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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) and sentry key immobilizer system (SKIS) problems; they are no start, diagnostic trouble code (DTC), and no trouble code problems for the ECM. 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 service information for the proper removal and repair procedure.

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

This manual will cover all the necessary requirements to begin a logical diagnostic path for each problem. If there is a diagnostic trouble code (DTC) detected, go to the trouble code test. If there are no DTCs present, go to a no trouble code (*), symptom based test.

This book reflects many suggested changes from readers of past issues. After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers all 2002 KJ body vehicles equipped with the 2.5L VM diesel engine.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the engine control module (ECM) and sentry key immobilizer system (SKIS) is done in six basic steps:

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

NOTE: All tests in this manual should be performed with the engine at operating temperature, unless specified within a particular test.

2.0 IDENTIFICATION OF SYSTEM

The ECM is located in the left side of the engine compartment between the left front headlamp and the intelligent power module. The sentry key immobilizer module (SKIM) is located below the steering column behind the steering wheel.

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 in the engine control module and SKIM are intended to assist the field technician in repairing vehicle problems by the quickest means.

The engine system incorporates a common rail fuel delivery design. This design utilizes electronically controlled solenoid valve type fuel injectors. Each injector is controlled individually by the ECM. Injector timing and fuel quantity are controlled by the ECM based on inputs from the various sensors. The precision control of the injectors by the ECM helps to reduce the engine noise, odor and smoke.

3.2 FUNCTIONAL OPERATION

3.2.1 ECM ON-BOARD DIAGNOSTICS

The ECM has been programmed to monitor many different circuits of the diesel fuel injection system. This monitoring is called on-board diagnostics.

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

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

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

3.2.2 ECM OPERATING MODES

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

Ignition Switch On (Engine Off)

When the ignition switch is turned on, the ECM activates the glow plug relay for a time period that is determined by engine coolant temperature, atmospheric temperature and battery voltage. The ECM also activates the lift pump to prime the fuel system.

Engine Start-up Mode

The ECM uses the engine temperature sensor and the crankshaft position sensor (engine speed) inputs to determine fuel injection quantity.

Normal Driving Modes

Engine idle, warm-up, acceleration, deceleration and wide open throttle modes are controlled based on all of the sensor inputs to the ECM. The ECM uses these sensor inputs to adjust fuel quantity and fuel injector timing.

Limp-In Mode

If there is a fault detected with the accelerator pedal position sensor, the ECM will set the engine speed at 1100 RPM.

Overspeed Detection Mode

If the ECM detects engine RPM that exceeds 5200 RPM, the ECM will set a DTC in memory and illuminate the MIL until the DTC is cleared.

After-Run Mode

The ECM transfers RAM information to ROM and performs an Input/Output state check.

3.2.3 MONITORED CIRCUITS

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

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

3.2.4 SKIS OVERIVEW

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

3.2.5 SKIS ON-BOARD DIAGNOSTICS

The sentry key immobilizer module (SKIM) has been programmed to transmit and monitor many different coded messages as well as PCI Bus messages. This monitoring is called On-Board Diagnostics. Certain criteria must be met for a DTC to be entered into SKIM memory. The criteria may be a range of; input voltage, PCI Bus message or coded messages to the SKIM. If all of the criteria for monitoring a circuit or function are met and a fault is detected, a DTC will be stored in the SKIM memory.

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 complete, 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, ECM 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 message to the available valid key codes in SKIM memory (8 key maximum at any one time). After validating the ignition key, the SKIM sends a PCI Bus message called a seed request to the ECM, then waits for the ECM response. If the ECM does not respond, the SKIM will

send the seed request again. After twenty failed attempts, the SKIM will stop sending the seed request and store a trouble code in memory. If the ECM sends a seed response, the SKIM sends a valid/invalid key message to the ECM. This is an encrypted message that is generated using the following:

- VIN - Vehicle Identification Number.
- Seed - a random number that is generated by the ECM at each ignition key cycle.

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

The SKIS incorporates a warning lamp located in the instrument cluster. The SKIS lamp is actuated when the SKIM sends a PCI Bus message to the instrument cluster requesting the lamp on, off or flashing.

The SKIM will request lamp operation for the following:
– bulb check at ignition on
– to alert the vehicle operator to a SKIS malfunction
– when the SKIM is in customer key programming mode

For all faults except transponder faults the lamp remains on steady. In the event of a transponder fault the lamp will flash at a 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 idle for 2 seconds then stall. This may occur 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 (DTC) is diagnosed by following a specific procedure. The diagnostic test procedure contains step-by-step instruction for determining the cause of the DTC as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin diagnosis by reading the DTCs using the DRBIII®.

3.3.1 HARD CODE

A DTC that comes back within one cycle of the ignition key is a hard code. This means that the problem is current every time the ECM/SKIM checks that circuit or function. Procedures in this manual verify if the DTC is a hard code at the beginning of each test. When the fault is not a hard code, an intermittent test must be performed. NOTE: If the DRBIII® displays faults for multiple components (i.e. ECT, VSS, IAT sensors) identify and check the shared circuits for possible problems before continuing (i.e. sensor grounds or 5-volt supply circuits). Refer to the appropriate schematic to identify shared circuits.

3.3.2 INTERMITTENT CODE

A DTC that is not current every time the ECM/SKIM checks the circuit or function is an intermittent code. Most intermittent DTCs are caused by wiring or connector problems. Problems 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 the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related wire harness. Look for chafed, pierced, or partially broken wire.
- Refer to hotlines or technical service bulletins that may apply.

NOTE: Electromagnetic (radio) interference can cause an intermittent system malfunction. This interference can interrupt communication between the ignition key transponder and the SKIM.

3.3.3 ECM DIAGNOSTIC TROUBLE CODES

IMPORTANT NOTE: Before replacing the ECM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most ECM driver/control circuit failures are caused by internal failures to components (i.e. relays and solenoids) and shorted circuits (i.e. sensor pull-ups, drivers and ground circuits). These faults are difficult to detect when a double fault has occurred and only one DTC has set.

If the DRBIII® displays faults for multiple components (i.e. VSS, ECT, Batt Temp, etc.), identify and check the shared circuits for possible problems before continuing (i.e. sensor grounds or 5-volt supply circuits). Refer to the appropriate wiring diagrams to identify shared circuits.

A/C CLUTCH RELAY CIRCUIT OPEN CIRCUIT
A/C CLUTCH RELAY CIRCUIT SHORT CIRCUIT
ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY
ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH BRAKE SWITCH
ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH LOW IDLE SWITCH
ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH POTENTIOMETER
ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO HIGH
ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO LOW
ACC PEDAL POSITION SENSOR 1 CKT SUPPLY VOLTAGE TOO HIGH OR LOW
AFTER RUN SHUT OFF ERROR-INJ. POWERSTAGE
AFTER RUN SHUT OFF ERROR-ZERO QUANTITY
AMBIENT AIR TEMPERATURE CIRCUIT RECEIVE TIMEOUT
AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO HIGH
AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO LOW
ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY
ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE
BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH
BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO LOW
BATTERY SENSE LINE 1 VOLTAGE TOO HIGH
BATTERY SENSE LINE 1 VOLTAGE TOO LOW
BATTERY SENSE LINE 2 VOLTAGE TOO HIGH
BATTERY SENSE LINE 2 VOLTAGE TOO LOW
BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
BOOST PRESSURE SENSOR PLAUSIBILITY
BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH
BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW
BOOST PRESSURE SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW
BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY AFTER INIT.
BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT
CAPACITOR VOLTAGE 1 VOLTAGE TOO HIGH
CAPACITOR VOLTAGE 1 VOLTAGE TOO LOW
CKP POSITION SENSOR CIRCUIT OVERSPEED RECOGNITION
CLUTCH PEDAL SW OVERRIDE RELAY SHORT CIRCUIT
CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE
CMP POSITION SENSOR CIRCUIT CORRECTION FOR MAIN INJECTION DELAYED
CMP POSITION SENSOR CIRCUIT DYNAMIC PLAUSIBILITY
CMP POSITION SENSOR CIRCUIT SIGNAL FREQUENCY TOO HIGH
CMP POSITION SENSOR CIRCUIT STATIC PLAUSIBILITY
CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE
CYLINDER 1-INJECTOR CIRCUIT LOAD DROP
CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
CYLINDER 2-INJECTOR CIRCUIT CURRENT DECREASE
CYLINDER 2-INJECTOR CIRCUIT LOAD DROP
CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
CYLINDER 3-INJECTOR CIRCUIT CURRENT DECREASE
CYLINDER 3-INJECTOR CIRCUIT LOAD DROP
CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
CYLINDER 4-INJECTOR CIRCUIT CURRENT DECREASE
CYLINDER 4-INJECTOR CIRCUIT LOAD DROP
CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
ECM ERROR GATE ARRAY - COMMUNICATION
ECM ERROR GATE ARRAY - QUANTITY STOP
ECM ERROR RECOVERY HAS OCCURRED
ECM ERROR REDUNDANT OVERRUN MONITORING
EEPROM PLAUSIBILITY CHECKSUM ERROR
EEPROM PLAUSIBILITY CODE WORD INCORRECT OR MISSING
EEPROM PLAUSIBILITY COMMUNICATION ERROR

EEPROM PLAUSIBILITY VARIATION NUMBER ERROR
EEPROM PLAUSIBILITY WRITE ERROR
EGR SOLENOID CIRCUIT OPEN CIRCUIT
EGR SOLENOID CIRCUIT SHORT CIRCUIT
ENGINE COOLANT TEMP SENSOR CIRCUIT ENGINE IS COLD TOO LONG
ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH
FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW
FUEL PRESS SENSOR CIRCUIT MALF SUPPLY VOLTAGE TOO HIGH OR LOW
FUEL PRESSURE SOLENOID OPEN CIRCUIT
FUEL PRESSURE SOLENOID SHORT CIRCUIT
FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED
FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO HIGH - SHUT OFF
FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO LOW
FUEL RAIL PRESSURE MALFUNCTION SOLENOID OPEN
GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH
GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO LOW
GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO HIGH
GENERATOR FIELD CONTROL MALF CHARGING VOLTS TOO LOW
GENERATOR FIELD CONTROL MALF OPEN CIRCUIT
GENERATOR FIELD CONTROL MALF SHORT CIRCUIT
GLOW PLUG CIRCUIT A OPEN CIRCUIT
GLOW PLUG CIRCUIT A SHORT CIRCUIT
GLOW PLUG CIRCUIT B OPEN CIRCUIT
GLOW PLUG CIRCUIT B SHORT CIRCUIT
IGNITION SWITCH PLAUSIBILITY
INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
J1850 COMMUNICATION BUS LOST ARBITRATION
J1850 COMMUNICATION BUS SHORT TO GROUND
J1850 COMMUNICATION BUS SHORT TO VOLTAGE
J1850 COMMUNICATION BUS UNAUTHORIZED RESET
MIL/DIAG LAMP VIA J1850 BUS - IN FRAME RESPONSE ERROR
MIL/DIAG LAMP VIA J1850 BUS - STATUS ERROR
OIL PRESS SENSOR CKT MALF PLAUSIBILITY
OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO HIGH
OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO LOW
OIL PRESS SENSOR CKT MALF SUPPLY VOLTAGE TOO HIGH OR LOW
S/C SWITCH SIGNAL CIRCUIT PLAUSIBILITY
S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH
S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO LOW
SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO HIGH
SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO LOW
SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO HIGH
SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO LOW
SKIM SYSTEM INVALID KEY CODE RECEIVED
SKIM SYSTEM INVALID SECRET KEY IN EEPROM
SKIM SYSTEM KEY COMMUNICATION TIMED OUT
SKIM SYSTEM WRITE ACCESS TO EEPROM FAILURE
SYSTEM VOLTAGE TOO HIGH
TRANSFER CASE POSITION SENSOR PLAUSIBILITY
TRANSFER CASE POSITION SENSOR PLAUSIBILITY 2
TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO HIGH
TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO LOW
VEHICLE SPEED SENSOR FREQUENCY TOO HIGH
VEHICLE SPEED SENSOR PLAUSIBILITY
VEHICLE SPEED SENSOR SIGNAL VOLTAGE TOO HIGH
VISCOUS HEATER OPEN CIRCUIT
VISCOUS HEATER SHORT CIRCUIT
VOLTAGE REGULATOR SIGNAL VOLTAGE TOO HIGH
VOLTAGE REGULATOR SIGNAL VOLTAGE TOO LOW

3.3.4 SKIM DIAGNOSTIC TROUBLE CODES

ANTENNA FAILURE
COP FAILURE
EEPROM FAILURE
INTERNAL FAULT
PCM STATUS FAILURE
RAM FAILURE
ROLLING CODE FAILURE
SERIAL LINK EXTERNAL FAULT
SERIAL LINK INTERNAL FAULT
STACK OVERFLOW FAILURE
TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH
VIN MISMATCH

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. When there are no trouble codes present, refer to the no trouble code (*) tests.

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading the DTCs, erasing the DTCs, lab scope usage and other DRBIII® functions.

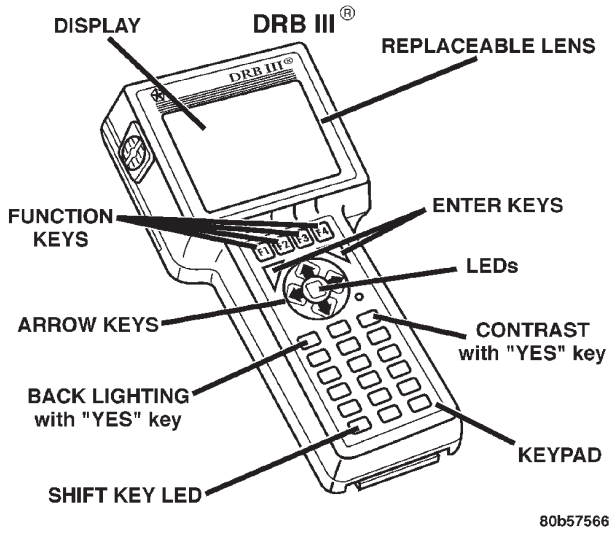
3.4.1 DRBIII® DOES NOT POWER UP

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 at data link connector cavity 16. A minimum of 11.0 volts is required to adequately power the DRBIII®. Check for proper ground connection at data link connector 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 diagnostic manual.

3.4.2 DISPLAY IS NOT VISIBLE

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



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

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

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make 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. 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 as an assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS OR POSSIBLY FATAL INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND 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, tip or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

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

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

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10 amp fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10 amps. Use the high current shunt to measure circuits exceeding 10 amps.
- 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 AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

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

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

4.3.2 VEHICLE DAMAGE CAUTIONS

Before disconnecting any control module, make sure the ignition is off. Failure to do so could damage the module. When testing voltage or circuit integrity at any control module, use the terminal side (not the wire end) of the harness connector. Do not probe through the insulation; this will damage it and eventually cause it to fail because of corrosion.

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

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool
vacuum gauge
ammeter
ohmmeter
jumper wires and probes
oscilloscope

6.0 GLOSSARY OF TERMS

A/C	air conditioning
APP	accelerator pedal position (sensor)
backfire, popback	fuel ignites in either the intake or the exhaust system
BCM	body control module
BP	boost pressure (sensor)
CKP	crankshaft position (sensor)
CMP	camshaft position (sensor)
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECM	engine control module
ECT	engine coolant temperature (sensor)
EGR	exhaust gas recirculation (solenoid/valve)
hard start	the engine takes longer than usual to start, even though it is able to crank at normal speed.
IAT	intake air temperature (sensor)
lack of power, sluggish	the engine power output has been reduced
MAF	mass air flow (sensor)
MIL	malfunction indicator lamp
ms	millisecond(s)
PDC	power distribution center
poor fuel economy	there is significantly less fuel mileage than other vehicles of the same design and configuration
runs rough/ unstable idle	the engine runs unevenly at idle causing the engine to shake if it is severe enough
S/C	speed control
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
start and stall	The engine starts but immediately dies (stalls)
surge	engine rpm fluctuation without corresponding change in accelerator pedal position
SRC	signal range check
WIF	water in fuel (sensor)
VSS	vehicle speed sensor

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:

*NO RESPONSE FROM ECM (PCI BUS) - DIESEL ONLY

POSSIBLE CAUSES
ECM PCI NO RESPONSE
PCI BUS CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Body then Body Computer. With the DRB, enter Anti-Lock Brakes. With the DRB, enter Body then Electro/Mechanical Cluster (MIC). With the DRB, enter Passive Restraints then Airbag. Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform ROAD TEST VERIFICATION - VER-2.	All
2	With the DRB read ECM Diagnostic Trouble Codes. This is to ensure power and grounds to the ECM are operational. **NOTE: If the DRB will not read ECM DTC's, follow the NO RESPONSE TO ECM (SCI only) symptom path.** Turn the ignition off. Disconnect the ECM harness connectors. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to ground. Connect the Red lead to the PCI Bus circuit in the ECM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the PCI Bus circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***NO RESPONSE FROM ECM (SCI ONLY) - DIESEL ONLY**

POSSIBLE CAUSES
CHECK ECM POWERS AND GROUNDS
SCI TRANSMIT CIRCUIT SHORTED TO GROUND
SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
SCI TRANSMIT CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Perform the symptom Checking ECM Power and Ground Circuits in the Driveability category. Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the ECM harness connectors. Turn the ignition on. Measure the voltage of the SCI Transmit circuit at the DLC connector (cav 7). Is the voltage above 1.0 volt? Yes → Repair the SCI Transmit circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the DRB from the DLC. Measure the resistance of the SCI Transmit circuit between the ECM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the SCI Transmit circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
WITH THE DRB PERFORM A MODULE SCAN
OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR
USING THE DRB, PERFORM THE PCI BUS CONTROL MODE
DISCONNECT THE MODULE(S) HARNESS CONNECTOR
PCI BUS CIRCUIT SHORTED TO VOLTAGE
DISCONNECT THE MODULE(S) HARNESS CONNECTOR
PCI BUS CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: Determine which modules this vehicle is equipped with before beginning.** Connect the Diagnostic Junction Port Tester #8339 to the DRBIII® and to the Diagnostic Junction Port. Using the DRBIII®, along with the Diagnostic Junction Port Tester #8339, select Junction Port Tool then PCI Bus Module Scan and follow the instructions on the DRBIII®. Was the DRBIII® able to scan (I/D or communicate) with any modules? Yes → Refer to the Communication category for the related symptom(s). (Individual module no responses). Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Measure the resistance of the PCI Bus circuit between the Data Link Connector and the Diagnostic Junction Port connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the PCI Bus circuit for an open between the DLC and the Diagnostic Junction Port. Perform BODY VERIFICATION TEST - VER 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	**Note: Determine which modules this vehicle is equipped with before beginning.** Connect the Diagnostic Junction Port Tester #8339 to the DRBIII® and to the Diagnostic Junction Port. Using the DRBIII®, along with the Diagnostic Junction Port Tester #8339, select Junction Port Tool then PCI Bus Control Mode and follow the instructions on the DRBIII®. **Note: Perform this function on each pin that is equipped with a PCI Bus circuit.** Did the DRB display No Modules Responding from any of the pins that were scanned? Yes → Go To 4 No → Check the PCI Bus circuit between the DLC and the Diagnostic Junction Port connector for a short to voltage or to ground, repair as necessary. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Diagnostic Junction Port Tester cable from the DRBIII®. Keep the tester connected to the Diagnostic Junction Port. Turn the ignition on. Measure the voltage of the PCI Bus circuit on the Diagnostic Junction Port Tester that the DRBIII® displayed No Modules Responding. Is the voltage steadily above 7.0 volts? Yes → Go To 5 No → Go To 6	All
5	Measure the voltage of the PCI Bus circuit on the Diagnostic Junction Port tester that previously measured above 7.0 volts. **Note: Turn the ignition off before disconnecting any module harness connector then turn the ignition on.** Disconnect the module harness connector(s). Note: If the problem occurred on pins 1, 2 or 3, of the Diagnostic Junction Port tester, observe the voltmeter while disconnecting each module connector one at a time. Is the voltage steadily above 7.0 volts with the module(s) disconnected? Yes → Repair the PCI Bus circuit that measured over 7.0 volts for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to voltage was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All
6	Disconnect the Diagnostic Junction Port Tester cable from the DRBIII®. Keep the tester connected to the Diagnostic Junction Port. Turn the ignition off. Disconnect the negative battery cable. Measure the resistance between ground and the PCI Bus circuit on the Diagnostic Junction Port Tester that the DRBIII® displayed No Modules Responding. Is the resistance below 100.0 ohms? Yes → Go To 7 No → Go To 8	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Disconnect the negative battery cable. Measure the resistance between ground and the PCI Bus circuit at the Diagnostic Junction Port tester that previously measured below 100.0 ohms. Disconnect the module harness connector(s). Note: If the problem occurred on pins 1, 2 or 3 of the Diagnostic Junction Port tester, observe the ohmmeter while disconnecting each module connector one at a time. Is the resistance below 100.0 ohms with the module(s) disconnected? Yes → Repair the PCI Bus circuit that measured below 100.0 ohms for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to ground was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

P0070-AMBIENT AIR TEMPERATURE CIRCUIT RECEIVE TIME-OUT

When Monitored and Set Condition:

P0070-AMBIENT AIR TEMPERATURE CIRCUIT RECEIVE TIMEOUT

When Monitored: With the ignition on.

Set Condition: When an expected BCM J1850 Bus message to the ECM is missing.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH BCM
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase ECM DTCs. Cycle the ignition key on and off several times. With the DRBIII®, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the Body Control Module. Can communication be established with the Body Control Module? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Refer to the Communication Category of the Body Diagnostic Procedures and perform the appropriate symptom related to no communication with Body Control Module. Perform ROAD TEST VERIFICATION - VER-2.	All

P0070-AMBIENT AIR TEMPERATURE CIRCUIT RECEIVE TIMEOUT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO HIGH
P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO HIGH.

When Monitored and Set Condition:

P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: When the BCM detects high voltage on the Ambient Air Temperature Sensor Signal circuit, a J1850 Bus message is sent to the ECM to set this DTC.

P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: When the BCM detects low voltage on the Ambient Air Temperature Sensor Signal circuit, a J1850 Bus message is sent to the ECM to set this DTC.

POSSIBLE CAUSES
REFER TO COMPASS/MINI TRIP COMPUTER SYMPTOM
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: The Ambient Air Temperature Sensor is hardwired to the Body Control Module (BCM). The Ambient Air Temperature Circuit DTCs are set in the ECM via the J1850 Bus by the BCM.** Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Cycle the ignition switch from OFF to ON. Monitor the DRBIII® for ECM DTCs. Does the DRBIII® display this DTC? Yes → Refer to symptom *TEMP DISPLAY INOPERATIVE OR WRONG in the Compass/Mini Trip Computer category in the Body Diagnostic Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All

P0070-AMBIENT AIR TEMPERATURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH
P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO LOW
P0606-ECM ERROR GATE ARRAY - COMMUNICATION
P0606-ECM ERROR GATE ARRAY - COMMUNICATION NOT VERIFIED
P0606-ECM ERROR GATE ARRAY - QUANTITY STOP
P0606-ECM ERROR RECOVERY HAS OCCURRED
P0606-ECM ERROR REDUNDANT OVERRUN MONITORING
P1206-CALCULATED INJECTOR VOLTAGE TOO HIGH
P1206-CALCULATED INJECTOR VOLTAGE TOO LOW
P1601-CAPACITOR VOLTAGE 1 VOLTAGE TOO HIGH
P1601-CAPACITOR VOLTAGE 1 VOLTAGE TOO LOW
P1606-AFTER RUN SHUT OFF ERROR-INJECTION POWERSTAGE
P1606-AFTER RUN SHUT OFF ERROR-ZERO QUANTITY
P1610-VOLTAGE REGULATOR SIGNAL VOLTAGE TOO HIGH
P1610-VOLTAGE REGULATOR SIGNAL VOLTAGE TOO LOW
P1652-J1850 COMMUNICATION BUS LOST ARBITRATION
P1652-J1850 COMMUNICATION BUS UNAUTHORIZED RESET
P1680-EEPROM PLAUSIBILITY CHECKSUM ERROR
P1680-EEPROM PLAUSIBILITY CODE WORD INCORRECT OR MISSING
P1680-EEPROM PLAUSIBILITY COMMUNICATION ERROR
P1680-EEPROM PLAUSIBILITY VARIATION NUMBER ERROR
P1680-EEPROM PLAUSIBILITY VIN CHECKSUM ERROR
P1680-EEPROM PLAUSIBILITY WRITE ERROR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH.

When Monitored and Set Condition:

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Barometric Pressure Sensor Signal is above 4.75 volts.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Barometric Pressure Sensor Signal is below 2.2 volts.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

P0606-ECM ERROR GATE ARRAY - COMMUNICATION

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P0606-ECM ERROR GATE ARRAY - COMMUNICATION NOT VERIFIED

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P0606-ECM ERROR GATE ARRAY - QUANTITY STOP

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P0606-ECM ERROR RECOVERY HAS OCCURRED

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P0606-ECM ERROR REDUNDANT OVERRUN MONITORING

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1601-CAPACITOR VOLTAGE 1 VOLTAGE TOO HIGH

When Monitored: With the engine running. During every 180° of engine rotation.

Set Condition: The ECM determines that the capacitor voltage is out of range.

P1601-CAPACITOR VOLTAGE 1 VOLTAGE TOO LOW

When Monitored: With the engine running. During every 180° of engine rotation.

Set Condition: The ECM determines that the capacitor voltage is out of range.

P1606-AFTER RUN SHUT OFF ERROR-INJECTION POWERSTAGE

When Monitored: At ignition off.

Set Condition: The ECM detects the engine speed has not fallen below 650 RPM within 0.5 seconds after ignition off.

P1606-AFTER RUN SHUT OFF ERROR-ZERO QUANTITY

When Monitored: At ignition off.

Set Condition: The ECM detects the engine speed has not fallen below 650 RPM within 0.5 seconds after ignition off.

P1652-J1850 COMMUNICATION BUS LOST ARBITRATION

When Monitored: With the ignition on.

Set Condition: The ECM fails to broadcast any messages on the J1850 Bus circuit.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

P1652-J1850 COMMUNICATION BUS UNAUTHORIZED RESET

When Monitored: With the ignition on.

Set Condition: An unauthorized reset of the J1850 hardware occurs during normal operation.

P1680-EEPROM PLAUSIBILITY CHECKSUM ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1680-EEPROM PLAUSIBILITY CODE WORD INCORRECT OR MISSING

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1680-EEPROM PLAUSIBILITY COMMUNICATION ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1680-EEPROM PLAUSIBILITY VARIATION NUMBER ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1680-EEPROM PLAUSIBILITY VIN CHECKSUM ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

P1680-EEPROM PLAUSIBILITY WRITE ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal failure.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INTERMITTENT CONDITION

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: This DTC indicates an internal ECM problem.** Turn the ignition on. With the DRB, erase ECM DTCs. Perform several engine run cycles, turning the ignition off for at least 20 seconds between each engine run cycle. With the DRBIII®, read the ECM DTC's. Did this DTC reset? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature Sensor Signal voltage is above 4.85 volts.

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
BOOST PRESSURE/IAT SENSOR
ENGINE CONTROL MODULE

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

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Boost Pressure/IAT Sensor harness connector. Measure the resistance of the Intake Air Temperature Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Intake Air Temperature Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Connect a jumper wire between the IAT Sensor Signal and IAT Sensor Ground circuits in the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Monitor the DRB for ECM DTCs. Does the DRB display P0110 INTAKE AIR TEMP. SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW? Yes → Replace the Boost Pressure/Intake Air Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the ECM harness connector and the Boost Pressure Sensor harness connector. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Intake Air Temperature Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature Sensor Signal voltage is below 0.21 volt.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Boost Pressure/IAT Sensor harness connector. Measure the resistance between ground and the Intake Air Temperature Sensor Signal circuit. Is the resistance above 100 kohms? Yes → Go To 3 No → Repair the Intake Air Temperature Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Monitor the DRB for ECM DTCs. Does the DRB display P0110 INTAKE AIR TEMP SIGNAL VOLTAGE TOO HIGH? Yes → Replace the Boost Pressure/Intake Air Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT ENGINE IS COLD TOO LONG

When Monitored and Set Condition:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT ENGINE IS COLD TOO LONG

When Monitored: With the engine running.

Set Condition: The engine temperature fails to reach 80°C (176°F) within 20 minutes of startup.

POSSIBLE CAUSES
ENGINE COLD TOO LONG

TEST	ACTION	APPLICABILITY
1	**Note: The best way to diagnose this DTC is to allow the vehicle to remain outside overnight in order to have a completely cold soaked engine.** **Note: Extremely cold outside ambient temperatures may cause this DTC to set.** Verify that the coolant level is correct. Start the engine. With the DRBIII®, set the engine RPM to 1500 and allow the engine to warm up for 10-15 minutes. With the DRBIII®, monitor the Engine Coolant Temperature value during the warm up cycle. Make sure the transition of temperature change is smooth. Did the engine temperature reach a minimum of 80° C (176° F)? Yes → Test Complete. No → Refer to the Service Information for cooling system performance diagnosis. The most probable cause is a Thermostat problem. Also, refer to any related TSBs. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature Sensor Signal voltage is above 4.95 volts for more than 1 second.

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

TEST	ACTION	APPLICABILITY
1	**NOTE: If multiple DTCs are present, the most likely cause is a 5-Volt Supply or Sensor Ground circuit shorted to voltage or ground. Refer to the Service Information Wiring section for circuits that would affect multiple DTCs.** Turn the ignition on. With the DRB, monitor the Engine Coolant Temperature (ECT) Sensor voltage. Is the ECT Sensor voltage above 4.5 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. Measure the voltage on the ECT Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the ECT Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Connect a jumper wire between the ECT Sensor harness connector cavities. Turn the ignition on. With the DRB, read the ECT Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the ECT Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the ECT Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the ECT Sensor harness connector. Measure the resistance of the ECT Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the ECT Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature Sensor Signal voltage is below 0.2 volt for more than 1 second.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECT SENSOR
ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECT SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, monitor the Engine Coolant Temperature (ECT) Sensor voltage. Is the ECT Sensor voltage below 0.3 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. With the DRB, read the ECT Sensor voltage. Is the voltage above 4.0 volts? Yes → Replace the ECT Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the ECT Sensor harness connector. Measure the resistance between ground and the ECT Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the ECT Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the ECT Sensor harness connector. Measure the resistance between the ECT Sensor Signal circuit and Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the ECT Sensor Signal and Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Fuel Rail Pressure Sensor Signal voltage is above 4.8 volts.

POSSIBLE CAUSES
ECM - FUEL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - FUEL PRESSURE SENSOR SIGNAL OPEN
FUEL PRESSURE SENSOR SIGNAL CIRCUIT OPEN
FUEL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
5-VOLT SUPPLY CIRCUIT OPEN
SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
FUEL PRESSURE SENSOR
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** Turn the ignition on. With the DRB III, erase ECM DTCs. Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time. With the DRB III, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 10	All

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Fuel Pressure Sensor Signal circuit. Select the appropriate voltage reading. Voltage is above 5.5 volts. Go To 3 Voltage is between 4.7 and 5.4 volts. Go To 4 Voltage is below 4.7 volts. Go To 9	All
3	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Fuel Pressure Sensor Signal circuit. Is the voltage below 1.0 volt? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fuel Pressure Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the 5-Volt Supply circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the 5-volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Sensor Ground circuit at the Fuel Pressure Sensor and ECM harness connectors. Is the voltage above 1.0 volt at either connector? Yes → Repair the Sensor Ground circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7 **NOTE: If the Sensor Ground circuit had a short to voltage on it, the ECM may have been damaged. Retest the Fuel Pressure Sensor circuit.**	All
7	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Connect a jumper wire between the Fuel Pressure Sensor Signal circuit and the Sensor Ground circuit in the Fuel Pressure Sensor harness connector. Turn the ignition on and monitor the DRB for DTCs. Is DTC P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW present? Yes → Replace the Fuel Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Pressure Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fuel Pressure Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Fuel Rail Pressure Sensor Signal voltage is below 0.2 volt.

POSSIBLE CAUSES
FUEL PRESSURE SENSOR
INTERMITTENT CONDITION
FUEL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
FUEL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
ECM - FUEL PRESSURE SENSOR SIGNAL SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** **NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** Turn the ignition on. With the DRB III, erase ECM DTCs. Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time. With the DRB III, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Measure the voltage of the Fuel Pressure Sensor Signal circuit. Is the voltage between 4.7 and 5.3 volts? Yes → Replace the Fuel Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Fuel Pressure Sensor Signal circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the Fuel Pressure Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the Fuel Pressure Sensor Signal circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Fuel Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored and Set Condition:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

Set Condition: The Fuel Pressure Sensor 5-Volt Supply voltage is below 4.7 volts or above 5.1 volts for 100 ms.

POSSIBLE CAUSES
CHECK FOR SENSOR REFERENCE VOLTAGE A CIRCUIT DTCS
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** Turn the ignition on. With the DRB III, read ECM DTCs. Is the High or Low DTC for P0641 SENSOR REFERENCE VOLTAGE A CIRCUIT set with this DTC? Yes → Refer to the symptom list for the related symptom(s). Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE
P0201-CYLINDER 1-INJECTOR CIRCUIT LOAD DROP
P0201-CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
P0201-CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
P0202-CYLINDER 2-INJECTOR CIRCUIT CURRENT DECREASE
P0202-CYLINDER 2-INJECTOR CIRCUIT LOAD DROP
P0202-CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
P0202-CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
P0203-CYLINDER 3-INJECTOR CIRCUIT CURRENT DECREASE
P0203-CYLINDER 3-INJECTOR CIRCUIT LOAD DROP
P0203-CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
P0203-CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT LOW SIDE
P0204-CYLINDER 4-INJECTOR CIRCUIT CURRENT DECREASE
P0204-CYLINDER 4-INJECTOR CIRCUIT LOAD DROP
P0204-CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE
P0204-CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT LOW SIDE

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

When Monitored and Set Condition:

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE

When Monitored: With the engine running.

Set Condition: The ECM detects an incorrect rate of current decrease after injection occurs.

P0201-CYLINDER 1-INJECTOR CIRCUIT LOAD DROP

When Monitored: With the engine running.

Set Condition: The ECM detects insufficient current through the injector driver.

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

P0201-CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the common driver circuit.

P0201-CYLINDER 1-INJECTOR CIRCUIT OVERCURRENT LOW SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the injector driver circuit.

P0202-CYLINDER 2-INJECTOR CIRCUIT CURRENT DECREASE

When Monitored: With the engine running.

Set Condition: The ECM detects an incorrect rate of current decrease after injection occurs.

P0202-CYLINDER 2-INJECTOR CIRCUIT LOAD DROP

When Monitored: With the engine running.

Set Condition: The ECM detects insufficient current through the injector driver.

P0202-CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the common driver circuit.

P0202-CYLINDER 2-INJECTOR CIRCUIT OVERCURRENT LOW SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the injector driver circuit.

P0203-CYLINDER 3-INJECTOR CIRCUIT CURRENT DECREASE

When Monitored: With the engine running.

Set Condition: The ECM detects an incorrect rate of current decrease after injection occurs.

P0203-CYLINDER 3-INJECTOR CIRCUIT LOAD DROP

When Monitored: With the engine running.

Set Condition: The ECM detects insufficient current through the injector driver.

P0203-CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the common driver circuit.

P0203-CYLINDER 3-INJECTOR CIRCUIT OVERCURRENT LOW SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the injector driver circuit.

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

P0204-CYLINDER 4-INJECTOR CIRCUIT CURRENT DECREASE

When Monitored: With the engine running.

Set Condition: The ECM detects an incorrect rate of current decrease after injection occurs.

P0204-CYLINDER 4-INJECTOR CIRCUIT LOAD DROP

When Monitored: With the engine running.

Set Condition: The ECM detects insufficient current through the injector driver.

P0204-CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT HIGH SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the common driver circuit.

P0204-CYLINDER 4-INJECTOR CIRCUIT OVERCURRENT LOW SIDE

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current on the injector driver circuit.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INTERMITTENT CONDITION
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO VOLTAGE
COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO GROUND
COMMON DRIVER CIRCUIT SHORTED TO GROUND
FUEL INJECTOR CIRCUITS SHORTED TOGETHER
FUEL INJECTOR CONTROL CIRCUIT OPEN
COMMON DRIVER CIRCUIT OPEN
FUEL INJECTOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 10	All

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the appropriate Cylinder Fuel Injector harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the appropriate Fuel Injector Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Fuel Injector Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Cylinder Fuel Injector harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Common Driver circuit. Is the voltage above 1.0 volt? Yes → Repair the Common Driver circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Cylinder Fuel Injector harness connector. Measure the resistance between ground and the Fuel Injector Control circuit. Is the resistance below 1000 ohms? Yes → Repair the Fuel Injector Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Cylinder Fuel Injector harness connector. Measure the resistance between ground and the Common Driver circuit. Is the resistance below 1000 ohms? Yes → Repair the Common Driver circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Cylinder Fuel Injector harness connector. Measure the resistance between the Fuel Injector Control circuit and the Common Driver circuit. Is the resistance below 1000 ohms? Yes → Repair the Fuel Injector Control circuit and Common Driver circuit for a short together. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Cylinder Fuel Injector harness connector. Measure the resistance of the Fuel Injector Control circuit. Is the resistance below 10 ohms? Yes → Go To 8 No → Repair the Fuel Injector Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Cylinder Fuel Injector harness connector. Measure the resistance of the Common Driver circuit. Is the resistance below 10 ohms? Yes → Go To 9 No → Repair the Common Driver circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Replace the Cylinder Fuel Injector in accordance with the Service Information. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → The repair is complete. Perform ROAD TEST VERIFICATION - VER-2.	All
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0235-BOOST PRESSURE SENSOR PLAUSIBILITY

When Monitored and Set Condition:

P0235-BOOST PRESSURE SENSOR PLAUSIBILITY

When Monitored: With the engine speed below 850 rpm.

Set Condition: When the engine is idling, the boost pressure sensor input does not agree with the barometric pressure sensor input for at least 5 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
BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR
ENGINE CONTROL MODULE

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

P0235-BOOST PRESSURE SENSOR PLAUSIBILITY — Continued

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

Symptom:

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Boost Pressure Sensor Signal voltage exceeds 4.5 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
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. With the DRB, read the Boost Pressure Sensor voltage. **NOTE: Ensure the turbocharger wastegate is operating properly. This code can be set if turbocharger boost pressure is too high.** Is the voltage above 4.5 volts? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Measure the voltage between ground and the Boost Pressure Sensor 5-volt Supply circuit. Is the voltage above 5.2 volts? Yes → Go To 3 No → Go To 4	All

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH — Continued

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

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. **NOTE: Ensure all harness connectors are connected.** Turn the ignition on. Measure the voltage of the Boost Pressure Sensor Signal circuit by back probing ECM harness connector C1, cavity 11. Is the voltage above 4.5 volts? Yes → Replace the Boost Pressure/Intake Air Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 8	All
8	Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Ensure good terminal contact between the Turbocharger Boost Pressure/IAT Sensor harness connector and the sensor. The repair is complete. Perform ROAD TEST VERIFICATION - VER-2.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Turbocharger Boost Pressure Sensor Signal voltage is below 0.15 volt for at least 2 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND
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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the Turbocharger Boost Pressure Sensor voltage. Is the voltage below 0.2 volt? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Measure the voltage between ground and the 5-volt Supply circuit. Is the voltage above 4.9 volt? Yes → Go To 3 No → Repair the 5-volt Supply circuit for an open or short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Connect a jumper wire between the Boost Pressure Sensor Signal and 5-volt Supply circuits. With the DRB, read the Boost Pressure Sensor voltage. Is the Boost Pressure Sensor voltage above 4.5 volts? Yes → Replace the Boost Pressure/Intake Air Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Boost Pressure Sensor Signal circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Boost Pressure Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Boost Pressure Sensor Signal circuit and Sensor Ground circuit. Is the resistance above 100 kohms? Yes → Go To 6 No → Repair the Boost Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Boost Pressure Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Boost Pressure Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0235-BOOST PRESSURE SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored and Set Condition:

P0235-BOOST PRESSURE SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

Set Condition: The Sensor Reference Voltage ″B″ voltage to the Boost Pressure Sensor is below 4.8 volts or above 5.2 volts for at least 100 ms.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND
5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off, wait 30 seconds, then turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage between ground and the 5-volt Supply circuit at the Boost Pressure/IAT Sensor harness connector. Is the voltage above 1.0 volt? Yes → Repair the 5-volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0235-BOOST PRESSURE SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the 5-volt Supply circuit at the Boost Pressure/IAT Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the 5-volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between Sensor Ground and the 5-volt Supply circuit at the Boost Pressure/IAT Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the 5-volt Supply circuit for a short to Sensor Ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the 5-volt Supply circuit at the Boost Pressure/IAT Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the APP Sensor 5-volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage between ground and the 5-volt Supply circuit at the APP Sensor harness connector. Is the voltage above 1.0 volt? Yes → Repair the APP Sensor 5-volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0235-BOOST PRESSURE SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0335-CKP POSITION SENSOR CIRCUIT OVERSPEED RECOGNITION

When Monitored and Set Condition:

P0335-CKP POSITION SENSOR CIRCUIT OVERSPEED RECOGNITION

When Monitored: With the engine running.

Set Condition: The engine speed sensor signal indicates engine speed is above 5200 RPM for at least 500 milliseconds. NOTE: Engine damage is possible when the engine speed exceeds 5200 RPM.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
OPEN SHIELD CIRCUIT
REPLACE THE CRANKSHAFT POSITION SENSOR
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**CAUTION: Engine damage is possible when engine speed exceeds 5200 RPM.** **NOTE: This DTC indicates the Engine Speed Sensor has seen an engine speed above 5200 RPM. This can occur if the vehicle is in 5th gear and the vehicle operator performs a downshift and accidentally downshifts from 5th gear to 2nd gear.** Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle and monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the CKP Sensor harness connector. Measure the resistance of the Shield circuit. Is the resistance below 10.0 ohms? Yes → Go To 3 No → Repair the Shield circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0335-CKP POSITION SENSOR CIRCUIT OVERSPEED RECOGNITION — Continued

TEST	ACTION	APPLICABILITY
3	Replace the Crankshaft Position Sensor in accordance with the Service Information. With the DRB, erase ECM DTCs. Perform several drive cycles, turning the ignition off for at least 10 seconds between each drive cycle. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → The repair is complete. Refer to the Service Information to check for engine mechanical problems that may have occurred due to excessive engine speed. Perform ROAD TEST VERIFICATION - VER-2.	All
4	**CAUTION: Refer to the Service Information to check for engine mechanical problems that may have occurred due to excessive engine RPM.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Check the CKP Sensor wiring harness for incorrect routing which may cause EMI interference. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0340-CKP POSITION SENSOR CIRCUIT DYNAMIC PLAUSIBILITY

When Monitored and Set Condition:

P0340-CKP POSITION SENSOR CIRCUIT DYNAMIC 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.

POSSIBLE CAUSES
CHECK CRANKSHAFT POSITION SENSOR SIGNAL
ENGINE CONTROL MODULE
INTERMITTENT CONDITION
CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT(S) SHORTED TO GROUND
CKP SENSOR CIRCUITS SHORTED TOGETHER
CKP SENSOR SIGNAL CIRCUITS OPEN
CKP SENSOR SIGNAL CIRCUIT(S) SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	Attempt to start the engine. Did the engine start? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

P0340-CKP POSITION SENSOR CIRCUIT DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the both of the CKP Sensor Signal circuits. Is the resistance above 1000 ohms for both measurements? Yes → Go To 4 No → Repair the CKP Sensor Signal circuit(s) for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the CKP Sensor Signal circuits. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the CKP Sensor Signal circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of CKP Sensor Signal circuits. Is the resistance below 10.0 ohms for both measurements? Yes → Go To 6 No → Repair the CKP Sensor Signal circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of both CKP Sensor Signal circuits. Is the voltage below 1.0 volt for both measurements? Yes → Go To 7 No → Repair the CKP Sensor Signal circuit(s) for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Using the DRB lab scope, backprobe both of the CKP Sensor Signal circuits at the ECM harness connector. **NOTE: Refer to Charts and Graphs to view a correct CKP Sensor signal.** Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRB. Does the DRB display a steady clean CKP Signal pattern for each circuit? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the Crankshaft Position Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P0340-CMP CORRECTION FOR MAIN INJECTION
P0340-CMP POSITION SENSOR CIRCUIT SIGNAL FREQUENCY TOO HIGH
P0340-CMP POSITION SENSOR CIRCUIT STATIC PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0340-CMP CORRECTION FOR MAIN INJECTION.

When Monitored and Set Condition:

P0340-CMP POSITION SENSOR CIRCUIT SIGNAL FREQUENCY TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects more than three camshaft sensor signals within a 10 ms time period.

POSSIBLE CAUSES
CHECKING FOR DAMAGE
ECM
SENSOR GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
VERIFY ASD RELAY OUTPUT
CMP SENSOR SIGNAL CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CMP SENSOR OPERATION DURING CRANKING CRANK
ECM SENSOR GROUND CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
CMP SENSOR CIRCUIT SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: The Timing Belt must be correctly installed and operational before diagnosis can be made. Refer to the Service Information to ensure the timing belt is properly installed.** Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start the engine. With the DRBIII®, read the ECM DTCs. Does the DRB III display this DTC? Yes → Go To 3 No → Go To 2	All

P0340-CMP CORRECTION FOR MAIN INJECTION — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the DRB III display this DTC? Yes → Go To 3 No → Go To 13	All
3	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit in CMP Sensor harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the CMP Sensor Signal circuit. Is the voltage above 10.0 volts? Yes → Go To 5 No → Go To 10	All
5	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the CMP Sensor Signal circuit. Is the test light on? Yes → Repair the CMP Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the CMP Sensor harness connector and the ECM harness connector. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0340-CMP CORRECTION FOR MAIN INJECTION — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition on. Disconnect the IAT/Boost Pressure Sensor harness connector. Disconnect the Camshaft Position Sensor harness connector. Connect one end of a jumper wire to the IATSensor signal circuit in the IAT/Boost Pressure Sensor harness connector. Connect the other end of the jumper wire to the Sensor Ground circuit in the Camshaft Position Sensor harness connector. With the DRB III in Engine, Sensors, read the Intake Air Temp volts. Is the voltage below 1.0 volt? Yes → Go To 8 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Remove the CMP Sensor. Inspect the camshaft for conditions such as loose mounting screws, damage, debris or cracked teeth. Is there any evidence of these conditions? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 9	All
9	Turn the ignition off. With the DRB III lab scope lead, backprobe the CMP Signal circuit. Set the DRB lab scope settings as follows: Time = 0.1s/Div, 20 volts scale, Offset = 0.00volts, Probe = X10, Coupling = DC While observing the DRB III display, crank the engine. **NOTE: The DRB III should display a digital signal (square wave) similar to that shown in the support material.** Does the DRB display an uninterrupted digital signal (square wave)? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the Camshaft Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the CMP Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 11 No → Repair the CMP Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All

P0340-CMP CORRECTION FOR MAIN INJECTION — Continued

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the CMP Sensor Signal circuit. Is the resistance below 1000 ohms? Yes → Repair the CMP Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 12	All
12	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the CMP Sensor Signal circuit and the Sensor Ground circuit at of the CMP Sensor harness connector. Is the resistance below 1000 ohms? Yes → Repair the CMP Sensor Signal and Sensor Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
13	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running 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. Remove the CMP Sensor and the CKP Sensor, checking for loose mounting screws and debris on the sensor magnets that can corrupt the sensor signal. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0340-CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE

When Monitored and Set Condition:

P0340-CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE

When Monitored: With the engine running.

Set Condition: The ECM determines that the camshaft position sensor signal frequency is not plausible with the crankshaft position sensor signal frequency.

POSSIBLE CAUSES
CHECK CAMSHAFT POSITION SENSOR SIGNAL
CHECK CRANKSHAFT POSITION SENSOR SIGNAL
CHECKING CKP SENSOR FOR DAMAGE
CHECKING CMP SENSOR FOR DAMAGE
ENGINE CONTROL MODULE
GEAR ALIGNMENT
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start the engine. With the DRBIII®, read the ECM DTCs. Does the DRB III display this DTC? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the DRB III display this DTC? Yes → Go To 3 No → Go To 8	All
3	Turn the ignition off. Remove the CMP Sensor. Inspect the camshaft Position Sensor for conditions such as loose mounting screws, damage or debris, also check the camshaft for cracked teeth. Is there any evidence of these conditions? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P0340-CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the CKP Sensor. Inspect the Crankshaft Position Sensor for conditions such as loose mounting screws, damage or debris. Is there any evidence of these conditions? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Using the DRB lab scope, backprobe the CMP Sensor Signal circuit at the CMP Sensor harness connector. Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRB. **NOTE: Refer to Charts and Graphs to view a correct CMP Sensor signal.** Does the DRB display a steady clean CMP Signal pattern? Yes → Go To 6 No → Perform Test for DTC P0340-Camshaft Position Sensor Circuit Static Plausibility. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Using the DRB lab scope, backprobe both of the CKP Sensor Signal circuits at the CKP Sensor harness connector. **NOTE: Refer to Charts and Graphs to view a correct CKP Sensor signal.** Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRB. Does the DRB display a steady clean CKP Signal pattern for each circuit? Yes → Go To 7 No → Perform Test for DTC P0340-Crankshaft Position Sensor Circuit Dynamic Plausibility. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Refer to the Service Information and check alignment of the camshaft sprocket, crankshaft sprocket and injection pump sprocket. Are all of the sprockets aligned correctly? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair or adjust as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

P0340-CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0380-GLOW PLUG 1 CONTROL CIRCUIT - OPEN CIRCUIT
P0380-GLOW PLUG 1 CONTROL CIRCUIT - SHORT CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0380-GLOW PLUG 1 CONTROL CIRCUIT - OPEN CIRCUIT.

When Monitored and Set Condition:

P0380-GLOW PLUG 1 CONTROL CIRCUIT - OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM does not detect voltage on the Glow Plug Relay 1 Control circuit.

P0380-GLOW PLUG 1 CONTROL CIRCUIT - SHORT CIRCUIT

When Monitored: With the ignition off.

Set Condition: The ECM detects excessive current on the Glow Plug Relay 1 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
SUBSTITUTE GLOW PLUG RELAY 1
GLOW PLUG RELAY 1 CONTROL CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG RELAY 1 CONTROL CIRCUIT SHORTED TO GROUND
GLOW PLUG RELAY 1 CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate Glow Plug Relay 1. Is Glow Plug Relay 1 clicking? Yes → Go To 2 No → Go To 3	All

P0380-GLOW PLUG 1 CONTROL CIRCUIT - OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
3	Turn the ignition off. Remove Glow Plug Relay 1 from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of Glow Plug Relay 1. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 5 No → Replace Glow Plug Relay 1. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Remove Glow Plug Relay 1 from the PDC. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Glow Plug Relay 1 Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Glow Plug Relay 1 Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All

P0380-GLOW PLUG 1 CONTROL CIRCUIT - OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove Glow Plug Relay 1 from the PDC. Disconnect the ECM harness connectors. Measure the resistance between ground and the Glow Plug Relay 1 Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Glow Plug Relay 1 Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Remove Glow Plug Relay 1 from the PDC. Disconnect the ECM harness connectors. Measure the resistance of the Glow Plug Relay 1 Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Glow Plug Relay 1 Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P0382-GLOW PLUG 2 CONTROL CIRCUIT - OPEN CIRCUIT
P0382-GLOW PLUG 2 CONTROL CIRCUIT - SHORT CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0382-GLOW PLUG 2 CONTROL CIRCUIT - OPEN CIRCUIT.

When Monitored and Set Condition:

P0382-GLOW PLUG 2 CONTROL CIRCUIT - OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM does not detect voltage on the Glow Plug Relay 2 Control circuit.

P0382-GLOW PLUG 2 CONTROL CIRCUIT - SHORT CIRCUIT

When Monitored: With the ignition off.

Set Condition: The ECM detects excessive current on the Glow Plug Relay 2 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
SUBSTITUTE GLOW PLUG RELAY 2
GLOW PLUG RELAY 2 CONTROL CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG RELAY 2 CONTROL CIRCUIT SHORTED TO GROUND
GLOW PLUG RELAY 2 CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate Glow Plug Relay 2. Is Glow Plug Relay 2 clicking? Yes → Go To 2 No → Go To 3	All

P0382-GLOW PLUG 2 CONTROL CIRCUIT - OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
3	Turn the ignition off. Remove Glow Plug Relay 2 from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of Glow Plug Relay 2. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 5 No → Replace Glow Plug Relay 2. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Remove Glow Plug Relay 2 from the PDC. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Glow Plug Relay 2 Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Glow Plug Relay 2 Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All

P0382-GLOW PLUG 2 CONTROL CIRCUIT - OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove Glow Plug Relay 2 from the PDC. Disconnect the ECM harness connectors. Measure the resistance between ground and the Glow Plug Relay 2 Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Glow Plug Relay 2 Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Remove Glow Plug Relay 2 from the PDC. Disconnect the ECM harness connectors. Measure the resistance of the Glow Plug Relay 2 Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Glow Plug Relay 2 Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0403-EGR SOLENOID CIRCUIT OPEN CIRCUIT

When Monitored and Set Condition:

P0403-EGR SOLENOID CIRCUIT OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the EGR Solenoid Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
EGR SOLENOID CONTROL CIRCUIT OPEN
SUBSTITUTE EGR SOLENOID
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Perform several ignition cycles, turning the ignition off for at least 10 seconds between each ignition cycle. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the EGR Solenoid Control circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the EGR Solenoid Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0403-EGR SOLENOID CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance of the EGR Solenoid Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the EGR Solenoid Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Install a substitute EGR Solenoid in place of the vehicle's EGR Solenoid. **NOTE: Ensure the ECM and EGR Solenoid harness connectors are connected.** Turn the ignition on. With the DRB, check for this DTC to reset. Did this DTC reset? Yes → Go To 6 No → Replace the EGR Solenoid. Perform ROAD TEST VERIFICATION - VER-2.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time.The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects excessive current draw on the EGR Solenoid 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. With the DRB, erase ECM DTCs. Test drive the vehicle and monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Does the DRB display P0403 EGR OPEN CIRCUIT? Yes → Replace the EGR Solenoid. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Solenoid Control circuit at the EGR Solenoid harness connector. Is the voltage below 0.5 volt? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the EGR Solenoid Control circuit. Is the voltage below 0.5 volt? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the EGR Solenoid Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Fuel Level Sensor Signal voltage is above 4.70 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
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off, wait 10 seconds, then turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Level Sensor harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Fuel Level Sensor Signal circuit. Is the voltage below 0.5 volt? Yes → Go To 3 No → Repair the Fuel Level Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Level Sensor harness connector. Measure the resistance of the Fuel Level Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Fuel Level Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Level Sensor harness connector. Measure the resistance of the Fuel Level Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Level Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Fuel Level Sensor harness connector. Turn the ignition on. With the DRB, read and record the Fuel Level Sensor voltage. **NOTE: The Fuel Level Sensor voltage should be 5.0 ± 0.3 volts with the sensor harness connector disconnected.** Connect a jumper wire between Fuel Level Sensor harness connector cavities 3 and 4. With the DRB, read the Fuel Level Sensor voltage. **NOTE: The Fuel Level Sensor voltage should be less then 1.0 volt with the jumper wire connected.** Are the voltage readings the expected voltages? Yes → Replace the Fuel Level Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Fuel Level Sensor Signal voltage is below 0.15 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
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off, wait 10 seconds, then turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Level Sensor harness connector. Turn the ignition on. With the DRB, read the Fuel Level Sensor voltage. Is the voltage above 4.8 volts? Yes → Replace the Fuel Level Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Level Sensor harness connector. Measure the resistance between ground and the Fuel Level Sensor Signal circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the Fuel Level Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0460-FUEL LEVEL SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Level Sensor harness connector. Measure the resistance between the Fuel Level Sensor Signal circuit and Sensor Ground circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Fuel Level Sensor Signal and Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH
P0500-VEHICLE SPEED SENSOR HIGH LEVEL DURATION
P0500-VEHICLE SPEED SENSOR PLAUSIBILITY
P0500-VEHICLE SPEED SENSOR SIGNAL VOLTAGE TOO HIGH

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

When Monitored and Set Condition:

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects a vehicle speed greater than the vehicle is capable.

P0500-VEHICLE SPEED SENSOR PLAUSIBILITY

When Monitored: With the engine under load and engine speed greater than 2400 RPM while vehicle speed is below 20 km/h (12 MPH).

Set Condition: The ECM compares the amount of fuel the fuel injectors are delivering to the vehicle speed from the VSS. The VSS indicates a vehicle speed that cannot be achieved with the present amount of fuel being delivered.

P0500-VEHICLE SPEED SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects a vehicle speed greater than 240 km/h (149 MPH).

POSSIBLE CAUSES
INTERMITTENT CONDITION
BODY CONTROL MODULE
CHECK FOR RELATED BODY CONTROL MODULE DTCS
CHECK FOR RELATED CONTROLLER ANTILOCK BRAKES DTCS
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
VEHICLE SPEED SIGNAL CIRCUIT OPEN
ENGINE CONTROL MODULE - NO VOLTAGE
ENGINE CONTROL MODULE - NO VOLTAGE CHANGE
ENGINE CONTROL MODULE - VOLTAGE TOO HIGH

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle. With the DRB, read Vehicle Speed. Does the DRB display an accurate Vehicle Speed? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
3	Turn the ignition on. With the DRB, check for Body Control Module DTCs. Are any related BCM DTCs present? Yes → Refer to symptom list for problems related to BCM DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition on. With the DRB, check for Controller Antilock Brakes DTCs. Are any related CAB DTCs present? Yes → Refer to symptom list for problems related to CAB DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the BCM harness connectors. Turn the ignition on. Measure the voltage of the Vehicle Speed Signal circuit. Select the range that the voltage reading falls into. Above 5.4 volts Go To 6 Between 4.5 and 5.4 volts Go To 7 Below 4.5 volts Go To 8	All
6	Turn the ignition off. Disconnect the BCM harness connectors. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Vehicle Speed Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the Vehicle Speed Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the BCM harness connectors. Turn the ignition on. Connect one end of a jumper wire to the Vehicle Speed Signal circuit. With the DRB, select, isolate and observe the Vehicle Speed status while tapping the other end of the jumper wire to ground. Does the DRB display a vehicle speed change while tapping the jumper wire to ground? Yes → Replace and program the Body Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the BCM harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and the Vehicle Speed Signal circuit. Is the resistance above 100 kohms? Yes → Go To 9 No → Repair the Vehicle Speed Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the BCM harness connectors. Disconnect the ECM harness connectors. Measure the resistance of the Vehicle Speed Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the Vehicle Speed Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects Battery Temperature Sensor Signal voltage above 4.72 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
BATTERY TEMPERATURE SENSOR GROUND CIRCUIT OPEN
BATTERY TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
BATTERY TEMPERATURE SENSOR
BATTERY TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, monitor the Battery Temperature Sensor voltage. Is the voltage above 4.5 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Battery Temperature Sensor harness connector. Turn the ignition on. Measure the voltage on the Battery Temperature Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the Battery Temperature Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Battery Temperature Sensor harness connector. Connect a jumper wire between the Battery Temperature Sensor harness connector cavities. Turn the ignition on. With the DRB, read the Battery Temperature Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Battery Temperature Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Battery Temperature Sensor harness connector. Connect a jumper wire between ground and the Battery Temperature Sensor Signal circuit. Turn the ignition on. With the DRB, read the Battery Temperature Sensor voltage. Is the voltage below 1.0 volt? Yes → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Battery Temperature Sensor harness connector. Measure the resistance of the Battery Temperature Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Battery Temperature Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

— Continued

TEST	ACTION	APPLICABILITY
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

POSSIBLE CAUSES
INTERMITTENT CONDITION
BATTERY TEMPERATURE SENSOR
BATTERY TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
BATTERY TEMPERATURE SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, monitor the Battery Temperature Sensor voltage. Is the Battery Temperature Sensor voltage below 0.3 volt? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Battery Temperature Sensor harness connector. Turn the ignition on. With the DRB, read the Battery Temperature Sensor voltage. Is the voltage above 4.0 volts? Yes → Replace the Battery Temperature Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Battery Temperature Sensor harness connector. Measure the resistance between ground and the Battery Temperature Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Battery Temperature Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Battery Temperature Sensor harness connector. Measure the resistance between the Battery Temperature Sensor Signal circuit and Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Battery Temperature Sensor Signal and Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY

When Monitored and Set Condition:

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY

When Monitored: At engine start-up.

Set Condition: The oil pressure signal is below the lower limit for 8 seconds after engine start-up.

POSSIBLE CAUSES
5-VOLT SUPPLY CIRCUIT OPEN
ECM - OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - OIL PRESSURE SENSOR SIGNAL SHORT TO GROUND
INCORRECT OIL PRESSURE
OIL PRESSURE SENSOR FAILURE
OIL PRESSURE SENSOR SIGNAL CIRCUIT OPEN
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND CIRCUIT OPEN
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose these DTC's before diagnosing this DTC.** Turn the ignition on. With the DRB III, erase ECM DTCs. Cycle the ignition key on and off several times, leaving the key on for at least 10 seconds at a time. Test drive the vehicle. With the DRB III, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 10	All
2	Refer to the Service Information and perform the Oil Pressure Test. Is the oil pressure within specification? Yes → Go To 3 No → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Oil Pressure Sensor Signal circuit. Select the appropriate voltage reading. Voltage is above 5.5 volts. Go To 4 Voltage is between 4.7 and 5.4 volts. Go To 5 Voltage is below 4.7 volts. Go To 7	All
4	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Oil Pressure Sensor Signal circuit. Is the voltage below 1.0 volt? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Oil Pressure Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance of the 5_Volt Supply circuit between the ECM harness connector and the Oil Pressure Sensor harness connector. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the 5-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance of the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Replace the Oil Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance of the Oil Pressure Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Oil Pressure Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance between ground and the Oil Pressure Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 9 No → Repair the Oil Pressure Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance between Sensor Ground and the Oil Pressure Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Oil Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0520-OIL PRESS SENSOR CKT MALF SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored and Set Condition:

P0520-OIL PRESS SENSOR CKT MALF SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

Set Condition: The Sensor Reference Voltage ″A″ voltage to the Oil Pressure Sensor is below 4.8 volts or above 5.2 volts for at least 100 ms.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND
5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off, wait 30 seconds, then start and idle the engine. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage between ground and the 5-volt Supply circuit at the Oil Pressure Sensor harness connector. Is the voltage above 1.0 volt? Yes → Repair the 5-volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0520-OIL PRESS SENSOR CKT MALF SUPPLY VOLTAGE TOO HIGH OR LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance between ground and the 5-volt Supply circuit at the Oil Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the 5-volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance between Sensor Ground and the 5-volt Supply circuit at the Oil Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the 5-volt Supply circuit for a short to Sensor Ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0560-SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0560-SYSTEM VOLTAGE TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects battery voltage is above 16.5 volts.

POSSIBLE CAUSES
GROUND CIRCUIT HIGH RESISTANCE
BATTERY SUPPLY OR ASD RELAY OUTPUT CIRCUIT HIGH RESISTANCE
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
GENERATOR INTERNALLY SHORTED TO GROUND
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: The battery must be fully charged and the generator belt must be in good condition and tensioned properly before continuing.** Turn the ignition off. Disconnect the ECM harness connectors. Using a 12-volt test light connected to 12-volts, check all of the ECM Ground circuits including the Battery(-) Sense circuit. Does the test light illuminate brightly for each circuit? Yes → Go To 2 No → Repair the Ground circuit(s) for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Using a 12-volt test light connected to ground, check all of the ECM Battery Supply and ASD Relay Output circuits including the Battery(+) Sense circuit. Does the test light illuminate brightly for each circuit? Yes → Go To 3 No → Repair the Battery Supply or ASD Relay Output circuit(s) for high resistance. Perform CHARGING VERIFICATION - VER-3.	All

P0560-SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect ECM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance between ground and the Generator Field Control circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the Generator Field Control circuit for a short to ground. Perform CHARGING VERIFICATION - VER-3.	All
4	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance between ground and the Generator Field Control terminal on the back of the Generator. Is the resistance above 100 kohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform CHARGING VERIFICATION - VER-3. No → Repair or replace the Generator as necessary. Perform CHARGING VERIFICATION - VER-3.	All

Symptom List:

P0560-SYSTEM VOLTAGE TOO LOW
***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 P0560-SYSTEM VOLTAGE TOO LOW.

When Monitored and Set Condition:

P0560-SYSTEM VOLTAGE TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM detects battery voltage is below 10.0 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
GENERATOR BELT CONDITION OR TENSION
HIGH RESISTANCE IN THE VOLTAGE SUPPLY CIRCUIT(S) TO THE ECM
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO VOLTAGE
GENERATOR FUSED B+ CIRCUIT HIGH RESISTANCE
GENERATOR FIELD CONTROL CIRCUIT OPEN
GENERATOR GROUND CIRCUIT HIGH RESISTANCE
FUSED ASD RELAY OUTPUT CIRCUIT TO GENERATOR OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If there are any Battery Sense DTCs (P1511 or P1512) present with this DTC, diagnose the Battery Sense DTCs first.** **NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator capacity.** **NOTE: The battery must be fully charged before continuing.** Inspect the generator belt condition and tension. Is the generator belt in good condition and tensioned properly? Yes → Go To 2 No → Repair as necessary. Perform CHARGING VERIFICATION - VER-3.	All

P0560-SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	Connect the positive lead of a voltmeter to the generator B+ (12V) terminal and the negative lead to the battery positive (+) post. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Is the voltage on the voltmeter below 0.4 volt? Yes → Go To 3 No → Repair the Generator Fused B+ circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
3	Connect the positive lead of a voltmeter to the generator case (housing) and the negative lead to the battery negative (-) post. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Is the voltage on the voltmeter below 0.4 volt? Yes → Go To 4 No → Repair the Generator Ground circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
4	Turn the ignition off, then on. With the DRB, read and record the Battery Voltage. With a voltmeter, measure and record the voltage between the Battery terminals. Compare the DRB Battery Voltage reading to the voltmeter reading. Is the difference between the two readings less than 0.5 volt? Yes → Go To 5 No → Go To 6	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform CHARGING VERIFICATION - VER-3. No → Test Complete.	All

P0560-SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. With a voltmeter, measure and record the voltage between the Battery terminals. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the ASD Relay Output circuits and Battery(+) Sense circuit in the ECM C1 harness connector. Are all voltage measurements within 0.5 volt of each other? Yes → Go To 7 No → Repair the circuit that had high resistance. Perform CHARGING VERIFICATION - VER-3.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Generator Field Control circuit. Is the voltage below 1.0 volt? Yes → Go To 8 No → Repair the Generator Field Control circuit for a short to voltage. Perform CHARGING VERIFICATION - VER-3.	All
8	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the Generator Field Control circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
9	Turn the ignition off. Disconnect the generator harness connector. Turn the ignition on. Measure the voltage of the Fused ASD Relay Output circuit. Is the voltage above 10.0 volts? Yes → Go To 10 No → Repair the Fused ASD Relay Output circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform CHARGING VERIFICATION - VER-3.	All

Symptom:

P0579-S/C SWITCH SIGNAL CIRCUIT PLAUSIBILITY

POSSIBLE CAUSES
INTERMITTENT CONDITION
HIGH RESISTANCE IN THE S/C SWITCH SIGNAL CIRCUIT
HIGH RESISTANCE IN THE S/C SWITCH GROUND CIRCUIT
S/C SWITCHES
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle and activate the Speed Control. At some point during the test drive, actuate each of the S/C Switch buttons. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the S/C Switch harness connectors. Disconnect the ECM harness connectors. Measure the resistance of the S/C Switch Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the S/C Switch Signal circuit for high resistance. Perform SPEED CONTROL VERIFICATION - VER-4.	All
3	Turn the ignition off. Disconnect the S/C Switch harness connectors. Disconnect the ECM harness connectors. Measure the resistance of the S/C Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the S/C Switch Ground circuit for high resistance. Perform SPEED CONTROL VERIFICATION - VER-4.	All

P0579-S/C SWITCH SIGNAL CIRCUIT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Replace the S/C Switches. Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle and activate the Speed Control. At some point during the test drive, actuate each of the S/C Switch buttons. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4. No → The repair is complete. Perform SPEED CONTROL VERIFICATION - VER-4.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform SPEED CONTROL VERIFICATION - VER-4. No → Test Complete.	All

Symptom:

P0579-S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH

POSSIBLE CAUSES
ECM - S/C SIGNAL CIRCUIT OPEN
ECM - S/C SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - SENSOR GROUND OPEN
S/C ON/OFF/SET SWITCH
S/C ON/OFF/SET SWITCH SIGNAL CIRCUIT OPEN
S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the S/C ON/OFF/SET button harness connector. Turn the ignition on. Measure the voltage of the S/C Switch Signal circuit. Select the appropriate voltage reading. Below 4.5 volts. Go To 2 Between 4.5 and 5.5 volts. Go To 3 Above 5.5 volts Go To 5	All
2	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance of the S/C Switch Signal circuit. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4. No → Repair the S/C ON/OFF/SET Switch Signal circuit for an open. Perform SPEED CONTROL VERIFICATION - VER-4.	All
3	Turn the ignition off. Disconnect the S/C ON/OFF/SET switch harness connector. Turn the ignition on. Connect a jumper wire between the S/C Switch Signal circuit and the Sensor Ground at the ON/OFF/SET Switch harness connector. With the DRB III, read the S/C Switch volts. Does the DRB III display below 0.5 volt? Yes → Replace the S/C ON/OFF/SET Switch. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 4	All

P0579-S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4. No → Repair the Sensor Ground circuit for an open. Perform SPEED CONTROL VERIFICATION - VER-4.	All
5	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the ECM harness connectors. Turn the ignition on. Measure the voltage of the S/C Switch Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the S/C ON/OFF/SET Switch Signal circuit for a short to voltage. Perform SPEED CONTROL VERIFICATION - VER-4. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4.	All

Symptom:

P0579-S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO LOW

POSSIBLE CAUSES
INTERMITTENT CONDITION
S/C ON/OFF/SET SWITCH
S/C RESUME/ACCEL SWITCH
S/C/ SWITCH SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
ECM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the S/C Switch voltage. Is the S/C Switch voltage below 1.0 volt? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRBIII®, monitor the S/C Switch voltage. Disconnect the S/C ON/OFF/SET Switch harness connector. Did the DRB reading change to above 4.7 volts? Yes → Replace the S/C ON/OFF/SET Switch. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, monitor the S/C Switch voltage. Disconnect the S/C Resume/Accel Switch harness connector. Did the volt change to above 4.7 volts? Yes → Replace the S/C Resume/Accel Switch. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 4	All
4	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the S/C RESUME/ACCEL Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance between the S/C Switch Signal circuit and the Sensor Ground circuit in the ECM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the S/C Switch Signal circuit shorted to the Sensor Ground circuit. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 5	All

P0579-S/C SWITCH SIGNAL CIRCUIT SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the S/C RESUME/ACCEL Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the S/C Switch Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the S/C Switch Signal circuit for a short to ground. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FANS. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FANS. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform SPEED CONTROL VERIFICATION - VER-4. No → Test Complete.	All

Symptom List:

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH
P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO LOW
P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO HIGH
P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO LOW
P0620-GENERATOR FIELD CONTROL MALF CHARGING VOLTS TOO LOW
P0620-GENERATOR FIELD CONTROL MALF OPEN CIRCUIT
P0620-GENERATOR FIELD CONTROL MALF SHORT CIRCUIT
P0620-GENERATOR FIELD CONTROL MALF UNSTABLE CURRENT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH.

When Monitored and Set Condition:

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM senses battery voltage above 16.5 volts.

P0620-GENERATOR FIELD CONTROL MALF CHARGING VOLTS TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM senses battery voltage that is 1volt or more below desired charging voltage.

P0620-GENERATOR FIELD CONTROL MALF OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the Generator Field Control circuit.

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH — Continued

P0620-GENERATOR FIELD CONTROL MALF SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Generator Field Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
GENERATOR FIELD
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO VOLTAGE
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
GENERATOR FIELD CONTROL CIRCUIT OPEN
HIGH RESISTANCE ON THE BATTERY(+) SENSE CIRCUIT
HIGH RESISTANCE ON THE BATTERY(-) SENSE CIRCUIT
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Start the engine several times. Allow the engine to run for at least 30 seconds each run cycle while turning the ignition off for at least 10 seconds between each run cycle. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance of the Field Control terminals on the back of the Generator. Is the resistance between 2 and 6 ohms? Yes → Go To 3 No → Repair or replace the Generator as necessary. Perform CHARGING VERIFICATION - VER-3.	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Generator Field Control circuit. Is the voltage below 1.0 volt? Yes → Go To 4 No → Repair the Generator Field Control circuit for a short to voltage. Perform CHARGING VERIFICATION - VER-3.	All

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect ECM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance between ground and the Generator Field Control circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Generator Field Control circuit for a short to ground. Perform CHARGING VERIFICATION - VER-3.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Generator Field Control circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Remove Fuse 26 from the PDC. Measure the resistance of the Battery(+) Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Battery(+) Sense circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance of the Battery(-) Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Battery(-) Sense circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform CHARGING VERIFICATION - VER-3.	All

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform CHARGING VERIFICATION - VER-3. No → Test Complete.	All

Symptom:

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Sensor Reference Voltage A circuit or the Fuel Pressure Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Fuel Pressure Sensor 5-Volt Supply circuit. Is the voltage below 1.0 volt? Yes → Go To 3 No → Repair the Fuel Pressure Sensor 5-Volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. **NOTE: Remove the jumper wire and reinstall the ASD Relay.**	All
3	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO LOW

When Monitored and Set Condition:

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to ground on the Sensor Reference Voltage A circuit or a short to ground on the Fuel Pressure Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL PRESSURE SENSOR SHORT TO GROUND
FUEL PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
FUEL PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Fuel Pressure Sensor 5-Volt Supply circuit. Is the voltage above 4.8 volts? Yes → Replace the Fuel Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Pressure Sensor harness connector. Measure the resistance between ground and the Fuel Pressure Sensor 5-Volt Supply circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the Fuel Pressure Sensor 5-Volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0641-SENSOR REFERENCE VOLTAGE A CKT VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Pressure Sensor harness connector. Measure the resistance between the Fuel Pressure Sensor 5-Volt Supply circuit and the Sensor Ground circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Fuel Pressure Sensor 5-Volt Supply circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0645-A/C CLUTCH RELAY CIRCUIT OPEN CIRCUIT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CIRCUIT OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the A/C Clutch Relay Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUSED ASD RELAY OUTPUT CIRCUIT OPEN
A/C CLUTCH RELAY
A/C CLUTCH RELAY CONTROL CKT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
ECM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

P0645-A/C CLUTCH RELAY CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused ASD Relay Output circuit in the PDC. Does the test light illuminate? Yes → Go To 4 No → Repair the Fused ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the PDC. With the DRBIII®, actuate the A/C Clutch Relay. Does the test light cycle on and off? Yes → Replace the A/C Clutch Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the ECM harness connector. Measure the resistance of the A/C Clutch Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the A/C Clutch Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the ECM harness connector. Measure the resistance between ground and the A/C Clutch Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the A/C Clutch Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0645-A/C CLUTCH RELAY CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition off.

Set Condition: The ECM detects a short to voltage on the A/C Clutch Relay Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
A/C CLUTCH RELAY
A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ECM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

P0645-A/C CLUTCH RELAY CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the PDC. With the DRBIII®, actuate the A/C Clutch Relay. Does the test light cycle on and off? Yes → Replace the A/C Clutch Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the ECM harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the A/C Clutch Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the A/C Clutch Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Sensor Reference Voltage B circuit or the Accelerator Pedal Position Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SENSOR REFERENCE VOLTAGE B CIRCUIT SHORTED TO VOLTAGE
ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the Engine Oil Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Sensor Reference Voltage B circuit. Is the voltage above 1.0 volt? Yes → Repair the Sensor Reference Voltage B circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3 **NOTE: Remove the jumper wire and reinstall the ASD Relay.**	All

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Accelerator Pedal Position Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage on the Accelerator Pedal Position Sensor 5-Volt Supply circuit. Is the voltage below 1.0 volt? Yes → Go To 4 No → Repair the Accelerator Pedal Position Sensor 5-Volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. **NOTE: Remove the jumper wire and reinstall the ASD Relay.**	All
4	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO LOW

When Monitored and Set Condition:

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to ground on the Sensor Reference Voltage B circuit, or a short to ground on the Accelerator Pedal Position Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
OIL PRESSURE, BOOST PRESSURE, OR ACCEL PEDAL POSITION SENSOR SHORT TO GROUND
SENSOR REFERENCE VOLTAGE B CIRCUIT SHORTED TO GROUND
SENSOR REFERENCE VOLTAGE B CIRCUIT SHORTED TO SENSOR GROUND
ACCELERATOR PEDAL POSITION SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
ACCELERATOR PEDAL POSITION SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 8	All

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII® in Sensors, monitor the Accelerator Pedal Position and Boost Pressure Sensors only. One at a time while monitoring the DRB sensor readings, disconnect then reconnect the Boost Pressure, Accelerator Pedal Position and Engine Oil Pressure Sensor harness connectors. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. **NOTE: If one of the sensors is shorted to ground internally, disconnecting it will cause the voltage reading on the DRB to rise for the monitored sensor that has not been disconnected.** **NOTE: Disconnecting components will generate new DTCs which should be ignored.** Did either of the monitored sensor voltage readings rise when one sensor was disconnected? Yes → Replace the Sensor that, when disconnected, caused the DRB sensor readings to rise. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Boost Pressure Sensor and Engine Oil Pressure Sensor harness connectors. Measure the resistance between ground and the Sensor Reference Voltage B circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the Sensor Reference Voltage B circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Engine Oil Pressure Sensor harness connector. Measure the resistance between the Sensor Reference Voltage B circuit and the Oil Pressure Sensor Ground circuit. Disconnect the Boost Pressure Sensor harness connector. Measure the resistance between the Sensor Reference Voltage B circuit and the Boost Pressure Sensor Ground circuit. Is the resistance above 100 kohms for both measurements? Yes → Go To 5 No → Repair the Sensor Reference Voltage B circuit for a short to the Sensor Ground circuit that measured below 100 kohms. Perform ROAD TEST VERIFICATION - VER-2.	All

P0651-SENSOR REFERENCE VOLTAGE B CKT VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Accelerator Pedal Position Sensor harness connector. Measure the resistance between ground and the Accelerator Pedal Position Sensor 5-Volt Supply circuit. Is the resistance above 100 kohms? Yes → Go To 6 No → Repair the Accelerator Pedal Position Sensor 5-Volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Accelerator Pedal Position Sensor harness connector. Measure the resistance between the Accelerator Pedal Position Sensor 5-Volt Supply circuit and the Sensor Ground circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Accelerator Pedal Position Sensor 5-Volt Supply circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:
P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY

When Monitored and Set Condition:

P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY

When Monitored: During after-run.

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

POSSIBLE CAUSES
CHECK FOR OTHER DTCS
INTERMITTENT CONDITION
SUBSTITUTE ASD RELAY
ASD RELAY CONTROL CIRCUIT OPEN INTERMITTENTLY
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for additional DTCs. Are other DTCs present? Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Turn the ignition on. With the DRB, erase ECM DTCs. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Install a substitute relay in place of the ASD Relay. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 4 No → Replace the ASD Relay. Perform ROAD TEST VERIFICATION - VER-2.	All

P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance of the ASD Relay Control circuit while wiggling the wiring harness and connectors between the ECM and the PDC. Was the resistance above 5.0 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the ASD Relay Control circuit for an intermittent open. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE

When Monitored and Set Condition:

P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE

When Monitored: During after-run.

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

POSSIBLE CAUSES
CHECK FOR OTHER DTCS
INTERMITTENT CONDITION
SUBSTITUTE ASD RELAY
ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND INTERMITTENTLY
ASD RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for additional DTCs. Are other DTCs present? Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Turn the ignition on. With the DRB, erase ECM DTCs. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 3 No → Go To 6	All

P0685-ASD RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the ASD Relay. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 4 No → Replace the ASD Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance between ground and the ASD Relay Control circuit while wiggling the wiring harness and connectors. Was the resistance below 5.0 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the ASD Relay Control circuit for an intermittent short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Turn the ignition on. Measure the voltage of the ASD Relay Output circuit. Is the voltage below 0.5 volt? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ASD Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT

P0703-BRAKE SWITCH SIGNAL CKTS PLAUS W/REDUNDANT CONTACT AFTER INITIALIZATION

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT.

When Monitored and Set Condition:

P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT

When Monitored: With the ignition on.

Set Condition: The ECM detects the Primary Brake Switch Signal circuit and Secondary Brake Switch Signal circuit inputs to the ECM do not agree.

P0703-BRAKE SWITCH SIGNAL CKTS PLAUS W/REDUNDANT CONTACT AFTER INITIALIZATION

When Monitored: With the ignition on.

Set Condition: The ECM detects the Primary Brake Switch Signal circuit and Secondary Brake Switch Signal circuit inputs to the ECM do not agree.

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

P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. While observing the PRIM BRAKE SWITCH status on the DRB display, press and release the brake pedal several times. Does the DRB display PRIM BRAKE SWITCH: PRESSED and RELEASED for the appropriate pedal position? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition on. While observing the SEC BRAKE SWITCH status on the DRB display, press and release the brake pedal several times. Does the DRB display SEC BRAKE SWITCH: PRESSED and RELEASED for the appropriate pedal position? Yes → Go To 3 No → Go To 4	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Turn the ignition on. Measure the voltage between the Secondary Brake Switch Signal circuit and ground. Is the voltage above 9.0 volts? Yes → Go To 5 No → Go To 8	All

P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT — Continued

TEST	ACTION	APPLICABILITY
5	Disconnect the Brake Lamp Switch harness connector. Turn the ignition on. While monitoring the SEC BRAKE SWITCH status with the DRB, connect a jumper wire between ground and the Secondary Brake Switch Signal circuit. Does the DRB display change from PRESSED to RELEASED? Yes → Adjust or replace the Brake Lamp Switch in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between ground and the Secondary Brake Switch Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Secondary Brake Switch Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Secondary Brake Switch Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 9 No → Repair the Secondary Brake Switch Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Secondary Brake Switch Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 10 No → Repair the Secondary Brake Switch Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0703-BRAKE SWITCH SIGNAL CIRCUITS PLAUSIBILITY WITH REDUNDANT CONTACT — Continued

TEST	ACTION	APPLICABILITY
11	Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Does the test light illuminate brightly? Yes → Go To 12 No → Repair the Brake Lamp Switch Fused B+ circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
12	Disconnect the Brake Lamp Switch harness connector. Turn the ignition on. 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. Does the DRB display change from RELEASED to PRESSED? Yes → Adjust or replace the Brake Lamp Switch in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 13	All
13	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage between the Primary Brake Switch Signal circuit and ground. Is the voltage above 1.0 volt? Yes → Repair the Primary Brake Switch Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 14	All
14	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Primary Brake Switch Signal circuit. Is the resistance below 5.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Primary Brake Switch Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY
P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY 2
P0836-TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO HIGH
P0836-TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY.

When Monitored and Set Condition:

P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY

When Monitored: When the ECM detects the transfer case in 4WD low.

Set Condition: The ECM detects a vehicle speed that is higher than is possible in 4WD low.

P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY 2

When Monitored: With the ignition on.

Set Condition: The ECM detects a voltage signal from the transfer case switch that does not fall into a valid switch position voltage range.

P0836-TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to voltage on the Transfer Case Position Sensor Signal circuit.

P0836-TRANSFER CASE POSITION SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to ground on the Transfer Case Position Sensor Signal circuit.

POSSIBLE CAUSES
CHECKING THE TRANSFER CASE POSITION SENSOR
INTERMITTENT WIRING AND CONNECTORS
TRANSFER CASE POSITION SENSOR SIGNAL CIRCUIT OPEN
TRANSFER CASE POSITION SENSOR SIGNAL CIRCUIT SHORT TO GROUND
TRANSFER CASE POSITION SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE

P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY — Continued

POSSIBLE CAUSES
TRANSFER CASE POSITION SENSOR SIGNAL CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: The vehicle speedometer must be operational for the result of this test to be valid.** With the DRBIII®, record and erase DTC's. Start the engine and cycle the Transfer Case through all positions. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off to the lock position. Disconnect the ECM harness connectors. Disconnect the Transfer Case Position Sensor harness connector. Remove the ASD Relay. Connect a jumper wire between cavities 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage of the Transfer Case Position Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the Transfer Case Position Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off to the lock position. Disconnect the ECM harness connectors. Disconnect the Transfer Case Position Sensor harness connector. Measure the resistance of the Transfer Case Position Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 4 No → Repair the Transfer Case Position Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off to the lock position. Disconnect the ECM harness connectors. Disconnect the Transfer Case Position Sensor harness connector. Measure the resistance between ground and the Transfer Case Position Sensor Signal circuit. Is the resistance below 1000.0 ohms? Yes → Repair the Transfer Case Position Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All

P0836-TRANSFER CASE POSITION SENSOR PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off to the lock position. Disconnect the ECM harness connectors. Disconnect the Transfer Case Position Sensor harness connector. Measure the resistance between the Transfer Case Position Sensor circuit and the Sensor Ground circuit. Is the resistance below 1000.0 ohms? Yes → Repair the Transfer Case Position Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition on. With the DRBIII® read the T-case Sensor Observe the T-case volts on the DRB while moving the transfer case selector lever in each of the transfer case positions. **NOTE: When shifting the transfer case selector to each position, the Sensor voltage should result in the following voltages: 4WD Low 0.15 - 0.40, Neutral 0.68 - 0.98, 4WD Part Time 1.78 - 2.12, 2WD 2.43 - 2.77.** Does each position provide the correct voltage? Yes → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the Transfer Case Position Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
7	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED
P1130-FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO HIGH-SHUT OFF
P1130-FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO LOW
P1130-FUEL RAIL PRESSURE MALFUNCTION SOLENOID OPEN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED.

When Monitored and Set Condition:

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED

When Monitored: With the engine running.

Set Condition: The ECM detects the desired flow of fuel at idle is greater than 5000 mm^3/sec.

P1130-FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO HIGH-SHUT OFF

When Monitored: With the ignition on.

Set Condition: The fuel rail pressure sensor indicates fuel pressure above 21,000 PSI with the engine off.

P1130-FUEL RAIL PRESSURE MALFUNCTION PRESSURE TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM determines that the fuel rail pressure is too low for a given engine speed.

P1130-FUEL RAIL PRESSURE MALFUNCTION SOLENOID OPEN

When Monitored: With the engine running.

Set Condition: The ECM detects a higher rate of fuel pressure than the target pressure.

POSSIBLE CAUSES
CHECKING FOR OTHER DTC'S
CHECKING THE FUEL PRESSURE
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO GROUND
FUEL PRESSURE SENSOR
FUEL SYSTEM LEAK

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

POSSIBLE CAUSES
INJECTOR COMMON DRIVER CIRCUIT OPEN
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** Turn the ignition on. With the DRBIII®, read the ECM DTCs. Are there any other DTC's present? Yes → Refer to symptom list for problems related to the DTC other than P1130. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle under various load and speed conditions to attempt to duplicate the fault. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Inspect the entire fuel system for leakage. Is there any evidence of leakage? Yes → Repair as necessary in accordance with the Service Information. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Fuel Injector harness connectors. Measure the resistance between ground and each of the Fuel Injector Control circuits. Is the resistance below 1000 ohms for any of the measurements? Yes → Repair the appropriate Fuel Injector Control circuit for a short to ground. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Fuel Injector harness connectors. Measure the resistance of the Common Injector Driver circuit between the ECM harness connector and each Fuel Injector harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 6 No → Repair the Injector Common Driver circuit for an open.	All

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

TEST	ACTION	APPLICABILITY
6	Refer to the appropriate Service Information and perform the Fuel Pressure Test. **NOTE: The following is a list of problems that can cause the fuel pressure to become out of specification: restricted fuel filter or fuel lines, failed fuel pressure solenoid, air in fuel system, failed fuel sending unit, gelled fuel, faulty injector.** Is the fuel pressure within specification? Yes → Replace the Fuel Pressure Sensor in accordance with the Service Information. No → Repair as necessary in accordance with the Service Information.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. No → Test Complete.	All

Symptom List:

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT
P1131-FUEL PRESSURE SOLENOID PLAUSIBILITY IN AFTER-RUN
P1131-FUEL PRESSURE SOLENOID SHORT CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT.

When Monitored and Set Condition:

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the Fuel Pressure Solenoid Control circuit.

P1131-FUEL PRESSURE SOLENOID PLAUSIBILITY IN AFTER-RUN

When Monitored: When the ignition is turned off.

Set Condition: The ECM detects engine speed does not fall below 650 RPM within 0.5 second after ignition off.

P1131-FUEL PRESSURE SOLENOID SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Fuel Pressure Solenoid Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
FUEL PRESSURE SOLENOID CONTROL SHORTED TO VOLTAGE
FUEL PRESSURE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
FUEL PRESSURE SOLENOID CONTROL CIRCUIT OPEN
FUEL PRESSURE SOLENOID
ENGINE CONTROL MODULE

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** Turn the ignition on. With the DRB, erase ECM DTCs. Start the engine several times, turning the ignition off for at least 30 seconds between each run cycle. Monitor the DRB for ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Fuel Pressure Solenoid Control circuit. Is the voltage below 1.0 volt? Yes → Go To 4 No → Repair the Fuel Pressure Solenoid Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Fuel Pressure Solenoid Control circuit. **NOTE: The Fuel Pressure Solenoid Control circuit is duplicated at ECM cavities C2-80 and C2-81.** Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Fuel Pressure Solenoid Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Pressure Solenoid Control circuit. **NOTE: The Fuel Pressure Solenoid Control circuit is duplicated at ECM cavities C1-80 and C1-81.** Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Fuel Pressure Solenoid Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. **NOTE: The DRB should display P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT.** Turn the ignition off. Connect a jumper wire between cavity 1 and cavity 2 of the Fuel Pressure Solenoid harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. **NOTE: The DRB should display P1131-FUEL PRESSURE SOLENOID SHORT CIRCUIT.** Does the DRB display the appropriate DTC for each condition? Yes → Replace the Fuel Pressure Solenoid/Fuel Pump Assembly in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time.The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH
P1511-BATTERY SENSE LINE 1 VOLTAGE TOO LOW
P1512-BATTERY SENSE LINE 2 VOLTAGE TOO HIGH
P1512-BATTERY SENSE LINE 2 VOLTAGE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH.

When Monitored and Set Condition:

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH

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

Set Condition: The ECM detects Battery Sense circuit voltage above 17.50 volts.

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO LOW

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

Set Condition: The ECM detects Battery Sense circuit voltage below 7.98 volts.

P1512-BATTERY SENSE LINE 2 VOLTAGE TOO HIGH

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

Set Condition: The ECM detects Battery Sense circuit voltage above 17.50 volts.

P1512-BATTERY SENSE LINE 2 VOLTAGE TOO LOW

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

Set Condition: The ECM detects Battery Sense circuit voltage below 7.98 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUSE 26 OPEN
ECM GROUND CIRCUIT(S) OPEN
BATTERY(-) SENSE CIRCUIT SHORTED TO VOLTAGE
BATTERY(-) SENSE CIRCUIT OPEN
BATTERY(+) SENSE CIRCUIT SHORTED TO GROUND
BATTERY(+) SENSE CIRCUIT OPEN
ENGINE CONTROL MODULE

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0560-SYSTEM VOLTAGE TOO HIGH is present with this DTC, perform diagnostics for P0560 first.** Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Remove and inspect Fuse 26 from the PDC. Is the fuse OK? Yes → Go To 3 No → Repair the short that caused the fuse to open and replace the fuse. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the ECM harness connectors. 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 2. Did the test light illuminate for both cavities? Yes → Go To 4 No → Repair the ECM Ground circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Battery (-) Sense circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Battery(-) Sense circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance between the Battery negative terminal and the Battery(-) Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Battery(-) Sense circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the ECM harness connectors. Remove Fuse 26 from the PDC. **NOTE: A short to ground on any circuit associated with Fuse 6 or 26 may cause this DTC to set.** Measure the resistance between ground and the Battery(+) Sense circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Battery(+) Sense circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Remove Fuse 26 from the PDC. Measure the resistance of the Battery(+) Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Battery(+) Sense circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:
P1605-IGNITION SWITCH PLAUSIBILITY

When Monitored and Set Condition:

P1605-IGNITION SWITCH PLAUSIBILITY

When Monitored: With the ignition off.

Set Condition: The ECM detects a short to voltage on the Ignition Switch Sense circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY
ENGINE CONTROL MODULE
IGNITION SWITCH SENSE 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. With the DRB, erase ECM DTCs. Cycle the ignition switch on and off several times, pausing for at least 10 seconds at each key off and key on. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Measure the voltage of all cavities in the ECM harness connectors. Is the voltage above 2.0 volts on any of the cavities? Yes → Go To 3 No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Measure the voltage on ECM harness connector C1, cavity 22. Is voltage present on ECM harness connector C1, cavity 22? Yes → Repair the Ignition Switch Sense circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P1605-IGNITION SWITCH PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Turn the ignition on. Measure the voltage on ECM harness connector C1 cavities 4 and 5. Is the voltage below 2.0 volts on both circuits? Yes → Go To 5 No → Repair the ASD Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Measure the resistance between ground and the ASD Relay Control circuit. Is the resistance above 100 kohms? Yes → Replace the ASD Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ASD Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1643-VISCOUS HEATER RELAY OPEN CIRCUIT
P1643-VISCOUS HEATER RELAY SHORT CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1643-VISCOUS HEATER RELAY OPEN CIRCUIT.

When Monitored and Set Condition:

P1643-VISCOUS HEATER RELAY OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM does not detect voltage on the Viscous Heater Relay Control circuit.

P1643-VISCOUS HEATER RELAY SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects excessive current on the Viscous Heater Relay Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
SUBSTITUTE VISCOU HEATER RELAY
VISCOUS HEATER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
VISCOUS HEATER RELAY CONTROL CIRCUIT SHORTED TO GROUND
VAISCOUS HEATER RELAY CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Viscous Heater Relay. Is the Viscous Heater Relay clicking? Yes → Go To 2 No → Go To 3	All

P1643-VISCOUS HEATER RELAY OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
3	Turn the ignition off. Disconnect the Viscous Heater Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit at the Viscous Heater Relay connector in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of the Viscous Heater Relay. Turn the ignition on. With the DRB, actuate the Viscous/Cabin Heater Relay for at least 20 seconds. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 5 No → Replace the Viscous Heater Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Remove the Viscous Heater Relay. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage on the Viscous Heater Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Viscous Heater Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All

P1643-VISCOUS HEATER RELAY OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove the Viscous Heater Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance between ground and the Viscous Heater Relay Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Viscous Heater Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Remove the Viscous Heater Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance of the Viscous Heater Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Viscous Heater Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P1651-MIL/DIAG LAMP VIA J1850 BUS IN FRAME RESPONSE ERROR
P1651-MIL/DIAG LAMP VIA J1850 BUS STATUS ERROR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1651-MIL/DIAG LAMP VIA J1850 BUS IN FRAME RESPONSE ERROR.

When Monitored and Set Condition:

P1651-MIL/DIAG LAMP VIA J1850 BUS IN FRAME RESPONSE ERROR

When Monitored: With the ignition on.

Set Condition: The ECM does not receive a response from the instrument cluster when a J1850 message to actuate the MIL is transmitted.

P1651-MIL/DIAG LAMP VIA J1850 BUS STATUS ERROR

When Monitored: With the ignition on.

Set Condition: The ECM has not received any J1850 messages from the instrument cluster.

POSSIBLE CAUSES
REFER TO COMMUNICATION SECTION
VERIFY INSTRUMENT CLUSTER COMMUNICATION
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Cycle the ignition switch from OFF to ON. Monitor the DRBIII® for ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 3	All

P1651-MIL/DIAG LAMP VIA J1850 BUS IN FRAME RESPONSE ERROR — Continued

TEST	ACTION	APPLICABILITY
2	Start and idle the engine. With the DRBIII®, select Instrument Cluster and read the PCM/ECM Monitors. **NOTE: If the DRB is unable to communicate with the Instrument cluster, refer to the appropriate symptom in the Body Diagnostic Information** Does the DRB display accurate monitors? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Refer to Body Diagnostic Information for problems related to Communication with ECM. Perform ROAD TEST VERIFICATION - VER-2.	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1652-J1850 COMMUNICATION BUS SHORT TO GROUND
P1652-J1850 COMMUNICATION BUS SHORT TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1652-J1850 COMMUNICATION BUS SHORT TO GROUND.

When Monitored and Set Condition:

P1652-J1850 COMMUNICATION BUS SHORT TO GROUND

When Monitored: With the ignition on.

Set Condition: The ECM detects continuous low voltage on the J1850 Bus circuit.

P1652-J1850 COMMUNICATION BUS SHORT TO VOLTAGE

When Monitored: With the ignition on.

Set Condition: The ECM detects continuous high voltage on the J1850 Bus circuit.

POSSIBLE CAUSES
VERIFY ACTIVE DTC
VERIFY INSTRUMENT CLUSTER COMMUNICATION
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® attempt to communicate with the Instrument Cluster. Is the Instrument Cluster communicating with the DRB? Yes → Go To 2 No → Refer to the appropriate symptom in the Body Diagnostic Information. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Turn the ignition off then turn the ignition on and wait 60 seconds. With the DRBIII®, read the ECM DTCs. Does the DRB display this DTC? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1652-J1850 COMMUNICATION BUS SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED
P1685-SKIM SYSTEM INVALID SECRET KEY IN EEPROM
P1685-SKIM SYSTEM KEY COMMUNICATION TIMED OUT
P1685-SKIM SYSTEM WRITE ACCESS TO EEPROM FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED.

When Monitored and Set Condition:

P1685-SKIM SYSTEM WRITE ACCESS TO EEPROM FAILURE

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
SKIM
INTERMITTENT CONDITION
CHECK FOR SKIM COMMUNICATION AND DTCS

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for Sentry Key Immobilizer Module communication and DTCs. Are any SKIS problems or DTCs present? Yes → Refer to symptom list for problems related to SKIM Communication and DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition on and off several times pausing 10 seconds between each key cycle. With the DRBIII®, read the ECM DTCs. Are any P1685 DTCs present? Yes → Go To 3 No → Go To 4	All

P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
3	Replace and program the SKIM in accordance with the Service Information. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition on and off several times pausing for 10 seconds between key cycles. With the DRBIII®, read ECM DTCs. Are there any P1685 DTC's present? Yes → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1830-CLUTCH OVER-RIDE RELAY CIRCUIT OPEN
P1830-CLUTCH OVER-RIDE RELAY CIRCUIT SHORTED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1830-CLUTCH OVER-RIDE RELAY CIRCUIT OPEN.

When Monitored and Set Condition:

P1830-CLUTCH OVER-RIDE RELAY CIRCUIT OPEN

When Monitored: With the ignition on.

Set Condition: The ECM does not detect voltage on the Clutch Relay Control circuit when the relay is commanded off.

P1830-CLUTCH OVER-RIDE RELAY CIRCUIT SHORTED

When Monitored: When the ignition on.

Set Condition: The ECM detects too much current on the Clutch Interlock Relay Control circuit when attempting to command the relay on.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IGNITION SWITCH OUTPUT CIRCUIT OPEN
SUBSTITUTE CLUTCH INTERLOCK RELAY
CLUTCH INTERLOCK RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
CLUTCH INTERLOCK RELAY CONTROL CIRCUIT SHORTED TO GROUND
CLUTCH INTERLOCK RELAY CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the Clutch Interlock Relay. Is the Clutch Interlock Relay clicking? Yes → Go To 2 No → Go To 3	All

P1830-CLUTCH OVER-RIDE RELAY CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
3	Turn the ignition off. Disconnect the Clutch Interlock Relay from the PDC. Using a 12-volt test light connected to ground, check the Ignition Switch Output circuit at the Clutch Interlock Relay connector in the PDC. Turn the ignition to the on/start position. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Ignition Switch Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of the Clutch Interlock Relay. Turn the ignition on. With the DRBIII®, actuate the Clutch Interlock Relay. With the DRB, read ECM DTCs. Did this DTC reset? Yes → Go To 5 No → Replace the Clutch Interlock Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Remove the Clutch Interlock Relay. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage on the Clutch Interlock Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Clutch Interlock Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All

P1830-CLUTCH OVER-RIDE RELAY CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove the Clutch Interlock Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance between ground and the Clutch Interlock Relay Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Clutch Interlock Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Remove the Clutch Interlock Relay from the PDC. Disconnect the ECM harness connectors. Measure the resistance of the Clutch Interlock Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Clutch Interlock Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY
P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH BRAKE SWITCH
P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH LOW IDLE SWITCH
P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH POTENTIOMETER
P2120-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO HIGH
P2120-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO LOW
P2120-ACC PEDAL POSITION SENSOR 1 CKT SUPPLY VOLTAGE TOO HIGH OR LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY.

When Monitored and Set Condition:

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY

When Monitored: With the ignition on.

Set Condition: The Accelerator Pedal Position Sensor Signal is below 1.6% or above 17.6% 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.

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH BRAKE SWITCH

When Monitored: With the ignition on.

Set Condition: The ECM detects the Accelerator Pedal and the Brake Pedal have been depressed at the same time for longer than the allowable time.

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY WITH LOW IDLE SWITCH

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.

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY 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.

P2120-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage on the Accelerator Pedal Position Sensor Signal circuit above 4.5 volts.

P2120-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage on the Accelerator Pedal Position Sensor Signal circuit 0.0 volt.

P2120-ACC PEDAL POSITION SENSOR 1 CKT SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

Set Condition: The Accelerator Pedal Position Sensor 5-Volt Supply voltage is too high or too low.

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

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

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

TEST	ACTION	APPLICABILITY
1	**NOTE: The brake switch must be operational for the result of this test to be valid.** Turn the ignition off. Disconnect the APP Sensor harness connector. Connect one end of a jumper wire to the Low Idle Position Sense circuit at the APP Sensor harness connector. Turn the ignition on. With the DRB III, monitor the Low Idle Position Switch input while tapping the other end of the jumper wire to the Sensor Ground circuit at the APP Sensor harness connector. Does the DRB III change between LOW IDLE and ABOVE IDLE when tapping the jumper wire? Yes → Go To 2 No → Go To 20	All
2	Turn the ignition on. With the DRB III observe the Low Idle Position Switch input. Press and release the accelerator pedal several times while observing the DRB III display. **NOTE: The Low Idle Position Switch input should change from IDLE to ABOVE IDLE when pressing and releasing the accelerator pedal.** Did Low Idle Position Switch input change between LOW IDLE and ABOVE IDLE? Yes → Go To 3 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5-volt Supply circuit in APP Sensor harness connector. Is the voltage between 4.7 and 5.3 volts? Yes → Go To 4 No → Go To 16	All
4	Turn the ignition off. Disconnect the APP Sensor harness connector. Connect a jumper wire between APP Sensor Signal circuit and the 5-volt supply circuit at the APP Sensor harness connector . With the DRBIII, read the PEDAL OUTPUT VOLTS. Does the DRBIII display between 4.0 and 5.5 volts? Yes → Go To 5 No → Go To 12	All
5	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the APP Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the App Sensor Ground circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the APP Sensor and the ECM. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the APP Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition on. With the DRB III, read the PEDAL OUTPUT VOLTS with the accelerator pedal in the at rest position. Does the DRB III display between 0.50 and 1.00 volt? Yes → Go To 8 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition on. Fully depress the accelerator pedal. With the DRBIII, read the PEDAL OUTPUT VOLTS. Does the DRB III display between 4.1 and 4.6 volts? Yes → Go To 9 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition on. With the DRB III, read the PEDAL OUTPUT VOLTS. With the accelerator pedal in the idle position, slowly depress the accelerator pedal until the pedal is fully depressed. **NOTE: The PEDAL OUTPUT VOLTS should increase smoothly as the pedal is depressed.** Does the voltage increase smoothly with the accelerator pedal travel? Yes → Go To 10 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
10	Turn the ignition on. With the DRB III, select Engine and with the custom display feature select Low Idle Switch input and the Accel Pedal %. Slowly depress and release the accelerator pedal several times while monitoring the DRB III display. **NOTE: The Low Idle Switch state should change between 5% and 10% of Accelerator Pedal position.** Did the Low Idle Switch state change between 5% and 10% of Accelerator Pedal position? Yes → Go To 11 No → Replace the Accelerator Pedal Position Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set by slowly pressing and releasing the accelerator pedal several times. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
12	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the APP Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 13 No → Repair the APP Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
13	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the APP Sensor Signal circuit. Is the resistance below 1000 ohms? Yes → Repair the APP Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 14	All
14	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the APP Sensor Signal circuit and the Sensor Ground circuit at of the APP Sensor harness connector. Is the resistance below 1000 ohms? Yes → Repair the APP Sensor Signal and Sensor Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 15	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the APP Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the APP Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
16	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the 5-volt Supply circuit. Is the resistance below 10.0 ohms? Yes → Go To 17 No → Repair the 5-volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
17	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the 5-volt Supply circuit and the Sensor Ground circuit at the APP Sensor harness connector. Is the resistance above 1000 ohms for both of the measurements? Yes → Go To 18 No → Repair the 5-volt Supply circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
18	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the 5-volt Supply circuit. Is the resistance below 1000 ohms? Yes → Repair the 5-volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 19	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
19	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the 5-volt Supply circuit in the ECM harness connector. Is the voltage above 1.0 volt? Yes → Repair the 5-volt Supply circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
20	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Low Idle Position Switch Sense circuit. Is the resistance below 10.0 ohms? Yes → Go To 21 No → Repair the Low Idle Position Switch Sense circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
21	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Low Idle Position Switch Sense circuit. Is the resistance above 1000 ohms? Yes → Go To 22 No → Repair the Low Idle Position Switch Sense circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
22	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Low Idle Position Switch Sense circuit and the Sensor Ground circuit at the APP Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 23 No → Repair the Low Idle Position Switch Sense circuit and Sensor Ground circuit for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
23	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Low Idle Position Switch Sense circuit. Is the voltage above 1.0 volt? Yes → Repair the Low Idle Position Switch Sense circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 24	All
24	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 of the ASD Relay connector. Turn the ignition on. Measure the voltage of the Low Idle Position Switch Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the Low Idle Position Switch Sense Ground circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 25	All
25	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Low Idle Switch Sensor Ground circuit between the APP Sensor and the ECM. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Low Idle Switch Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***A/C INOPERATIVE**

POSSIBLE CAUSES
A/C HIGH PRESSURE SWITCH OPEN
CHECK FOR ECM DTCS
FUSED B+ CIRCUIT OPEN
A/C CLUTCH RELAY
A/C LOW PRESSURE SWITCH OPEN
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO GROUND
HI PRESSURE SIGNAL CIRCUIT OPEN
A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C SWITCH SENSE CIRCUIT OPEN
A/C - HEATER CONTROL MODULE
A/C CLUTCH GROUND CIRCUIT OPEN
GROUND CIRCUIT OPEN
BCM - NO SWITCH STATE CHANGE
A/C CLUTCH
A/C ON/OFF CONTROL CIRCUIT OPEN
ECM - PRESSURE SIGNAL OPEN
BCM - ON/OFF CONTROL CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for ECM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Position the Mode switch on the A/C - Heater Control Module to the Panel position (A/C off). Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while turning the Mode switch from Panel (A/C off) to Bi-Level (A/C on), then back to Panel (A/C off). Does the switch state change from Off to On, then back to Off? Yes → Go To 3 No → Go To 16	All

*A/C INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, actuate the A/C Compressor Clutch Relay. Observe the A/C Compressor Clutch during actuation. Is the A/C Compressor Clutch clicking? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off. Disconnect the A/C High Pressure Switch harness connector. Measure the resistance of the A/C High Pressure Switch. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Replace the A/C High Pressure Switch. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the A/C Low Pressure Switch harness connector. Measure the resistance of the A/C Low Pressure Switch. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Replace the A/C Low Pressure Switch. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the A/C High Pressure Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance of the A/C Pressure Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the A/C Pressure Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the A/C Low Pressure Switch harness connector. Disconnect the A/C High Pressure Switch harness connector. Measure the resistance of the A/C Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the A/C Switch Sense circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the A/C Low Pressure Switch harness connector. Measure the resistance between ground and the A/C Low Pressure Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the A/C Low Pressure Switch Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*A/C INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
9	If there are no possible causes remaining, view repair. Repair Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
10	**NOTE: If the A/C Clutch fuse is open, refer to the system schematics for all circuits that are powered by the A/C Clutch fuse to determine the cause of the blown fuse.** Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 11 No → Repair the Fused B+ circuit. Inspect fuse and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Install a substitute relay in place of the A/C Clutch Relay. Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Does the A/C Clutch Relay cycle on and off? Yes → Replace the A/C Clutch Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 12	All
12	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the resistance between ground and the A/C Clutch Relay Output circuit. Is the resistance above 100 kohms? Yes → Go To 13 No → Repair the A/C Clutch Relay Output circuit for a short to ground. Inspect fuse and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
13	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the resistance of the A/C Clutch Relay Output circuit. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the A/C Clutch Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*A/C INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the A/C Clutch harness connector. Using a 12-volt test light connected to 12-volts, check the A/C Clutch Ground circuit. Does the test light illuminate brightly? Yes → Go To 15 No → Repair the A/C Clutch Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
15	If there are no possible causes remaining, view repair. Repair Replace the A/C Clutch in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
16	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Measure the voltage of the A/C On/Off Control circuit. Is the voltage greater than 11.0 volts? Yes → Go To 17 No → Go To 18	All
17	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C On/Off Control circuit. Does the A/C Select Switch state change from Off to On when the jumper wire is connected? Yes → Replace the A/C - Heater Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
18	Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the A/C - Heater Control C1 harness connector. Measure the resistance of the A/C On/Off Control circuit. Is the resistance below 5.0 ohms? Yes → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the A/C On/Off Control circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*A/C OPERATES IN ALL MODE SWITCH POSITIONS

POSSIBLE CAUSES
A/C CLUTCH
CHECK FOR ECM DTCS
A/C CLUTCH RELAY
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE
A/C ON/OFF CONTROL CIRCUIT SHORTED TO GROUND
A/C - HEATER CONTROL MODULE
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check for ECM DTCs. Are any DTCs present? Yes → Return to the symptom list and choose the symptom(s). Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Position the Mode switch on the A/C - Heater Control Module to the Panel position (A/C off). Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while turning the Mode switch from Panel (A/C off) to Bi-Level (A/C on), then back to Panel (A/C off). Does the switch state change from Off to On, then back to Off? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Disconnect the A/C Clutch harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine and observe the A/C Clutch and Compressor. Does the A/C Compressor run with the harness connector disconnected? Yes → Replace the A/C Clutch in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

*A/C OPERATES IN ALL MODE SWITCH POSITIONS — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the voltage of the A/C Clutch Relay Output circuit. Is the voltage above 1.0 volt? Yes → Repair the A/C Clutch Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Install a substitute relay in place of the A/C Clutch Relay. Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Does the A/C Clutch Relay cycle on and off? Yes → Replace the A/C Clutch Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the BCM C1 harness connector. Disconnect the A/C - Heater Control C1 harness connector. Measure the resistance between ground and the A/C On/Off Control circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the A/C On/Off Control circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. **NOTE: Make sure that the BCM harness connectors are connected to the BCM.** Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. With the DRBIII® in BCM, select Inputs/Outputs. Monitor the A/C Select Switch state while connecting a jumper wire between ground and the A/C On/Off Control circuit in the A/C - Heater Control C1 harness connector. Does the A/C Select Switch state change from Off to On when the jumper wire is connected? Yes → Replace the A/C - Heater Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

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

POSSIBLE CAUSES
APP SENSOR
APP SENSOR - IDLE
APP SENSOR - WOT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the Accelerator pedal is free from any restriction or binding before continuing.** Turn the ignition on. With the DRBIII® in Engine, Sensors, read the APP Output Volt. **NOTE: The accelerator pedal must be released (Idle) for this step.** Is the voltage below 1.0 volt? Yes → Go To 2 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition on. While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM. Monitor the voltmeter while slowly pressing the accelerator pedal completely down. Did the voltage increase smoothly with pedal travel? Yes → Go To 3 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition on. With the DRBIII® in Engine, Sensors, read the APP Output Volt. Press the accelerator pedal completely down. Is the voltage above 3.7 volts with the accelerator pedal fully depressed? Yes → Test Complete. No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE BOOST PRESSURE SENSOR CALIBRATION

POSSIBLE CAUSES
TURBOCHARGER BOOST PRESSURE SENSOR CALIBRATION

TEST	ACTION	APPLICABILITY
1	Allow the engine to idle. With the DRBIII®, select Engine, then Sensors. Read the Boost Pressure Voltage. Is the Boost Pressure Voltage between 1.50 and 2.00 volts? Yes → Test Complete. No → Replace the Turbocharger Boost Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE ECM POWER AND GROUND CIRCUITS

POSSIBLE CAUSES
ASD RELAY OUTPUT CIRCUIT(S) OPEN
ECM GROUND CIRCUIT(S) OPEN
FUSED ASD RELAY BATTERY SUPPLY CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the ECM harness connectors. 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 2. Did the test light illuminate for both cavities? Yes → Go To 2 No → Repair the ECM Ground circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Output circuit in ECM harness connector C1 cavity 22. Is the test light on? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Remove the ASD Relay from the PDC. Using a 12-volt test light connected to ground, check the Fused ASD Relay Battery Supply circuit in ASD Relay connector cavity 30. Is the test light on? Yes → Go To 4 No → Repair the Fused ASD Relay Battery Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and cavity 87 in the ASD Relay connector. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit in ECM harness connector C1 cavities 4 and 5. Did the test light illuminate for both circuits? Yes → Test Complete. No → Repair the ASD Relay Output circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
*CHECKING THE EGR SYSTEM

POSSIBLE CAUSES
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CIRCUIT OPEN
EGR VALVE
VACUUM SUPPLY HOSE

TEST	ACTION	APPLICABILITY
1	Disconnect the Vacuum Supply Hose at the EGR solenoid. Connect a vacuum gauge to the Vacuum Supply Hose. Start the engine and allow the engine to idle. Is the vacuum above 10 inches of mercury at idle? Yes → Go To 2 No → Repair leaking or restricted Vacuum Supply Hose or faulty Vacuum Supply Pump. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ASD Relay Output circuit at the EGR Solenoid harness connector. Is the test light on? Yes → Go To 3 No → Repair the ASD Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance of the EGR Solenoid Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 4 No → Repair the EGR Solenoid Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	**NOTE: The Vacuum Output Hose must not be leaking or restricted for the result of this test to be valid.** Turn the ignition off. Disconnect the Vacuum Supply and Vacuum Output Hoses in the EGR Solenoid vacuum connector. Connect the Vacuum Supply Hose to the Vacuum Output Hose. Test drive the vehicle and observe vehicle performance. Is there a power reduction on vehicle acceleration? Yes → Test Complete. No → Replace the EGR Valve. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR CALIBRATION**

POSSIBLE CAUSES
ECT SENSOR - COLD
ECT SENSOR - HOT

TEST	ACTION	APPLICABILITY
1	**NOTE: The thermostat must be operating correctly for this test to be valid.** With the DRBIII® in Sensors, read and note the engine coolant temperature. Using a temperature probe, measure the engine block temperature near the ECT Sensor. **NOTE: The engine temperature should be below 50°C (120°F)** Are the readings within 7°C (13°F) of each other? Yes → Go To 2 No → Replace the Engine Coolant Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
2	**NOTE: The thermostat must be operating correctly for this test to be valid.** Start the engine and bring the engine to operating temperature (thermostat open). Turn the engine off and wait 10 minutes to allow the engine temperature to stabilize. Using a temperature probe, measure the engine block temperature near the ECT Sensor. With the DRBIII®, select Engine, then Sensors and read the engine coolant temperature. Are the readings within 7°C (13°F) of each other? Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
*CHECKING THE ENGINE MECHANICAL SYSTEMS

POSSIBLE CAUSES
CHECKING ENGINE MECHANICAL SYSTEMS

TEST	ACTION	APPLICABILITY
1	**NOTE: The following items should be checked as a possible cause of a Driveability or No-Start problem.** **WARNING: Do not attempt to remove or separate high pressure fuel line. Attempting to do so could result in severe bodily injury or death.** Engine Valve Timing - must be within specification Engine Compression - must be within specifications Camshaft Lobes - check for abnormal wear Camshaft Position Sensor - check the camshaft position sensor tooth for debris and deterioration Crankshaft Position Sensor - check the crankshaft tone wheel for debris and deterioration Engine Exhaust System - must be free of any restriction Engine Drive Sprocket - must be properly positioned Power Brake Booster - must be free of any vacuum leaks Fuel - must have adequate supply and must be free of contamination and gasoline Fuel Injectors - must not be plugged or restricted Fuel Injection Pump - must be producing the correct output volume and pressure Inspect the Fuel Lines, Fuel Filter and Fuel Pressure Relief Valve for signs of restriction and leaks **NOTE: Check for any Technical Service Bulletins that may relate to the problem.** Are there any problems evident? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

*CHECKING THE GLOW PLUG OPERATION

POSSIBLE CAUSES
CHECKING THE GLOW PLUGS
FUSED B+ CIRCUIT OPEN
GLOW PLUG RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG RELAY OUTPUT CIRCUIT SHORTED TO GROUND
GLOW PLUG RELAY OUTPUT CIRCUIT OPEN
GLOW PLUG RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Glow Plug harness connectors for all cylinders. Turn the ignition on. With the DRBIII®, actuate the Glow Plug 1 Relay. Using a 12-volt test light connected to ground, probe #1 and #2 Glow Plug harness connectors during actuator test. With the DRBIII®, actuate the Glow Plug 2 Relay. Using a 12-volt test light connected to ground, probe #3 and #4 Glow Plug harness connectors during actuator test. Does the test light cycle on and off at each Glow Plug harness connector during actuation? Yes → Go To 2 No → Go To 3	All
2	Refer to the Service Information and perform the Glow Plug Test. Are all Glow Plugs operating properly? Yes → Test Complete. No → Replace the Glow Plug(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
3	**NOTE: If the Glow Plug Relay fuse or fuselink is open, refer to the system schematics for all circuits that are powered by the Glow Plug Relay fuse or fuselink to determine the cause of the blown fuse/fuselink.** Remove the Glow Plug Relay of the affected cylinder(s). Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the Glow Plug Relay connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused B+ (Fuse/Fuselink) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE GLOW PLUG OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Glow Plug harness connectors of the affected cylinder(s). Remove the Glow Plug Relay of the affected cylinder(s). Turn the ignition on. Measure the voltage on the Glow Plug Relay Output circuit of the affected cylinder(s). Is the voltage above 1.0 volt? Yes → Repair the Glow Plug Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Glow Plug harness connectors of the affected cylinder(s). Remove the Glow Plug Relay of the affected cylinder(s). Measure the resistance between ground and the Glow Plug Relay Output circuit of the affected cylinder(s). Is the resistance above 100 kohms? Yes → Go To 6 No → Repair the Glow Plug Relay Output circuit for a short to ground. Inspect the fuse or fuselink and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Glow Plug harness connectors of the affected cylinder(s). Remove the Glow Plug Relay of the affected cylinder(s). Connect a jumper wire across Glow Plug Relay connector cavities 30 and 87. Using a 12-volt test light connected to ground, check the Glow Plug Relay Output circuit at the Glow Plug harness connectors of the affected cylinder(s). Is the test light on at each Glow Plug harness connector? Yes → Go To 7 No → Repair the Glow Plug Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Glow Plug Relay of the affected cylinder(s). Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE SPEED CONTROL OPERATION

POSSIBLE CAUSES
CHECKING CRUISE SWITCHES
CHECKING THE BRAKE SWITCH INPUT
CHECKING THE ECM FOR DTC'S
CHECKING THE VSS SIGNAL
ECM
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECM DTCs. Are there any ECM DTC's present? Yes → Refer to symptom list for problems related to the ECM DTC. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 2	All
2	**NOTE: Prior to testing the speed control operation ensure the Learn Speed Control feature has been performed on the ECM.** Test drive the vehicle above 60 Km/h (35 mph). Attempt to Set the Speed Control. Is the Speed Control function operating properly? Yes → Test Complete. No → Go To 3	All
3	Start the engine. With the DRBIII®, read the CRUISE SW VOLTS. Observe the cruise switch volts on the DRBIII® while pressing and holding each cruise button separately. **NOTE: Pressing each cruise button should result in the following voltages: ON/OFF 0.7v - 1.0, SET 3.0 - 3.5v, RESUME/ACCEL 3.9 - 4.2v, CANCEL 1.5 - 1.9v, COAST 2.5 - 2.9v, No Button Pressed 4.4 - 4.8v** Does each switch provide the correct voltage? Yes → Go To 4 No → Refer to symptom list for problems related to S/C Switches. Perform SPEED CONTROL VERIFICATION - VER-4.	All

*CHECKING THE SPEED CONTROL OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition on. With the DRBIII® in Sensors, read the Vehicle Speed Sensor signal. Have an assistant drive the vehicle while you are observing the Vehicle Speed Signal on the DRBIII®. While observing vehicle speed signal note any rapid changes (signal drop-outs) in the reading that do not correspond with actual vehicle speed. Is the DRBIII® displaying an accurate Vehicle Speed Signal? Yes → Go To 5 No → Refer to symptom list for problems related to the Vehicle Speed Sensor. Perform SPEED CONTROL VERIFICATION - VER-4.	All
5	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Primary and Secondary switch states while pressing and releasing the Brake Pedal several times. Did the DRBIII® indicate the correct brake pedal state when pressing and releasing the Brake Pedal? Yes → Go To 6 No → Refer to symptom list for problems related to Brake Switch input. Perform SPEED CONTROL VERIFICATION - VER-4.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform SPEED CONTROL VERIFICATION - VER-4. No → Replace and program the ECM in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4.	All

Symptom:

*CHECKING THE TRANSFER CASE POSITION SENSOR

POSSIBLE CAUSES
CHECKING THE TRANSFER CASE POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® read the T-case Sensor Observe the T-case volts on the DRB while moving the transfer case selector lever in each of the transfer case positions. **NOTE: When shifting the transfer case selector to each position, the Sensor voltage should result in the following voltages: 4WD Low 0.15 - 0.40, Neutral 0.68 - 0.98, 4WD Part Time 1.78 - 2.12, 2WD 2.43 - 2.77.** Does each position provide the correct voltage? Yes → Test Complete. No → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors between the Transfer Case Position Sensor and the ECM. If wiring and connectors are ok, replace the Transfer Case Position Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***CHECKING THE VISCOUS/CABIN HEATER RELAY**

POSSIBLE CAUSES
FUSED B+ CIRCUIT OPEN
VISCOUS HEATER RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
VISCOUS HEATER RELAY OUTPUT CIRCUIT SHORTED TO GROUND
VISCOUS HEATER RELAY OUTPUT CIRCUIT OPEN
VISCOUS HEATER RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Viscous Heater harness connector. Turn the ignition on. With the DRB, actuate the Viscous Heater Relay. Using a 12-volt test light connected to ground, probe the Viscous Heater Relay Output circuit at the Viscous Heater harness connector during actuator test. Does the test light cycle on and off during the actuator test? Yes → Test Complete. No → Go To 2	All
2	**NOTE: If the Viscous Heater Relay fuse or fuselink is open, refer to the system schematics for all circuits that are powered by the Cabin Heater Relay fuse or fuselink to determine the cause of the blown fuse/fuselink.** Remove the Viscous Heater Relay. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the Viscous Heater Relay connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Fused B+ (Fuse/Fuselink) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Viscous Heater harness connector. Remove the Viscous Heater Relay. Turn the ignition on. Measure the voltage on the Viscous Heater Relay Output circuit. Is the voltage above 1.0 volt? Yes → Repair the Viscous Heater Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

*CHECKING THE VISCOUS/CABIN HEATER RELAY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Viscous Heater harness connector. Remove the Viscous Heater Relay. Measure the resistance between ground and the Viscous Heater Relay Output circuit. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Viscous Heater Relay Output circuit for a short to ground. Inspect the fuse or fuselink and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Viscous Heater harness connector. Remove the Viscous Heater Relay. Connect a jumper wire across Viscous Heater Relay connector cavities 30 and 87. Using a 12-volt test light connected to ground, check the Viscous Heater Relay Output circuit at each Viscous Heater harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Viscous Heater Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Viscous Heater Relay. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***ENGINE CRANKS BUT WILL NOT START**

POSSIBLE CAUSES
CHECK CAMSHAFT POSITION SENSOR SIGNAL
CHECK CRANKSHAFT POSITION SENSOR SIGNAL
CHECKING FOR ECM CODES
CHECKING FOR SKIM CODES
CHECKING THE ECT SENSOR
CHECKING THE GLOW PLUG OPERATION
ENGINE CONTROL MODULE
ENGINE DRIVE BELT
FUEL INJECTOR DRIVER CIRCUIT(S) SHORTED TO GROUND
FUEL PRESSURE SENSOR
FUEL PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
FUEL PRESSURE SENSOR SIGNAL CIRCUIT OPEN
FUEL SUPPLY CONTAMINATION
FUEL SYSTEM PRESSURE MECHANICAL
FUEL SYSTEM RESTRICTION
SENSOR GROUND OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display any ECM DTCs? Yes → Refer to symptom list for problems related to ECM DTC. Perform NO START VERIFICATION - VER-1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display any SKIM DTCs? Yes → Refer to symptom list for problems related to SKIM DTC. Perform NO START VERIFICATION - VER-1. No → Go To 3	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
3	Using a temperature probe, check the vehicle temperature near the ECT Sensor. Turn the ignition on. With the DRBIII® in Sensors, read the ECT Sensor temperature. Compare the temperature probe reading with the DRBIII® reading. Are the two readings within 10°C of each other? Yes → Go To 4 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
4	**NOTE: Prior to performing this test, be sure to check the Glow Plug Relay operation. Refer to CHECKING GLOW PLUG OPERATION for the related symptom(s).** Refer to the Service Information and check the Glow Plugs for proper operation. Are the Glow Plugs operating properly? Yes → Go To 5 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all 4 Fuel Injector harness connectors. Measure the resistance between Ground and each Fuel Injector Driver circuit at it's respective Fuel Injector harness connector. Is the resistance below 1000 ohms for any of the measurements? Yes → Repair the Fuel Injector Driver circuit(s) for a short to ground. Perform NO START VERIFICATION - VER-1. No → Go To 6	All
6	Inspect the fuel system lines for restrictions, leaks or other problems. Is there any evidence of problems? Yes → Repair as necessary. Perform NO START VERIFICATION - VER-1. No → Go To 7	All
7	Turn the ignition off. Using the DRBIII® lab scope, backprobe the CMP Sensor Signal circuit at the ECM harness connector. Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRBIII®. **NOTE: Refer to Charts and Graphs to view a correct CMP Sensor signal.** Does the DRBIII® display a steady clean CMP Signal pattern? Yes → Go To 8 No → Perform Test for DTC P0340-Camshaft Position Sensor Circuit Static Plausibility. Perform NO START VERIFICATION - VER-1.	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Using the DRBIII® lab scope, backprobe both of the CKP Sensor Signal circuits at the ECM harness connector. **NOTE: Refer to Charts and Graphs to view a correct CKP Sensor signal.** Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRBIII®. Does the DRBIII® display a steady clean CKP Signal pattern for each circuit? Yes → Go To 9 No → Perform Test for DTC P0340-Crankshaft Position Sensor Circuit Dynamic Plausibility. Perform NO START VERIFICATION - VER-1.	All
9	Refer to the Service Information and perform the fuel pressure test. Is the fuel pressure within specification? Yes → Go To 10 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
10	Refer to the Service Information and perform the fuel pressure test. Note the test results. Using the DRBIII®, read the Fuel Pressure PSI and compare the two readings. Are the two readings within 500 psi of each other? Yes → Go To 11 No → Go To 13	All
11	Refer to the Service Information to ensure the Engine Drive Belt is installed correctly and the camshaft and crankshaft gears are timed correctly. Were any problems found? Yes → Repair as necessary. Perform NO START VERIFICATION - VER-1. No → Go To 12	All
12	Inspect the fuel supply for contamination. Is the fuel contaminated? Yes → Check the fuel supply for contamination. Perform NO START VERIFICATION - VER-1. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform NO START VERIFICATION - VER-1.	All
13	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Pressure Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 14 No → Repair the Fuel Pressure Sensor Signal circuit for an open. Perform NO START VERIFICATION - VER-1.	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Pressure Sensor 5-volt Supply circuit. Is the resistance below 10.0 ohms? Yes → Go To 15 No → Repair the Fuel Pressure Sensor 5-volt Supply circuit for an open. Perform NO START VERIFICATION - VER-1.	All
15	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Replace the Fuel Pressure Sensor in accordance with the Service Information. Perform NO START VERIFICATION - VER-1. No → Repair the Sensor Ground circuit for an open. Perform NO START VERIFICATION - VER-1.	All

Symptom:

***ENGINE WILL NOT CRANK**

POSSIBLE CAUSES
BATTERY CABLE HIGH RESISTANCE
CHECKING FOR SKIM CODES
CLUTCH INTERLOCK SWITCH
CLUTCH INTERLOCK SWITCH OUTPUT CIRCUIT
IGNITION SWITCH START OUTPUT CIRCUIT OPEN
INSPECT BATTERY CABLES
MECHANICAL PROBLEM
OPEN FUSED BATTERY (+) CIRCUIT
STARTER MOTOR
STARTER RELAY
STARTER RELAY GROUND CIRCUIT OPEN
STARTER RELAY OUTPUT CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **NOTE: The battery must be fully charged before diagnosing a no crank condition.** Inspect the battery cables for corrosion, looseness or other problems. Is there evidence of problems? Yes → Repair as necessary. Perform NO START VERIFICATION - VER-1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display any SKIM DTCs? Yes → Refer to symptom list for problems related to SKIM. Perform NO START VERIFICATION - VER-1. No → Go To 3	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Starter Relay from the PDC. **WARNING: THE TRANSMISSION MUST BE IN NEUTRAL AND THE PARK BRAKE MUST BE SET FOR THIS TEST.** **WARNING: THE ENGINE MAY CRANK IN THE NEXT STEP. WHEN THE ENGINE IS CRANKING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Momentarily jumper Starter Relay connector cavities 30 and 87 in the PDC connector. Did the engine crank? Yes → Go To 4 No → Go To 8	All
4	Remove the Starter Relay from the PDC. Using a 12-volt test light connected to ground, check the Ignition Switch Start Output circuit while fully depressing the clutch pedal and turning the ignition switch to the START position. Does the test light illuminate with the ignition switch in the START position? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Remove the Starter Relay From the PDC. Install a substitute relay in place of the Starter Relay. Attempt to start the engine. Does the engine crank? Yes → Replace the Starter Relay. Perform NO START VERIFICATION - VER-1. No → Repair the Starter Relay Ground Circuit for an open. Perform NO START VERIFICATION - VER-1.	All
6	Turn the ignition off. Remove the Starter Relay from the PDC. Disconnect the Clutch Interlock Switch harness connector. Connect a jumper wire across the Clutch Interlock Switch harness connector. Using a 12-volt test light connected to ground, check the Ignition Switch Start Output circuit at the Starter Relay connector in the PDC and turning the ignition switch to the Start position. Does the test light illuminate with the ignition switch in the Start position? Yes → Replace the Clutch Interlock Switch. Perform NO START VERIFICATION - VER-1. No → Go To 7	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Clutch Interlock Switch harness connector. Remove the Starter Relay from the PDC. Measure the resistance of the Clutch Interlock Switch Output circuit between the PDC and the Clutch Interlock Switch harness connector. Is the resistance below 10.0 ohms? Yes → Repair the Ignition Switch Start Output circuit to the Clutch Interlock Switch. Perform NO START VERIFICATION - VER-1. No → Repair the Clutch Interlock Switch Output circuit for an open. Perform NO START VERIFICATION - VER-1.	All
8	Remove the Starter Relay from the PDC. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Starter Relay connector in the PDC. Is the test light on? Yes → Go To 9 No → Repair the Fused B(+) circuit for an open. Perform NO START VERIFICATION - VER-1.	All
9	Turn the ignition off. Remove the Starter Relay from the PDC. Disconnect the Starter Relay Output wire from the Starter Solenoid. Connect the Starter Relay Output wire (at the Starter) to ground. Using a 12-volt test light connected to 12-volts, check the Starter Relay Output circuit at the Starter Relay connector in the PDC. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the Starter Relay Output circuit for an open. Perform NO START VERIFICATION - VER-1.	All
10	Using the Service Information, check the battery cables for high resistance. Did either battery cable have a voltage drop greater than 0.2 volts? Yes → Replace the battery cable(s). Perform NO START VERIFICATION - VER-1. No → Go To 11	All
11	Turn the ignition off. Attempt to manually rotate the crankshaft 360°. Is the crankshaft able to rotate 360°? Yes → Replace the Starter Motor. Perform NO START VERIFICATION - VER-1. No → Repair the engine mechanical problem. 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

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

When Monitored and Set Condition:

ANTENNA FAILURE

When Monitored: Every 250 milliseconds with the ignition on.

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

COP FAILURE

When Monitored: With the ignition on.

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

EEPROM FAILURE

When Monitored: With the ignition on.

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

INTERNAL FAULT

When Monitored: With the ignition on.

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

RAM FAILURE

When Monitored: With the ignition on.

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

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

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

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

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

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

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

Symptom List:

PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

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

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC exists when a PCM STATUS message was not received from the ECM 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 ECM due to a SKIM reset, or during SECRET KEY transfers to the ECM.

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

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

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

PCM STATUS FAILURE — Continued

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

Symptom List:

ROLLING CODE FAILURE
VIN MISMATCH

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

When Monitored and Set Condition:

ROLLING CODE FAILURE

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

VIN MISMATCH

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
VERIFYING ECM VIN
INTERMITTENT WIRING HARNESS PROBLEM
ECM

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

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the ECM. If a VIN is not displayed, attempt to program the ECM with the correct vehicle VIN before continuing.** Does the VIN recorded from the ECM match the VIN of the vehicle? Yes → Go To 3 No → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRBIII®, display and clear all ECM and SKIM DTC's. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRBIII®, check for SKIM DTC's. Does the DRBIII® display the same DTC? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

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

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

When Monitored and Set Condition:

TRANSPONDER COMMUNICATION FAILURE

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

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

TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE

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

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

TRANSPONDER ID MISMATCH

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

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

TRANSPONDER RESPONSE MISMATCH

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

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

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

TRANSPONDER COMMUNICATION FAILURE — Continued

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

TRANSPONDER COMMUNICATION FAILURE — Continued

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

VERIFICATION TESTS

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Engine Control Module (ECM) was replaced, proceed to number 5. If the SKIM or ECM was not replaced, continue to the next number. 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to learn VIN). If the vehicle is equipped with VTSS, use the DRBIII and enable VTSS. 4. Program tire size, country code and all RKE transmitters (if RKE Module was replaced) and other options as necessary. Proceed to number 12. 5. Obtain the Vehicle's unique PIN assigned to it's original SKIM from the vehicle's invoice. 6. NOTE: Once Secured Access Mode is active, the SKIM will remain in that mode for 60 seconds. 7. With the DRBIII®, select THEFT ALARM, SKIM, MISCELLANEOUS and select SKIM REPLACED. Enter the 4 digit PIN to put the SKIM in Secured Access Mode. 8. The DRBIII® will prompt for the following steps. 9. Using the DRBIII®, program all customer keys into the SKIM memory. This requires that the SKIM be in Secured Access Mode, using the 4 digit PIN. 10. Note: If the ECM is replaced, the VIN and the unique Secret Key data must be transferred from the SKIM to the ECM. This procedure requires the SKIM to be placed in Secured Access Mode using the 4-digit PIN. 11. Note: If 3 attempts are made to enter Secured Access Mode using an incorrect PIN, Secured Access Mode will be locked out for 1 hour which causes the DRBIII® to display ″Bus +\- Signals Open″. To exit this mode, turn ignition to Run for 1 hour. 12. Ensure all accessories are turned off and the battery is fully charged. 13. Turn the Ignition on and with the DRBIII, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 14. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. Are any DTC's present or is the original complaint still present? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

VERIFICATION TESTS — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) was replaced, proceed to number 8. If the SKIM or PCM was not replaced, continue to the next number. 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to learn VIN). If the vehicle is equipped with VTSS, use the DRBIII and enable VTSS. 4. Program tire size, country code, radio EQ setting and all RKE transmitters (if RKE Module was replaced) and other options as necessary. 5. (BUX only) If the Intrusion Transceiver Module ITM was replaced, use the DRBIII to enable ITM and Program Interior Type. 6. (BUX only) If the Siren was replaced perform the DRBIII Siren Replacement procedure. 7. Proceed to number 15. 8. Obtain the Vehicle's unique PIN assigned to it's original SKIM from either the vehicles invoice or from Chryslers Customer Assistance Center (1-800-992-1997). 9. NOTE: Once Secured Access Mode is active, the SKIM will remain in that mode for 60 seconds. 10. With the DRBIII®, select THEFT ALARM, SKIM, MISCELLANEOUS and select SKIM REPLACED. Enter the 4 digit PIN to put the SKIM in Secured Access Mode. 11. The DRBIII® will prompt for the following steps. 12. Using the DRBIII®, program all customer keys into the SKIM memory. This requires that the SKIM be in Secured Access Mode, using the 4 digit PIN. 13. Note: If the PCM is replaced, the VIN and the unique Secret Key data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in Secured Access Mode using the 4-digit PIN. 14. Note: If 3 attempts are made to enter Secured Access Mode using an incorrect PIN, Secured Access Mode will be locked out for 1 hour which causes the DRBIII® to display ″Bus +\- Signals Open″. To exit this mode, turn ignition to Run for 1 hour. 15. Ensure all accessories are turned off and the battery is fully charged. 16. Turn the Ignition on and with the DRBIII, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 17. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. Are any DTC's present or is the original complaint still present? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

VERIFICATION TESTS — Continued

CHARGING VERIFICATION - VER-3	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. With the DRB, erase all diagnostic trouble codes (DTCs). 3. Start the engine. 4. Raise the engine speed to 2000 RPM for at least 30 seconds. 5. Allow the engine to idle. 6. Turn the ignition off for 20 seconds. 7. Turn the ignition on. 8. With the DRB, read ECM DTCs. 9. 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. 10. If the charging system is functioning correctly and there are no DTCs, the repair is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

NO START VERIFICATION - VER-1	APPLICABILITY
1. NOTE: IMPORTANT! If the Engine Control Module or Sentry Key Immobilizer Module has been replaced, ensure the programming procedures for the module has been performed in accordance with the Service Information. 2. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 3. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter. 4. With the DRB, erase all diagnostic trouble codes (DTCs). 5. Turn the ignition off for at least 10 seconds. 6. Attempt to start the engine. 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. 8. If the engine starts and continues to run, the repair is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

VERIFICATION TESTS — Continued

ROAD TEST VERIFICATION - VER-2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a non-DTC test, perform steps 3 and 4. 3. Check to see if the initial symptom still exists. If there are no trouble codes and the symptom no longer exists, the repair was successful and testing is now complete. 4. If the initial or another symptom exists, the repair is not complete. Check all pertinent Technical Service Bulletins (TSBs) and return to the Symptom List if necessary. 5. For previously read DTCs that have not been dealt with, return to the Symptom List and follow the diagnostic path for that DTC; otherwise, continue. 6. If the Engine Control Module (ECM) has not been changed, perform steps 7 and 8, otherwise, continue with step 9. 7. With the DRB, erase all diagnostic trouble codes (DTCs), then disconnect the DRB. 8. Turn the ignition off for at least 10 seconds. 9. If equipped with a Transfer Case Position Switch, perform step 10, otherwise, continue with step 11. 10. With the ignition switch on, place the Transfer Case Shift Lever in each gear position, stopping for 15 seconds in each position. 11. Ensure no DTCs remain by performing steps 12 through 15. 12. 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. 13. At some point, stop the vehicle and turn the engine off for at least 10 seconds, then restart the engine and continue. 14. Upon completion of the road test, turn the engine off and check for DTCs with the DRB. 15. If the repaired DTC has reset, the repair is not complete. Check for any pertinent Technical Service Bulletins (TSBs) and return to the Symptom List. If there are no DTCs, the repair was successful and is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

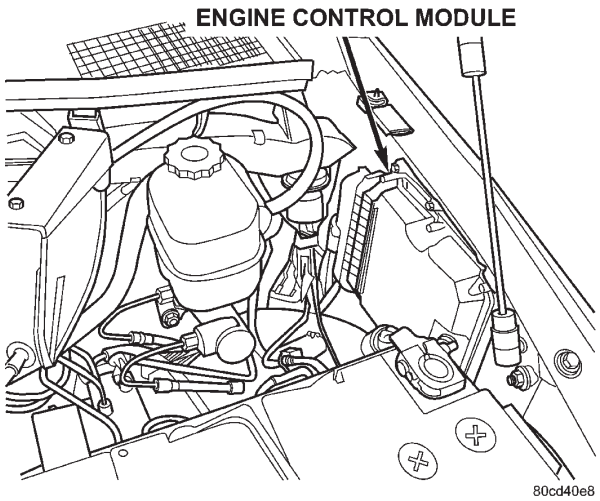
SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997).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

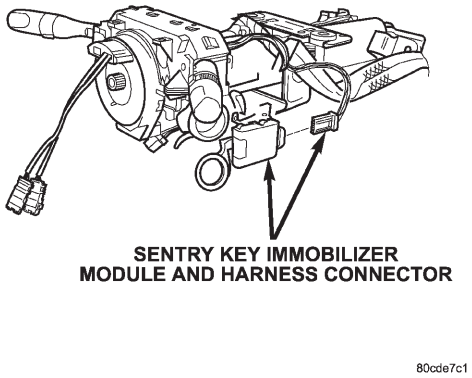
VERIFICATION TESTS — Continued

SPEED CONTROL VERIFICATION - VER-4	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. With the DRB, erase all diagnostic trouble codes (DTCs). 3. Road test the vehicle at a speed above 58 km/h (35 MPH). 4. Turn the speed control ON/OFF switch on. 5. Depress and release the SET switch. If the speed control does not engage, the repair is not complete, continue with step 12. 6. 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 12. 7. Using caution, depress and release the brake pedal. If the speed control does not disengage, the repair is not complete, continue with step 12. 8. 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 12. 9. Hold down the COAST switch. If the vehicle does not decelerate, the repair is not complete, continue with step 12. 10. 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 12. 11. 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 12. 12. 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. 13. If the vehicle successfully performed all of the previous steps, the speed control system is now functioning as designed. The repair is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

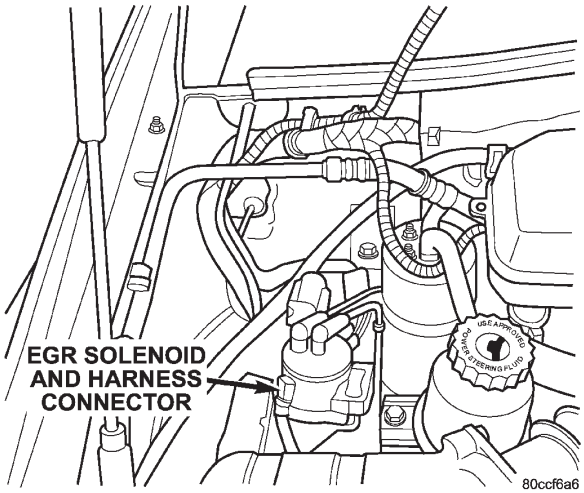
8.0 COMPONENT LOCATIONS

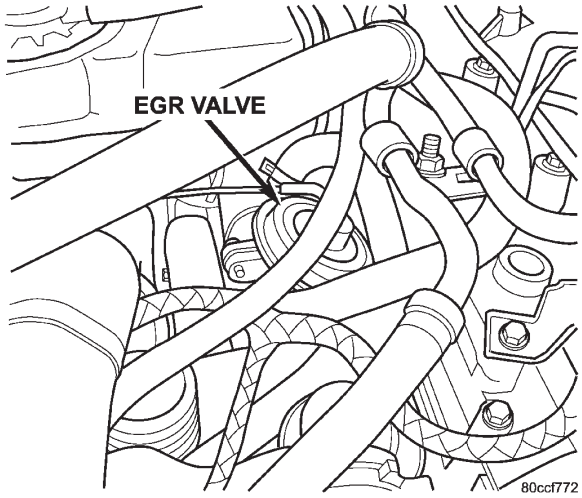
8.1 CONTROL MODULES

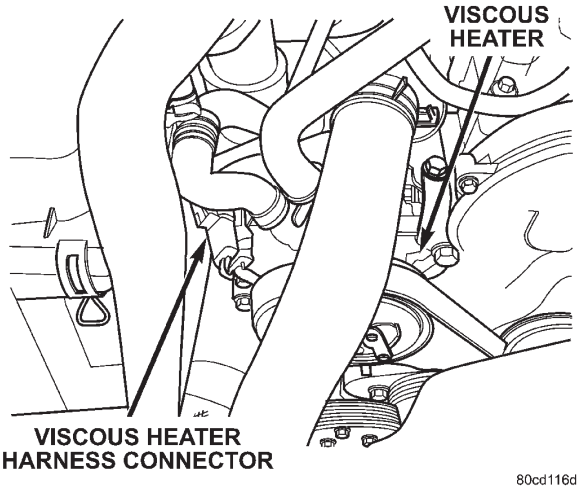




8.2 CONTROLS AND SOLENOIDS







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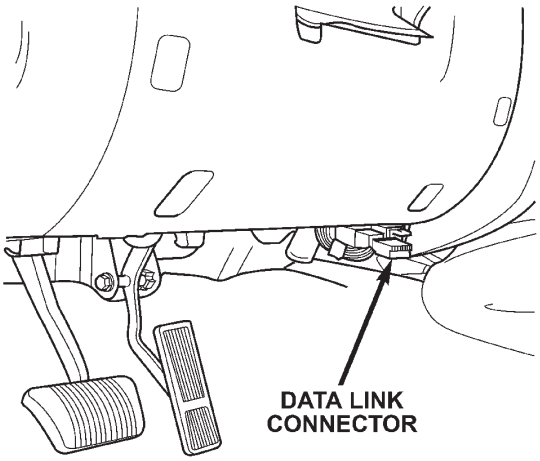

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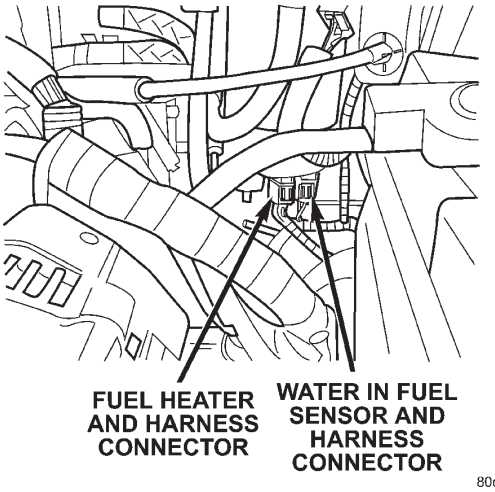
8.4 FUEL SYSTEM



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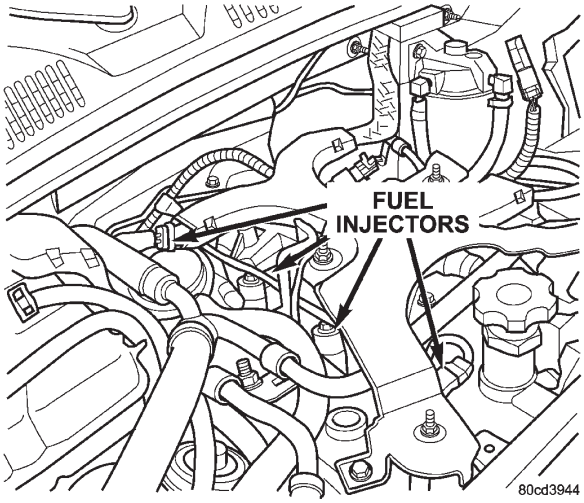

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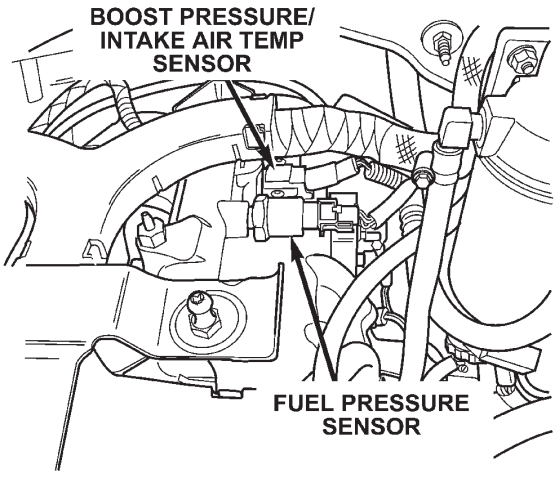

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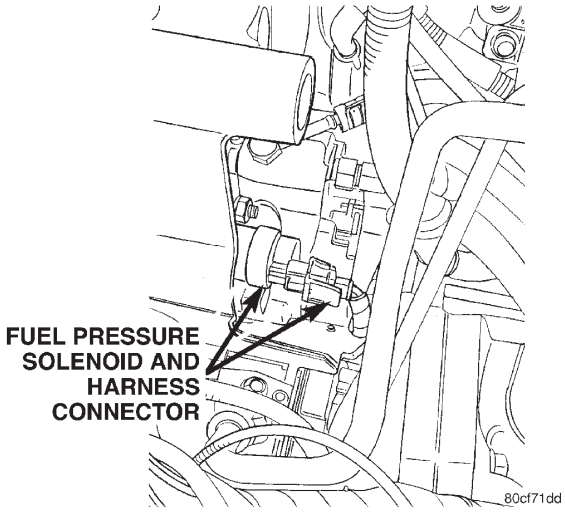

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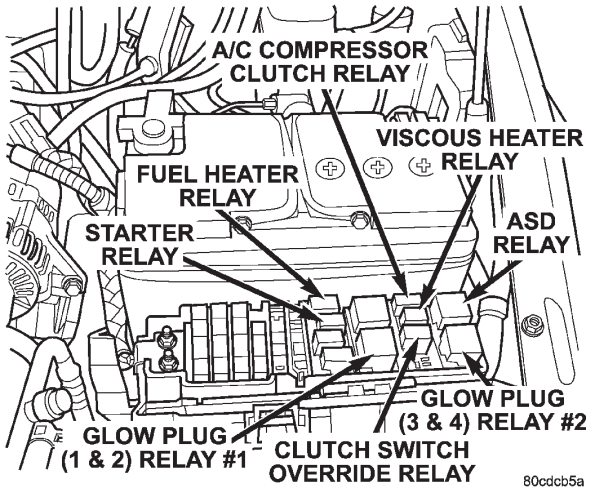
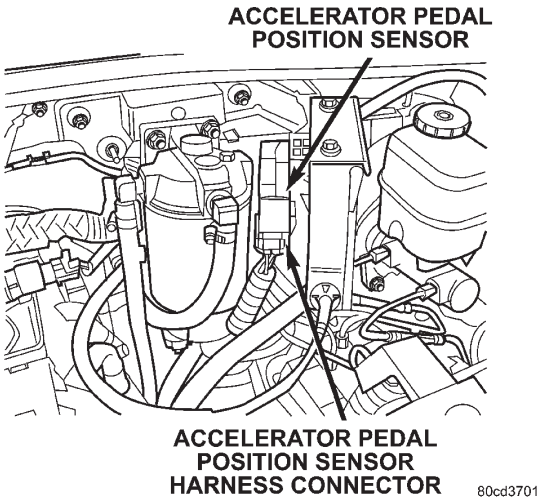
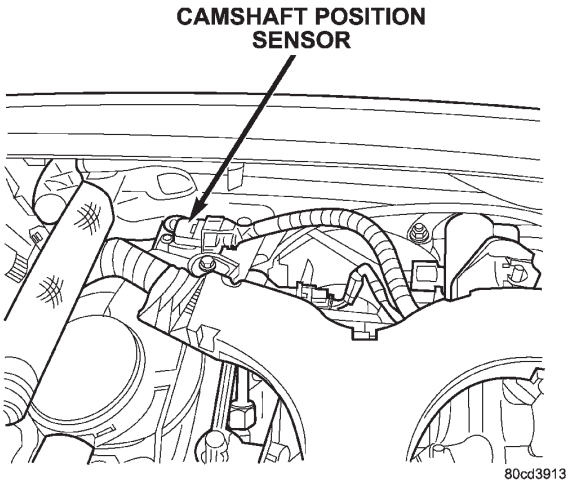
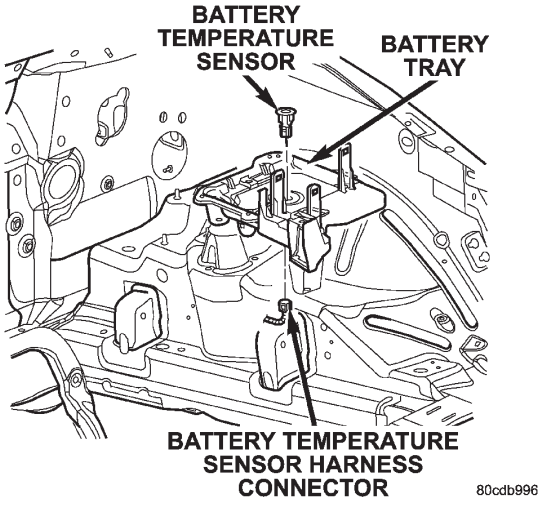
8.5 RELAYS

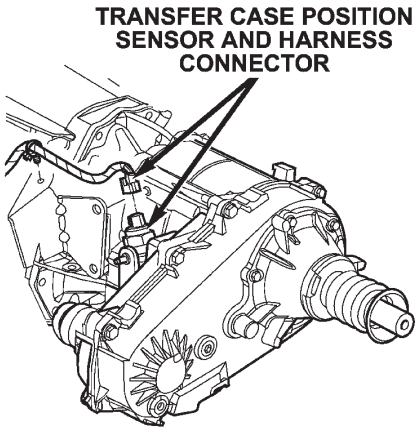


8.6 SENSORS

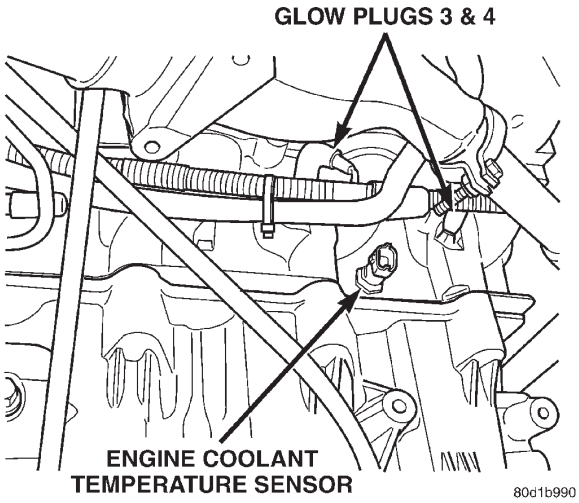


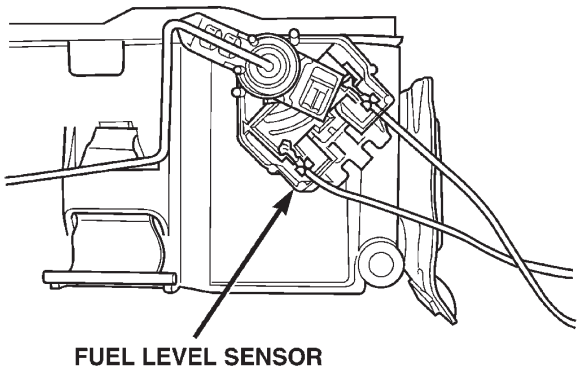


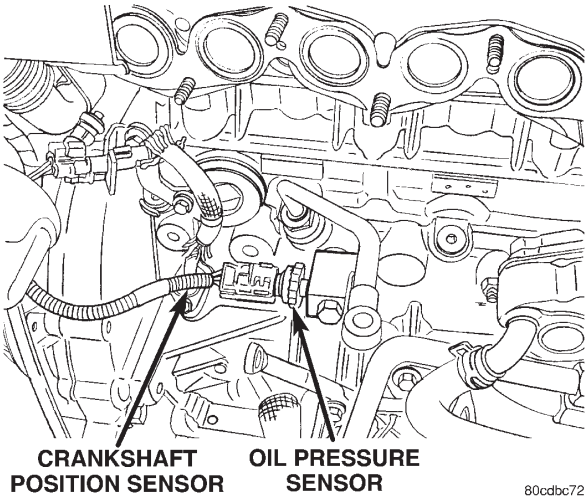




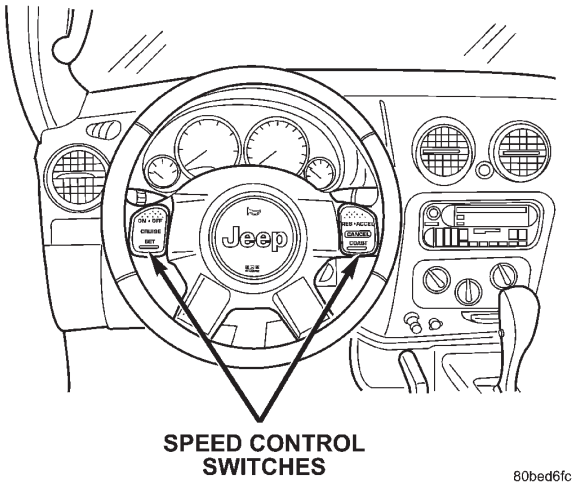
8.6 SENSORS (Continued)

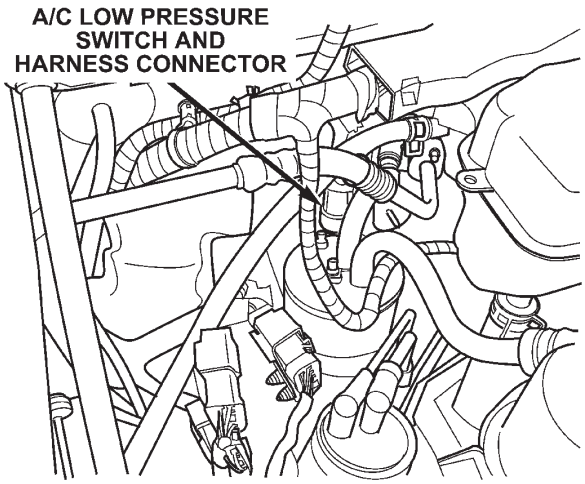


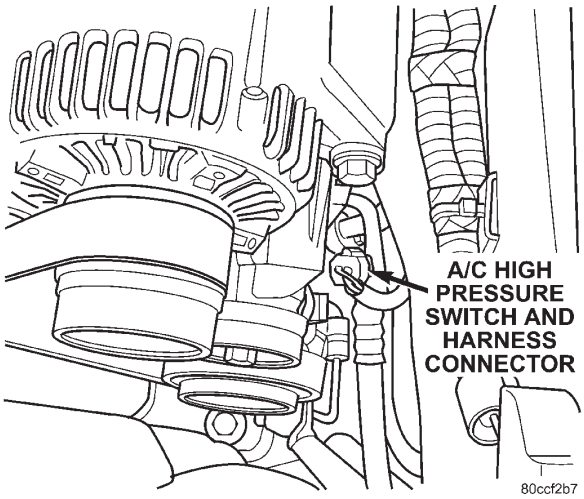




8.7 SWITCHES






A/C HIGH
PRESSURE
SWITCH AND
HARNESS
CONNECTOR
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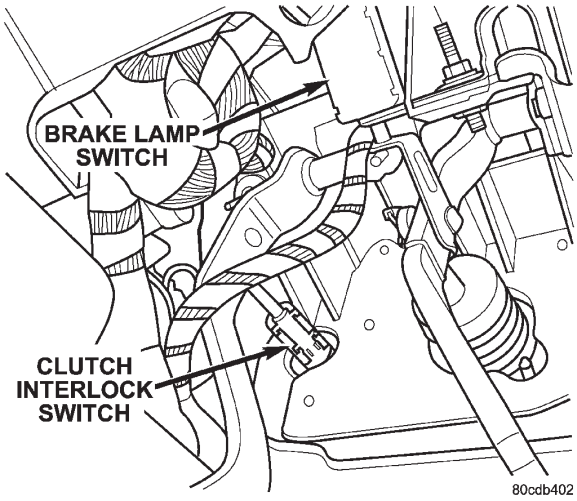
BRAKE LAMP
SWITCH
CLUTCH
INTERLOCK
SWITCH
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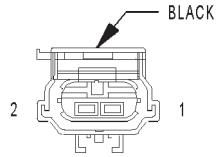
NOTES

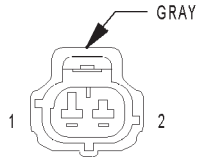
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY

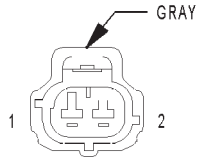
CAV	CIRCUIT	FUNCTION
1	C3 18DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z246 18BK/GY	GROUND



A/C HIGH PRESSURE SWITCH (DIESEL)

A/C HIGH PRESSURE SWITCH (DIESEL) - GRAY 2 WAY

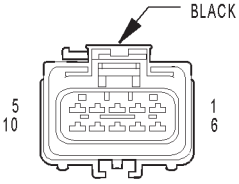
CAV	CIRCUIT	FUNCTION
1	C18 20DB	A/C PRESSURE SIGNAL
2	C21 18DB/OR	A/C SWITCH SENSE



A/C LOW PRESSURE SWITCH

A/C LOW PRESSURE SWITCH - GRAY 2 WAY

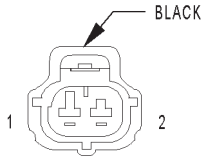
CAV	CIRCUIT	FUNCTION
1	C21 18DB/OR	A/C SWITCH SENSE
2	Z142 18BK/WT (RHD)	GROUND
2	Z212 18BK/OR (LHD)	GROUND



ACCELERATOR PEDAL POSITION SENSOR (DIESEL)

ACCELERATOR PEDAL POSITION SENSOR (DIESEL) - BLACK 10 WAY

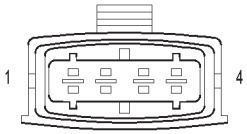
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	K4 18BK/LB	SENSOR GROUND
5	K151 20WT	LOW IDLE POSITION SWITCH SENSE
6	-	-
7	K81 20VT/TN	ACCELERATOR PEDAL POSITION SENSOR SIGNAL
8	K255 20WT/DG	ACCELERATOR PEDAL POSITION SENSOR GROUND
9	-	-
10	K852 20VT/WT	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY



BATTERY TEMPERATURE SENSOR

BATTERY TEMPERATURE SENSOR - BLACK 2 WAY

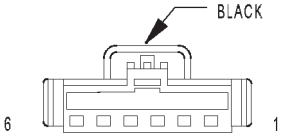
CAV	CIRCUIT	FUNCTION
1	K118 18PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



BOOST PRESSURE SENSOR (DIESEL)

BOOST PRESSURE SENSOR (DIESEL) - 4 WAY

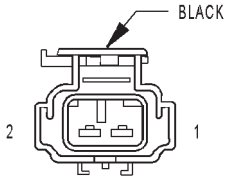
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
3	K6 18VT/WT	SENSOR REFERENCE VOLTAGE B
4	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - BLACK 6 WAY

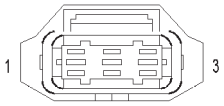
CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
2	L50 18WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
3	V30 18DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	V32 18YL/RD	SPEED CONTROL SUPPLY
5	Z3 18BK/OR	GROUND
6	K29 18WT/PK (GAS)	BRAKE SWITCH SENSE
6	K29 18WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL



CABIN HEATER (DIESEL)

CABIN HEATER (DIESEL) - BLACK 2 WAY

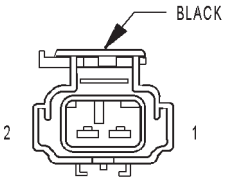
CAV	CIRCUIT	FUNCTION
1	C151 18DB/WT	CABIN HEATER RELAY OUTPUT
2	Z186 12BK/OR	GROUND



CAMSHAFT POSITION SENSOR (DIESEL)

CAMSHAFT POSITION SENSOR (DIESEL) - 3 WAY

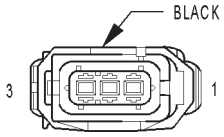
CAV	CIRCUIT	FUNCTION
1	K944 20BK/LB	CAMSHAFT POSITION SENSOR GROUND
2	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
3	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT



CLUTCH INTERLOCK SWITCH (M/T)

CLUTCH INTERLOCK SWITCH (M/T) - BLACK 2 WAY

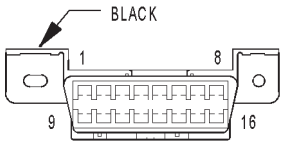
CAV	CIRCUIT	FUNCTION
1	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
2	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)



CRANKSHAFT POSITION SENSOR (DIESEL)

CRANKSHAFT POSITION SENSOR (DIESEL) - BLACK 3 WAY

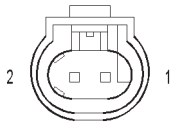
CAV	CIRCUIT	FUNCTION
1	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL 1
2	K3 20LB/BK	CRANKSHAFT POSITION SENSOR SIGNAL 2
3	Y101 20BK/OR	CRANKSHAFT POSITION SENSOR SHIELD



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

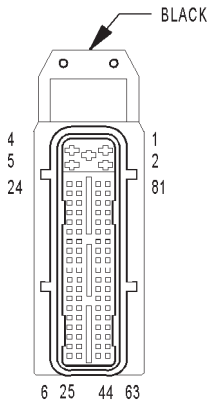
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 18YL/VT	PCI BUS
3	-	-
4	Z252 18BK/GY	GROUND
5	Z252 18BK/GY	GROUND
6	D32 20LG/DG (GAS)	SCI RECEIVE
6	D32 20LG/DG (DIESEL)	NOT USED
7	D21 20PK/RD	SCI TRANSMIT
8	D24 18WT/DG	FLASH ABS
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D20 20LG (DIESEL)	NOT USED
14	D20 20LG (GAS)	SCI RECEIVE
15	-	-
16	F33 20PK/RD	FUSED B(+)



EGR
SOLENOID
(DIESEL)

EGR SOLENOID (DIESEL) - 2 WAY

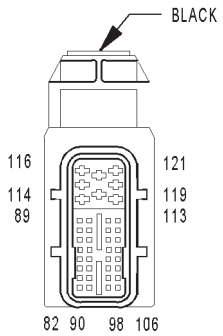
CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K35 18GY/YL	EGR SOLENOID CONTROL



ENGINE CONTROL MODULE - C1 (DIESEL)

ENGINE CONTROL MODULE - C1 (DIESEL) - BLACK 81 WAY

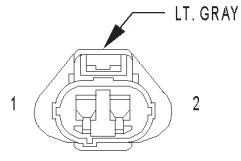
CAV	CIRCUIT	FUNCTION
1	Z108 14BK/DG	GROUND
2	Z108 14BK/DG	GROUND
3	K20 18DG	GENERATOR FIELD CONTROL
4	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
5	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
6	-	-
7	D25 20VT/YL	PCI BUS
8	K944 20BK/LB	CAMSHAFT POSITION SENSOR GROUND
9	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
10	-	-
11	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL
12	-	-
13	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
14	-	-
15	K81 20VT/TN	ACCELERATOR PEDAL POSITION SENSOR SIGNAL
16	K80 20BK/VT	FUEL PRESSURE SENSOR GROUND
17	-	-
18	-	-
19	F92 20YL/BR	BATTERY SENSE (+)
20	Z109 20BK/DB	BATTERY SENSE (-)
21	K4 20BK/LB	SENSOR GROUND
22	F1 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	K6 20VT/WT	SENSOR REFERENCE VOLTAGE B
24	K3 20LB/BK	CRANKSHAFT POSITION SENSOR SIGNAL 2
25	-	-
26	-	-
27	-	-
28	-	-
29	K77 20BR/WT	TRANSFER CASE POSITION SENSOR INPUT
30	G60 20GY/YL	ENGINE OIL PRESSURE SENSOR SIGNAL
31	G123 20DG/WT	WATER IN FUEL SENSOR SIGNAL
32	K118 20PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
33	-	-
34	K255 20WT/DG	ACCELERATOR PEDAL POSITION SENSOR GROUND
35	K852 20VT/WT	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY
36	-	-
37	-	-
38	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
39	K226 20DB/WT	FUEL LEVEL SENSOR SIGNAL
40	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
41	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
42	Y101 20BK/OR	CRANKSHAFT POSITION SENSOR SHIELD
43	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL 1
44	-	-
45	-	-
46	-	-
47	L50 20WT/TN	PRIMARY BRAKE SWITCH SIGNAL
48	K29 20WT/PK	SECONDARY BRAKE SWITCH SIGNAL
49	-	-
50	-	-
51	-	-
52	-	-
53	-	-
54	-	-
55	B22 20DG/YL	VEHICLE SPEED SIGNAL
56	-	-
57	-	-
58	-	-
59	-	-
60	K7 20OR	FUEL PRESSURE SENSOR 5 VOLT SUPPLY
61	K51 20DB/YL	AUTO SHUT DOWN RELAY CONTROL
62	-	-
63	-	-
64	K151 20WT	LOW IDLE POSITION SWITCH SENSE
65	-	-
66	-	-
67	-	-
68	-	-
69	C13 20DG	A/C COMPRESSOR CLUTCH RELAY CONTROL
70	-	-
71	-	-
72	K236 20GY/PK	GLOW PLUG RELAY RELAY NO. 2 CONTROL
73	-	-
74	K90 20TN	CLUTCH SWITCH OVERRIDE RELAY CONTROL
75	K132 20DG/LB	CABIN HEATER RELAY CONTROL
76	-	-
77	K152 20WT	GLOW PLUG RELAY NO. 1 CONTROL
78	-	-
79	-	-
80	K46 20OR/BK	FUEL PRESSURE SOLENOID CONTROL
81	K46 20OR/BK	FUEL PRESSURE SOLENOID CONTROL



ENGINE CONTROL MODULE - C2 (DIESEL)

ENGINE CONTROL MODULE - C2 (DIESEL) - BLACK 40 WAY

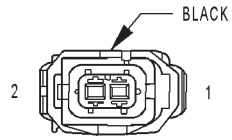
CAV	CIRCUIT	FUNCTION
82	D21 20PK	SCI TRANSMIT
83	-	-
84	-	-
85	-	-
86	-	-
87	-	-
88	-	-
89	K35 20GY/YL	EGR SOLENOID CONTROL
90	-	-
91	-	-
92	-	-
93	-	-
94	-	-
95	-	-
96	-	-
97	-	-
98	-	-
99	-	-
100	-	-
101	C18 20DB	A/C PRESSURE SIGNAL
102	-	-
103	-	-
104	-	-
105	-	-
106	-	-
107	-	-
108	-	-
109	-	-
110	-	-
111	-	-
112	-	-
113	-	-
114	-	-
115	K14 2.5mmLB/BR	FUEL INJECTOR NO. 4 CONTROL
116	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
117	-	-
118	K11 2.5mmWT/DB	FUEL INJECTOR NO. 1 CONTROL
119	K12 2.5mmTN	FUEL INJECTOR NO. 2 CONTROL
120	K13 2.5mmYL/WT	FUEL INJECTOR NO. 3 CONTROL
121	-	-



ENGINE COOLANT LEVEL SENSOR (DIESEL)

ENGINE COOLANT LEVEL SENSOR (DIESEL) - LT. GRAY 2 WAY

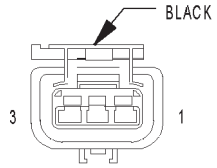
CAV	CIRCUIT	FUNCTION
1	G18 18PK/BK	COOLANT LEVEL SENSOR SIGNAL
2	Z246 18BK/GY	SENSOR GROUND



ENGINE COOLANT TEMP SENSOR (DIESEL)

ENGINE COOLANT TEMP SENSOR (DIESEL) - BLACK 2 WAY

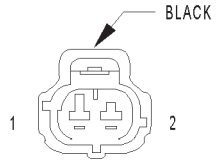
CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



ENGINE OIL PRESSURE SENSOR

ENGINE OIL PRESSURE SENSOR - BLACK 3 WAY

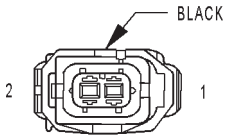
CAV	CIRCUIT	FUNCTION
1	K6 18VT/WT	SENSOR REFERENCE VOLTAGE B
2	G60 20GY/YL (DIESEL)	ENGINE OIL PRESSURE SENSOR SIGNAL
2	G60 18GY/YL (GAS)	ENGINE OIL PRESSURE SENSOR SIGNAL
3	K4 18BK/LB	SENSOR GROUND



FUEL HEATER (DIESEL)

FUEL HEATER (DIESEL) - BLACK 2 WAY

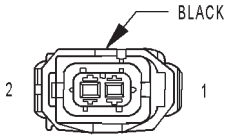
CAV	CIRCUIT	FUNCTION
1	A93 16RD/BK	FUEL HEATER RELAY OUTPUT
2	Z246 16BK/GY	GROUND



FUEL INJECTOR NO. 1 (DIESEL)

FUEL INJECTOR NO. 1 (DIESEL) - BLACK 2 WAY

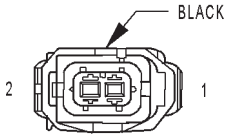
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K11 2.5mmWT/DB	FUEL INJECTOR NO. 1 CONTROL



FUEL INJECTOR NO. 2 (DIESEL)

FUEL INJECTOR NO. 2 (DIESEL) - BLACK 2 WAY

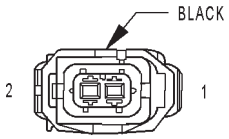
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K12 2.5mmTN	FUEL INJECTOR NO. 2 CONTROL



FUEL INJECTOR NO. 3 (DIESEL)

FUEL INJECTOR NO. 3 (DIESEL) - BLACK 2 WAY

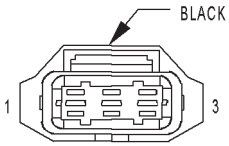
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K13 2.5mmYL/WT	FUEL INJECTOR NO. 3 CONTROL



FUEL INJECTOR NO. 4 (DIESEL)

FUEL INJECTOR NO. 4 (DIESEL) - BLACK 2 WAY

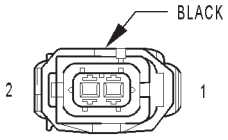
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K14 2.5mmLB/BR	FUEL INJECTOR NO. 4 CONTROL



FUEL PRESSURE SENSOR (DIESEL)

FUEL PRESSURE SENSOR (DIESEL) - BLACK 3 WAY

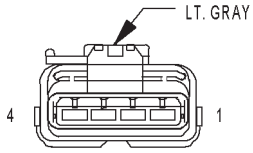
CAV	CIRCUIT	FUNCTION
1	K80 20BK/VT	FUEL PRESSURE SENSOR GROUND
2	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
3	K7 20OR	FUEL PRESSURE SENSOR 5 VOLT SUPPLY



FUEL PRESSURE SOLENOID (DIESEL)

FUEL PRESSURE SOLENOID (DIESEL) - BLACK 2 WAY

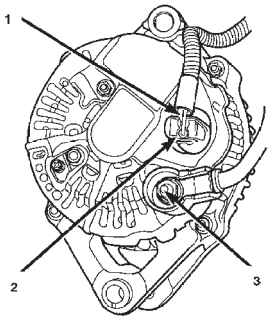
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
2	K46 18OR/BK	FUEL PRESSURE SOLENOID CONTROL



FUEL PUMP MODULE

FUEL PUMP MODULE - LT. GRAY 4 WAY

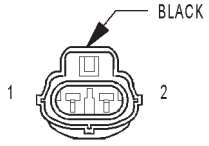
CAV	CIRCUIT	FUNCTION
1	Z211 16BK (GAS)	GROUND
2	K4 18BK/LB	SENSOR GROUND
3	K226 18DB/WT	FUEL LEVEL SENSOR SIGNAL
4	A141 16DG/WT (GAS)	FUEL PUMP RELAY OUTPUT



GENERATOR

GENERATOR - 3 WAY

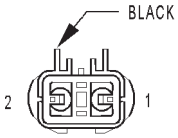
CAV	CIRCUIT	FUNCTION
1	-	FIELD WIRES
2	-	FIELD WIRE CONNECTOR
3	-	B(+) (OUTPUT TERMINALS)



GENERATOR

GENERATOR - BLACK 2 WAY

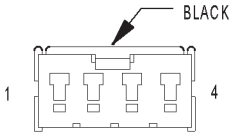
CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD (DIESEL)	FUSED AUTO SHUT DOWN RELAY OUTPUT
1	K20 18DG (GAS)	GENERATOR FIELD CONTROL
2	K20 18DG (DIESEL)	GENERATOR FIELD CONTROL
2	K125 18WT/DB (GAS)	GENERATOR SOURCE



GLOW
PLUG
ASSEMBLY
(DIESEL)

GLOW PLUG ASSEMBLY (DIESEL) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K154 10GY	GLOW PLUG RELAY NO. 1 OUTPUT
2	K104 10RD/WT	GLOW PLUG RELAY NO. 2 OUTPUT

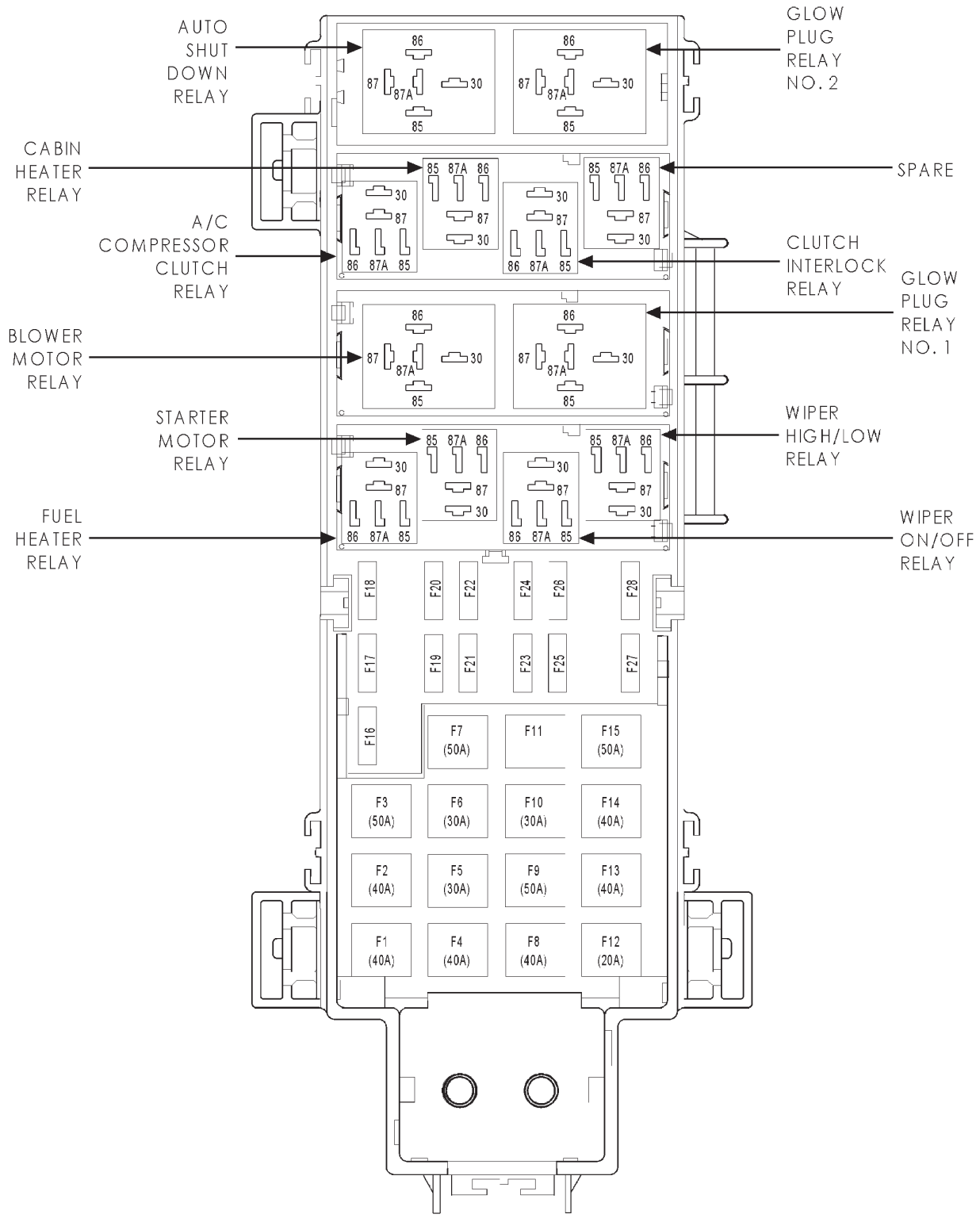


LEFT
SPEED CONTROL
SWITCH

LEFT SPEED CONTROL SWITCH (EXCEPT BASE) - BLACK 4 WAY

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

POWER DISTRIBUTION CENTER
DIESEL



FUSES (DIESEL)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A122 12OR	FUSED B(+)
2	30A	A99 14RD/VT	FUSED B(+)
3	50A	A13 10PK/WT	FUSED B(+)
4	40A	A10 12RD/DG	FUSED B (+)
5	30A	A32 14RD/DB	FUSED B(+)
6	-	A9 14RD/YL	FUSED B(+)
6	30A	A9 14RD/YL	FUSED B(+)
7	50A	A7 10RD/BK	FUSED B(+)
8	40A	A2 12PK/BK	FUSED B (+)
9	50A	A18 10PK	FUSED B(+)
10	50A	A54 10RD	FUSED B(+)
11	50A	A58 10RD/GY	FUSED B(+)
12	20A	A34 16LB/RD	FUSED B(+)
13	40A	A25 12DB	FUSED B(+)
14	40A	A1 12RD	FUSED B(+)
15	50A	A12 10RD/TN	FUSED B(+)
16	15A	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	-	-	-
19	30A	A4 12BK/PK	FUSED B(+)
20	-	-	-
21	20A	A17 18RD/BK	FUSED B(+)
21	-	A17 18RD/BK	FUSED B(+)
22	-	-	-
23	-	-	-
24	-	-	-
25	20A	A20 12RD/DB	FUSED B(+)
26	10A	F92 18YL/BR	FUSED B(+)
27	-	-	-
28	-	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
28	15A	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
30	A17 18RD/BK	FUSED B(+)
85	C13 18DG (EXCEPT RHD A/T)	A/C COMPRESSOR CLUTCH RELAY CONTROL
85	C13 18DB/OR (RHD A/T)	A/C COMPRESSOR CLUTCH RELAY CONTROL
86	F1 18DB (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	A71 18DG/RD (DIESEL)	FUSED AUTO SHUT DOWN RELAY OUTPUT
86	F1 18DB (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	C3 18DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
87A	-	-

AUTO SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
30	A9 14RD/YL	FUSED B(+)
30	A9 14RD/YL (DIESEL)	FUSED B(+)
85	K51 18DB/YL	AUTO SHUT DOWN RELAY CONTROL
86	A9 14RD/YL (DIESEL)	FUSED B(+)
86	F1 18DB (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F1 18DB (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	A142 14DG/OR (DIESEL)	AUTO SHUT DOWN RELAY OUTPUT
87	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
87A	-	-

CABIN HEATER RELAY (DIESEL)

CAV	CIRCUIT	FUNCTION
30	A17 18RD/BK	FUSED B(+)
85	K132 18DG/LB	CABIN HEATER RELAY CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	C151 18DB/WT	CABIN HEATER RELAY OUTPUT
87A	-	-

CLUTCH SWITCH OVERRIDE RELAY (M/T)

CAV	CIRCUIT	FUNCTION
30	F45 18YL/BR (GAS)	FUSED IGNITION SWITCH OUTPUT (START)
30	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
85	K90 18TN	CLUTCH SWITCH OVERRIDE RELAY CONTROL
86	A21 12RD/DB	IGNITION SWITCH OUTPUT (RUN-START)
87	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
87	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
87A	-	-

FUEL HEATER RELAY (DIESEL)

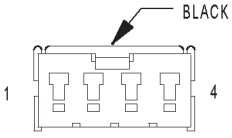
CAV	CIRCUIT	FUNCTION
30	A34 16LB/RD	FUSED B(+)
85	Z142 18BK/WT	GROUND
86	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
87	A93 16RD/BK	FUEL HEATER RELAY OUTPUT
87A	-	-

GLOW PLUG RELAY NO. 1 (DIESEL)

CAV	CIRCUIT	FUNCTION
30	A54 10RD	FUSED B(+)
85	K152 18WT	GLOW PLUG RELAY NO. 1 CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	K154 10GY	GLOW PLUG RELAY NO. 1 RELAY OUTPUT
87A	-	-

GLOW PLUG RELAY NO. 2 (DIESEL)

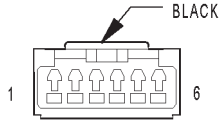
CAV	CIRCUIT	FUNCTION
30	A58 10RD/GY	FUSED B(+)
85	K236 18GY/PK	GLOW PLUG RELAY NO. 2 CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	K104 10RD/WT	GLOW PLUG RELAY NO. 2 OUTPUT
87A	-	-



RIGHT SPEED CONTROL SWITCH

RIGHT SPEED CONTROL SWITCH (EXCEPT BASE) - BLACK 4 WAY

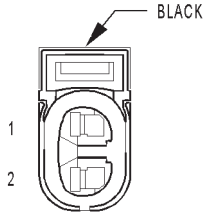
CAV	CIRCUIT	FUNCTION
1	-	-
2	K4 20BK/LB	SENSOR GROUND
3	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
4	-	-



SENTRY KEY IMMOBILIZER MODULE (EXCEPT BASE)

SENTRY KEY IMMOBILIZER MODULE (EXCEPT BASE) - BLACK 6 WAY

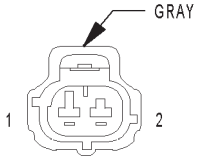
CAV	CIRCUIT	FUNCTION
1	F33 20PK/RD	FUSED B(+)
2	Z11 20BK/WT	GROUND
3	F1 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	Z110 20BK/TN	GROUND
5	D25 20YL/VT/BK	PCI BUS
6	-	-



TRANSFER CASE POSITION SENSOR

TRANSFER CASE POSITION SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K77 20BR/WT (DIESEL)	TRANSFER CASE POSITION SENSOR INPUT
1	K77 18BR/WT (GAS)	TRANSFER CASE POSITION SENSOR INPUT
2	K4 18BK/LB	SENSOR GROUND



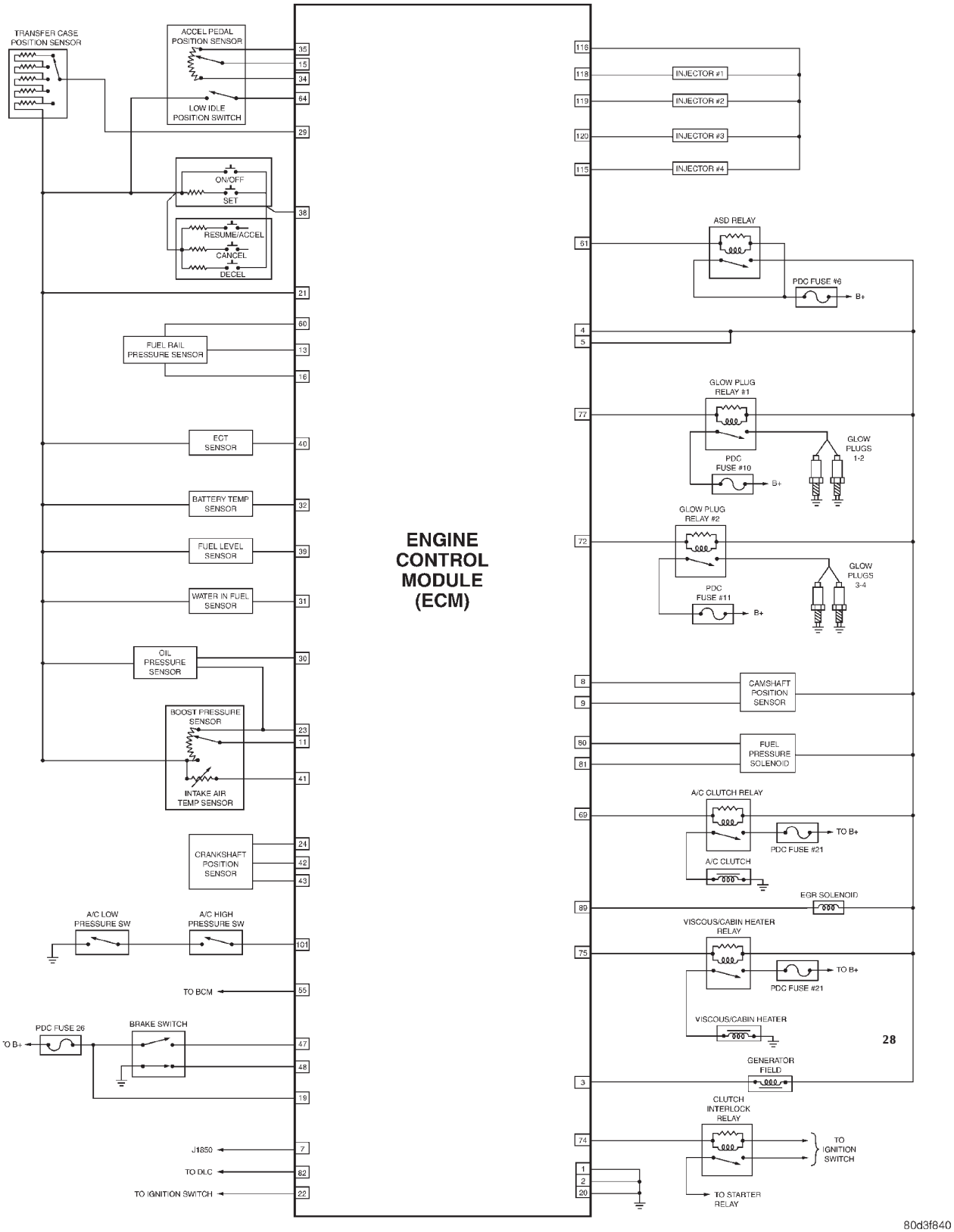
WATER IN FUEL SENSOR (DIESEL)

WATER IN FUEL SENSOR (DIESEL) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	G123 20DG/WT	WATER IN FUEL SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND

10.0 SCHEMATIC DIAGRAMS

10.1 2002 KJ 2.5L TURBO DIESEL



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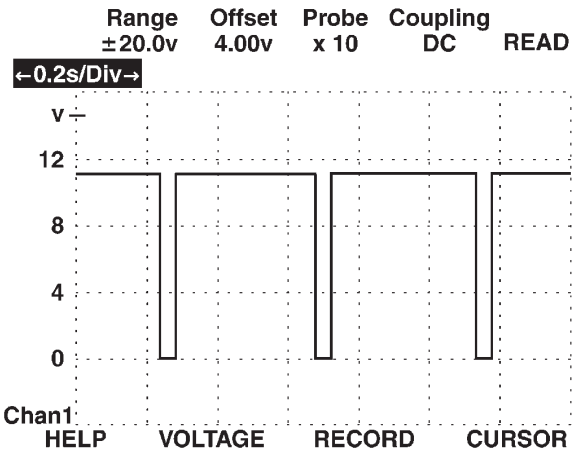
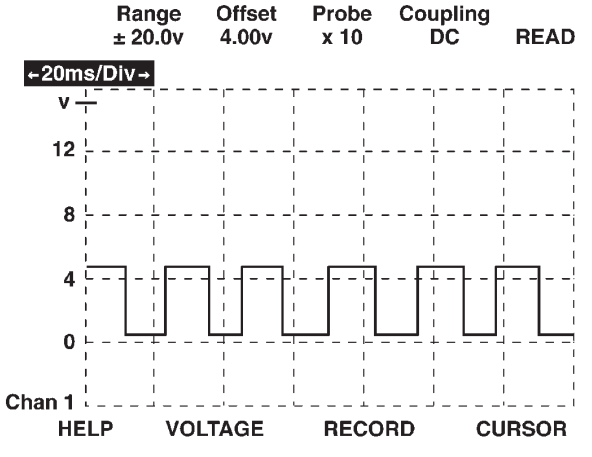
NOTES

11.0 CHARTS AND GRAPHS



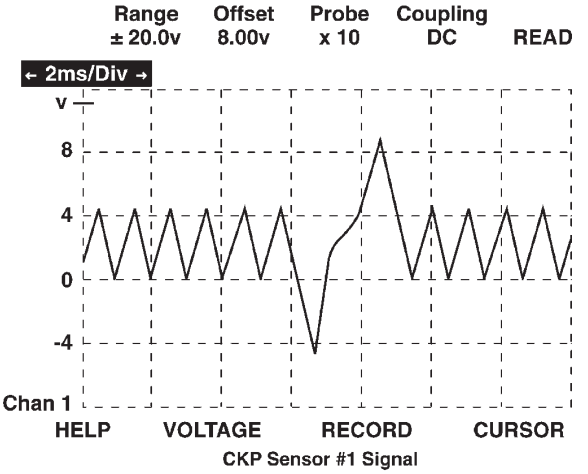
Camshaft Position Sensor Signal - During Engine Cranking

80c7708b



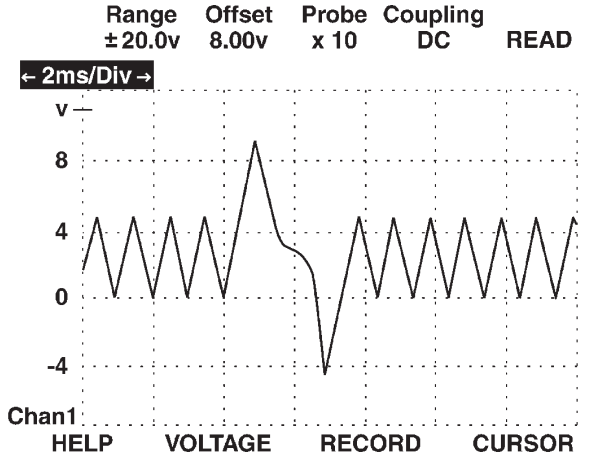
Vehicle Speed Signal - Driving in 3rd gear at 1100-1200 RPM

80bc7ab4



CKP Sensor #1 Signal

80bc7b84



CKP Sensor #2 Signal

80d0834f

NOTES