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## 1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose engine control module (ECM), powertrain control module (PCM) and sentry key immobilizer module (SKIM) problems; they are no start, diagnostic trouble code, and no trouble code problems. The diagnostics in this manual are based on the trouble condition or symptom being present at the time of diagnosis.

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

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. **IT IS RECOMMENDED THAT YOU REVIEW THE ENTIRE MANUAL TO BECOME FAMILIAR WITH ALL NEW AND CHANGED DIAGNOSTIC PROCEDURES.**

Please follow the recommendations below when choosing your diagnostic path.

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

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

An \* placed before the symptom description indicates a no DTC customer complaint.

### 1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the 2001 XJ equipped with the 2.5L VM diesel engine.

### 1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the engine control module (ECM) and 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

LHD The ECM is located behind the lower instrument panel to the right of the accelerator pedal.

RHD The ECM is located behind the lower instrument panel to the left of the clutch pedal.

The PCM for both LHD and RHD is located in the engine compartment behind the air cleaner housing.

## 3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

### 3.1 GENERAL DESCRIPTION

The 2.5L VM diesel engine system is equipped with the latest in technical advances. The on-board diagnostics incorporated with the powertrain control module and engine control module are intended to assist the field technician in repairing vehicle problems by the quickest means.

### 3.2 FUNCTIONAL OPERATION

#### 3.2.1 PCM ON-BOARD DIAGNOSTICS

The PCM and ECM have been programmed to monitor many different circuits of the diesel fuel injection system. This monitoring is called "on-board diagnosis."

Certain criteria must be met for a trouble code to be entered into the PCM or ECM memory. The criteria may be a range of: engine rpm, engine temperature, and/or input voltage. If all of the criteria for monitoring a system or circuit are met and a problem is sensed, then a trouble code will be stored in the PCM or the ECM.

It is possible that a trouble code for a monitored circuit may not be entered into memory even though a malfunction has occurred. This may happen when the monitoring criteria have not been met.

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



## GENERAL INFORMATION

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### 3.2.2 ECM OPERATING MODES

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

#### **Ignition Switch On (Engine Off Mode)**

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

1. The ECM determines atmospheric air pressure from the atmospheric pressure sensor located in the ECM.
2. The ECM energizes the fuel quantity actuator and the fuel shutdown solenoid if no faults are present.

If the engine is not started within 5 seconds of ignition on, the ECM deactivates the fuel quantity actuator and the fuel shutdown solenoid to prevent overheating.

**Engine Start-up Mode** - The ECM uses the engine temperature sensor, fuel temperature sensor, atmospheric pressure sensor, intake air temperature sensor and the engine speed sensor to determine fuel delivery during this mode.

**Normal Driving Modes** - Engine idle, warm-up, acceleration, deceleration and wide open throttle modes are all controlled based on the sensor inputs to the ECM and are modified based on engine temperature, boost pressure, intake air temperature and engine speed.

**Overheat Protection Mode** - If engine temperature becomes too hot, the ECM limits fuel quantity for engine protection.

**Limp-In Modes** - The ECM operates in limp-in mode when certain system faults are detected. The ECM operates in one of the following modes based on the type and severity of the fault:

1. 10% torque reduction.
2. 50% torque reduction.
3. Engine speed set to 1100 rpm.

**After-Run** - When fused ignition switch output is removed from the ECM cavity C1-47, the ECM performs a self-diagnostic check in the following order:

1. Electrical shut-off test.
2. Fuel quantity actuator test.
3. Monitoring module test.
4. Voltage regulator test.
5. Main relay test (if tests 1-4 pass).

If any of tests 1-4 fail, the fault is stored in memory and can be retrieved during the next ignition cycle using the DRBIII.

### 3.2.3 MONITORED CIRCUITS

The PCM and ECM are able to monitor and identify most driveability related trouble conditions. Some circuits are directly monitored through feedback circuitry. In addition, the PCM and ECM monitor the voltage state of some circuits and compare those states with expected values. Other systems are monitored indirectly when the PCM and ECM conduct a rationality test to identify problems.

Although most engine control subsystems are either directly or indirectly monitored, there may be occasions when diagnostic trouble codes are not immediately identified. For a trouble code to set, specific conditions must be met and unless these conditions are encountered, a code will not set.

### 3.2.4 SKIS ON-BOARD DIAGNOSTICS

The SKIS has been programmed to transmit and monitor many different coded messages as well as CCD Bus messages. This monitoring is called "On-Board Diagnosis".

Certain criteria must be met for a diagnostic trouble code to be entered in to the SKIS memory. The criteria may be a range of: input voltage, CCD Bus messages, or coded messages to the SKIS. 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 SKIS memory.

### 3.2.5 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is an immobilizer system designed to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip, engine controller and powertrain controller. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is "Valid" the SKIM sends a CCD Bus message to the powertrain controller indicating the presence of a valid ignition key. The PCM then supplies the ECM with a valid immobilizer signal allowing the engine to continue to operate.

### 3.2.6 SKIS OPERATION

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

**Secret Key** - This is an electronically stored value (identification number) that is unique to each SKIS.



The secret key is stored in the SKIM, PCM and all ignition key transponders.

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

The secret key and challenge are the two variables used in the algorithm that produces the encrypted response message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by 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 key codes in SKIM memory (8 key maximum). After validating the ignition key the SKIM sends a CCD Bus message called a "Seed Request" to the powertrain controller then waits for a powertrain controller response. If the powertrain controller 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 powertrain controller sends a seed response, the SKIM sends a valid/invalid key message to the powertrain controller. 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 powertrain controller uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for a PCM status message from the powertrain controller. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code stored.

The SKIS incorporates a SKIS indicator lamp located in the instrument cluster. The lamp is actuated when the SKIM sends a CCD Bus message to the electro/mechanical instrument cluster (MIC) requesting the lamp on. The MIC then provides the power and ground for the lamp. The SKIM will request lamp operation for the following:

- bulb check at ignition on
- to alert the vehicle operator to a SKIS malfunction

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 the rate of 1Hz (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 ECM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the ECM disables fuel delivery until the fault is corrected.

### 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. This procedure begins in DTC TEST - Checking the System for Diagnostic Trouble Codes. This will direct you to the specific test(s) that must be performed.

#### 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 fault is there every time the powertrain control module/engine control module/sentry key immobilizer system (SKIS) 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.

#### 3.3.2 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the powertrain control module/engine control module/sentry key immobilizer system (SKIS) checks the circuit is an "intermittent" code. Most intermittent codes are caused by wiring or connector problems. Faults that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that cause them. The following checks may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any hotlines or technical service bulletins that may apply.

NOTE: Electro-magnetic (Radio) interference can cause intermittent system malfunction.

## GENERAL INFORMATION

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### 3.3.4 ECM DIAGNOSTIC TROUBLE CODES

AC CONTROL OPEN CIRCUIT  
AC CONTROL SHORT CIRCUIT  
ACCEL. PEDAL SENSOR PLAUSIBILITY  
ACCEL. PEDAL SENSOR PWG PLAUS WITH POTENTIOMETER  
ACCEL. PEDAL SENSOR SIGNAL HIGH EXCEEDED  
ACCEL. PEDAL SENSOR SUPPLY HIGH EXCEEDED  
ACCEL. PEDAL SENSOR SUPPLY LOW EXCEEDED  
AIR TEMP. SENSOR SIGNAL HIGH EXCEEDED  
AIR TEMP. SENSOR SIGNAL LOW EXCEEDED  
ATMOSPHERE PRESSURE SENSOR SRC HIGH EXCEEDED  
ATMOSPHERE PRESSURE SENSOR SRC LOW EXCEEDED  
BATTERY VOLTAGE SRC HIGH EXCEEDED  
BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT  
CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED  
CONTROL SLEEVE SENSOR START END POS. NOT ATTAINED  
CONTROL SLEEVE SENSOR STOP END POS. NOT ATTAINED  
EEPROM PLAUSIBILITY CHECKSUM ERROR FOR ADJ (EGR)  
EEPROM PLAUSIBILITY CHECKSUM ERROR IN CC212  
EEPROM PLAUSIBILITY COMMUNICATION WITH EEPROM  
EEPROM PLAUSIBILITY FUNC SWITCH WRONG OR MISSING  
EEPROM PLAUSIBILITY VER NUMBER NOT CORRESPONDING  
EEPROM PLAUSIBILITY VIN CHECKSUM ERROR  
EGR OPEN CIRCUIT  
EGR SHORT CIRCUIT  
ENGINE SPEED SENSOR DYN. PLAUSIBILITY  
ENGINE SPEED SENSOR OVER SPEED RECOGNITION  
ENGINE SPEED SENSOR STATIC PLAUSIBILITY  
FAN CONTROL OPEN CIRCUIT  
FAN CONTROL SHORT CIRCUIT  
FUEL QUANTITY ACTUATOR NEG GOV DEVIATION COLD  
FUEL QUANTITY ACTUATOR NEG GOV DEVIATION WARM  
FUEL QUANTITY ACTUATOR POS GOV DEVIATION COLD  
FUEL QUANTITY ACTUATOR POS GOV DEVIATION WARM  
FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED  
FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED  
GLOW DISPLAY OPEN CIRCUIT  
GLOW DISPLAY SHORT CIRCUIT  
GLOW RELAY CONTROLLER OPEN CIRCUIT  
GLOW RELAY CONTROLLER SHORT CIRCUIT  
INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY  
INDUCTIVE AUX. SPEED SENSOR OVER SPEED RECOGNITION  
INDUCTIVE AUX. SPEED SENSOR PLAUSIBILITY  
INDUCTIVE AUX. SPEED SENSOR STATIC PLAUSIBILITY  
MICROCONTROLLER GATE-ARRAY MONITORING  
MICROCONTROLLER GATE-ARRAY WATCHDOG  
MICROCONTROLLER PREPARE FUEL QUANTITY STOP  
MICROCONTROLLER RECOVERY WAS OCCURRED  
MICROCONTROLLER REDUNDANT OVERRUN MONITORING  
NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED  
NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED  
REDUNDANT EMER. STOP PLAUSIBILITY IN AFTER-RUN  
REDUNDANT EMER. STOP POWERSTAGE DEFECTIVE  
REGULATOR LOWER REGULATOR LIMIT  
REGULATOR UPPER REGULATOR LIMIT  
SOLENOID VALVE CONTROLLER OPEN CIRCUIT

SOLENOID VALVE CONTROLLER SHORT CIRCUIT  
 TEMPERATURE OF ENGINE COOLANT SRC HIGH EXCEEDED  
 TEMPERATURE OF ENGINE COOLANT SRC LOW EXCEEDED  
 TERMINAL 15 PLAUSIBILITY AFTER START-UP  
 TIMING GOVERNING NEGATIVE GOVERNOR DEVIATION  
 TIMING GOVERNING POSITIVE GOVERNOR DEVIATION  
 TURBOCHARGER BOOST SENSOR PLAUSIBILITY  
 TURBOCHARGER BOOST SENSOR SIGNAL HIGH EXCEEDED  
 TURBOCHARGER BOOST SENSOR SIGNAL LOW EXCEEDED  
 TURBOCHARGER BOOST SENSOR SUPPLY HIGH EXCEEDED  
 TURBOCHARGER BOOST SENSOR SUPPLY LOW EXCEEDED  
 U\_REF (2.5V)  
 VEHICLE SPEED GOV ANALOG CTRL CONTROL CONTACT ALONE  
 VEHICLE SPEED SENSOR PEC FREQUENCY TOO HIGH  
 VEHICLE SPEED SENSOR SRC HIGH EXCEEDED  
 VEHICLE SPEED SENSOR PLAUSIBILITY  
 VEHICLE THEFT ALARM IMMOBILIZER SIGNAL LOST  
 VEHICLE THEFT ALARM INVALID SKIM MESSAGE

**3.3.5 HANDLING NO TROUBLE CODE PROBLEMS**

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 or User-Requested COLD Boot

This is a sample of such an error message display:

```

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

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

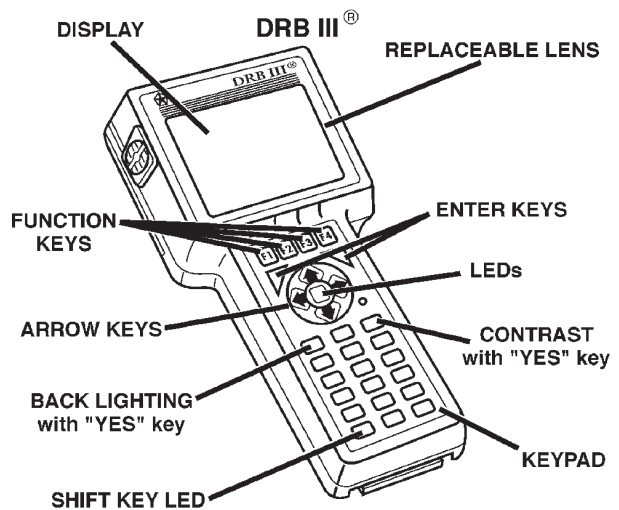
**3.5.1 DRBIII® DOES NOT POWER UP**

If the LEDs do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts at DLC cavity 16 is required to adequately power the DRBIII. Check for proper ground connection at DLC cavities 4 and 5.

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

**3.5.2 DISPLAY IS NOT VISIBLE**

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



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# GENERAL INFORMATION

## 4.0 DISCLAIMERS, SAFETY, WARNINGS

### 4.1 DISCLAIMERS

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

### 4.2 SAFETY

#### 4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

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

#### 4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic 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 OR POSSIBLY FATAL 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<br>0 - 500 volts DC |
| Ohms (resistance)*                        | 0 - 1.12 megohms                          |
| Frequency Measured<br>Frequency Generated | 0 - 10 kHz                                |
| Temperature                               | -58 - 1100F<br>-50 - 600C                 |

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

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.

4.3 WARNINGS

4.3.1 VEHICLE DAMAGE WARNINGS

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

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

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

4.3.2 ROAD TESTING A COMPLAINT VEHICLE

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®.**

5.0 REQUIRED TOOLS AND EQUIPMENT

- ammeter
- DRBIII® (diagnostic read-out box) scan tool
- high impedance 12-volt test light
- jumper wires and probes
- ohmmeter
- vacuum gauge
- voltmeter

6.0 GLOSSARY OF TERMS

- backfire, popback** fuel ignites in either the intake or the exhaust system
- cuts out, misses** a steady pulsation or the inability of the engine to maintain a consistent rpm
- DLC** data link connector (previously called “engine diagnostic connector”)
- detonation, pre-ignition** a mild to severe ping, especially under loaded engine conditions
- ECM** engine control module (Bosch EDC15)
- ECT** engine coolant temperature sensor
- EGR** exhaust gas recirculation valve and system
- EVM** electric vacuum modulator
- generator** previously called “alternator”
- hard start** The engine takes longer than usual to start, even though it is able to crank normally.
- hesitation, sag, stumble** There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
- lack of power, sluggish** The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
- MIC** electro/mechanical instrument cluster
- MIL** malfunction indicator lamp
- PCM** powertrain control module (JTEC+)
- PDC** power distribution center
- poor fuel economy** There is significantly less fuel mileage than other vehicles of the same design and configuration.



## GENERAL INFORMATION

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**rough, unstable, or erratic idle, stalling** The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called "hunting"). This condition may cause stalling if it is severe enough.

**SKIM** sentry key immobilizer module

**SKIS** sentry key immobilizer system

**start & stall** The engine starts but immediately dies.

**surge** engine rpm fluctuation without corresponding change in throttle position sensor

**VSS** vehicle speed sensor



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7.0

DIAGNOSTIC INFORMATION AND  
PROCEDURES

# CHARGING

## Symptom:

### **P0622-GENERATOR FIELD NOT SWITCHING PROPERLY - DIESEL**

#### When Monitored and Set Condition:

#### **P0622-GENERATOR FIELD NOT SWITCHING PROPERLY - DIESEL**

When Monitored: With the engine speed greater than 1500 RPM for at least 25 seconds.

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

#### POSSIBLE CAUSES

INTERMITTENT CONDITION  
 CHECK FOR OTHER CHARGING SYSTEM DTCS  
 GENERATOR FIELD CIRCUIT OPEN  
 GENERATOR SOURCE CIRCUIT OPEN  
 POWERTRAIN CONTROL MODULE (INTERNAL DRIVER FAULT)  
 GENERATOR (FIELD OPEN)  
 POWERTRAIN CONTROL MODULE (GENERATOR SOURCE OPEN)

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, read PCM DTCs.<br>Are there any other Charging System related DTCs?<br><br>Yes → Refer to the symptom list for the related symptom(s).<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Go To 2   | All           |
| 2    | <b>NOTE: The battery must be fully charged and the generator belt must be in good condition and tensioned properly before continuing.</b><br>Turn the ignition on.<br>With the DRB, erase PCM DTCs.<br>Turn the ignition off for 10 seconds, then start the engine.<br>With the DRB, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 3<br><br>No → Go To 7 | All           |
| 3    | Turn the ignition off, then on.<br>Measure the voltage of the Generator Field Driver circuit in PCM harness connector C2 by back probing.<br>Is the voltage above 10.0 volts?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Go To 4              | All           |

## P0622-GENERATOR FIELD NOT SWITCHING PROPERLY - DIESEL — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Disconnect the Generator Field harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Generator Source circuit.<br>Is the voltage above 10.0 volts?<br><br>Yes → Go To 5<br>No → Go To 6  | All           |
| 5    | Turn the ignition off.<br>Disconnect the Generator Field harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Generator Field circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Replace the Generator.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Repair the Generator Field circuit for an open.<br>Perform CHARGING VERIFICATION - VER-3.   | All           |
| 6    | Turn the ignition off.<br>Disconnect the Generator Field harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Generator Source circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Repair the Generator Source circuit for an open.<br>Perform CHARGING VERIFICATION - VER-3.  | All           |
| 7    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Test Complete. | All           |

# CHARGING

## Symptom:

### **P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH - DIESEL**

#### When Monitored and Set Condition:

##### **P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH - DIESEL**

When Monitored: With the ignition on.

Set Condition: The PCM detects voltage on the ambient/battery temperature sensor signal circuit above 4.94 volts for more than 3 seconds.

#### **POSSIBLE CAUSES**

POWERTRAIN CONTROL MODULE (SHORTED TO VOLTAGE INTERNALLY)  
INTERMITTENT CONDITION  
AMB/BATT TEMP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
AMBIENT/BATTERY TEMPERATURE SENSOR  
AMBIENT/BATTERY TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN  
AMBIENT/BATTERY TEMPERATURE SENSOR GROUND CIRCUIT OPEN  
POWERTRAIN CONTROL MODULE (OPEN INTERNALLY)

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, erase PCM DTCs.<br>Cycle the ignition on for five seconds, then off for five seconds, several times.<br>With the DRB, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 8  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the Ambient/Battery Temperature Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage between ground and the Ambient/Battery Temperature Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Go To 3<br>No → Go To 4 | All                  |

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

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Turn the ignition off.<br/>           Disconnect the Ambient/Battery Temperature Sensor harness connector.<br/>           Disconnect the PCM harness connectors.<br/>           Remove the ASD/Diesel Power Relay from the PDC.<br/>           Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>           Turn the ignition on.<br/>           Measure the voltage between ground and the Amb/Batt Temp Sensor Signal circuit.<br/>           Is the voltage below 0.5 volt?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>           Perform CHARGING VERIFICATION - VER-3.</p> <p>No → Repair the Ambient/Battery Temperature Sensor Signal circuit for a short to voltage.<br/>           Perform CHARGING VERIFICATION - VER-3.</p> | All           |
| 4    | <p>Turn the ignition off.<br/>           Disconnect the Ambient/Battery Temperature Sensor harness connector.<br/>           Measure the resistance of the Amb/Batt Temp Sensor.<br/>           Is the resistance above 100 kohms?</p> <p>Yes → Replace the Ambient/Battery Temperature Sensor.<br/>           Perform CHARGING VERIFICATION - VER-3.</p> <p>No → Go To 5</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>           Disconnect the Ambient/Battery Temperature Sensor harness connector.<br/>           Disconnect the PCM harness connectors.<br/>           Measure the resistance of the Amb/Batt Temp Sensor Signal circuit.<br/>           Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the Ambient/Battery Temperature Sensor Signal circuit for an open.<br/>           Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 6    | <p>Turn the ignition off.<br/>           Disconnect the Ambient/Battery Temperature Sensor harness connector.<br/>           Disconnect the PCM harness connectors.<br/>           Measure the resistance of the Amb/Batt Temp Sensor Ground circuit.<br/>           Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the Ambient/Battery Temperature Sensor Ground circuit for an open.<br/>           Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 7    | <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>           Perform CHARGING VERIFICATION - VER-3.</p>  | All           |

# CHARGING

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

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 8           | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform CHARGING VERIFICATION - VER-3.</p> <p>No → Test Complete.</p> | All                  |



**Symptom:**

**P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW - DIESEL**

**When Monitored and Set Condition:**

**P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW - DIESEL**

When Monitored: With the ignition on.

Set Condition: The PCM detects voltage on the ambient/battery temperature sensor signal circuit below 0.08 volt for more than 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 AMBIENT/BATTERY TEMPERATURE SENSOR  
 AMBIENT/BATTERY TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND  
 AMB/BATT TEMP SENSOR SIGNAL AND SENSOR GROUND CIRCUITS SHORTED TOGETHER  
 POWERTRAIN CONTROL MODULE (SHORT TO GROUND INTERNALLY)

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, read the voltage of the Ambient/Battery Temperature Sensor.<br>Is the voltage below 0.4 volt?<br><br>Yes → Go To 2<br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Ambient/Battery Temperature Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read the voltage of the Ambient/Battery Temperature Sensor.<br>Is the voltage above 4.0 volts?<br><br>Yes → Replace the Ambient/Battery Temperature Sensor.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Go To 3  | All           |
| 3    | Turn the ignition off.<br>Disconnect the Ambient/Battery Temperature Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the Amb/Batt Temp Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br>No → Repair the Ambient/Battery Temperature Sensor Signal circuit for a short to ground.<br>Perform CHARGING VERIFICATION - VER-3. | All           |

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

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Disconnect the Ambient/Battery Temperature Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between the Amb/Batt Temp Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Ambient/Battery Temperature Sensor Signal and Sensor Ground circuits for a short together.<br>Perform CHARGING VERIFICATION - VER-3.   | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform CHARGING VERIFICATION - VER-3.   | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1594-CHARGING SYSTEM VOLTAGE TOO HIGH - DIESEL**

**When Monitored and Set Condition:**

**P1594-CHARGING SYSTEM VOLTAGE TOO HIGH - DIESEL**

When Monitored: With the engine running.

Set Condition: The voltage at PCM cavity C1-22 is 1.0 volt or more above the target charging voltage for at least 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND  
 POWERTRAIN CONTROL MODULE (TARGET CHARGING VOLTAGE TOO LOW)  
 GENERATOR SHORTED TO GROUND INTERNALLY  
 POWERTRAIN CONTROL MODULE (FIELD DRIVER SHORTED TO GROUND)

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: The battery must be fully charged and the generator belt must be in good condition and tensioned properly before continuing.</b><br/>                     Turn the ignition on.<br/>                     With the DRB, actuate the Generator Field.<br/>                     Measure the voltage between ground and the Generator Field Driver circuit by back probing the Generator Field harness connector with a voltmeter.<br/>                     Does the voltage cycle from B+ to below 2.0 volts?</p> <p>Yes → Go To 2<br/>                     No → Go To 4</p> <p><b>NOTE: With the DRB, stop the Generator Field actuation.</b></p> | All           |
| 2    | <p>Start the engine.<br/>                     With the DRB, read the Target Charging voltage<br/>                     Is the Target Charging voltage above 13.0 volts?</p> <p>Yes → Go To 3<br/>                     No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform CHARGING VERIFICATION - VER-3.</p>   | All           |

**P1594-CHARGING SYSTEM VOLTAGE TOO HIGH - DIESEL — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform CHARGING VERIFICATION - VER-3.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |
| 4    | <p>Turn the ignition off.</p> <p>Disconnect PCM harness connector C2.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Measure the resistance between ground and the Generator Field Driver circuit.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Repair the Generator Field Driver circuit for a short to ground.<br/>Perform CHARGING VERIFICATION - VER-3.</p>   | All           |
| 5    | <p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Measure the resistance between ground and the Generator Field Driver terminal on the back of the Generator.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Repair or replace the Generator as necessary.<br/>Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 6    | <p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>Perform CHARGING VERIFICATION - VER-3.</p>   | All           |

**Symptom:**

**P1600-BATTERY VOLTAGE SRC HIGH EXCEEDED - DIESEL**

**When Monitored and Set Condition:**

**P1600-BATTERY VOLTAGE SRC HIGH EXCEEDED - DIESEL**

When Monitored: With the ignition on.

Set Condition: The ECM detects the system voltage has exceeded 20 volts for at least 5 seconds.

**POSSIBLE CAUSES**

CHECK THE CHARGING VOLTAGE AT 2000 RPM  
 CLEAR THE DTC AND RETEST  
 INTERMITTENT CONDITION

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Start the engine.<br>Set the engine speed to 2000 RPM.<br>Measure the voltage at the battery.<br>Is the voltage above 17.0 volts?<br><br>Yes → Refer to symptom list for problems related to the charging system.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Go To 2  | All           |
| 2    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Start the engine and vary the engine speed between idle and 2500 RPM for several minutes..<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform CHARGING VERIFICATION - VER-3.<br><br>No → Go To 3 | All           |

**P1600-BATTERY VOLTAGE SRC HIGH EXCEEDED - DIESEL — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform CHARGING VERIFICATION - VER-3.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |



**Symptom List:**

**P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL**

**\*CHECKING THE CHARGING SYSTEM OPERATION - DIESEL**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL.**

**When Monitored and Set Condition:**

**P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL**

When Monitored: With the engine running.

Set Condition: The voltage at PCM cavity C1-22 is 0.5 volt or more below the target charging voltage for at least 3 seconds.

**POSSIBLE CAUSES**

CHECK FOR CYCLING VOLTAGE ON THE GENERATOR FIELD DRIVER CIRCUIT  
 INTERMITTENT CONDITION  
 GENERATOR BELT CONDITION OR TENSION  
 HIGH RESISTANCE IN THE FUSED B+ CIRCUIT TO THE PCM  
 GENERATOR FIELD DRIVER CIRCUIT SHORTED TO VOLTAGE  
 GENERATOR FUSED B+ CIRCUIT HIGH RESISTANCE  
 ASD RELAY OUTPUT CIRCUIT OPEN  
 GENERATOR GROUND CIRCUIT HIGH RESISTANCE  
 GENERATOR FIELD DRIVER CIRCUIT OPEN  
 POWERTRAIN CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator capacity.</b><br/> <b>NOTE: The battery must be fully charged before continuing.</b><br/>                     Inspect the generator belt condition and tension.<br/>                     Is the generator belt in good condition and tensioned properly?</p> <p>Yes → Go To 2</p> <p>No → Repair as necessary.<br/>                     Perform CHARGING VERIFICATION - VER-3.</p> | All           |

# CHARGING

## P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 2    | <p>Turn the ignition on.<br/>           With the DRB, actuate the Generator Field.<br/>           Measure the voltage between ground and the Generator Field Driver circuit by back probing the Generator Field harness connector with a voltmeter.<br/> <b>NOTE: The voltage should cycle from Battery voltage to below 2.0 volts every 1.4 seconds.</b><br/>           While monitoring the voltmeter, wiggle the generator field harness and connectors between the generator, PCM and the ASD/Diesel Power Relay (in the PDC).<br/>           Was there any interruption of the normal voltage cycling?</p> <p>Yes → Repair the harness as necessary where the wiggling caused the interruption.<br/>           Perform CHARGING VERIFICATION - VER-3.</p> <p>No → Go To 3</p> <p><b>NOTE: With the DRB, stop the Generator Field actuation.</b></p> | All           |
| 3    | <p>Connect the positive lead of a voltmeter to the generator B+ (12V) terminal and the negative lead to the battery positive (+) post.<br/> <b>WARNING: KEEP EVERYTHING CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/>           Start the engine.<br/>           Is the voltage on the voltmeter below 0.4 volt?</p> <p>Yes → Go To 4</p> <p>No → Repair the Generator Fused B+ circuit for high resistance.<br/>           Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 4    | <p>Connect the positive lead of a voltmeter to the generator case (housing) and the negative lead to the battery negative (-) post.<br/> <b>WARNING: KEEP EVERYTHING CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/>           Start the engine.<br/>           Is the voltage on the voltmeter below 0.4 volt?</p> <p>Yes → Go To 5</p> <p>No → Repair the Generator Ground circuit for high resistance.<br/>           Perform CHARGING VERIFICATION - VER-3.</p>   | All           |
| 5    | <p>Turn the ignition off, then on.<br/>           With the DRB, read and record the Battery Voltage.<br/>           With a voltmeter, measure and record the voltage between the Battery terminals.<br/>           Compare the DRB Battery Voltage reading to the voltmeter reading.<br/>           Is the difference between the two readings less than 0.5 volt?</p> <p>Yes → Go To 6</p> <p>No → Go To 7</p>  | All           |

**P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform CHARGING VERIFICATION - VER-3.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |
| 7    | <p>Turn the ignition off.</p> <p>With a voltmeter, measure and record the voltage between the Battery terminals. Disconnect the PCM harness connectors.</p> <p>Measure the voltage of the Fused B+ circuit in the PCM C1 harness connector. Are the voltage measurements within 0.5 volt of each other?</p> <p style="padding-left: 40px;">Yes → Go To 8</p> <p style="padding-left: 40px;">No → Repair the Fused B+ circuit to the Powertrain Control Module for high resistance.<br/>Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 8    | <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Turn the ignition on.</p> <p>Measure the voltage of the Generator Field Driver circuit.</p> <p>Is the voltage below 0.5 volt?</p> <p style="padding-left: 40px;">Yes → Go To 9</p> <p style="padding-left: 40px;">No → Repair the Generator Field Driver circuit for a short to voltage.<br/>Perform CHARGING VERIFICATION - VER-3.</p>  | All           |
| 9    | <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p>Turn the ignition on.</p> <p>Measure the voltage of the ASD Relay Output circuit in PCM harness connector C3, cavity 12.</p> <p>Is the voltage above 10.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 10</p> <p style="padding-left: 40px;">No → Repair the ASD Relay Output circuit for an open.<br/>Perform CHARGING VERIFICATION - VER-3.</p>  | All           |

# CHARGING

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## **P1682-CHARGING SYSTEM VOLTAGE TOO LOW - DIESEL — Continued**

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 10          | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Generator Field harness connector.<br>Measure the resistance of the Generator Field Driver circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 11<br><br>No → Repair the Generator Field Driver circuit for an open.<br>Perform CHARGING VERIFICATION - VER-3. | All                  |
| 11          | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform CHARGING VERIFICATION - VER-3.   | All                  |

**Symptom:**

**P-1685 INVALID SKIM KEY**

**When Monitored and Set Condition:**

**P-1685 INVALID SKIM KEY**

When Monitored: With the ignition on.

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

| POSSIBLE CAUSES   |
|---|
| INCORRECT VIN IN PCM<br>INVALID SKIM KEY NOT PRESENT<br>NO COMMUNICATION WITH SKIM<br>NO VIN PROGRAMMED IN THE PCM<br>PCM<br>SKIM TROUBLE CODES SET |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | With the DRB III, read the PCM DTCs. Look for P1685.<br>Turn the ignition on.<br>Is the Starts Since Set counter for DTC P1685 displayed and equal to 0?<br><br>Yes → Go To 2<br><br>No → Go To 7  | All           |
| 2    | Turn the ignition on.<br>With the DRB III, attempt to communicate with the SKIM.<br>Can you communicate with the SKIM?<br><br>Yes → Go To 3<br><br>No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 3    | Turn the ignition on.<br>With the DRB III, check for SKIM DTC's.<br>Are there any trouble codes set in the SKIM?<br><br>Yes → Repair all SKIM DTC's.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4  | All           |

**P-1685 INVALID SKIM KEY — Continued**

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



**Symptom:**

**P-1686 NO SKIM BUS MESSAGE RECEIVED**

**When Monitored and Set Condition:**

**P-1686 NO SKIM BUS MESSAGE RECEIVED**

When Monitored: With the ignition on.

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

| POSSIBLE CAUSES   |
|---|
| PCM<br>INTERMITTENT CONDITION<br>CCD BUS CIRCUIT(S) OPEN FROM PCM TO SKIM<br>LOSS OF SKIM COMMUNICATION |

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

**P-1686 NO SKIM BUS MESSAGE RECEIVED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |

**Symptom List:**

- P0600-PCM FAILURE SPI COMMUNICATIONS - DIESEL**
- P0601-PCM INTERNAL CONTROLLER FAILURE - DIESEL**
- P1696-PCM FAILURE EEPROM WRITE DENIED**

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

**POSSIBLE CAUSES**

POWERTRAIN CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: This DTC indicates an internal PCM problem.</b><br/>View repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |

**Symptom:**

**P1687-NO CLUSTER BUS MESSAGE - DIESEL**

**When Monitored and Set Condition:**

**P1687-NO CLUSTER BUS MESSAGE - DIESEL**

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**

CCD BUS CIRCUIT(S) OPEN  
 CHECKING CLUSTER COMMUNICATION  
 PCM - INTERNAL FAILURE  
 INTERMITTENT CONDITION

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB III, erase PCM DTCs.<br>Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time.<br>With the DRB III, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 4  | All           |
| 2    | Turn the ignition on.<br>With the DRB III, attempt to communicate with the instrument cluster.<br>Can the DRB communicate with the instrument cluster?<br><br>Yes → Go To 3<br>No → Refer to COMMUNICATION for the related symptom(s).<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the instrument cluster harness connector.<br>Measure the resistance of both CCD Bus circuits between the PCM and the instrument cluster.<br>Is the resistance below 5.0 ohms for both measurements?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the CCD Bus circuit(s) that measured above 5.0 ohms for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1687-NO CLUSTER BUS MESSAGE - DIESEL — Continued**

| TEST     | ACTION   | APPLICABILITY |
|----------|--|---------------|
| <p>4</p> | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | <p>All</p>    |

**Symptom:**

**\*NO RESPONSE FROM ECM AND PCM (DIESEL ONLY)**

| POSSIBLE CAUSES  |
|--|
| ATTEMPT TO COMMUNICATE WITH ANOTHER VEHICLE<br>CHECK ECM POWERS AND GROUNDS<br>POWERTRAIN CONTROL MODULE - SCI TRANSMIT<br>CONTROLLER ANTILOCK BRAKE - SCI TRANSMIT<br>SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE<br>SCI CIRCUITS SHORTED TOGETHER<br>SCI TRANSMIT CIRCUIT SHORTED TO GROUND<br>SCI TRANSMIT CIRCUIT OPEN<br>GROUND CIRCUITS AT DLC OPEN<br>ENGINE CONTROL MODULE |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>Connect the DRB to another vehicle.<br>Will the DRB communicate with this vehicle?<br><br>Yes → Go To 2<br><br>No → Repair or replace the DRB or DRB cable as necessary.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.  | All           |
| 2    | Perform the symptom Checking ECM and PCM Power and Ground Circuits in the Driveability category.<br>Did the vehicle pass this test?<br><br>Yes → Go To 3<br><br>No → Repair as necessary.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.  | All           |
| 3    | Turn the ignition off.<br><b>NOTE: Reconnect all previously disconnected components.</b><br>Disconnect the PCM harness connectors.<br>Turn the ignition on.<br>With the DRB, attempt to communicate with the ECM.<br>Was the DRB able to communicate with the ECM?<br><br>Yes → Replace the Powertrain Control Module.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.<br><br>No → Go To 4 | All           |

**\*NO RESPONSE FROM ECM AND PCM (DIESEL ONLY) — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the CAB harness connector.<br/>                     Turn the ignition on.<br/>                     With the DRB, attempt to communicate with the ECM.<br/>                     Was the DRB able to communicate with the ECM?</p> <p style="padding-left: 40px;">Yes → Replace the Controller Antilock Brake.<br/>                     Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 5</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the DRB from the DLC.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the CAB harness connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the SCI Transmit circuit at the DLC connector.<br/>                     Is the voltage above 1.0 volt?</p> <p style="padding-left: 40px;">Yes → Repair the SCI Transmit circuit for a short to voltage.<br/>                     Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 6</p>         | All           |
| 6    | <p>Turn the ignition off.<br/>                     Disconnect the DRB from the DLC.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the CAB harness connector.<br/>                     Measure the resistance between the SCI Transmit circuit and the SCI Receive circuit at the PCM connector.<br/>                     Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Repair the short between the SCI Transmit and the SCI Receive circuits.<br/>                     Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 7</p> | All           |
| 7    | <p>Turn the ignition off.<br/>                     Disconnect the DRB from the DLC.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the CAB harness connector.<br/>                     Measure the resistance between ground and the SCI Transmit circuit at the DLC.<br/>                     Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Repair the SCI Transmit circuit for a short to ground.<br/>                     Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 8</p>   | All           |

# COMMUNICATION

## \*NO RESPONSE FROM ECM AND PCM (DIESEL ONLY) — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | Turn the ignition off.<br>Disconnect the DRB from the DLC.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the SCI Transmit circuit between the ECM connector and the DLC.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 9<br><br>No → Repair the SCI Transmit circuit for an open.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.                               | All           |
| 9    | Turn the ignition off.<br>Disconnect the DRB from the DLC.<br>Disconnect the negative battery cable.<br>Measure the resistance between ground and both ground circuits at the DLC.<br>Is the resistance below 5.0 ohms for each measurement?<br><br>Yes → Go To 10<br><br>No → Repair the ground circuit that measured above 5.0 ohms for an open.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1. | All           |
| 10   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace the Engine Control Module.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.  | All           |



**Symptom:**

**\*NO RESPONSE FROM POWERTRAIN CONTROL MODULE (DIESEL ONLY)**

| POSSIBLE CAUSES  |
|--|
| ATTEMPT TO COMMUNICATE WITH THE ECM<br>CHECK PCM POWERS AND GROUNDS<br>SCI RECEIVE CIRCUIT SHORTED TO GROUND<br>SCI RECEIVE CIRCUIT OPEN<br>SCI TRANSMIT CIRCUIT OPEN<br>POWERTRAIN CONTROL MODULE |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB attempt to communicate with the ECM.<br>Was the DRB able to communicate with the ECM?<br><br>Yes → Go To 2<br><br>No → Refer to symptom list for problems related to No Response From ECM and PCM.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.   | All           |
| 2    | Perform the symptom Checking ECM and PCM Power and Ground Circuits in the Driveability category.<br>Did the vehicle pass this test?<br><br>Yes → Go To 3<br><br>No → Repair as necessary.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.  | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM C3 harness connector.<br>Disconnect the DRB from the DLC.<br>Measure the resistance between ground and the SCI Receive circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Repair the SCI Receive circuit for a short to ground.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.<br><br>No → Go To 4 | All           |
| 4    | Turn the ignition off.<br>Disconnect the PCM C3 harness connector.<br>Measure the resistance of the SCI Receive circuit between the PCM C3 connector and the DLC.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 5<br><br>No → Repair the SCI Receive circuit for an open.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.                      | All           |

**\*NO RESPONSE FROM POWERTRAIN CONTROL MODULE (DIESEL ONLY) — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 5    | Turn the ignition off.<br>Disconnect the PCM C3 harness connector.<br>Measure the resistance of the SCI Transmit circuit between the PCM C3 connector and the DLC.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 6<br><br>No → Repair the SCI Transmit circuit for an open.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1. | All           |
| 6    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace the Powertrain Control Module.<br>Perform POWERTRAIN VERIFICATION TEST VER - 1.   | All           |

**Symptom:****P0115-TEMPERATURE OF ENGINE COOLANT SRC HIGH EXCEEDED****When Monitored and Set Condition:****P0115-TEMPERATURE OF ENGINE COOLANT SRC HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The voltage on the ECM engine coolant temperature sensor signal circuit is above 4.9 volts for more than 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 ECM ECT SENSOR GROUND CIRCUIT OPEN  
 ECM ECT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 ECM ECT SENSOR  
 ECM ECT SENSOR SIGNAL CIRCUIT OPEN  
 ENGINE CONTROL MODULE

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, monitor the ECM Engine Coolant Temperature (ECT) Sensor voltage.<br>Is the ECM ECT Sensor voltage above 4.5 volts?<br><br>Yes → Go To 2<br><br>No → Go To 7   | All                  |
| 2           | Turn the ignition off.<br>Disconnect the ECM ECT Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage on the ECM ECT Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Repair the ECM ECT Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All                  |
| 3           | Turn the ignition off.<br>Disconnect the ECM ECT Sensor harness connector.<br>Connect a jumper wire between the ECM ECT Sensor harness connector cavities.<br>Turn the ignition on.<br>With the DRB, read the ECM ECT Sensor voltage.<br>Is the voltage below 1.0 volt?<br><br>Yes → Replace the ECM ECT Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4 | All                  |

**P0115-TEMPERATURE OF ENGINE COOLANT SRC HIGH EXCEEDED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the ECM ECT Sensor harness connector.<br/>                     Connect a jumper wire between ground and the ECM ECT Sensor Signal circuit.<br/>                     Turn the ignition on.<br/>                     With the DRB, read the ECM ECT Sensor voltage.<br/>                     Is the voltage below 1.0 volt?</p> <p style="padding-left: 40px;">Yes → Repair the ECM ECT Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 5</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the ECM ECT Sensor harness connector.<br/>                     Measure the resistance of the ECM ECT Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Repair the ECM ECT Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |

**Symptom:****P0115-TEMPERATURE OF ENGINE COOLANT SRC LOW EXCEEDED****When Monitored and Set Condition:****P0115-TEMPERATURE OF ENGINE COOLANT SRC LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The voltage on the ECM engine coolant temperature sensor signal circuit is below 0.5 volt for more than 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

ECM ECT SENSOR

ECM ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

ECM ECT SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER

ENGINE CONTROL MODULE

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, monitor the ECM Engine Coolant Temperature (ECT) Sensor voltage.<br>Is the ECM ECT Sensor voltage below 0.3 volt?<br><br>Yes → Go To 2<br>No → Go To 6  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the ECM ECT Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read the ECM ECT Sensor voltage.<br>Is the voltage above 4.0 volts?<br><br>Yes → Replace the ECM ECT Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3  | All                  |
| 3           | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the ECM ECT Sensor harness connector.<br>Measure the resistance between ground and the ECM ECT Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the ECM ECT Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |

**P0115-TEMPERATURE OF ENGINE COOLANT SRC LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the ECM ECT Sensor harness connector.<br>Measure the resistance between the ECM ECT Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the ECM ECT Sensor Signal and Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P0117-ECT SENSOR VOLTAGE TOO LOW**

**When Monitored and Set Condition:**

**P0117-ECT SENSOR VOLTAGE TOO LOW**

When Monitored: With the ignition on.

Set Condition: The voltage on the PCM engine coolant temperature sensor signal circuit is below 0.25 volt for more than 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

PCM ECT SENSOR

PCM ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

PCM ECT SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER

POWERTRAIN CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, monitor the PCM Engine Coolant Temperature (ECT) Sensor voltage.<br>Is the PCM ECT Sensor voltage below 0.25 volt?<br><br>Yes → Go To 2<br><br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the PCM ECT Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read the PCM ECT Sensor voltage.<br>Is the voltage above 4.0 volts?<br><br>Yes → Replace the PCM ECT Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3  | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the PCM ECT Sensor harness connector.<br>Measure the resistance between ground and the PCM ECT Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the PCM ECT Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0117-ECT SENSOR VOLTAGE TOO LOW — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the PCM ECT Sensor harness connector.<br>Measure the resistance between the PCM ECT Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the PCM ECT Sensor Signal and Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |



**Symptom:**

**P0118-ECT SENSOR VOLTAGE TOO HIGH**

**When Monitored and Set Condition:**

**P0118-ECT SENSOR VOLTAGE TOO HIGH**

When Monitored: With the ignition on.

Set Condition: The voltage on the PCM engine coolant temperature sensor signal circuit is above 4.9 volts for more than 3 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 PCM ECT SENSOR GROUND CIRCUIT OPEN  
 PCM ECT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 PCM ECT SENSOR  
 PCM ECT SENSOR SIGNAL CIRCUIT OPEN  
 POWERTRAIN CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, monitor the PCM Engine Coolant Temperature (ECT) Sensor voltage.<br>Is the PCM ECT Sensor voltage above 4.98 volts?<br><br>Yes → Go To 2<br><br>No → Go To 7  | All           |
| 2    | Turn the ignition off.<br>Disconnect the PCM ECT Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage on the PCM ECT Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Repair the PCM ECT Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM ECT Sensor harness connector.<br>Connect a jumper wire between the PCM ECT Sensor harness connector cavities.<br>Turn the ignition on.<br>With the DRB, read the PCM ECT Sensor voltage.<br>Is the voltage below 1.0 volt?<br><br>Yes → Replace the PCM ECT Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4 | All           |

**P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the PCM ECT Sensor harness connector.<br/>                     Connect a jumper wire between ground and the PCM ECT Sensor Signal circuit.<br/>                     Turn the ignition on.<br/>                     With the DRB, read the PCM ECT Sensor voltage.<br/>                     Is the voltage below 1.0 volt?</p> <p style="padding-left: 40px;">Yes → Repair the PCM ECT Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 5</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the PCM ECT Sensor harness connector.<br/>                     Measure the resistance of the PCM ECT Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Repair the PCM ECT Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |

**Symptom:**

**P0180-FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED**

**When Monitored and Set Condition:**

**P0180-FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The fuel temperature sensor signal voltage is above 4.7 volts.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 FUEL TEMPERATURE SENSOR (FUEL INJECTION PUMP) OPEN INTERNALLY  
 FUEL TEMPERATURE SENSOR GROUND CIRCUIT OPEN  
 FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN  
 INTERNAL FUEL INJECTION PUMP TEST  
 FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 10 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 7   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Connect a jumper wire between the Fuel Temperature Sensor Signal circuit and the Sensor Ground circuit in the Fuel Injection Pump harness connector (vehicle side).<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs and then read ECM DTCs.<br>Did DTC P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED set?<br><br>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3 | All           |

**P0180-FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the Fuel Injection Pump harness connector.<br/>                     Connect a jumper wire between ground and the Fuel Temperature Sensor Signal circuit in the Fuel Injection Pump harness connector (vehicle side).<br/>                     Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs and then read ECM DTCs.<br/>                     Did DTC P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED set?</p> <p>Yes → Repair the Fuel Temperature Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 4</p>   | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Fuel Injection Pump harness connector.<br/>                     Measure the resistance of the Fuel Temperature Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fuel Temperature Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Fuel Injection Pump harness connector.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the Fuel Temperature Sensor Signal circuit.<br/>                     Is the voltage above 1.0 volt?</p> <p>Yes → Repair the Fuel Temperature Sensor Signal circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 6</p>  | All           |
| 6    | <p>Disconnect the Fuel Injection Pump harness connector.<br/>                     Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br/>                     Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br/>                     Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br/>                     Cavity 5 to cavities 6, 7, 8, and 9.<br/>                     Cavity 7 to cavities 6, 8, 9, and 10.<br/>                     Cavity 8 to cavities 6 and 10.<br/> <b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br/>                     Is the resistance above 100 ohms for each of the measurements?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |

**P0180-FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED**

**When Monitored and Set Condition:**

**P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The fuel temperature sensor signal voltage is below 0.8 volt.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 FUEL TEMPERATURE SENSOR (FUEL INJECTION PUMP) SHORTED TO GROUND INTERNALLY  
 FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND  
 FUEL TEMPERATURE SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER  
 INTERNAL FUEL INJECTION PUMP TEST  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 10 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs and then read ECM DTCs.<br>Did DTC P0180 FUEL TEMPERATURE SENSOR SRC HIGH EXCEEDED set?<br><br>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3 | All           |

**P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between ground and the Fuel Temperature Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Fuel Temperature Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the Fuel Temperature Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Fuel Temperature Sensor Signal and Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br>Cavity 5 to cavities 6, 7, 8, and 9.<br>Cavity 7 to cavities 6, 8, 9, and 10.<br>Cavity 8 to cavities 6 and 10.<br><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br>Is the resistance above 100 ohms for each of the measurements?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0180-FUEL TEMPERATURE SENSOR SRC LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom:**

**P0235-TURBOCHARGER BOOST SENSOR PLAUSIBILITY**

**When Monitored and Set Condition:**

**P0235-TURBOCHARGER BOOST SENSOR PLAUSIBILITY**

When Monitored: With the engine speed between 600 and 870 RPM.

Set Condition: When the engine is idling, the turbocharger boost pressure sensor input does not agree with the atmospheric pressure sensor input for at least 7 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

HIGH RESISTANCE IN THE BOOST PRESSURE SENSOR SIGNAL CIRCUIT

HIGH RESISTANCE IN THE BOOST PRESSURE SENSOR GROUND CIRCUIT

HIGH RESISTANCE IN THE 5-VOLT SUPPLY CIRCUIT

TURBOCHARGER BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR

ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then start and idle the engine for at least 30 seconds.<br><b>NOTE: Engine idle speed must be below 870 RPM.</b><br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Boost Pressure Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 3<br><br>No → Repair the Boost Pressure Sensor Signal circuit for high resistance.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0235-TURBOCHARGER BOOST SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance of the Sensor Ground circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the Boost Pressure Sensor Ground circuit for high resistance.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance of the 5-volt Supply circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the 5-volt Supply circuit for high resistance.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p>Turn the ignition off.<br/>                     Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br/>                     Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Test drive the vehicle, pausing several times to cycle the ignition.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → The repair is complete.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL HIGH EXCEEDED**

**When Monitored and Set Condition:**

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The turbocharger boost pressure sensor signal voltage exceeds 4.80 volts for at least 2 seconds.

| POSSIBLE CAUSES   |  |
|---|--|
| INTERMITTENT CONDITION                                    |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE                  |  |
| BOOST PRESSURE SENSOR GROUND CIRCUIT OPEN                 |  |
| BOOST PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE   |  |
| TURBOCHARGER BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR |  |
| POOR CONNECTOR TERMINAL CONTACT                           |  |
| ENGINE CONTROL MODULE (5-VOLT SUPPLY SHORTED TO VOLTAGE)  |  |
| ENGINE CONTROL MODULE (INTERNAL)                          |  |
| ENGINE CONTROL MODULE (SENSOR SIGNAL SHORTED TO VOLTAGE)  |  |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, read the Turbocharger Boost Pressure Sensor voltage.<br>Is the voltage above 4.5 volts?<br><br>Yes → Go To 2<br><br>No → Go To 9   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage between ground and the Turbocharger Boost Pressure Sensor 5-volt Supply circuit.<br>Is the voltage above 5.2 volts?<br><br>Yes → Go To 3<br><br>No → Go To 4 | All           |

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL HIGH EXCEEDED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage between ground and the 5-volt Supply circuit.<br/>                     Is the voltage above 1.0 volt?</p> <p>Yes → Repair the 5-volt Supply circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>                               | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage between ground and the Boost Pressure Sensor Signal circuit.<br/>                     Is the voltage above 1.0 volt?</p> <p>Yes → Go To 5</p> <p>No → Go To 6</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage between ground and the Boost Pressure Sensor Signal circuit.<br/>                     Is the voltage above 1.0 volt?</p> <p>Yes → Repair the Boost Pressure Sensor Signal circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 6    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance of the Sensor Ground circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the Boost Pressure Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |

## P0235-TURBOCHARGER BOOST SENSOR SIGNAL HIGH EXCEEDED — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 7    | Turn the ignition off.<br><b>NOTE: Ensure all harness connectors are connected.</b><br>Turn the ignition on.<br>Measure the voltage of the Boost Pressure Sensor Signal circuit by backprobing ECM harness connector C1, cavity 40.<br>Is the voltage above 4.5 volts?<br><br>Yes → Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 8   | All           |
| 8    | Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Ensure good terminal contact between the Turbocharger Boost Pressure/IAT Sensor harness connector and the sensor. The repair is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 9    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL LOW EXCEEDED**

**When Monitored and Set Condition:**

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The turbocharger boost pressure sensor signal voltage stays below 0.15 volt for at least 2 seconds.

| <b>POSSIBLE CAUSES</b>  |  |
|---|--|
| INTERMITTENT CONDITION  |  |
| 5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND                   |  |
| TURBOCHARGER BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR         |  |
| BOOST PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND            |  |
| BOOST PRESSURE SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER |  |
| BOOST PRESSURE SENSOR SIGNAL CIRCUIT OPEN                         |  |
| ENGINE CONTROL MODULE   |  |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, read the Turbocharger Boost Pressure Sensor voltage.<br>Is the voltage below 0.2 volt?<br><br>Yes → Go To 2<br><br>No → Go To 8  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage between ground and the 5-volt Supply circuit.<br>Is the voltage above 4.9 volt?<br><br>Yes → Go To 3<br><br>No → Repair the 5-volt Supply circuit for an open or short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |

## P0235-TURBOCHARGER BOOST SENSOR SIGNAL LOW EXCEEDED — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Turn the ignition on.<br>Connect a jumper wire between the Boost Pressure Sensor Signal and 5-volt Supply circuits.<br>With the DRB, read the Turbocharger Boost Pressure Sensor voltage.<br>Is the Boost Pressure Sensor voltage above 4.5 volts?<br><br>Yes → Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4 | All           |
| 4    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Boost Pressure Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Boost Pressure Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between the Boost Pressure Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 6<br><br>No → Repair the Boost Pressure Sensor Signal circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 6    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Boost Pressure Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the Boost Pressure Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**P0235-TURBOCHARGER BOOST SENSOR SIGNAL LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom:**

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY HIGH EXCEEDED**

**When Monitored and Set Condition:**

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The turbocharger boost pressure sensor supply voltage exceeds 5.2 volts for at least 2 seconds.

| POSSIBLE CAUSES   |
|---|
| INTERMITTENT CONDITION<br>5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE<br>ENGINE CONTROL MODULE |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 3  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage between ground and the 5-volt Supply circuit.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the 5-volt Supply circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY HIGH EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY LOW EXCEEDED**

**When Monitored and Set Condition:**

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The turbocharger boost pressure sensor supply voltage stays below 4.75 volts for at least 2 seconds.

| <b>POSSIBLE CAUSES</b>                                    |  |
|---|--|
| INTERMITTENT CONDITION                                    |  |
| TURBOCHARGER BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND                   |  |
| 5-VOLT SUPPLY AND SENSOR GROUND CIRCUITS SHORTED TOGETHER |  |
| ENGINE CONTROL MODULE                                     |  |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage between ground and the Turbocharger Boost Pressure Sensor 5-volt Supply circuit.<br>Is the voltage above 4.7 volts?<br><br>Yes → Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3 | All                  |
| 3           | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Measure the resistance between ground and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the 5-volt Supply circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.                            | All                  |

**P0235-TURBOCHARGER BOOST SENSOR SUPPLY LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the 5-volt Supply and Sensor Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**  
**P0400-EGR OPEN CIRCUIT**

**When Monitored and Set Condition:**

**P0400-EGR OPEN CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the electric vacuum modulator control circuit.

| <b>POSSIBLE CAUSES</b>   |
|--|
| INTERMITTENT CONDITION<br>FUSED ASD RELAY OUTPUT CIRCUIT OPEN<br>EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND<br>EGR SOLENOID CONTROL CIRCUIT OPEN<br>SUBSTITUTE EGR SOLENOID<br>ENGINE CONTROL MODULE |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Perform several ignition cycles, turning the ignition off for at least 10 seconds between each ignition cycle.<br>Monitor the DRB for ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 7   | All                  |
| 2           | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fused ASD Relay Output circuit.<br>Does the test light illuminate brightly?<br><br>Yes → Go To 3<br><br>No → Repair the Fused ASD Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |

**P0400-EGR OPEN CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the EGR Solenoid Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the EGR Solenoid Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the EGR Solenoid Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 5<br><br>No → Repair the EGR Solenoid Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 5    | Turn the ignition off.<br>Install a substitute EGR Solenoid in place of the vehicle's EGR Solenoid.<br><b>NOTE: Ensure the ECM and EGR Solenoid harness connectors are connected.</b><br>Turn the ignition on.<br>With the DRB, check for this DTC to reset.<br>Did this DTC reset?<br><br>Yes → Go To 6<br><br>No → Replace the EGR Solenoid.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**  
**P0400-EGR SHORT CIRCUIT**

**When Monitored and Set Condition:**

**P0400-EGR SHORT CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects excessive current draw on the electric vacuum modulator control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 EGR SOLENOID  
 EGR SOLENOID CONTROL SHORTED TO VOLTAGE  
 ENGINE CONTROL MODULE (INTERNAL)  
 ENGINE CONTROL MODULE (INTERNAL SHORT TO VOLTAGE)

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Test drive the vehicle and monitor the DRB for ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 5  | All           |
| 2    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Monitor the DRB for ECM DTCs.<br>Does the DRB display P0400 EGR OPEN CIRCUIT?<br><br>Yes → Replace the EGR Solenoid.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All           |
| 3    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Turn the ignition on.<br>Measure the voltage of the EGR Solenoid Control circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4 | All           |

**P0400-EGR SHORT CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the EGR Solenoid harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the EGR Solenoid Control circuit.<br/>                     Is the voltage below 0.5 volt?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the EGR Solenoid Control circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom:**

**P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES**

**When Monitored and Set Condition:**

**P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES**

When Monitored: With the ignition on.

Set Condition: The PCM receives a vehicle speed signal for an extended duration without a change in fuel level signal voltage.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS  
 FUEL TANK OBSTRUCTING THE FUEL LEVEL SENSOR  
 POWERTRAIN CONTROL MODULE  
 FUEL LEVEL SENSOR

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for additional PCM DTCs.<br>Are other Fuel Level Sensor DTCs present?<br><br>Yes → Refer to the Symptom List for diagnosis of other Fuel Level Sensor related DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Level Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read and record the Fuel Level Sensor voltage.<br><b>NOTE: The DRB should read 10.0 volts with the Fuel Level Sensor harness connector disconnected.</b><br>Connect a 12-volt test light between Fuel Level Sensor harness connector cavities 3 and 4.<br>With the DRB, read the Fuel Level Sensor voltage.<br>Did the voltage change to less than 10.0 volts?<br><br>Yes → Go To 3<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Remove the Fuel Level Sensor from the Fuel Tank in accordance with the Service Information.<br>Inspect the inside of the Fuel Tank for any obstructions or deformities.<br>Is the Fuel Tank OK?<br><br>Yes → Replace the Fuel Level Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair or replace the Fuel Tank in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW**

**When Monitored and Set Condition:**

**P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW**

When Monitored: With the ignition on.

Set Condition: The fuel level sensor signal voltage on PCM cavity C3-26 is below 0.25 volt.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

FUEL LEVEL SENSOR

FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

FUEL LEVEL SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER

POWERTRAIN CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase PCM DTCs.<br>Turn the ignition off, wait 10 seconds, then turn the ignition on.<br>With the DRB, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Level Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read the Fuel Level Sensor voltage.<br>Is the voltage above 9.0 volts?<br><br>Yes → Replace the Fuel Level Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3  | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Fuel Level Sensor harness connector.<br>Measure the resistance between ground and the Fuel Level Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Fuel Level Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Fuel Level Sensor harness connector.<br>Measure the resistance between the Fuel Level Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Fuel Level Sensor Signal and Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH**

**When Monitored and Set Condition:**

**P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH**

When Monitored: With the ignition on.

Set Condition: The fuel level sensor signal voltage on PCM cavity C3-26 is above 9.50 volts.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN  
 FUEL LEVEL SENSOR GROUND CIRCUIT OPEN  
 FUEL LEVEL SENSOR  
 POWERTRAIN CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase PCM DTCs.<br>Turn the ignition off, wait 10 seconds, then turn the ignition on.<br>With the DRB, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 7   | All           |
| 2    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Fuel Level Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage on the Fuel Level Sensor Signal circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 3<br>No → Repair the Fuel Level Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Fuel Level Sensor harness connector.<br>Measure the resistance of the Fuel Level Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 4<br>No → Repair the Fuel Level Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                               | All           |

**P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the Fuel Level Sensor harness connector.<br/>                     Measure the resistance of the Fuel Level Sensor Ground circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fuel Level Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the Fuel Level Sensor harness connector.<br/>                     Turn the ignition on.<br/>                     With the DRB, read and record the Fuel Level Sensor voltage.<br/> <b>NOTE: The Fuel Level Sensor voltage should be 10.0 volts with the sensor harness connector disconnected.</b><br/>                     Connect a jumper wire between Fuel Level Sensor harness connector cavities 3 and 4.<br/>                     With the DRB, read the Fuel Level Sensor voltage.<br/> <b>NOTE: The Fuel Level Sensor voltage should be less than 1.0 volt with the jumper wire connected.</b><br/>                     Are the voltage readings the expected voltages?</p> <p>Yes → Replace the Fuel Level Sensor in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 6</p>   | All           |
| 6    | <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom List:**

**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH**  
**P0500-VEH. SPEED SENSOR PLAUSIBILITY**  
**P0500-VEH. SPEED SENSOR SRC HIGH EXCEEDED**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH.**

**When Monitored and Set Condition:****P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH**

When Monitored: With the engine running.

Set Condition: The ECM detects a vehicle speed greater than 220 km/h (137 MPH).

**P0500-VEH. SPEED SENSOR PLAUSIBILITY**

When Monitored: With the engine running.

Set Condition: The ECM compares the amount of fuel the fuel quantity actuator is delivering to the vehicle speed from the vehicle speed sensor (VSS). The VSS indicates a vehicle speed that cannot be achieved with the present amount of fuel being delivered.

**P0500-VEH. SPEED SENSOR SRC HIGH EXCEEDED**

When Monitored: With the engine running.

Set Condition: The ECM detects a vehicle speed greater than 220 km/h (137 MPH).

**POSSIBLE CAUSES**

VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND  
 POWERTRAIN CONTROL MODULE - 5-VOLT SUPPLY HIGH  
 POWERTRAIN CONTROL MODULE - AFTER 5-VOLT SUPPLY SHORTED TO VOLTAGE  
 REPAIR THE 5-VOLT SUPPLY CIRCUIT AND CHECK THE PCM  
 INTERMITTENT CONDITION  
 5-VOLT SUPPLY CIRCUIT OPEN  
 POWERTRAIN CONTROL MODULE - SHORTED TO VOLTAGE  
 SPEEDOMETER PINION AND DRIVE TEETH DAMAGED  
 VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT  
 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND  
 ENGINE CONTROL MODULE - SHORTED TO VOLTAGE  
 VEHICLE SPEED SENSOR SIGNAL CIRCUIT OPEN  
 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND

**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH — Continued**

| <b>POSSIBLE CAUSES</b>   |
|--|
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND<br>VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE<br>POWERTRAIN CONTROL MODULE - 5-VOLT SUPPLY CIRCUIT LOW<br>SENSOR GROUND CIRCUIT OPEN<br>VEHICLE SPEED SENSOR<br>ENGINE CONTROL MODULE - INTERNAL FAULT |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Test drive the vehicle.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 21  | All                  |
| 2           | Turn the ignition off.<br>Remove the Vehicle Speed Sensor.<br>Inspect the Speedometer Pinion and drive teeth on the Output Shaft (located in the transmission).<br>Are both components OK?<br><br>Yes → Go To 3<br><br>No → Repair or replace the Speedometer Pinion or internal components as necessary in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |
| 3           | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Check connectors - Clean/repair as necessary</b><br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit in the Vehicle Speed Sensor harness connector.<br>Is the voltage between 4.8 and 5.5 volts?<br><br>Yes → Go To 4<br><br>Above<br>Go To 15<br><br>Below<br>Go To 17         | All                  |
| 4           | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Go To 5<br><br>No → Go To 8  | All                  |



**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 5    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Go To 6<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Go To 7<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Repair the Vehicle Speed Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 8    | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM C1 and C2 harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the Vehicle Speed Sensor Signal circuit and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 9<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to the 5-volt Supply circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 9    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance of the Vehicle Speed Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 10<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 10   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance between ground and the Vehicle Speed Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 11<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 11   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance of the Vehicle Speed Sensor Ground circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 12<br><br>No → Repair the Vehicle Speed Sensor Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 12   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>NOTE: Ensure the ECM and PCM harness connectors are connected before continuing.</b><br>Turn the ignition on.<br>Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the VSS harness connector.<br>With the DRB, monitor the VEHICLE SPEED while tapping the other end of the jumper wire to ground.<br>Does the DRB display km/h (MPH) greater than 0?<br><br>Yes → Replace the Vehicle Speed Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 13 | All           |
| 13   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the Vehicle Speed Sensor Signal circuit and the Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 14<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 14   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 15   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Turn the ignition on.<br>Measure the voltage between ground and the 5-volt Supply circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 16                                    | All           |
| 16   | Turn the ignition off.<br>Repair the 5-volt Supply circuit for a short to voltage.<br>Reconnect all harness connectors except the Vehicle Speed Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit.<br>Is the voltage above 4.8 volts?<br><br>Yes → The repair is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 17   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM C1 harness connector.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance of the 5-volt Supply circuit between the Vehicle Speed Sensor harness connector and the PCM C1 harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 18<br><br>No → Repair the 5-volt Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                                 | All           |
| 18   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between ground and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 19<br><br>No → Repair the 5-volt Supply circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**P0500-VEH. SPEED SENSOR PEC FREQUENCY TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 19   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Vehicle Speed Sensor harness connector.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 20<br><br>No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 20   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 21   | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P0522-OIL PRESSURE VOLTAGE TOO LOW**

**When Monitored and Set Condition:**

**P0522-OIL PRESSURE VOLTAGE TOO LOW**

When Monitored: With the ignition on.

Set Condition: The PCM detects voltage on the oil pressure sensor signal circuit below 0.1 volt.

**POSSIBLE CAUSES**

CHECKING THE OIL PRESSURE SENSOR

OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND

PCM - OIL PRESSURE SENSOR SIGNAL SHORT TO GROUND

INTERMITTENT CONDITION

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB III, erase PCM DTCs.<br>Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time.<br>With the DRB III, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 5  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Oil Pressure Sensor harness connector.<br>Measure the voltage of the Oil Pressure Sensor Signal circuit.<br>Is the voltage between 4.7 and 5.3 volts?<br><br>Yes → Replace the Oil Pressure Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All           |
| 3    | Turn the ignition off.<br>Disconnect the Oil Pressure Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the Oil Pressure Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Oil Pressure Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P0522-OIL PRESSURE VOLTAGE TOO LOW — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Oil Pressure Sensor harness connector.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance between Sensor Ground and the Oil Pressure Sensor Signal circuit.<br/>                     Is the resistance above 100 kohms?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Oil Pressure Sensor Signal circuit for a short to Sensor Ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | 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.

Set Condition: The PCM detects voltage on the oil pressure sensor signal circuit above 4.8 volts.

**POSSIBLE CAUSES**

OIL PRESSURE SENSOR FAILURE

OIL PRESSURE SENSOR SIGNAL CIRCUIT OPEN

OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE

PCM - OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE

PCM - OIL PRESSURE SENSOR SIGNAL OPEN

SENSOR GROUND CIRCUIT OPEN

INTERMITTENT CONDITION

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB III, erase PCM DTCs.<br>Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time.<br>With the DRB III, read PCM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Oil Pressure Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Oil Pressure Sensor Signal circuit.<br>Select the appropriate voltage reading.<br><br>Voltage is above 5.5 volts.<br>Go To 3<br><br>Voltage is between 4.7 and 5.4 volts.<br>Go To 4<br><br>Voltage is below 4.7 volts.<br>Go To 5 | All           |

**P0523-OIL PRESSURE VOLTAGE TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the Oil Pressure Sensor harness connector.<br/>                     Disconnect the PCM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the Oil Pressure Sensor Signal circuit.<br/>                     Is the voltage below 1.0 volt?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Oil Pressure Sensor Signal circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Oil Pressure Sensor harness connector.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance of the Sensor Ground circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Oil Pressure Sensor.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the Oil Pressure Sensor harness connector.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance of the Oil Pressure Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Oil Pressure Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |



**P0523-OIL PRESSURE VOLTAGE TOO HIGH — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom List:**

- P0725-ENGINE SPEED SENSOR DYN. PLAUSIBILITY**
- P0725-ENGINE SPEED SENSOR STATIC PLAUSIBILITY**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0725-ENGINE SPEED SENSOR DYN. PLAUSIBILITY.**

**When Monitored and Set Condition:**

**P0725-ENGINE SPEED SENSOR DYN. PLAUSIBILITY**

When Monitored: The engine speed is above 790 RPM.

Set Condition: The ECM detects a change in engine speed that has occurred more rapidly than the engine is capable of changing speed.

**P0725-ENGINE SPEED SENSOR STATIC PLAUSIBILITY**

When Monitored: With the engine speed above 700 RPM.

Set Condition: The engine speed sensor signal indicates engine speed below 75 RPM and the needle movement sensor signal (injector #1) indicates engine speed above 700 RPM.

**POSSIBLE CAUSES**

- ENGINE CONTROL MODULE
- INTERMITTENT CONDITION
- ENGINE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
- ENGINE SPEED SENSOR CIRCUITS SHORTED TOGETHER
- ENGINE SPEED SENSOR SIGNAL CIRCUIT OPEN
- ENGINE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
- ENGINE SPEED SENSOR

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Attempt to start the engine.<br>Did the engine start?<br><br>Yes → Go To 2<br><br>No → Go To 3 | All           |

**P0725-ENGINE SPEED SENSOR DYN. PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 2    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |
| 3    | <p>Turn the ignition off.</p> <p>Disconnect the Engine Speed Sensor harness connector.</p> <p>Disconnect the ECM harness connectors.</p> <p>Measure the resistance between ground and the Engine Speed Sensor Signal circuit.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Engine Speed Sensor Signal circuit for a short to ground.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 4    | <p>Turn the ignition off.</p> <p>Disconnect the Engine Speed Sensor harness connector.</p> <p>Disconnect the ECM harness connectors.</p> <p>Measure the resistance between the Engine Speed Sensor Signal and Sensor Ground circuits.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Repair the Engine Speed Sensor Signal and Sensor Ground circuits for a short together.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p>Turn the ignition off.</p> <p>Disconnect the Engine Speed Sensor harness connector.</p> <p>Disconnect the ECM harness connectors.</p> <p>Measure the resistance of the Engine Speed Sensor Signal circuit.</p> <p>Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Repair the Engine Speed Sensor Signal circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |

**P0725-ENGINE SPEED SENSOR DYN. PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | Turn the ignition off.<br>Disconnect the Engine Speed Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Measure the voltage of the Engine Speed Sensor Signal circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 7<br><br>No → Repair the Engine Speed Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 7    | <b>NOTE: Ensure the ECM and Engine Speed Sensor harness connectors are connected.</b><br>Connect, by back probing, a voltmeter capable of reading frequency to ECM harness connector C2 cavity 67.<br>Crank the engine while monitoring the voltmeter.<br>Is the frequency between 16 and 20 Hz at 270-300 cranking RPM?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Engine Speed Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**P0725-ENGINE SPEED SENSOR OVERSPEED RECOGNITION**

**When Monitored and Set Condition:**

**P0725-ENGINE SPEED SENSOR OVERSPEED RECOGNITION**

When Monitored: With the engine running.

Set Condition: The engine speed sensor signal indicates engine speed is above 5100 RPM for at least 500 milliseconds. NOTE: Engine damage is possible when the engine speed exceeds 5100 RPM.

| POSSIBLE CAUSES  |
|--|
| CHECK FOR OTHER DTCS<br>ENGINE CONTROL MODULE<br>REPLACE THE ENGINE SPEED SENSOR<br>INTERMITTENT CONDITION |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>CAUTION: Engine damage is possible when engine speed exceeds 5100 RPM.</b><br/> <b>NOTE: This DTC indicates the Engine Speed Sensor has seen an engine speed above 5100 RPM.</b><br/>                     Turn the ignition on.<br/>                     With the DRB, check for other Engine Speed Sensor DTCs.<br/>                     Are other Engine Speed Sensor DTCs present?</p> <p style="padding-left: 40px;">Yes → Refer to symptom list for problems related to other DTCs before continuing.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 2</p> | All           |
| 2    | <p>Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Test drive the vehicle and monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Go To 4</p>   | All           |

**P0725-ENGINE SPEED SENSOR OVERSPEED RECOGNITION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Replace the Engine Speed Sensor in accordance with the Service Information.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → The repair is complete.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 4    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Check the Engine Speed Sensor wiring harness for incorrect routing which may cause EMI interference.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom List:**

- P1105-ATMOSPHERE PRESSURE SENSOR SRC HIGH EXCEEDED**
- P1105-ATMOSPHERE PRESSURE SENSOR SRC LOW EXCEEDED**
- P1610-REGULATOR LOWER REGULATOR LIMIT**
- P1610-REGULATOR UPPER REGULATOR LIMIT**
- P1615-MICROCONTROLLER GATE-ARRAY MONITORING**
- P1615-MICROCONTROLLER GATE-ARRAY WATCHDOG**
- P1615-MICROCONTROLLER PREPARE FUEL QUANTITY STOP**
- P1615-MICROCONTROLLER RECOVERY HAS OCCURRED**
- P1615-MICROCONTROLLER REDUNDANT OVERRUN MONITORING**
- P1620 - U-REF (2.5V)**
- P1680-EEPROM PLAUSIBILITY CHECKSUM ERROR FOR ADJ (EGR)**
- P1680-EEPROM PLAUSIBILITY CHECKSUM ERROR IN CC212**
- P1680-EEPROM PLAUSIBILITY COMMUNICATION WITH EEPROM**
- P1680-EEPROM PLAUSIBILITY FUNC SWITCH WRONG OR MISSING**
- P1680-EEPROM PLAUSIBILITY VER NUMBER NOT CORRESPONDING**
- P1680-EEPROM PLAUSIBILITY VIN CHECKSUM ERROR**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1105-ATMOSPHERE PRESSURE SENSOR SRC HIGH EXCEEDED.**

| <b>POSSIBLE CAUSES</b> |  |
|------------------------|--|
| ENGINE CONTROL MODULE  |  |
| INTERMITTENT CONDITION |  |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | <p><b>NOTE: This DTC indicates an internal ECM problem.</b></p> <p>Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several engine run cycles, turning the ignition off for at least 20 seconds between each engine run cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p style="padding-left: 40px;">Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 2</p> | All                  |

**P1105-ATMOSPHERE PRESSURE SENSOR SRC HIGH EXCEEDED —  
Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 2    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom:**

**P1110-AIR TEMP. SENSOR SRC HIGH EXCEEDED**

**When Monitored and Set Condition:**

**P1110-AIR TEMP. SENSOR SRC HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The intake air temperature sensor signal goes above 4.7 volts for at least 2 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 INTAKE AIR TEMP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 INTAKE AIR TEMP SENSOR GROUND CIRCUIT OPEN  
 INTAKE AIR TEMP SENSOR SIGNAL CIRCUIT OPEN  
 TURBOCHARGER BOOST PRESSURE/IAT SENSOR  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Monitor the DRB for ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage on the IAT Sensor Signal circuit.<br>Is the voltage below 1.0 volt?<br><br>Yes → Go To 3<br>No → Repair the Intake Air Temperature Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br><b>NOTE: Remove the jumper wire.</b> | All           |

**P1110-AIR TEMP. SENSOR SRC HIGH EXCEEDED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Measure the resistance of the Intake Air Temperature Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the Intake Air Temperature Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Connect a jumper wire between the IAT Sensor Signal and IAT Sensor Ground circuits in the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Turn the ignition on.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Does the DRB display P1110 AIR TEMP. SENSOR SRC LOW EXCEEDED?</p> <p>Yes → Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 5</p>   | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br/>                     Turn the ignition on.<br/>                     Connect a jumper wire between the Intake Air Temperature Sensor Signal circuit and ground.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Does the DRB display P1110 AIR TEMP. SENSOR SRC LOW EXCEEDED?</p> <p>Yes → Repair the Intake Air Temperature Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1110-AIR TEMP. SENSOR SRC LOW EXCEEDED**

**When Monitored and Set Condition:**

**P1110-AIR TEMP. SENSOR SRC LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The intake air temperature sensor signal goes below 0.18 volt for at least 2 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 INTAKE AIR TEMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND  
 TURBOCHARGER BOOST PRESSURE/IAT SENSOR  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Monitor the DRB for ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 5  | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Measure the resistance between ground and the Intake Air Temperature Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 3<br><br>No → Repair the Intake Air Temperature Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 3    | Turn the ignition off.<br>Disconnect the Turbocharger Boost Pressure/IAT Sensor harness connector.<br>Turn the ignition on.<br>Monitor the DRB for ECM DTCs.<br>Does the DRB display P1110 AIR TEMP. SENSOR SRC HIGH EXCEEDED?<br><br>Yes → Replace the Turbocharger Boost Pressure/Intake Air Temperature Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4  | All           |

**P1110-AIR TEMP. SENSOR SRC LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Engine Control Module in accordance with the Service Information.</p> <p>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1201-NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED**

**When Monitored and Set Condition:**

**P1201-NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The ECM detects high voltage on the needle movement sensor signal circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 NEEDLE MOVEMENT SENSOR GROUND CIRCUIT OPEN  
 NEEDLE MOVEMENT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 NEEDLE MOVEMENT SENSOR  
 NEEDLE MOVEMENT SENSOR SIGNAL CIRCUIT OPEN  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 7   | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Needle Movement Sensor harness connector.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage on the Needle Movement Sensor Signal circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 3<br>No → Repair the Needle Movement Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br><b>NOTE: Remove the jumper wire.</b> | All           |

**P1201-NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p><b>NOTE: Ensure the ECM harness connectors are connected and the ASD/Diesel Power Relay is installed before continuing.</b></p> <p>Turn the ignition off.<br/>                     Disconnect the Needle Movement Sensor harness connector.<br/>                     Connect a jumper wire between the Needle Movement Sensor harness connector cavities.<br/>                     Turn the ignition on.<br/>                     With the DRB, read ECM DTCs.<br/>                     Did DTC P1201 NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED set?</p> <p style="padding-left: 40px;">Yes → Replace the Needle Movement Sensor in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 4</p> | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the Needle Movement Sensor harness connector.<br/>                     Connect a jumper wire between ground and the Needle Movement Sensor Signal circuit.<br/>                     Turn the ignition on.<br/>                     With the DRB, read ECM DTCs.<br/>                     Did DTC P1201 NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED set?</p> <p style="padding-left: 40px;">Yes → Repair the Needle Movement Sensor Ground circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 5</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Needle Movement Sensor harness connector.<br/>                     Measure the resistance of the Needle Movement Sensor Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Repair the Needle Movement Sensor Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**P1201-NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1201-NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED**

**When Monitored and Set Condition:**

**P1201-NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The ECM detects the voltage on the needle movement sensor signal circuit below 0.141 volt.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 NEEDLE MOVEMENT SENSOR  
 NEEDLE MOVEMENT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND  
 NEEDLE MOVEMENT SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the Needle Movement Sensor harness connector.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did DTC P1201 NEEDLE MOVEMENT SENSOR SRC HIGH EXCEEDED set?<br><br>Yes → Replace the Needle Movement Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3  | All           |
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Needle Movement Sensor harness connector.<br>Measure the resistance between ground and the Needle Movement Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Needle Movement Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |



**P1201-NEEDLE MOVEMENT SENSOR SRC LOW EXCEEDED — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Needle Movement Sensor harness connector.<br>Measure the resistance between the Needle Movement Sensor Signal circuit and Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Needle Movement Sensor Signal and Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION COLD**

**When Monitored and Set Condition:**

**P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION COLD**

When Monitored: With the engine running.

Set Condition: The ECM has attempted to compensate for a rich condition and the engine coolant temperature is below 60° C (140° F). NOTE: An improperly timed fuel injection pump may also set this code.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 FUEL INJECTION PUMP SHORTED INTERNALLY  
 FUEL QUANTITY ACTUATOR CONTROL CIRCUIT SHORTED TO GROUND  
 INTERNAL FUEL INJECTION PUMP TEST  
 ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: An improperly timed Fuel Injection Pump may also set this DTC.</b><br/>                     Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Turn the ignition off, wait 10 seconds, then attempt to start and idle the engine.<br/>                     With the DRB, read ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Go To 2<br/>                     No → Go To 5</p>                                   | All           |
| 2    | <p>Turn the ignition off.<br/>                     Disconnect the Fuel Injection Pump harness connector.<br/>                     Measure the resistance between ground and Fuel Injection Pump connector (fuel pump side) cavity 8.<br/>                     Is the resistance above 100 kohms?</p> <p>Yes → Go To 3<br/>                     No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |

## P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION COLD — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p>Turn the ignition off.<br/>Disconnect the ECM harness connectors.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Measure the resistance between ground and the Fuel Quantity Actuator Control circuit in ECM harness connector C2, cavities 59, 66, and 80.<br/>Is the resistance above 100 kohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fuel Quantity Actuator Control circuit for a short to ground.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 4    | <p>Turn the ignition off.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br/>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br/>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br/>Cavity 5 to cavities 6, 7, 8, and 9.<br/>Cavity 7 to cavities 6, 8, 9, and 10.<br/>Cavity 8 to cavities 6 and 10.<br/><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br/>Is the resistance above 100 ohms for each of the measurements?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>Refer to any Technical Service Bulletins (TSB) that may apply.<br/>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION WARM**

**When Monitored and Set Condition:**

**P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION WARM**

When Monitored: With the engine running.

Set Condition: The ECM has attempted to compensate for a rich condition and the engine coolant temperature is above 60° C (140° F).

| <b>POSSIBLE CAUSES</b>  |
|---|
| <p>INTERMITTENT CONDITION</p> <p>FUEL INJECTION PUMP SHORTED INTERNALLY</p> <p>FUEL QUANTITY ACTUATOR CONTROL CIRCUIT SHORTED TO GROUND</p> <p>INTERNAL FUEL INJECTION PUMP TEST</p> <p>ENGINE CONTROL MODULE</p> |

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | <p>Turn the ignition on.</p> <p>With the DRB, erase ECM DTCs.</p> <p>Start the engine and vary the engine speed from idle to 3500 RPM several times.</p> <p>With the DRB, read ECM DTCs.</p> <p>Did this DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 5</p>  | All                  |
| 2           | <p>Turn the ignition off.</p> <p>Disconnect the Fuel Injection Pump harness connector.</p> <p>Measure the resistance between ground and Fuel Injection Pump connector (fuel pump side) cavity 8.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Fuel Injection Pump in accordance with the Service Information.</p> <p style="padding-left: 40px;">Perform ROAD TEST VERIFICATION - VER-2.</p>  | All                  |
| 3           | <p>Turn the ignition off.</p> <p>Disconnect the ECM harness connectors.</p> <p>Disconnect the Fuel Injection Pump harness connector.</p> <p>Measure the resistance between ground and the Fuel Quantity Actuator Control circuit in ECM harness connector C2, cavities 59, 66, and 80.</p> <p>Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Fuel Quantity Actuator Control circuit for a short to ground.</p> <p style="padding-left: 40px;">Perform ROAD TEST VERIFICATION - VER-2.</p> | All                  |

## P1220-FUEL QUANTITY ACTUATOR NEG GOV DEVIATION WARM — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>           Disconnect the Fuel Injection Pump harness connector.<br/>           Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br/>           Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br/>           Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br/>           Cavity 5 to cavities 6, 7, 8, and 9.<br/>           Cavity 7 to cavities 6, 8, 9, and 10.<br/>           Cavity 8 to cavities 6 and 10.<br/> <b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br/>           Is the resistance above 100 ohms for each of the measurements?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>           Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>           Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>           With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>           Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>           Refer to any Technical Service Bulletins (TSB) that may apply.<br/>           Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>           Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>           Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>           Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom List:**

**P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION COLD**  
**P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION WARM**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION COLD.**

**When Monitored and Set Condition:**

**P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION COLD**

When Monitored: With the engine running.

Set Condition: The ECM has attempted to compensate for a lean condition and the engine coolant temperature is below 60° C (140° F).

**P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION WARM**

When Monitored: With the engine running.

Set Condition: The ECM has attempted to compensate for a lean condition and the engine coolant temperature is above 60° C (140° F).

| <b>POSSIBLE CAUSES</b>               |  |
|--------------------------------------|--|
| INTERMITTENT CONDITION               |  |
| CHECK THE FUEL INJECTION PUMP TIMING |  |
| CHECK FOR A FUEL RESTRICTION         |  |
| REPLACE THE FUEL INJECTION PUMP      |  |
| ENGINE CONTROL MODULE                |  |

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 1           | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Start the engine and vary the engine speed from idle to 3500 RPM several times.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 5                                    | All                  |
| 2           | Check the Fuel Injection Pump timing using the Service Information.<br>Is the Fuel Injection Pump timing correct?<br><br>Yes → Go To 3<br><br>No → Set the Fuel Injection Pump timing in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |

## P1220-FUEL QUANTITY ACTUATOR POS GOV DEVIATION COLD — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Inspect the fuel system for restrictions in the delivery lines, filter and/or at the fuel level sensor module.<br>Was a restriction found?<br><br>Yes → Repair as necessary.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4   | All           |
| 4    | Turn the ignition off.<br>Replace the Fuel Injection Pump in accordance with the Service Information.<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Start the engine and vary the engine speed from idle to 3500 RPM several times.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → The repair is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom List:**

**P1225-CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED**  
**P1225-CONTROL SLEEVE SENSOR SIGNAL LOW EXCEEDED**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1225-CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED.**

**When Monitored and Set Condition:**

**P1225-CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED**

When Monitored: With the ignition on and during after-run mode (at key-off).

Set Condition: The ECM does not receive a correct signal from the measure coil and/or the sensor coil. NOTE: This fault will cause the engine to stumble and/or stall.

**P1225-CONTROL SLEEVE SENSOR SIGNAL LOW EXCEEDED**

When Monitored: With the ignition on and during after-run mode (at key-off).

Set Condition: The ECM does not receive a correct signal from the measure coil and/or the sensor coil.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 FUEL INJECTION PUMP - CONTROL SLEEVE POSITION SENSOR OPEN  
 FUEL INJECTION PUMP - CONTROL SLEEVE POSITION SENSOR SHORTED TO GROUND  
 CONTROL SLEEVE POSITION SENSOR CIRCUITS SHORTED TO VOLTAGE  
 CONTROL SLEEVE POSITION SENSOR CIRCUIT SHORTED TO GROUND  
 CONTROL SLEEVE POSITION SENSOR CIRCUITS SHORTED TOGETHER  
 CONTROL SLEEVE POSITION SENSOR CIRCUITS OPEN  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off and wait for at least 30 seconds.<br>Turn the ignition on.<br>Monitor the DRB for ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 9 | All           |



## P1225-CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 2    | <p>Turn the ignition off.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Measure the resistance between Fuel Injection Pump connector (fuel pump side) cavities 1 and 2, then 2 and 3.<br/>Is the resistance between 5.0 and 7.0 ohms for each measurement?</p> <p>Yes → Go To 3</p> <p>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 3    | <p>Turn the ignition off.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Measure the resistance between ground and Fuel Injection Pump connector (fuel pump side) cavities 1, 2 then 3.<br/>Is the resistance above 100 kohms for each measurement?</p> <p>Yes → Go To 4</p> <p>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 4    | <p>Turn the ignition off.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Disconnect the ECM harness connectors.<br/>Remove the ASD/Diesel Power Relay from the PDC.<br/>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>Turn the ignition on.<br/>Measure the voltage on ECM harness connector C2 cavity 56.<br/>Measure the voltage on ECM harness connector C2 cavity 57.<br/>Measure the voltage on ECM harness connector C2 cavity 58.<br/>Is the voltage above 0.5 volt for any of the measurements?</p> <p>Yes → Repair the Control Sleeve Position Sensor circuit(s) that measured above 0.5 volt for a short to voltage.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 5</p> <p><b>NOTE: Remove the jumper wire.</b></p> | All           |
| 5    | <p>Turn the ignition off.<br/>Disconnect the Fuel Injection Pump harness connector.<br/>Disconnect the ECM harness connectors.<br/>Measure the resistance between ground and ECM harness connector C2 cavities 56, 57, and 58.<br/>Is the resistance above 100 kohms for each of the measurements?</p> <p>Yes → Go To 6</p> <p>No → Repair the Control Sleeve Position Sensor circuit(s) that measured below 100 kohms for a short to ground.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |

**P1225-CONTROL SLEEVE SENSOR SIGNAL HIGH EXCEEDED** —  
Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ECM harness connector C2 cavities 56 and 57, then 56 and 58, then 57 and 58.<br>Is the resistance below 100 kohms for any of the measurements?<br><br>Yes → Repair the Control Sleeve Position Sensor circuits that measured below 100 kohms for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 7   | All           |
| 7    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ECM harness connector C2 cavity 56 and Fuel Injection Pump harness connector cavity 1.<br>Measure the resistance between ECM harness connector C2 cavity 57 and Fuel Injection Pump harness connector cavity 2.<br>Measure the resistance between ECM harness connector C2 cavity 58 and Fuel Injection Pump harness connector cavity 3.<br>Is the resistance below 5.0 ohms for each of the measurements?<br><br>Yes → Go To 8<br><br>No → Repair the Control Sleeve Position Sensor circuit(s) that measured above 5.0 ohms for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 8    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 9    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom List:**

**P1225-CONTROL SLEEVE SENSOR START END POS. NOT ATTAINED**

**P1225-CONTROL SLEEVE SENSOR STOP END POS. NOT ATTAINED**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1225-CONTROL SLEEVE SENSOR START END POS. NOT ATTAINED.**

**When Monitored and Set Condition:**

**P1225-CONTROL SLEEVE SENSOR START END POS. NOT ATTAINED**

When Monitored: With the ignition on.

Set Condition: The control sleeve sensor signal indicates the control sleeve did not reach its start position.

**P1225-CONTROL SLEEVE SENSOR STOP END POS. NOT ATTAINED**

When Monitored: With the ignition on.

Set Condition: The control sleeve position sensor signal indicates the control sleeve is not at its ending position.

**POSSIBLE CAUSES**

ENGINE CONTROL MODULE  
 REPLACE THE FUEL INJECTION PUMP  
 INTERMITTENT CONDITION

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: If other Control Sleeve Position Sensor or Fuel Quantity Actuator DTCs are present, diagnose the other DTCs before continuing.</b></p> <p>Turn the ignition on.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Go To 2<br/>                     No → Go To 3</p> | All           |

**P1225-CONTROL SLEEVE SENSOR START END POS. NOT ATTAINED — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 2    | <p>Replace the Fuel Injection Pump in accordance with the Service Information.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → The repair is complete.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:****P1230-TIMING GOVERNING NEGATIVE GOVERNOR DEVIATION****When Monitored and Set Condition:****P1230-TIMING GOVERNING NEGATIVE GOVERNOR DEVIATION**

When Monitored: With the engine speed between 1000 and 4800 RPM.

Set Condition: The ECM detects 3 degrees of excess timing retard for at least 10 seconds.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS  
 ENGINE CONTROL MODULE  
 REPLACE THE FUEL INJECTION PUMP  
 INTERMITTENT CONDITION  
 FUEL INJECTION PUMP TIMING INCORRECT

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then attempt to start the engine.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 5   | All           |
| 2    | <b>NOTE: This DTC will set due to noise on the Needle Movement Sensor circuit.</b><br>Turn the ignition on.<br>With the DRB, check for additional DTCs.<br>Are other DTCs present?<br><br>Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br>No → Go To 3 | All           |
| 3    | Check the Fuel Injection Pump timing using the Service Information.<br>Is the Fuel Injection Pump timed correctly?<br><br>Yes → Go To 4<br>No → Reset the Fuel Injection Pump timing in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**P1230-TIMING GOVERNING NEGATIVE GOVERNOR DEVIATION —**  
**Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Replace the Fuel Injection Pump in accordance with the Service Information.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → The repair is complete.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1230-TIMING GOVERNING POSITIVE GOVERNOR DEVIATION**

**When Monitored and Set Condition:**

**P1230-TIMING GOVERNING POSITIVE GOVERNOR DEVIATION**

When Monitored: With the engine speed between 1000 and 4800 RPM.

Set Condition: The ECM detects 3 degrees of excess timing advance for at least 10 seconds.

**POSSIBLE CAUSES**

ENGINE CONTROL MODULE  
 REPLACE THE FUEL INJECTION PUMP  
 INTERMITTENT CONDITION  
 FUEL SYSTEM RESTRICTIONS  
 FUEL INJECTION PUMP TIMING INCORRECT

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then attempt to start the engine.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 5   | All           |
| 2    | <b>NOTE: This DTC will set due to low fuel volume to the Fuel Injection Pump.</b><br>Check the fuel system for restrictions.<br>Were any problems found?<br><br>Yes → Repair as necessary.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3                       | All           |
| 3    | Check the Fuel Injection Pump timing using the Service Information.<br>Is the Fuel Injection Pump timed correctly?<br><br>Yes → Go To 4<br><br>No → Reset the Fuel Injection Pump timing in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1230-TIMING GOVERNING POSITIVE GOVERNOR DEVIATION —**  
**Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Replace the Fuel Injection Pump in accordance with the Service Information.<br/>                     With the DRB, erase ECM DTCs.<br/>                     Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle.<br/>                     Monitor the DRB for ECM DTCs.<br/>                     Did this DTC reset?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → The repair is complete.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 5    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom List:****P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY****P1515-ACCEL. PEDAL SENSOR PWG PLAUS WITH POTENTIOMETER****P1515-ACCEL. PEDAL SENSOR SIGNAL HIGH EXCEEDED****P1515-ACCEL. PEDAL SENSOR SUPPLY HIGH EXCEEDED****P1515-ACCEL. PEDAL SENSOR SUPPLY LOW EXCEEDED**

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**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY.**

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**When Monitored and Set Condition:****P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY**

When Monitored: With the ignition on.

Set Condition: The accelerator pedal position sensor signal is below 0.2 volt (4%) or above 4.5 volts (90%) and the idle switch is not in the correct state. NOTE: The idle switch is designed to transition when the accel position is approximately 16% (1.00 volt). This code sets the ECM to Limp-in Mode, which includes a fixed engine speed of 1100 RPM.

**P1515-ACCEL. PEDAL SENSOR PWG PLAUS WITH POTENTIOMETER**

When Monitored: With the ignition on.

Set Condition: The accelerator pedal position sensor signal is below 0.20 volts, the idle switch transitions at too high a percentage intermittently or the idle switch is not in the correct state intermittently. NOTE: The idle switch is designed to transition when the accel position is approximately 16% (1.00 volt). This code sets the ECM to Limp-in Mode, which includes a fixed engine speed of 1100 RPM.

**P1515-ACCEL. PEDAL SENSOR SIGNAL HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The accelerator pedal position sensor signal voltage is above 4.5 volts. NOTE: This code sets the ECM to Limp-in Mode, which includes a fixed engine speed of 1100 RPM.

**P1515-ACCEL. PEDAL SENSOR SUPPLY HIGH EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage on the accelerator pedal position sensor 5-volt supply circuit above 5.2 volts.

**P1515-ACCEL. PEDAL SENSOR SUPPLY LOW EXCEEDED**

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage the accelerator pedal position sensor 5-volt supply circuit below 4.75 volts.

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| POSSIBLE CAUSES   |  |
|---|--|
| 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE                                    |  |
| APP SENSOR CIRCUIT SHORTED TO VOLTAGE                                       |  |
| APP SENSOR IDLE VOLTAGE   |  |
| APP SENSOR WIDE OPEN THROTTLE VOLTAGE                                       |  |
| ECM SENSOR GROUND CIRCUIT OPEN  |  |
| LOW IDLE POSITION SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE                   |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT                  |  |
| APP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT              |  |
| INTERMITTENT CONDITION  |  |
| LOW IDLE POSITION SWITCH SENSE CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND                                     |  |
| APP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND                                 |  |
| LOW IDLE POSITION SWITCH SENSE CIRCUIT SHORTED TO GROUND                    |  |
| 5-VOLT SUPPLY CIRCUIT OPEN  |  |
| APP SENSOR SIGNAL CIRCUIT OPEN  |  |
| LOW IDLE POSITION SWITCH SENSE CIRCUIT OPEN                                 |  |
| ECM - 5-VOLT SUPPLY CIRCUIT   |  |
| ECM - APP SENSOR SIGNAL CIRCUIT   |  |
| PCM SENSOR GROUND CIRCUIT OPEN  |  |
| PCM - SENSOR GROUND CIRCUIT   |  |
| VERIFY LOW IDLE POSITION SWITCH OPERATION                                   |  |
| VERIFY APP SENSOR OPERATION   |  |
| ECM - SENSOR GROUND OPEN  |  |
| VERIFY CORRECT SWITCHING  |  |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Connect one end of a jumper wire to APP Sensor harness connector cavity 4.<br>Turn the ignition on.<br>With the DRB III, monitor the Low Idle Position Switch input while tapping the other end of the jumper wire to APP Sensor harness connector cavity 5.<br>Does the DRB III change between IDLE and ABOVE IDLE when tapping the jumper wire?<br><br>Yes → Go To 2<br>No → Go To 8 | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 2    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage of the Low Idle Position Switch Sense circuit.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the Low Idle Position Switch Sense circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3 | All           |
| 3    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between the Low Idle Position Switch Sense circuit and the Sensor Ground circuits at cavity 4 and 8 of the APP Sensor harness connector.<br>Is the resistance above 100 kohms for both measurements?<br><br>Yes → Go To 4<br><br>No → Repair the Low Idle Position Switch Sense circuit and Sensor Ground circuit for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.                         | All           |
| 4    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Low Idle Position Switch Sense circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Low Idle Position Switch Sense circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Low Idle Position Switch Sense circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 6<br><br>No → Repair the Low Idle Position Switch Sense circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Sensor Ground circuit between APP Sensor harness connector cavity 4 and the PCM harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the PCM APP Sensor Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 8    | Turn the ignition on.<br>With the DRB III observe the Low Idle Position Switch input.<br>Press and release the accelerator pedal several times while observing the DRB III display.<br><b>NOTE: The Low Idle Position Switch input should change from IDLE to ABOVE IDLE when pressing and releasing the accelerator pedal.</b><br>Did Low Idle Position Switch input change between IDLE and ABOVE IDLE?<br><br>Yes → Go To 9<br><br>No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 9    | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit in APP Sensor harness connector cavity 10.<br>Is the voltage between 4.7 and 5.3 volts?<br><br>Yes → Go To 10<br><br>No → Go To 23  | All           |
| 10   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Connect a jumper wire between APP Sensor harness connector cavities 7 and 10.<br>With the DRBIII, read the PEDAL OUTPUT VOLTS.<br>Does the DRBIII display between 4.0 and 5.5 volts?<br><br>Yes → Go To 11<br><br>No → Go To 18   | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 11   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Sensor Ground circuit between APP Sensor harness connector cavity 8 and ECM harness connector C1.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 12<br><br>No → Repair the ECM APP Sensor Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 12   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Turn the ignition on.<br>Connect a voltmeter between the 5-volt Supply circuit cavity 10 and the Sensor Ground circuit cavity 8 in the APP Sensor harness connector.<br>Is the voltage between 4.5 and 5.5 volts?<br><br>Yes → Go To 13<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 13   | Turn the ignition on.<br>With the DRB III, read the PEDAL OUTPUT VOLTS with the accelerator pedal in the at rest position.<br>Does the DRB III display between 0.28 and 0.38 volt?<br><br>Yes → Go To 14<br><br>No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 14   | Turn the ignition on.<br>Fully depress the accelerator pedal.<br>With the DRBIII, read the PEDAL OUTPUT VOLTS.<br>Does the DRB III display between 4.1 and 4.6 volts?<br><br>Yes → Go To 15<br><br>No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 15   | Turn the ignition on.<br>With the DRB III, read the PEDAL OUTPUT VOLTS.<br>With the accelerator pedal in the idle position, slowly depress the accelerator pedal until the pedal is fully depressed.<br><b>NOTE: The PEDAL OUTPUT VOLTS should increase smoothly as the pedal is depressed.</b><br>Does the voltage increase smoothly with the accelerator pedal travel?<br><br>Yes → Go To 16<br><br>No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 16   | <p>Turn the ignition on.<br/>                     With the DRB III, select Engine and with the custom display feature select Low Idle Switch input and the Accel Pedal %.<br/>                     Slowly depress and release the accelerator pedal several times while monitoring the DRB III display.<br/> <b>NOTE: The Low Idle Switch state should change between 5% and 10% of Accelerator Pedal position.</b><br/>                     Did the Low Idle Switch state change between 5% and 10% of Accelerator Pedal position?</p> <p>Yes → Go To 17</p> <p>No → Replace the Accelerator Pedal Position Sensor.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 17   | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |
| 18   | <p>Turn the ignition off.<br/>                     Disconnect the APP Sensor harness connector.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the APP Sensor Signal circuit.<br/>                     Is the voltage above 1.0 volt?</p> <p>Yes → Repair the APP Sensor Signal circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 19</p>  | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 19   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between the APP Sensor Signal circuit and the Sensor Ground circuits at cavity 4 and 8 of the APP Sensor harness connector.<br>Is the resistance below 10 kohms for any of the measurements?<br><br>Yes → Repair the APP Sensor Signal and Sensor Ground circuits for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 20   | All           |
| 20   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the APP Sensor Signal circuit.<br>Is the resistance below 10 kohms?<br><br>Yes → Repair the APP Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 21   | All           |
| 21   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the APP Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 22<br><br>No → Repair the APP Sensor Signal circuit for an open<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 22   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 23   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit in the ECM harness connector.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the 5-volt Supply circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 24 | All           |

**P1515-ACCEL. PEDAL SENSOR PLAUSIBILITY — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 24   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuits at cavities 4 and 8 of the APP Sensor harness connector.<br>Is the resistance above 100 kohms for both of the measurements?<br><br>Yes → Go To 25<br><br>No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 25   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the 5-volt Supply circuit.<br>Is the resistance below 10 kohms?<br><br>Yes → Repair the 5-volt Supply circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 26  | All           |
| 26   | Turn the ignition off.<br>Disconnect the APP Sensor harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the 5-volt Supply circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 27<br><br>No → Repair the 5-volt Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 27   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |



**Symptom:****P1520-VEHICLE SPEED GOV ANALOG CTRL - CONTROL CONTACT ALONE****POSSIBLE CAUSES**

PERFORM SYMPTOM \*CHECKING THE SPEED CONTROL OPERATION  
 INTERMITTENT CONDITION  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 10 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 3  | All           |
| 2    | Perform symptom *CHECKING THE SPEED CONTROL OPERATION in the Symptom List.<br>Were any problems found?<br><br>Yes → Repair as necessary.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.  | All           |
| 3    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1605-TERMINAL 15 PLAUSIBILITY AFTER START UP**

**When Monitored and Set Condition:**

**P1605-TERMINAL 15 PLAUSIBILITY AFTER START UP**

When Monitored: During power-up and in after-run mode.

Set Condition: The switched ignition voltage at ECM cavity C1-47 drops to 0 volt and battery voltage is present at an ECM cavity other than cavities C1-33 and C1-45. NOTE: The name "Terminal 15" refers to the internal terminal on the Bosch controller and not to the actual switched ignition cavity (cavity C1-47) in the ECM harness connector.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 ASD/DIESEL POWER RELAY  
 ENGINE CONTROL MODULE  
 ECM CIRCUIT SHORTED TO VOLTAGE  
 ASD RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE  
 ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Cycle the ignition switch on and off several times, pausing for at least 10 seconds at each key off and key on.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br>No → Go To 6  | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Measure the voltage of all cavities in the ECM harness connectors except cavities C1-33 and C1-45.<br>Is the voltage above 2.0 volts on any of the cavity terminals except C1-33 and C1-45?<br><br>Yes → Go To 3<br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1605-TERMINAL 15 PLAUSIBILITY AFTER START UP — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Measure the voltage of ECM harness connector C1, cavities 2 and 28.<br>Is voltage present on ECM harness connector C1, cavities 2 and 28?<br><br>Yes → Go To 4<br><br>No → Repair the ECM circuit that measured above 2.0 volts for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Measure the voltage on ECM harness connector C1 cavity 2.<br>Is the voltage below 2.0 volts?<br><br>Yes → Go To 5<br><br>No → Repair the ASD Relay Output circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 5    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Measure the resistance between ground and the ASD Relay Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Replace the ASD/Diesel Power Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the ASD Relay Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 6    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO LATE**

**When Monitored and Set Condition:**

**P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO LATE**

When Monitored: During after-run.

Set Condition: The internal ECM timer determines that the ASD/Diesel Power Relay remains on too long when AFTER-RUN mode of operation has been completed.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS

INTERMITTENT CONDITION

SUBSTITUTE ASD/DIESEL POWER RELAY

ASD/DIESEL POWER RELAY CONTROL CIRCUIT SHORTED TO GROUND INTERMITTENTLY

ASD/DIESEL POWER RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE

ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for additional DTCs.<br>Are other DTCs present?<br><br>Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2                       | All           |
| 2    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Perform several ignition key cycles, pausing for at least 10 seconds between each cycle.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 3<br><br>No → Go To 7 | All           |

**P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO LATE — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Install a substitute relay in place of the ASD/Diesel Power Relay.<br>Perform several ignition key cycles, pausing for at least 10 seconds between each cycle.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 4<br><br>No → Replace the ASD/Diesel Power Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the ASD/Diesel Power Relay Control circuit while wiggling the wiring harness and connectors.<br>Was the resistance below 5.0 ohms at any time while wiggling the wiring harness and connectors?<br><br>Yes → Repair the ASD/Diesel Power Relay Control circuit for an intermittent short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5 | All           |
| 5    | Turn the ignition off.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Turn the ignition on.<br>Measure the voltage of the ASD/Diesel Power Relay Output circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 6<br><br>No → Repair the ASD/Diesel Power Relay Output circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 6    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO LATE — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 7    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |

**Symptom:****P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO SOON****When Monitored and Set Condition:****P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO SOON**

When Monitored: During after-run.

Set Condition: The internal ECM timer determines that the ASD/Diesel Power Relay has shut off before the AFTER-RUN mode of operation has been completed.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS

INTERMITTENT CONDITION

SUBSTITUTE ASD/DIESEL POWER RELAY

ASD/DIESEL POWER RELAY CONTROL CIRCUIT OPEN INTERMITTENTLY

ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for additional DTCs.<br>Are other DTCs present?<br><br>Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2  | All           |
| 2    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Perform several ignition key cycles, pausing for at least 10 seconds between each cycle.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 3<br><br>No → Go To 6  | All           |
| 3    | Turn the ignition off.<br>Install a substitute relay in place of the ASD/Diesel Power Relay.<br>Perform several ignition key cycles, pausing for at least 10 seconds between each cycle.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 4<br><br>No → Replace the ASD/Diesel Power Relay.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1625-ASD/DIESEL POWER RELAY SHUTS OFF TOO SOON — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance of the ASD/Diesel Power Relay Control circuit while wiggling the wiring harness and connectors between the ECM and the PDC.<br/>                     Was the resistance above 5.0 ohms at any time while wiggling the wiring harness and connectors?</p> <p>Yes → Repair the ASD/Diesel Power Relay Control circuit for an intermittent open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 5</p>  | All           |
| 5    | <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |



**Symptom:**

**P1630-SOLENOID VALVE CONTROLLER OPEN CIRCUIT**

**When Monitored and Set Condition:**

**P1630-SOLENOID VALVE CONTROLLER OPEN CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the fuel timing solenoid control circuit.

**POSSIBLE CAUSES**

FUEL INJECTION PUMP  
 INTERMITTENT CONDITION  
 FUEL TIMING SOLENOID CONTROL CIRCUIT SHORTED TO GROUND  
 FUSED ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND  
 FUSED ASD RELAY OUTPUT OPEN  
 FUEL TIMING SOLENOID CONTROL CIRCUIT OPEN  
 FUEL TIMING SOLENOID (FUEL INJECTION PUMP) INTERNAL  
 INTERNAL FUEL INJECTION PUMP TEST  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 9                        | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Turn the ignition on.<br>Measure the voltage on the Fused ASD Relay Output circuit.<br>Is the voltage above 10.5 volts?<br><br>Yes → Go To 3<br><br>No → Go To 7 | All           |

**P1630-SOLENOID VALVE CONTROLLER OPEN CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between ground and the Fuel Timing Solenoid Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Fuel Timing Solenoid Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance of the Fuel Timing Solenoid Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 5<br><br>No → Repair the Fuel Timing Solenoid Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 5    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance of the Fuel Timing Solenoid at the Fuel Injection Pump connector (fuel pump side) between cavities 5 and 10.<br>Is the resistance between 12.0 and 20.0 ohms?<br><br>Yes → Go To 6<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 6    | Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br>Cavity 5 to cavities 6, 7, 8, and 9.<br>Cavity 7 to cavities 6, 8, 9, and 10.<br>Cavity 8 to cavities 6 and 10.<br><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br>Is the resistance above 100 ohms for each of the measurements?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 7    | Remove and inspect the ASD Relay Output Fuse from the PDC.<br>Is the fuse OK?<br><br>Yes → Repair the Fused ASD Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 8   | All           |

**P1630-SOLENOID VALVE CONTROLLER OPEN CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | <p>Turn the ignition off.<br/>Remove the ASD Relay Output Fuse.<br/>Measure the resistance between ground and the Fused ASD Relay Output circuit.<br/>Is the resistance above 100 kohms?</p> <p>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Fused ASD Relay Output circuit for a short to ground.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 9    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>Refer to any Technical Service Bulletins (TSB) that may apply.<br/>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**P1630-SOLENOID VALVE CONTROLLER SHORT CIRCUIT**

**When Monitored and Set Condition:**

**P1630-SOLENOID VALVE CONTROLLER SHORT CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects excessive current draw on the fuel timing solenoid control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

FUEL TIMING SOLENOID (FUEL INJECTION PUMP) SHORTED TO VOLTAGE INTERNALLY

FUEL TIMING SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE

INTERNAL FUEL INJECTION PUMP TEST

ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 5  | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs and then read ECM DTCS.<br>Did DTC P1630 SOLENOID VALVE CONTROLLER OPEN CIRCUIT set?<br><br>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3 | All           |

**P1630-SOLENOID VALVE CONTROLLER SHORT CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage of the Fuel Timing Solenoid Control circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 4<br><br>No → Repair the Fuel Timing Solenoid Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 4    | Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br>Cavity 5 to cavities 6, 7, 8, and 9.<br>Cavity 7 to cavities 6, 8, 9, and 10.<br>Cavity 8 to cavities 6 and 10.<br><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br>Is the resistance above 100 ohms for each of the measurements?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1635-GLOW RELAY 1 CONTROLLER OPEN CIRCUIT**

**When Monitored and Set Condition:**

**P1635-GLOW RELAY 1 CONTROLLER OPEN CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or a short to ground on the glow plug relay 1 control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 ASD/DIESEL POWER RELAY OUTPUT CIRCUIT OPEN  
 SUBSTITUTE GLOW PLUG RELAY  
 GLOW PLUG RELAY CONTROL CIRCUIT SHORTED TO GROUND  
 GLOW PLUG RELAY CONTROL CIRCUIT OPEN  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, actuate the Glow Plug Relay.<br>Is the Glow Plug Relay clicking?<br><br>Yes → Go To 2<br>No → Go To 3<br><br><b>NOTE: Stop the Glow Plug Relay actuation by the DRB.</b>   | All           |
| 2    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**P1635-GLOW RELAY 1 CONTROLLER OPEN CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Remove the Glow Plug Relay from the PDC.<br>Turn the ignition on.<br>Using a 12-volt Test Light connected to ground, check the ASD/Diesel Power Relay Output circuit.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 4<br><br>No → Repair the ASD/Diesel Power Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 4    | Turn the ignition off.<br>Install a substitute relay in place of the Glow Plug Relay.<br>Turn the ignition on.<br>With the DRB, actuate the Glow Plug Relay.<br>Is the Glow Plug Relay clicking?<br><br>Yes → Replace the Glow Plug Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5  | All           |
| 5    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the Glow Plug Relay from the PDC.<br>Measure the resistance between ground and the Glow Plug Relay Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 6<br><br>No → Repair the Glow Plug Relay Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the Glow Plug Relay from the PDC.<br>Measure the resistance of the Glow Plug Relay Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the Glow Plug Relay Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                              | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**Symptom:**

**P1635-GLOW RELAY 1 CONTROLLER SHORT CIRCUIT**

**When Monitored and Set Condition:**

**P1635-GLOW RELAY 1 CONTROLLER SHORT CIRCUIT**

When Monitored: When the ECM attempts to activate glow plug relay 1.

Set Condition: The ECM detects excessive current draw on the glow plug relay 1 control circuit when attempting to activate the glow plug relay.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 SUBSTITUTE GLOW PLUG RELAY  
 GLOW PLUG RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, actuate the Glow Plug Relay.<br>Is the Glow Plug Relay clicking?<br><br>Yes → Go To 2<br><br>No → Go To 3<br><br><b>NOTE: Stop the Glow Plug Relay actuation by the DRB.</b>   | All           |
| 2    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |



**P1635-GLOW RELAY 1 CONTROLLER SHORT CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Install a substitute relay in place of the Glow Plug Relay.<br>Turn the ignition on.<br>With the DRB, actuate the Glow Plug Relay.<br>Is the Glow Plug Relay clicking?<br><br>Yes → Replace the Glow Plug Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4   | All           |
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connector(s).<br>Remove the Glow Plug Relay from the PDC.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage of the Glow Plug Relay Control circuit.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the Glow Plug Relay Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5 | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**P1645-GLOW DISPLAY OPEN CIRCUIT**

**When Monitored and Set Condition:**

**P1645-GLOW DISPLAY OPEN CIRCUIT**

When Monitored: During wait to start lamp operation.

Set Condition: The ECM detects an open or short to ground on the wait to start lamp control circuit. NOTE: This code may set if the ASD/Diesel Power Relay contacts stick together or the ASD/Diesel Power Relay control circuit shorts to ground after key-off.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS  
 INTERMITTENT CONDITION  
 GLOW PLUG LAMP CONTROL CIRCUIT SHORTED TO GROUND  
 GLOW PLUG LAMP CONTROL CIRCUIT OPEN  
 ENGINE CONTROL MODULE  
 CHECK THE GLOW PLUG LAMP BULB  
 MESSAGE CENTER

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: This DTC may set if the ASD/Diesel Power Relay contacts stick together after ignition off.</b><br/>                     Turn the ignition on.<br/>                     With the DRB, check for additional DTCs.<br/>                     Are other DTCs present?</p> <p>Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 2</p> | All           |
| 2    | <p>Turn the ignition on.<br/>                     With the DRB, actuate the Glow Plug Lamp.<br/>                     Is the Glow Plug Lamp cycling on and off?</p> <p>Yes → Go To 3</p> <p>No → Go To 4</p>   | All           |

**P1645-GLOW DISPLAY OPEN CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |
| 4    | <p>Turn the ignition off.</p> <p>Disconnect the ECM harness connectors.</p> <p>Disconnect the Message Center harness connector.</p> <p>Measure the resistance between ground and the Glow Plug Lamp Control circuit.</p> <p>Is the resistance above 100 kohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the Glow Plug Lamp Control circuit for a short to ground.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p>Turn the ignition off.</p> <p>Disconnect the ECM harness connectors.</p> <p>Disconnect the Message Center harness connector.</p> <p>Measure the resistance of the Glow Plug Lamp Control circuit.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the Glow Plug Lamp Control circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p><b>NOTE: Ensure the Message Center harness connector is connected.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the ECM harness connectors.</p> <p>Turn the ignition on.</p> <p>Connect a jumper wire between ground and the Glow Plug Lamp Control circuit in ECM harness connector C1.</p> <p>Did the Glow Plug Lamp illuminate?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 7</p>   | All           |

**P1645-GLOW DISPLAY OPEN CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition off.<br>Remove and check the Glow Plug Lamp bulb from the Instrument Cluster.<br>Is the bulb OK?<br><br>Yes → Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Glow Plug Lamp bulb.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:****P1645-GLOW DISPLAY SHORT CIRCUIT****When Monitored and Set Condition:****P1645-GLOW DISPLAY SHORT CIRCUIT**

When Monitored: During wait to start lamp operation.

Set Condition: The ECM detects excessive current draw on the wait to start lamp control circuit when attempting to activate the wait to start lamp.

**POSSIBLE CAUSES**

CHECK FOR OTHER DTCS  
 INTERMITTENT CONDITION  
 GLOW PLUG LAMP CONTROL CIRCUIT SHORTED TO GROUND  
 GLOW PLUG LAMP CONTROL CIRCUIT OPEN  
 ENGINE CONTROL MODULE  
 CHECK THE GLOW PLUG LAMP BULB  
 MESSAGE CENTER

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for additional DTCs.<br>Are other DTCs present?<br><br>Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2 | All           |
| 2    | Turn the ignition on.<br>With the DRB, actuate the Glow Plug Lamp.<br>Is the Glow Plug Lamp cycling on and off?<br><br>Yes → Go To 3<br><br>No → Go To 4  | All           |

**P1645-GLOW DISPLAY SHORT CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br/>                     With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Message Center harness connector.<br/>                     Measure the resistance between ground and the Glow Plug Lamp Control circuit.<br/>                     Is the resistance above 100 kohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the Glow Plug Lamp Control circuit for a short to ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the Message Center harness connector.<br/>                     Measure the resistance of the Glow Plug Lamp Control circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the Glow Plug Lamp Control circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 6    | <p><b>NOTE: Ensure the Message Center harness connector is connected.</b><br/>                     Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Turn the ignition on.<br/>                     Connect a jumper wire between ground and the Glow Plug Lamp Control circuit in ECM harness connector C1.<br/>                     Did the Glow Plug Lamp illuminate?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 7</p>   | All           |

**P1645-GLOW DISPLAY SHORT CIRCUIT — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition off.<br>Remove and check the Glow Plug Lamp bulb from the Instrument Cluster.<br>Is the bulb OK?<br><br>Yes → Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Glow Plug Lamp bulb.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**P1660-REDUNDANT EMERG. STOP PLAUSIBILITY IN AFTER-RUN**

**When Monitored and Set Condition:**

**P1660-REDUNDANT EMERG. STOP PLAUSIBILITY IN AFTER-RUN**

**When Monitored:** During after-run, when the engine speed is below 800 RPM and vehicle speed is below 2.5 MPH.

**Set Condition:** The fuel shutdown solenoid is turned off and engine speed does not drop below 500 RPM.

| POSSIBLE CAUSES  |
|--|
| INTERMITTENT CONDITION<br>FUEL SHUTDOWN SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE<br>FUEL SHUTDOWN SOLENOID (FUEL INJECTION PUMP) SHORTED INTERNALLY<br>INTERNAL FUEL INJECTION PUMP TEST<br>ENGINE CONTROL MODULE |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Start and stop the engine several times, pausing for 10 seconds at key off each time.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 5   | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage on the Fuel Shutdown Solenoid Control circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 3<br><br>No → Repair the Fuel Shutdown Solenoid Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br><b>NOTE: Remove the jumper wire from the ASD/Diesel Power Relay connector, reinstall the ASD/Diesel Power Relay in the PDC, and reconnect the ECM harness connectors.</b> | All           |



## P1660-REDUNDANT EMERG. STOP PLAUSIBILITY IN AFTER-RUN — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Turn the ignition on.<br>With the DRB, actuate the Fuel Shutdown Solenoid.<br>Measure the voltage on the Fuel Shutdown Solenoid Control circuit.<br>Does the voltage cycle from B+ to below 1.0 volt?<br><br>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4  | All           |
| 4    | Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br>Cavity 5 to cavities 6, 7, 8, and 9.<br>Cavity 7 to cavities 6, 8, 9, and 10.<br>Cavity 8 to cavities 6 and 10.<br><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br>Is the resistance above 100 ohms for each of the measurements?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**P1660-REDUNDANT EMERG. STOP POWERSTAGE DEFECTIVE**

**When Monitored and Set Condition:**

**P1660-REDUNDANT EMERG. STOP POWERSTAGE DEFECTIVE**

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the fuel shutdown solenoid control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

FUEL SHUTDOWN SOLENOID CONTROL CIRCUIT OPEN

FUEL SHUTDOWN SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

FUEL SHUTDOWN SOLENOID (FUEL INJECTION PUMP) SHORTED INTERNALLY

INTERNAL FUEL INJECTION PUMP TEST

ENGINE CONTROL MODULE

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Cycle the ignition on and off several times, pausing for 10 seconds at key off each time.<br>Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Go To 2<br><br>No → Go To 6   | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance of the Fuel Shutdown Solenoid Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 3<br><br>No → Repair the Fuel Shutdown Solenoid Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

## P1660-REDUNDANT EMERG. STOP POWERSTAGE DEFECTIVE — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between ground and the Fuel Shutdown Solenoid Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Fuel Shutdown Solenoid Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump harness connector.<br>Turn the ignition on.<br>With the DRB, actuate the Fuel Shutdown Solenoid.<br>Measure the voltage on the Fuel Shutdown Solenoid Control circuit.<br>Does the voltage cycle from B+ to below 1.0 volt?<br><br>Yes → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5   | All           |
| 5    | Disconnect the Fuel Injection Pump harness connector.<br>Measure the resistance between the following cavities in the Fuel Injection Pump connector (fuel pump side):<br>Cavity 1 to cavities 4, 5, 6, 7, 8, 9, and 10.<br>Cavity 4 to cavities 5, 6, 7, 8, 9, and 10.<br>Cavity 5 to cavities 6, 7, 8, and 9.<br>Cavity 7 to cavities 6, 8, 9, and 10.<br>Cavity 8 to cavities 6 and 10.<br><b>NOTE: The resistance should be above 100 ohms for all measurements.</b><br>Is the resistance above 100 ohms for each of the measurements?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Fuel Injection Pump in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**P1660-REDUNDANT EMERG. STOP POWERSTAGE DEFECTIVE —**  
**Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 6    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom List:**

**P1685-VEHICLE THEFT ALARM IMMOBILIZER SIG LOST**  
**P1685-VEHICLE THEFT ALARM INVALID SKIM MESSAGE**

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1685-VEHICLE THEFT ALARM IMMOBILIZER SIG LOST.**

**When Monitored and Set Condition:**

**P1685-VEHICLE THEFT ALARM IMMOBILIZER SIG LOST**

When Monitored: With the ignition on and the immobilizer disarmed.

Set Condition: The ECM detects an open, short to ground, or short to voltage on the immobilizer signal circuit.

**P1685-VEHICLE THEFT ALARM INVALID SKIM MESSAGE**

When Monitored: With the ignition on.

Set Condition: The ECM determines that the coded message from the PCM does not match the message programmed into memory.

**POSSIBLE CAUSES**

CHECK FOR SKIM COMMUNICATION AND DTCS  
 ECM - VIN MISMATCH  
 PCM - VIN MISMATCH  
 IMMOBILIZER SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 IMMOBILIZER SIGNAL CIRCUIT SHORTED TO GROUND  
 ENGINE CONTROL MODULE  
 IMMOBILIZER SIGNAL CIRCUIT OPEN  
 ENGINE CONTROL MODULE - INTERNAL SHORT  
 POWERTRAIN CONTROL MODULE - INTERNAL SHORT

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for Sentry Key Immobilizer Module communication and DTCs. Are any SKIS problems or DTCs present?<br><br>Yes → Refer to symptom list for problems related to SKIM Communication and DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2 | All           |

**P1685-VEHICLE THEFT ALARM IMMOBILIZER SIG LOST — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 2    | <p>With the DRB, select ENGINE, then BOSCH 3.1L VM DIESEL CONTROLLER from the menu.<br/>                     Display the Vehicle Identification Number (VIN).<br/>                     Compare the programmed VIN to the vehicle VIN.<br/>                     Does the programmed VIN match the vehicle VIN?</p> <p>Yes → Go To 3</p> <p>No → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 3    | <p>With the DRB, select ENGINE, then JTEC CONTROLLER from the menu.<br/>                     Display the Vehicle Identification Number (VIN).<br/>                     Compare the programmed VIN to the vehicle VIN.<br/>                     Does the programmed VIN match the vehicle VIN?</p> <p>Yes → Go To 4</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the Immobilizer Signal circuit.<br/>                     Is the voltage below 1.0 volt?</p> <p>Yes → Go To 5</p> <p>No → Repair the Immobilizer Signal circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p><b>NOTE: Remove the jumper wire and install the ASD/Diesel Power Relay.</b></p> | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance between ground and the Immobilizer Signal circuit.<br/>                     Is the resistance above 100 kohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the Immobilizer Signal circuit for a short to ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 6    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance of the Immobilizer Signal circuit.<br/>                     Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the Immobilizer Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**P1685-VEHICLE THEFT ALARM IMMOBILIZER SIG LOST — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition off.<br><b>NOTE: Ensure the ECM harness connectors are connected.</b><br>Measure the amperage between ground and the Immobilizer Signal circuit in PCM harness connector C3.<br>Turn the ignition on.<br>Is the amperage between 1.0 and 1.4 milliamps?<br><br>Yes → Go To 8<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 8    | Turn the ignition off.<br><b>NOTE: Ensure all connectors are connected.</b><br>With the DRB oscilloscope function, select LAB SCOPE and set the oscilloscope to the following specifications:<br>Voltage Range to +20.0V<br>Probe to X10<br>Time Range to 0.1s/Div<br>Turn the ignition on.<br>With the DRB oscilloscope lead, back probe PCM harness connector C3 cavity 16.<br><b>NOTE: A valid Immobilizer Signal voltage will cycle high and low.</b><br>Does the DRB display show the 12-volt Immobilizer Signal voltage cycling high and low?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**P1690-FAN CONTROL OPEN CIRCUIT**

**When Monitored and Set Condition:**

**P1690-FAN CONTROL OPEN CIRCUIT**

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the radiator fan relay control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 ASD/DIESEL POWER RELAY OUTPUT CIRCUIT OPEN  
 SUBSTITUTE RADIATOR FAN RELAY  
 RADIATOR FAN RELAY CONTROL CIRCUIT SHORTED TO GROUND  
 RADIATOR FAN RELAY CONTROL CIRCUIT OPEN  
 ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay.<br>Does the Radiator Fan cycle on and off?<br><br>Yes → Go To 2<br><br>No → Go To 3  | All           |
| 2    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |



**P1690-FAN CONTROL OPEN CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the ASD/Diesel Power Relay Output circuit.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 4<br><br>No → Repair the ASD/Diesel Power Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.     | All           |
| 4    | Turn the ignition off.<br>Install a substitute relay in place of the Radiator Fan Relay.<br>Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay.<br>Does the Radiator Fan cycle on and off?<br><br>Yes → Replace the Radiator Fan Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5   | All           |
| 5    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Radiator Fan Relay Control circuit.<br>Is the resistance below 100 kohms?<br><br>Yes → Repair the Radiator Fan Relay Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 6 | All           |
| 6    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Radiator Fan Relay Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the Radiator Fan Relay Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                            | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**P1690-FAN CONTROL SHORT CIRCUIT**

**When Monitored and Set Condition:**

**P1690-FAN CONTROL SHORT CIRCUIT**

When Monitored: With the ignition on and the ECM attempting to enable the radiator fan relay.

Set Condition: The ECM detects excessive current draw on the radiator fan relay control circuit.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

SUBSTITUTE RADIATOR FAN RELAY

RADIATOR FAN RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE

ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay.<br>Does the Radiator Fan cycle on and off?<br><br>Yes → Go To 2<br><br>No → Go To 3  | All           |
| 2    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**P1690-FAN CONTROL SHORT CIRCUIT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Install a substitute relay in place of the Radiator Fan Relay.<br>Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay.<br>Does the Radiator Fan cycle on and off?<br><br>Yes → Replace the Radiator Fan Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4   | All           |
| 4    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Turn the ignition on.<br>Measure the voltage of the Radiator Fan Relay Control circuit.<br>Is the voltage below 1.0 volt?<br><br>Yes → Go To 5<br><br>No → Repair the Radiator Fan Relay Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**P1703-BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT**

**When Monitored and Set Condition:**

**P1703-BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT**

When Monitored: With the ignition on.

Set Condition: The ECM detects the brake switch sense circuit and brake lamp switch output circuit inputs to the ECM do not agree. NOTE: An out of adjustment brake lamp switch may also cause a reduction in engine power.

**POSSIBLE CAUSES**

- INTERMITTENT CONDITION
- BRAKE LAMP SWITCH (SECONDARY OPEN)
- BRAKE LAMP SWITCH FUSED B+ CIRCUIT OPEN
- SECONDARY BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
- BRAKE LAMP SWITCH (PRIMARY OPEN)
- SECONDARY BRAKE SWITCH GROUND CIRCUIT OPEN
- SECONDARY BRAKE SWITCH SIGNAL CIRCUIT OPEN
- PRIMARY BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
- PRIMARY BRAKE SWITCH SIGNAL CIRCUIT OPEN
- ENGINE CONTROL MODULE (INTERNAL)
- ENGINE CONTROL MODULE (PRIMARY BRAKE SIGNAL)
- ENGINE CONTROL MODULE (SECONDARY BRAKE SIGNAL)

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>While observing the PRIM BRAKE SWITCH status on the DRB display, press and release the brake pedal several times.<br>Does the DRB display PRIM BRAKE SWITCH: PRESSED and RELEASED for the appropriate pedal position?<br><br>Yes → Go To 2<br>No → Go To 11 | All           |
| 2    | Turn the ignition on.<br>While observing the SEC BRAKE SWITCH status on the DRB display, press and release the brake pedal several times.<br>Does the DRB display SEC BRAKE SWITCH: PRESSED and RELEASED for the appropriate pedal position?<br><br>Yes → Go To 3<br>No → Go To 4    | All           |

**P1703-BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.</p> <p>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.</p> <p>Refer to any Technical Service Bulletins (TSB) that may apply.</p> <p>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |
| 4    | <p>Turn the ignition off.</p> <p>Disconnect the Brake Lamp Switch harness connector.</p> <p>Turn the ignition on.</p> <p>Measure the voltage between the Secondary Brake Switch Signal circuit and ground.</p> <p>Is the voltage above 9.0 volts?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Go To 8</p>  | All           |
| 5    | <p>Disconnect the Brake Lamp Switch harness connector.</p> <p>Turn the ignition on.</p> <p>While monitoring the SEC BRAKE SWITCH status with the DRB, connect a jumper wire between ground and the Secondary Brake Switch Signal circuit.</p> <p>Does the DRB display change from PRESSED to RELEASED?</p> <p style="padding-left: 40px;">Yes → Adjust or replace the Brake Lamp Switch in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 6</p>   | All           |
| 6    | <p>Turn the ignition off.</p> <p>Disconnect the Brake Lamp Switch harness connector.</p> <p>Measure the resistance between ground and the Secondary Brake Switch Ground circuit.</p> <p>Is the resistance below 5.0 ohms?</p> <p style="padding-left: 40px;">Yes → Go To 7</p> <p style="padding-left: 40px;">No → Repair the Secondary Brake Switch Ground circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 7    | <p>If there are no possible causes remaining, view repair.</p> <p style="padding-left: 40px;">Repair</p> <p style="padding-left: 80px;">Replace and program the Engine Control Module in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**P1703-BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Secondary Brake Switch Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 9<br><br>No → Repair the Secondary Brake Switch Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 9    | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Secondary Brake Switch Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 10<br><br>No → Repair the Secondary Brake Switch Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 10   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 11   | Disconnect the Brake Lamp Switch harness connector.<br>Using a 12-volt test light connected to ground, check the Fused B+ circuit.<br>Does the test light illuminate brightly?<br><br>Yes → Go To 12<br><br>No → Repair the Brake Lamp Switch Fused B+ circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 12   | Disconnect the Brake Lamp Switch harness connector.<br>Turn the ignition on.<br>While monitoring the PRIM BRAKE SWITCH status with the DRB, connect a jumper wire between the Primary Brake Switch Signal circuit and the Fused B(+) circuit.<br>Does the DRB display change from RELEASED to PRESSED?<br><br>Yes → Adjust or replace the Brake Lamp Switch in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 13 | All           |

**P1703-BRAKE SIGNAL PLAUS WITH REDUNDANT CONTACT — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 13   | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Measure the voltage between the Primary Brake Switch Signal circuit and ground.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the Primary Brake Switch Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 14 | All           |
| 14   | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Primary Brake Switch Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 15<br><br>No → Repair the Primary Brake Switch Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 15   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom List:**

**P1725-INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY**

**P1725-INDUCTIVE AUX. SPEED SENSOR OVERSPEED RECOGNITION**

**P1725-INDUCTIVE AUX. SPEED SENSOR PLAUSIBILITY**

**P1725-INDUCTIVE AUX. SPEED SENSOR STATIC PLAUSIBILITY**

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**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1725-INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY.**

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**When Monitored and Set Condition:**

**P1725-INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY**

When Monitored: With the engine running.

Set Condition: The ECM has determined that the inductive auxiliary speed sensor values are incorrect during an engine speed transition.

**P1725-INDUCTIVE AUX. SPEED SENSOR OVERSPEED RECOGNITION**

When Monitored: With the engine running.

Set Condition: The ECM detects the engine speed signal from the needle movement sensor has exceeded 6600 RPM.

**P1725-INDUCTIVE AUX. SPEED SENSOR PLAUSIBILITY**

When Monitored: With the engine running.

Set Condition: The ECM has determined that the needle movement sensor input is incorrect.

**P1725-INDUCTIVE AUX. SPEED SENSOR STATIC PLAUSIBILITY**

When Monitored: With the engine running.

Set Condition: The ECM has determined that the inductive auxiliary speed sensor values are incorrect.

---

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

CHECK THE NEEDLE MOVEMENT SENSOR CONNECTOR TERMINALS

MIS-ROUTED WIRING HARNESS

NEEDLE MOVEMENT SENSOR SIGNAL CIRCUIT OPEN

NEEDLE MOVEMENT SENSOR GROUND CIRCUIT OPEN

ENGINE CONTROL MODULE



## P1725-INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY — Continued

### POSSIBLE CAUSES

NEEDLE MOVEMENT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND  
NEEDLE MOVEMENT SENSOR

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p>Turn the ignition on.<br/>With the DRB, erase ECM DTCs.<br/>Start the engine and vary the engine speed from idle to 3500 RPM several times.<br/>With the DRB, read ECM DTCs.<br/>Did this DTC reset?</p> <p>Yes → Go To 2<br/>No → Go To 8</p>   | All           |
| 2    | <p>Turn the ignition off.<br/>Disconnect the Needle Movement Sensor harness connector.<br/>Check the Needle Movement Sensor connector terminals in the harness side connector and the sensor side connector.<br/>Is there any damage or corrosion to any of the terminals in either connector?</p> <p>Yes → Repair as necessary.<br/>Perform ROAD TEST VERIFICATION - VER-2.<br/>No → Go To 3</p> | All           |
| 3    | <p><b>NOTE: EMI interference can be caused by high current carrying wires or the Alternator.</b><br/>Check the wiring harness for mis-routing that could cause EMI interference.<br/>Is the wiring harness mis-routed?</p> <p>Yes → Repair as necessary.<br/>Perform ROAD TEST VERIFICATION - VER-2.<br/>No → Go To 4</p>   | All           |
| 4    | <p>Turn the ignition off.<br/>Disconnect the ECM harness connectors.<br/>Disconnect the Needle Movement Sensor harness connector.<br/>Measure the resistance of the Needle Movement Sensor Signal circuit.<br/>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5<br/>No → Repair the Needle Movement Sensor Signal circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>      | All           |
| 5    | <p>Turn the ignition off.<br/>Disconnect the Needle Movement Sensor harness connector.<br/>Disconnect the ECM harness connectors.<br/>Measure the resistance of the Needle Movement Sensor Ground circuit.<br/>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6<br/>No → Repair the Needle Movement Sensor Ground circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>      | All           |

**P1725-INDUCTIVE AUX. SPEED SENSOR DYN. PLAUSIBILITY —**  
**Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Needle Movement Sensor harness connector.<br>Measure the resistance between ground and the Needle Movement Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 7<br><br>No → Repair the Needle Movement Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 7    | Turn the ignition off.<br>Replace the Needle Movement Sensor in accordance with the Service Information.<br>Turn the ignition on.<br>With the DRB, erase ECM DTCs.<br>Start the engine and vary the engine speed from idle to 3500 RPM several times.<br>With the DRB, read ECM DTCs.<br>Did this DTC reset?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → The repair is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 8    | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**Symptom:**

**\*CHECKING THE A/C SYSTEM**

| POSSIBLE CAUSES                                  |
|--|
| A/C COMPRESSOR CLUTCH                            |
| A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN        |
| A/C COMPRESSOR CLUTCH RELAY OUTPUT CIRCUIT OPEN  |
| A/C HIGH PRESSURE SWITCH OPEN                    |
| A/C LOW PRESSURE SWITCH OPEN                     |
| A/C PRESSURE SENSE CIRCUIT OPEN                  |
| A/C SELECT SWITCH SENSE CIRCUIT OPEN             |
| A/C SELECT SWITCH SENSE CIRCUIT SHORT TO GROUND  |
| A/C SELECT SWITCH SENSE CIRCUIT SHORT TO VOLTAGE |
| A/C SWITCH INPUT TO THE PCM                      |
| A/C SWITCH SIGNAL OPEN                           |
| A/C SWITCH SIGNAL SHORTED TO GROUND              |
| ACTUATOR TEST                                    |
| ECM  |
| ECM - PRESSURE SIGNAL OPEN                       |
| FUSED B+ CIRCUIT OPEN                            |
| GROUND CIRCUIT OPEN                              |
| HI PRESSURE SIGNAL CIRCUIT OPEN                  |
| PCM - A/C SELECT SWITCH SENSE CIRCUIT OPEN       |
| PCM - A/C SWITCH INPUT                           |
| PCM - INTERNAL A/C SELECT SWITCH CIRCUIT         |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: Prior to diagnosing the A/C electrical system, check for proper A/C system pressure. Improper refrigerant charge can cause incorrect system diagnosis and unnecessary component replacement.</b></p> <p><b>NOTE: Refer to the Service Information to check the A/C mechanical system before continuing.</b></p> <p>With the DRB, select Engine, JTEC then Inputs/Outputs.<br/>                     Start the engine and set the blower to Panel.<br/>                     Turn the A/C on.<br/>                     With the DRB, read the A/C Select Switch.<br/>                     Does the DRB display A/C Select Switch YES?</p> <p style="margin-left: 40px;">Yes → Go To 2</p> <p style="margin-left: 40px;">No → Go To 16</p> | All           |

# DRIVEABILITY - DIESEL

## \*CHECKING THE A/C SYSTEM — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 2    | <p>With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br/>Start the engine and set the blower to Panel.<br/>Turn the A/C on.<br/>With the DRB, read the A/C Switch.<br/>Does the DRB display A/C Switch ON?</p> <p>Yes → Go To 3<br/>No → Go To 13</p>  | All           |
| 3    | <p>Turn the ignition on.<br/>With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br/>Read the A/C H/L Press Sw<br/>Does the DRB display A/C H/L Press Sw ON?</p> <p>Yes → Go To 4<br/>No → Go To 8</p>   | All           |
| 4    | <p>Turn the ignition on.<br/>With the DRBIII®, actuate the A/C Compressor Clutch Relay.<br/>Observe the A/C Compressor Clutch during actuation.<br/>Is the A/C Compressor Clutch clicking?</p> <p>Yes → The electrical portion of the A/C System is operating properly.<br/>Perform ROAD TEST VERIFICATION - VER-2.<br/>No → Go To 5</p>  | All           |
| 5    | <p>Remove the A/C Compressor Clutch Relay from the PDC.<br/>Using a 12-volt test light connected to ground, check the Fused B+ circuit.<br/>Is the test light on?</p> <p>Yes → Go To 6<br/>No → Repair the Fused B+ circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |
| 6    | <p>Remove the A/C Compressor Clutch Relay from the PDC.<br/>Disconnect the A/C Compressor Clutch harness connector.<br/>Connect a jumper wire across the A/C Compressor Clutch Relay connector cavities 30 and 87 in the PDC.<br/>Using a 12-volt test light connected to ground, check the A/C Compressor Clutch Relay Output circuit in the A/C Compressor Clutch harness connector.<br/>Is the test light on?</p> <p>Yes → Go To 7<br/>No → Repair the A/C Compressor Clutch Relay Output circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 7    | <p>Disconnect the A/C Compressor Clutch harness connector.<br/>Using a 12-volt test light connected to 12 volts, check the A/C Compressor Clutch Ground circuit.<br/>Is the test light on?</p> <p>Yes → Replace the A/C Compressor Clutch in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.<br/>No → Repair the A/C Compressor Clutch Ground circuit for an open.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**\*CHECKING THE A/C SYSTEM — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 8    | Turn the ignition on.<br>Connect one end of a jumper wire to ground and back probe the A/C Pressure Signal circuit at the ECM harness connector.<br>With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br>Read the A/C H/L Press Sw.<br>Does the DRB display A/C H/L Press Sw ON?<br><br>Yes → Go To 9<br><br>No → Replace and program the ECM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 9    | Disconnect the A/C High Pressure Switch harness connector.<br>Turn the ignition on.<br>Connect one end of a jumper wire to ground and back probe the A/C Pressure Signal circuit at the A/C High Pressure Switch harness connector.<br>With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br>Read the A/C H/L Press Sw.<br>Does the DRB display A/C H/L Press Sw ON?<br><br>Yes → Go To 10<br><br>No → Repair the A/C Pressure Signal circuit for an open between the ECM and the A/C High Pressure Switch.<br>Perform ROAD TEST VERIFICATION - VER-2.                       | All           |
| 10   | Turn the ignition off.<br>Disconnect the A/C High Pressure Switch harness connector.<br>Measure the resistance of the A/C High Pressure Switch.<br>Is the Resistance below 10.0 ohms?<br><br>Yes → Go To 11<br><br>No → Replace the A/C High Pressure Switch.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 11   | Disconnect the A/C Low Pressure Switch harness connector.<br>Turn the ignition on.<br>Connect one end of a jumper wire to ground and the other end to the A/C Pressure Sense circuit at the A/C Low Pressure Switch harness connector.<br>With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br>Read the A/C H/L Press Sw.<br>Does the DRB display A/C H/L Press Sw ON?<br><br>Yes → Go To 12<br><br>No → Repair the A/C Pressure Sense circuit for an open between the A/C High Pressure Switch and the A/C Low Pressure Switch.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 12   | Turn the ignition off.<br>Disconnect the A/C Low Pressure Switch harness connector.<br>Measure the resistance of the A/C Low Pressure Switch.<br>Is the Resistance below 10.0 ohms?<br><br>Yes → Repair the ground circuit at the A/C Low Pressure Switch for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the A/C Low Pressure Switch.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

## \*CHECKING THE A/C SYSTEM — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 13   | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Turn the ignition on.<br/>                     With the DRB, select Engine, Bosch Controller then Inputs/Outputs.<br/>                     While reading the A/C Switch input, use a jumper wire to connect the A/C Switch Signal circuit to ground at the PCM harness connector.<br/>                     Does the DRB display A/C Switch ON?</p> <p>Yes → Replace and program the PCM in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 14</p> | All           |
| 14   | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance between ground and the A/C Switch Signal circuit.<br/>                     Is the resistance below 100.0 ohms?</p> <p>Yes → Repair the A/C Switch Signal circuit for a short to ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 15</p>  | All           |
| 15   | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the ECM harness connectors.<br/>                     Measure the resistance of the A/C Switch Signal circuit.<br/>                     Is the resistance below 10.0 ohms?</p> <p>Yes → Replace and program the ECM in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the A/C Switch Signal circuit for an open.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 16   | <p>Turn the ignition off.<br/>                     Disconnect the A/C Heater Control harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the A/C Select Switch Sense circuit.<br/>                     Is the voltage below 1.0 volt?</p> <p>Yes → Go To 17</p> <p>No → Repair the A/C Select Switch Sense circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 17   | <p>Turn the ignition off.<br/>                     Disconnect the A/C Heater Control harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Measure the resistance between ground and the A/C Select Switch Sense circuit.<br/>                     Is the resistance below 100.0 ohms?</p> <p>Yes → Repair the A/C Select Switch Sense circuit for a short to ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 18</p>   | All           |

**\*CHECKING THE A/C SYSTEM — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 18   | Turn the ignition off.<br>Disconnect the A/C Heater Control harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the A/C Select Switch Sense circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 19<br><br>No → Repair the A/C Select Switch Sense circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 19   | Turn the ignition off.<br>Disconnect the A/C Heater Control harness connectors.<br>Turn the ignition on.<br>With the DRB, select Engine, JTEC then Inputs/Outputs<br>Start the Engine.<br>Connect a jumper wire between the A/C Select Switch Sense circuit and ground at the A/C Heater Control harness connector.<br>With the DRB, read the A/C Select Switch.<br>Does the DRB display A/C Select Switch YES?<br><br>Yes → Refer to symptom list for problems related to A/C Select Switch operation.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace and program the PCM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE ACCELERATOR PEDAL POSITION SENSOR CALIBRATION**

| POSSIBLE CAUSES                                     |
|---|
| APP SENSOR<br>APP SENSOR - IDLE<br>APP SENSOR - WOT |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: Ensure the Accelerator pedal is free from any restriction or binding before continuing.</b><br/>                     Turn the ignition on.<br/>                     While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM.<br/> <b>NOTE: The accelerator pedal must be released for this step.</b><br/>                     Is the voltage below 1.0 volt?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 2    | <p>Turn the ignition on.<br/>                     While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM.<br/>                     Monitor the voltmeter while slowly pressing the accelerator pedal completely down.<br/>                     Did the voltage increase smoothly with pedal travel?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 3    | <p>Turn the ignition on.<br/>                     While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM.<br/>                     Press the accelerator pedal completely down.<br/>                     Is the voltage above 3.5 volts?</p> <p style="padding-left: 40px;">Yes → Test Complete.</p> <p style="padding-left: 40px;">No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |



**Symptom:**

**\*CHECKING THE CHECK ENGINE LAMP OPERATION**

| POSSIBLE CAUSES   |
|---|
| ACTUATE CHECK ENGINE LAMP<br>CHECK ENGINE CONTROL CIRCUIT SHORTED TO VOLTAGE<br>CHECK ENGINE LAMP BULB<br>ENGINE CONTROL MODULE<br>INSTRUMENT CLUSTER<br>INSTRUMENT CLUSTER - LAMP NEVER ON<br>POWERTRAIN CONTROL MODULE - CONTROL SHORTED TO VOLTAGE<br>POWERTRAIN CONTROL MODULE - INTERNAL FAULT<br>CHECK ENGINE LAMP CONTROL CIRCUIT SHORTED TO GROUND<br>CHECK ENGINE LAMP CONTROL CIRCUIT OPEN<br>POWERTRAIN CONTROL MODULE - CONTROL SHORTED TO GROUND |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on and observe the Check Engine Lamp.<br>Did the Check Engine Lamp illuminate for approximately 2 seconds then go out for a bulb check?<br><br>Yes → Go To 2<br><br>No → Go To 10  | All           |
| 2    | Turn the ignition on.<br>With the DRB, actuate the Diag/Glow Plug Lamp.<br>Did the Check Engine Lamp illuminate?<br><br>Yes → The Check Engine Lamp System is working properly.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3                               | All           |
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Measure the voltage of the Check Engine Lamp Control circuit.<br>Is the voltage between 4.8 and 5.5 volts?<br><br>Yes → Go To 4<br><br>Above<br>Go To 6<br><br>Below<br>Go To 7 | All           |

**\*CHECKING THE CHECK ENGINE LAMP OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Connect a jumper wire between the Check Engine Lamp Control circuit and ground.<br/>                     Did the Check Engine Lamp illuminate?</p> <p>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 5</p>   | All           |
| 5    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br/>                     Turn the ignition on.<br/>                     Connect a jumper wire between the Check Engine Lamp Control circuit and ground.<br/>                     With the DRB, select Body from the System menu, then Monitor CCD Bus Info.<br/>                     Does the DRB display Engine Lamp Status On?</p> <p>Yes → Replace the Instrument Cluster in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 6    | <p>Turn the ignition off.<br/>                     Disconnect the ECM harness connectors.<br/>                     Disconnect the PCM harness connectors.<br/>                     Remove the ASD/Diesel Power Relay from the PDC.<br/>                     Connect a jumper wire between ASD/Diesel Power Relay connector cavities 30 and 87 (in PDC).<br/>                     Turn the ignition on.<br/>                     Measure the voltage of the Check Engine Lamp Control circuit.<br/>                     Is the voltage below 0.5 volt?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Repair the Check Engine Lamp Control circuit for a short to voltage.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**\*CHECKING THE CHECK ENGINE LAMP OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Check Engine Lamp Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 8<br><br>No → Repair the Check Engine Lamp Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 8    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Check Engine Lamp Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 9<br><br>No → Repair the Check Engine Lamp Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                            | All           |
| 9    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 10   | Turn the ignition off.<br>Remove and inspect the Check Engine Lamp bulb from the Instrument Cluster.<br>Is the bulb OK?<br><br>Yes → Replace the Instrument Cluster in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Check Engine Lamp bulb.<br>Perform ROAD TEST VERIFICATION - VER-2.                                | All           |

**Symptom:**

**\*CHECKING THE ECM AND PCM POWER AND GROUND CIRCUITS**

| POSSIBLE CAUSES                           |
|---|
| ASD RELAY OUTPUT CIRCUIT OPEN AT ECM      |
| ASD RELAY OUTPUT OPEN AT PCM              |
| ECM GROUND CIRCUIT OPEN                   |
| FUSED ASD BATTERY SUPPLY CIRCUIT OPEN     |
| FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN |
| PCM BATTERY SUPPLY CIRCUIT OPEN           |
| PCM GROUND CIRCUIT OPEN                   |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Using a 12-volt test light connected to 12-volts, check both of the ECM ground circuits in ECM harness connector C1 cavities 1 and 27.<br>Did the test light illuminate for both cavities?<br><br>Yes → Go To 2<br><br>No → Repair the ECM Ground circuit(s) for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.             | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fused Ignition Switch Output circuit in ECM harness connector C1 cavity 47.<br>Is the test light on?<br><br>Yes → Go To 3<br><br>No → Repair the Fused Ignition Switch Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 3    | Turn the ignition off.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Using a 12-volt test light connected to ground, check the Fused ASD Battery Supply circuit in ASD/Diesel Power Relay connector cavity 30.<br>Is the test light on?<br><br>Yes → Go To 4<br><br>No → Repair the Fused ASD Battery Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                 | All           |

**\*CHECKING THE ECM AND PCM POWER AND GROUND CIRCUITS —**  
**Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between cavity 30 and cavity 87 in the ASD/Diesel Power Relay connector.<br>Using a 12-volt test light connected to ground, check the ASD Relay Output circuit in ECM harness connector C1 cavities 2 and 28.<br>Did the test light illuminate for both circuits?<br><br>Yes → Go To 5<br><br>No → Repair the ASD Relay Output circuit(s) for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                 | All           |
| 5    | Disconnect the PCM harness connectors.<br>Using a 12-volt test light connected to ground, check the PCM Battery Supply circuit in PCM harness connector C1 cavity 22.<br>Is the test light on?<br><br>Yes → Go To 6<br><br>No → Repair the PCM Battery Supply circuit(s) for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | Disconnect the PCM harness connectors.<br>Using a 12-volt test light connected to 12-volts, check both PCM Ground circuits in PCM harness connector C1 cavities 31 and 32.<br>Did the test light illuminate for both cavities?<br><br>Yes → Go To 7<br><br>No → Repair the PCM Ground circuit(s) for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | Turn the ignition off.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Disconnect the PCM harness connectors.<br>Connect a jumper wire between cavity 30 and cavity 87 of the ASD/Diesel Power Relay connector.<br>Using a 12-volt test light connected to ground, check the ASD Relay Output circuit in PCM harness connectors C1 cavity 2 and C3 cavity 12.<br>Did the test light illuminate for both circuits?<br><br>Yes → Test Complete.<br><br>No → Repair the ASD Relay Output circuit(s) for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE EGR SYSTEM**

| POSSIBLE CAUSES   |
|---|
| ASD RELAY OUTPUT CIRCUIT OPEN<br>EGR VALVE<br>GROUND CIRCUIT OPEN<br>VACUUM SUPPLY HOSE |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Disconnect the Vacuum Supply Hose at the EGR solenoid.<br>Connect a vacuum gauge to the Vacuum Supply Hose.<br>Start the engine and allow the engine to idle.<br>Is the vacuum above 10 inches of mercury at idle?<br><br>Yes → Go To 2<br><br>No → Repair leaking or restricted Vacuum Supply Hose or faulty Vacuum Supply Pump.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 2    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the ASD Relay Output circuit at the EGR Solenoid harness connector.<br>Is the test light on?<br><br>Yes → Go To 3<br><br>No → Repair the ASD Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 3    | Turn the ignition off.<br>Disconnect the EGR Solenoid harness connector.<br>Using a 12-volt test light connected to 12-volts, check the Ground circuit in the EGR Solenoid harness connector.<br>Is the test light on?<br><br>Yes → Go To 4<br><br>No → Repair the Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 4    | <b>NOTE: The Vacuum Output Hose must not be leaking or restricted for the result of this test to be valid.</b><br>Turn the ignition off.<br>Disconnect the Vacuum Supply and Vacuum Output Hoses in the EGR Solenoid vacuum connector.<br>Connect the Vacuum Supply Hose to the Vacuum Output Hose.<br>Test drive the vehicle and observe vehicle performance.<br>Is there a power reduction on vehicle acceleration?<br><br>Yes → Test Complete.<br><br>No → Replace the EGR Valve.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE ELECTRIC RADIATOR FAN OPERATION**

| POSSIBLE CAUSES  |
|--|
| ACTUATE THE RADIATOR FAN RELAY WITH THE DRB<br>CHECK FOR FAN CONTROL DTCS<br>RADIATOR FAN RELAY - SHORTED<br>RADIATOR FAN RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE<br>FUSED B+ CIRCUIT OPEN<br>SUBSTITUTE RADIATOR FAN RELAY<br>RADIATOR FAN RELAY OUTPUT CIRCUIT OPEN<br>RADIATOR FAN GROUND CIRCUIT OPEN<br>RADIATOR FAN - OPEN |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for ECM Fan Control DTCS.<br>Are any Fan Control DTCS present?<br><br>Yes → Refer to symptom list for problems related to the Fan Control DTCS.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2  | All           |
| 2    | Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay and observe the Radiator Fan.<br>Did the Radiator Fan cycle on and off?<br><br>Yes → The test is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>Radiator Fan inoperative<br>Go To 3<br><br>Radiator Fan always on<br>Go To 8      | All           |
| 3    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Using a 12-volt test light connected to ground, check the Fused B+ circuit.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 4<br><br>No → Repair the Fused B+ circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**\*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Install a substitute relay in place of the Radiator Fan Relay.<br>Turn the ignition on.<br>With the DRB, actuate the Radiator Fan Relay.<br>Does the Radiator Fan cycle on and off?<br><br>Yes → Replace the Radiator Fan Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5   | All           |
| 5    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Disconnect the Radiator Fan harness connector.<br>Connect a fused jumper wire between the Fused B+ circuit cavity and the Radiator Fan Relay Output circuit cavity in the Radiator Fan Relay connector.<br>Using a 12-volt test light connected to ground, check the Radiator Fan Relay Output circuit in the Radiator Fan harness connector.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 6<br><br>No → Repair the Radiator Fan Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 6    | Turn the ignition off.<br>Disconnect the Radiator Fan harness connector.<br>Using a 12-volt test light connected to 12-volts, check the Radiator Fan Ground circuit.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 7<br><br>No → Repair the Radiator Fan Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace the Radiator Fan.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 8    | Turn the ignition off.<br>Remove the Radiator Fan Relay from the PDC.<br>Disconnect the Radiator Fan harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Radiator Fan Relay Output circuit.<br>Is the voltage above 0.5 volt?<br><br>Yes → Repair the Radiator Fan Relay Output circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Radiator Fan Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |



**Symptom:****\*CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR CALIBRATION****POSSIBLE CAUSES**

ECT SENSOR - COLD

ECT SENSOR - HOT

| <b>TEST</b> | <b>ACTION</b>  | <b>APPLICABILITY</b> |
|-------------|--|----------------------|
| 1           | <p><b>NOTE: The thermostat must be operating correctly for this test to be valid.</b><br/>           With the DRB, read and note the engine coolant temperature.<br/>           Using a temperature probe, measure the engine block temperature near the ECT Sensor.<br/>           Are the readings within 7°C (13°F) of each other?</p> <p>Yes → Go To 2</p> <p>No → Replace the Engine Coolant Temperature Sensor.<br/>           Perform ROAD TEST VERIFICATION - VER-2.</p>   | All                  |
| 2           | <p><b>NOTE: The thermostat must be operating correctly for this test to be valid.</b><br/>           Start the engine.<br/>           Using a temperature probe, measure the engine block temperature near the ECT Sensor. When the engine temperature reaches 75°C (180°F), use the DRB and read the engine coolant temperature.<br/>           Are the readings within 7°C (13°F) of each other?</p> <p>Yes → Test Complete.</p> <p>No → Replace the Engine Coolant Temperature Sensor.<br/>           Perform ROAD TEST VERIFICATION - VER-2.</p> | All                  |

**Symptom:**

**\*CHECKING THE ENGINE MECHANICAL SYSTEMS**

| POSSIBLE CAUSES                    |
|------------------------------------|
| CHECKING ENGINE MECHANICAL SYSTEMS |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: The following items should be checked as a possible cause of a Driveability or No-Start problem.</b></p> <p>Engine Valve Timing - must be within specification<br/>                     Engine Compression - must be within specifications<br/>                     Camshaft Lobes - check for abnormal wear<br/>                     Engine Speed Sensor Pick-Up - check the flywheel slots for debris and deterioration<br/>                     Engine Exhaust System - must be free of any restriction<br/>                     Engine Drive Sprocket - must be properly positioned<br/>                     Power Brake Booster - must be free of any vacuum leaks<br/>                     Fuel - must be free of contamination<br/>                     Fuel Injector - must not be plugged or restricted<br/>                     Fuel Injection Pump - must be properly timed</p> <p><b>NOTE: Check for any Technical Service Bulletins that may relate to the problem.</b></p> <p>Are there any problems evident?</p> <p style="padding-left: 40px;">Yes → Repair as necessary.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | All           |

**Symptom:**

**\*CHECKING THE FUEL COMPUTER**

| POSSIBLE CAUSES  |
|--|
| ECM - FUEL COMPUTER OUTPUT CIRCUIT<br>FUEL COMP OUPUT CIRCUIT SHORTED TO VOLTAGE<br>FUEL COMPUTER OUTPUT CIRCUIT OPEN<br>FUEL COMPUTER OUTPUT CIRCUIT SHORT TO GROUND<br>OVERHEAD CONSOLE<br>PCM<br>PCM - FUEL COMPUTER OUTPUT CIRCUIT |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Measure the voltage of the Fuel Computer Output circuit at the ECM harness connector.<br>Is the voltage between 4.5 and 5.5 volts?<br><br>Yes → Go To 2<br><br>Below 4.5 volts<br>Go To 4<br><br>Above 5.5 volts<br>Repair the Fuel Computer Output circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Connect a jumper wire between ground and ECM harness connector C1 cavity 18 while observing the Overhead Fuel Computer.<br>Did the Overhead Fuel Computer status change?<br><br>Yes → Replace the ECM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All           |
| 3    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Connect one end of a jumper wire to ECM harness connector C1 cavity 18 while observing the Overhead Fuel Computer.<br>With the DRB, select Body System and monitor PCI Bus Info while connecting and disconnecting the other end of the jumper wire to ground.<br>Does the DRB display a change in Fuel Computer Status?<br><br>Yes → Replace the Overhead Console in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**\*CHECKING THE FUEL COMPUTER — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Disconnect the PCM and ECM harness connectors.<br>Measure the resistance of the Fuel Computer Output circuit between the ECM and PCM harness connectors.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 5<br><br>No → Repair the Fuel Computer Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | Turn the ignition off.<br>Disconnect the PCM and ECM harness connectors.<br>Measure the resistance between ground and the Fuel Computer Output circuit.<br>Is the resistance below 100.0 ohms?<br><br>Yes → Repair the Fuel Computer Output circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the PCM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:****\*CHECKING THE FUEL HEATER OPERATION****POSSIBLE CAUSES**

FUEL HEATER RELAY  
 FUEL HEATER RELAY OUTPUT CIRCUIT OPEN  
 FUEL HEATER RESISTANCE  
 FUSED B+ CIRCUIT OPEN  
 GROUND CIRCUIT OPEN  
 IGNITION SWITCH OUTPUT CIRCUIT OPEN  
 RELAY GROUND CIRCUIT OPEN

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition off.<br>Disconnect the Fuel Heater harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fuel Heater Relay Output circuit at the Fuel Heater harness connector.<br>Is the test light on?<br><br>Yes → Go To 2<br>No → Go To 4  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the Fuel Heater harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to 12-volts, check the Ground circuit at the Fuel Heater harness connector.<br>Is the test light on?<br><br>Yes → Go To 3<br>No → Repair the Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All                  |
| 3           | Turn the ignition off.<br>Disconnect the Fuel Heater harness connector.<br>Turn the ignition on.<br>With the DRB, read the Fuel Temperature Sensor.<br><b>NOTE: The Fuel temperature must be below 4.5°C (40°F).</b><br>Measure the resistance of the Fuel Heater.<br>Is the resistance between 0.7 and 2.0 ohms?<br><br>Yes → Test Complete.<br>No → Replace the Fuel Heater.<br>Perform ROAD TEST VERIFICATION - VER-2. | All                  |

**\*CHECKING THE FUEL HEATER OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Install a substitute relay in place of the Fuel Heater Relay.<br>Disconnect the Fuel Heater harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fuel Heater Relay Output circuit.<br>Is the test light on?<br>Yes → Replace the initial Fuel Heater Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br>No → Go To 5                               | All           |
| 5    | Turn the ignition off.<br>Remove the Fuel Heater Relay.<br>Using a 12-volt test light connected to ground, check the Fused B+ circuit.<br>Is the test light on?<br>Yes → Go To 6<br>No → Repair the Fused B+ circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 6    | Turn the ignition off.<br>Remove the Fuel Heater Relay.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Ignition Switch Output circuit.<br>Is the test light on?<br>Yes → Go To 7<br>No → Repair the Ignition Switch Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 7    | Turn the ignition off.<br>Remove the Fuel Heater Relay.<br>Turn the ignition on.<br>Using a 12-volt test light connected to 12-volts, check the Ground circuit at the Fuel Heater Relay connector.<br>Is the test light on?<br>Yes → Repair the Fuel Heater Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.<br>No → Repair the Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE FUEL INJECTION PUMP**

**POSSIBLE CAUSES**

CHECKING THE FUEL INJECTION PUMP

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: This test should be performed before replacing the ECM during fault code diagnostics.</b></p> <p><b>NOTE: This test checks for shorted circuits internal to the Fuel Injection Pump assembly.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the Fuel Injection Pump 10-way harness connector.</p> <p><b>NOTE: The following resistance measurements are performed on the Fuel Injection Pump 10-way harness connector (pump side). Resistance on these measurements should be greater than 100.0 ohms each.</b></p> <p>Measure the resistance between cavity 1 and cavities 4, 5, 6, 7, 8, 9, 10 and case ground.</p> <p>Measure the resistance between cavity 4 and cavities 5, 6, 8, 9, 10 and case ground.</p> <p>Measure the resistance between cavity 5 and cavities 6, 7, 8 and case ground.</p> <p>Measure the resistance between cavity 6 and cavities 7, 8, 9 and 10.</p> <p>Measure the resistance between cavity 7 and cavities 8, 9, 10 and case ground.</p> <p>Is the resistance below 100.0 ohms for any of the measurements?</p> <p>Yes → Replace the Fuel Injection Pump Assembly in accordance with the Service Information.<br/>Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Test Complete.</p> | All           |

**Symptom:**

**\*CHECKING THE FUEL LEVEL GAUGE OPERATION**

| POSSIBLE CAUSES   |
|---|
| FUEL LEVEL SENSOR   |
| FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN                     |
| FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND        |
| FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND |
| INSTRUMENT CLUSTER  |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, perform the Instrument Cluster Self Test.<br><b>NOTE: The 5 calibration points are: #1 Empty Stop, #2 Empty, #3 1/2 Full, #4 Full, #5 Full Stop.</b><br>Observe the gauge during the Self Test and compare the readings with the readings described in the NOTE.<br><b>NOTE: With the DRB ensure there are no PCM Fuel Level Sensor DTCs. If there are DTCs, they must be repaired before continuing.</b><br>Did the gauge reach the proper calibration points?<br><br>Yes → Go To 2<br><br>No → Replace the Instrument Cluster.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 2    | Turn the ignition off.<br>Disconnect the Fuel Level Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Fuel Level Sensor Signal circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 3<br><br>No → Repair the Fuel Level Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 3    | Turn the ignition off.<br>Disconnect the Fuel Level Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the Fuel Level Sensor Signal circuit.<br>Is the resistance below 1000.0 ohms?<br><br>Yes → Repair the Fuel Level Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4  | All           |



**\*CHECKING THE FUEL LEVEL GAUGE OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the Fuel Level Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between Sensor Ground and the Fuel Level Sensor Signal circuit.<br>Is the resistance below 1000.0 ohms?<br><br>Yes → Repair the Fuel Level Sensor Signal circuit for a short to Sensor Ground.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5   | All           |
| 5    | Turn the ignition off.<br>Completely drain the fuel tank. Refer to Service Information for proper procedure.<br><b>NOTE: It is necessary to know the fuel tank capacity for this test.</b><br>Fill the fuel tank to 1/4 of its capacity then turn the ignition on and note the instrument cluster fuel gauge reading.<br>Turn the ignition off.<br>Fill the fuel tank to 3/4 of its capacity then turn the ignition on and note the instrument cluster fuel gauge reading.<br>Does the Fuel Gauge read the fuel tank levels accurately?<br><br>Yes → Test Complete.<br><br>No → Replace the Fuel Level Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE FUEL TEMPERATURE SENSOR CALIBRATION**

| POSSIBLE CAUSES                |
|--------------------------------|
| FUEL TEMPERATURE SENSOR - COLD |
| FUEL TEMPERATURE SENSOR - HOT  |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Disconnect the Fuel Heater harness connector.<br>With the DRB, monitor the engine coolant temperature and fuel temperature.<br>Start and idle the engine until engine temperature reaches 70°C (160°F).<br><b>NOTE: If the engine temperature is above 70°C (160°F), allow the engine to cool down to 70°C (160°F).</b><br>Is the fuel temperature between 20°C (70°F) and 50°C (120°F)?<br><br>Yes → Go To 2<br><br>No → Replace the Fuel Injection Pump Assembly in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 2    | Disconnect the Fuel Heater harness connector.<br>With the DRB, monitor the engine coolant temperature and fuel temperature.<br>Start and idle the engine until engine temperature reaches 70°C (160°F).<br><b>NOTE: If the engine temperature is above 70°C (160°F), allow the engine to cool down to 70°C (160°F).</b><br>Start the engine and allow engine to reach operating temperature of 90°C (195°F).<br>Does the Fuel Temperature increase smoothly to 40-60°C (100-140°F)?<br><br>Yes → Test Complete.<br><br>No → Replace the Fuel Injection Pump Assembly in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE GLOW PLUG LAMP OPERATION**

| POSSIBLE CAUSES                                   |
|---|
| ACTUATE THE GLOW PLUG LAMP WITH THE DRB           |
| MESSAGE CENTER - LAMP NEVER ON                    |
| MESSAGE CENTER - LAMP ON CONTINUOUSLY             |
| ENGINE CONTROL MODULE - FAILS TO ACTIVATE LAMP    |
| ENGINE CONTROL MODULE - LAMP ON CONTINUOUSLY      |
| GLOW PLUG LAMP CONTROL CIRCUIT SHORTED TO GROUND  |
| GLOW PLUG LAMP CONTROL CIRCUIT SHORTED TO VOLTAGE |
| GLOW PLUG LAMP CONTROL CIRCUIT OPEN               |
| MESSAGE CENTER IGNITION FEED OPEN                 |
| GLOW PLUG LAMP BULB                               |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on and observe the Glow Plug Lamp.<br>Did the Glow Plug Lamp illuminate and stay on longer than 20 seconds?<br><br>Yes → Go To 2<br><br>No → Go To 4  | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Is the Glow Plug Lamp on?<br><br>Yes → Go To 3<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Glow Plug Lamp Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Glow Plug Lamp Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 4    | Turn the ignition on.<br>With the DRB, actuate the Glow Plug Lamp.<br>Does the Glow Plug Lamp cycle on and off?<br><br>Yes → The Glow Plug Lamp System is operating properly. Test complete.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5   | All           |

**\*CHECKING THE GLOW PLUG LAMP OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 5    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Connect a jumper wire between ground and the Glow Plug Lamp Control circuit in the ECM C1 harness connector.<br>Is the Glow Plug Lamp on?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 6  | All           |
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Message Center harness connector.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay connector cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage of the Glow Plug Lamp Control circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Go To 7<br><br>No → Repair the Glow Plug Lamp Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 7    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Message Center harness connector.<br>Measure the resistance of the Glow Plug Lamp Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 8<br><br>No → Repair the Glow Plug Lamp Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 8    | Turn the ignition off.<br>Disconnect the Message Center harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Ignition Feed circuit.<br>Is the voltage above 10.0 volts?<br><br>Yes → Go To 9<br><br>No → Repair the Ignition Feed circuit to the Message Center for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 9    | Turn the ignition off.<br>Remove and inspect the Glow Plug Lamp bulb from the Message Center.<br>Is the bulb OK?<br><br>Yes → Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Glow Plug Lamp bulb.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**Symptom:**

**\*CHECKING THE GLOW PLUG OPERATION**

| POSSIBLE CAUSES  |
|--|
| CHECKING THE GLOW PLUGS<br>FUSED B+ CIRCUIT OPEN<br>GLOW PLUG RELAY<br>GLOW PLUG RELAY OUTPUT CIRCUIT OPEN |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition off.<br>Disconnect all four Glow Plug connectors.<br>Turn the ignition on.<br>With the DRB, actuate Glow Relay #1.<br>Using a 12-volt test light connected to ground, probe each Glow Plug connector.<br>Does the test light cycle on and off for each Glow Plug connector during actuator test?<br><br>Yes → Go To 2<br><br>No → Go To 3  | All           |
| 2    | Refer to the Service Information and perform the Glow Plug Test.<br>Are all the Glow Plugs operating properly?<br><br>Yes → Test Complete.<br><br>No → Replace the Glow Plug(s) as necessary in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 3    | Remove the Glow Plug Relay from the PDC.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Glow Plug Relay connector in the PDC.<br>Is the test light on?<br><br>Yes → Go To 4<br><br>No → Repair the Fused B+ circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 4    | Turn the ignition off.<br>Disconnect all the Glow Plug connectors.<br>Remove the Glow Plug Relay from the PDC.<br>Connect a jumper wire across the Glow Plug Relay connector cavities 30 and 87.<br>Using a 12-volt test light connected to ground, check each Glow Plug Relay Output circuit at each Glow Plug connector.<br>Is the test light on at each of the Glow Plug connectors?<br><br>Yes → Replace the Glow Plug Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Glow Plug Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE LOW COOLANT LAMP OPERATION**

| POSSIBLE CAUSES  |
|--|
| CHECK THE LOW COOLANT SWITCH                               |
| POWERTRAIN CONTROL MODULE - CONTROL OPEN                   |
| POWERTRAIN CONTROL MODULE - CONTROL SHORTED TO GROUND      |
| LOW COOLANT LAMP CONTROL SHORTED TO VOLTAGE                |
| LOW COOLANT SWITCH SIGNAL CIRCUIT OPEN                     |
| LOW COOLANT SWITCH SIGNAL CIRCUIT SHORTED TO GROUND        |
| LOW COOLANT LAMP CONTROL CIRCUIT SHORTED TO GROUND         |
| LOW COOLANT SWITCH - OPEN                                  |
| LOW COOLANT SWITCH SIGNAL CIRCUIT SHORTED TO SWITCH GROUND |
| LOW COOLANT LAMP CONTROL CIRCUIT OPEN                      |
| LOW COOLANT SWITCH - INTERNAL SHORT                        |
| POWERTRAIN CONTROL MODULE - SIGNAL OPEN                    |
| LOW COOLANT LAMP BULB                                      |
| POWERTRAIN CONTROL MODULE - SIGNAL SHORT TO GROUND         |
| MESSAGE CENTER   |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: Ensure the engine coolant is at the proper level before continuing.</b><br/>                     Turn the ignition on and observe the Low Coolant Lamp.<br/>                     Select the outcome of this operation.</p> <p style="padding-left: 40px;">Lamp on for 2 seconds, then off<br/>                     Go To 2</p> <p style="padding-left: 40px;">Lamp on continuously<br/>                     Go To 7</p> <p style="padding-left: 40px;">Lamp inoperative<br/>                     Go To 12</p> | All           |
| 2    | <p>Turn the ignition off.<br/>                     Remove the coolant from the coolant reservoir.<br/>                     Turn the ignition on.<br/>                     Did the Low Coolant Lamp illuminate and stay on?</p> <p style="padding-left: 40px;">Yes → The Low Coolant Lamp System is working properly.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 3</p>   | All           |

**\*CHECKING THE LOW COOLANT LAMP OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Low Coolant Switch harness connector.<br>Measure the resistance between ground and the Low Coolant Switch Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 4<br><br>No → Repair the Low Coolant Switch Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.                                 | All           |
| 4    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Low Coolant Switch harness connector.<br>Measure the resistance between the Low Coolant Switch Signal circuit and Switch Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Low Coolant Switch Signal and Switch Ground circuit for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 5    | Turn the ignition off.<br>Disconnect the Low Coolant Switch harness connector.<br>Turn the ignition on and wait 30 seconds.<br>Is the Low Coolant Lamp on?<br><br>Yes → Replace the Low Coolant Switch.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 6   | All           |
| 6    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 7    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Turn the ignition on and observe the Low Coolant Lamp.<br>Did the Low Coolant Lamp illuminate and stay on continuously?<br><br>Yes → Go To 8<br><br>No → Go To 9   | All           |

**\*CHECKING THE LOW COOLANT LAMP OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Message Center harness connector.<br>Measure the resistance between ground and the Low Coolant Lamp Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Low Coolant Lamp Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 9    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Low Coolant Switch harness connector.<br>Measure the resistance of the Low Coolant Switch Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 10<br><br>No → Repair the Low Coolant Switch Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 10   | <b>NOTE: Ensure the PCM harness connectors are connected.</b><br>Disconnect the Low Coolant Switch harness connector.<br>Connect a high impedance test light between the Low Coolant Switch harness connector cavities.<br>Turn the ignition on.<br>After 30 seconds, is the Low Coolant Lamp on steady?<br><br>Yes → Go To 11<br><br>No → Replace the Low Coolant Switch.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 11   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 12   | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Message Center harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Low Coolant Lamp Control circuit.<br>Is the voltage above 0.5 volt?<br><br>Yes → Repair the Low Coolant Lamp Control circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 13  | All           |



**\*CHECKING THE LOW COOLANT LAMP OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 13   | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Connect a jumper wire between the Low Coolant Lamp Control circuit and ground.<br>Turn the ignition on.<br>Is the Low Coolant Lamp illuminated?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 14 | All           |
| 14   | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Message Center harness connector.<br>Measure the resistance of the Low Coolant Lamp Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 15<br><br>No → Repair the Low Coolant Lamp Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                             | All           |
| 15   | Turn the ignition off.<br>Remove the Message Center.<br>Remove and inspect the Low Coolant Lamp bulb.<br>Is the bulb OK?<br><br>Yes → Go To 16<br><br>No → Replace the Low Coolant Lamp bulb.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 16   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**Symptom:**

**\*CHECKING THE OIL PRESSURE GAUGE OPERATION**

| POSSIBLE CAUSES  |
|--|
| CHECK FOR OTHER DTCS   |
| POWERTRAIN CONTROL MODULE                                    |
| POWERTRAIN CONTROL MODULE - SENSOR GROUND SHORTED TO VOLTAGE |
| INSTRUMENT CLUSTER   |
| CHECK ENGINE OIL PRESSURE WITH EXTERNAL GAUGE                |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND                      |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND               |
| 5-VOLT SUPPLY CIRCUIT OPEN                                   |
| ENGINE OIL PRESSURE SENSOR                                   |
| POWERTRAIN CONTROL MODULE - 5-VOLT SUPPLY CIRCUIT LOW        |
| SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE                     |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, check for Oil Pressure Sensor related DTCs.<br>Are any Oil Pressure Sensor DTCs present?<br><br>Yes → Refer to symptom list for problems related to Oil Pressure Sensor DTCs.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 2  | All           |
| 2    | <b>CAUTION: Ensure the engine oil is at the proper level before proceeding.</b><br>Start the engine.<br>With the DRB in Sensors, read the Oil Pressure Sensor voltage.<br>Is the voltage between 1.0 and 4.0 volts?<br><br>Yes → Go To 3<br>No → Go To 4   | All           |
| 3    | Turn the ignition off, wait 30 seconds, then turn the ignition on.<br>With the DRB, select BODY from the SYSTEM menu, then select ELECTRO/MECH CLUSTER (MIC), ACTUATOR TESTS and SELF TEST.<br>Perform the Instrument Cluster Self Test.<br>Observe the Oil Pressure Gauge.<br><b>NOTE: The Oil Pressure Gauge should stop at 0 Bar (0 PSI), 3.0 Bar (40 PSI), 5.0 Bar (80 PSI) and 8.3 Bar (120 PSI).</b><br>Did the gauge reach the proper calibration points?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Instrument Cluster in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**\*CHECKING THE OIL PRESSURE GAUGE OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | Turn the ignition off.<br>Connect a 8.3 Bar (120 PSI) oil pressure gauge to the engine.<br>Start the engine.<br>Observe the mechanical oil pressure gauge.<br>Is the engine oiling system functioning properly?<br><br>Yes → Go To 5<br><br>No → Repair the engine oiling system in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 5    | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.<br>Is the voltage between 4.8 and 5.5 volts?<br><br>Yes → Go To 6<br><br>No → Go To 8   | All           |
| 6    | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Measure the voltage on the Sensor Ground circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Replace the Engine Oil Pressure Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 7  | All           |
| 7    | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Turn the ignition on.<br>Measure the voltage of the Sensor Ground circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Sensor Ground circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 8    | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 9<br><br>No → Repair the 5-volt Supply circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**\*CHECKING THE OIL PRESSURE GAUGE OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 9    | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Engine Oil Pressure Sensor harness connector.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 10<br><br>No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 10   | Turn the ignition off.<br>Disconnect the Engine Oil Pressure Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the 5-volt Supply circuit between the Engine Oil Pressure Sensor harness connector and the PCM C1 harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 11<br><br>No → Repair the 5-volt Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                            | All           |
| 11   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**\*CHECKING THE SPEEDOMETER OPERATION**

| POSSIBLE CAUSES   |
|---|
| CHECK FOR VEHICLE SPEED SENSOR DTCS                                   |
| CHECK GAUGES AND OTHER LAMPS AT KEY ON                                |
| COMPARE THE DRB VEHICLE SPEED WITH THE SPEEDOMETER INSTRUMENT CLUSTER |
| POWERTRAIN CONTROL MODULE - 5-VOLT OPEN                               |
| POWERTRAIN CONTROL MODULE - INTERNAL FAULT                            |
| 5-VOLT SUPPLY CIRCUIT OPEN  |
| CHECK VSS CIRCUITS FOR A SHORT TO VOLTAGE                             |
| CHECK VSS CIRCUITS FOR A SHORT TO GROUND                              |
| CHECK VSS CIRCUITS FOR A SHORT TOGETHER                               |
| CHECK VSS CIRCUITS FOR AN OPEN  |
| VEHICLE SPEED SENSOR  |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on and observe gauge and lamp operation during bulb check.<br>Did the gauges and other lamps operate properly during the bulb check?<br><br>Yes → Go To 2<br><br>No → Refer to symptom list for problems related to Vehicle Communication.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 2    | Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Are any Vehicle Speed Sensor DTCs present?<br><br>Yes → Refer to symptom list for problems related to Vehicle Speed Sensor DTCs before continuing.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3                              | All           |
| 3    | With the DRB, monitor Vehicle Speed in the PCM Sensor Display menu.<br>Test drive the vehicle and observe the Vehicle Speed on the DRB.<br>Does the Vehicle Speed reading on the DRB increase with vehicle speed?<br><br>Yes → Go To 4<br><br>No → Go To 6  | All           |

**\*CHECKING THE SPEEDOMETER OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | <p>With the DRB, monitor Vehicle Speed in the PCM Sensor Display menu. Test drive the vehicle and observe the Vehicle Speed on the DRB. Compare the DRB reading with the vehicle's Speedometer. Are the readings within 5 km/h (3 MPH) of each other?</p> <p>Yes → The Speedometer System is working properly. Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Go To 5</p>  | All           |
| 5    | <p>With the DRB, select BODY from the Systems menu, ELECTRO/MECH INSTRUMENT CLUSTER, MONITOR DISPLAY, then CCD BUS ENGINE INFO. Monitor Vehicle Speed while driving the vehicle. Does the Vehicle Speed Sensor reading increase with vehicle speed?</p> <p>Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 6    | <p>Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. <b>Check connectors - Clean/repair as necessary</b> Turn the ignition on. Measure the voltage of the 5-volt Supply circuit in the Vehicle Speed Sensor harness connector. Is the voltage above 4.5 volts?</p> <p>Yes → Go To 7</p> <p>No → Go To 12</p>  | All           |
| 7    | <p>Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the PCM harness connectors. Turn the ignition on. Disconnect the Vehicle Speed Sensor harness connector. Measure the voltage between ground and Vehicle Speed Sensor harness connector cavities 1, 2, and 3. Is the voltage below 1.0 volt on each circuit?</p> <p>Yes → Go To 8</p> <p>No → Repair the circuit that measured above 1.0 volt for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.</p>  | All           |

**\*CHECKING THE SPEEDOMETER OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 8    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Measure the resistance between ground and Vehicle Speed Sensor harness connector cavities 1, 2, and 3.<br>Is the resistance above 100 kohms on each circuit?<br><br>Yes → Go To 9<br><br>No → Repair the circuit that measured below 100 kohms for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 9    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Measure the resistance between VSS harness connector cavity 1 and cavities 2 and 3, then between cavity 2 and 3.<br>Is the resistance above 100 kohms for each measurement?<br><br>Yes → Go To 10<br><br>No → Repair the circuit that measured below 100 kohms for a short together.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 10   | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Measure the resistance of the Vehicle Speed Sensor Signal circuit.<br>Measure the resistance of the Vehicle Speed Sensor Ground circuit.<br>Is the resistance below 5.0 ohms for each measurement?<br><br>Yes → Go To 11<br><br>No → Repair the circuit that measured above 5.0 ohms for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 11   | If there are no possible causes remaining, view repair.<br><br>Yes → Replace the Vehicle Speed Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 12   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM C2 harness connector.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance of the 5-volt Supply circuit between the Vehicle Speed Sensor harness connector and the PCM C2 harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the 5-volt Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE TACHOMETER OPERATION**

| POSSIBLE CAUSES  |
|--|
| CHECK OPERATION OF OTHER GAUGES<br>INSTRUMENT CLUSTER - INOPERATIVE TACHOMETER<br>ENGINE CONTROL MODULE - INCORRECT SIGNAL PROCESSING<br>ENGINE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE<br>ENGINE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND<br>ENGINE SPEED SENSOR SIGNAL CIRCUIT OPEN<br>POWERTRAIN CONTROL MODULE |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>Observe gauge and bulb operation during cluster initialization check.<br>Do the other gauges operate properly?<br><br>Yes → Go To 2<br><br>No → Refer to symptom list for problems related to Instrument Cluster Communication.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 2    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay connector cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage on the Engine Speed Sensor Signal circuit.<br>Is the voltage between 4.0 and 6.0 volts?<br><br>Yes → Go To 3<br><br>No → Go To 5  | All           |
| 3    | Start the engine.<br>With the DRB, select Body from the Systems menu, Electro/Mech Cluster (MIC), Monitor Display, then PCI Bus Engine Info.<br>Monitor the DRB and Instrument Cluster Tachometer engine speed with the engine idling, then raise the engine speed to 2500 RPM and release it back to idle.<br><b>NOTE: The DRB engine speed should be approximately 850 RPM at idle, increase with actual engine speed and match the Instrument Cluster Tachometer reading.</b><br>Did the Instrument Cluster Tachometer perform as it should?<br><br>Yes → Go To 4<br><br>No → Replace the Instrument Cluster in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |



**\*CHECKING THE TACHOMETER OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br><b>NOTE: Ensure the ECM harness connectors are connected.</b><br>Start the engine.<br>With a voltmeter set to measure frequency (Hz), measure the frequency of the Engine Speed Sensor Signal circuit by back probing ECM C1 cavity 6.<br>Is the frequency between 26.0 and 34.0 Hz at idle?<br><br>Yes → Test Complete.<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 5    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Turn the ignition on.<br>Measure the voltage on the Engine Speed Sensor Signal circuit.<br>Is the voltage above 6.0 volts?<br><br>Yes → Repair the Engine Speed Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 6  | All           |
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the Engine Speed Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 7<br><br>No → Repair the Engine Speed Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 7    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Engine Speed Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 8<br><br>No → Go To 8   | All           |
| 8    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**\*CHECKING THE TURBOCHARGER BOOST PRESSURE SENSOR CALIBRATION**

**POSSIBLE CAUSES**

TURBOCHARGER BOOST PRESSURE SENSOR CALIBRATION

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, select Engine, Bosch then Sensors. Read the Boost Pressure Voltage.<br>Is the Boost Pressure Voltage between 1.70 and 1.95 volts?<br><br>Yes → Test Complete.<br><br>No → Replace the Turbocharger Boost Pressure Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**Symptom:**

**\*CHECKING THE TURBOCHARGER OPERATION**

| POSSIBLE CAUSES                  |
|----------------------------------|
| CHECKING THE TURBOCHARGER HOSES  |
| CHECKING THE WASTEGATE HOSE      |
| TURBOCHARGER                     |
| WASTEGATE ACTUATOR ARM OPERATION |
| WASTEGATE RESTRICTION            |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: The exhaust system must be free from any restriction to perform this test.</b><br/>                     Check the turbocharger outlet hose between the turbocharger and the intake manifold and the turbocharger inlet hose between the turbocharger and the air cleaner for loose connection, damage or restriction.<br/>                     Are any of these conditions evident?</p> <p style="padding-left: 40px;">Yes → Repair or replace as necessary.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 2</p>   | All           |
| 2    | <p>Check the wastegate actuator supply hose for loose connection, damage or restriction.<br/>                     Are any of these conditions evident?</p> <p style="padding-left: 40px;">Yes → Repair or replace as necessary.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Go To 3</p>  | All           |
| 3    | <p>Disconnect the Wastegate Actuator Supply Hose from the intake manifold.<br/>                     Using an air pressure regulator, connect an air hose to the disconnected end of the Wastegate Actuator Supply Hose.<br/>                     Start at 0 kPa (0 PSI) and slowly increase air pressure to 310 kPa (45 PSI) while monitoring the Wastegate Actuator Arm.<br/> <b>NOTE: The Wastegate Actuator Arm should remain closed until air pressure reaches 117-138 kPa (17-20 PSI) and fully open when the air pressure reaches 234-276 kPa (34-40 PSI).</b><br/>                     Did the Wastegate Actuator unseat and fully open as described?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Go To 5</p> | All           |

**\*CHECKING THE TURBOCHARGER OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p>Connect an air pressure gauge in-line with the Wastegate Actuator Supply Hose.<br/> <b>NOTE: Air pressure gauge must be rated above 276 kPa (40 PSI).</b><br/> <b>NOTE: The vehicle must be on flat level ground to perform this test. Failure to drive vehicle on flat level ground could result in incorrect boost pressure readings.</b><br/> <b>NOTE: FIRST GEAR - The following numbers are a comparison of Boost Pressure and Engine Speed (PSI/RPM) for the First Gear test: 21 kPa (3 PSI)/1500rpm - 28 kPa (4 PSI)/2000rpm - 48 kPa (7 PSI)/2500rpm - 69 kPa (10 PSI)/3000rpm - 90 kPa (13 PSI)/3500rpm</b><br/> <b>NOTE: SECOND GEAR - The following numbers are a comparison of Boost Pressure and Engine Speed (PSI/RPM) for the Second Gear test: 28 kPa (4 PSI)/1500rpm - 28 kPa (4 PSI)/2000rpm - 48 kPa (7 PSI)/2500rpm - 76 kPa (11 PSI)/3000rpm - 97 kPa (14 PSI)/3500rpm</b><br/>                     Test drive the vehicle in First gear. Increase engine RPM in 500 RPM increments slowly until engine speed is 3500 RPM. Note the Air Pressure Gauge reading at each 500 RPM increment. Repeat this step with the vehicle in Second Gear.<br/>                     Compare the two sets of readings to the appropriate GEAR NOTE.<br/>                     Do the Air Pressure Gauge readings match the values indicated in the NOTE [00b1] 14 kPa (2 PSI)?</p> <p>Yes → Test Complete.</p> <p>No → Replace the Turbocharger Assembly in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |
| 5    | <p>Remove the E-clip and disconnect the Wastegate Actuator Rod from the Wastegate Actuator Arm.<br/>                     Manually move the Wastegate Actuator Arm from closed to fully open.<br/>                     Does the Wastegate Actuator Arm move easily without restriction?</p> <p>Yes → Replace the Wastegate Actuator in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p>No → Clean Wastegate Actuator Arm or Wastegate Actuator Shaft as necessary. If OK, replace Turbocharger Assembly in accordance with the Service Information.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |

**Symptom:**

**\*CHECKING THE VEHICLE SPEED SIGNAL**

| <b>POSSIBLE CAUSES</b>   |  |
|--|--|
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND         |  |
| CHECK FOR VSS DTC  |  |
| POWERTRAIN CONTROL MODULE - 5-VOLT SUPPLY HIGH                       |  |
| POWERTRAIN CONTROL MODULE - AFTER 5-VOLT SUPPLY SHORTED TO VOLTAGE   |  |
| REPAIR THE 5-VOLT SUPPLY CIRCUIT AND CHECK THE PCM                   |  |
| 5-VOLT SUPPLY CIRCUIT OPEN   |  |
| POWERTRAIN CONTROL MODULE - SHORTED TO VOLTAGE                       |  |
| SPEEDOMETER PINION AND DRIVE TEETH DAMAGED                           |  |
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND                              |  |
| ENGINE CONTROL MODULE - SHORTED TO VOLTAGE                           |  |
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT OPEN                             |  |
| 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND                       |  |
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND                |  |
| VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE               |  |
| POWERTRAIN CONTROL MODULE - 5-VOLT SUPPLY CIRCUIT LOW                |  |
| SENSOR GROUND CIRCUIT OPEN   |  |
| VEHICLE SPEED SENSOR   |  |
| ENGINE CONTROL MODULE - INTERNAL FAULT                               |  |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | Turn the ignition on.<br>With the DRB, select Engine, JTEC then Sensors.<br>Note the Vehicle Speed reading on the DRB while test driving the vehicle.<br>Does the DRB display an accurate vehicle speed reading?<br><br>Yes → Test Complete.<br><br>No → Go To 2 | All           |
| 2    | Turn the ignition on.<br>With the DRB, read ECM DTCs.<br>Are any VSS DTCs present?<br><br>Yes → Refer to symptom list for problems related to VSS DTCs.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 3   | All           |

**\*CHECKING THE VEHICLE SPEED SIGNAL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Remove the Vehicle Speed Sensor.<br>Inspect the Speedometer Pinion and drive teeth on the Output Shaft (located in the transmission).<br>Are both components OK?<br>Yes → Go To 4<br>No → Repair or replace the Speedometer Pinion or internal components as necessary in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 4    | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Check connectors - Clean/repair as necessary</b><br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit in the Vehicle Speed Sensor harness connector.<br>Is the voltage between 4.8 and 5.5 volts?<br>Yes → Go To 5<br>Above<br>Go To 16<br>Below<br>Go To 18   | All           |
| 5    | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br>Yes → Go To 6<br>No → Go To 9  | All           |
| 6    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br>Yes → Go To 7<br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |

**\*CHECKING THE VEHICLE SPEED SIGNAL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 7    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage of the Vehicle Speed Sensor Signal circuit.<br>Is the voltage above 5.5 volts?<br><br>Yes → Go To 8<br><br>No → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 8    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Repair the Vehicle Speed Sensor Signal circuit for a short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 9    | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM C1 and C2 harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the Vehicle Speed Sensor Signal circuit and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 10<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to the 5-volt Supply circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 10   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance of the Vehicle Speed Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 11<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 11   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance between ground and the Vehicle Speed Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 12<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**\*CHECKING THE VEHICLE SPEED SIGNAL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 12   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>Note: Check connectors - Clean/repair as necessary.</b><br>Measure the resistance of the Vehicle Speed Sensor Ground circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 13<br><br>No → Repair the Vehicle Speed Sensor Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 13   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br><b>NOTE: Ensure the ECM and PCM harness connectors are connected before continuing.</b><br>Turn the ignition on.<br>Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the VSS harness connector.<br>With the DRB, monitor the VEHICLE SPEED while tapping the other end of the jumper wire to ground.<br>Does the DRB display km/h (MPH) greater than 0?<br><br>Yes → Replace the Vehicle Speed Sensor.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 14 | All           |
| 14   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the Vehicle Speed Sensor Signal circuit and the Sensor Ground circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 15<br><br>No → Repair the Vehicle Speed Sensor Signal circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 15   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 16   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Turn the ignition on.<br>Measure the voltage between ground and the 5-volt Supply circuit.<br>Is the voltage below 0.5 volt?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 17  | All           |



**\*CHECKING THE VEHICLE SPEED SIGNAL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 17   | Turn the ignition off.<br>Repair the 5-volt Supply circuit for a short to voltage.<br>Reconnect all harness connectors except the Vehicle Speed Sensor harness connector.<br>Turn the ignition on.<br>Measure the voltage of the 5-volt Supply circuit.<br>Is the voltage above 4.8 volts?<br><br>Yes → The repair is complete.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 18   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM C1 harness connector.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance of the 5-volt Supply circuit between the Vehicle Speed Sensor harness connector and the PCM C1 harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 19<br><br>No → Repair the 5-volt Supply circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                                 | All           |
| 19   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between ground and the 5-volt Supply circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 20<br><br>No → Repair the 5-volt Supply circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 20   | Turn the ignition off.<br>Disconnect the Vehicle Speed Sensor harness connector.<br>Disconnect the PCM harness connectors.<br><b>Check connectors - Clean/repair as necessary</b><br>Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit in the Vehicle Speed Sensor harness connector.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 21<br><br>No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2.        | All           |
| 21   | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

**Symptom:**

**\*CHECKING THE WATER IN FUEL LAMP OPERATION**

| POSSIBLE CAUSES  |
|--|
| MESSAGE CENTER<br>PCM<br>PCM - WATER IN FUEL SIGNAL CIRCUIT<br>SENSOR GROUND OPEN<br>WATER IN FUEL LAMP BULB<br>WATER IN FUEL SENOR SIGNAL CIRCUIT OPEN<br>WATER IN FUEL SENSOR<br>WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND<br>WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND |

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: Be sure a water in fuel condition does not exist before continuing.</b><br/>                     Turn the ignition on while monitoring the Water In Fuel Lamp.<br/>                     Choose the appropriate answer.</p> <p style="padding-left: 40px;">The lamp turns on and stays on.<br/>                     Go To 2</p> <p style="padding-left: 40px;">The lamp turns on for 2 seconds then off<br/>                     Go To 5</p> <p style="padding-left: 40px;">The lamp does not turn on at all.<br/>                     Go To 8</p>                                | All           |
| 2    | <p>Turn the ignition off.<br/>                     Disconnect the Water In Fuel Sensor harness connector.<br/>                     Turn the ignition on while observing the Water In Fuel Lamp.<br/>                     Does the Water In Fuel Lamp turn on and stay on?</p> <p style="padding-left: 40px;">Yes → Go To 3</p> <p style="padding-left: 40px;">No → Replace the Water In Fuel Sensor<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p>   | All           |
| 3    | <p>Turn the ignition off.<br/>                     Disconnect the PCM harness connectors.<br/>                     Disconnect the Water In Fuel Sensor harness connector.<br/>                     Measure the resistance between engine ground and the Water In Fuel Sensor Signal circuit.<br/>                     Is the resistance above 100 kohms?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Repair the Water In Fuel Sensor Signal circuit for a short to ground.<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> | All           |

**\*CHECKING THE WATER IN FUEL LAMP OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the PCM harness connectors.<br>Disconnect the Water In Fuel Sensor harness connector.<br>Measure the resistance between the Sensor Ground circuit and the Water In Fuel Sensor Signal circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Replace and program the PCM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Water In Fuel Sensor Signal circuit for a short to the Sensor Ground circuit.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 5    | Turn the ignition off.<br>Disconnect the Water In Fuel Sensor harness connector.<br>Turn the ignition on.<br>Connect a jumper wire across the Water In Fuel Sensor harness connector cavities 1 and 2.<br>Observe the Water In Fuel Lamp.<br>Is the lamp on?<br><br>Yes → Test Complete.<br><br>No → Go To 6  | All           |
| 6    | Turn the ignition off.<br>Disconnect the Water In Fuel Sensor harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Water In Fuel Sensor Signal circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the Water In Fuel Sensor Signal circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |
| 7    | Turn the ignition off.<br>Disconnect the Water In Fuel Sensor harness connector.<br>Measure the resistance of the Sensor Ground circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Replace and program the PCM in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Repair the Sensor Ground circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |
| 8    | Turn the ignition off.<br>Remove and inspect the Water In Fuel Lamp bulb.<br>Is the bulb OK?<br><br>Yes → Replace the Message Center.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Replace the Water In Fuel Lamp Bulb.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**Symptom:**

**P1655-AC CONTROL OPEN CIRCUIT - DIESEL**

**When Monitored and Set Condition:**

**P1655-AC CONTROL OPEN CIRCUIT - DIESEL**

When Monitored: With the ignition on.

Set Condition: With the A/C clutch operation not requested, the ECM detects low voltage on the A/C Clutch Relay Control circuit. NOTE: AC is an option that may not be present on all vehicles.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

ASD/DIESEL POWER RELAY OUTPUT CIRCUIT OPEN

SUBSTITUTE A/C COMPRESSOR CLUTCH RELAY

A/C COMPRESSOR CLUTCH RELAY CONTROL CIRCUIT SHORTED TO GROUND

A/C COMPRESSOR CLUTCH RELAY CONTROL CIRCUIT OPEN

ENGINE CONTROL MODULE

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRB, actuate the A/C Compressor Clutch Relay.<br>Is the A/C Compressor Clutch Relay clicking?<br><br>Yes → Go To 2<br><br>No → Go To 3<br><br><b>NOTE: Stop the A/C Compressor Clutch Relay actuation by the DRB.</b>   | All           |
| 2    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Test Complete. | All           |

**P1655-AC CONTROL OPEN CIRCUIT - DIESEL — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Remove the A/C Compressor Clutch Relay from the PDC.<br>Turn the ignition on.<br>Using a 12-volt Test Light connected to ground, check the ASD/Diesel Power Relay Output circuit.<br>Did the test light illuminate brightly?<br><br>Yes → Go To 4<br><br>No → Repair the ASD/Diesel Power Relay Output circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                         | All           |
| 4    | Turn the ignition off.<br>Install a substitute relay in place of the A/C Compressor Clutch Relay.<br>Turn the ignition on.<br>With the DRB, actuate the A/C Compressor Clutch Relay.<br>Is the A/C Compressor Clutch clicking?<br><br>Yes → Replace the A/C Compressor Clutch Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5  | All           |
| 5    | Turn the ignition off.<br>Disconnect the ECM harness connector(s).<br>Remove the A/C Compressor Clutch Relay from the PDC.<br>Measure the resistance between ground and the A/C Compressor Clutch Relay Control circuit.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 6<br><br>No → Repair the A/C Compressor Clutch Relay Control circuit for a short to ground.<br>Perform ROAD TEST VERIFICATION - VER-2. | All           |
| 6    | Turn the ignition off.<br>Disconnect the ECM harness connector(s).<br>Remove the A/C Compressor Clutch Relay from the PDC.<br>Measure the resistance of the A/C Compressor Clutch Relay Control circuit.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 7<br><br>No → Repair the A/C Compressor Clutch Relay Control circuit for an open.<br>Perform ROAD TEST VERIFICATION - VER-2.                            | All           |
| 7    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.  | All           |

**Symptom:**

**P1655-AC CONTROL SHORT CIRCUIT - DIESEL**

**When Monitored and Set Condition:**

**P1655-AC CONTROL SHORT CIRCUIT - DIESEL**

When Monitored: With the ignition on.

Set Condition: The ECM detects excessive current draw on the A/C clutch relay control circuit when attempting to activate the A/C clutch. NOTE: AC is an option that may not be present on all vehicles.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

SUBSTITUTE A/C COMPRESSOR CLUTCH RELAY

A/C COMPRESSOR CLUTCH RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE

ENGINE CONTROL MODULE

| TEST     | ACTION   | APPLICABILITY |
|----------|--|---------------|
| <p>1</p> | <p>Turn the ignition on.<br/>                     With the DRB, actuate the A/C Compressor Clutch Relay.<br/>                     Is the A/C Compressor Clutch Relay clicking?</p> <p style="padding-left: 40px;">Yes → Go To 2</p> <p style="padding-left: 40px;">No → Go To 3</p> <p><b>NOTE: Stop the A/C Compressor Clutch Relay actuation by the DRB.</b></p>   | <p>All</p>    |
| <p>2</p> | <p><b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br/> <b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br/>                     Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br/>                     Refer to any Technical Service Bulletins (TSB) that may apply.<br/>                     Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br/>                     Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br/>                     Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary<br/>                     Perform ROAD TEST VERIFICATION - VER-2.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | <p>All</p>    |

**P1655-AC CONTROL SHORT CIRCUIT - DIESEL — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 3    | Turn the ignition off.<br>Install a substitute relay in place of the A/C Compressor Clutch Relay.<br>Turn the ignition on.<br>With the DRB, actuate the A/C Compressor Clutch Relay.<br>Is the A/C Compressor Clutch clicking?<br><br>Yes → Replace the A/C Compressor Clutch Relay.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 4  | All           |
| 4    | Turn the ignition off.<br>Disconnect the ECM harness connector(s).<br>Remove the A/C Compressor Clutch Relay from the PDC.<br>Remove the ASD/Diesel Power Relay from the PDC.<br>Connect a jumper wire between ASD/Diesel Power Relay cavities 30 and 87 (in PDC).<br>Turn the ignition on.<br>Measure the voltage of the A/C Compressor Clutch Relay Control circuit.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the A/C Compressor Clutch Relay Control circuit for a<br>short to voltage.<br>Perform ROAD TEST VERIFICATION - VER-2.<br><br>No → Go To 5 | All           |
| 5    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace and program the Engine Control Module in accordance<br>with the Service Information.<br>Perform ROAD TEST VERIFICATION - VER-2.   | All           |

# SPEED CONTROL

## Symptom:

### **P1596-SPEED CONTROL SWITCH ALWAYS HIGH - DIESEL**

#### **When Monitored and Set Condition:**

#### **P1596-SPEED CONTROL SWITCH ALWAYS HIGH - DIESEL**

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

Set Condition: The PCM detects voltage above 4.8 volts on the S/C switch signal circuit for at least 2 minutes.

#### **POSSIBLE CAUSES**

CHECKING S/C ON/OFF-SET SWITCH  
PCM - S/C SIGNAL CIRCUIT OPEN  
PCM - S/C SIGNAL CIRCUIT SHORTED TO VOLTAGE  
PCM - SENSOR GROUND OPEN  
S/C ON/OFF-SET SWITCH SIGNAL CIRCUIT OPEN  
S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE  
SENSOR GROUND OPEN

| <b>TEST</b> | <b>ACTION</b>   | <b>APPLICABILITY</b> |
|-------------|---|----------------------|
| 1           | Turn the ignition off.<br>Disconnect the S/C ON/OFF-SET button harness connector.<br>Turn the ignition on.<br>Measure the voltage of the S/C Switch Signal circuit.<br>Select the appropriate voltage reading.<br><br>Below 4.5 volts.<br>Go To 2<br><br>Between 4.5 and 5.5 volts.<br>Go To 3<br><br>Above 5.5 volts<br>Go To 5  | All                  |
| 2           | Turn the ignition off.<br>Disconnect the S/C ON/OFF-SET Switch harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the S/C Switch Signal circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Repair the S/C ON/OFF-SET Switch Signal circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4. | All                  |



**P1596-SPEED CONTROL SWITCH ALWAYS HIGH - DIESEL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the S/C ON/OFF-SET button harness connector.<br>Turn the ignition on.<br>Connect a jumper wire between the S/C Switch Signal circuit and the Sensor Ground at the ON/OFF-SET Switch harness connector.<br>With the DRB III, read the S/C Switch Volts.<br>Does the DRB III display below 0.5 volts?<br><br>Yes → Replace the S/C ON/OFF-SET Switch<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 4  | All           |
| 4    | Turn the ignition off.<br>Disconnect the S/C ON/OFF-SET Switch harness connector.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the Sensor Ground circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Repair the Sensor Ground circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.                                      | All           |
| 5    | Turn the ignition off.<br>Disconnect the S/C ON/OFF-SET Switch harness connector.<br>Disconnect the PCM harness connectors.<br>Turn the ignition on.<br>Measure the voltage of the S/C Switch Signal circuit.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the S/C Switch Signal circuit for a short to voltage.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Replace and program the Powertrain Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4. | All           |

# SPEED CONTROL

## Symptom:

### **P1597-SPEED CONTROL SWITCH ALWAYS LOW - DIESEL**

#### When Monitored and Set Condition:

#### **P1597-SPEED CONTROL SWITCH ALWAYS LOW - DIESEL**

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

Set Condition: The PCM detects voltage below 0.39 volt on the S/C switch signal circuit for at least 2 minutes.

#### POSSIBLE CAUSES

INTERMITTENT CONDITION

SPEED CONTROL ON/OFF SWITCH

SPEED CONTROL RESUME/ACCEL SWITCH

SPEED CONTROL SWITCH CONTROL CIRCUIT SHORTED TO SENSOR GROUND

SPEED CONTROL SWITCH CONTROL CIRCUIT SHORTED TO GROUND

PCM

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | Turn the ignition on.<br>With the DRBIII®, read the Speed Control voltage.<br>Is the Speed Control voltage below 1.0 volts?<br><br>Yes → Go To 2<br><br>No → Go To 7  | All           |
| 2    | Turn the ignition on.<br>With the DRBIII®, monitor the Speed Control Switch voltage.<br>Disconnect the Speed Control On/Off Switch harness connector.<br>Did the volt change to above 4.7 volts?<br><br>Yes → Replace the Speed Control On/Off Switch.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 3             | All           |
| 3    | Turn the ignition on.<br>With the DRBIII®, monitor the Speed Control Switch voltage.<br>Disconnect the Speed Control Resume/Accel Switch harness connector.<br>Did the volt change to above 4.7 volts?<br><br>Yes → Replace the Speed Control Resume/Accel Switch.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 4 | All           |

**P1597-SPEED CONTROL SWITCH ALWAYS LOW - DIESEL — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 4    | Turn the ignition off.<br>Disconnect the Speed Control On/Off Switch harness connector.<br>Disconnect the Speed Control Resume/Accel Switch harness connector.<br>Disconnect the PCM harness connector.<br>Measure the resistance between the Speed Control Switch circuit and the Sensor ground circuit in the PCM harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Repair the Speed Control Switch Signal circuit shorted to Sensor ground circuit.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 5  | All           |
| 5    | Turn the ignition off.<br>Disconnect the Speed Control On/Off Switch harness connector.<br>Disconnect the Speed Control Resume/Accel Switch harness connector.<br>Disconnect the PCM harness connector.<br>Measure the resistance of the Speed Control Switch circuit in PCM harness connector to ground.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Repair the Speed Control Switch Signal circuit shorted to ground.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 6  | All           |
| 6    | If there are no possible causes remaining, view repair.<br><br>Repair<br>Replace the Powertrain Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.   | All           |
| 7    | <b>WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.</b><br><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b><br>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set.<br>Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set.<br>Refer to any Technical Service Bulletins (TSB) that may apply.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Test Complete. | All           |

## SPEED CONTROL

---

### Symptom:

#### **\*CHECKING THE SPEED CONTROL OPERATION**

#### **POSSIBLE CAUSES**

BRAKE LAMP SWITCH - PRIMARY CIRCUIT  
BRAKE LAMP SWITCH - SECONDARY CKT  
CHECKING BRAKE LAMP SWITCH ADJUSTMENT  
CHECKING THE S/C LAMP OPERATION  
CHECKING THE VEHICLE SPEED SIGNAL  
ECM - BRAKE SWITCH SIGNAL  
ECM - PRIMARY BRAKE SWITCH CIRCUIT  
ECM - S/C LAMP CONTROL  
ECM - S/C SIGNAL  
ECM - SPEED CONTROL  
FUSED B+ CIRCUIT OPEN  
GROUND CIRCUIT OPEN  
PCM - S/C LAMP CONTROL  
PRIMARY BRAKE SWITCH SIGNAL CIRCUIT OPEN  
PRIMARY BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND  
S/C LAMP SIGNAL OPEN  
S/C LAMP SIGNAL SHORTED TO GROUND  
S/C LAMP SIGNAL SHORTED TO VOLTAGE  
S/C SWITCH SIGNAL CIRCUIT OPEN  
S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND  
S/C SWITCHES  
SECONDARY BRAKE SWITCH SIGNAL CIRCUIT OPEN  
SECONDARY BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND  
SENSOR GROUND CIRCUIT OPEN  
INTERMITTENT CONDITION

**\*CHECKING THE SPEED CONTROL OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p>Start the engine.<br/>With the DRB, select Engine, Bosch Controller then Sensor Display.<br/>Observe the cruise switch volts on the DRB while pressing and holding each cruise button separately.</p> <p><b>NOTE: Pressing each cruise button should result in the following voltages: ON/OFF 0.55 - 1.15v, SET 3.15 - 3.6v, RESUME/ACCEL 3.9 - 4.15v, CANCEL 1.55 - 2.05v, COAST 2.5 - 3.0v, No Button Pressed 4.4 - 4.7v</b></p> <p>Does each switch provide the correct voltage?</p> <p>Yes → Go To 2</p> <p>No → Go To 23</p> | All           |
| 2    | <p>Turn the ignition on.<br/>With the DRB, select Engine, Bosch and Inputs/Outputs.<br/>Observe the Brake Switch input while pressing and releasing the brake pedal several times.<br/>Does the DRB indicate the correct change of state from Released to Pressed?</p> <p>Yes → Go To 3</p> <p>No → Go To 19</p>   | All           |
| 3    | <p>Turn the ignition on.<br/>With the DRB, select Engine, Bosch and Inputs/Outputs.<br/>Observe the Brake Switch input while pressing and releasing the brake pedal several times.<br/>Does the DRB indicate the correct change of state from Released to Pressed?</p> <p>Yes → Go To 4</p> <p>No → Go To 14</p>   | All           |
| 4    | <p>With the DRB, select Engine, then Bosch Controller and monitor the Vehicle Speed Signal while test driving the vehicle.<br/>Does the DRB display accurate vehicle speed?</p> <p>Yes → Go To 5</p> <p>No → Refer to symptom list for problems related to Vehicle Speed Sensor Signal.<br/>Perform SPEED CONTROL VERIFICATION - VER-4.</p>  | All           |
| 5    | <p>Drive the vehicle and generate a vehicle speed above 55 Km/h (35 mph).<br/>Attempt to set the speed control.<br/>Did vehicle speed control maintain set vehicle speed?</p> <p>Yes → Go To 6</p> <p>No → Go To 12</p>  | All           |
| 6    | <p>Drive the vehicle and generate a vehicle speed above 55 Km/h (35 mph).<br/>Set the speed control and observe the Speed Control Lamp.<br/>Does the Speed Control Lamp illuminate when speed control is on?</p> <p>Yes → Test Complete.</p> <p>No → Go To 7</p>   | All           |

# SPEED CONTROL

## \*CHECKING THE SPEED CONTROL OPERATION — Continued

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition on.<br>With the DRB, select Engine, JTEC then Actuators.<br>With the DRB, actuate the S/C Lamp while observing the S/C Lamp.<br>Is the S/C Lamp turning on and off during actuation?<br><br>Yes → Go To 8<br><br>No → Refer to symptom list for problems related to S/C Lamp operation.<br>Perform SPEED CONTROL VERIFICATION - VER-4.   | All           |
| 8    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance of the S/C Lamp Signal circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 9<br><br>No → Repair the S/C Lamp Signal circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.   | All           |
| 9    | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Measure the resistance between ground and the S/C Lamp Signal circuit.<br>Is the resistance below 100.0 ohms?<br><br>Yes → Repair the S/C Lamp Signal circuit for a short to ground.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 10   | All           |
| 10   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the PCM harness connectors.<br>Disconnect the ASD Relay from the PDC.<br>Connect a jumper wire across ASD Relay connector cavities 30 and 87 (in the PDC).<br>Turn the ignition on.<br>Measure the voltage of the S/C Lamp Signal circuit.<br>Is the voltage below 8.0 volts?<br><br>Yes → Go To 11<br><br>No → Repair the S/C Lamp Signal circuit for a short to voltage.<br>Perform SPEED CONTROL VERIFICATION - VER-4. | All           |
| 11   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Turn the ignition on.<br>Connect a jumper wire between the S/C Lamp Signal circuit and ground.<br>Observe the S/C Lamp.<br>Is the S/C Lamp on?<br><br>Yes → Replace and program the ECM in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Replace and program the PCM in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.                | All           |

**\*CHECKING THE SPEED CONTROL OPERATION — Continued**

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 12   | Refer to any Technical Service Bulletins (TSB) that may apply to this condition.<br>Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.<br>Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.<br>Were any of the above conditions present?<br><br>Yes → Repair as necessary<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 13 | All           |
| 13   | Check the brake lamp switch for proper adjustment.<br>Is the brake lamp switch adjusted properly?<br><br>Yes → Replace and program the Engine Control Module in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Adjust or replace the brake lamp switch as necessary.<br>Perform SPEED CONTROL VERIFICATION - VER-4.  | All           |
| 14   | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Turn the ignition on.<br>Measure the voltage of the Secondary Brake Switch Signal circuit.<br>Is the voltage above 9.0 volts?<br><br>Yes → Go To 15<br><br>No → Go To 17   | All           |
| 15   | Turn the ignition off.<br>Disconnect the Brake Switch harness connector.<br>With the DRB, monitor the brake switch input.<br>Connect a jumper wire between the Brake Lamp Switch harness connector cavities 1 and 2.<br>Did the DRB display change from Pressed to Released?<br><br>Yes → Adjust or replace the Brake Lamp Switch.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 16  | All           |
| 16   | Disconnect the Brake Lamp Switch harness connector.<br>Measure the resistance between ground and the Brake Lamp Switch harness connector cavity 2.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Replace and program the ECM in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Repair the Ground circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.   | All           |

# SPEED CONTROL

## \*CHECKING THE SPEED CONTROL OPERATION — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 17   | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance of the Secondary Brake Switch Signal between the Brake Lamp Switch and the PCM.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 18<br><br>No → Repair the Secondary Brake Switch Signal circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.  | All           |
| 18   | Turn the ignition off.<br>Disconnect the Brake Lamp Switch harness connector.<br>Disconnect the ECM harness connectors.<br>Measure the resistance between ground and the Secondary Brake Switch Signal circuit.<br>Is the resistance below 100.0 ohms?<br><br>Yes → Repair the Secondary Brake Switch Signal circuit for a short to ground.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Replace and program the ECM in accordance with the Service Information.<br>Perform SPEED CONTROL VERIFICATION - VER-4. | All           |
| 19   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Brake Lamp Switch harness connector.<br>Measure the resistance between ground and the Primary Brake Switch Sense circuit.<br>Is the resistance below 100.0 ohms?<br><br>Yes → Repair the Primary Brake Switch Signal circuit for a short to ground.<br>Perform SPEED CONTROL VERIFICATION - VER-4.<br><br>No → Go To 20  | All           |
| 20   | Turn the ignition off.<br>Disconnect the ECM harness connectors.<br>Disconnect the Brake Lamp Switch harness connector.<br>Measure the resistance of the Primary Brake Switch Sense circuit.<br>Is the resistance below 10.0 ohms?<br><br>Yes → Go To 21<br><br>No → Repair the Primary Brake Switch Signal circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.   | All           |
| 21   | Disconnect the Brake Lamp Switch harness connector.<br>Turn the ignition on.<br>Using a 12-volt test light connected to ground, check the Fused B+ circuit at the Brake Lamp Switch harness connector.<br>Does the test light illuminate brightly?<br><br>Yes → Go To 22<br><br>No → Repair the Fused B+ circuit for an open.<br>Perform SPEED CONTROL VERIFICATION - VER-4.  | All           |



**\*CHECKING THE SPEED CONTROL OPERATION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 22   | <p><b>NOTE: The Brake Switch must be properly adjusted before performing this test.</b></p> <p>Turn the ignition off.<br/>           Disconnect the ECM harness connectors.<br/>           Using a 12-volt test light connected to ground, probe the Primary Brake Switch Sense circuit at the ECM harness connector.<br/>           While observing the test light, press and release the Brake Pedal several times.<br/>           Does the test light turn on and off while pressing and releasing the Brake Pedal?</p> <p>Yes → Replace and program the ECM in accordance with the Service Information.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p> <p>No → Replace the Brake Lamp Switch.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p> | All           |
| 23   | <p>Turn the ignition off.<br/>           Disconnect the S/C Switch 4-way harness connector.<br/>           Turn the ignition on.<br/>           With the DRB, read the cruise switch voltage while connecting a jumper wire between the Sensor Ground circuit and the S/C Switch Signal circuit.<br/>           Did the voltage change from approximately 5.0 volts to below 0.3 volts?</p> <p>Yes → Replace the S/C Switches.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p> <p>No → Go To 24</p>   | All           |
| 24   | <p>Turn the ignition off.<br/>           Disconnect the S/C Switch 4-way harness connector.<br/>           Disconnect the ECM harness connector(s).<br/>           Measure the resistance of the S/C Switch Signal circuit.<br/>           Is the resistance below 10.0 ohms?</p> <p>Yes → Go To 25</p> <p>No → Repair the S/C Switch Signal circuit for an open.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p>   | All           |
| 25   | <p>Turn the ignition off.<br/>           Disconnect the S/C Switch 4-way harness connector.<br/>           Disconnect the ECM harness connector(s).<br/>           Measure the resistance of the S/C Sensor Ground circuit.<br/>           Is the resistance below 10.0 ohms?</p> <p>Yes → Go To 26</p> <p>No → Repair the Sensor Ground circuit for an open.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p>   | All           |
| 26   | <p>Turn the ignition off.<br/>           Disconnect the S/C Switch 4-way harness connector.<br/>           Disconnect the ECM harness connector(s).<br/>           Measure the resistance between ground and the S/C Switch Signal circuit.<br/>           Is the resistance below 100.0 ohms?</p> <p>Yes → Repair the S/C Switch Signal circuit for a short to ground.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p> <p>No → Replace and program the ECM in accordance with the Service Information.<br/>           Perform SPEED CONTROL VERIFICATION - VER-4.</p>  | All           |

# STARTING

## Symptom:

**\*NO CRANK CONDITION**

### POSSIBLE CAUSES

BATTERY CABLE HIGH RESISTANCE  
 CHECKING SHIFTER LINKAGE  
 CLUTCH INTERLOCK SWITCH  
 CLUTCH INTERLOCK SWITCH SENSE CKT OPEN  
 INSPECT BATTERY CABLES  
 MECHANICAL PROBLEM  
 OPEN FUSED BATTERY (+) CIRCUIT  
 OPEN IGNITION SWITCH START OUTPUT  
 STARTER MOTOR  
 STARTER RELAY  
 STARTER RELAY OUTPUT CIRCUIT OPEN

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>NOTE: The Clutch Pedal must be depressed during any engine start attempt.</b><br/>                     Turn the ignition off.<br/> <b>NOTE: The battery must be fully charged before diagnosing a no crank condition.</b><br/>                     Inspect the battery cables for corrosion, looseness or other problems.<br/>                     Is there evidence of problems?</p> <p>Yes → Repair as necessary.<br/>                     Perform NO START VERIFICATION - VER-1.</p> <p>No → Go To 2</p> | All           |
| 2    | <p>Remove the Starter Relay from the PDC.<br/>                     Using a 12-volt test light connected to ground, check the Fused B+ circuit.<br/>                     Is the test light on?</p> <p>Yes → Go To 3</p> <p>No → Repair the Fused B(+) circuit for an open.<br/>                     Perform NO START VERIFICATION - VER-1.</p>   | All           |
| 3    | <p>Remove the Starter Relay from the PDC.<br/>                     Using a 12-volt test light connected to ground, check the Ignition Switch Start Output circuit while turning the ignition switch to the crank position.<br/>                     Does the test light illuminate with the ignition switch in the crank position?</p> <p>Yes → Go To 4</p> <p>No → Repair the Ignition Switch Start Output circuit.<br/>                     Perform NO START VERIFICATION - VER-1.</p>                          | All           |

**\*NO CRANK CONDITION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 4    | <p><b>WARNING: The transmission must be in Neutral and the parking break must be engaged for this test.</b></p> <p><b>WARNING: The engine may be cranked in this test. Keep away from moving engine parts.</b></p> <p>Briefly connect a jumper wire between the Starter Relay Output circuit and the Fused B+ circuit at the starter relay connector in the PDC.</p> <p>Did the engine crank?</p> <p>Yes → Go To 5</p> <p>No → Go To 8</p>   | All           |
| 5    | <p>Turn the ignition off.</p> <p>Remove the Starter Relay From the PDC.</p> <p>Install a substitute relay in place of the Starter Relay.</p> <p>Attempt to start the engine.</p> <p>Does the engine crank?</p> <p>Yes → Replace the Starter Relay.<br/>Perform NO START VERIFICATION - VER-1.</p> <p>No → Go To 6</p>  | All           |
| 6    | <p>Turn the ignition off.</p> <p>Disconnect the Clutch Interlock Switch harness connector.</p> <p>Connect a jumper wire between the Clutch Interlock Switch Sense circuit and ground.</p> <p>Attempt to start the engine.</p> <p>Does the engine crank?</p> <p>Yes → Repair the Clutch Interlock Switch Sense circuit for an open.<br/>Perform NO START VERIFICATION - VER-1.</p> <p>No → Go To 7</p>  | All           |
| 7    | <p>Check the shifter and associated linkage for proper adjustment between shifter and transmission.</p> <p>Were any problems found?</p> <p>Yes → Repair or replace as necessary.<br/>Perform NO START VERIFICATION - VER-1.</p> <p>No → Replace the Clutch Interlock Switch in accordance with the Service Information.<br/>Perform NO START VERIFICATION - VER-1.</p>   | All           |
| 8    | <p>Turn the ignition off.</p> <p>Remove the Starter Relay from the PDC.</p> <p>Disconnect the Starter Relay Output wire from the Starter Solenoid.</p> <p>Measure the resistance of the Starter Relay Output circuit between the PDC and the Starter Solenoid.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the Starter Relay Output circuit for an open.<br/>Perform NO START VERIFICATION - VER-1.</p> | All           |

## STARTING

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### \*NO CRANK CONDITION — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 9    | Using the Service Information, check the battery cables for high resistance.<br>Did either battery cable have a voltage drop greater than 0.2 volts?<br><br>Yes → Replace the battery cable(s).<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Go To 10                                    | All           |
| 10   | Turn the ignition off.<br>Attempt to manually rotate the crankshaft 360°.<br>Is the crankshaft able to rotate 360°?<br><br>Yes → Replace the Starter Motor.<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Repair the engine mechanical problem.<br>Perform NO START VERIFICATION - VER-1. | All           |

**Symptom:****\*NO START CONDITION****POSSIBLE CAUSES**

CHECKING FUEL QUANTITY ACTUATOR  
 ECM - IMMOBILIZER SIGNAL  
 ECM - IMMOBILIZER SIGNAL OUTPUT  
 FUEL INJECTION PUMP TIMING  
 FUEL QUANTITY ACTUATOR CIRCUIT SHORT TO VOLTAGE  
 FUEL SUPPLY CONTAMINATION  
 FUEL SYSTEM PRESSURE  
 FUEL SYSTEM RESTRICTION  
 IMMOBILIZER SIGNAL CIRCUIT OPEN  
 IMMOBILIZER SIGNAL CIRCUIT SHORTED TO GROUND  
 IMMOBILIZER SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 VERIFYING IMMOBILIZER SIGNAL

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p><b>NOTE: Check for SKIM, ECM, and PCM DTCs. Return to the Symptom List to diagnose any DTCs that are present before continuing.</b><br/>           With the DRB, select Engine (JTEC), Miscellaneous and View SKIM Status.<br/>           While observing the DRB, attempt to start the engine.<br/>           Does the DRB display Fuel Shut-Off Activated?</p> <p>Yes → Go To 2<br/>           No → Go To 7</p>   | All           |
| 2    | <p>Turn the ignition off.<br/>           Disconnect the PCM harness connector.<br/>           Disconnect the ECM harness connector.<br/>           Remove the ASD Relay from the PDC.<br/>           Connect a jumper wire between ASD Relay connector cavity 30 and cavity 87 in the PDC.<br/>           Turn the ignition on.<br/>           Measure the voltage of the Immobilizer Signal circuit.<br/>           Is the voltage above 1.0 volt?</p> <p>Yes → Repair the Immobilizer Signal circuit for a short to voltage.<br/>           Perform NO START VERIFICATION - VER-1.<br/>           No → Go To 3</p> | All           |

# STARTING

## \*NO START CONDITION — Continued

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 3    | Turn the ignition off.<br>Disconnect the PCM harness connector.<br>Disconnect the ECM harness connector.<br>Measure the resistance of the Immobilizer Signal circuit between the PCM harness connector and the ECM harness connector.<br>Is the resistance below 5.0 ohms?<br><br>Yes → Go To 4<br><br>No → Repair the Immobilizer Signal circuit for an open.<br>Perform NO START VERIFICATION - VER-1.  | All           |
| 4    | Turn the ignition off.<br>Disconnect the PCM harness connector.<br>Disconnect the ECM harness connector.<br>Measure the resistance between ground and the Immobilizer Signal circuit at the PCM harness connector.<br>Is the resistance above 100 kohms?<br><br>Yes → Go To 5<br><br>No → Repair the Immobilizer Signal circuit for a short to ground.<br>Perform NO START VERIFICATION - VER-1.  | All           |
| 5    | Turn the ignition off.<br>Disconnect the PCM harness connector.<br>Turn the ignition on.<br>Measure the amperage between PCM harness connector C-3 cavity 16 and ground.<br>Is the amperage between 1.0 and 1.4 milliamperes?<br><br>Yes → Go To 6<br><br>No → Replace and program the ECM in accordance with the Service Information.<br>Perform NO START VERIFICATION - VER-1.  | All           |
| 6    | With the DRBIII®, select the Lab Scope function.<br>Set the voltage range to +20.0V<br>Set the probe to X10.<br>Set the time range to 0.1S/Div.<br>Turn the ignition on.<br>Using the oscilloscope lead, backprobe the PCM harness connector C3 cavity 16.<br><b>NOTE: A valid immobilizer signal will cycle high and low similar to the pattern shown in Charts and Graphs.</b><br>Does the DRB display show the 12-volt signal cycling high and low?<br><br>Yes → Replace and program the ECM in accordance with the Service Information.<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Replace the PCM in accordance with the Service Information.<br>Perform NO START VERIFICATION - VER-1. | All           |

**\*NO START CONDITION — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 7    | Turn the ignition off.<br>Disconnect the Fuel Injection Pump 10-way harness connector.<br>Measure the resistance between cavity 8 and cavity 9 of the Fuel Injection Pump 10-way harness connector.<br>Is the resistance between 0.7 and 1.6 ohms?<br><br>Yes → Go To 8<br><br>No → Replace the Fuel Injection Pump assembly.<br>Perform NO START VERIFICATION - VER-1.  | All           |
| 8    | Turn the ignition off.<br>Disconnect the ECM harness connector.<br>Remove the ASD Relay from the PDC.<br>Connect a jumper wire between ASD Relay connector cavity 30 and cavity 87 in the PDC.<br>Turn the ignition on.<br>Measure the voltage of the Fuel Quantity Actuator circuit at ECM harness connector C2 cavity 59.<br>Is the voltage above 1.0 volt?<br><br>Yes → Repair the Fuel Quantity Actuator circuit for a short to voltage.<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Go To 9 | All           |
| 9    | Inspect and fuel system lines for restrictions, leaks or other problems.<br>Is there any evidence of problems?<br><br>Yes → Repair as necessary.<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Go To 10  | All           |
| 10   | Refer to the Service Information and perform the fuel pressure test.<br>Is the fuel pressure within specification?<br><br>Yes → Go To 11<br><br>No → Check the Fuel Injection Pump drive. If the drive is working properly, replace the Fuel Injection Pump.<br>Perform NO START VERIFICATION - VER-1.   | All           |
| 11   | Refer to the Service Information and check the Fuel Injection Pump Timing.<br>Is the Fuel Injection Pump timing correct?<br><br>Yes → Check the fuel supply for contamination.<br>Perform NO START VERIFICATION - VER-1.<br><br>No → Refer to the Service Information to correctly time the Fuel Injection Pump.<br>Perform NO START VERIFICATION - VER-1.   | All           |

### **Symptom List:**

**ANTENNA FAILURE**  
**COP FAILURE**  
**EEPROM FAILURE**  
**INTERNAL FAULT**  
**RAM FAILURE**  
**SERIAL LINK INTERNAL FAULT**  
**STACK OVERFLOW FAILURE**

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

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### **When Monitored and Set Condition:**

#### **ANTENNA FAILURE**

When Monitored: Every 250 milliseconds with the ignition on.

Set Condition: The SKIM's microcontroller determines that an antenna circuit fault has occurred for 2.0 consecutive seconds.

#### **COP FAILURE**

When Monitored: With the ignition on.

Set Condition: The COP timer is not reset by the microcontroller every 65.5 milliseconds

#### **EEPROM FAILURE**

When Monitored: With the ignition on.

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

#### **INTERNAL FAULT**

When Monitored: With the ignition on.

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

#### **RAM FAILURE**

When Monitored: With the ignition on.

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

#### **SERIAL LINK INTERNAL FAULT**

When Monitored: With the ignition on.

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

#### **STACK OVERFLOW FAILURE**

When Monitored: With the ignition on.

Set Condition: The microcontroller has exceeded its stack space limit.



**ANTENNA FAILURE — Continued**

| POSSIBLE CAUSES           |
|---------------------------|
| SKIM INTERNAL DTC FAILURE |

| TEST | ACTION  | APPLICABILITY |
|------|---|---------------|
| 1    | <p><b>Note: This trouble code indicates an internal SKIM fault.</b></p> <p>With the DRB III, read and record the SKIM DTC's and then erase the SKIM DTC's</p> <p>Perform 10 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle.</p> <p>With the DRB III, read the SKIM DTC's.</p> <p>Did the same SKIM DTC return?</p> <p style="padding-left: 40px;">Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information.<br/>Perform SKIS VERIFICATION.</p> <p style="padding-left: 40px;">No → Test Complete.</p> | 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    | <p><b>NOTE: Ensure the PCM has proper power and ground connections before continuing.</b></p> <p>With the DRB III, read and record the SKIM DTC's then erase the SKIM DTC's.<br/>                     Turn the ignition off.<br/>                     Wait 2 minutes.<br/>                     Turn the ignition on.<br/>                     With the DRB III, read the SKIM DTC's.<br/>                     Does the DRB III display the DTC that was previously erased?</p> <p>Yes → Go To 2<br/>                     No → Go To 4</p> | All           |

**PCM STATUS FAILURE — Continued**

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

## Symptom List:

**ROLLING CODE FAILURE  
VIN MISMATCH**

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

### When Monitored and Set Condition:

#### ROLLING CODE FAILURE

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

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

#### VIN MISMATCH

**When Monitored:** With the ignition on.

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

### POSSIBLE CAUSES

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

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

**ROLLING CODE FAILURE — Continued**

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

**Symptom List:**

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

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

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**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.

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**POSSIBLE CAUSES**

CHECKING MULTIPLE KEY OPERATION

SKIM

INTERMITTENT WIRING HARNESS PROBLEM

REPLACE IGNITION KEY

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**TRANSPONDER COMMUNICATION FAILURE — Continued**

| TEST | ACTION   | APPLICABILITY |
|------|--|---------------|
| 1    | <p>With the DRB III, read and record the SKIM DTC's.<br/>                     With the DRB III, erase the SKIM DTC's.<br/> <b>NOTE: Perform the following test several times to ensure the DTC is current.</b><br/>                     Turn the ignition off.<br/>                     Wait 10 seconds.<br/>                     Turn the ignition on.<br/>                     With the DRB III, read the SKIM DTC's.<br/>                     Does the DRB display the DTC that was previously erased?</p> <p style="padding-left: 40px;">Yes → Go To 2<br/>                     No → Go To 7</p>   | All           |
| 2    | <p>Are there multiple vehicle ignition keys available?</p> <p style="padding-left: 40px;">Yes → Go To 3<br/>                     No → Go To 4</p>  | All           |
| 3    | <p><b>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.</b><br/>                     With the DRB III, erase the SKIM DTC's.<br/>                     Turn the ignition off.<br/>                     Wait 10 seconds.<br/>                     Turn the ignition on.<br/>                     With the DRB III, read the SKIM DTC's.<br/>                     Is the DTC present for all ignition keys.</p> <p style="padding-left: 40px;">Yes → Replace the Sentry Key Immobilizer Module in accordance with the Service Information.<br/>                     Perform SKIS VERIFICATION.<br/>                     No → Test Complete.</p> | All           |
| 4    | <p>With the DRB III, attempt to reprogram the ignition keys to the SKIM.<br/>                     With the DRB III, erase the SKIM DTC's.<br/>                     Wait 10 seconds.<br/>                     Turn the ignition on.<br/>                     With the DRB III, read the SKIM DTC's.<br/>                     Does the DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 5<br/>                     No → Test Complete.</p>  | All           |
| 5    | <p>Replace the ignition key with a new key.<br/>                     With the DRB III, program the new ignition key to the SKIM.<br/>                     With the DRB III, erase the SKIM DTC's<br/>                     Turn the ignition off.<br/>                     Wait 10 seconds.<br/>                     Turn the ignition on.<br/>                     With the DRB III, read the SKIM DTC's.<br/>                     Does the DTC reset?</p> <p style="padding-left: 40px;">Yes → Go To 6<br/>                     No → Test Complete.</p>   | All           |

**TRANSPONDER COMMUNICATION FAILURE — Continued**

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



**Verification Tests**

| CHARGING VERIFICATION - VER-3   | APPLICABILITY |
|---|---------------|
| <p>1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</p> <p>2. If the PCM has been replaced, perform step 3. Otherwise, continue with step 4.</p> <p>3. If the vehicle is equipped with a factory theft alarm, start the engine at least 20 times in order to be able to activate the alarm system when desired.</p> <p>4. With the DRB, erase all diagnostic trouble codes (DTCs).</p> <p>5. Start the engine.</p> <p>6. Raise the engine speed to 2000 RPM for at least 30 seconds.</p> <p>7. Allow the engine to idle.</p> <p>8. Turn the ignition off for 20 seconds.</p> <p>9. Turn the ignition on.</p> <p>10. With the DRB, read ECM and PCM DTCs.</p> <p>11. If this DTC has reset, or another DTC has set, look for any Technical Service Bulletins (TSBs) that may relate to this condition. Return to the Symptom List if necessary.</p> <p>12. If the charging system is functioning correctly and there are no DTCs, the repair is now complete.</p> <p>Are any DTCs or symptoms remaining?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p> | <p>All</p>    |

| NO START VERIFICATION - VER-1   | APPLICABILITY |
|---|---------------|
| <p><b>1. NOTE: IMPORTANT! If the Engine Control Module, Sentry Key Immobilizer Module or Powertrain Control Module have been replaced, ensure the programming procedures for these modules have been performed in accordance with the Service Information.</b></p> <p>2. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</p> <p>3. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter.</p> <p>4. With the DRB, erase all diagnostic trouble codes (DTCs).</p> <p>5. Turn the ignition off for at least 10 seconds.</p> <p>6. Attempt to start the engine.</p> <p>7. If the engine is unable to start, look for any Technical Service Bulletins (TSBs) that may relate to this condition. Return to the Symptom List if necessary.</p> <p>8. If the engine starts and continues to run, the repair is now complete.</p> <p>Are any DTCs or symptoms remaining?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p> | <p>All</p>    |

# VERIFICATION TESTS

## Verification Tests — Continued

| POWERTRAIN VERIFICATION TEST VER - 1   | APPLICABILITY |
|--|---------------|
| <ol style="list-style-type: none"> <li>1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</li> <li>2. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter.</li> <li>3. Perform the steps 4 through 6 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification.</li> <li>4. If PCM has been changed and correct VIN and mileage have not been programmed a DTC will be set in ABS and Air Bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start.</li> <li>5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules.</li> <li>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</li> <li>7. Attempt to start the engine.</li> <li>8. If the engine is unable to start, look for any Technical Service Bulletins that may relate to this condition. Return to Symptom List if necessary.</li> <li>9. If the engine starts and stays running, the repair is now complete.</li> </ol> | All           |

| ROAD TEST VERIFICATION - VER-2   | APPLICABILITY |
|--|---------------|
| <ol style="list-style-type: none"> <li>1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</li> <li>2. If this verification procedure is being performed after a non-DTC test, perform steps 3 and 4.</li> <li>3. Check to see if the initial symptom still exists. If there are no trouble codes and the symptom no longer exists, the repair was successful and testing is now complete.</li> <li>4. If the initial or another symptom exists, the repair is not complete. Check all pertinent Technical Service Bulletins (TSBs) and return to the Symptom List if necessary.</li> <li>5. For previously read DTCs that have not been dealt with, return to the Symptom List and follow the diagnostic path for that DTC; otherwise, continue.</li> <li>6. If the engine control module (ECM) has not been changed, perform steps 7 and 8, otherwise, continue with step 9.</li> <li>7. With the DRB, erase all diagnostic trouble codes (DTCs), then disconnect the DRB.</li> <li>8. Turn the ignition off for at least 10 seconds.</li> <li>9. Ensure no DTCs remain by performing steps 10 through 13.</li> <li>10. Road test the vehicle. For some of the road test, go at least 64 km/h (40 MPH). If this test is for an A/C Relay Control Circuit, drive the vehicle for at least 5 minutes with the A/C on.</li> <li>11. At some point, stop the vehicle and turn the engine off for at least 10 seconds, then restart the engine and continue.</li> <li>12. Upon completion of the road test, turn the engine off and check for DTCs with the DRB.</li> <li>13. If the repaired DTC has reset, the repair is not complete. Check for any pertinent Technical Service Bulletins (TSBs) and return to the Symptom List. If there are no DTCs, the repair was successful and is now complete.</li> </ol> <p>Are any DTCs or symptoms remaining?</p> <p style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">No → Repair is complete.</p> | All           |

**Verification Tests — Continued**

| SKIS VERIFICATION  | APPLICABILITY                          |
|--|--|
| <p>1. Reconnect all previously disconnected components and connectors.</p> <p>2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997).</p> <p><b>3. NOTE: When entering the PIN, care should be taken because the SKIM will only allow 3 consecutive attempts to enter the correct PIN. If 3 consecutive incorrect PIN's are entered the SKIM will Lock Out the DRB III for 1 hour.</b></p> <p>4. To exit Lock Out mode, the ignition key must remain in the Run position continually for 1 hour. Turn off all accessories and connect a battery charger if necessary.</p> <p>5. With the DRB III, select Theft Alarm, SKIM and Miscellaneous. Then select desired procedure and follow the steps that will be displayed.</p> <p>6. If the SKIM has been replaced, ensure all of the vehicle ignition keys are programmed to the new SKIM.</p> <p><b>7. NOTE: Prior to returning vehicle to the costumer, perform a module scan to be sure that all DTC's are erased. Erase any DTC's that are found.</b></p> <p>8. With the DRB III erase all DTC's. Perform 5 ignition key cycles leaving the key on for at least 90 seconds per cycle.</p> <p>9. With the DRB III, read the SKIM DTC's.</p> <p>Are there any SKIM DTC's?</p> <p style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">No → Repair is complete.</p> | <p style="text-align: center;">All</p> |

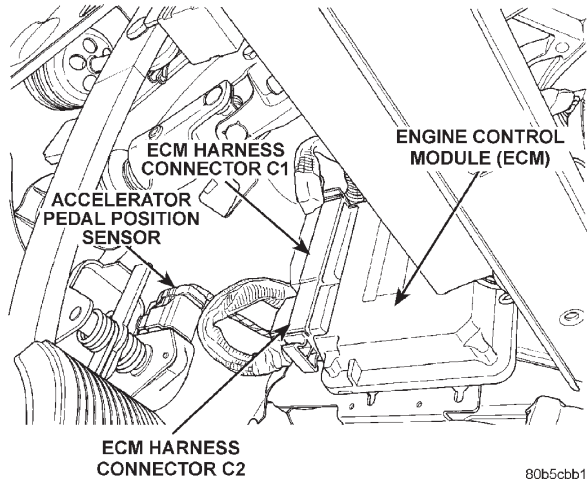
## Verification Tests — Continued

| SPEED CONTROL VERIFICATION - VER-4  | APPLICABILITY |
|---|---------------|
| <p>1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</p> <p>2. If the PCM has been replaced, perform step 3. Otherwise, continue with step 4.</p> <p>3. If the vehicle is equipped with a factory theft alarm, start the engine at least 20 times in order to be able to activate the alarm system when desired.</p> <p>4. With the DRB, erase all diagnostic trouble codes (DTCs).</p> <p>5. Road test the vehicle at a speed above 58 km/h (35 MPH).</p> <p>6. Turn the speed control ON/OFF switch on.</p> <p>7. Depress and release the SET switch. If the speed control does not engage, the repair is not complete, continue with step 15.</p> <p>8. Quickly depress and release the RESUME/ACCEL switch. If the vehicle speed does not increase by 3 km/h (2 MPH), the repair is not complete, continue with step 15.</p> <p>9. Using caution, depress and release the brake pedal. If the speed control does not disengage, the repair is not complete, continue with step 15.</p> <p>10. With the vehicle speed at least 56 km/h (35 MPH), depress the RESUME/ACCEL switch. If the speed control does not resume at the previously set speed, the repair is not complete, continue with step 15.</p> <p>11. Hold down the COAST switch. If the vehicle does not decelerate, the repair is not complete, continue with step 15.</p> <p>12. While still holding down the COAST switch, ensure the vehicle speed is at least 56 km/h (35 MPH) and release the COAST switch. If the vehicle does not adjust and set a new vehicle speed, the repair is not complete, continue with step 15.</p> <p>13. With the speed control engaged, depress the ON/OFF switch. If the speed control does not disengage, the repair is not complete, continue with step 15.</p> <p>14. If the vehicle did not successfully perform all of the previous steps, check for Technical Service Bulletins (TSBs) that pertain to this speed control problem and then, if necessary, return to the Symptom List.</p> <p>15. If the vehicle successfully performed all of the previous steps, the speed control system is now functioning as designed. The repair is now complete.</p> <p>Are any DTCs or symptoms remaining?</p> <p style="padding-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="padding-left: 40px;">No → Repair is complete.</p> | <p>All</p>    |

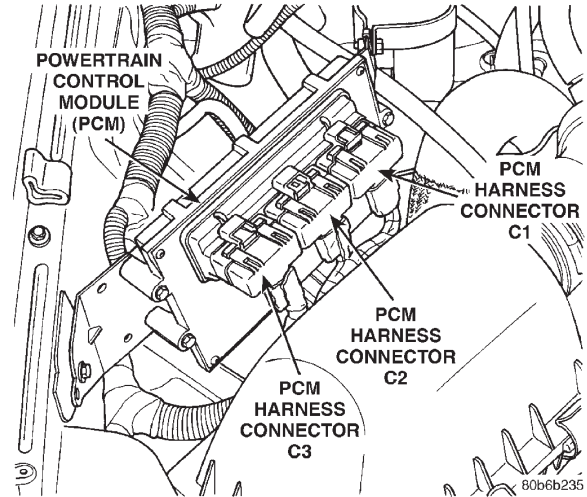
8.0 COMPONENT LOCATIONS

8.1 ENGINE CONTROL MODULE, POWERTRAIN CONTROL MODULE AND SENTRY KEY IMMOBILIZER MODULE

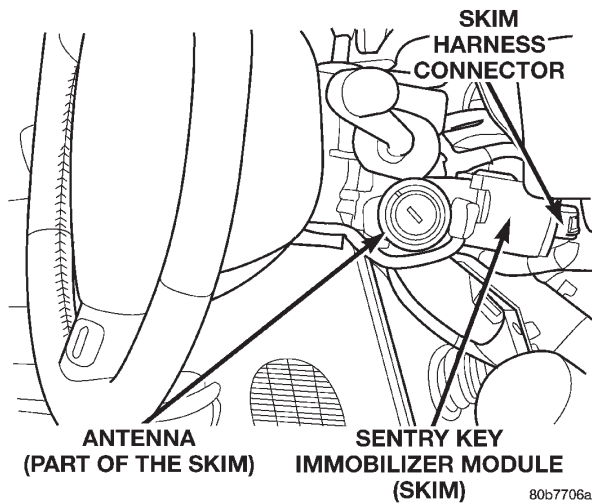
Engine Control Module



Powertrain Control Module

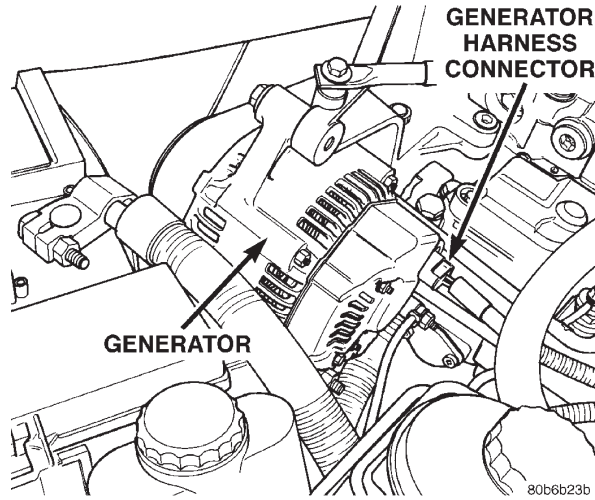
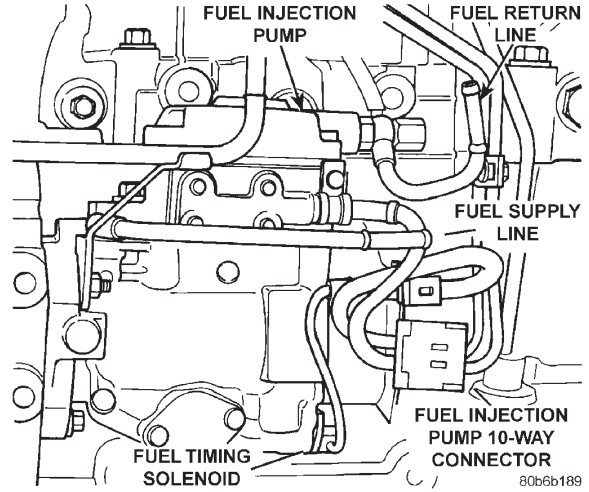
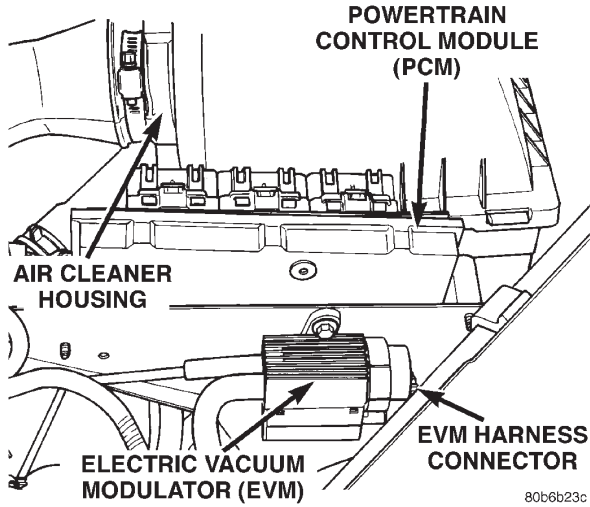


Sentry Key Immobilizer Module

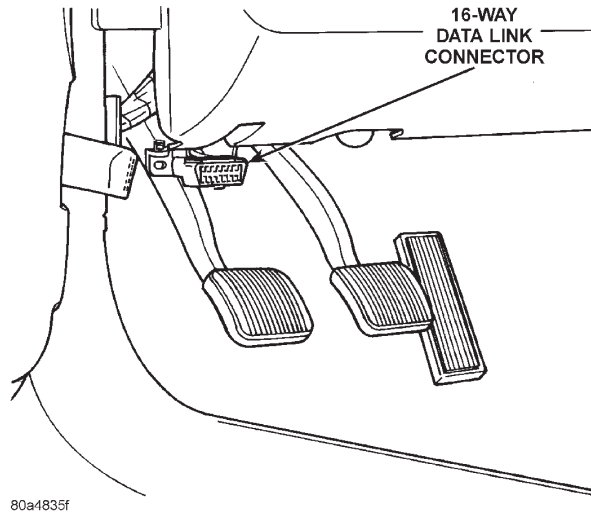


# COMPONENT LOCATIONS

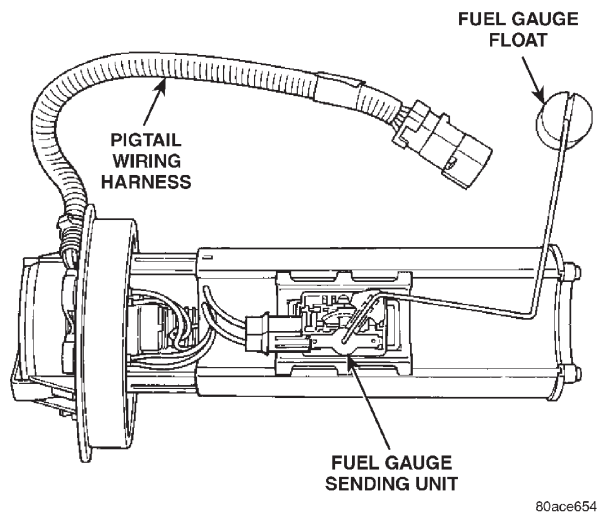
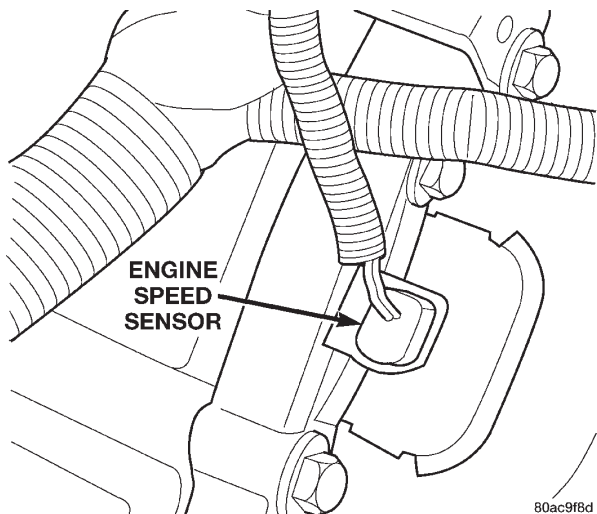
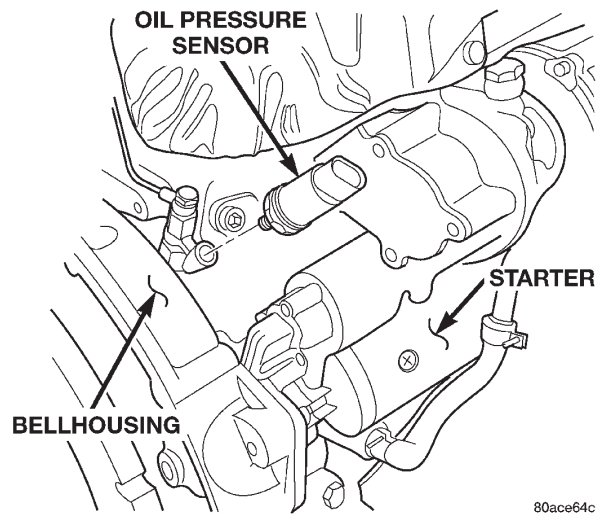
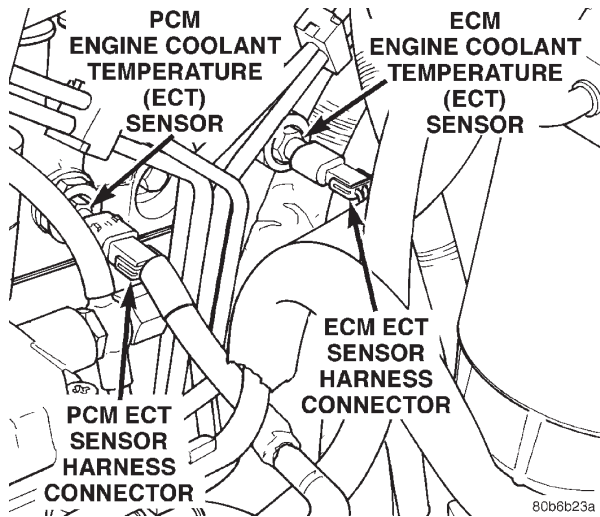
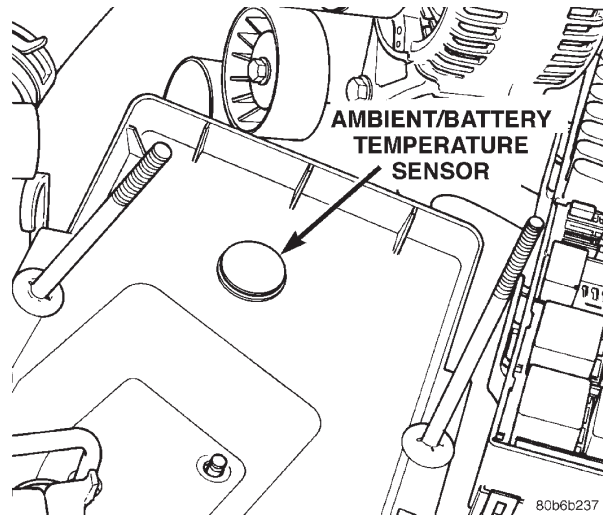
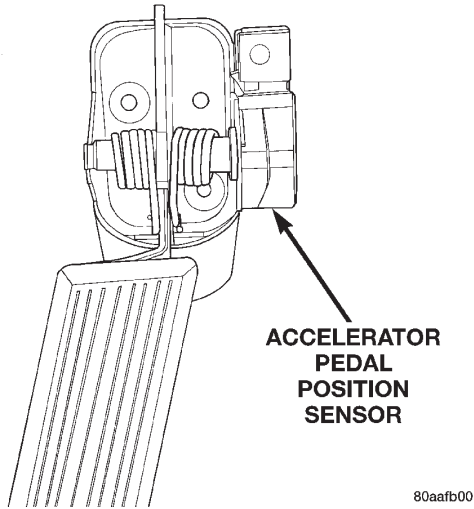
## 8.2 CONTROLS AND SOLENOIDS



## 8.3 DATA LINK CONNECTOR LHD-RHD Symmetrically Opposite



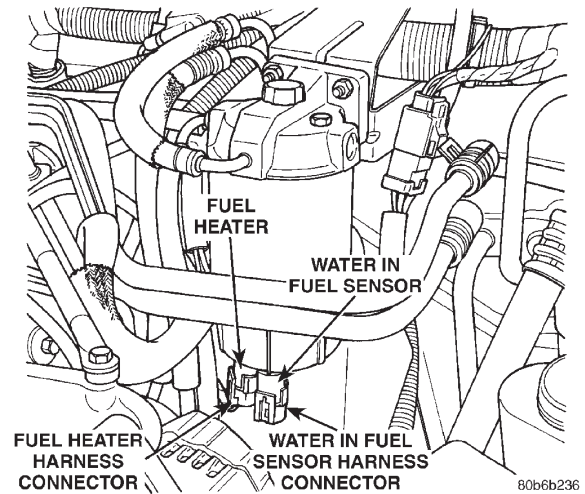
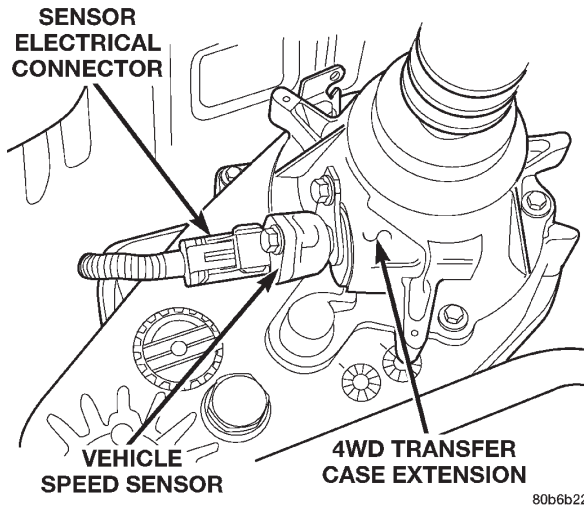
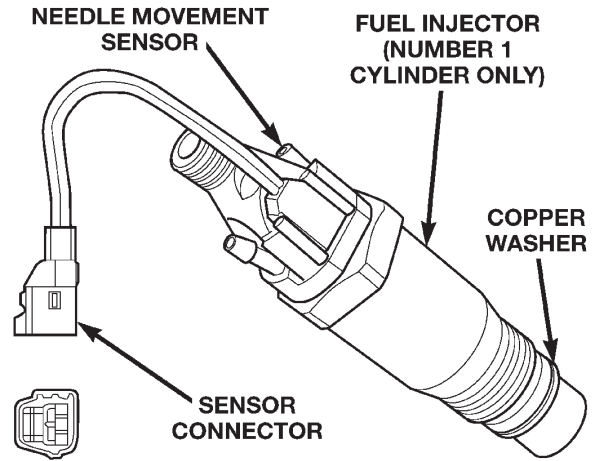
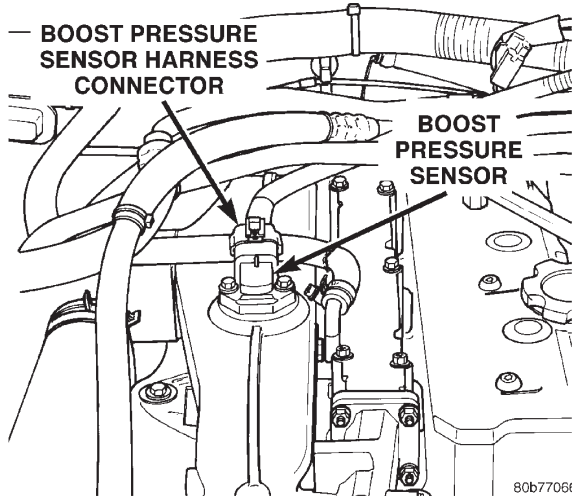
8.4 SENSORS



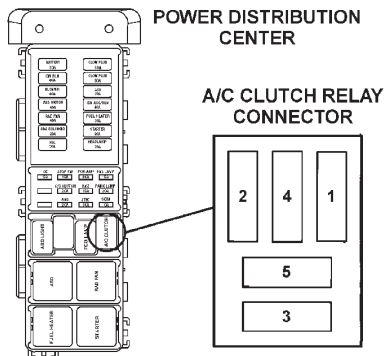


# COMPONENT LOCATIONS

## 8.4 SENSORS (Continued)

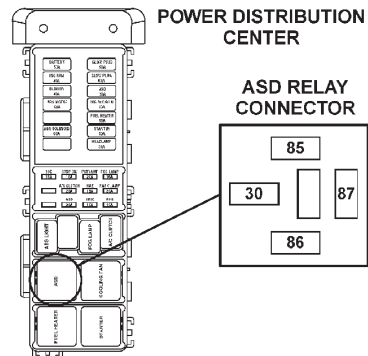


## 8.5 RELAYS



| CAV | COLOR | FUNCTION                 |
|-----|-------|--------------------------|
| 1   | DB/OR | A/C CLUTCH RELAY CONTROL |
| 2   | DG/OR | ASD RELAY OUTPUT         |
| 3   | RD/BK | FUSED BATTERY SUPPLY     |
| 5   | DB/BK | A/C CLUTCH RELAY OUTPUT  |

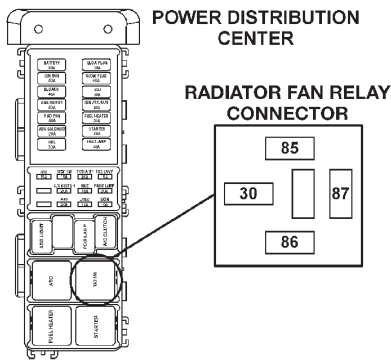
80bce9c8



| CAV | COLOR | FUNCTION             |
|-----|-------|----------------------|
| 30  | RD/LG | FUSED BATTERY SUPPLY |
| 85  | RD/LG | FUSED BATTERY SUPPLY |
| 86  | DB/YL | ASD RELAY CONTROL    |
| 87  | DG/OR | ASD RELAY OUTPUT     |

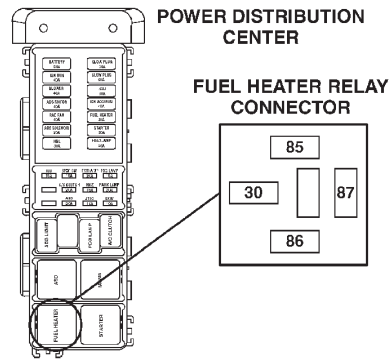
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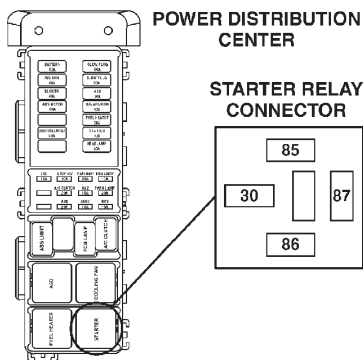
| CAV | COLOR | FUNCTION                   |
|-----|-------|----------------------------|
| 30  | LG/RD | FUSED BATTERY SUPPLY       |
| 85  | DB/PK | RADIATOR FAN RELAY CONTROL |
| 86  | DG/OR | ASD RELAY OUTPUT           |
| 87  | LB    | RADIATOR FAN RELAY OUTPUT  |

80bce9c3



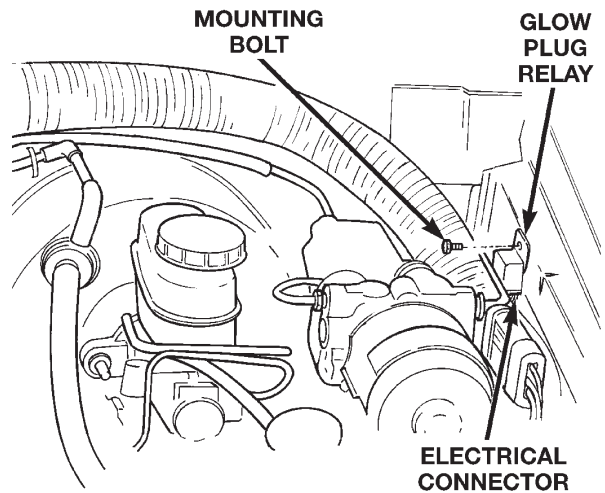
| CAV | COLOR | FUNCTION                 |
|-----|-------|--------------------------|
| 30  | LG/RD | FUSED BATTERY SUPPLY     |
| 85  | DB/WT | FUSED IGNITION OUTPUT    |
| 86  | BK    | RELAY COIL GROUND        |
| 87  | RD/BK | FUEL HEATER RELAY OUTPUT |

80bce9c2



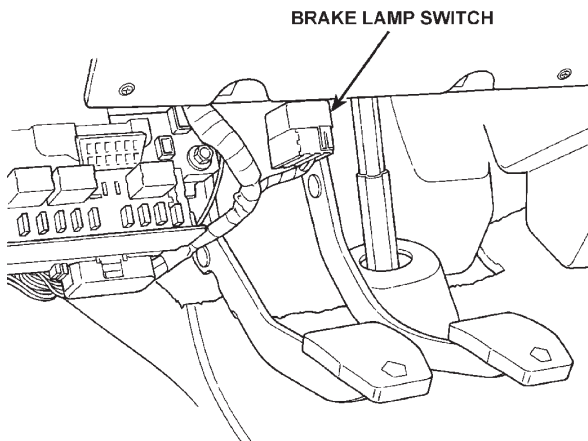
| CAV | COLOR | FUNCTION                       |
|-----|-------|--------------------------------|
| 30  | YL    | FUSED BATTERY SUPPLY           |
| 85  | BK    | GROUND                         |
| 86  | YL    | CLUTCH INTERLOCK SWITCH OUTPUT |
| 87  | BR    | STARTER RELAY OUTPUT           |

80b6b22e

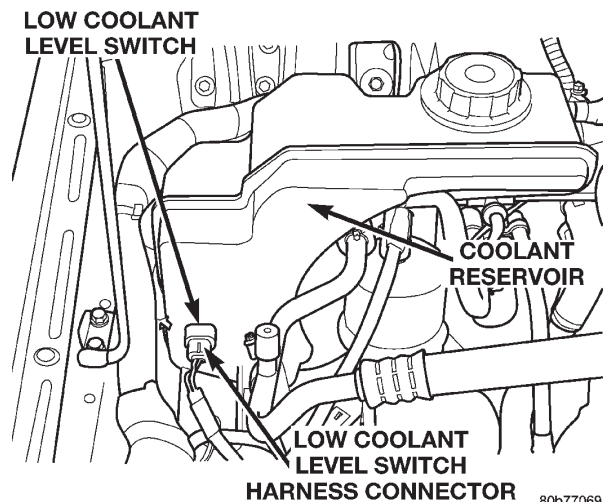


80ad08f8

## 8.6 SWITCHES



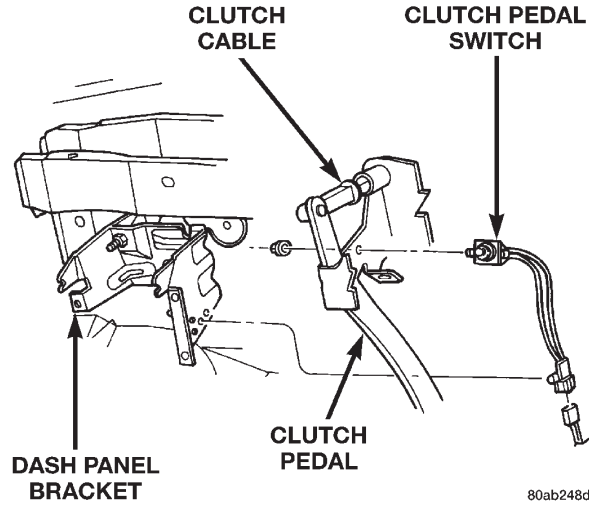
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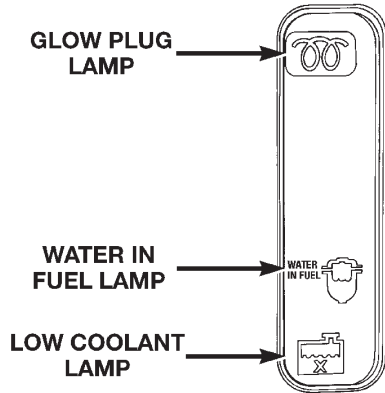
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# COMPONENT LOCATIONS

## 8.6 SWITCHES (Continued)

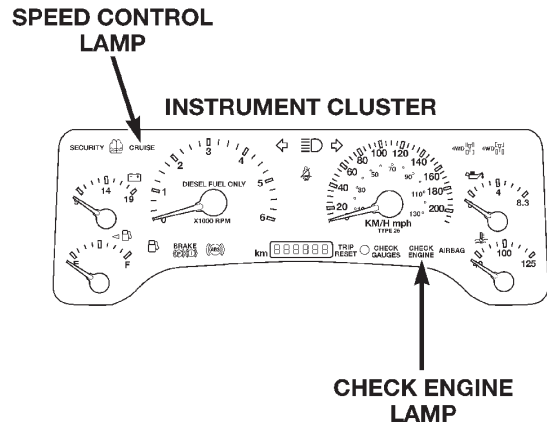


## 8.7 LAMPS



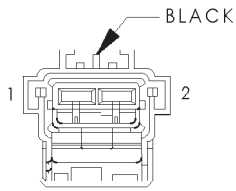
80acb0b4

**XJ BODY**



80acb0b3

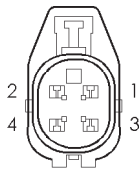
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH (DIESEL)

A/C COMPRESSOR CLUTCH (DIESEL) - BLACK 2 WAY

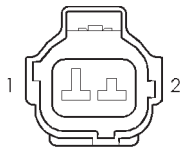
| CAV | CIRCUIT    | FUNCTION                           |
|-----|------------|------------------------------------|
| 1   | C3 14DB/BK | A/C COMPRESSOR CLUTCH RELAY OUTPUT |
| 2   | Z1 16BK    | GROUND                             |



A/C HIGH PRESSURE SWITCH

A/C HIGH PRESSURE SWITCH - 4 WAY

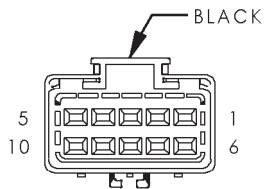
| CAV | CIRCUIT              | FUNCTION                  |
|-----|----------------------|---------------------------|
| 1   | C21 20DB/PK          | A/C SWITCH SENSE          |
| 2   | C48 18TN             | RADIATOR FAN REQUEST      |
| 3   | C90 20LG (GAS)       | A/C SWITCH SENSE          |
| 3  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



A/C LOW PRESSURE SWITCH

A/C LOW PRESSURE SWITCH - 2 WAY

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

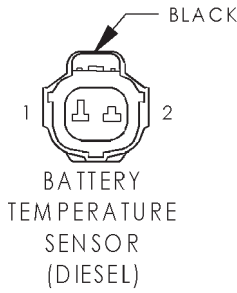


ACCELERATOR PEDAL POSITION SENSOR (DIESEL)

ACCELERATOR PEDAL POSITION SENSOR (DIESEL) - BLACK 10 WAY

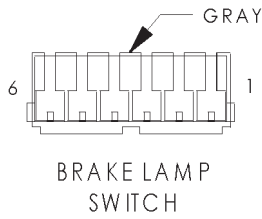
| CAV | CIRCUIT      | FUNCTION                                 |
|-----|--------------|--|
| 1   | -            | -  |
| 2   | -            | -  |
| 3   | K4 20BK/LB   | SENSOR GROUND                            |
| 4   | -            | -  |
| 5   | K151 20WT    | LOW IDLE POSITION SWITCH SIGNAL          |
| 6   | -            | -  |
| 7   | K22 200R/DB  | ACCELERATOR PEDAL POSITION SENSOR SIGNAL |
| 8   | K255 20WT/DG | ACCELERATOR PEDAL POSITION SENSOR GROUND |
| 9   | -            | -  |
| 10  | K6 20VT/WT   | 5V SUPPLY                                |

# CONNECTOR PINOUTS



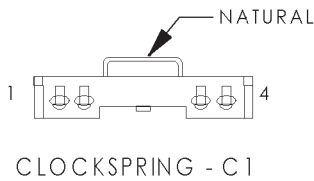
**BATTERY TEMPERATURE SENSOR (DIESEL) - BLACK 2 WAY**

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



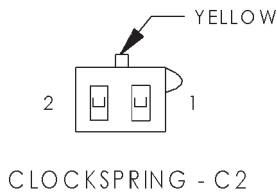
**BRAKE LAMP SWITCH - GRAY 6 WAY**

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



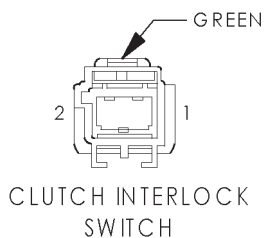
**CLOCKSPRING C1 - NATURAL 4 WAY**

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



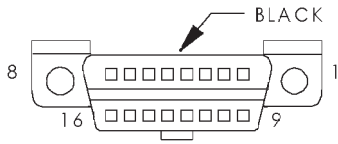
**CLOCKSPRING C2 - YELLOW 2 WAY**

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



**CLUTCH INTERLOCK SWITCH - GREEN 2 WAY**

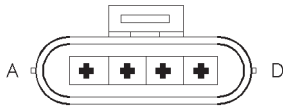
| CAV | CIRCUIT                         | FUNCTION                             |
|-----|---------------------------------|--------------------------------------|
| 1   | F45 20YL/RD (LHD DIESEL)        | FUSED IGNITION SWITCH OUTPUT (START) |
| 1   | T141 20YL (EXCEPT LHD DIESEL)   | IGNITION SWITCH OUTPUT (START)       |
| 2   | F45 20YL/RD (EXCEPT LHD DIESEL) | FUSED IGNITION SWITCH OUTPUT (START) |
| 2   | T141 20YL (LHD DIESEL)          | IGNITION SWITCH OUTPUT (START)       |



DATA LINK CONNECTOR

## DATA LINK CONNECTOR - BLACK 16 WAY

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



EGR SOLENOID (DIESEL)

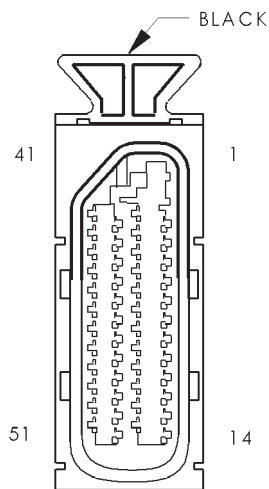
## EGR SOLENOID (DIESEL) - 4 WAY

| CAV | CIRCUIT      | FUNCTION                               |
|-----|--------------|--|
| A   | F142 18DG/OR | FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT |
| B   | K35 18GY/YL  | EGR SOLENOID CONTROL                   |
| C   | -            | -                                      |
| D   | Z1 18BK      | GROUND                                 |

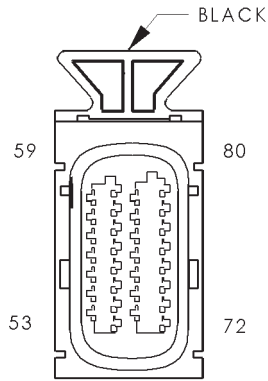
# CONNECTOR PINOUTS

## ENGINE CONTROL MODULE C1 (DIESEL) - BLACK 51 WAY

| CAV | CIRCUIT      | FUNCTION                                 |
|-----|--------------|--|
| 1   | Z12 14BK/TN  | GROUND                                   |
| 2   | A142 16DG/OR | AUTOMATIC SHUT DOWN RELAY OUTPUT         |
| 3   | -            | -  |
| 4   | -            | -  |
| 5   | C13 20DB/OR  | A/C COMPRESSOR CLUTCH RELAY CONTROL      |
| 6   | K159 18VT/RD | ENGINE SPEED SENSOR SIGNAL               |
| 7   | -            | -  |
| 8   | C103 18DG    | A/C REQUEST INPUT                        |
| 9   | K29 20WT/PK  | BRAKE LAMP SWITCH SENSE                  |
| 10  | C22 20DB/WT  | A/C PRESSURE SWITCH SENSE                |
| 11  | K6 20VT/WT   | 5V SUPPLY                                |
| 12  | K151 20WT    | LOW IDLE POSITION SWITCH SIGNAL          |
| 13  | K21 20BK/RD  | INTAKE AIR TEMPERATURE SENSOR SIGNAL     |
| 14  | -            | -  |
| 15  | -            | -  |
| 16  | -            | -  |
| 17  | C27 18DB/PK  | RADIATOR FAN RELAY CONTROL               |
| 18  | G8 18LB/BK   | FUEL MONITOR OUTPUT SIGNAL               |
| 19  | -            | -  |
| 20  | L50 20WT/TN  | BRAKE LAMP SWITCH OUTPUT                 |
| 21  | -            | -  |
| 22  | -            | -  |
| 23  | K255 20WT/DG | ACCELERATOR PEDAL POSITION SENSOR GROUND |
| 24  | K22 20OR/DB  | ACCELERATOR PEDAL POSITION SENSOR SIGNAL |
| 25  | -            | -  |
| 26  | -            | -  |
| 27  | Z12 16BK/TN  | GROUND                                   |
| 28  | A142 16DG/OR | AUTOMATIC SHUT DOWN RELAY OUTPUT         |
| 29  | K35 18GY/YL  | EGR SOLENOID CONTROL                     |
| 30  | V66 18RD/LG  | SPEED CONTROL INDICATOR SIGNAL           |
| 31  | -            | -  |
| 32  | K185 20OR/LB | WAIT TO START INDICATOR DRIVER           |
| 33  | K51 20DB/YL  | AUTOMATIC SHUT DOWN RELAY CONTROL        |
| 34  | K48 18OR/RD  | FAULT INDICATOR REQUEST INPUT            |
| 35  | -            | -  |
| 36  | -            | -  |
| 37  | -            | -  |
| 38  | G55 18OR/BK  | ENGINE DISABLE SIGNAL                    |
| 39  | K9 20LB      | 5V SUPPLY                                |
| 40  | K1 20DG/RD   | BOOST PRESSURE SENSOR SIGNAL             |
| 41  | -            | -  |
| 42  | K152 18WT    | GLOW PLUG RELAY CONTROL                  |
| 43  | -            | -  |
| 44  | -            | -  |
| 45  | D21 20PK     | SCI TRANSMIT                             |
| 46  | -            | -  |
| 47  | F12 18DB/WT  | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| 48  | C48 18TN     | RADIATOR FAN REQUEST                     |
| 49  | -            | -  |
| 50  | -            | -  |
| 51  | G7 20WT/OR   | VEHICLE SPEED SENSOR SIGNAL              |

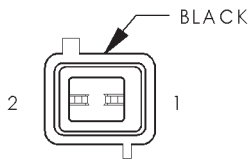


ENGINE CONTROL  
MODULE - C1  
(DIESEL)



ENGINE CONTROL MODULE - C2 (DIESEL)

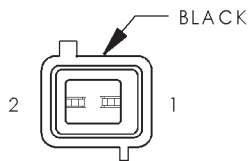
| ENGINE CONTROL MODULE C2 (DIESEL) - BLACK 29 WAY |              |   |
|--|--------------|---|
| CAV  | CIRCUIT      | FUNCTION                                    |
| 52   | -            | -   |
| 53   | K156 20GY    | FUEL TEMPERATURE SENSOR SIGNAL              |
| 54   | K2 20TN/BK   | ENGINE COOLANT TEMPERATURE SENSOR SIGNAL    |
| 55   | K68 18LG/YL  | NEEDLE MOVEMENT SENSOR GROUND               |
| 56   | K134 20LB/BK | CONTROL SLEEVE POSITION SENSOR SIGNAL       |
| 57   | K57 20LG/OR  | CONTROL SLEEVE POSITION SENSOR MIDDLE TAP   |
| 58   | K135 20WT/BK | CONTROL SLEEVE POSITION SENSOR MEASURE COIL |
| 59   | K140 18TN/WT | FUEL QUANTITY ACTUATOR CONTROL              |
| 60   | V37 20RD/LG  | SPEED CONTROL SWITCH SIGNAL                 |
| 61   | K4 20BK/LB   | SENSOR GROUND                               |
| 62   | K67 18BR/BK  | NEEDLE MOVEMENT SENSOR SIGNAL               |
| 63   | -            | -   |
| 64   | -            | -   |
| 65   | -            | -   |
| 66   | K140 18TN/WT | FUEL QUANTITY ACTUATOR CONTROL              |
| 67   | K24 20GY/BK  | ENGINE SPEED SENSOR SIGNAL                  |
| 68   | -            | -   |
| 69   | K3 20LG/BK   | ENGINE SPEED SENSOR GROUND                  |
| 70   | -            | -   |
| 71   | -            | -   |
| 72   | -            | -   |
| 73   | -            | -   |
| 74   | -            | -   |
| 75   | -            | -   |
| 76   | -            | -   |
| 77   | K153 18OR    | FUEL SHUTDOWN SOLENOID CONTROL              |
| 78   | -            | -   |
| 79   | K126 18LG    | FUEL TIMING SOLENOID CONTROL                |
| 80   | K140 18TN/WT | FUEL QUANTITY ACTUATOR CONTROL              |



ENGINE COOLANT TEMPERATURE SENSOR NO. 1 (DIESEL ECM)

| ENGINE COOLANT TEMPERATURE SENSOR NO. 1 (DIESEL ECM) - BLACK 2 WAY |            |  |
|--|------------|--|
| CAV  | CIRCUIT    | FUNCTION                                     |
| 1  | K2 18TN/BK | ECM ENGINE COOLANT TEMPERATURE SENSOR SIGNAL |
| 2  | K4 18BK/LB | SENSOR GROUND                                |

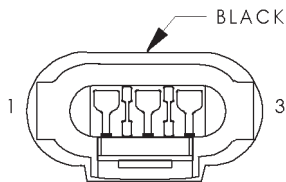
# CONNECTOR PINOUTS



ENGINE COOLANT TEMPERATURE SENSOR NO. 2 (DIESEL PCM)

**ENGINE COOLANT TEMPERATURE SENSOR NO. 2 (DIESEL PCM) - BLACK 2 WAY**

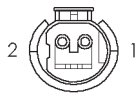
| CAV | CIRCUIT      | FUNCTION                                     |
|-----|--------------|--|
| 1   | K222 18TN/RD | PCM ENGINE COOLANT TEMPERATURE SENSOR SIGNAL |
| 2   | K167 18BR/YL | SENSOR GROUND                                |



ENGINE SPEED SENSOR (DIESEL)

**ENGINE SPEED SENSOR (DIESEL) - BLACK 3 WAY**

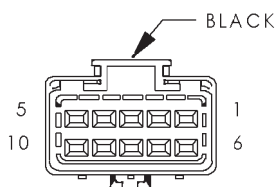
| CAV | CIRCUIT     | FUNCTION                   |
|-----|-------------|----------------------------|
| 1   | K3 20LG/BK  | ENGINE SPEED SENSOR GROUND |
| 2   | -           | -                          |
| 3   | K24 20GY/BK | ENGINE SPEED SENSOR SIGNAL |



FUEL HEATER (DIESEL)

**FUEL HEATER (DIESEL) - 2 WAY**

| CAV | CIRCUIT     | FUNCTION                 |
|-----|-------------|--------------------------|
| 1   | A93 14RD/BK | FUEL HEATER RELAY OUTPUT |
| 2   | Z1 16BK     | GROUND                   |

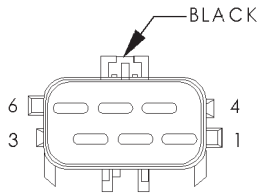


FUEL INJECTION PUMP (DIESEL)

**FUEL INJECTION PUMP (DIESEL) - BLACK 10 WAY**

| CAV | CIRCUIT      | FUNCTION   |
|-----|--------------|--|
| 1   | K134 20LB/BK | CONTROL SLEEVE POSITION SENSOR SIGNAL            |
| 2   | K57 20LG/OR  | CONTROL SLEEVE POSITION SENSOR MIDDLE TAP SIGNAL |
| 3   | K135 20WT/BK | CONTROL SLEEVE POSITION SENSOR MEASURE COIL      |
| 4   | K4 20BK/LB   | SENSOR GROUND                                    |
| 5   | K126 18LG    | FUEL TIMING SOLENOID CONTROL                     |
| 6   | K153 18OR    | FUEL SHUT DOWN SOLENOID CONTROL                  |
| 7   | K156 20GY    | FUEL TEMPERATURE SENSOR SIGNAL                   |
| 8   | K140 16TN/WT | FUEL QUANTITY ACTUATOR CONTROL                   |
| 9   | A142 16DG/OR | AUTOMATIC SHUT DOWN RELAY OUTPUT                 |
| 10  | F142 16DG/OR | FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT           |

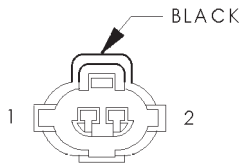




FUEL LEVEL  
SENSOR  
(DIESEL)

### FUEL LEVEL SENSOR (DIESEL) - BLACK 6 WAY

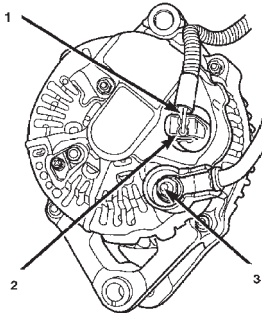
| CAV | CIRCUIT      | FUNCTION                 |
|-----|--------------|--------------------------|
| 1   | A141 16DG/WT | NOT USED                 |
| 2   | -            | -                        |
| 3   | K226 20DB/LG | FUEL LEVEL SENSOR SIGNAL |
| 4   | K167 20BR/YL | SENSOR GROUND            |
| 5   | -            | -                        |
| 6   | Z1 16BK      | NOT USED                 |



GENERATOR

### GENERATOR - BLACK 2 WAY

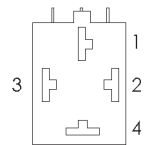
| CAV | CIRCUIT              | FUNCTION         |
|-----|----------------------|------------------|
| 1   | K72 16DG/OR (GAS)    | GENERATOR SOURCE |
| 1   | K72 18DG/OR (DIESEL) | GENERATOR SOURCE |
| 2   | K20 16DG (GAS)       | GENERATOR FIELD  |
| 2   | K20 18DG (DIESEL)    | GENERATOR FIELD  |



GENERATOR

### GENERATOR - 3 WAY

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

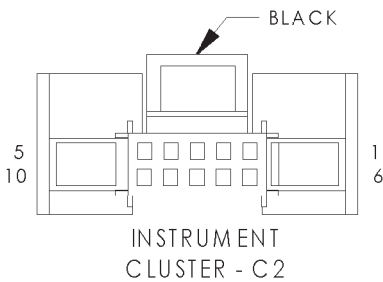


GLOW PLUG  
RELAY  
(DIESEL)

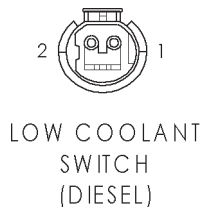
### GLOW PLUG RELAY (DIESEL) - 4 WAY

| CAV | CIRCUIT      | FUNCTION                               |
|-----|--------------|--|
| 1   | A54 10RD/GY  | FUSED B(+)                             |
| 2   | F142 18DG/OR | FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT |
| 3   | K152 18WT    | GLOW PLUG RELAY CONTROL                |
| 4   | K154 10GY    | GLOW PLUG RELAY OUTPUT                 |

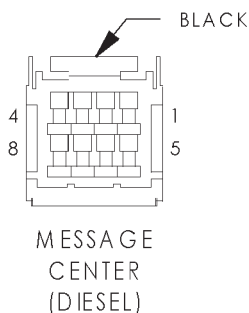
# CONNECTOR PINOUTS



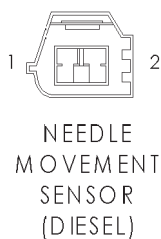
| INSTRUMENT CLUSTER C2 - BLACK 10 WAY |              |                                    |
|--------------------------------------|--------------|------------------------------------|
| CAV                                  | CIRCUIT      | FUNCTION                           |
| 1                                    | D2 20WT/BK   | CCD BUS(-)                         |
| 2                                    | D1 20VT/BR   | CCD BUS(+)                         |
| 3                                    | C81 20LB/WT  | REAR WINDOW DEFOGGER RELAY CONTROL |
| 4                                    | C80 20DB/WT  | REAR WINDOW DEFOGGER SWITCH SENSE  |
| 5                                    | G107 20BK/RD | 4WD SWITCH SENSE (PART-TIME)       |
| 6                                    | L60 20TN     | RIGHT TURN SIGNAL                  |
| 7                                    | G106 20BK/WT | 4WD SWITCH SENSE (FULL-TIME)       |
| 8                                    | G26 20LB     | KEY-IN IGNITION SWITCH SENSE       |
| 9                                    | Z2 18BK/LG   | GROUND                             |
| 10                                   | G10 20LG/RD  | SEAT BELT SWITCH SENSE             |



| LOW COOLANT SWITCH (DIESEL) - 2 WAY |              |                             |
|-------------------------------------|--------------|-----------------------------|
| CAV                                 | CIRCUIT      | FUNCTION                    |
| 1                                   | G18 18PK/BK  | COOLANT LEVEL SWITCH SIGNAL |
| 2                                   | K167 20BR/YL | SENSOR GROUND               |

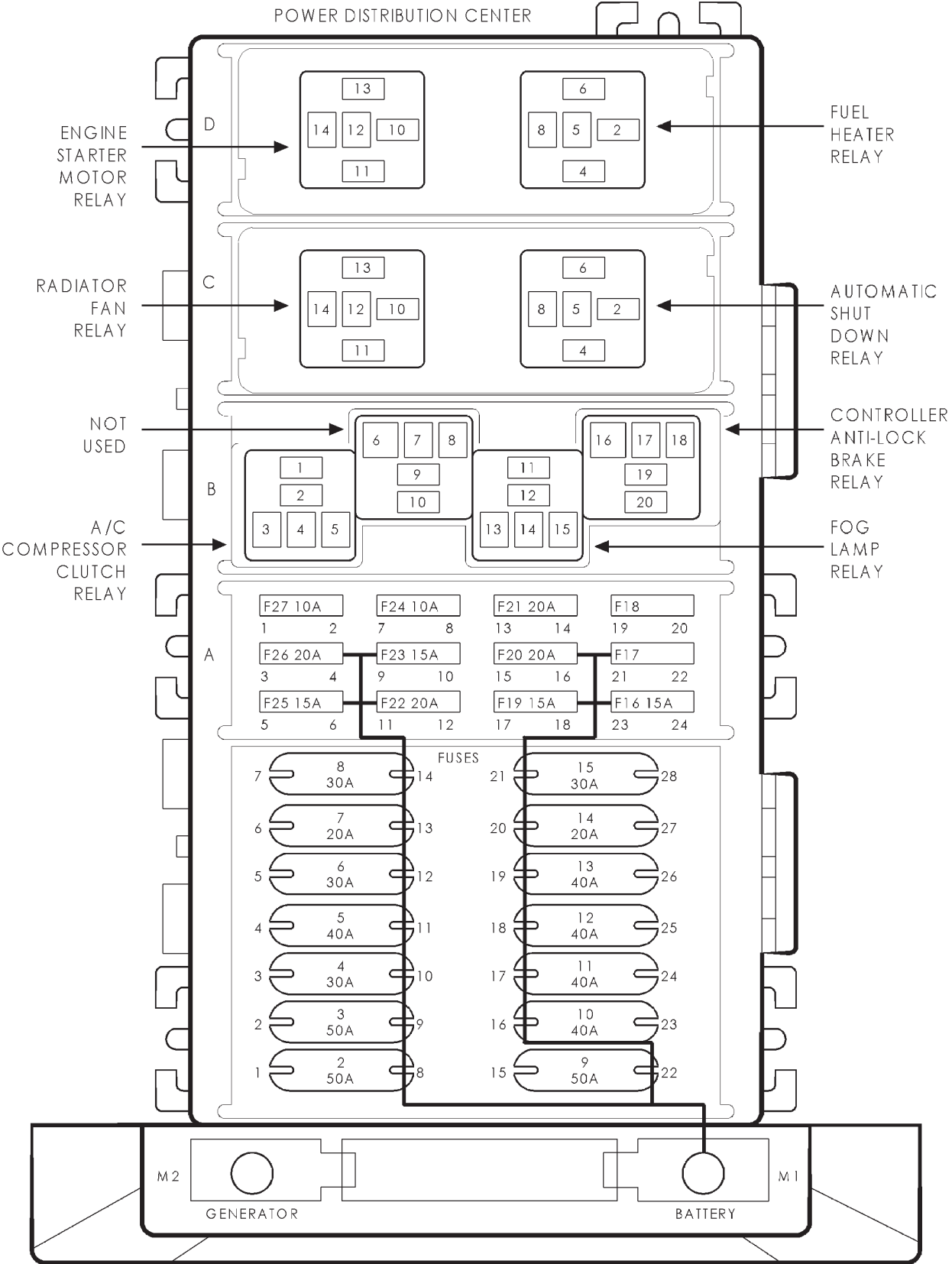


| MESSAGE CENTER (DIESEL) - BLACK 8 WAY |              |  |
|---------------------------------------|--------------|--|
| CAV                                   | CIRCUIT      | FUNCTION                                 |
| 1                                     | F87 20WT/BK  | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| 2                                     | -            | -  |
| 3                                     | -            | -  |
| 4                                     | K185 20OR/LB | WAIT TO START INDICATOR DRIVER           |
| 5                                     | -            | -  |
| 6                                     | -            | -  |
| 7                                     | G86 20TN/OR  | WATER IN FUEL INDICATOR DRIVER           |
| 8                                     | G154 20VT/LG | LOW COOLANT INDICATOR DRIVER             |



| NEEDLE MOVEMENT SENSOR (DIESEL) - 2 WAY |             |                            |
|---|-------------|----------------------------|
| CAV                                     | CIRCUIT     | FUNCTION                   |
| 1                                       | K67 18BR/BK | NEEDLE MOVEMENT SENSOR (+) |
| 2                                       | K68 18LG/YL | NEEDLE MOVEMENT SENSOR (-) |

# CONNECTOR PINOUTS



CONNECTOR PINOUTS

# CONNECTOR PINOUTS

## FUSES (DIESEL)

| FUSE NO. | AMPS | FUSED CIRCUIT | FUNCTION                               |
|----------|------|---------------|--|
| 1        | -    | -             | -                                      |
| 2        | 50A  | A54 12RD/GY   | FUSED B(+)                             |
| 3        | 50A  | A54 12RD/GY   | FUSED B(+)                             |
| 4        | 30A  | A16 12RD/LG   | FUSED B(+)                             |
| 5        | 40A  | A1 12RD       | FUSED B(+)                             |
| 6        | 30A  | A61 14LG/RD   | FUSED B(+)                             |
| 7        | 20A  | A41 16YL      | FUSED B(+)                             |
| 8        | 30A  | A3 14RD/WT    | FUSED B(+)                             |
| 9        | 50A  | A7 10RD/BK    | FUSED B(+)                             |
| 10       | 40A  | A2 12PK/BK    | FUSED B(+)                             |
| 11       | 40A  | A111 12RD/LG  | FUSED B(+)                             |
| 12       | 40A  | F141 12LG/RD  | FUSED B(+)                             |
| 13       | 40A  | F141 12LG/RD  | FUSED B(+)                             |
| 14       | 20A  | A20 12RD/DB   | FUSED B(+)                             |
| 15       | 30A  | A4 12BK/PK    | FUSED B(+)                             |
| 16       | 15A  | M1 20PK       | FUSED B(+)                             |
| 16       | 15A  | M1 20PK       | FUSED B(+)                             |
| 17       | -    | -             | -                                      |
| 18       | -    | -             | -                                      |
| 19       | 15A  | F32 20PK/DB   | FUSED B(+)                             |
| 20       | 20A  | A17 18RD/BK   | FUSED B(+)                             |
| 20       | 20A  | A17 16RD/BK   | FUSED B(+)                             |
| 21       | 20A  | F142 16DG/OR  | FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT |
| 22       | 20A  | F75 16VT      | FUSED B(+)                             |
| 23       | 15A  | L9 20BK/PK    | FUSED B(+)                             |
| 24       | 10A  | F16 16RD/LG   | FUSED B(+)                             |
| 25       | 15A  | F61 20WT/OR   | FUSED B(+)                             |
| 26       | 20A  | F34 18TN/BK   | FUSED B(+)                             |
| 27       | 10A  | F1 20DB/GY    | FUSED B(+)                             |

## A/C COMPRESSOR CLUTCH RELAY (DIESEL) - BLACK 2 WAY

| CAV | CIRCUIT     | FUNCTION                            |
|-----|-------------|-------------------------------------|
| B1  | A17 16RD/BK | FUSED B(+)                          |
| B2  | C3 16DB/BK  | A/C COMPRESSOR CLUTCH RELAY OUTPUT  |
| B3  | C13 20DB/OR | A/C COMPRESSOR CLUTCH RELAY CONTROL |
| B4  | -           | -                                   |
| B5  | A142 18DG   | AUTOMATIC SHUT DOWN RELAY OUTPUT    |

## AUTOMATIC SHUT DOWN RELAY (DIESEL)

| CAV | CIRCUIT      | FUNCTION                          |
|-----|--------------|-----------------------------------|
| C2  | A16 12RD/LG  | FUSED B(+)                        |
| C4  | A16 12RD/LG  | FUSED B(+)                        |
| C5  | -            | -                                 |
| C6  | K51 20DB/YL  | AUTOMATIC SHUT DOWN RELAY CONTROL |
| C8  | A142 16DG/OR | AUTOMATIC SHUT DOWN RELAY OUTPUT  |
| C8  | A142 18DG    | AUTOMATIC SHUT DOWN RELAY OUTPUT  |

## ENGINE STARTER MOTOR RELAY (DIESEL)

| CAV | CIRCUIT    | FUNCTION                          |
|-----|------------|-----------------------------------|
| D10 | A41 16YL   | FUSED B(+)                        |
| D11 | T141 20YL  | IGNITION SWITCH OUTPUT (START)    |
| D12 | -          | -                                 |
| D13 | Z1 20BK    | GROUND                            |
| D13 | Z1 20BK/YL | GROUND                            |
| D14 | T40 16BR   | ENGINE STARTER MOTOR RELAY OUTPUT |

## FUEL HEATER RELAY (DIESEL)

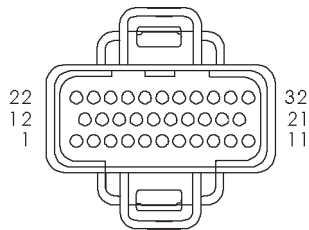
| CAV | CIRCUIT     | FUNCTION                                 |
|-----|-------------|--|
| D2  | A61 14LG/RD | FUSED B(+)                               |
| D4  | F12 18DB/WT | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| D5  | -           | -  |
| D6  | Z1 20BK     | GROUND                                   |
| D8  | A93 14RD/BK | FUEL HEATER RELAY OUTPUT                 |

## RADIATOR FAN RELAY

| CAV | CIRCUIT           | FUNCTION                                 |
|-----|-------------------|--|
| C10 | F141 12LG/RD      | FUSED B(+)                               |
| C11 | A142 18DG         | AUTOMATIC SHUT DOWN RELAY OUTPUT         |
| C11 | A142 18DG         | AUTOMATIC SHUT DOWN RELAY OUTPUT         |
| C12 | -                 | -  |
| C13 | C27 18DB/PK (RHD) | RADIATOR FAN RELAY CONTROL               |
| C13 | C27 20DB/PK (LHD) | RADIATOR FAN RELAY CONTROL               |
| C14 | C25 12LB          | RADIATOR FAN RELAY OUTPUT                |
| D10 | F141 12LG/RD      | FUSED B(+)                               |
| D11 | F20 18WT          | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| D11 | F20 18WT          | FUSED IGNITION SWITCH OUTPUT (RUN-START) |
| D12 | -                 | -  |
| D13 | C27 18DB/PK       | RADIATOR FAN RELAY CONTROL               |
| D14 | C25 12LB          | RADIATOR FAN RELAY OUTPUT                |

# CONNECTOR PINOUTS

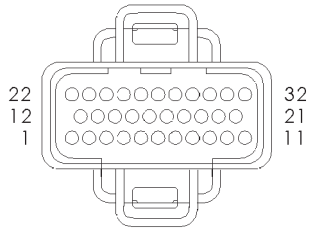
## POWERTRAIN CONTROL MODULE C1 (DIESEL) - 32 WAY



POWERTRAIN  
CONTROL MODULE - C1  
(DIESEL)

| CAV | CIRCUIT      | FUNCTION                          |
|-----|--------------|-----------------------------------|
| 1   | -            | -                                 |
| 2   | A142 16DG/OR | AUTOMATIC SHUT DOWN RELAY OUTPUT  |
| 3   | -            | -                                 |
| 4   | K167 18BR/YL | SENSOR GROUND                     |
| 5   | -            | -                                 |
| 6   | -            | -                                 |
| 7   | -            | -                                 |
| 8   | K159 18VT/RD | ENGINE SPEED SENSOR SIGNAL        |
| 9   | -            | -                                 |
| 10  | -            | -                                 |
| 11  | -            | -                                 |
| 12  | G18 18PK/BK  | COOLANT LEVEL SWITCH SIGNAL       |
| 13  | -            | -                                 |
| 14  | -            | -                                 |
| 15  | -            | -                                 |
| 16  | K222 18TN/RD | ENGINE COOLANT TEMP SENSOR SIGNAL |
| 17  | K7 18OR      | 5V SUPPLY                         |
| 18  | G8 18LB/BK   | FUEL MONITOR OUTPUT SIGNAL        |
| 19  | -            | -                                 |
| 20  | -            | -                                 |
| 21  | -            | -                                 |
| 22  | F16 16RD/LG  | FUSED B(+)                        |
| 23  | -            | -                                 |
| 24  | -            | -                                 |
| 25  | -            | -                                 |
| 26  | -            | -                                 |
| 27  | G123 18DG/WT | WATER IN FUEL SENSOR SIGNAL       |
| 28  | -            | -                                 |
| 29  | -            | -                                 |
| 30  | -            | -                                 |
| 31  | Z12 14BK/TN  | GROUND                            |
| 32  | Z12 14BK/TN  | GROUND                            |

## POWERTRAIN CONTROL MODULE C2 (DIESEL) - 32 WAY

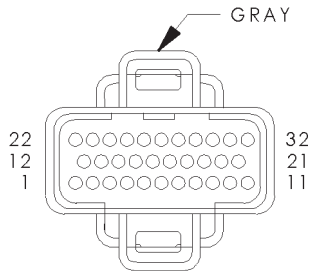


POWERTRAIN  
CONTROL MODULE - C2  
(DIESEL)

| CAV | CIRCUIT     | FUNCTION                          |
|-----|-------------|-----------------------------------|
| 1   | -           | -                                 |
| 2   | -           | -                                 |
| 3   | -           | -                                 |
| 4   | -           | -                                 |
| 5   | -           | -                                 |
| 6   | -           | -                                 |
| 7   | -           | -                                 |
| 8   | -           | -                                 |
| 9   | -           | -                                 |
| 10  | K20 18DG    | GENERATOR FIELD                   |
| 11  | -           | -                                 |
| 12  | -           | -                                 |
| 13  | -           | -                                 |
| 14  | -           | -                                 |
| 15  | -           | -                                 |
| 16  | -           | -                                 |
| 17  | -           | -                                 |
| 18  | V66 18RD/LG | SPEED CONTROL INDICATOR SIGNAL    |
| 19  | -           | -                                 |
| 20  | -           | -                                 |
| 21  | -           | -                                 |
| 22  | -           | -                                 |
| 23  | G60 18GY/YL | ENGINE OIL PRESSURE SENSOR SIGNAL |
| 24  | -           | -                                 |
| 25  | -           | -                                 |
| 26  | -           | -                                 |
| 27  | G7 18WT/OR  | VEHICLE SPEED SENSOR SIGNAL       |
| 28  | -           | -                                 |
| 29  | -           | -                                 |
| 30  | -           | -                                 |
| 31  | -           | -                                 |
| 32  | -           | -                                 |

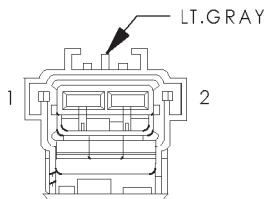
# CONNECTOR PINOUTS

CONNECTOR PINOUTS



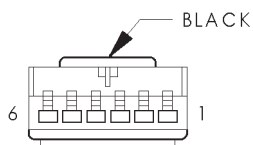
POWERTRAIN  
CONTROL MODULE - C3  
(DIESEL)

| POWERTRAIN CONTROL MODULE C3 (DIESEL) - 32 WAY |              |                                   |
|--|--------------|-----------------------------------|
| CAV  | CIRCUIT      | FUNCTION                          |
| 1  | C103 18DG    | A/C REQUEST OUTPUT                |
| 2  | -            | -                                 |
| 3  | -            | -                                 |
| 4  | -            | -                                 |
| 5  | -            | -                                 |
| 6  | -            | -                                 |
| 7  | -            | -                                 |
| 8  | G154 18VT/LG | LOW COOLANT INDICATOR DRIVER      |
| 9  | G86 18TN/OR  | WATER IN FUEL INDICATOR DRIVER    |
| 10   | -            | -                                 |
| 11   | -            | -                                 |
| 12   | A142 16DG/OR | AUTOMATIC HUT DOWN RELAY OUTPUT   |
| 13   | -            | -                                 |
| 14   | -            | -                                 |
| 15   | K118 18PK/YL | BATTERY TEMPERATURE SENSOR SIGNAL |
| 16   | G55 18OR/BK  | ENABLE DISABLE SIGNAL             |
| 17   | -            | -                                 |
| 18   | -            | -                                 |
| 19   | -            | -                                 |
| 20   | -            | -                                 |
| 21   | -            | -                                 |
| 22   | K48 18OR/RD  | FAULT INDICATOR REQUEST INPUT     |
| 23   | C90 18LG     | A/C SWITCH SENSE                  |
| 24   | -            | -                                 |
| 25   | K72 18DG/OR  | GENERATOR SOURCE                  |
| 26   | K226 18DB/LG | FUEL LEVEL SENSOR SIGNAL          |
| 27   | D21 18BK     | SCI TRANSMIT                      |
| 28   | D2 18WT/BK   | CCD BUS (-)                       |
| 29   | D20 18LG/BK  | SCI RECEIVE                       |
| 30   | D1 18VT/BR   | CCD BUS (+)                       |
| 31   | -            | -                                 |
| 32   | -            | -                                 |



RADIATOR  
FAN MOTOR

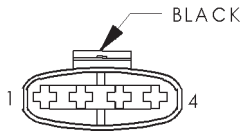
| RADIATOR FAN MOTOR - LT. GRAY 2 WAY |          |                           |
|-------------------------------------|----------|---------------------------|
| CAV                                 | CIRCUIT  | FUNCTION                  |
| 1                                   | C25 12LB | RADIATOR FAN RELAY OUTPUT |
| 2                                   | Z1 12BK  | GROUND                    |



SENTRY KEY  
IMMOBILIZER  
MODULE

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

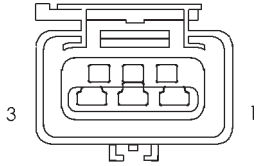




TURBO BOOST  
PRESSURE  
SENSOR  
(DIESEL)

### TURBO BOOST PRESSURE SENSOR (DIESEL) - BLACK 4 WAY

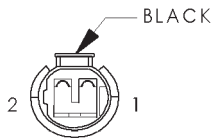
| CAV | CIRCUIT     | FUNCTION                             |
|-----|-------------|--------------------------------------|
| 1   | K4 20BK/LB  | SENSOR GROUND                        |
| 2   | K21 20BK/RD | INTAKE AIR TEMPERATURE SENSOR SIGNAL |
| 3   | K9 20LB     | 5V SUPPLY                            |
| 4   | K1 20DG/RD  | BOOST PRESSURE SENSOR SIGNAL         |



VEHICLE SPEED  
SENSOR  
(DIESEL)

### VEHICLE SPEED SENSOR (DIESEL) - 3 WAY

| CAV | CIRCUIT      | FUNCTION                    |
|-----|--------------|-----------------------------|
| 1   | K7 18OR      | 5V SUPPLY                   |
| 2   | K167 18BR/YL | SENSOR GROUND               |
| 3   | G7 8WT/OR    | VEHICLE SPEED SENSOR SIGNAL |



WATER IN FUEL  
SENSOR  
(DIESEL)

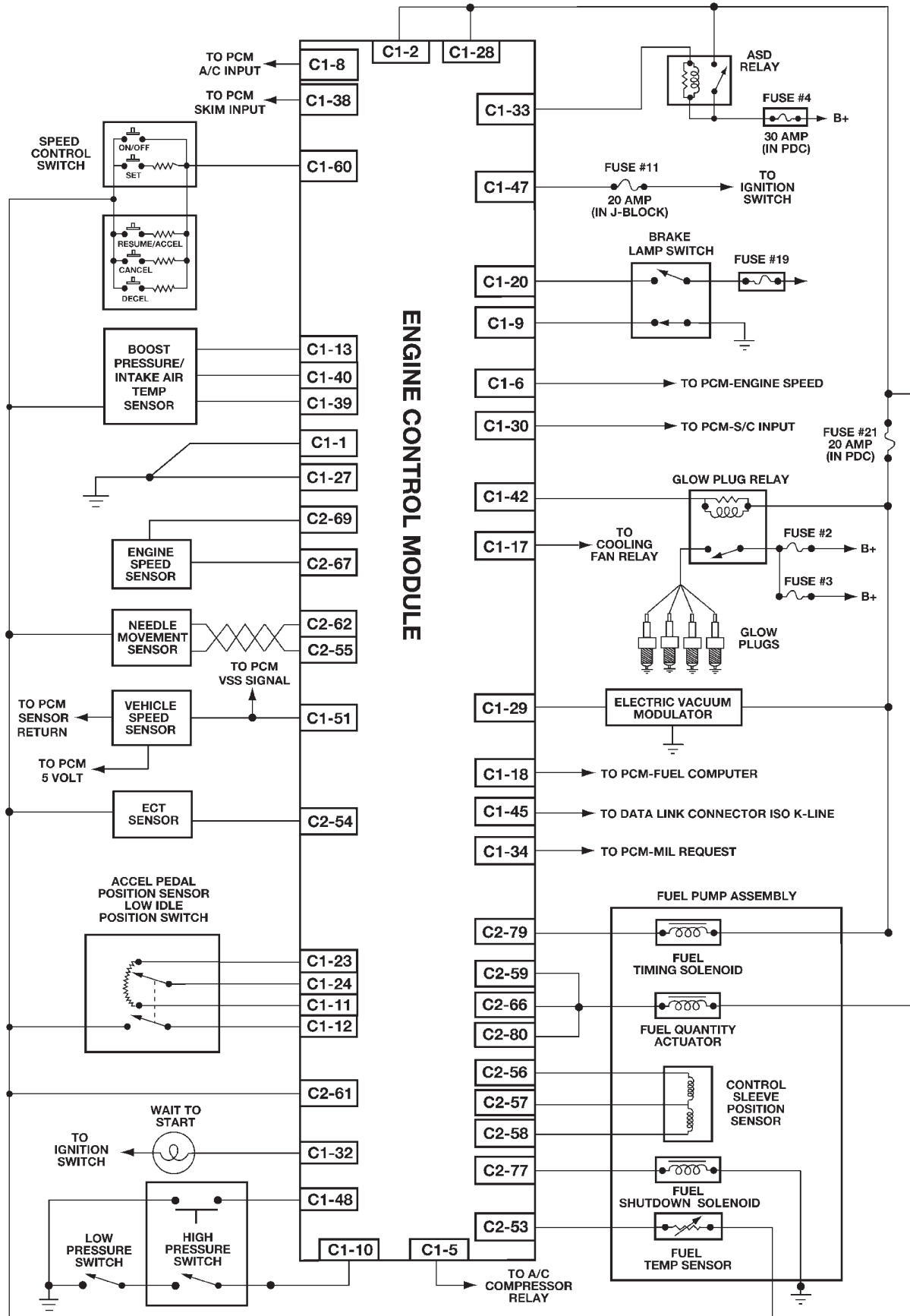
### WATER IN FUEL SENSOR (DIESEL) - BLACK 2 WAY

| CAV | CIRCUIT      | FUNCTION                    |
|-----|--------------|-----------------------------|
| 1   | G123 18DG/WT | WATER IN FUEL SENSOR SIGNAL |
| 2   | K167 20BR/YL | SENSOR GROUND               |



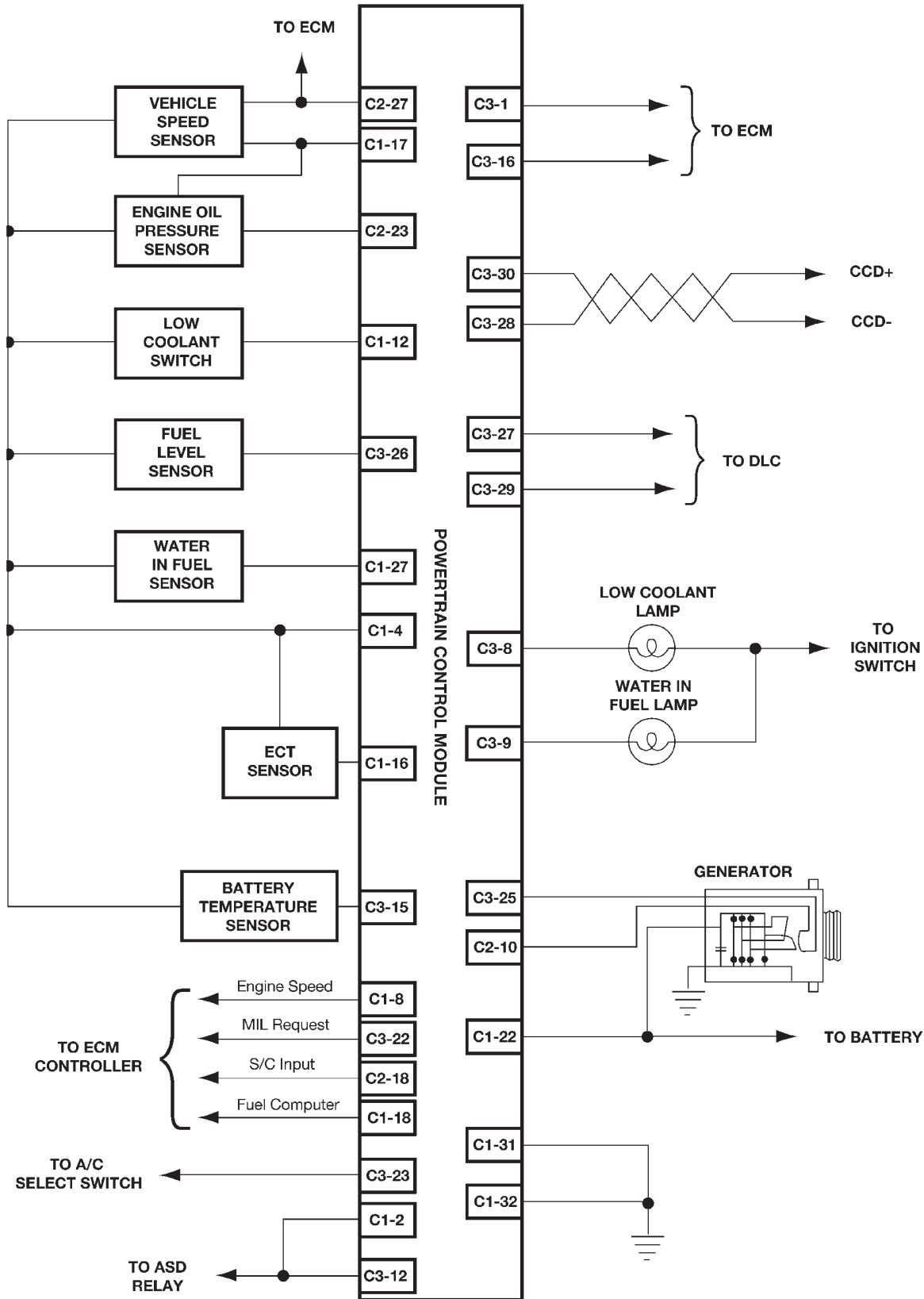
10.0 SCHEMATIC DIAGRAMS

10.1 ENGINE CONTROL MODULE



# SCHEMATIC DIAGRAMS

## 10.2 POWERTRAIN CONTROL MODULE



SCHEMATICS



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## NOTES