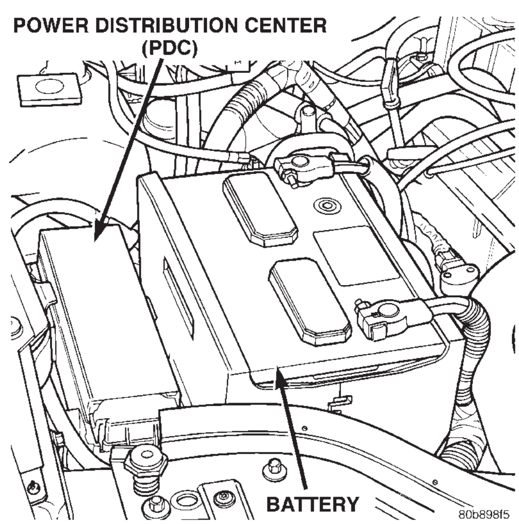




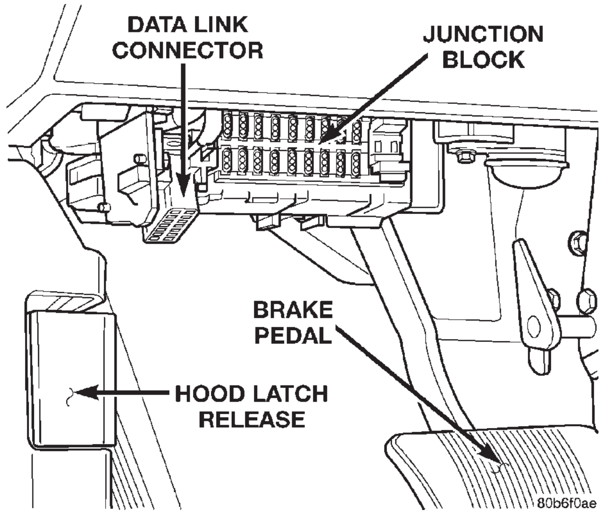








8.2 DATA LINK CONNECTOR



8.3 SENSORS AND SOLENOIDS

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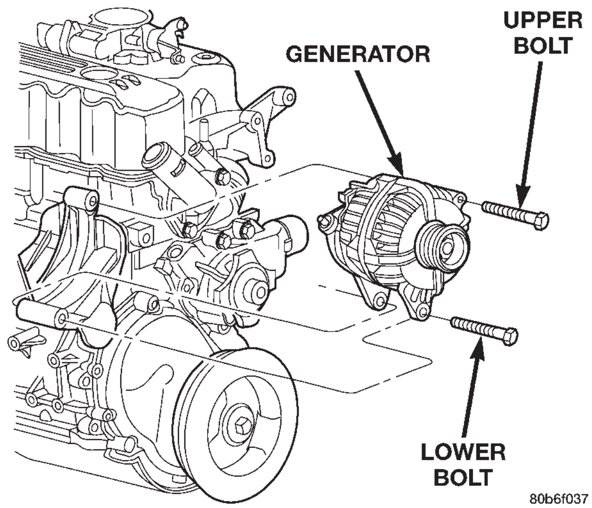

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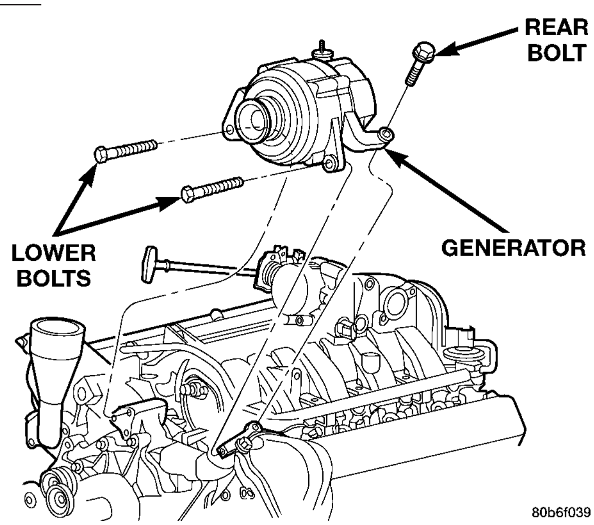

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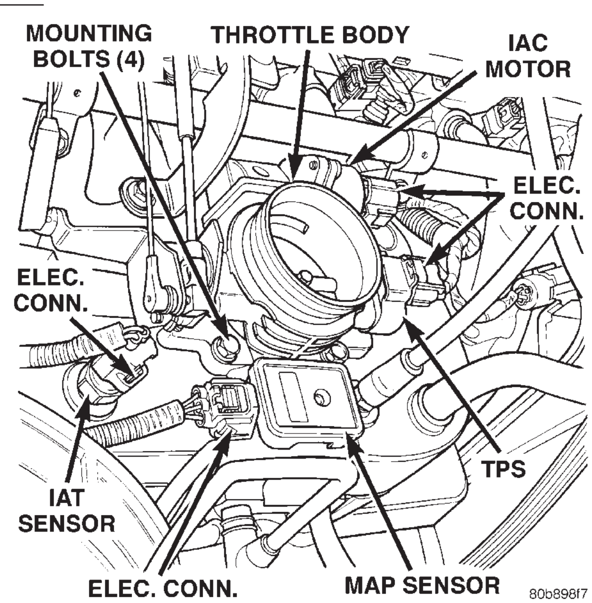

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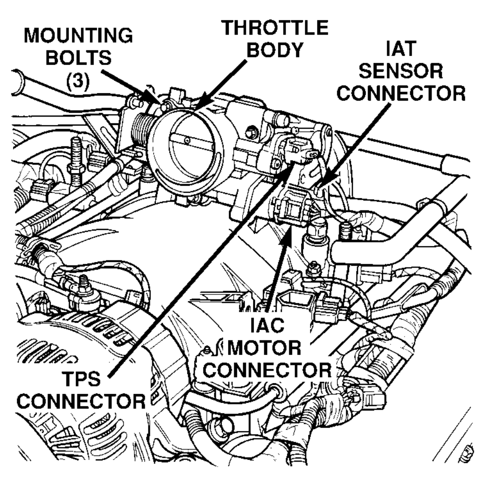

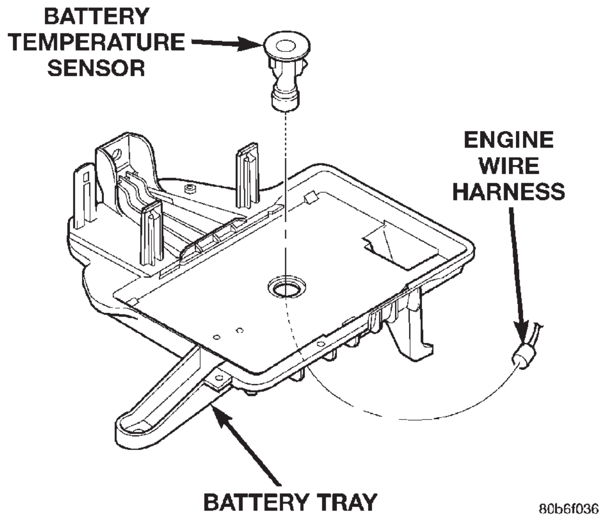

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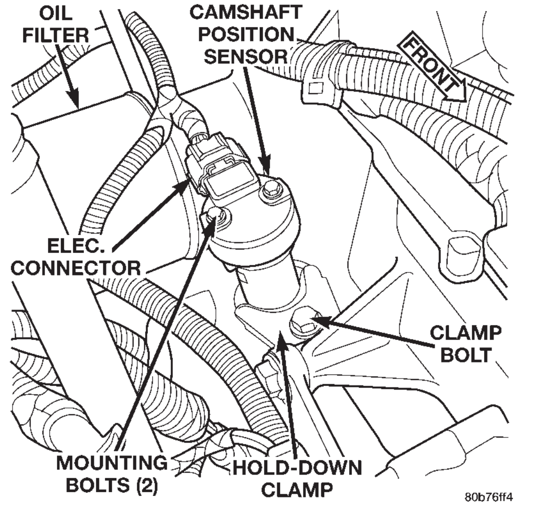

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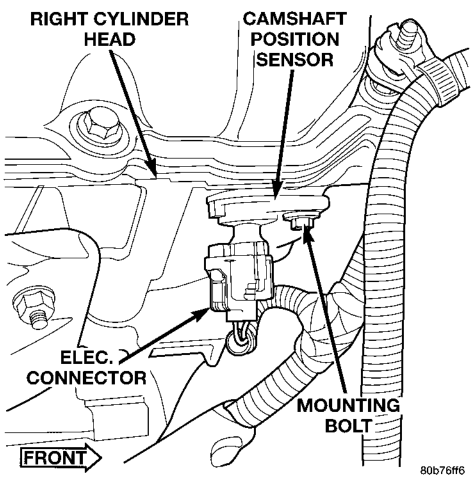

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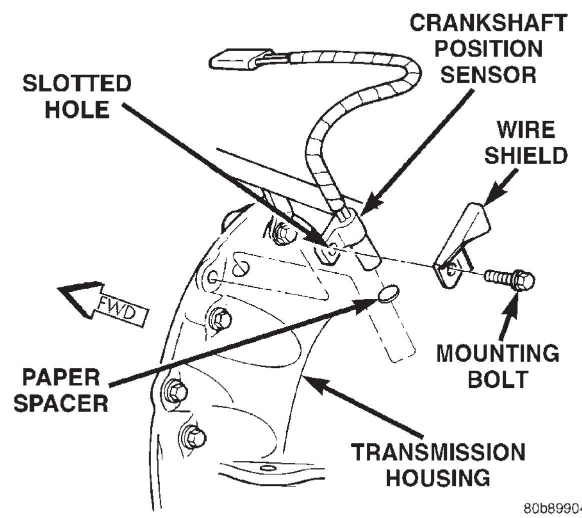

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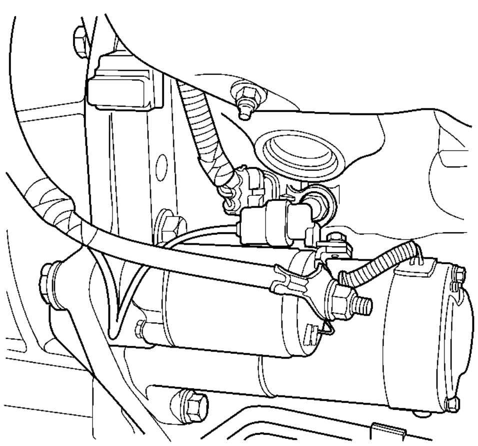

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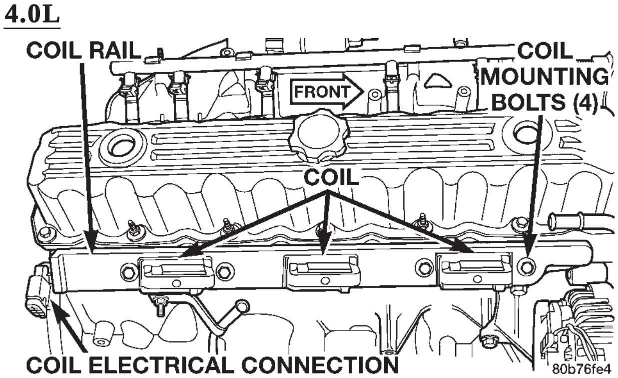

8.3 SENSORS AND SOLENOIDS (Continued)

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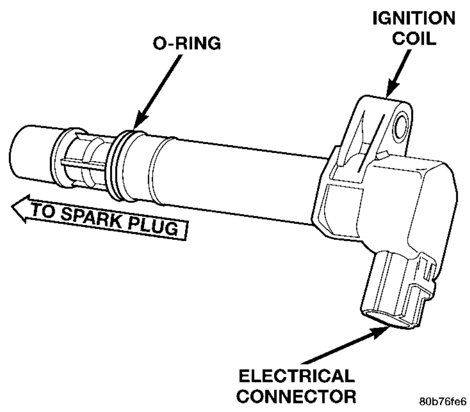

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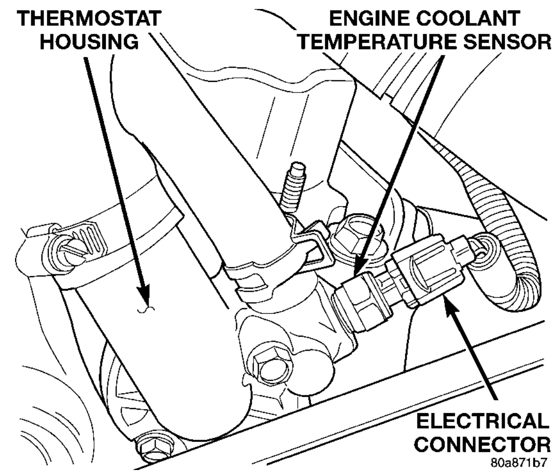

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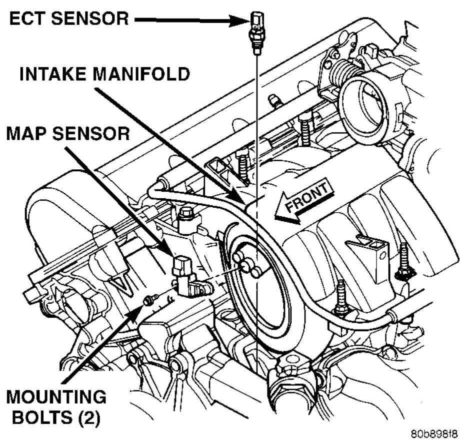

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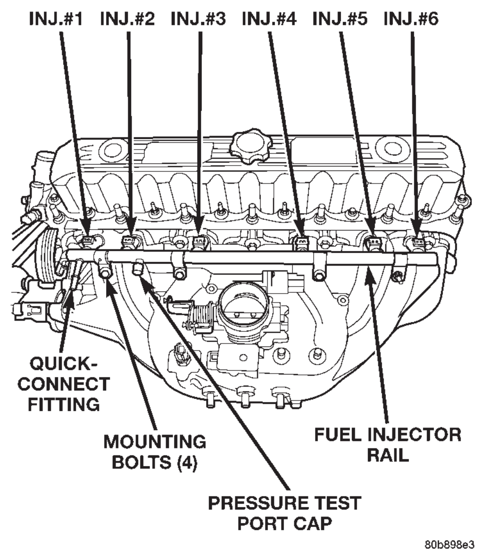

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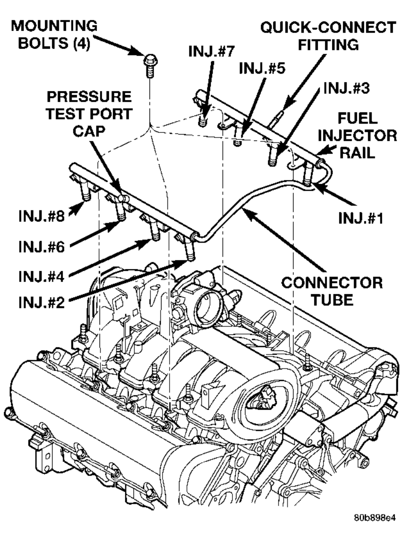
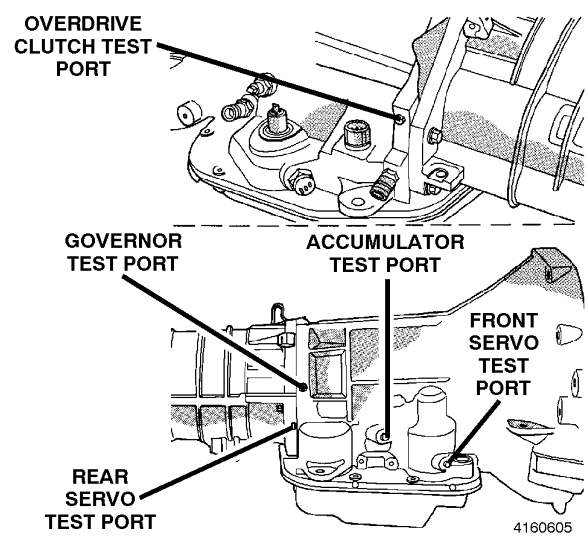
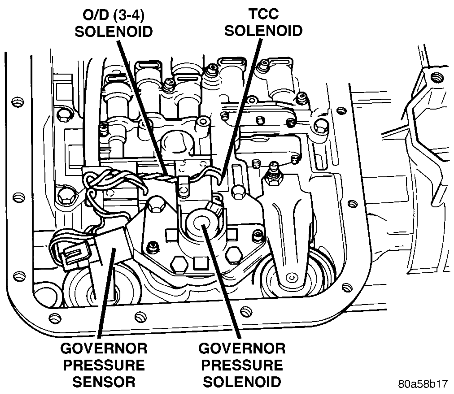
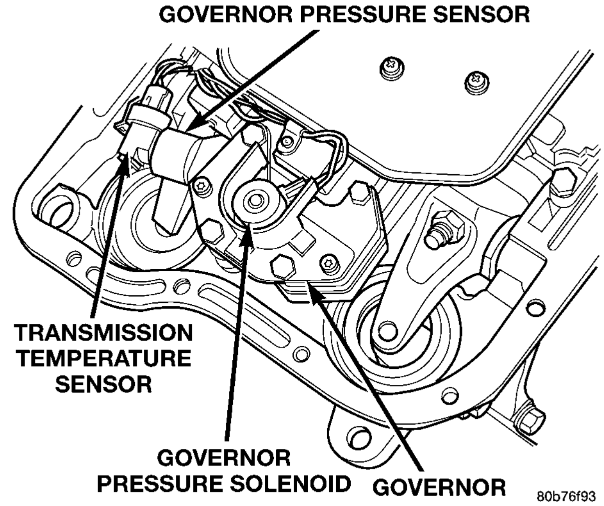




COMPONENT LOCATIONS





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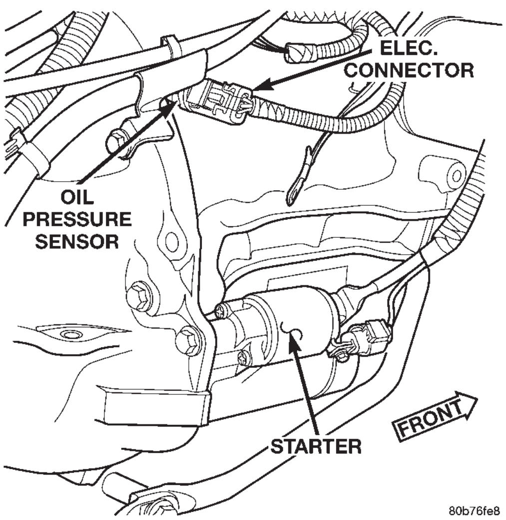

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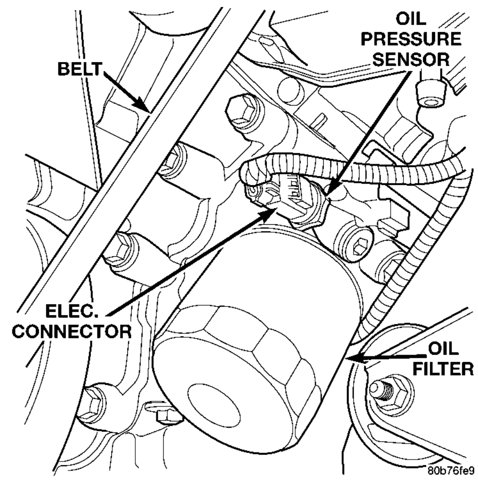

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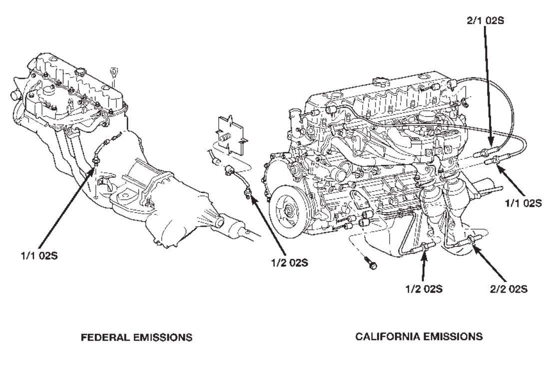

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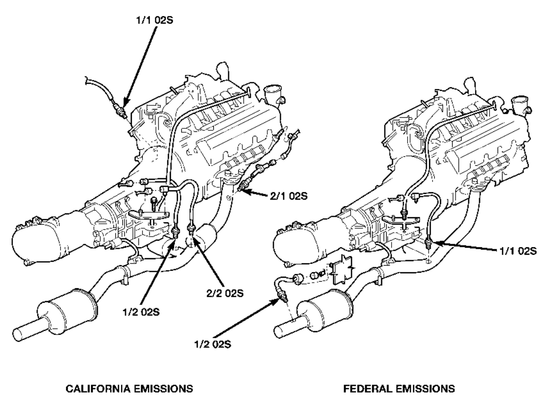
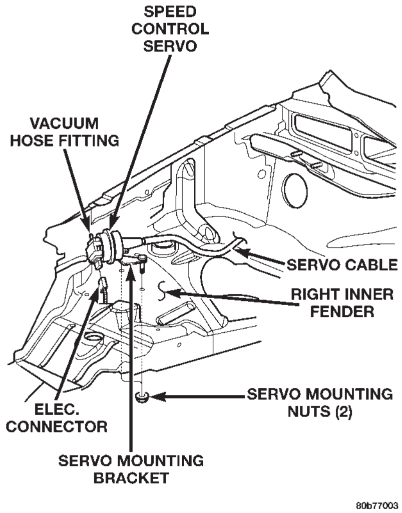
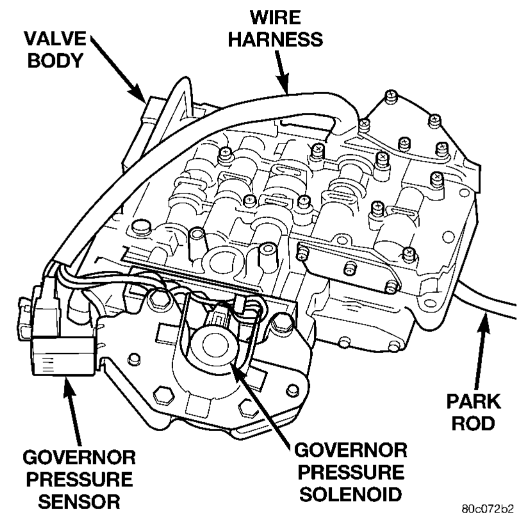
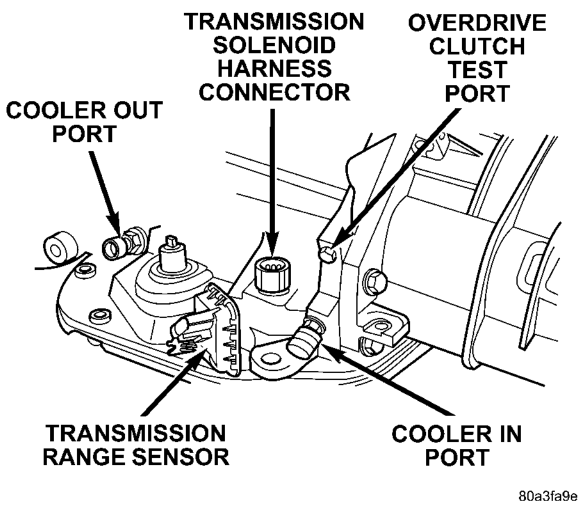
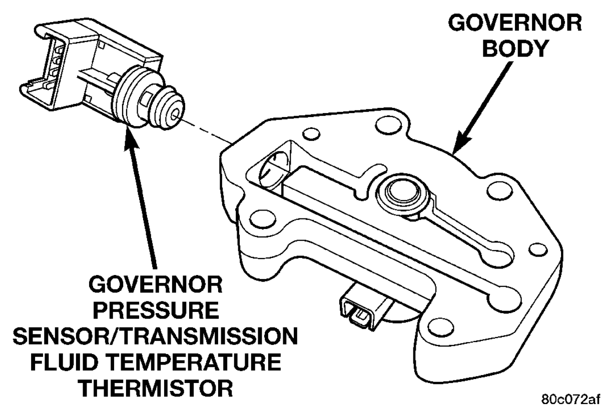


8.3 SENSORS AND SOLENOIDS (Continued)

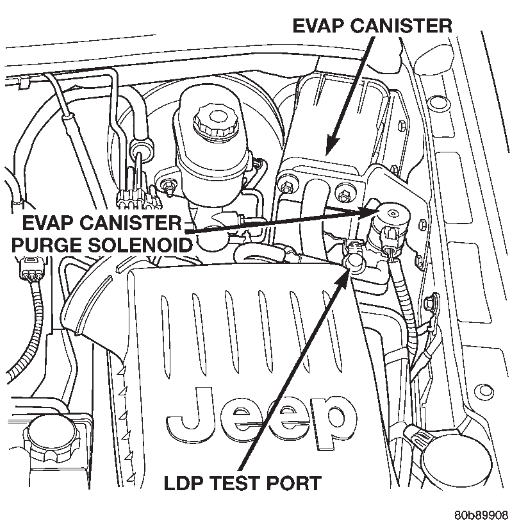


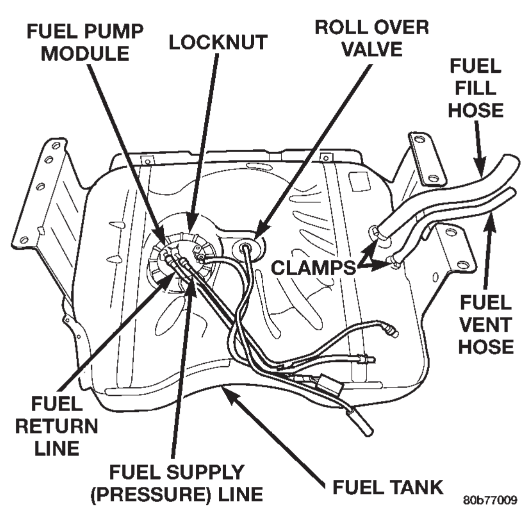


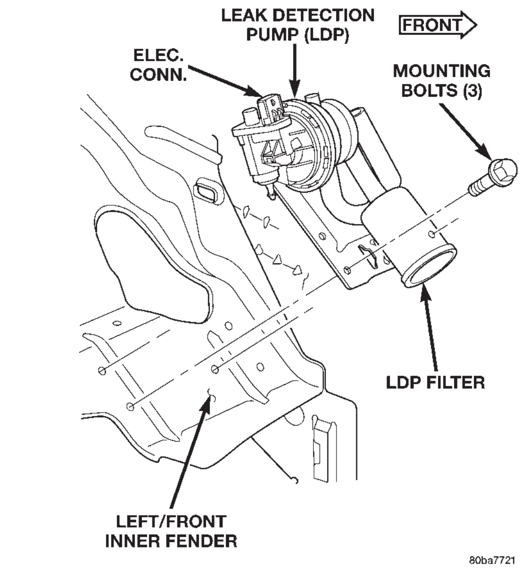


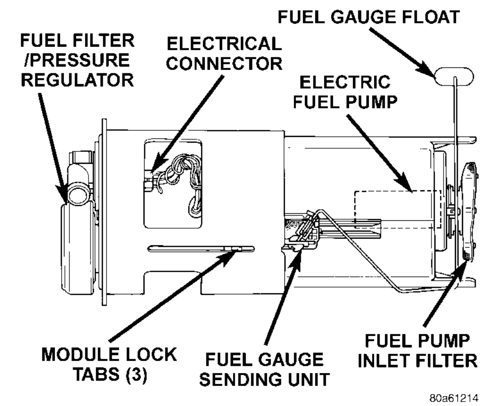


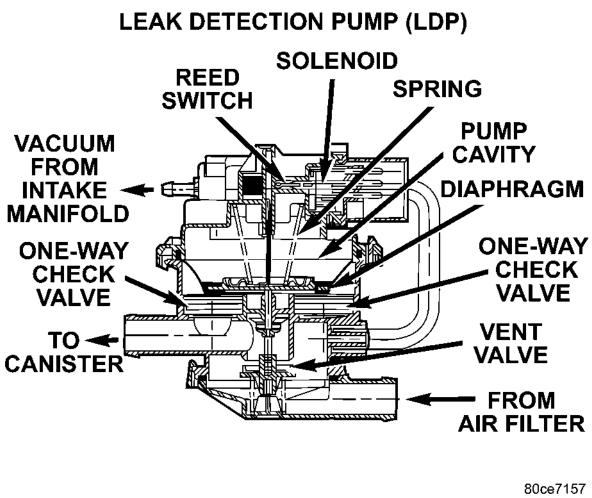
8.4 FUEL SYSTEM

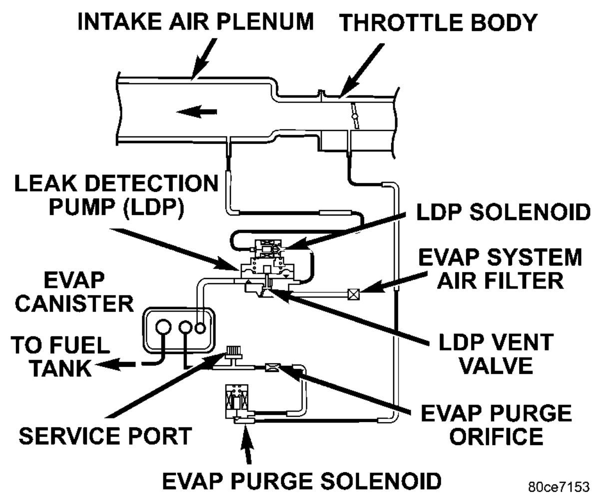


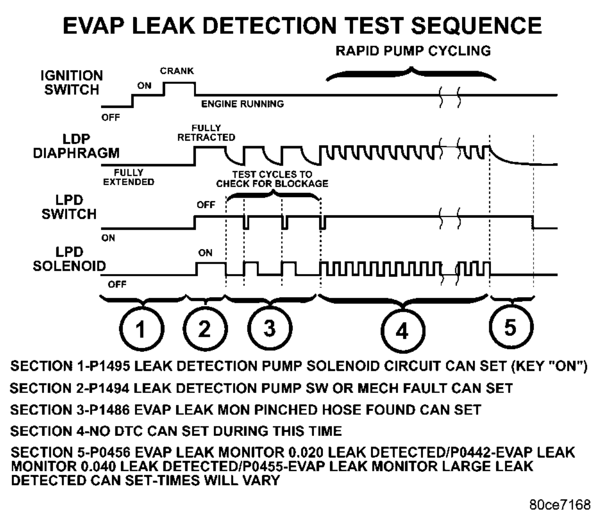



LEAK DETECTION PUMP (LDP)
FRONT
ELEC. CONN.
MOUNTING BOLTS (3)
LDP FILTER
LEFT/FRONT INNER FENDER
80ba7721

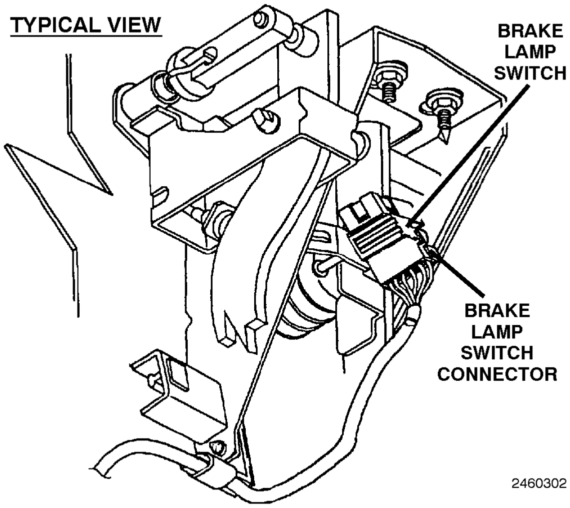

FUEL GAUGE FLOAT
FUEL FILTER /PRESSURE REGULATOR
ELECTRICAL CONNECTOR
ELECTRIC FUEL PUMP
MODULE LOCK TABS (3)
FUEL GAUGE SENDING UNIT
FUEL PUMP INLET FILTER
80a61214

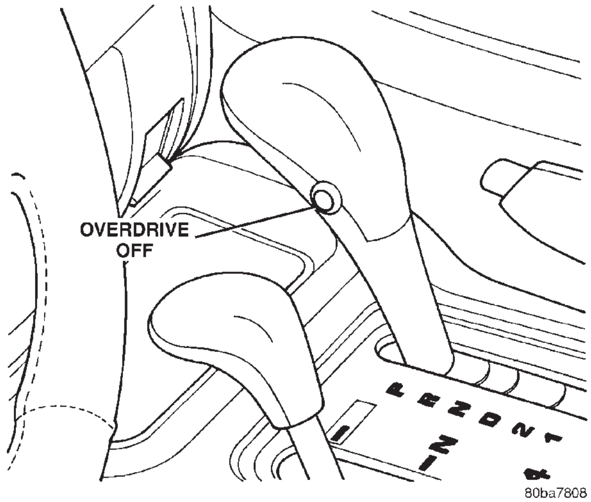

LEAK DETECTION PUMP (LDP)
SOLENOID
REED SWITCH
SPRING
VACUUM FROM INTAKE MANIFOLD
PUMP CAVITY
DIAPHRAGM
ONE-WAY CHECK VALVE
ONE-WAY CHECK VALVE
TO CANISTER
VENT VALVE
FROM AIR FILTER
80ce7157

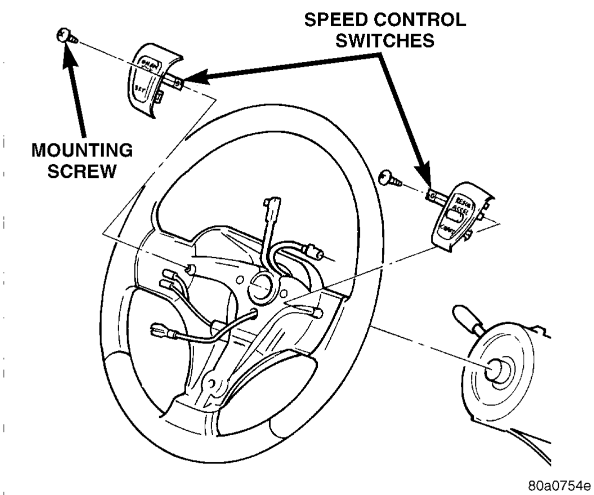

INTAKE AIR PLENUM
THROTTLE BODY
LEAK DETECTION PUMP (LDP)
LDP SOLENOID
EVAP SYSTEM AIR FILTER
EVAP CANISTER
TO FUEL TANK
LDP VENT VALVE
EVAP PURGE ORIFICE
SERVICE PORT
EVAP PURGE SOLENOID
80ce7153

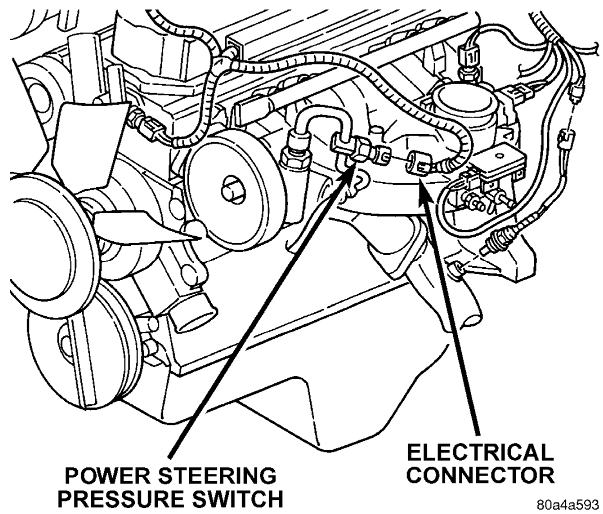

EVAP LEAK DETECTION TEST SEQUENCE
RAPID PUMP CYCLING
IGNITION SWITCH
CRANK
ON
OFF
ENGINE RUNNING
LDP DIAPHRAGM
FULLY RETRACTED
FULLY EXTENDED
TEST CYCLES TO CHECK FOR BLOCKAGE
LPD SWITCH
OFF
ON
LPD SOLENOID
ON
OFF
1
2
3
4
5
SECTION 1-P1495 LEAK DETECTION PUMP SOLENOID CIRCUIT CAN SET (KEY "ON")
SECTION 2-P1494 LEAK DETECTION PUMP SW OR MECH FAULT CAN SET
SECTION 3-P1486 EVAP LEAK MON PINCHED HOSE FOUND CAN SET
SECTION 4-NO DTC CAN SET DURING THIS TIME
SECTION 5-P0456 EVAP LEAK MONITOR 0.020 LEAK DETECTED/P0442-EVAP LEAK MONITOR 0.040 LEAK DETECTED/P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED CAN SET-TIMES WILL VARY
80ce7168

8.5 SWITCHES

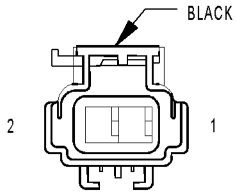

TYPICAL VIEW
BRAKE
LAMP
SWITCH
BRAKE
LAMP
SWITCH
CONNECTOR
2460302


OVERDRIVE
OFF
80ba7808


SPEED CONTROL
SWITCHES
MOUNTING
SCREW
80a0754e


POWER STEERING
PRESSURE SWITCH
ELECTRICAL
CONNECTOR
80a4a593

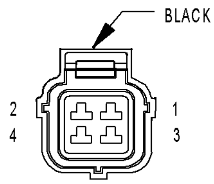
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH

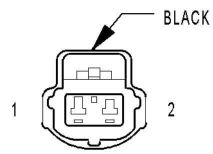
CAV	CIRCUIT	FUNCTION
1	C2 18DB/YL	A/C CLUTCH RELAY OUTPUT
2	Z18 18BK	GROUND



A/C PRESSURE TRANSDUCER

A/C PRESSURE TRANSDUCER

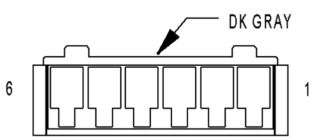
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K6 18VT/BK (GAS)	5 VOLT SUPPLY
2	K6 18VT/WT (DIESEL)	SENSOR REFERENCE VOLTAGE B
3	C18 18DB	A/C PRESSURE SIGNAL
4	-	-



BATTERY TEMPERATURE SENSOR

BATTERY TEMPERATURE SENSOR

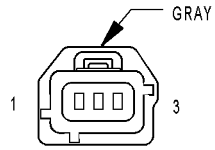
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB (DIESEL/RHD)	SENSOR GROUND
1	K4 18BK/LB (GAS LHD)	SENSOR GROUND
2	K25 18VT/LG	BATTERY TEMPERATURE SENSOR SIGNAL



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH

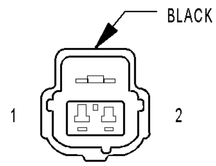
CAV	CIRCUIT	FUNCTION
1	K29 18WT/PK (GAS)	BRAKE SWITCH SENSE
1	K29 18WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL
2	Z243 18BK (RHD)	GROUND
2	Z238 18BK (LHD)	GROUND
3	V32 22OR/DG (GAS)	SPEED CONTROL POWER SUPPLY
3	B30 18DG/OR (DIESEL)	SPEED CONTROL POWER SUPPLY
4	Z238 18BK (DIESEL)	
4	V30 22DB/RD (GAS)	SPEED CONTROL BRAKE 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)

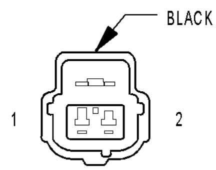
CAV	CIRCUIT	FUNCTION
1	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



CAPACITOR
(4.0L)

CAPACITOR (4.0L)

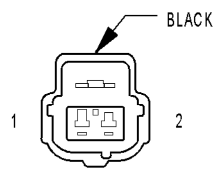
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR (LHD)	AUTO SHUT DOWN RELAY OUTPUT
1	A142 16DG/OR (RHD)	AUTO SHUT DOWN RELAY OUTPUT
2	-	-



CAPACITOR
NO. 1
(4.7L)

CAPACITOR NO. 1 (4.7L)

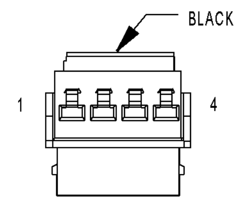
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
2	-	-



CAPACITOR
NO. 2
(4.7L)

CAPACITOR NO. 2 (4.7L)

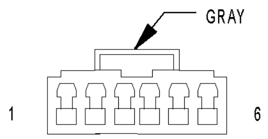
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
2	-	-



CLOCKSPRING C1

CLOCKSPRING C1

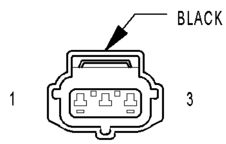
CAV	CIRCUIT	FUNCTION
1	X3 20GY/OR	HORN RELAY CONTROL
2	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
3	K4 20BK/LB	SENSOR GROUND
4	-	-



CLOCKSPRING C3

CLOCKSPRING C3

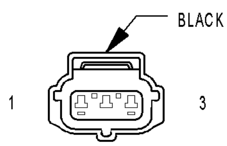
CAV	CIRCUIT	FUNCTION
1	X20 20RD/YL	RADIO CONTROL MUX
2	X10 20RD/BK	RADIO CONTROL MUX RETURN
3	X3 20GY/OR	HORN RELAY CONTROL
4	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
5	K4 20BK/LB	SENSOR GROUND
6	-	-



COIL ON
PLUG NO. 1
(4.7L)

COIL ON PLUG NO. 1 (4.7L)

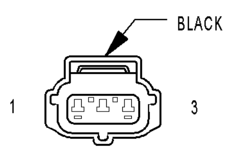
CAV	CIRCUIT	FUNCTION
1	K91 14TN/RD	COIL DRIVER NO. 1
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 2
(4.7L)

COIL ON PLUG NO. 2 (4.7L)

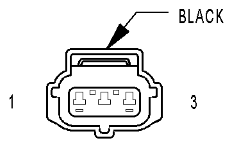
CAV	CIRCUIT	FUNCTION
1	K92 14TN/PK	COIL DRIVER NO. 2
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 3
(4.7L)

COIL ON PLUG NO. 3 (4.7L)

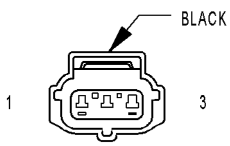
CAV	CIRCUIT	FUNCTION
1	K93 14TN/OR	COIL DRIVER NO. 3
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 4
(4.7L)

COIL ON PLUG NO. 4 (4.7L)

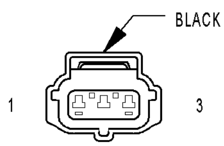
CAV	CIRCUIT	FUNCTION
1	K94 14TN/LG	COIL DRIVER NO. 4
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 5
(4.7L)

COIL ON PLUG NO. 5 (4.7L)

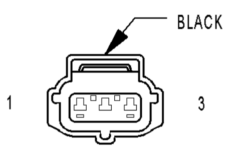
CAV	CIRCUIT	FUNCTION
1	K95 14TN/DG	COIL DRIVER NO. 5
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 6
(4.7L)

COIL ON PLUG NO. 6 (4.7L)

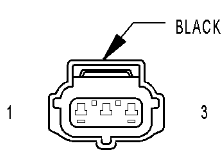
CAV	CIRCUIT	FUNCTION
1	K96 14TN/LB	COIL DRIVER NO. 6
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 7
(4.7L)

COIL ON PLUG NO. 7 (4.7L)

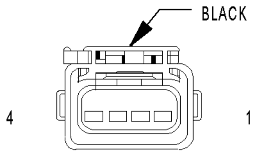
CAV	CIRCUIT	FUNCTION
1	K97 14BR	COIL DRIVER NO. 7
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG NO. 8
(4.7L)

COIL ON PLUG NO. 8 (4.7L)

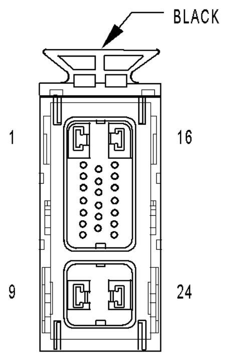
CAV	CIRCUIT	FUNCTION
1	K98 14LB/RD	COIL DRIVER NO. 8
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL
RAIL
(4.0L)

COIL RAIL (4.0L)

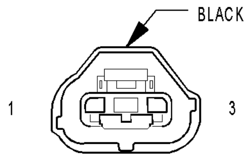
CAV	CIRCUIT	FUNCTION
1	K91 14TN/RD	COIL DRIVER NO. 1
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	K92 14TN/PK	COIL DRIVER NO. 2
4	K93 14TN/OR	COIL DRIVER NO. 3



CONTROLLER
ANTILOCK
BRAKE

CONTROLLER ANTILOCK BRAKE

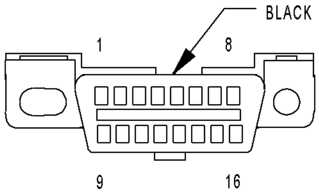
CAV	CIRCUIT	FUNCTION
1	Z101 12BK/OR	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18VT/YL	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
11	D52 18LG/WT (DIESEL)	CAN C BUS(+)
12	-	-
13	B22 18DG/YL	VEHICLE SPEED SIGNAL
14	D51 18DG/WT (DIESEL)	CAN C BUS(-)
15	-	-
16	Z102 12BK/OR	GROUND
17	G9 18GY/BK	RED BRAKE WARNING INDICATOR SWITCH SENSE
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	Z231 18BK	GROUND
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)



CRANKSHAFT
POSITION
SENSOR
(GAS)

CRANKSHAFT POSITION SENSOR (GAS)

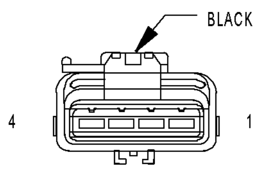
CAV	CIRCUIT	FUNCTION
1	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



DATA LINK CONNECTOR

DATA LINK CONNECTOR

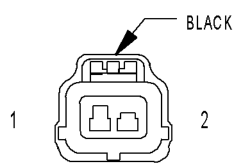
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20YL/VT	PCI BUS
3	-	-
4	Z305 20BK/OR	GROUND
5	Z306 20BK/LG	GROUND
6	D32 20LG/DG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D20 20LG	SCI RECEIVE
15	-	-
16	F33 20PK/RD	FUSED B(+)



ELECTRONIC SPEED CONTROL SERVO

ELECTRONIC SPEED CONTROL SERVO

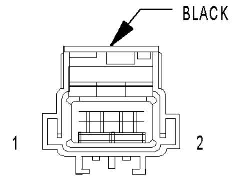
CAV	CIRCUIT	FUNCTION
1	V36 18TN/RD (LHD GAS)	SPEED CONTROL VACUUM SOLENOID CONTROL
1	V36 20TN/RD (RHD/GAS)	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 18LG/RD (LHD GAS)	SPEED CONTROL VENT SOLENOID CONTROL
2	V35 20LG/RD (RHD/GAS)	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z307 20BK	GROUND



ENGINE COOLANT TEMPERATURE SENSOR (GAS)

ENGINE COOLANT TEMPERATURE SENSOR (GAS)

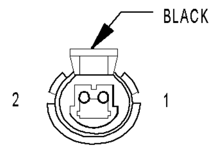
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



ENGINE OIL PRESSURE SWITCH (GAS)

ENGINE OIL PRESSURE SWITCH (GAS)

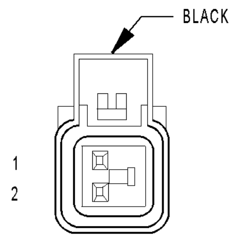
CAV	CIRCUIT	FUNCTION
1	G60 18GY/YL	ENGINE OIL PRESSURE SWITCH SIGNAL
2	-	-



EVAP/PURGE SOLENOID (GAS)

EVAP/PURGE SOLENOID (GAS)

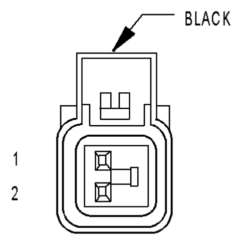
CAV	CIRCUIT	FUNCTION
1	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	K52 20PK/BK (LHD)	DUTY CYCLE EVAP/PURGE SOLENOID CONTROL
2	K52 18PK/BK (RHD)	DUTY CYCLE EVAP/PURGE SOLENOID CONTROL



FUEL INJECTOR NO. 1 (GAS)

FUEL INJECTOR NO. 1 (GAS)

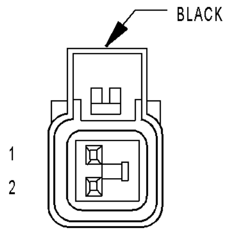
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 2 (GAS)

FUEL INJECTOR NO. 2 (GAS)

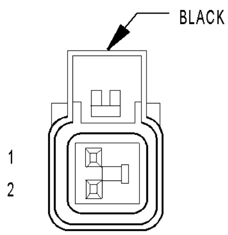
CAV	CIRCUIT	FUNCTION
1	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR
NO. 3
(GAS)

FUEL INJECTOR NO. 3 (GAS)

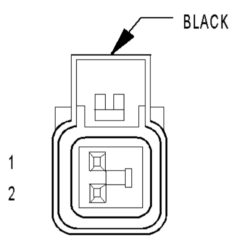
CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR
NO. 4
(GAS)

FUEL INJECTOR NO. 4 (GAS)

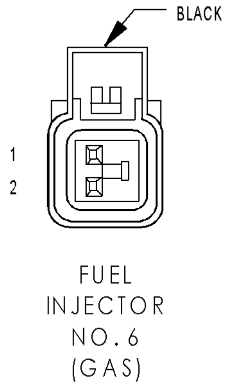
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR
NO. 5
(GAS)

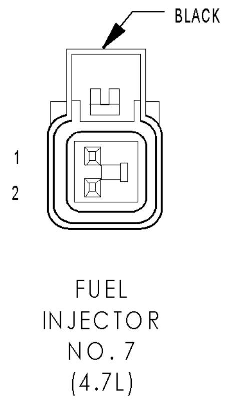
FUEL INJECTOR NO. 5 (GAS)

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



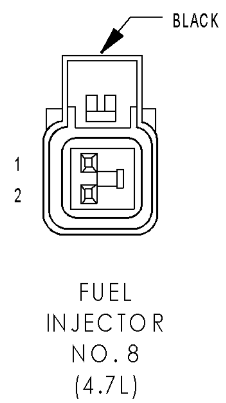
FUEL INJECTOR NO. 6 (GAS)

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



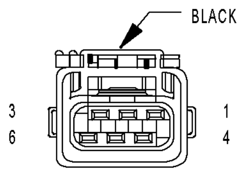
FUEL INJECTOR NO. 7 (4.7L)

CAV	CIRCUIT	FUNCTION
1	K26 18VT	FUEL INJECTOR NO. 7 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 8 (4.7L)

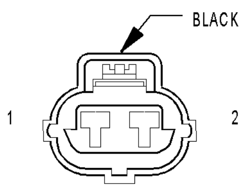
CAV	CIRCUIT	FUNCTION
1	K28 18GY/LB	FUEL INJECTOR NO. 8 DRIVER
2	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT



FUEL PUMP MODULE (GAS)

FUEL PUMP MODULE (GAS)

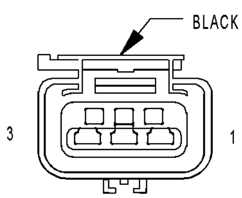
CAV	CIRCUIT	FUNCTION
1	A141 16DG/BK	FUEL PUMP RELAY OUTPUT
2	-	-
3	K226 20LB/YL	FUEL LEVEL SENSOR SIGNAL
4	K4 20BK/LB	SENSOR GROUND
5	-	-
6	Z150 16BK	GROUND



GENERATOR (GAS)

GENERATOR (GAS)

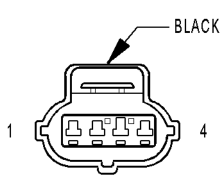
CAV	CIRCUIT	FUNCTION
1	K125 18WT/DB	GENERATOR SOURCE
2	K20 18DG	GENERATOR FIELD DRIVER



HYDRAULIC COOLING MODULE

HYDRAULIC COOLING MODULE

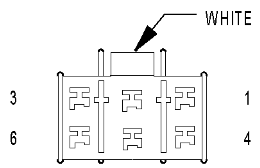
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG (GAS)	FUSED AUTO SHUT DOWN RELAY OUTPUT
1	F15 18DB/WT (DIESEL)	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K173 18LG (GAS)	RADIATOR FAN RELAY CONTROL
2	K173 18LG (DIESEL)	HYDRAULIC RADIATOR FAN SOLENOID CONTROL
3	Z500 18BK	GROUND



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR

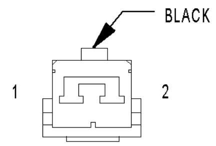
CAV	CIRCUIT	FUNCTION
1	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
2	K40 18BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
3	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
4	K39 18GY/BK	IDLE AIR CONTROL NO. 1 DRIVER



IGNITION SWITCH C1

IGNITION SWITCH C1

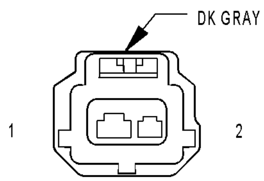
CAV	CIRCUIT	FUNCTION
1	A41 12YL	IGNITION SWITCH OUTPUT (START)
2	A2 12PK/BK	FUSED B(+)
3	A22 12BK/OR	IGNITION SWITCH OUTPUT (RUN)
4	A1 12RD	FUSED B(+)
5	A31 12RD/BK	IGNITION SWITCH OUTPUT (RUN-ACC)
6	A21 12DB	IGNITION SWITCH OUTPUT (RUN-START)



IGNITION SWITCH C2

IGNITION SWITCH C2

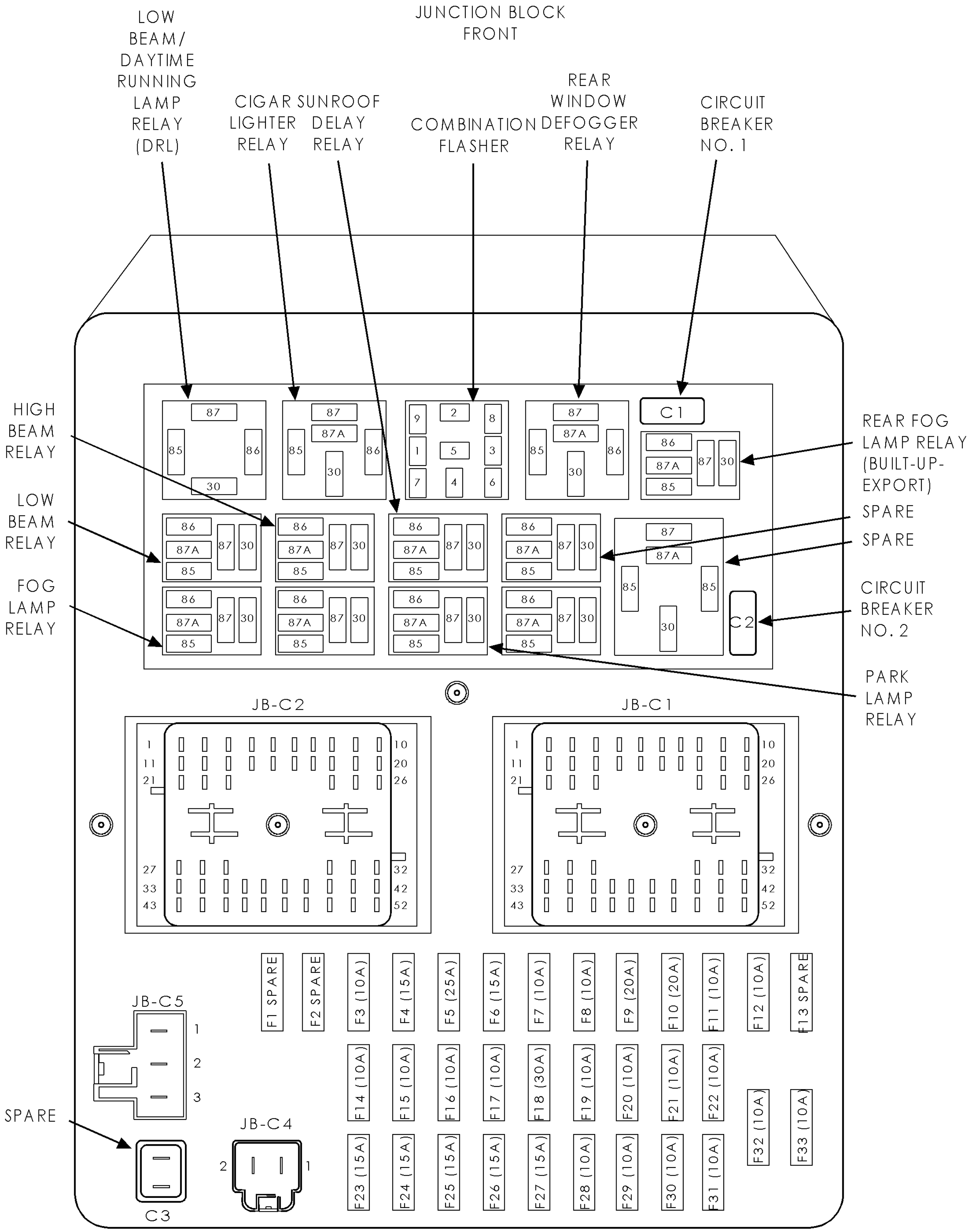
CAV	CIRCUIT	FUNCTION
1	G26 20LB	KEY-IN IGNITION SWITCH SENSE
2	Z234 20BK	GROUND



INTAKE AIR TEMPERATURE SENSOR (GAS)

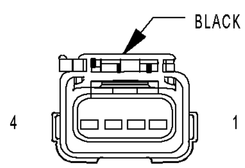
INTAKE AIR TEMPERATURE SENSOR (GAS)

CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL


JUNCTION BLOCK FRONT
LOW BEAM/ DAYTIME RUNNING LAMP RELAY (DRL)
CIGAR LIGHTER RELAY
SUNROOF DELAY RELAY
COMBINATION FLASHER
REAR WINDOW DEFOGGER RELAY
CIRCUIT BREAKER NO. 1
HIGH BEAM RELAY
LOW BEAM RELAY
FOG LAMP RELAY
REAR FOG LAMP RELAY (BUILT-UP-EXPORT)
SPARE
SPARE
CIRCUIT BREAKER NO. 2
PARK LAMP RELAY
C1
C2
JB-C2
JB-C1
JB-C5
JB-C4
SPARE
C3
F1 SPARE
F2 SPARE
F3 (10A)
F4 (15A)
F5 (25A)
F6 (15A)
F7 (10A)
F8 (10A)
F9 (20A)
F10 (20A)
F11 (10A)
F12 (10A)
F13 SPARE
F14 (10A)
F15 (10A)
F16 (10A)
F17 (10A)
F18 (30A)
F19 (10A)
F20 (10A)
F21 (10A)
F22 (10A)
F23 (15A)
F24 (15A)
F25 (15A)
F26 (15A)
F27 (15A)
F28 (10A)
F29 (10A)
F30 (10A)
F31 (10A)
F32 (10A)
F33 (10A)

FUSES (JB)

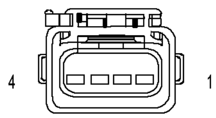
FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	-	-	-
3	10A	L33 18RD	FUSED HIGH BEAM RELAY OUTPUT
4	15A	INTERNAL	FUSED B(+)
5	25A	INTERNAL	FUSED B(+)
6	15A	INTERNAL	FUSED B(+)
7	10A	INTERNAL	FUSED B(+)
8	15A	INTERNAL	FUSED B(+)
9	20A	INTERNAL	FUSED B(+)
10	20A	F72 16RD/YL (EXCEPT EXPORT)	FUSED B(+)
11	10A	C15 20BK/WT	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
12	10A	F991 20OR/DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	-	-	-
14	10A	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
15	10A	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
16	10A	L34 18RD/OR	FUSED HIGH BEAM RELAY OUTPUT
17	10A	INTERNAL	FUSED B(+)
18	30A	F9 20RD/BK	FUSED B(+)
19	10A	F20 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
20	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
21	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
22	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	15A	F32 20PK/DB	FUSED B(+)
24	15A	INTERNAL	FUSED B(+)
25	15A	INTERNAL	FUSED B(+)
26	15A	F30 18RD	FUSED CIGAR LIGHTER RELAY OUTPUT
27	15A	INTERNAL (EXPORT)	FUSED B(+)
28	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
29	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
30	10A	X12 20WT/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
31	10A	F45 20YL/RD	FUSED IGNITION SWITCH OUTPUT (START)
32	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
33	10A	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)



KNOCK
SENSOR

KNOCK SENSOR

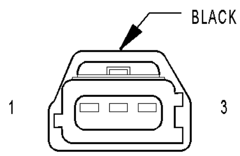
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K42 18DB/LG	KNOCK SENSOR NO. 1 SIGNAL
3	K4 18BK/LB	SENSOR GROUND
4	K142 18GY/BK	KNOCK SENSOR NO. 2 SIGNAL



LEAK DETECTION PUMP (EXCEPT EXPORT)

LEAK DETECTION PUMP (EXCEPT EXPORT)

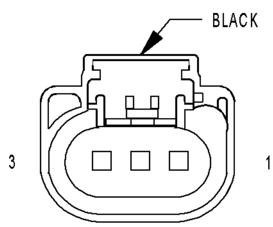
CAV	CIRCUIT	FUNCTION
1	-	-
2	K125 18OR/DG	GENERATOR SOURCE
3	K106 20WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 20OR/YL	LEAK DETECTION PUMP SWITCH SENSE



MANIFOLD ABSOLUTE PRESSURE SENSOR (4.0L)

MANIFOLD ABSOLUTE PRESSURE SENSOR (4.0L)

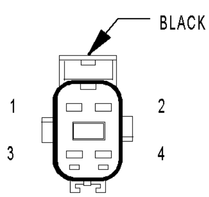
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K1 18DG/RD	MAP SENSOR SIGNAL
3	K7 18OR	5 VOLT SUPPLY



MANIFOLD ABSOLUTE PRESSURE SENSOR (4.7L)

MANIFOLD ABSOLUTE PRESSURE SENSOR (4.7L)

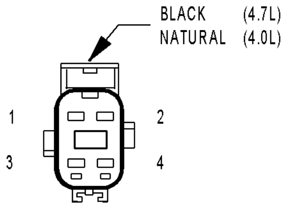
CAV	CIRCUIT	FUNCTION
1	K1 18DG/RD	MAP SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



OXYGEN SENSOR 1/1 UPSTREAM

OXYGEN SENSOR 1/1 UPSTREAM

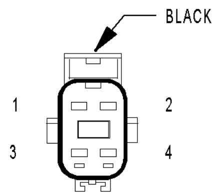
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
3	K4 18BK/LB	SENSOR GROUND
4	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR 1/2 DOWNSTREAM

OXYGEN SENSOR 1/2 DOWNSTREAM

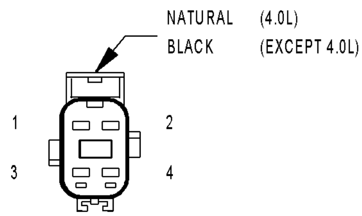
CAV	CIRCUIT	FUNCTION
1	K200 18VT/OR (EXCEPT 4.0L EXPORT)	OXYGEN SENSOR DOWNSTREAM RELAY OUTPUT
1	F142 18OR/DG (4.0L EX-PORT)	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K299 18BR/WT (4.0L EX-PORT)	OXYGEN SENSOR 1/2 HEATER CONTROL
2	Z186 18BK (EXCEPT 4.0L EXPORT)	GROUND
3	K4 18BK/LB	SENSOR GROUND
4	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR 2/1 UPSTREAM

OXYGEN SENSOR 2/1 UPSTREAM

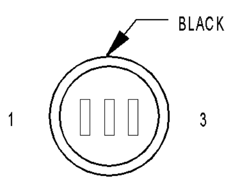
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
3	K4 18BK/LB	SENSOR GROUND
4	K241 18LG/RD	OXYGEN SENSOR 2/1 SIGNAL



OXYGEN SENSOR 2/2 DOWNSTREAM

OXYGEN SENSOR 2/2 DOWNSTREAM

CAV	CIRCUIT	FUNCTION
1	K200 18VT/OR	OXYGEN SENSOR DOWNSTREAM RELAY OUTPUT
2	Z186 18BK	GROUND
3	K4 18BK/LB	SENSOR GROUND
4	K341 18PK/WT (4.7L/4.0L JAPAN)	OXYGEN SENSOR 2/2 SIGNAL
4	K341 18TN/WT (4.0L EX-CEPT JAPAN)	OXYGEN SENSOR 2/2 SIGNAL

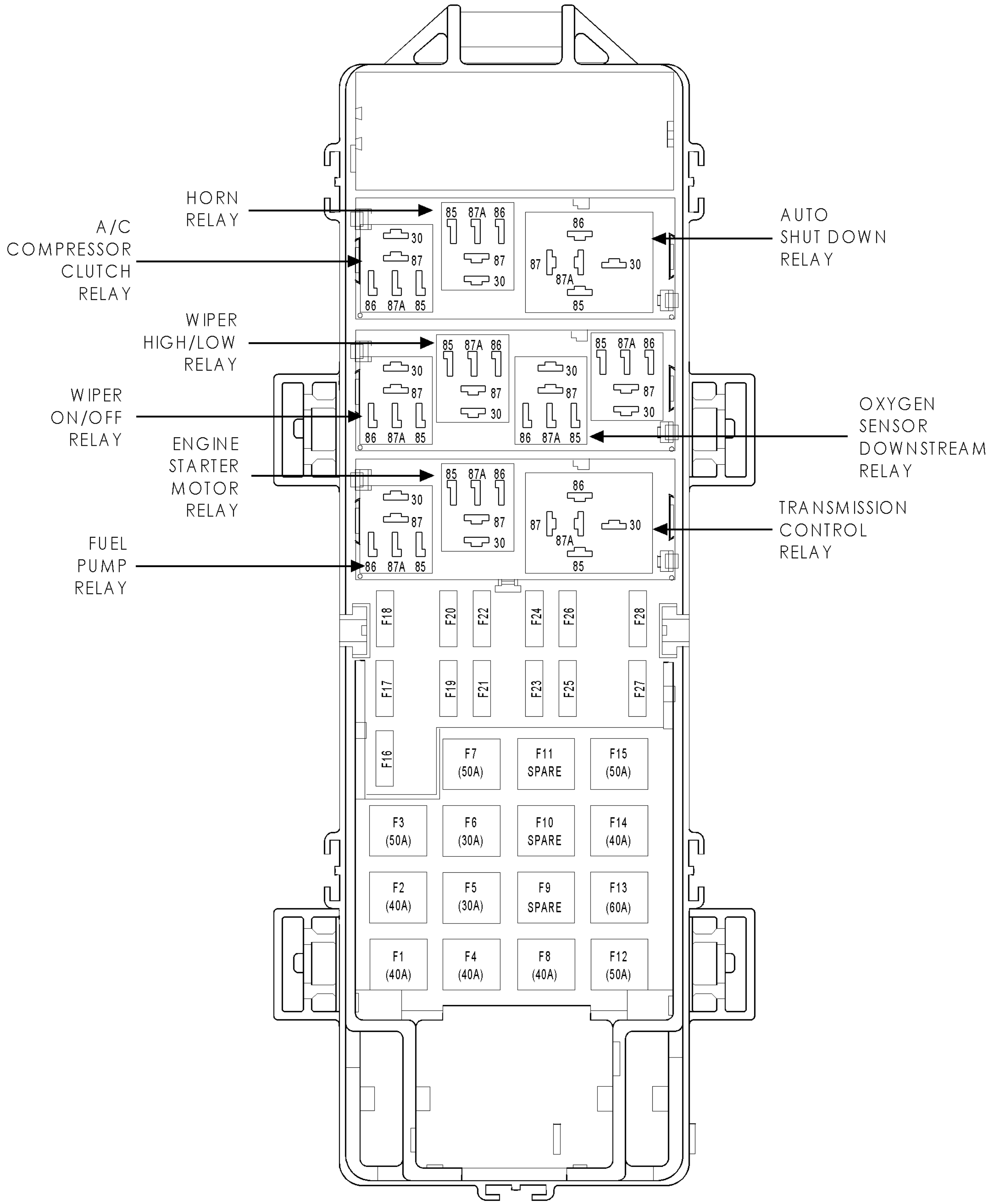


PARK/NEUTRAL POSITION SWITCH (4.0L)

PARK/NEUTRAL POSITION SWITCH (4.0L)

CAV	CIRCUIT	FUNCTION
1	L1 18VT/BK	BACK-UP LAMP FEED
2	T41 18BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE (T41)
3	F22 18WT/PK	FUSED IGNITION SWITCH OUTPUT (RUN)

POWER DISTRIBUTION CENTER (GAS)



FUSES (GAS)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	C1 12DG	FUSED B(+)
2	40A	A149 12RD/TN	FUSED B(+)
3	50A	A145 10WT/RD	FUSED B(+)
4	40A	A10 12RD/DG	FUSED B(+)
5	30A	A30 14RD/WT	FUSED B(+)
5	30A	A30 14RD/WT (4.7L)	FUSED B(+)
6	30A	A14 14RD/DG	FUSED B(+)
7	50A	A147 10RD/GY	FUSED B(+)
8	40A	A1 12RD	FUSED B(+)
9	-	-	-
10	40	A16 12GY (4.0L)	FUSED B(+)
11	-	-	-
12	50A	A146 10OR/WT	FUSED B(+)
13	-	-	-
14	40A	A2 12PK/BK	FUSED B(+)
15	50A	A148 10PK/WT	FUSED B(+)
16	15A	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
16	15A	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	15A	F62 18RD	FUSED B(+)
18	15A	F62 18RD	FUSED B(+)
19	10A	A7 14RD/BK	FUSED B(+)
20	-	-	-
21	15A	A17 18RD/BK	FUSED B(+)
22	-	-	-
23	-	-	-
24	20A	A62 16VT/LB (LHD)	FUSED B(+)
24	20A	A62 16VT/WT (RHD)	FUSEDB(+)
25	20A	A20 12RD/DB	FUSED B(+)
26	15A	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT
26	15A	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT
27	20A	A148 16LG/RD	FUSED B(+)
28	15A	T15 18YL/BR (4.0L)	FUSED TRANSMISSION CONTROL RELAY OUTPUT

A/C COMPRESSOR CLUTCH RELAY (GAS)

CAV	CIRCUIT	FUNCTION
30	A17 18RD/BK	FUSED B(+)
85	C13 18DB/OR (LHD)	A/C CLUTCH RELAY CONTROL
85	C13 20DB/OR (RHD)	A/C COMPRESSOR CLUTCH RELAY CONTROL
86	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	C2 18DB/YL	A/C CLUTCH RELAY OUTPUT
87A	-	-

AUTO SHUT DOWN RELAY (GAS)

CAV	CIRCUIT	FUNCTION
30	A14 14RD/DG	FUSED B(+)
85	K51 18DB/YL	AUTO SHUT DOWN RELAY CONTROL
86	F991 20OR/DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F991 20OR/DB (RHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F991 18OR/DB (LHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
87A	-	-

ENGINE STARTER MOTOR RELAY (GAS)

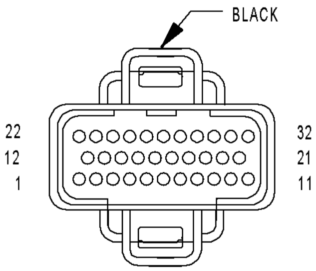
CAV	CIRCUIT	FUNCTION
30	A1 12RD	FUSED B(+)
85	T41 18BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE (T41)
85	T41 18BK/WT (RHD)	PARK/NEUTRAL POSITION SWITCH SENSE (T41)
86	F45 18YL/RD (EXCEPT 4.0L RHD)	FUSED IGNITION SWITCH OUTPUT (START)
86	F45 18YL/RD (4.7L)	FUSED IGNITION SWITCH OUTPUT (START)
86	F45 20YL/RD (4.0L RHD)	FUSED IGNITION SWITCH OUTPUT (START)
87	T40 12LG	ENGINE STARTER MOTOR RELAY OUTPUT
87A	-	-

FUEL PUMP RELAY (GAS)

CAV	CIRCUIT	FUNCTION
30	A62 16VT/LB (LHD)	FUSED B(+)
30	A62 16VT/WT (RHD)	FUSED B(+)
85	K31 18BR	FUEL PUMP RELAY CONTROL
86	F991 18OR/DB (LHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F991 20OR/DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F991 20OR/DB (RHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	A141 16DG/WT (LHD)	FUEL PUMP RELAY OUTPUT
87A	-	-
87	A141 16DG/BK (RHD)	FUEL PUMP RELAY OUTPUT

OXYGEN SENSOR DOWNSTREAM RELAY

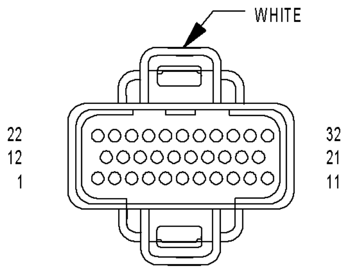
CAV	CIRCUIT	FUNCTION
30	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
30	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
85	K512 18RD/YL	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
86	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
86	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
87A	-	-
87	K200 18VT/OR	OXYGEN SENSOR DOWNSTREAM RELAY OUTPUT



POWERTRAIN CONTROL MODULE C1 (GAS)

POWERTRAIN CONTROL MODULE C1 (GAS)

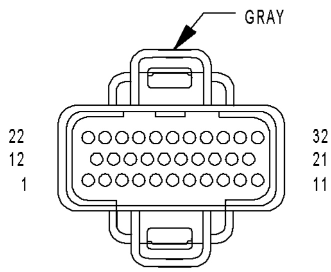
CAV	CIRCUIT	FUNCTION
1	K93 14TN/OR	COIL DRIVER NO. 3
2	F991 18OR/DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	K94 14TN/LG (4.7L)	COIL DRIVER NO. 4
4	K4 18BK/LB	SENSOR GROUND
5	K96 14TN/LB (4.7L)	COIL DRIVER NO. 6
6	T41 18BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE (T41)
7	K91 14TN/RD	COIL DRIVER NO. 1
8	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
9	K98 14LB/RD (4.7L)	COIL DRIVER NO. 8
10	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
11	K40 18BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
12	-	-
13	-	-
14	K77 18LG/BK (EXCEPT JAPAN)	TRANSFER CASE POSITION SENSOR INPUT
15	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
16	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
17	K7 18OR	5 VOLT SUPPLY
18	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
19	K39 18GY/BK	IDLE AIR CONTROL NO. 1 DRIVER
20	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
21	K95 14TN/DG (4.7L)	COIL DRIVER NO. 5
22	A7 14RD/BK	FUSED B(+)
23	K22 18OR/RD	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 (EXCEPT 4.0L EXPORT)	OXYGEN SENSOR 2/1 SIGNAL
27	K1 18DG/RD	MAP SENSOR SIGNAL
28	-	-
29	K341 18PK/WT (4.7L/4.0L JAPAN)	OXYGEN SENSOR 2/2 SIGNAL
29	K341 18TN/WT (4.0L EX-CEPT JAPAN)	OXYGEN SENSOR 2/2 SIGNAL
30	-	-
31	Z82 14BK/WT	GROUND
32	Z81 14BK/TN	GROUND



POWERTRAIN CONTROL MODULE C2 (GAS)

POWERTRAIN CONTROL MODULE C2 (GAS)

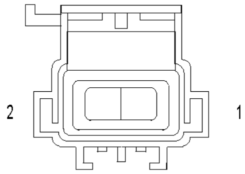
CAV	CIRCUIT	FUNCTION
1	T54 18VT (4.0L)	TRANSMISSION TEMPERATURE SENSOR SIGNAL
2	K26 18VT (4.7L)	FUEL INJECTOR NO. 7 DRIVER
3	-	-
4	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
5	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
6	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
7	K97 14BR (4.7L)	COIL DRIVER NO. 7
8	K88 18PK (4.0L)	GOVERNOR PRESSURE SOLENOID CONTROL
9	K92 14TN/PK	COIL DRIVER NO. 2
10	K20 18DG	GENERATOR FIELD DRIVER
11	T20 18LB (4.0L)	TORQUE CONVERTER CLUTCH SOLENOID CONTROL
12	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
13	K28 18GY/LB (4.7L)	FUEL INJECTOR NO. 8 DRIVER
14	-	-
15	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
16	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
17	K173 18LG	RADIATOR FAN RELAY CONTROL
18	-	-
19	C18 18DB	A/C PRESSURE SIGNAL
20	-	-
21	T60 18BR (4.0L)	3-4 SHIFT SOLENOID CONTROL
22	-	-
23	G60 18GY/YL	ENGINE OIL PRESSURE SWITCH SIGNAL
24	-	-
25	T13 18DB/BK (4.0L)	SPEED SENSOR GROUND
26	-	-
27	B22 18DG/YL	VEHICLE SPEED SIGNAL
28	T14 18LG/WT (4.0L)	OUTPUT SPEED SENSOR SIGNAL
29	T25 18LG/RD (4.0L)	GOVERNOR PRESSURE SENSOR SIGNAL
30	K30 18PK/YL (4.0L)	TRANSMISSION CONTROL RELAY CONTROL
31	K6 18VT/BK	5 VOLT SUPPLY
32	-	-



POWERTRAIN CONTROL MODULE C3 (GAS)

POWERTRAIN CONTROL MODULE C3 (GAS)

CAV	CIRCUIT	FUNCTION
1	C13 18DB/OR	A/C CLUTCH RELAY CONTROL
2	-	-
3	K51 18DB/YL	AUTO SHUT DOWN RELAY CONTROL
4	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
5	V35 18LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
6	-	-
7	K42 18DB/LG (4.7L HIGH OUTPUT)	KNOCK SENSOR NO. 1 SIGNAL
8	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
9	K512 18RD/YL	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
10	K106 18WT/DG (EXCEPT EXPORT)	LEAK DETECTION PUMP SOLENOID CONTROL
11	V32 18OR/DG	SPEED CONTROL POWER SUPPLY
12	F42 18DG/LG	FUSED AUTO SHUT DOWN RELAY OUTPUT
13	T6 18OR/BK (4.0L RHD)	OVERDRIVE OFF SWITCH SENSE
13	T10 18YL/DG (4.7L RHD)	TORQUE MANAGEMENT REQUEST SENSE
13	T6 18OR/WT (4.0L LHD)	OVERDRIVE OFF SWITCH SENSE
13	T10 18DG/LG (4.7L LHD)	TORQUE MANAGEMENT REQUEST SENSE
14	K107 18OR/PK (EXCEPT EXPORT)	LEAK DETECTION PUMP SWITCH SENSE
15	K25 18VT/LG	BATTERY TEMPERATURE SENSOR SIGNAL
16	K299 18BR/WT	OXYGEN SENSOR 1/2 HEATER CONTROL
17	-	-
18	K142 18GY/BK (4.7L HIGH OUTPUT)	KNOCK SENSOR NO. 2 SIGNAL
19	K31 18BR	FUEL PUMP RELAY CONTROL
20	K52 18PK/BK	DUTY CYCLE EVAP/PURGE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	K29 18WT/PK	BRAKE SWITCH SENSE
25	K125 18WT/DB	GENERATOR SOURCE
26	K226 18LB/YL	FUEL LEVEL SENSOR SIGNAL
27	D21 18PK	SCI TRANSMIT
28	-	-
29	D32 18LG/DG (RHD)	SCI RECEIVE
29	D32 18LG (LHD)	SCI RECEIVE
30	D25 18VT/YL	PCI BUS
31	-	-
32	V37 18RD/LG	SPEED CONTROL SWITCH SIGNAL

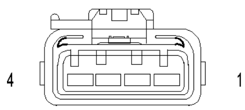


RADIATOR FAN MOTOR (4.0L)

RADIATOR FAN MOTOR (4.0L)

CAV	CIRCUIT	FUNCTION
1	C23 12DG	RADIATOR FAN MOTOR RELAY OUTPUT
2	Z4 12WT/BK	GROUND

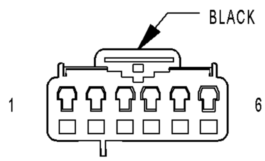
CONNECTOR PINOUTS



RADIATOR FAN MOTOR RELAY (4.0L)

RADIATOR FAN MOTOR RELAY (4.0L)

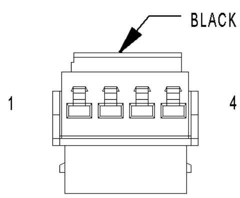
CAV	CIRCUIT	FUNCTION
1	Z307 20BK	GROUND
2	K173 20LG	RADIATOR FAN RELAY CONTROL
3	C23 12DG	RADIATOR FAN MOTOR RELAY OUTPUT
4	A16 12GY	FUSED B(+)



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE

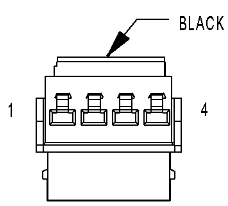
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	Z132 20BK/OR	GROUND
3	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	-	-
5	D25 20YL/VT/BK	PCI BUS
6	-	-



SPEED CONTROL SWITCH NO. 1

SPEED CONTROL SWITCH NO. 1

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

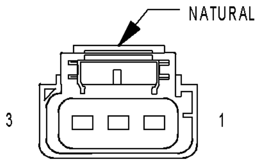


SPEED CONTROL SWITCH NO. 2

SPEED CONTROL SWITCH NO. 2

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

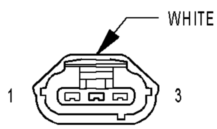
CONNECTOR PINOUTS



THROTTLE POSITION SENSOR (4.0L)

THROTTLE POSITION SENSOR (4.0L)

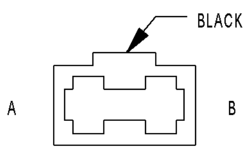
CAV	CIRCUIT	FUNCTION
1	K7 18OR	5 VOLT SUPPLY
2	K4 18BK/LB	SENSOR GROUND
3	K22 18OR/RD	THROTTLE POSITION SENSOR SIGNAL



THROTTLE POSITION SENSOR (4.7L)

THROTTLE POSITION SENSOR (4.7L)

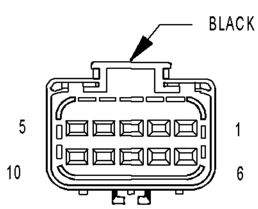
CAV	CIRCUIT	FUNCTION
1	K7 18OR	5 VOLT SUPPLY
2	K22 18OR/RD	THROTTLE POSITION SENSOR SIGNAL
3	K4 18BK/LB	SENSOR GROUND



TRAILER TOW CIRCUIT BREAKER

TRAILER TOW CIRCUIT BREAKER

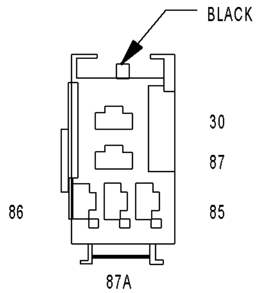
CAV	CIRCUIT	FUNCTION
A	Y203 14RD/WT	FUSED CIGAR LIGHTER RELAY OUTPUT
B	Y202 14RD/TN	CIGAR LIGHTER RELAY OUTPUT



TRAILER TOW CONNECTOR

TRAILER TOW CONNECTOR

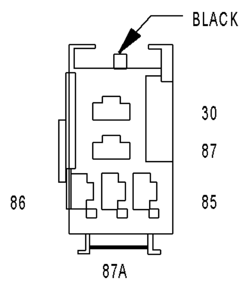
CAV	CIRCUIT	FUNCTION
1	-	-
2	L74 14PK/BK	TRAILER TOW LEFT TURN RELAY OUTPUT
3	L1 18VT/BK	BACK-UP LAMP FEED
4	Y203 14RD/WT	FUSED CIGAR LIGHTER RELAY OUTPUT
5	L7 18BK/YL	PARK LAMP RELAY OUTPUT
6	-	-
7	B40 14LB	TRAILER TOW BRAKE B(+)
8	Z150 14BK	GROUND
9	Z150 14BK	GROUND
10	L73 14PK/WT	TRAILER TOW RIGHT TURN RELAY OUTPUT



TRAILER TOW
LEFT TURN RELAY

TRAILER TOW LEFT TURN RELAY

CAV	CIRCUIT	FUNCTION
30	L73 14PK/WT	TRAILER TOW LEFT TURN RELAY OUTPUT
85	L50 18WT/TN	PRIMARY BRAKE SWITCH SIGNAL
86	L63 20DG/RD	LEFT TURN SIGNAL
87A	-	-
87	F9 14RD/BK	FUSED B(+)

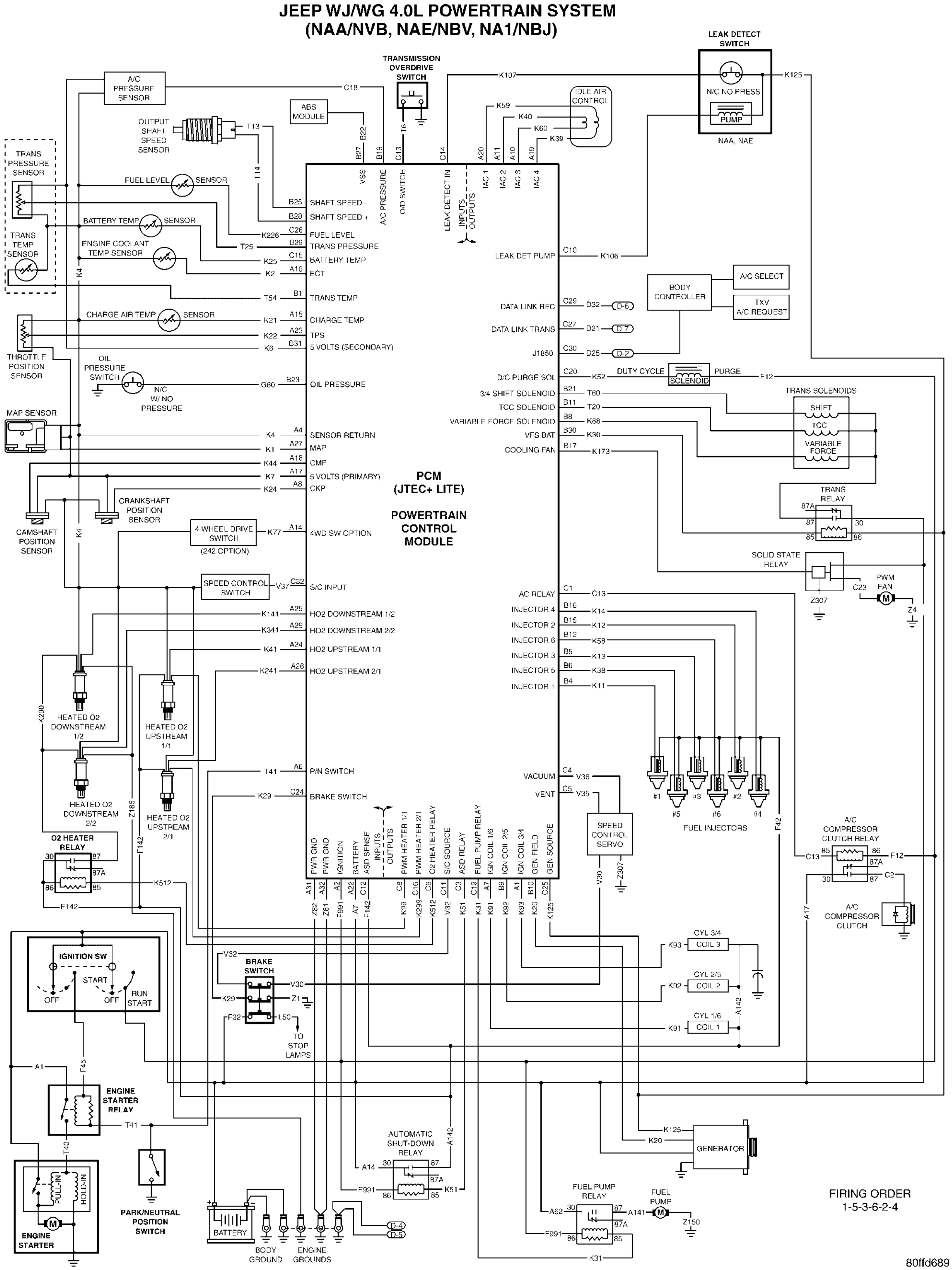


TRAILER TOW
RIGHT TURN RELAY

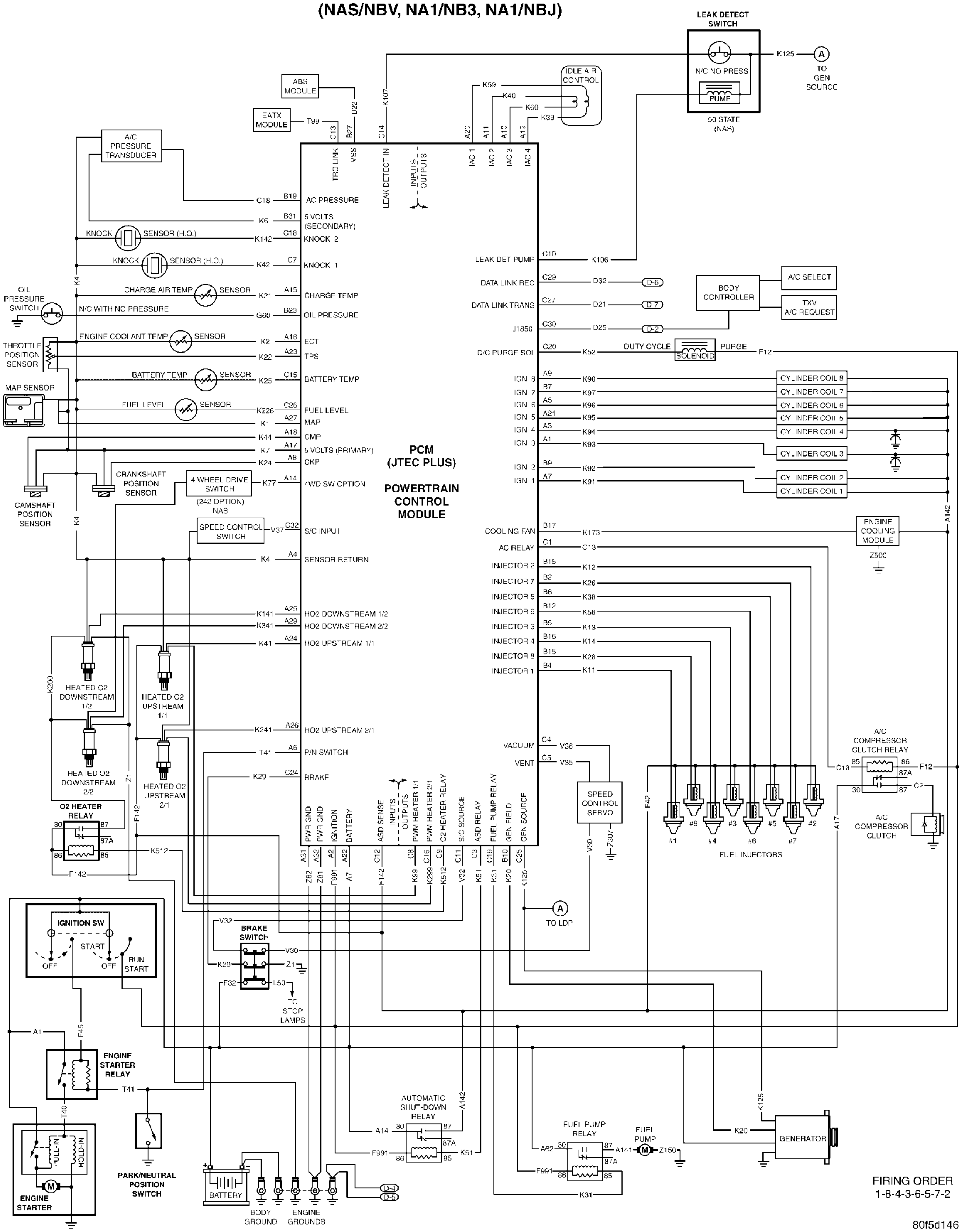
TRAILER TOW RIGHT TURN RELAY

CAV	CIRCUIT	FUNCTION
30	L74 14PK/BK	TRAILER TOW RIGHT TURN RELAY OUTPUT
85	L50 18WT/TN	PRIMARY BRAKE SWITCH SIGNAL
86	L62 20BR/RD	RIGHT TURN SIGNAL
87	F9 14RD/BK	FUSED B(+)
87A	-	-

10.0 SCHEMATIC DIAGRAMS



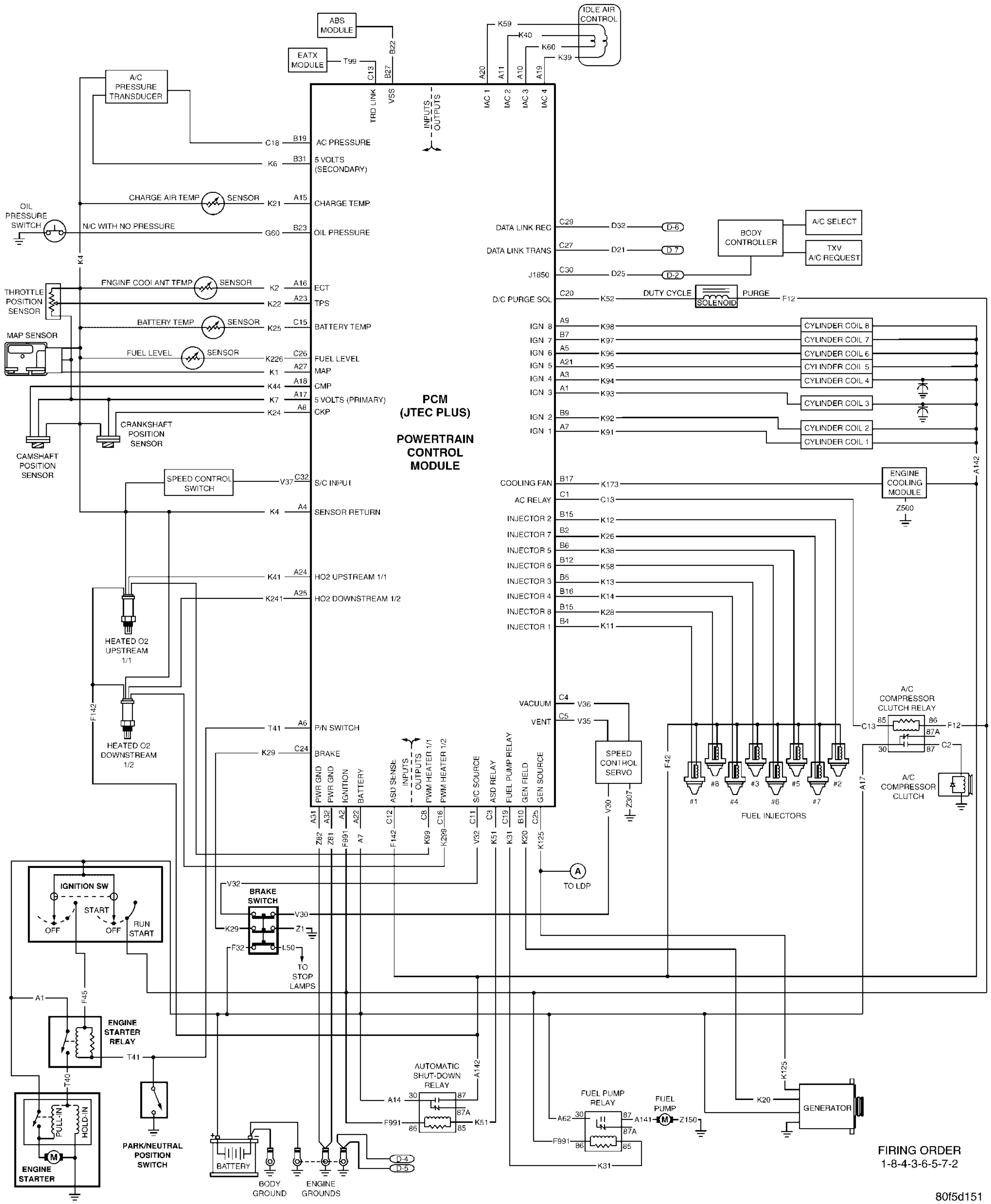
JEEP WJ/WG 4.7L POWERTRAIN SYSTEM
(NAS/NBV, NA1/NB3, NA1/NBJ)



FIRING ORDER
1-8-4-3-6-5-7-2

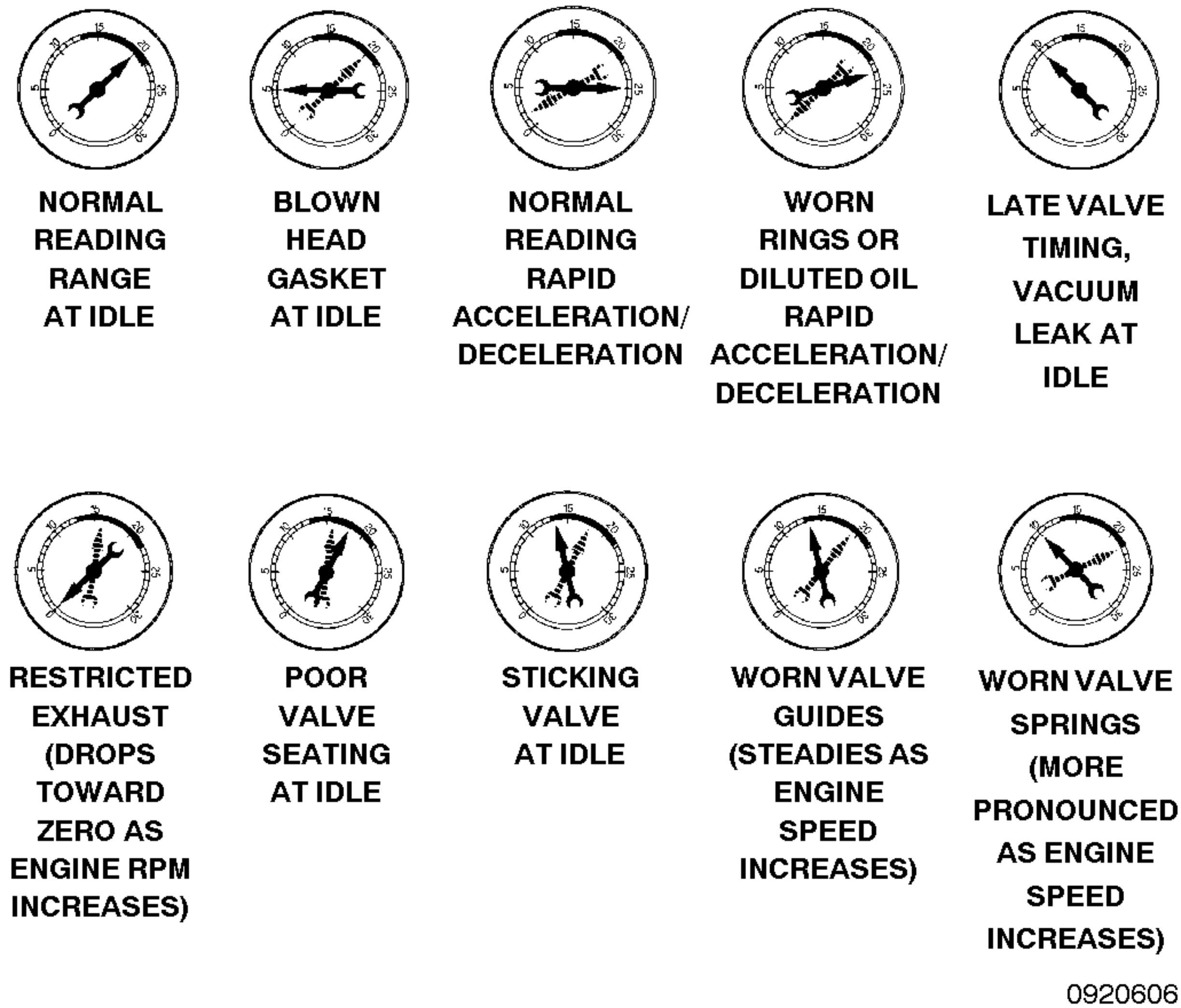
80f5d146

JEEP W1 4.7L POWERTRAIN SYSTEM (NA1/NB2)



NOTES

11.0 CHARTS AND GRAPHS

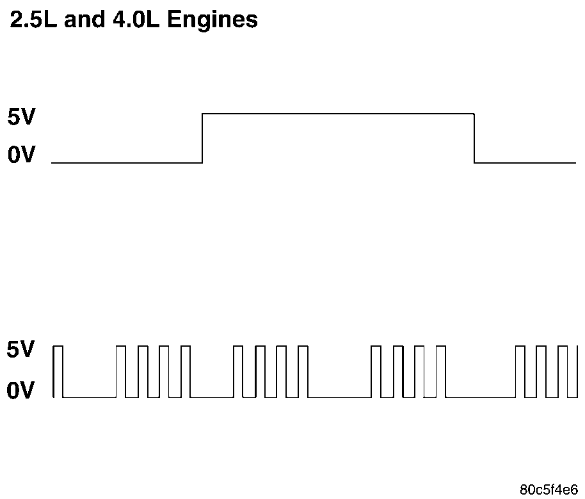


O2 SENSOR CONFIGURATION

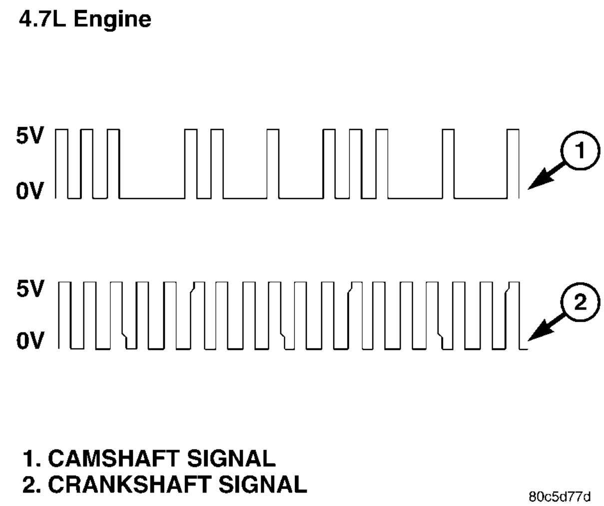
AB 3.9L	1/1	UPSTREAM
AB 3.9L	1/2	DOWNSTREAM
AB 5.2L	1/1	LEFT BANK UPSTREAM
AB 5.2L	1/2	LEFT BANK DOWNSTREAM
AB 5.2L	2/1	RIGHT BANK UPSTREAM
AB 5.2L	2/2	RIGHT BANK DOWNSTREAM
AB 5.9L	1/1	UPSTREAM
AB 5.9L	1/2	DOWNSTREAM
AN 2.5L	1/1	UPSTREAM
AN 2.5L	1/2	DOWNSTREAM
AN 3.9L	1/1	UPSTREAM
AN 3.9L	1/2	DOWNSTREAM
AN 4.7L	1/1	LEFT BANK UPSTREAM
AN 4.7L	1/2	LEFT BANK DOWNSTREAM
AN 4.7L	2/1	RIGHT BANK UPSTREAM
AN 4.7L	2/2	RIGHT BANK DOWNSTREAM
AN 5.9L 2WD	1/1	LEFT BANK UPSTREAM
AN 5.9L 2WD	1/2	PRE CATALYST
AN 5.9L 2WD	1/3	POST CATALYST
AN 5.9L 2WD	2/1	RIGHT BANK UPSTREAM
AN 5.9L 4WD	1/1	UPSTREAM
AN 5.9L 4WD	1/2	DOWNSTREAM
DN 3.9L	1/1	UPSTREAM
DN 3.9L	1/2	DOWNSTREAM
DN 4.7L	1/1	LEFT BANK UPSTREAM
DN 4.7L	1/2	LEFT BANK DOWNSTREAM
DN 4.7L	2/1	RIGHT BANK UPSTREAM
DN 4.7L	2/2	RIGHT BANK DOWNSTREAM
DN 5.9L	1/1	UPSTREAM
DN 5.9L	1/2	DOWNSTREAM
DR 3.7L	1/1	UPSTREAM
DR 3.7L	1/2	DOWNSTREAM
DR 4.7L	1/1	LEFT BANK UPSTREAM
DR 4.7L	1/2	LEFT BANK DOWNSTREAM
DR 4.7L	2/1	RIGHT BANK UPSTREAM
DR 4.7L	2/2	RIGHT BANK DOWNSTREAM
DR 5.7L	1/1	LEFT BANK UPSTREAM
DR 5.7L	1/2	LEFT BANK DOWNSTREAM
DR 5.7L	2/1	RIGHT BANK UPSTREAM
DR 5.7L	2/2	RIGHT BANK DOWNSTREAM
DR 5.9L	1/1	UPSTREAM
DR 5.9L	1/2	DOWNSTREAM
DR 8.0L	1/1	LEFT BANK UPSTREAM
DR 8.0L	1/2	PRE CATALYST
DR 8.0L	1/3	POST CATALYST
DR 8.0L	2/1	RIGHT BANK UPSTREAM
KJ 2.4L	1/1	UPSTREAM
KJ 2.4L	1/2	DOWNSTREAM
KJ 3.7L	1/1	LEFT BANK UPSTREAM
KJ 3.7L	1/2	LEFT BANK DOWNSTREAM
KJ 3.7L	2/1	RIGHT BANK UPSTREAM
KJ 3.7L	2/2	RIGHT BANK DOWNSTREAM
TJ 2.4L	1/1	UPSTREAM
TJ 2.4L	1/2	DOWNSTREAM
TJ 4.0L	1/1	FRONT UPSTREAM
TJ 4.0L	1/2	FRONT DOWNSTREAM
TJ 4.0L	2/1	REAR UPSTREAM
TJ 4.0L	2/2	REAR DOWNSTREAM
WJ 4.0L	1/1	FRONT UPSTREAM
WJ 4.0L	1/2	FRONT DOWNSTREAM
WJ 4.0L	2/1	REAR UPSTREAM
WJ 4.0L	2/2	REAR DOWNSTREAM
WJ 4.7L	1/1	LEFT BANK UPSTREAM
WJ 4.7L	1/2	LEFT BANK DOWNSTREAM
WJ 4.7L	2/1	RIGHT BANK UPSTREAM
WJ 4.7L	2/2	RIGHT BANK DOWNSTREAM
WJ 5.9L	1/1	UPSTREAM
WJ 5.9L	1/2	DOWNSTREAM
ZB 8.3L	1/1	LEFT BANK UPSTREAM
ZB 8.3L	1/2	LEFT BANK DOWNSTREAM
ZB 8.3L	2/1	RIGHT BANK UPSTREAM
ZB 8.3L	2/2	RIGHT BANK DOWNSTREAM

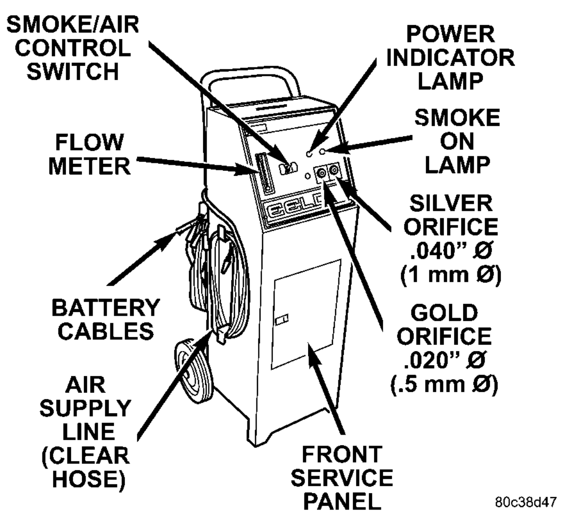
80f4482e

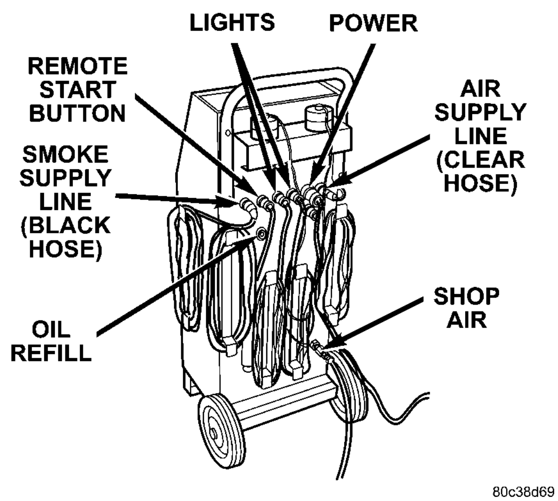
4.0L

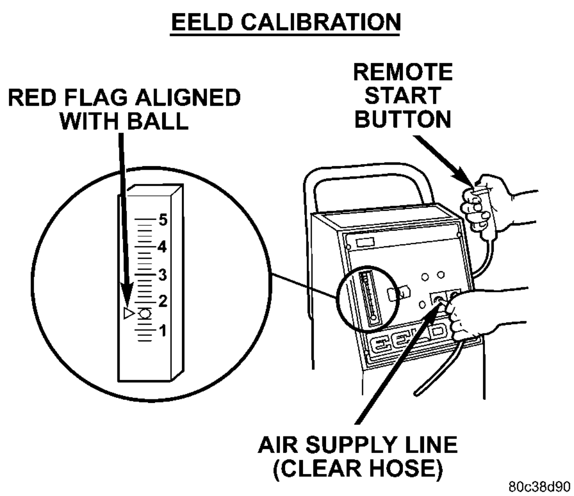

2.5L and 4.0L Engines
5V
0V
5V
0V
80c5f4e6

4.7L


4.7L Engine
5V
0V
1
5V
0V
2
1. CAMSHAFT SIGNAL
2. CRANKSHAFT SIGNAL
80c5d77d


SMOKE/AIR CONTROL SWITCH
POWER INDICATOR LAMP
SMOKE ON LAMP
FLOW METER
SILVER ORIFICE .040" Ø (1 mm Ø)
BATTERY CABLES
GOLD ORIFICE .020" Ø (.5 mm Ø)
AIR SUPPLY LINE (CLEAR HOSE)
FRONT SERVICE PANEL
80c38d47


LIGHTS
POWER
REMOTE START BUTTON
AIR SUPPLY LINE (CLEAR HOSE)
SMOKE SUPPLY LINE (BLACK HOSE)
SHOP AIR
OIL REFILL
80c38d69


EELD CALIBRATION
RED FLAG ALIGNED WITH BALL
REMOTE START BUTTON
5
4
3
2
1
AIR SUPPLY LINE (CLEAR HOSE)
80c38d90

NOTES