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1.0 INTRODUCTION

The procedures contained in this manual include all 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 2005 RG body vehicles equipped with the 2.5L and 2.8L direct injection diesel engines.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the engine control module (ECM) and sentry key remote entry system (SKREES) 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 headlamp and the integrated power module. The Sentry Key Remote Entry Module (SKREEM) is located below the steering column behind the steering wheel.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

The 2.5L/2.8L direct injection diesel engine system is equipped with the latest in technical advances. The on-board diagnostics incorporated in the engine control module and SKREEM 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.

Overheat Protection Mode

If the engine temperature is above 106°C (223°F) and vehicle speed is above 40 km/h (25 MPH) the ECM will activate the high speed fan and will limit fuel quantity for engine protection.

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, limit engine RPM to no more than 2500 RPM, 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 SENTRY KEY REMOTE ENTRY SYSTEM (SKREES) OVERVIEW

The Sentry Key Remote Entry Module (SKREEM) combines the Sentry Immobilizer Module (SKIM) and the Remote Keyless Entry (RKE) Module into one module system that performs the functions of both modules. Refer to the Body diagnostic information manual for all RKE related diagnostic information.

The SKREEM is designed to prevent unauthorized vehicle operation. The system consists of a SKREEM, ignition key(s) equipped with a transponder chip and ECM. When the ignition switch is turned on, the SKREEM interrogates the ignition key. If the ignition key is Valid or Invalid, the SKREEM 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 SKREEM ON-BOARD DIAGNOSTICS

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

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

3.2.6 SKREES OPERATION

When ignition power is supplied to the SKREEM, the SKREEM performs an internal self-test. After the self-test is completed, the SKREEM 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

SKREES. The secret key is stored in the SKREEM, ECM and all ignition key transponders.

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

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

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

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

- bulb checks at ignition on
- to alert the vehicle operator to a SKIS malfunction
- customer key programming mode

For all faults except transponder faults and VTSS LED remains on steady. In the event of a transponder fault the LED flashes at a rate of 1 Hz (once per second). If a fault is present the LED will remain on or flashing for the complete ignition cycle. If a fault is stored in SKREEM memory which prevents the system from operating properly, the ECM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the ECM disables the starter relay 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®. This will direct you to the specific test(s) that must be performed.

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/SKREEM 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/SKREEM 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 SKREES malfunction. This interference can interrupt communication between the ignition key transponder and the SKREEM.

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
A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY
A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
A/C PRESSURE SENSOR CIRCUIT SUPPLY VOLTAGE TOO HIGH OR LOW
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 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
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
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
CALCULATED INJECTOR VOLTAGE TOO HIGH
CALCULATED INJECTOR VOLTAGE TOO LOW
CAPACITOR VOLTAGE 1 VOLTAGE TOO HIGH
CAPACITOR VOLTAGE 1 VOLTAGE TOO LOW
CKP POSITION SENSOR CIRCUIT OVERSPEED RECOGNITION
CLUTCH UPSTOP SWITCH PERF PLAUSIBILITY
CLUTCH PEDAL SW OVERRIDE RELAY SHORT CIRCUIT
CMP POSITION SENSOR CIRCUIT CMP/CKP SYNC FAILURE
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 - COMMUNICATION NOT VERIFIED
ECM ERROR GATE ARRAY - COMMUNICATION
ECM ERROR GATE ARRAY - QUANTITY STOP
ECM ERROR RECOVERY HAS OCCURRED
ECM ERROR REDUNDANT OVERRUN MONITORING
ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY
ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE
EEPROM MEMORY WRITE DENIED
EEPROM PLAUSIBILITY CHECKSUM ERROR
EEPROM PLAUSIBILITY CODE WORD INCORRECT OR MISSING
EEPROM PLAUSIBILITY COMMUNICATION ERROR
EEPROM PLAUSIBILITY VARIATION NUMBER ERROR
EEPROM PLAUSIBILITY VIN CHECKSUM ERROR
EEPROM PLAUSIBILITY WRITE ERROR
EGR SOLENOID CIRCUIT OPEN CIRCUIT
EGR SOLENOID CIRCUIT SHORT CIRCUIT
ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
FAN 1 CONTROL CIRCUIT OPEN CIRCUIT
FAN 1 CONTROL CIRCUIT SHORT CIRCUIT
FAN 2 CONTROL CIRCUIT OPEN CIRCUIT
FAN 2 CONTROL CIRCUIT SHORT CIRCUIT
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 PLAUSIBILITY IN AFTER-RUN
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 BATTERY VOLTAGE TOO LOW
GENERATOR FIELD CONTROL MALF CHARGING VOLTS TOO LOW
GENERATOR FIELD CONTROL MALF OPEN CIRCUIT
GENERATOR FIELD CONTROL MALF SHORT CIRCUIT
GENERATOR FIELD CONTROL MALF UNSTABLE CURRENT
GLOW PLUG 1 CONTROL CIRCUIT OPEN CIRCUIT
GLOW PLUG 1 CONTROL CIRCUIT SHORT CIRCUIT
IGNITION SWITCH PLAUSIBILITY
INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
LIFT PUMP RELAY CONTROL CIRCUIT OPEN CIRCUIT
LIFT PUMP RELAY CONTROL CIRCUIT SHORT CIRCUIT
MASS AIR FLOW SENSOR PLAUSIBILITY
MASS AIR FLOW SENSOR PLAUSIBILITY POSITIVE AREA
MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO HIGH
MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO LOW
MASS AIR FLOW SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW
OIL PRESS SENSOR CKT MALF PLAUSIBILITY
OIL PRESS SENSOR CKT MALF SUPPLY VOLTAGE TOO HIGH OR 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 SKIM ERROR

SKIM SYSTEM WRITE ACCESS TO EEPROM FAILURE
STARTER RELAY CIRCUIT SHORT CIRCUIT
SYSTEM VOLTAGE TOO HIGH
SYSTEM VOLTAGE TOO LOW
VEHICLE SPEED SENSOR FREQUENCY TOO HIGH
VEHICLE SPEED SENSOR HIGH LEVEL DURATION
VEHICLE SPEED SENSOR PLAUSIBILITY
VEHICLE SPEED SENSOR SIGNAL VOLTAGE TOO HIGH
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
NO BCM COMMUNICATION
PCM STATUS FAILURE
RAM FAILURE
ROLLING CODE FAILURE
ROM FAULT
SERIAL LINK EXTERNAL FAULT
SERIAL LINK INTERNAL FAULT
STACK OVERFLOW FAILURE
TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH
UNPROGRAMMED SKREEM
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.

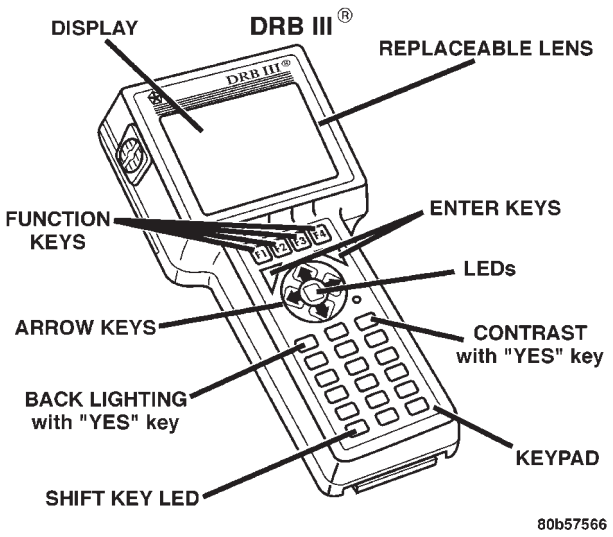
3.4.1 DRBIII® DOES NOT POWER UP

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: HIGH-PRESSURE FUEL LINES DELIVER DIESEL FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE FUEL INJECTORS. THIS MAY BE AS HIGH AS 23,200 PSI (1600 BAR). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS. FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.

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
voltmeter
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)
IPM	integrated power module
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
SKREEM	sentry key remote entry module
SKREES	sentry key remote entry 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 List:

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY
P0100-MASS AIR FLOW SENSOR PLAUSIBILITY POSITIVE AREA
P0100-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO HIGH
P0100-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO LOW
P0100-MASS AIR FLOW SENSOR 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 P0100-MASS AIR FLOW SENSOR PLAUSIBILITY.

When Monitored and Set Condition:

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY

When Monitored: With the engine running.

Set Condition: The mass airflow measure does not correspond with the engine load measurements.

P0100-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Mass Air Flow Sensor Signal voltage is above 4.5 volts.

P0100-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Mass Air Flow Sensor Signal voltage is below 0.2 volt.

P0100-MASS AIR FLOW SENSOR SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
ECM - 5-VOLT SUPPLY CIRCUIT
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
MASS AIRFLOW SENSOR
SENSOR GROUND OPEN
INTERMITTENT CONDITION
SENSOR REFERENCE VOLTAGE A CIRCUIT OPEN
MAF SENSOR SIGNAL CIRCUIT OPEN

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY — Continued

POSSIBLE CAUSES
SENSOR REFERENCE VOLTAGE A CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
MAF SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECM SENSOR GROUND CIRCUIT OPEN
SENSOR REFERENCE VOLTAGE A CIRCUIT SHORTED TO GROUND
MAF SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
SENSOR REFERENCE VOLTAGE A CIRCUIT SHORTED TO VOLTAGE
MAF SENSOR CIRCUIT SHORTED TO VOLTAGE
ECM - MAF SENSOR SIGNAL CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** **NOTE: Inspect the turbocharger inlet tube between the MAF Sensor and the turbocharger for damage, restriction or poor connection. Any of these conditions can cause a MAF Plausibility DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 a Mass Air Flow Sensor DTC? Yes → Go To 2 No → Go To 15	All
2	**NOTE: A malfunctioning EGR system can cause this DTC to set. Refer to symptom Checking the EGR System in the Driveability category to check EGR system operation.** Turn the ignition off. Disconnect the MAF Sensor harness connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage A circuit in MAF Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 3 No → Go To 11	All

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the MAF Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the MAF Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the MAF Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the MAF Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the MAF Sensor Signal circuit. Is the resistance below 1000 ohms? Yes → Repair the MAF Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the MAF Sensor Signal circuit and the Sensor Ground circuit at of the MAF Sensor harness connector. Is the resistance below 1000 ohms? Yes → Repair the MAF Sensor Signal for a short to Sensor Ground . Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	Turn the ignition off. Disconnect the MAF Sensor harness connector. Connect a jumper wire between MAF Sensor Signal circuit and the Sensor reference Voltage A circuit at the MAF Sensor harness connector . Turn the ignition on. With the DRBIII, read the MAF VOLTS. Does the DRBIII display between 4.0 and 5.5 volts? Yes → Go To 8 No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the MAF Sensor and the ECM. Is the resistance below 10.0 ohms? Yes → Go To 9 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the MAF Sensor harness connector. Turn the ignition on. Measure the voltage between the 5-volt Supply circuit and the Sensor Ground circuit at the MAF Sensor harness connector. Is the voltage above 4.5 volts? Yes → Go To 10 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
10	Turn the ignition off. Disconnect the MAF Sensor harness connector. Turn the ignition on. With the DRBIII®, actuate the ECM/PCM Relay. Measure the voltage of the 12-volt Supply circuit at the MAF Sensor harness connector Is the voltage above 10.0 volts? Yes → Replace the MAF Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ECM/PCM Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Reference Voltage A circuit. Is the resistance below 10.0 ohms? Yes → Go To 12 No → Repair the Sensor Reference Voltage A circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
12	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Reference Voltage A circuit and the Sensor Ground circuit at the MAF Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 13 No → Repair the Sensor Reference Voltage A circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All

P0100-MASS AIR FLOW SENSOR PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Sensor Reference Voltage A circuit at the MAF harness connector. Is the resistance below 1000 ohms? Yes → Repair the Sensor Reference Voltage A circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 14	All
14	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage A circuit in the ECM harness connector. Is the voltage above 1.0 volt? Yes → Repair the Sensor Reference Voltage A 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
15	**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 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
P1602-CAPACITOR VOLTAGE 2 VOLTAGE TOO HIGH
P1602-CAPACITOR VOLTAGE 2 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
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
P1685-SKIM SYSTEM INVALID SECRET KEY IN EEPROM
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 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 4.86 volts.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Barometric Pressure Sensor Signal is below 0.66 volt.

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 greater than 100 volts.

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 less than 91 volts.

P1602-CAPACITOR VOLTAGE 2 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.

P1602-CAPACITOR VOLTAGE 2 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.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

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.

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 the code word test routine not yet performed (for injector classification).

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 incorrect software programming.

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.

P1685-SKIM SYSTEM INVALID SECRET KEY IN EEPROM

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal mismatch of the secret key code when performing an internal EEPROM check.

P0105-BAROMETRIC PRESSURE CIRCUIT SIGNAL VOLTAGE TOO HIGH — Continued

P1685-SKIM SYSTEM WRITE ACCESS TO EEPROM FAILURE

When Monitored: With the ignition on.

Set Condition: The ECM detects an internal EEPROM fault.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: This DTC indicates an internal ECM problem except in the case of DTC P0606 or P1660 where it may indicate a fuel injector problem. Using the Service Information, check the fuel injectors for leakage before replacing the ECM.** **NOTE: This code can be caused by an intermittent problem in the wiring and connectors to the Engine Control Module. Inspect the Engine Control Module harness connector and associated wiring for signs of poor terminal contact.** Turn the ignition on. With the DRBIII®, 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 DTCs. Did this DTC set again? 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

P0105-BAROMETRIC PRESSURE 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:

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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All

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

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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
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 10.0 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 circuit and IAT Sensor Ground circuit 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 0.80 volt.

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

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs for at least 2 minutes. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Turn the ignition on. Monitor the DRB for ECM DTCs for at least 2 minutes. 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 3	All

P0110-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW — 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 between ground and the Intake Air Temperature Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Intake Air Temperature Sensor Signal 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 Boost Pressure/IAT Sensor harness connector. Measure the resistance between the Intake Air Temperature Sensor Signal circuit and the Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Intake Air Temperature 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 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 Sensor Ground circuit between the ECM harness connector and the ECT harness connector. Is the resistance below 10.0 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 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 CKT SHORTED TO SENSOR GROUND CIRCUIT
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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

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

TEST	ACTION	APPLICABILITY
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
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 circuit for a short to Sensor Ground. 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, 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, read ECM DTCs. Did this DTC set again? 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 5.4 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 10.0 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 10.0 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 could be 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 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 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 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, 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, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW — 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. 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
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 1000 ohms? 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 1000 ohms? 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

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW — 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 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, 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 when on.

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 when on.

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 when on.

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 when on.

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

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start the engine and test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect all of the Cylinder Fuel Injector harness connectors. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of each Fuel Injector Control circuit. Is the voltage above 1.0 volt for any of the measurements? Yes → Repair the appropriate 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 all of the Cylinder Fuel Injector harness connectors. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 all of the Fuel Injector harness connectors. Measure the resistance between ground and each Fuel Injector Control circuit. Is the resistance below 1000 ohms for any of the measurements? Yes → Repair the Fuel Injector Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Cylinder Fuel Injector harness connectors. 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 all of the Cylinder Fuel Injector harness connectors. Measure the resistance between each of the Fuel Injector Control circuits and the Common Driver circuit. Is the resistance below 1000 ohms for any of the measurements? 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
7	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Cylinder Fuel Injector harness connectors. Measure the resistance of each Fuel Injector Control circuit between its respective injector harness connector and the ECM harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 8 No → Repair the appropriate 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 all of the Cylinder Fuel Injector harness connectors. Measure the resistance of each Common 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 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

P0201-CYLINDER 1-INJECTOR CIRCUIT CURRENT DECREASE — 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 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 idling.

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 SENSOR REFERENCE VOLTAGE B CIRCUIT
BOOST PRESSURE/INTAKE AIR TEMPERATURE SENSOR
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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? 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 10.0 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 10.0 ohms? Yes → Go To 4 No → Repair the 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 Sensor Reference Voltage B circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the Sensor Reference Voltage B 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 set again? 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 4.85 volts for at least 2 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
BOOST PRESSURE SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
BOOST PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
BOOST PRESSURE SENSOR GROUND CIRCUIT OPEN
BOOST PRESSURE SENSOR
POOR CONNECTOR TERMINAL CONTACT
ENGINE CONTROL MODULE (INTERNAL)
ENGINE CONTROL MODULE (SENSOR SIGNAL SHORTED TO VOLTAGE)

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: Ensure all turbocharger inlet and outlet tubes are connected properly, without damage and restriction before continuing with this test. Also ensure the wastegate actuator and actuator rod are attached and functioning properly.** **NOTE: If a P0243 DTC is present with this DTC, diagnose P0243 DTC before continuing.** Turn the ignition on. With the DRB, 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, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 8	All

P0235-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the ECM harness connectors. Turn the ignition on. Measure the voltage of the Boost Pressure Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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
4	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Boost Pressure Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the Boost Pressure Sensor Ground circuit for a short to voltage. Note: The ECM will need to be checked for proper operation before the repair is completed. A short to voltage on a ground circuit can damage the ECM. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Boost 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 → Go To 6 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
6	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 4.85 volts? Yes → Replace the Boost Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	Turn the ignition on. With the DRB, read ECM DTCs. With the DRBIII®, erase ECM DTCs. Did this DTC set again? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Ensure that there is good terminal contact between the Turbocharger Boost Pressure Sensor harness connector and the sensor. The repair is complete. 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:

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 Boost Pressure Sensor Signal voltage is below 0.15 volt for at least 2 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SENSOR REFERENCE VOLTAGE B CIRCUIT OPEN
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 Sensor Reference Voltage B circuit. Is the voltage above 4.9 volts? Yes → Go To 3 No → Repair the Sensor Reference Voltage B circuit for an open. 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 Sensor Reference Voltage B 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 1000 ohms? 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 1000 ohms? 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 10.0 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 circuit 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
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
SENSOR REFERENCE VOLTAGE B CIRCUIT SHORTED TO GROUND
SENSOR REFERENCE VOLTAGE B CIRCUIT SHORTED TO SENSOR GROUND
SENSOR REFERENCE VOLTAGE B 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active 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 set again? Yes → Go To 2 No → Go To 7	All

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

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage B circuit at the Boost Pressure/IAT Sensor harness connector. 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	All
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 Sensor Reference B circuit. Is the resistance above 1000 ohms? 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 Boost Pressure/IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the Sensor Reference Voltage B circuit at the Boost Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Sensor Reference Voltage B circuit for a short to the Sensor Ground circuit. 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 APP Sensor 5-Volt Supply circuit at the APP 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

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

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage between ground and the APP Sensor 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
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 List:

P0243-TURBOCHARGER WASTEGATE SOL CKT NEGATIVE DEVIATION

P0243-TURBOCHARGER WASTEGATE SOL CKT POSITIVE DEVIATION

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0243-TURBOCHARGER WASTEGATE SOL CKT NEGATIVE DEVIATION.

POSSIBLE CAUSES
AIR FILTER
AIR RESTRICTION
CHECKING FOR AIR LEAKS
INTERMITTENT CONDITION
BOOST PRESSURE SERVO MOTOR
TURBOCHARGER

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: Ensure all turbocharger inlet and outlet tubes are connected properly, without damage and restriction before continuing with this test. Also ensure the Boost Pressure Servo Motor and Servo Motor rod are attached and functioning properly.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Test drive the vehicle. Monitor the DRBIII® for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Remove and inspect the Air Filter for soiling or excessive dirt and debris which may cause air flow restriction. Were any of these problems found? Yes → Replace the Air Filter element. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0243-TURBOCHARGER WASTEGATE SOL CKT NEGATIVE DEVIATION

— Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Inspect all air intake and turbocharger related tubes for damage, restriction or poor connection. Any of these conditions can cause a this DTC to set.** Turn the ignition off. Inspect all air intake and turbocharger related tubes and connections. Were any problems found? Yes → Repair or replace as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Remove the Intake Air Temperature Sensor. Connect smoke machine 84-04 to the air intake duct and begin injecting smoke into the intake system. Observe all intake system components for evidence of smoke leakage. Is there evidence of smoke leakage? Yes → Repair or replace as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Replace the Turbocharger Wastegate Solenoid in accordance with the Service Information. **NOTE: Ensure the ECM and Turbocharger Wastegate Solenoid harness connectors are connected.** Test drive the vehicle. With the DRB, check for this DTC to set again. Did this DTC set again? Yes → Replace the Turbocharger assembly in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the Boost Pressure Servo Motor. 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:
P0243-TURBOCHARGER WASTEGATE SOL CKT OPEN CIRCUIT

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
TURBOCHARGER WASTEGATE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
TURBOCHARGER WASTEGATE SOLENOID CONTROL CKT OPEN
TURBOCHARGER WASTEGATE SOLENOID
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ECM/PCM Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Turbocharger Wastegate Solenoid Control circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Turbocharger Wastegate Solenoid Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0243-TURBOCHARGER WASTEGATE SOL CKT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Turbocharger Wastegate Solenoid Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the Turbocharger Wastegate Solenoid Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Install a substitute Turbocharger Wastegate Solenoid in place of the vehicle's Turbocharger Wastegate Solenoid. **NOTE: Ensure the ECM and Turbocharger Wastegate Solenoid harness connectors are connected.** Turn the ignition on. With the DRB, check for this DTC to set again. Did this DTC set again? Yes → Go To 6 No → Replace the Turbocharger Wastegate 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:
P0243-TURBOCHARGER WASTEGATE SOL CKT SHORT CIRCUIT

POSSIBLE CAUSES
INTERMITTENT CONDITION
TURBOCHARGER WASTEGATE SOLENOID
TURBOCHARGER WASTEGATE SOLENOID CONTROL SHORT TO VOLTAGE
ENGINE CONTROL MODULE - INTERNAL
ENGINE CONTROL MODULE - INTERNAL SHORT TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle and monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Does the DRB display P0243 TURBOCHARGER WASTEGATE OPEN CIRCUIT? Yes → Replace the Turbocharger Wastegate Solenoid. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Turn the ignition on. Measure the voltage of the Turbocharger Wastegate 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 → Go To 4	All

P0243-TURBOCHARGER WASTEGATE SOL CKT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Turbocharger Wastegate Solenoid harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Turbocharger Wastegate 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 Turbocharger Wastegate 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:

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
CRANKSHAFT POSITION SENSOR
ENGINE CONTROL MODULE
OPEN SHIELD CIRCUIT
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **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 DRBIII®, erase ECM DTCs. Test drive the vehicle and monitor the DRBIII® for ECM DTCs. Did this DTC set again? 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 set again? 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 List:

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP DYNAMIC PLAUSIBILITY
P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP STATIC PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP DYNAMIC PLAUSIBILITY.

When Monitored and Set Condition:

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP DYNAMIC PLAUSIBILITY

When Monitored: The engine speed is above 790 RPM.

Set Condition: The ECM compares the current crankshaft RPM to the last calculated crankshaft RPM and the acceleration or deceleration is greater than is physically possible.

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP STATIC PLAUSIBILITY

When Monitored: The engine speed is above 790 RPM.

Set Condition: The ECM compares the current crankshaft RPM to the last calculated crankshaft RPM and the acceleration or deceleration is greater than is possible.

POSSIBLE CAUSES
CRANKSHAFT POSITION SENSOR
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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Attempt to start the engine. Did the engine start? Yes → Go To 2 No → Go To 3	All

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP DYNAMIC PLAUSIBILITY — 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 CKP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and 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

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CKP DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY
P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP SIGNAL FREQUENCY TOO HIGH
P0340-CMP/CKP 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/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY.

When Monitored and Set Condition:

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP 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.

P0340-CMP/CKP POSITION SENSOR CIRCUIT - STATIC PLAUSIBILITY

When Monitored: With the engine cranking or running.

Set Condition: The ECM detects the Camshaft Sensor Signal is missing.

POSSIBLE CAUSES
CHECKING FOR OTHER DTCS
DAMAGED CMP SENSOR OR CAMSHAFT
ECM
SENSOR GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CMASHAFT POSITION SENSOR
ECM - CMP SENSOR GROUND CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
CMP SENSOR CIRCUIT SHORTED TO VOLTAGE

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: The Timing Belt/Chain must be correctly installed and operational before diagnosis can be made. Refer to the Service Information to ensure the timing belt/chain is properly installed.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 DRBIII® 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 DRBIII® display this DTC? Yes → Go To 3 No → Go To 14	All
3	Turn the ignition on. With the DRBIII®, read and note all ECM DTCs. Does the DRB display DTC P1696 with P0340? 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
4	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 ECM/PCM Relay Output circuit in CMP Sensor harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the ECM/PCM Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	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 6 No → Go To 11	All

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
6	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 at the CMP Sensor harness connector. 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 7	All
7	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 8 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	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 IAT Sensor 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 DRBIII® in Engine, Sensors, read the Intake Air Temp volts. Is the voltage below 1.0 volt? Yes → Go To 9 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Remove the CMP Sensor. Inspect the CMP Sensor for conditions such as loose mounting screws, damage, or cracks. Inspect the camshaft for conditions such as 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 10	All

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. With the DRBIII® lab scope lead, backprobe the CMP Signal circuit. Set the DRBIII® lab scope settings as follows: Time = 0.2s/Div, 20 volts scale, Offset = 0.00 volts, Probe = X10, Coupling = DC. While observing the DRBIII® display, crank the engine. **NOTE: The DRBIII® should display a digital signal (square wave) similar to that shown in Charts and Graphs.** Does the DRBIII® 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
11	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 12 No → Repair the CMP Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All
12	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 13	All
13	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 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

P0340-CMP/CKP POSITION SENSOR CIRCUIT - CMP DYNAMIC PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
14	**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/CKP POSITION SENSOR CIRCUIT - CMP/CKP SYNC FAILURE

When Monitored and Set Condition:

P0340-CMP/CKP 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
CAMSHAFT POSITION SENSOR SIGNAL PROBLEM
CRANKSHAFT POSITION SENSOR SIGNAL PROBLEM
DAMAGED CKP SENSOR
DAMAGED CMP SENSOR OR CAMSHAFT
ENGINE CONTROL MODULE
GEAR ALIGNMENT PROBLEM
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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

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

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the CMP Sensor. Inspect the CMP 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
4	Turn the ignition off. Remove the CKP Sensor. Inspect the CKP 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/CKP 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 CIRCUIT A OPEN CIRCUIT
P0380-GLOW PLUG CIRCUIT A SHORT CIRCUIT

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

When Monitored and Set Condition:

P0380-GLOW PLUG CIRCUIT A OPEN CIRCUIT

When Monitored: With the ignition on and glow plug operation not active.

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

P0380-GLOW PLUG CIRCUIT A SHORT CIRCUIT

When Monitored: With the ignition on and when attempting to activate the Glow Plug Relay.

Set Condition: The ECM detects excessive current on the Glow Plug Relay Control circuit when the glow plug relay is commanded on.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
GLOW PLUG RELAY
GLOW PLUG RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG RELAY CONTROL CIRCUIT SHORTED TO GROUND
GLOW PLUG RELAY CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

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

P0380-GLOW PLUG CIRCUIT A 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 Glow Plug Relay harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ECM/PCM 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 Glow Plug 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. With the DRBIII®, erase ECM DTCs. Did this DTC set again? Yes → Go To 5 No → Replace the Glow Plug Relay. Perform ROAD TEST VERIFICATION - VER-2.	All

P0380-GLOW PLUG CIRCUIT A OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Glow Plug Relay harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 1 and cavity 4 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage on the Glow Plug Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Glow Plug Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Glow Plug Relay harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Glow Plug Relay Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Glow Plug Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the Glow Plug Relay harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Glow Plug Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Glow Plug Relay 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
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
EGR SOLENOID CONTROL CIRCUIT OPEN
EGR SOLENOID
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? 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 ECM/PCM Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ECM/PCM Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0403-EGR SOLENOID CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
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 1000 ohms? Yes → Go To 4 No → Repair the EGR Solenoid Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
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 10.0 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 set again. Did this DTC set again? 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

P0403-EGR SOLENOID CIRCUIT OPEN CIRCUIT — 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:
P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on and the ECM attempting to actuate the EGR Solenoid.

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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Test drive the vehicle and monitor the DRB for ECM DTCs. Did this DTC set again? 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

P0403-EGR SOLENOID CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR 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
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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:

P0480-FAN 1 CONTROL CIRCUIT OPEN CIRCUIT

When Monitored and Set Condition:

P0480-FAN 1 CONTROL CIRCUIT OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the Radiator Fan Relay No. 1 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY NO. 1
LOW SPEED RADIATOR FAN CONTROL CIRCUIT SHORTED TO GROUND
LOW SPEED RADIATOR FAN CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the Low Speed Radiator Fan Relay. Do the Radiator Fans cycle on and off? Yes → Go To 2 No → Go To 3	All

P0480-FAN 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. Disconnect the Radiator Fan Relay No. 1 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit. Did the test light illuminate brightly? Yes → Go To 4 No → Repair the ECM/PCM 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 Radiator Fan Relay No. 1. Turn the ignition on. With the DRB, actuate the Low Speed Fan Relay. Do the Radiator Fans cycle on and off? Yes → Replace Radiator Fan Relay No. 1. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Radiator Fan Relay No. 1 harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Low Speed Radiator Fan Control circuit. Is the resistance below 1000 ohms? Yes → Repair the Low Speed Radiator Fan Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All

P0480-FAN 1 CONTROL CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Radiator Fan Relay No. 1 harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Low Speed Radiator Fan Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Low Speed Radiator Fan Control 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

Symptom:

P0480-FAN 1 CONTROL CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0480-FAN 1 CONTROL CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Radiator Fan Relay No. 1 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
RADIATOR FAN RELAY NO. 1
LOW SPEED RADIATOR FAN CONTROL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the Low Speed Radiator Fan Relay. Do the Radiator Fans cycle on and off? 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

P0480-FAN 1 CONTROL CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the Radiator Fan Relay No. 1. Turn the ignition on. With the DRB, actuate the Low Speed Radiator Fan Relay. Do the Radiator Fans cycle on and off? Yes → Replace Radiator Fan Relay No. 1. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Radiator Fan Relay No. 1 harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Low Speed Radiator Fan Control circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Low Speed Radiator Fan Control circuit for a short to voltage. 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

Symptom:

P0481-FAN 2 CONTROL CIRCUIT OPEN CIRCUIT

When Monitored and Set Condition:

P0481-FAN 2 CONTROL CIRCUIT OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the Radiator Fan Relay No. 2 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECM/PCM RELAY OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY NO. 2 OR 3
HIGH SPEED RADIATOR FAN CONTROL CIRCUIT SHORTED TO GROUND
HIGH SPEED RADIATOR FAN CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the High Speed Radiator Fan Relay. Does the Radiator Fan cycle on and off? Yes → Go To 2 No → Go To 3	All

P0481-FAN 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. Disconnect the Radiator Fan Relay No. 2 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit. Did the test light illuminate brightly? Yes → Go To 4 No → Repair the ECM/PCM Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. One at a time, install a substitute relay in place of Radiator Fan Relays No. 2 and No. 3. Turn the ignition on. With the DRB, actuate the High Speed Fan Relay. Does one Radiator Fan cycle on and off? Yes → Replace the Radiator Fan Relay that the substitute relay caused the radiator fan to cycle on and off. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Radiator Fan Relays No. 2 and No. 3 harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and the High Speed Radiator Fan Control circuit. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the High Speed Radiator Fan Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P0481-FAN 2 CONTROL CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Radiator Fan Relay No. 2 harness connector. Disconnect the ECM harness connectors. Measure the resistance of the High Speed Radiator Fan Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the High Speed Radiator Fan Control 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

Symptom:

P0481-FAN 2 CONTROL CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0481-FAN 2 CONTROL CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Radiator Fan Relay No. 2 Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
RADIATOR FAN RELAY NO. 2 OR 3
HIGH SPEED RADIATOR FAN CONTROL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the High Speed Radiator Fan Relay. Does the Radiator Fan cycle on and off? 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

P0481-FAN 2 CONTROL CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. One at a time, install a substitute relay in place of Radiator Fan Relays No. 2 and then No. 3. Turn the ignition on. With the DRB, actuate the High Speed Radiator Fan Relay. Does one Radiator Fan cycle on and off? Yes → Replace the Radiator Fan Relay that the substitute relay caused the radiator fan to cycle on and off. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect Radiator Fan Relays No. 2 and 3 harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the High Speed Radiator Fan Control circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the High Speed Radiator Fan Control circuit for a short to voltage. 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

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
IGNITION SWITCH OUTPUT CIRCUIT OPEN
SPEEDOMETER PINION AND DRIVE TEETH DAMAGED
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE - SHORTED TO VOLTAGE
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
VEHICLE SPEED SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
VEHICLE SPEED SENSOR
ENGINE CONTROL MODULE - INTERNAL FAULT

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Test drive the vehicle. With the DRBIII®, read Vehicle Speed. Does the DRBIII® 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 off. Remove the Vehicle Speed Sensor. Inspect the Speedometer Pinion and drive teeth on the Output Shaft (located in the transmission). Inspect the VSS for metal debris and damage to the Sensor and connector. Are both components OK? Yes → Go To 4 No → Repair or replace the Speedometer Pinion or internal components as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0500-VEHICLE SPEED SENSOR FREQUENCY TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the Ignition Switch Output circuit in the Vehicle Speed Sensor harness connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Ignition Switch Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the Vehicle Speed Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Go To 6 No → Go To 8	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Vehicle Speed Sensor Signal circuit. Is the voltage below 1.0 volt? Yes → Go To 7 No → Repair the Vehicle Speed Sensor Signal circuit for a short to voltage. 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 ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance between ground and the Vehicle Speed Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 9 No → Repair the Vehicle Speed Sensor 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 Vehicle Speed Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Vehicle Speed Sensor Signal circuit and the Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 10 No → Repair the Vehicle Speed Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
10	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the Vehicle Speed Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 11 No → Repair the Vehicle Speed Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the Vehicle Speed Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 12 No → Repair the Vehicle Speed Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
12	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. **NOTE: Ensure the ECM harness connectors are connected before continuing.** Turn the ignition on. Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the VSS harness connector. With the DRB, monitor the VEHICLE SPEED while tapping the other end of the jumper wire to ground. Does the DRB display km/h (MPH) greater than 0? Yes → Replace the Vehicle Speed Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 13	All
13	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 4.87 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 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 Battery Temperature Sensor Signal circuit for an open. 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:

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0514-BATTERY TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects Battery Temperature Sensor Signal voltage below 0.175 volt.

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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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

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

TEST	ACTION	APPLICABILITY
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
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 circuit for a short to the Sensor Ground circuit. 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
ECM - OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - OIL PRESSURE SENSOR SIGNAL SHORT TO GROUND
MECHANICAL PROBLEM
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
SENSOR REFERENCE A CIRCUIT OPEN
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Start the engine several times, letting the engine run for at least 30 seconds at a time. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 10	All

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
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
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 5.4 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 Sensor Reference A 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 Sensor Reference A circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
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
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

P0520- OIL PRESS SENSOR CIRCUIT MALF PLAUSIBILITY — 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:

P0520-OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0520-OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects the Oil Pressure Sensor Signal above 4.7 volts for more than 3 seconds.

POSSIBLE CAUSES
ECM - OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - OIL PRESSURE SENSOR SIGNAL OPEN
ENGINE OIL PRESSURE SENSOR
OIL PRESSURE SENSOR SIGNAL CIRCUIT OPEN
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 DTCs P0641 and P0651 before diagnosing this DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Start the engine several times, letting the engine run for at least 30 seconds at a time. With the DRBIII®, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All

P0520-OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	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 5.4 volts. Go To 3 Voltage is between 4.7 and 5.4 volts. Go To 4 Voltage is below 4.7 volts. Go To 5	All
3	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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
4	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 5.0 ohms? Yes → Replace the Engine 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
5	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 → 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 an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0520-OIL PRESS SENSOR CKT MALF 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 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 SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0520-OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM detects the Oil Pressure Sensor Signal voltage below 0.5 volt for more than 3 seconds.

POSSIBLE CAUSES
ECM - OIL PRESSURE SENSOR SIGNAL SHORT TO GROUND
ENGINE OIL PRESSURE SENSOR
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, 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 DRBIII®, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Measure the voltage of the Oil Pressure Sensor Signal circuit. Is the voltage between 4.7 and 5.3 volts? Yes → Replace the Engine Oil Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0520-OIL PRESS SENSOR CKT MALF SIGNAL VOLTAGE TOO 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 Oil Pressure Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Oil Pressure Sensor Signal 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 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
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 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
SEN REF SUPPLY STSG
SENSOR REFERENCE A CIRCUIT SHORTED TO GROUND
SENSOR REFERENCE A 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active 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 set again? Yes → Go To 2 No → Go To 5	All

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

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage between ground and the Sensor Reference A circuit at the Oil Pressure Sensor harness connector. Is the voltage above 1.0 volt? Yes → Repair the Sensor Reference A circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Oil Pressure Sensor harness connector. Measure the resistance between ground and the Sensor Reference A circuit at the Oil Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Sensor Reference A 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

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

TEST	ACTION	APPLICABILITY
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 List:

P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY
P0530-A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH
P0530-A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW
P0530-A/C PRESSURE SENSOR CIRCUIT 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 P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY.

When Monitored and Set Condition:

P0530-A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The A/C Pressure Sensor Signal voltage is above 4.84 volts.

P0530-A/C PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The A/C Pressure Sensor Signal voltage is below 0.1 volt.

P0530-A/C PRESSURE SENSOR CIRCUIT SUPPLY VOLTAGE TOO HIGH OR LOW

When Monitored: With the ignition on.

Set Condition: The Sensor Reference Voltage B voltage to the A/C Pressure Sensor is below 4.7 volts or above 5.1 volts for at least 100 ms.

POSSIBLE CAUSES
INTERMITTENT CONDITION
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR REFERENCE VOLTAGE B CIRCUIT
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
A/C PRESSURE SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
A/C PRESSURE SENSOR
A/C PRESSURE SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
A/C PRESSURE SENSOR
SENSOR REFERENCE VOLTAGE B CIRCUIT OPEN

P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY — Continued

POSSIBLE CAUSES
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
ECM - A/C PRESSURE SENSOR SIGNAL
ECM - SENSOR REFERENCE VOLTAGE B CIRCUIT
ECM - SIGNAL VOLTAGE HIGH

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Select the choice that best reflects the DRBIII® reading. Above 4.6 volts Go To 2 Between 0.7 and 4.6 volts Go To 9 Below 0.7 volt Go To 10	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connector. Measure the resistance between the A/C Pressure Sensor Signal circuit and the Sensor Reference Voltage B circuit in the A/C Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 3 No → Repair the A/C Pressure Sensor Signal circuit for a short to the Sensor Reference Voltage B circuit. Perform ROAD TEST VERIFICATION - VER-2.	All

P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Ground circuit at the A/C 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 4 **NOTE: If the Sensor Ground circuit had a short to voltage on it, the ECM may have been damaged. Retest the A/C Pressure Sensor circuit.**	All
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the A/C Pressure Sensor Signal circuit in the A/C Pressure Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Connect a jumper wire between the A/C Pressure Sensor Signal circuit and the Sensor Ground circuit. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Turn the ignition on. Is the voltage below 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connector. Measure the resistance of the A/C Pressure Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the A/C Pressure Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Measure the resistance between ground and the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Sensor Ground 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
10	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage B circuit in the A/C Pressure Sensor harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 11 No → Go To 15	All
11	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Is the voltage above 0.7 volt? Yes → Replace the A/C Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 12	All

P0530-A/C PRESSURE SENSOR CIRCUIT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the A/C Pressure Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 13 No → Repair the A/C Pressure Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
13	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the A/C Pressure Sensor Signal circuit and the Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 14 No → Repair the A/C Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
14	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
15	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Reference Voltage B circuit. Is the resistance below 10.0 ohms? Yes → Go To 16 No → Repair the Sensor Reference Voltage B circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
16	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:
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 ECM/PCM 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: If DTC P1511 or P1512 is present with this DTC, diagnose DTCs P1511 and P1512 before diagnosing this DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **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

P0560-SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Using a 12-volt test light connected to ground, check all of the ECM Battery Supply and ECM/PCM Relay Output circuits including the Battery(+) Sense (Fuel Heater Relay Output) circuit. Does the test light illuminate brightly for each circuit? Yes → Go To 3 No → Repair the Battery Supply or ECM/PCM Relay Output circuit(s) for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
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 1000 ohms? 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 1000 ohms? 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**

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
GENERATOR FIELD
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 FIELD CONTROL CIRCUIT SHORTED TO GROUND
GENERATOR GROUND CIRCUIT HIGH RESISTANCE
BODY GROUND CIRCUIT OPEN
FUSED ECM/PCM RELAY OUTPUT CIRCUIT TO GENERATOR OPEN
ENGINE CONTROL MODULE
HIGH RESISTANCE ON THE ECM/PCM RELAY OUTPUT CIRCUIT
HIGH RESISTANCE ON THE GROUND CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: If there are any Battery Sense DTCs (P1511 or P1512) present, 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? Yes → Go To 3 No → Go To 14	All
3	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 4 No → Repair the Generator Fused B+ circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
4	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 5 No → Repair the Generator Ground circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
5	Turn the ignition off. Measure the voltage between the body and the negative battery terminal. Is the voltage below 0.4 volt? Yes → Go To 6 No → Repair the Body Ground circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance between the Field Control terminals on the back of the Generator. Is the resistance between 2.0 and 6.0 ohms? Yes → Go To 7 No → Repair or replace the Generator as necessary. Perform CHARGING VERIFICATION - VER-3.	All

P0560-SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. With a voltmeter, measure and record the voltage between the Battery terminals. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the ECM/PCM Relay Output circuits at ECM harness connector C1, cavities 4, 5, and 19. Are all voltage measurements at the ECM within 0.5 volt of the recorded B voltage? Yes → Go To 8 No → Repair the circuit that had high resistance. Perform CHARGING VERIFICATION - VER-3.	All
8	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 9 No → Repair the Generator Field Control circuit for a short to voltage. Perform CHARGING VERIFICATION - VER-3.	All
9	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 1000 ohms? Yes → Go To 10 No → Repair the Generator Field Control circuit for a short to ground. Perform CHARGING VERIFICATION - VER-3.	All
10	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 11 No → Repair the Generator Field Control circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All

P0560-SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect the generator harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused ECM/PCM Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 12 No → Repair the Fused ECM/PCM Relay Output circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
12	Turn the ignition off. Disconnect the ECM harness connectors. Remove Fuse 16 from the IPM. Measure the resistance of the ECM/PCM Relay Output circuit between ECM harness connector cavity C1-19 and the IPM at Fuse 16. Is the resistance below 10.0 ohms? Yes → Go To 13 No → Repair the ECM/PCM Relay Output circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
13	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance of the Ground circuit at ECM harness connector cavity C1-20. Is the resistance below 5.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform CHARGING VERIFICATION - VER-3. No → Repair the Ground circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
14	**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:
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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? 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 10.0 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 set again? 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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

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

TEST	ACTION	APPLICABILITY
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, read the S/C Switch volts. Does the DRB 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
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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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

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

TEST	ACTION	APPLICABILITY
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 10.0 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
5	Turn the ignition off. Disconnect the S/C ON/OFF/SET Switch harness connector. Disconnect the Speed Control 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:
P0615-STARTER RELAY CIRCUIT SHORT CIRCUIT

When Monitored and Set Condition:

P0615-STARTER RELAY CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the Starter Relay Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
STARTER RELAY
STARTER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Attempt to start the engine several times, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Install a substitute Starter Relay. Turn the ignition on. With the DRBIII®, erase DTCs. Attempt to start the engine several times, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 3 No → Replace the Starter Relay. Perform ROAD TEST VERIFICATION - VER-2.	All

P0615-STARTER RELAY CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Starter Relay from the IPM. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Starter Relay Control 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 Starter Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	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:

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 LOW
P0620-GENERATOR FIELD CONTROL MALF CHARGING VOLTS TOO LOW
P0620-GENERATOR FIELD CONTROL MALF OPEN CIRCUIT

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 DEVIATION TOO HIGH

When Monitored: With the engine running.

Set Condition: The ECM detects the battery voltage and the ASD voltage difference is greater than 2.0 volts.

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE DEVIATION TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM detects the battery voltage and the ASD voltage difference is greater than 2.0 volts.

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO LOW

When Monitored: With the engine running.

Set Condition: The ECM detects the battery voltage is less than 8.0 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

POSSIBLE CAUSES
INTERMITTENT CONDITION
GENERATOR BELT CONDITION OR TENSION
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 ECM/PCM RELAY OUTPUT CIRCUIT
HIGH RESISTANCE ON THE GROUND CIRCUIT
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
2	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 at more than 1200 RPM 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 set again? Yes → Go To 3 No → Go To 10	All

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

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance between the Field Control terminals on the back of the Generator. Is the resistance between 2.0 and 6.0 ohms? Yes → Go To 4 No → Repair or replace the Generator as necessary. Perform CHARGING VERIFICATION - VER-3.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Generator Field harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 5 No → Repair the Generator Field Control circuit for a short to voltage. Perform CHARGING VERIFICATION - VER-3.	All
5	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 1000 ohms? Yes → Go To 6 No → Repair the Generator Field Control circuit for a short to ground. Perform CHARGING VERIFICATION - VER-3.	All
6	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 7 No → Repair the Generator Field Control circuit for an open. Perform CHARGING VERIFICATION - VER-3.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Measure the resistance of the ECM/PCM Relay Output circuit between the ECM/PCM Relay connector and ECM harness connector cavity C1-19. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the ECM/PCM Relay Output circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All

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

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance of the Ground circuit at ECM harness connector cavity C1-20. Is the resistance below 10.0 ohms? Yes → Go To 9 No → Repair the Ground circuit for high resistance. Perform CHARGING VERIFICATION - VER-3.	All
9	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
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 and at more than 1200 RPM, 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 List:

P0620-GENERATOR FIELD CONTROL MALF BATTERY VOLTAGE TOO HIGH
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 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 SHORT CIRCUIT

When Monitored: With the ignition on and the ECM attempting to actuate the Generator Field.

Set Condition: The ECM detects excessive current on the Generator Field Control circuit when attempting to actuate the Generator Field.

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 ECM/PCM RELAY OUTPUT CIRCUIT
HIGH RESISTANCE ON THE GROUND CIRCUIT
ENGINE CONTROL MODULE

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

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 at more than 1200 RPM 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 set again? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance between the Field Control terminals on the back of the Generator. Is the resistance between 2.0 and 6.0 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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
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 1000 ohms? Yes → Go To 5 No → Repair the Generator Field Control circuit for a short to ground. Perform CHARGING VERIFICATION - VER-3.	All

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

TEST	ACTION	APPLICABILITY
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 10.0 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 the ECM/PCM Relay from the IPM. Measure the resistance of the ECM/PCM Relay Output circuit between the ECM/PCM Relay connector and ECM harness connector cavity C1-19. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the ECM/PCM Relay Output 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 Ground circuit at ECM harness connector cavity C1-20. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Ground 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
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 and at more than 1200 RPM, 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:

P0627-FUEL LIFT PUMP RELAY CONTROL CIRCUIT OPEN CIRCUIT

POSSIBLE CAUSES
INTERMITTENT CONDITION
IGNITION SWITCH (RUN/START) CIRCUIT OPEN
FUEL LIFT PUMP RELAY
FUEL LIFT PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
FUEL LIFT PUMP RELAY CONTROL CIRCUIT OPEN
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the Fuel Lift Pump Relay. Does the Fuel Lift Pump Relay cycle on and off? 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

P0627-FUEL LIFT PUMP RELAY CONTROL CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Fuel Lift Pump Relay from the IPM. Turn the ignition on. Using a 12-volt test light connected to ground, check the Ignition Switch (RUN/START) circuit. Did the test light illuminate brightly? Yes → Go To 4 No → Repair the Ignition Switch (RUN/START) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of the Fuel Lift Pump Relay. Turn the ignition on. With the DRB, actuate the Fuel Lift Pump Relay. Does the Fuel Lift Pump Relay cycle on and off? Yes → Replace the Fuel Lift Pump Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Remove the Fuel Lift Pump Relay from the IPM. Disconnect the ECM harness connectors. Measure the resistance between ground and the Fuel Lift Pump Relay Control circuit. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Fuel Lift Pump Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Remove the Fuel Lift Pump Relay from the IPM. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Lift Pump Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Fuel Lift Pump Relay Control 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

Symptom:

P0627-FUEL LIFT PUMP RELAY CONTROL CIRCUIT SHORT CIRCUIT

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL LIFT PUMP RELAY
FUEL LIFT PUMP RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, actuate the Fuel Lift Pump Relay. Does the Fuel Lift Pump Relay cycle on and off? 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

P0627-FUEL LIFT PUMP RELAY CONTROL CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the Fuel Lift Pump Relay. Turn the ignition on. With the DRB, actuate the Fuel Lift Pump Relay. Does the Fuel Lift Pump Relay cycle on and off? Yes → Replace the Fuel Lift Pump Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Remove the Fuel Lift Pump Relay from the IPM. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Fuel Lift Pump Relay Control circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Fuel Lift Pump Relay Control circuit for a short to voltage. 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

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
SENSOR REFERENCE VOLTAGE A SHORTED TO VOLTAGE
ENGINE CONTROL MODULE
FUEL PRESSURE SENSOR 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the MAF and Engine Oil Pressure Sensor harness connectors. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage A circuit. Is the voltage above 1.0 volt? Yes → Repair the Sensor Reference Voltage A circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

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

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 4 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 ECM/PCM 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:
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 the Fuel Pressure Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL PRESSURE SENSOR SHORTED TO GROUND
MASS AIR FLOW SENSOR SHORTED TO GROUND
ENGINE OIL PRESSURE SENSOR SHORTED TO GROUND
SENSOR REFERENCE VOLTAGE A CIRCUIT SHORTED TO GROUND
SENSOR REFERENCE VOLTAGE A CIRCUIT SHORTED TO SENSOR 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 10	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

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

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAF Sensor harness connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage A circuit. Is the voltage above 4.8 volts? Yes → Replace the Mass Air Flow Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Engine Oil Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Sensor Reference Voltage A circuit. Is the voltage above 4.8 volts? Yes → Replace the Engine Oil Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the MAF Sensor and Engine Oil Pressure Sensor harness connectors. Measure the resistance between ground and the Sensor Reference Voltage A circuit. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Sensor Reference Voltage A 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 MAF Sensor harness connector. Measure the resistance between the Sensor Reference Voltage A circuit and the MAF Sensor Ground circuit. Disconnect the Engine Oil Pressure Sensor harness connector. Measure the resistance between the Sensor Reference Voltage A circuit and the Engine Oil Pressure Sensor Ground circuit. Is the resistance above 1000 ohms for both measurements? Yes → Go To 7 No → Repair the Sensor Reference Voltage A circuit for a short to the Sensor Ground circuit that measured below 1000 ohms. Perform ROAD TEST VERIFICATION - VER-2.	All
7	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 1000 ohms? Yes → Go To 8 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
8	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 1000 ohms? Yes → Go To 9 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
9	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
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:

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
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
A/C CLUTCH RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
INTEGRATED POWER MODULE
A/C CLUTCH RELAY
IPM FUSE/RELAY CENTER
A/C CLUTCH RELAY CONTROL CKT OPEN
ECM

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Does the A/C Clutch Relay cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the wiring harness from the A/C Clutch Relay to the ECM. Did the A/C Clutch Relay stop cycling on and off when wiggling the wiring harness? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

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

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit in the IPM. Does the test light illuminate? Yes → Go To 5 No → Go To 10	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the IPM. 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 6	All
6	Turn the ignition off. Disconnect the IPM C3 harness connector. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the IPM harness connector. With the DRBIII®, actuate the A/C Clutch Relay. Does the test light flash on and off? Yes → Replace the IPM Fuse/Relay Center. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All

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

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the IPM C3 harness connector. Disconnect the ECM harness connector. Measure the resistance of the A/C Clutch Relay Control circuit between the IPM C3 harness connector and the ECM harness connector. Is the resistance below 10.0 ohms. Yes → Go To 8 No → Repair the A/C Clutch Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the IPM C3 harness connector. Disconnect the ECM harness connector. Measure the resistance of the A/C Clutch Relay Control circuit in the IPM C3 harness connector to ground. Is the resistance below 1000 ohms. Yes → Repair the A/C Clutch Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 9	All
9	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
10	Turn the ignition off. Disconnect the IPM C3 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch circuit in the IPM harness connector. Does the test light illuminate? Yes → Replace the IPM Fuse/Relay Center. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fused Ignition Switch Output circuit for an open. 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 on.

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

POSSIBLE CAUSES
A/C CLUTCH RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
INTEGRATED POWER MODULE
A/C CLUTCH RELAY
IPM FUSE/RELAY CENTER
A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ECM

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Does the A/C Clutch Relay cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the wiring harness from the A/C Clutch Relay to the ECM. Did the A/C Clutch Relay stop cycling on and off when wiggling the wiring harness? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

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

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit in the IPM. Does the test light illuminate? Yes → Go To 5 No → Go To 9	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the IPM. 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 6	All
6	Turn the ignition off. Disconnect the IPM C3 harness connector. Turn the ignition on. Using a 12-volt test light connected to 12-volts, probe the A/C Clutch Relay Control circuit in the IPM harness connector. With the DRBIII®, actuate the A/C Clutch Relay. Does the test light flash on and off? Yes → Replace the IPM Fuse/Relay Center. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All

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

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the IPM C3 harness connector. Disconnect the ECM harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 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 IPM C3 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch circuit in the IPM harness connector. Does the test light illuminate? Yes → Replace the IPM Fuse/Relay Center. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fused Ignition Switch Output circuit for an open. 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Monitor the DRBIII® for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the A/C Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 ECM/PCM 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 ECM/PCM 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 the Accelerator Pedal Position Sensor 5-Volt Supply circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
BOOST PRESSURE OR ACCEL PEDAL POSITION SENSOR SHORTED 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Monitor the DRBIII® for ECM DTCs. Did this DTC set again? 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. One at a time while monitoring the DRB sensor readings, disconnect then reconnect the Boost Pressure and Accelerator Pedal Position Sensor harness connectors. **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.** Did the DRB sensor voltage readings rise when one sensor was disconnected? Yes → Replace the Sensor that, when disconnected, caused the other sensor's DRB reading to increase. 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 A/C Pressure Sensor harness connectors. Measure the resistance between ground and the Sensor Reference Voltage B circuit. Is the resistance above 1000 ohms? 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 A/C Pressure Sensor harness connector. Measure the resistance between the Sensor Reference Voltage B circuit and the A/C 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 1000 ohms 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 1000 ohms. Perform ROAD TEST VERIFICATION - VER-2.	All
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 1000 ohms? 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

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

TEST	ACTION	APPLICABILITY
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 1000 ohms? 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-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY

When Monitored and Set Condition:

P0685-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY

When Monitored: During after-run.

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

POSSIBLE CAUSES
CHECK FOR OTHER DTCS
INTERMITTENT CONDITION
ECM/PCM RELAY
ECM/PCM 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 and diagnose the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? Yes → Go To 3 No → Go To 5	All

P0685-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO EARLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the ECM/PCM 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. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Did this DTC set again? Yes → Go To 4 No → Replace the ECM/PCM Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the ECM/PCM Relay from the IPM. Disconnect the ECM harness connectors. Measure the resistance of the ECM/PCM Relay Control circuit while wiggling the wiring harness and connectors between the ECM and the IPM. Was the resistance above 10.0 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the ECM/PCM 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-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE

When Monitored and Set Condition:

P0685-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE

When Monitored: During after-run.

Set Condition: The internal ECM timer determines that the ECM/PCM Relay remains on too long when AFTER-RUN mode of operation.

POSSIBLE CAUSES
CHECK FOR OTHER DTCS
INTERMITTENT CONDITION
ECM/PCM RELAY
ECM/PCM RELAY CONTROL CIRCUIT SHORTED TO GROUND INTERMITTENTLY
ECM/PCM 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 and diagnose of the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 set again? Yes → Go To 3 No → Go To 6	All

P0685-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the ECM/PCM Relay. Turn the ignition on. With the DRBIII®, erase 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 set again? Yes → Go To 4 No → Replace the ECM/PCM Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the ECM/PCM Relay from the IPM. Disconnect the ECM harness connectors. Measure the resistance between ground and the ECM/PCM Relay Control circuit while wiggling the wiring harness and connectors. Was the resistance below 1000 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the ECM/PCM 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 ECM/PCM Relay from the IPM. Turn the ignition on. Measure the voltage of the ECM/PCM 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 ECM/PCM Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P0685-ECM/PCM RELAY CONTROL CIRCUIT SHUTS OFF TOO LATE — 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 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 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 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the PRIM BRAKE SWITCH state while pressing and releasing the brake pedal several times. Does the DRB display the correct PRIM BRAKE SWITCH state with the brake pedal pressed and released? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the SEC BRAKE SWITCH state while pressing and releasing the brake pedal several times. Does the DRB display the correct SEC BRAKE SWITCH state with the brake pedal pressed and released? 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 of the Secondary Brake Switch Signal circuit. 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. With the DRBIII® in Inputs/Outputs, read the SEC BRAKE SWITCH state while connecting a jumper wire between ground and the Secondary Brake Switch Signal circuit. Does the DRB display change from PRESSED to RELEASED when connecting and disconnecting the jumper wi 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. With the DRBIII® in Inputs/Outputs, read the PRIM BRAKE SWITCH state while connecting a jumper wire between ground and the Primary Brake Switch Signal circuit. Does the DRB display change from RELEASED to PRESSED when connecting and disconnecting the jumper wi 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Primary Brake Switch Signal circuit. 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 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 Primary Brake Switch Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
P0833-CLUTCH PEDAL PLAUSIBILITY

POSSIBLE CAUSES
CLUTCH PEDAL SWITCH
CLUTCH PEDAL SWITCH SENSE CIRCUIT OPEN
CLUTCH PEDAL SWITCH SENSE CIRCUIT SHORTED TO GROUND
ECM
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Clutch switch state while pressing and releasing the Clutch Pedal several times. Does the DRB display the correct clutch switch state with the Clutch Pedal pressed and released? 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.** 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

P0833-CLUTCH PEDAL PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Clutch Switch state while connecting a jumper wire between ground and the Clutch Pedal Switch Sense circuit in the Clutch Pedal Switch harness connector. **NOTE: Leave jumper connected to ground for 5 seconds then disconnect jumper and note DRB reading for both conditions.** Does the DRB display change from RELEASED and PRESSED when connecting and disconnecting the jumper w Yes → Replace the Clutch Pedal Switch. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Measure the resistance of the Clutch Pedal Switch Sense circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the Clutch Pedal Switch Sense circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Clutch Pedal Switch Sense circuit. Is the resistance below 1000 ohms? Yes → Repair the Clutch Pedal Switch Sense circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	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 flow of fuel is greater than 6000 mm^3/sec at idle.

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

When Monitored: With the engine running.

Set Condition: The fuel rail pressure sensor indicates fuel pressure above 1450 BAR (21,000 PSI) with the engine running.

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
AIR IN FUEL SYSTEM
CHECKING ELECTRICAL CIRCUITS-ENGINE RUNNING
CHECKING ELECTRICAL CIRCUITS-NO START
CHECKING FOR OTHER DTC'S
CHECKING THE FUEL DELIVERY SYSTEM

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

POSSIBLE CAUSES
CHECKING THE FUEL DELIVERY SYSTEM
FUEL INJECTOR(S)
FUEL PRESSURE SOLENOID
FUEL PRESSURE SOLENOID
FUEL PUMP
FUEL PUMP
FUEL SYSTEM CONTAMINATION
FUEL SYSTEM LEAK
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**WARNING: HIGH-PRESSURE FUEL LINES DELIVER DIESEL FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE FUEL INJECTORS. THIS MAY BE AS HIGH AS 23,200 PSI (1600 BAR). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS.** **WARNING: FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.** Turn the ignition on. With the DRBIII®, read the ECM DTCs. Are there any other DTCs present? Yes → Refer to symptom list for problems related to the DTC other than this DTC. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start the engine. Does the engine start and idle? Yes → Go To 3 No → Go To 13	All

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: HIGH-PRESSURE FUEL LINES DELIVER DIESEL FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE FUEL INJECTORS. THIS MAY BE AS HIGH AS 23,200 PSI (1600 BAR). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS.** **WARNING: FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.** Inspect the entire fuel system for leakage. Is there any evidence of leakage? Yes → Repair as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	**NOTE: Mixing any other fuels such as gasoline or kerosine can cause this DTC to set.** Turn the ignition off. **WARNING: HIGH-PRESSURE FUEL LINES DELIVER DIESEL FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE FUEL INJECTORS. THIS MAY BE AS HIGH AS 23,200 PSI (1600 BAR). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS.** **WARNING: FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.** Inspect the fuel system for contamination. Is the fuel contaminated? Yes → Repair as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB III® at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: Refer to the Service Information and perform the Air Bleed Procedure before continuing diagnosis.** Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Start and idle the engine while monitoring for ECM DTC's. If the DTC does not reset at idle condition, test drive the vehicle under various load and speed conditions to attempt to duplicate the fault. **NOTE: Driving the vehicle up and down steep hills or rapid cornering with a low fuel level can cause this DTC to set. Verify with customer if Low Fuel Light was illuminated when fault occurred.** With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 6 No → Go To 12	All
6	Start the engine. With the DRBIII® in Sensors, compare the Fuel Pressure Setpoint with the Actual Fuel Pressure readings. **NOTE: If there is air in the fuel system, the Actual Fuel Pressure will oscillate above and below the Fuel Pressure Setpoint.** Does Actual Fuel Pressure oscillate above and below the Fuel Pressure Setpoint? Yes → Refer to the Service Information to purge air from the fuel system. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	Start the engine. With the DRBIII® in Sensors, compare the Fuel Pressure Setpoint with the Actual Fuel Pressure readings. **NOTE: A sticking Fuel Pressure Solenoid is indicated by Actual Fuel Pressure gradually dropping below the Fuel Pressure Setpoint then suddenly increasing (spiking) above the Fuel Pressure Setpoint.** Does Actual Fuel Pressure gradually decrease then suddenly increase (spike) above the Fuel Pressure Yes → Replace the Fuel Pressure Solenoid in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 8	All

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

TEST	ACTION	APPLICABILITY
8	Refer to the appropriate Service Information and refer to Diagnosis and Testing Fuel Delivery System table. **NOTE: The following is a list of problems that can cause fuel pressure to deviate from specification: restricted fuel filter or fuel lines, failed fuel pressure solenoid, air in fuel system, failed fuel sending unit, contaminated fuel, faulty injector.** Were there any problems with the Fuel Delivery System? Yes → Repair as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 9	All
9	Refer to each of the following symptoms in the Driveability category. CHECKING THE FUEL PRESSURE SOLENOID CIRCUITS CHECKING THE FUEL PRESSURE SENSOR CIRCUITS Were any problems found? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 10	All
10	**NOTE: An injector that sticks open can cause this DTC. A sticking injector will cause the engine to missfire and emit excessive black smoke from the exhaust system.** Refer to the Service Information and perform the Fuel Injector Leak Quantity during engine cranking test. Were any problems found? Yes → Using the Service Information, remove and inspect the Fuel Injectors for signs of damage or debris that may cause the injector to stick. Sticking injectors may cause the combustion chamber to become black and oil soaked. Replace Injector(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 11	All
11	Turn the ignition off. Replace the Fuel Pressure Solenoid in accordance with the Service Information. Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start and test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Replace the Fuel Pump in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

P1130-FUEL RAIL PRESSURE MALFUNCTION LEAKAGE DETECTED — Continued

TEST	ACTION	APPLICABILITY
12	**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 III® 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
13	Refer to the appropriate Service Information and refer to Diagnosis and Testing Fuel Delivery System table. **NOTE: The following is a list of problems that can cause fuel pressure to deviate from specification: restricted fuel filter or fuel lines, failed fuel pressure solenoid, air in fuel system, failed fuel sending unit, contaminated fuel, faulty injector.** Were there any problems with the Fuel Delivery System? Yes → Repair as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 14	All
14	Refer to each of the following symptoms in the Driveability category. CHECKING THE FUEL PRESSURE SOLENOID CIRCUITS CHECKING THE FUEL PRESSURE SENSOR CIRCUITS Were any problems found? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 15	All
15	Turn the ignition off. Replace the Fuel Pressure Solenoid in accordance with the Service Information. Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Attempt to start and test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the ECM display this DTC? Yes → Replace the Fuel Pump in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. 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 and the ECM attempting to actuate the Fuel Pressure Solenoid.

Set Condition: The ECM detects excessive current on the Fuel Pressure Solenoid Control circuit when attempting to actuate the Fuel Pressure Solenoid.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECM/PCM 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **WARNING: HIGH-PRESSURE FUEL LINES DELIVER DIESEL FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE FUEL INJECTORS. THIS MAY BE AS HIGH AS 23,200 PSI (1600 BAR). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS.** **WARNING: FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.** 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 set again? 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 ECM/PCM Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ECM/PCM 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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

P1131-FUEL PRESSURE SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
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 C1-80 and C1-81.** Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Fuel Pressure Solenoid Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
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 10.0 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 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 is above 23.0 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 is below 5.0 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 is above 4.9 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 is below -5.0 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUSE 17 OPEN
ECM GROUND CIRCUIT(S) OPEN
GROUND CIRCUIT SHORTED TO VOLTAGE
ECM/PCM RELAY OUTPUT CIRCUIT SHORTED TO GROUND
GROUND CIRCUIT OPEN
ECM/PCM RELAY OUTPUT 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.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 17 from the IPM. 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Ground circuit in ECM harness connector cavity C1-20. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Ground circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P1511-BATTERY SENSE LINE 1 VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all components connected to the ECM/PCM Relay Output circuit. Refer to the wiring diagrams. Remove the ECM/PCM Relay from the IPM. Measure the resistance between ground and the ECM/PCM Relay Output circuit at ECM harness connector cavity C1-19. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the ECM/PCM Relay Output circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Measure the resistance between the Battery negative terminal and the Ground circuit in ECM harness connector cavity C1-20. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Measure the resistance of the ECM/PCM Relay Output circuit between ECM harness connector cavity C1-19 and the ECM/PCM Relay Output connector in the IPM. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the ECM/PCM Relay Output 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

P1511-BATTERY SENSE LINE 1 VOLTAGE 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 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
ENGINE CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT (RUN/START) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT (RUN/START) CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** **NOTE: This DTC is set when the ECM sees a change from On to Off and then back On within a few milliseconds during ECM initialization at Key On. Look for an intermittent open or short to ground on the Ignition Switch Sense circuit.** 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 set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the ignition switch harness connector. Measure the resistance of the Fused Ignition Switch Output (RUN/START) circuit. Is the resistance below 10.0 ohms? Yes → Go To 3 No → Repair the Fused Ignition Switch Output (RUN/START) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P1605-IGNITION SWITCH PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the ignition switch harness connector. Measure the resistance between ground and the Fused Ignition Switch Output (RUN/START) circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Fused Ignition Switch Output (RUN/START) circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	If there are no possible causes remaining, view repair. Repair Using the schematic, ensure no shared circuits on the Fused Ignition Switch Output (RUN/START) ckt are causing an initial low spike in circuit voltage. If all other components are OK, replace and program the ECM 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 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 receives an incorrect response from the instrument cluster after transmitting a PCI Bus message to actuate the MIL.

P1651-MIL/DIAG LAMP VIA J1850 BUS STATUS ERROR

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
ENGINE CONTROL MODULE
REFER TO COMMUNICATION SECTION
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 RECEIVE TIMEOUT
P1652-J1850 COMMUNICATION BUS SHORT TO GROUND
P1652-J1850 COMMUNICATION BUS SHORT TO VOLTAGE
P1652-J1850 COMMUNICATION BUS SPI ERROR
P1652-J1850 COMMUNICATION BUS TRANSMIT BUFFER OVER-RUN
P1652-J1850 COMMUNICATION BUS UNAUTHORIZED RESET

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

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 PCI 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 PCI Bus circuit.

P1652-J1850 COMMUNICATION BUS UNAUTHORIZED RESET

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
ENGINE CONTROL MODULE
VERIFY INSTRUMENT CLUSTER COMMUNICATION
INTERMITTENT CONDITION

P1652-J1850 COMMUNICATION BUS RECEIVE TIMEOUT — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® attempt to communicate with the Instrument Cluster. **NOTE: If there are other DTCs set with this DTC, refer to the Symptom List and repair other stored ECM DTCs before diagnosing this DTC.** 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	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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
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:
P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED

When Monitored and Set Condition:

P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED

When Monitored: With the ignition on.

Set Condition: The ECM receives a message from the SKIM indicating an incorrect message was received from the ignition key.

POSSIBLE CAUSES
ECM
ECM CORRECT VIN
ECM VIN
SKREEM
INTERMITTENT CONDITION
CHECK FOR SKREEM COMMUNICATION AND DTCS

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 6	All
2	Turn the ignition on. With the DRB, check for Sentry Key Remote Entry Module communication and DTCs. Are any SKREES problems or DTCs present? Yes → Refer to symptom list for problems related to SKREEM Communication and DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1685-SKIM SYSTEM INVALID KEY CODE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, display the VIN that is programmed in the ECM. Is there a VIN programmed into the ECM? Yes → Go To 4 No → Program the correct VIN into the ECM and retest. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition on. With the DRBIII®, display the VIN that is programmed in the ECM. Is the correct VIN programmed into the ECM? Yes → Go To 5 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Replace and program the SKREEM 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 DTCs present? Yes → Replace and Program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → The test 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:
P1685-SKIM SYSTEM KEY COMMUNICATION TIMED OUT

When Monitored and Set Condition:

P1685-SKIM SYSTEM KEY COMMUNICATION TIMED OUT

When Monitored: With the ignition on.

Set Condition: Communication between the ECM and the SKREEM is not completed within 2.0 seconds

POSSIBLE CAUSES
ECM
PCI CIRCUIT OPEN
INTERMITTENT CONDITION
CHECK FOR SKREEM COMMUNICATION AND DTCS

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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 4	All
2	Turn the ignition on. With the DRB, check for Sentry Key Remote Entry Module communication and DTCs. Are any SKREES problems or DTCs present? Yes → Refer to symptom list for problems related to SKREEM Communication and DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1685-SKIM SYSTEM KEY COMMUNICATION TIMED OUT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the SKREEM harness connector. Measure the resistance of the PCI Bus circuit between the ECM harness connector and the SKREEM harness connector. Is the resistance below 10.0 ohms? Yes → Replace and Program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the PCI circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	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:
P1685-SKIM SYSTEM SKIM ERROR

POSSIBLE CAUSES
SKREEM
INTERMITTENT CONDITION
CHECK FOR SKREEM COMMUNICATION AND DTCS
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for Sentry Key Remote Entry Module communication and DTCs. Are any SKREES problems or DTCs present? Yes → Refer to symptom list for problems related to SKREEM Communication and DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** 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
3	Replace and program the SKREEM 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 DTCs present? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → The test is complete. Perform ROAD TEST VERIFICATION - VER-2.	All

P1685-SKIM SYSTEM SKIM ERROR — 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 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 below 0.2 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
LOW IDLE POSITION SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
VERIFY CORRECT SWITCHING
ECM - APP SENSOR SIGNAL CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** **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, 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 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, observe the Low Idle Position Switch input. Press and release the accelerator pedal several times while observing the DRB 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	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 DRB, read the PEDAL OUTPUT VOLTS. Does the DRB 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the 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 Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2120-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: If DTC P0641 or P0651 is present with this DTC, diagnose DTCs P0641 and P0651 before diagnosing this DTC.** **NOTE: If the ECM detects and stores a DTC, the ECM also stores the engine/vehicle operating conditions under which the DTC was set. Some of these conditions are displayed on the DRB at the same time the DTC is displayed.** **NOTE: Before erasing stored DTCs, record these conditions. Attempting to duplicate these conditions may assist when checking for an active DTC.** Turn the ignition on. With the DRB, read the PEDAL OUTPUT VOLTS with the accelerator pedal in the at rest position. Does the DRB display between 0.5 and 1.0 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
8	Turn the ignition on. Fully depress the accelerator pedal. With the DRB, read the PEDAL OUTPUT VOLTS. Does the DRB 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, 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, 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 Position Switch state should change between 5% and 10% of Accelerator Pedal position.** Did the Low Idle Position 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 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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? 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 above 1000 ohms? Yes → Go To 19 No → Repair the 5-volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 for a short to the Sensor Ground circuit. 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM 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 ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the Sensor 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 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 Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING FUEL PRESSURE SOLENOID CIRCUITS

POSSIBLE CAUSES
FUEL PRESSURE SOLENOID RESISTANCE
OPEN CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Disconnect the ECM harness connectors. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Repair as necessary. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Repair as necessary. Measure the resistance of both Fuel Pressure Solenoid circuits between the ECM harness connector and the Fuel Pressure Solenoid harness connector. Is the resistance below 10.0 ohms for both measurements? Yes → Go To 2 No → Repair open circuit(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
2	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Measure the resistance of the Fuel Pressure Solenoid. Is the resistance between 3.5 and 5.5 ohms? Yes → Test Complete. No → Replace the Fuel Pressure Solenoid. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE A/C CLUTCH OPERATION

POSSIBLE CAUSES
CHECK THE A/C CLUTCH OPERATION
FUSED B+ CIRCUIT OPEN
A/C CLUTCH RELAY
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
A/C CLUTCH RELAY OUTPUT CIRCUIT SHORTED TO GROUND
A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C CLUTCH GROUND CIRCUIT OPEN
A/C CLUTCH

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch actuating? Yes → The A/C Clutch System is operating properly at this time. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**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 open fuse.** Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the IPM. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Fused B+ circuit. Inspect fuse and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
3	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 4	All

*CHECKING THE A/C CLUTCH OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. 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. Remove the A/C Clutch Relay from the IPM. Disconnect the A/C Clutch harness connector. Measure the resistance between ground and the A/C Clutch Relay Output circuit. Is the resistance above 1000 ohms? Yes → Go To 6 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
6	Turn the ignition off. Remove the A/C Clutch Relay from the IPM. Disconnect the A/C Clutch harness connector. Measure the resistance of the A/C Clutch Relay Output circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the A/C Clutch Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	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 8 No → Repair the A/C Clutch Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	If there are no possible causes remaining, view repair. Repair Replace the A/C Clutch. Perform ROAD TEST VERIFICATION - VER-2.	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. While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM. **NOTE: The accelerator pedal must be released (Idle) for this step.** Is the voltage below 0.6 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. While back probing, measure the voltage of the APP Sensor Signal circuit at the ECM. 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 DRB, select Engine, Bosch 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
ECM GROUND CIRCUIT(S) OPEN
ECM/PCM RELAY CONTROL CIRCUIT OPEN
ECM/PCM RELAY OUTPUT CIRCUIT(S) OPEN
FUSED ECM/PCM RELAY BATTERY SUPPLY CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
ECM/PCM RELAY
ECM/PCM RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE

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 brightly 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. Does the test light illuminate brightly? 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 ECM/PCM Relay from the IPM. Using a 12-volt test light connected to ground, check the Fused ECM/PCM Relay Battery Supply circuit in ECM/PCM Relay connector cavity 30. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused ECM/PCM Relay Battery Supply circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE ECM POWER AND GROUND CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 in the ECM/PCM Relay connector. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit in ECM harness connector C1 cavities 4 and 5. Did the test light illuminate brightly for both circuits? Yes → Go To 5 No → Repair the ECM/PCM Relay Output circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Install a substitute relay in place of the ECM/PCM Relay. Turn the ignition on. With the DRB, attempt to communicate with the ECM. Is the DRB, able to communicate with the ECM? Yes → Replace the ECM/PCM Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 in the ECM/PCM Relay connector. Using a 12-volt test light connected to ground, check the ECM/PCM Relay Output circuit in ECM harness connector C1 cavities 4 and 5. Does the test light illuminate brightly for both cavities? Yes → Go To 7 No → Repair the ECM/PCM Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector in the IPM. Turn the ignition on. Measure the voltage of the ECM/PCM Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the ECM/PCM Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:
*CHECKING THE EGR SYSTEM

POSSIBLE CAUSES
ECM/PCM 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 ECM/PCM Relay Output circuit at the EGR Solenoid harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ECM/PCM 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 ELECTRIC RADIATOR FAN OPERATION**

POSSIBLE CAUSES
ACTUATE THE HIGH AND LOW SPEED RADIATOR FAN WITH THE DRB
CHECK FOR RADIATOR FAN RELAY CONTROL DTCS
RADIATOR FAN RELAY NO. 1 OUTPUT CIRCUIT SHORTED TO VOLTAGE
RADIATOR FAN RELAY NO.2 AND NO.3 COMMON OUTPUT CIRCUIT SHORTED TO VOLTAGE
RADIATOR FAN NO. 1 CONTROL CIRCUIT SHORTED TO VOLTAGE
RADIATOR FAN RELAY NO. 1 FUSED B+ CIRCUIT OPEN
RADIATOR FAN RELAY NO. 2 AND NO. 3 COMMON OUTPUT CIRCUIT SHORTED TO GROUND
RADIATOR FAN RELAY NO. 3 FUSED B+ CIRCUIT OPEN
RADIATOR FAN RELAY NO.2 FUSED B+ CIRCUIT OPEN
RADIATOR FAN NO. 1 CONTROL CIRCUIT SHORTED TO GROUND
RADIATOR FAN RELAY NO. 2
RADIATOR FAN RELAY NO. 3
RADIATOR FAN RELAY NO.1
RADIATOR FAN RELAY NO.1 - INTERNAL SHORT TO VOLTAGE
RADIATOR FAN RELAY NO.2 OR NO.3 - INTERNAL SHORT TO VOLTAGE
RADIATOR FAN NO.1 - SHORTED
RADIATOR FAN NO.2 - SHORTED
RADIATOR FAN RELAY NO. 2 AND NO. 3 COMMON OUTPUT CIRCUIT OPEN FROM RELAY NO. 2
RADIATOR FAN RELAY NO. 3 GROUND CIRCUIT OPEN
RADIATOR FAN RELAY NO.1 OUTPUT CIRCUIT SHORTED TO GROUND
HIGH SPEED RADIATOR FAN DUAL RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY NO.1 OUTPUT CIRCUIT OPEN
RADIATOR FAN NO.1 CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY NO.2 AND NO.3 COMMON OUTPUT CIRCUIT OPEN FROM RELAY NO. 3
RADIATOR FAN NO.1 - OPEN
RADIATOR FAN NO.2 - OPEN

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Are any Radiator Fan DTCs present? Yes → Refer to symptom list for problems related to Radiator Fan control. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**NOTE: The engine temperature must not be hot enough to cause the radiator fans to be on with the key off.** Turn the ignition off. Observe the radiator fans with the key off. Is either radiator fan running with the key off? Yes → Go To 3 No → Go To 6	All
3	**NOTE: The engine temperature must not be hot enough to cause the radiator fans to be on with the key off.** Turn the ignition off. Observe the radiator fans with the key off. Which radiator fan(s) are running? Fan 1 and Fan 2 Go To 4 Fan 2 Only Go To 5	All
4	**NOTE: The engine temperature must not be hot enough to cause the radiator fans to be on with the key off.** Turn the ignition off. Remove Radiator Fan Relay No.1. Observe the radiator fans. Did the radiator fans stop running? Yes → Replace Radiator Fan Relay No.1. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Radiator Fan Relay No. 1 Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**NOTE: The engine temperature must not be hot enough to cause the radiator fans to be on with the key off.** Turn the ignition off. One at a time, remove Radiator Fan Relay No.2 and then Radiator Fan Relay No.3. Observe the radiator fans after disconnecting each relay. Did the radiator fan stop running? Yes → Replace Radiator Fan Relay that caused the radiator fan to stop. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Radiator Fan Relay No. 2 and No.3 Common Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition on. With the DRB, actuate the Low Speed Rad Fan and observe the Radiator Fans. **NOTE: Both Radiator Fans should operate at low speed.** Did both Radiator Fans operate properly? Yes → Go To 7 Fans do not operate on Low Go To 15 Fan 1 on High/Fan 2 not on Go To 23 Fan 1 not on/Fan 2 on High Go To 26	All
7	Turn the ignition on. With the DRB, actuate the High and Low Speed Rad Fans at the same time and observe the Radiator Fans. **NOTE: Both Radiator Fans should operate at high speed.** Did both Radiator Fans operate properly? Yes → The test is complete. Ensure the ECM will turn the fans on when the engine is hot. Perform ROAD TEST VERIFICATION - VER-2. Fan 1 on High/ Fan 2 not on Go To 8 Fan 1 not on/Fan 2 on High Go To 11	All
8	Turn the ignition off. Disconnect the Radiator Fan Relay No.2 harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Did the test light illuminate brightly? Yes → Go To 9 No → Repair the Radiator Fan Relay No.2 Fused B+ circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Install a substitute relay in place of Radiator Fan Relay No. 2. Turn the ignition on. With the DRB, actuate the High Speed Fan Relay. Does Radiator Fan No. 2 cycle on and off? Yes → Replace Radiator Fan Relay No. 2. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 10	All

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Radiator Fan Relay No. 2 harness connector. Disconnect the Radiator Fan No. 2 harness connector. Measure the resistance of the Radiator Fan Relay No. 2 and No. 3 Common Output circuit from Radiator Fan Relay No. 2. Is the resistance below 10.0 ohms? Yes → Test Complete. No → Repair the Radiator Fan Relay No. 2 and No. 3 Common Output circuit from Radiator Fan Relay No. 2 for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Did the test light illuminate brightly? Yes → Go To 12 No → Repair the Radiator Fan Relay No. 3 Fused B+ circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
12	Turn the ignition off. Install a substitute relay in place of Radiator Fan Relay No. 3. Turn the ignition on. With the DRB, actuate the High Speed Fan Relay and then actuate the Low Speed Fan Relay. Does Radiator Fan No. 2 cycle on and off and then both fans cycle on and off when requested? Yes → Replace Radiator Fan Relay No. 3. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 13	All
13	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the Radiator Fan No. 2 harness connector. Using a 12-volt test light connected to 12-volts, check the Radiator Fan Relay No. 3 Ground circuit at the Radiator Fan Relay No. 3 harness connector. Did the test light illuminate brightly? Yes → Go To 14 No → Repair the Radiator Fan Relay No. 3 Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
14	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the ECM harness connectors. Measure the resistance of the High Speed Radiator Fan Dual Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Test Complete. No → Repair the High Speed Radiator Fan Dual Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the Radiator Fan Relay No. 1 harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit. Did the test light illuminate brightly? Yes → Go To 16 No → Repair the Radiator Fan Relay No. 1 Fused B+ circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
16	Turn the ignition off. Install a substitute relay in place of Radiator Fan Relay No.1. Turn the ignition on. With the DRB, actuate the Low Speed Fan Relay. Do both Radiator Fans cycle on and off? Yes → Replace Radiator Fan Relay No.1. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 17	All
17	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the Radiator Fan No. 2 harness connector. Using a 12-volt test light connected to 12-volts, check the Radiator Fan Relay No. 3 Ground circuit at the Radiator Fan Relay No. 3 harness connector. Did the test light illuminate brightly? Yes → Go To 18 No → Repair the Radiator Fan Relay No. 3 Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
18	Turn the ignition off. Disconnect the Radiator Fan Relay No.1 harness connector. Disconnect the Radiator Fan No.1 harness connector. Using a 12-volt test light connected to 12-volts, check the Radiator Fan Relay No.1 Output circuit in the Radiator Fan Relay No.1 harness connector. Did the test light illuminate brightly? Yes → Repair the Radiator Fan Relay No.1 Output circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 19	All
19	Turn the ignition off. Disconnect the Radiator Fan Relay No.1 harness connector. Disconnect the Radiator Fan No.1 harness connector. Measure the resistance of the Radiator Fan Relay No.1 Output circuit. Is the resistance below 10.0 ohms? Yes → Go To 20 No → Repair the Radiator Fan Relay No.1 Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
20	Turn the ignition off. Disconnect the Radiator Fan Relay No.3 harness connector. Disconnect the Radiator Fan No.1 harness connector. Measure the resistance of the Radiator Fan No.1 Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 21 No → Repair the Radiator Fan No.1 Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
21	Turn the ignition off. Disconnect the Radiator Fan Relay No.3 harness connector. Disconnect the Radiator Fan No.2 harness connector. Measure the resistance of the Radiator Fan Relay No.2 and No.3 Common Output circuit from Radiator Fan Relay No.3. Is the resistance below 10.0 ohms? Yes → Go To 22 No → Repair the Radiator Fan Relay No.2 and No.3 Common Output circuit from Radiator Fan Relay No.3 for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
22	Turn the ignition off. Disconnect the Radiator Fan No. 1 harness connector. Connect a fused jumper wire between the Radiator Fan No. 1 harness connector cavities. Turn the ignition on. With the DRB, actuate the Low Speed Fan Relay. Did Radiator Fan No. 2 activate on High speed? Yes → Replace Radiator Fan No. 1. Perform ROAD TEST VERIFICATION - VER-2. No → Replace Radiator Fan No.2. Perform ROAD TEST VERIFICATION - VER-2.	All
23	**NOTE: Radiator Fan No. 2 is fed voltage from Radiator Fan Relay No. 3 during low speed operation and then fed voltage from Radiator Fan Relay No. 2 during high speed operation by a common circuit connected to both relays.** Turn the ignition off. Disconnect the Radiator Fan Relay No. 2 harness connector. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the Radiator Fan No. 2 harness connector. Measure the resistance between ground and the Radiator Fan Relay No. 2 and No. 3 Common Output circuit. Is the resistance above 1000 ohms? Yes → Go To 24 No → Repair the Radiator Fan Relay No. 2 and No. 3 Common Output circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE ELECTRIC RADIATOR FAN OPERATION — Continued

TEST	ACTION	APPLICABILITY
24	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the Radiator Fan No. 1 harness connector. Using a 12-volt test light connected to 12-volts, check the Radiator Fan No. 1 Control circuit. Did the test light illuminate brightly? Yes → Repair the Radiator Fan No. 1 Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 25	All
25	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan No.2. Perform ROAD TEST VERIFICATION - VER-2.	All
26	Turn the ignition off. Disconnect the Radiator Fan Relay No. 3 harness connector. Disconnect the Radiator Fan No. 1 harness connector. Measure the voltage on the Radiator Fan No. 1 Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Radiator Fan No. 1 Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 27	All
27	If there are no possible causes remaining, view repair. Repair Replace Radiator Fan No.1. 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 DRB, 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. Using the DRB, 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 Vacuum System - must operate properly and be free of any vacuum leaks Fuel - must have adequate supply and must be free of contamination (ie. debris, water and gasoline) Fuel Injectors - must not be plugged or restricted Fuel Lift Pump - must operate properly (where applicable) 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 FUEL PRESSURE SENSOR CIRCUITS

POSSIBLE CAUSES
OPEN CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Repair as necessary. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Repair as necessary. Measure the resistance of each of the three Fuel Pressure Sensor circuits between the ECM harness connector and the Fuel Pressure Sensor harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Test Complete. No → Repair open circuit(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***CHECKING THE GLOW PLUG OPERATION**

POSSIBLE CAUSES
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 DRB, actuate the Glow Plug Relay. Using a 12-volt test light connected to ground, probe each Glow Plug harness connector during actuator test. Does the test light cycle on and off for each circuit during the actuator test? 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 open fuse/fuselink.** Remove the Glow Plug Relay. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the Glow Plug Relay connector, cavity 30 in the IPM. 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
4	Turn the ignition off. Disconnect all the Glow Plug harness connectors. Remove the Glow Plug Relay. Turn the ignition on. Measure the voltage on the Glow Plug Relay Output circuit. 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

*CHECKING THE GLOW PLUG OPERATION — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect all the Glow Plug harness connectors. Remove the Glow Plug Relay. Measure the resistance between ground and the Glow Plug Relay Output circuit. Is the resistance above 1000 ohms? 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 all the Glow Plug harness connectors. Remove the Glow Plug Relay. 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 each Glow Plug harness connector. Does the test light illuminate brightly 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	Refer to the Service Information and perform the Glow Plug Test. Are all Glow Plugs operating properly? Yes → Go To 8 No → Replace the Glow Plug(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Glow Plug Relay. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE LIFT PUMP MOTOR OPERATION

POSSIBLE CAUSES
LIFT PUMP OUTPUT TEST
FUSED B+ CIRCUIT OPEN
FUEL LIFT PUMP RELAY
LIFT PUMP RELAY OUTPUT CIRCUIT SHORTED TO VOLTAGE
LIFT PUMP RELAY OUTPUT CIRCUIT SHORTED TO GROUND
LIFT PUMP RELAY OUTPUT CIRCUIT OPEN
LIFT PUMP GROUND CIRCUIT OPEN
LIFT PUMP MOTOR

TEST	ACTION	APPLICABILITY
1	**NOTE: If any Fuel Lift Pump DTCs are present, diagnose the DTCs first.** Turn the ignition on. With the DRB, actuate the Lift Pump Relay. Gain access to the Lift Pump Motor to determine if it is cycling on and off. Does the Lift Pump Motor cycle on and off? Yes → Go To 2 No → Go To 3	All
2	**NOTE: The Lift Pump fuel output must be sufficient to prime the Injector Pump.** Refer to the Service Information to test the Lift Pump pressure and volume output. Did the Lift Pump pass the Lift Pump pressure and volume test? Yes → Test Complete. No → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
3	**NOTE: If the Lift Pump Relay fuse is open, refer to the system schematics for all circuits that are powered by the Lift Pump Relay fuse to determine the cause of the open fuse.** Remove the Lift Pump Relay from the IPM. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the Lift Pump Relay connector in the IPM. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused B+ (Fuse) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE LIFT PUMP MOTOR OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Install a substitute relay in place of the Lift Pump Relay. Turn the ignition on. With the DRB, actuate the Lift Pump Relay. Does the Lift Pump Motor cycle on and off? Yes → Replace the Fuel Lift Pump Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off. Disconnect the Lift Pump Motor harness connector. Remove the Lift Pump Relay. Turn the ignition on. Measure the voltage on the Lift Pump Relay Output circuit. Is the voltage above 1.0 volt? Yes → Repair the Lift Pump Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Lift Pump Motor harness connector. Remove the Lift Pump Relay. Measure the resistance between ground and the Lift Pump Relay Output circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Lift Pump Relay Output circuit for a short to ground. Inspect the fuse and replace as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the Lift Pump Motor harness connector. Remove the Lift Pump Relay. Connect a jumper wire across Lift Pump Relay connector cavities 30 and 87. Using a 12-volt test light connected to ground, check the Lift Pump Relay Output circuit in the Lift Pump Motor harness connector. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the Lift Pump Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the Lift Pump Motor harness connector. Using a 12-volt test light connected to 12-volts, check the Lift Pump Ground circuit. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the Lift Pump Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE LIFT PUMP MOTOR OPERATION — Continued

TEST	ACTION	APPLICABILITY
9	If there are no possible causes remaining, view repair. Repair Replace the Lift Pump Motor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

*CHECKING THE MAF SENSOR CALIBRATION

POSSIBLE CAUSES
MAF - SIGNAL DEVIATION AT 2000 RPM
MAF - SIGNAL DEVIATION AT 3000 RPM
MAF - SIGNAL DEVIATION AT 4000 RPM
MAF - SIGNAL DEVIATION AT IDLE

TEST	ACTION	APPLICABILITY
1	Allow the engine to idle for 2 minutes. **NOTE: The induction tubes connected to the MAF Sensor and the turbocharger must be properly connected and without damage, air leaks or restrictions.** With the DRBIII® in Sensors, read the MASS AIR FLOW Volts. Is the voltage between 2.0 and 2.7 volts? Yes → Go To 2 No → Replace the Mass Air Flow Sensor.	All
2	Allow the engine to idle for 2 minutes. **NOTE: The induction tubes connected to the MAF Sensor and the turbocharger must be properly connected and without damage, air leaks or restrictions.** With the DRBIII® in Sensors, read the MASS AIR FLOW Volts. With the transmission in Neutral and the parking brake set, increase engine speed to 2000 rpm and note the DRB reading. Is the voltage between 2.8 and 3.5 volts? Yes → Go To 3 No → Replace the Mass Air Flow Sensor.	All
3	Allow the engine to idle for 2 minutes. **NOTE: The induction tubes connected to the MAF Sensor and the turbocharger must be properly connected and without damage, air leaks or restrictions.** With the DRBIII® in Sensors, read the MASS AIR FLOW Volts. With the transmission in Neutral and the parking brake set, increase engine speed to 3000 rpm and note the DRB reading. Is the voltage between 3.5 and 4.1 volts? Yes → Go To 4 No → Replace the Mass Air Flow Sensor.	All

*CHECKING THE MAF SENSOR CALIBRATION — Continued

TEST	ACTION	APPLICABILITY
4	Allow the engine to idle for 2 minutes. **NOTE: The induction tubes connected to the MAF Sensor and the turbocharger must be properly connected and without damage, air leaks or restrictions.** With the DRBIII® in Sensors, read the MASS AIR FLOW Volts. With the transmission in Neutral and the parking brake set, increase engine speed to 4000 rpm for 5.0 seconds and note DRB reading. Is the voltage between 3.8 and 4.5 volts? Yes → Test Complete. No → Replace the Mass Air Flow Sensor.	All

Symptom:
*CHECKING THE SPEED CONTROL OPERATION

POSSIBLE CAUSES
BRAKE SWITCH SIGNAL
CHECKING CRUISE SWITCHES
CHECKING THE ECM FOR DTC'S
CLUTCH PEDAL SWITCH
CLUTCH PEDAL SWITCH SENSE CIRCUIT OPEN
CLUTCH PEDAL SWITCH SENSE CIRCUIT SHORTED TO GROUND
ENGINE CONTROL MODULE
VSS SIGNAL
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECM DTCs. Are there any ECM DTCs 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	Start the engine. With the DRB, read the CRUISE SW VOLTS. Observe the cruise switch volts on the DRB while pressing and holding each cruise button separately. **NOTE: Pressing each cruise button should result in the following voltages: ON/OFF 0.0 - 0.61v, SET 3.58 - 4.14v, RESUME/ACCEL 4.19 - 4.59v, CANCEL 1.28 - 1.88v, COAST 2.69 - 3.20v, No Button Pressed 4.74 - 5.2v** Does each switch provide the correct voltage when pressed? Yes → Go To 3 No → Refer to symptom list for problems related to S/C Switches. Perform SPEED CONTROL VERIFICATION - VER-4.	All
3	**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. Does the Speed Control function properly? Yes → Test Complete. No → Go To 4	All

*CHECKING THE SPEED CONTROL OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition on. With the DRBIII® in Sensors, read Vehicle Speed. Have an assistant drive the vehicle while you are observing the Vehicle Speed Signal on the DRB. While observing vehicle speed on the DRBIII®, note any rapid changes (signal dropouts) in the reading that do not correspond with actual vehicle speed. Does the DRB display an accurate Vehicle Speed reading? 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 brake switch states while pressing and releasing the Brake Pedal several times. Does the DRB display the correct brake pedal switch state when pressing and releasing the Brake Peda Yes → Go To 6 No → Refer to symptom list for problems related to Brake Switch Signal. Perform SPEED CONTROL VERIFICATION - VER-4.	All
6	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Clutch switch states while pressing and releasing the Clutch Pedal several times. Does the DRB display the correct clutch pedal switch state when pressing and releasing the Clutch Pe Yes → Go To 7 No → Go To 8	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.** 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 Engine Control Module in accordance with the Service Information. Perform SPEED CONTROL VERIFICATION - VER-4.	All

*CHECKING THE SPEED CONTROL OPERATION — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Clutch Switch state while using a jumper wire to connect the Clutch Pedal Switch Sense circuit to ground at the Clutch Pedal Switch harness connector. **NOTE: Leave jumper connected to ground for 5 seconds then disconnect jumper and note DRB reading for both conditions.** Does the DRB display switch between RELEASED and PRESSED when connecting and disconnecting the jumpe Yes → Replace the Clutch Pedal Switch. Perform SPEED CONTROL VERIFICATION - VER-4. No → Go To 9	All
9	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Measure the resistance of the Clutch Pedal Switch Sense circuit. Is the resistance below 10.0 ohms? Yes → Go To 10 No → Repair the Clutch Pedal Switch Sense circuit for an open. Perform SPEED CONTROL VERIFICATION - VER-4.	All
10	Turn the ignition off. Disconnect the Clutch Pedal Switch harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Clutch Pedal Switch Sense circuit. Is the resistance below 1000 ohms? Yes → Repair the Clutch Pedal Switch Sense circuit for a short to ground. 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:

*CHECKING THE VEHICLE SPEED SIGNAL

POSSIBLE CAUSES
VSS DTCS PRESENT
IGNITION SWITCH OUTPUT CIRCUIT OPEN
SPEEDOMETER PINION AND DRIVE TEETH DAMAGED
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE - SHORTED TO VOLTAGE
VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
VEHICLE SPEED SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
VEHICLE SPEED SENSOR
ENGINE CONTROL MODULE - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, select Engine, then Sensors. While an assistant is test driving the vehicle, note the Vehicle Speed reading on the DRB. While reading the VSS Signal, note any rapid changes (signal drop-outs) that do not correspond with actual vehicle speed. Does the DRB display an accurate vehicle speed reading? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition on. With the DRB, read ECM DTCs. Are any VSS DTCs present? Yes → Refer to symptom list for problems related to VSS DTCs. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Remove the Vehicle Speed Sensor. Inspect the Speedometer Pinion and drive teeth on the Output Shaft (located in the transmission). Inspect the VSS for metal debris and damage to the Sensor and connector. Are both components OK? Yes → Go To 4 No → Repair or replace the Speedometer Pinion or internal components as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the Ignition Switch Output circuit in the Vehicle Speed Sensor harness connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Ignition Switch Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the Vehicle Speed Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Go To 6 No → Go To 8	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Vehicle Speed Sensor Signal circuit. Is the voltage below 1.0 volt? Yes → Go To 7 No → Repair the Vehicle Speed Sensor Signal circuit for a short to voltage. 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 ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance between ground and the Vehicle Speed Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 9 No → Repair the Vehicle Speed Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Vehicle Speed Sensor Signal circuit and the Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 10 No → Repair the Vehicle Speed Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
10	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the Vehicle Speed Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 11 No → Repair the Vehicle Speed Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the Vehicle Speed Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 12 No → Repair the Vehicle Speed Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
12	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. **NOTE: Ensure the ECM harness connectors are connected before continuing.** Turn the ignition on. Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the VSS harness connector. With the DRB, monitor the VEHICLE SPEED while tapping the other end of the jumper wire to ground. Does the DRB display km/h (MPH) greater than 0? Yes → Replace the Vehicle Speed Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 13	All
13	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:

*ENGINE CRANKS BUT WILL NOT START

POSSIBLE CAUSES
CAMSHAFT POSITION SENSOR SIGNAL PROBLEM
CRANKSHAFT POSITION SENSOR SIGNAL PROBLEM
ECM CODES PRESENT
ECT SENSOR
ENGINE CONTROL MODULE
ENGINE DRIVE BELT/CHAIN
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
GLOW PLUGS
SENSOR GROUND OPEN
SKREEM CODES PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: The ECM must have proper power and ground connections for the following tests to be valid. Refer to Checking the ECM Power and Grounds in the symptom list.** 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 SKREEM DTCs. Does the DRBIII® display any SKREEM DTCs? Yes → Refer to symptom list for problems related to SKREEM DTC. Perform NO START VERIFICATION - VER-1. No → Go To 3	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
3	Refer to the Service Information to ensure the Engine Drive Belt/Chain 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 4	All
4	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 DRB reading. Are the two readings within 7°C (13°F) of each other? Yes → Go To 5 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
5	**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 6 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
6	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 7	All
7	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 8	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Using the DRB 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 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 9 No → Perform Test for DTC P0340-Camshaft Position Sensor Circuit Static Plausibility. Perform NO START VERIFICATION - VER-1.	All
9	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 → Go To 10 No → Perform Test for DTC P0340-Crankshaft Position Sensor Circuit Dynamic Plausibility. Perform NO START VERIFICATION - VER-1.	All
10	Refer to the Service Information and perform the fuel pressure test. Is the fuel pressure within specification? Yes → Go To 11 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
11	Refer to the Service Information and perform the fuel pressure test. Note the test results. Using the DRB, read the Fuel Pressure PSI and compare the two readings. Are the two readings within 3450 kPa (500 PSI) of each other? Yes → Go To 12 No → Go To 13	All
12	Inspect the fuel supply for contamination. Is the fuel contaminated? Yes → Refer to the Service Information to remove and replace fuel throughout the fuel system. 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

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
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
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
BATTERY CABLES
CLUTCH INTERLOCK SWITCH
CLUTCH INTERLOCK SWITCH OUTPUT CIRCUIT
ECM
IGNITION SWITCH START OUTPUT CIRCUIT OPEN
MECHANICAL PROBLEM
OPEN FUSED BATTERY (+) CIRCUIT
OPEN IGNITION SWITCH START OUTPUT
P/N SWITCH INPUT
SKREEM CODES PRESENT
STARTER MOTOR
STARTER RELAY
STARTER RELAY
STARTER RELAY CONTROL CIRCUIT OPEN
STARTER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
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 SKREEM DTCs. Does the DRBIII® display any SKREEM DTCs? Yes → Refer to symptom list for problems related to SKREEM. Perform NO START VERIFICATION - VER-1. No → Go To 3	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
3	Is the vehicle equipped with an automatic transmission? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off. Remove the Starter Relay from the IPM. **WARNING: THE TRANSMISSION MUST BE IN PARK/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 5 No → Go To 15	All
5	Turn the ignition off. Place the transmission in Park or Neutral. Remove the Starter Relay from the IPM. Using a 12-volt test light connected to ground, check the Ignition Switch Start Output circuit while turning the ignition switch to the START position. Does the test light illuminate with the ignition switch in the START position? Yes → Go To 6 No → Repair the Ignition Switch Start Output circuit for an open. Perform NO START VERIFICATION - VER-1.	All
6	Turn the ignition off. Remove the Starter Relay from the IPM. 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 → Go To 7	All
7	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Park/Neutral state while shifting the transmission through all gears. Does the DRB display the appropriate gear position when the gear selector is changed to each gear? Yes → Go To 8 No → Refer to the Service Information to diagnose to diagnose Park/Neutral input from the TCM to the ECM. Perform NO START VERIFICATION - VER-1.	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
8	Remove the Starter Relay. Disconnect the ECM harness connectors. Measure the resistance of the Starter Relay Control circuit between the IPM and the ECM harness connector. Is the resistance below 10.0 ohms? Yes → Go To 9 No → Repair the Starter Relay Control Circuit for an open. Perform NO START VERIFICATION - VER-1.	All
9	Turn the ignition off. Remove the Starter Relay from the IPM. Disconnect the ECM harness connectors. Remove the ECM/PCM Relay from the IPM. Connect a jumper wire between cavity 30 and cavity 87 of the ECM/PCM Relay connector. Turn the ignition on. Measure the voltage of the Starter Relay Control circuit. Is the voltage below 1.0 volt? Yes → Replace the ECM in accordance with the Service Information. Perform NO START VERIFICATION - VER-1. No → Repair the Starter Relay Control Circuit for a short to voltage. Perform NO START VERIFICATION - VER-1.	All
10	Turn the ignition off. Remove the Starter Relay from the IPM. **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 11 No → Go To 15	All
11	Remove the Starter Relay from the IPM. 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 12 No → Go To 13	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
12	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
13	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 14	All
14	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
15	Remove the Starter Relay from the IPM. 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 16 No → Repair the Fused B(+) circuit for an open. Perform NO START VERIFICATION - VER-1.	All
16	Turn the ignition off. Remove the Starter Relay from the IPM. 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 IPM. Does the test light illuminate brightly? Yes → Go To 17 No → Repair the Starter Relay Output circuit for an open. Perform NO START VERIFICATION - VER-1.	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
17	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 18	All
18	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
RAM FAILURE
ROM 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 SKREEM'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 at 65.5 millisecond intervals.

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 written operation.

RAM FAILURE

When Monitored: With the ignition on.

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

ROM FAILURE

When Monitored: With the ignition on.

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

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

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

ANTENNA FAILURE — Continued

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
SKREEM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**NOTE: This trouble code indicates an internal SKREEM fault.** With the DRBIII®, read and record the SKREEM DTCs and then erase the SKREEM DTCs Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII® , read the SKREEM DTCs. Did the same SKREEM DTC return? Yes → Replace and program the SKREEM in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. No → Test Complete.	All

Symptom:
BCM MESSAGE MISSING

When Monitored and Set Condition:

BCM MESSAGE MISSING

When Monitored: With the ignition on.

Set Condition: The SKREEM does not recieve an expected BCM PCI Bus message.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH ANOTHER MODULE
INTERMITTENT WIRING HARNESS PROBLEM
SKREEM

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. With the DRB, read SKREEM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on. With the DRB, attempt to communicate with the Body Control Module. Was the DRB able to I/D or communicate with the BCM? Yes → Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. No → Refer to symptom list for problems related to Communication with the BCM. Perform SKREEM VERIFICATION TEST - VER 1A.	All
3	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 SKREEM VERIFICATION TEST - VER 1A. No → Test Complete.	All

Symptom List:

PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

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

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

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

SERIAL LINK EXTERNAL FAULT

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

Set Condition: When the SKREEM 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
SKREEM/ECM

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

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform SKREEM VERIFICATION TEST - VER 1A. No → Go To 3	All
3	**NOTE: Before proceeding it will be necessary to obtain the SKREEM PIN.** Turn the ignition on. With the DRBIII®, display and erase all ECM and SKREEM 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 SKREEM DTCs. Does the code appear? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. 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 SKREEM VERIFICATION TEST - VER 1A. 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 SKREEM or ECM reset.

Set Condition: When a PCM STATUS message with a Valid Key status is not received by the SKREEM 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 SKREEM's EEPROM.

POSSIBLE CAUSES
VERIFYING ECM VIN
REPLACE SKREEM AND CHECK DTC'S
INTERMITTENT WIRING HARNESS PROBLEM
ECM

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

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the 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 SKREEM VERIFICATION TEST - VER 1A.	All
3	Turn the ignition off. Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information. Turn the ignition on. With the DRBIII®, display and clear all ECM and SKREEM DTC's. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRBIII®, check for SKREEM DTCs. Does the DRBIII® display the same DTC? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. No → The repair is complete. Perform SKREEM VERIFICATION TEST - VER 1A.	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 SKREEM VERIFICATION TEST - VER 1A. No → Test Complete.	All

Symptom List:

TRANSPONDER COMMUNICATION 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 SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

TRANSPONDER ID MISMATCH

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

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

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

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read and record the SKREEM DTCs. With the DRBIII®, erase the SKREEM 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 SKREEM 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 SKREEM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKREEM DTCs. Is the DTC present for all ignition keys? Yes → Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. No → Replace the ignition key(s) that cause the SKREEM DTC. Perform SKREEM VERIFICATION TEST - VER 1A.	All
4	With the DRBIII®, attempt to reprogram the ignition keys to the SKREEM. With the DRBIII®, erase the SKREEM DTCs. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKREEM DTCs. Does the DTC set again? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. With the DRBIII®, program the new ignition key to the SKREEM. With the DRBIII®, erase the SKREEM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKREEM DTCs. Does the DTC set again? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A.	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 SKREEM VERIFICATION TEST - VER 1A. No → Test Complete.	All

Symptom:
UNPROGRAMMED KEY

When Monitored and Set Condition:

UNPROGRAMMED KEY

When Monitored: With the ignition on.

Set Condition: The Sentry Key Remote Entry Module has not been programmed.

POSSIBLE CAUSES
VERIFY ACTIVE DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt program the SKREEM in accordance with the Service Information. With the DRBIII®, erase SKREEM DTCs. Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII®, read SKREEM DTCs. Did this DTC set again? Yes → Replace the Sentry Key Remote Entry Module in accordance with the Service Information. Perform SKREEM VERIFICATION TEST - VER 1A. No → Test Complete.	All

Verification Tests

CHARGING VERIFICATION - VER-3	APPLICABILITY
1. Inspect the vehicle to ensure that all 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 the DTC has set again, or another DTC has set, look for 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 Remote Entry Module has been replaced, ensure the programming procedure 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 engine 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 will not 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 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. If not, proceed to step 5. 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 diagnosed, 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 III®, erase all diagnostic trouble codes (DTCs), then disconnect the DRB III®. 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, drive the vehicle 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 III®. 15. If the repaired DTC has set again, 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

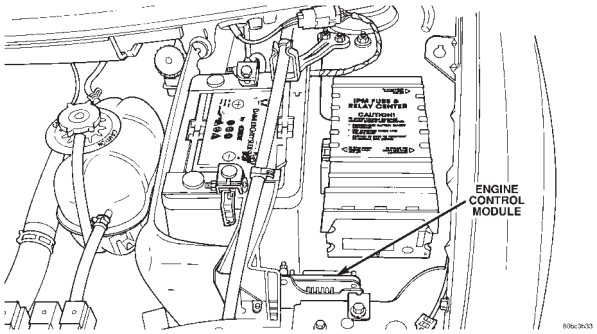
SKREEM VERIFICATION TEST - VER 1A	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKREEM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center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

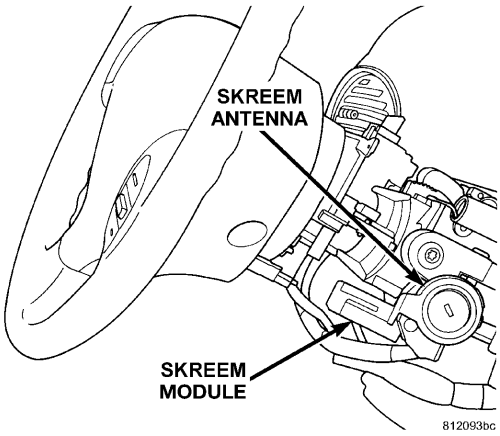
Verification Tests — Continued

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 60 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 60 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 60 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

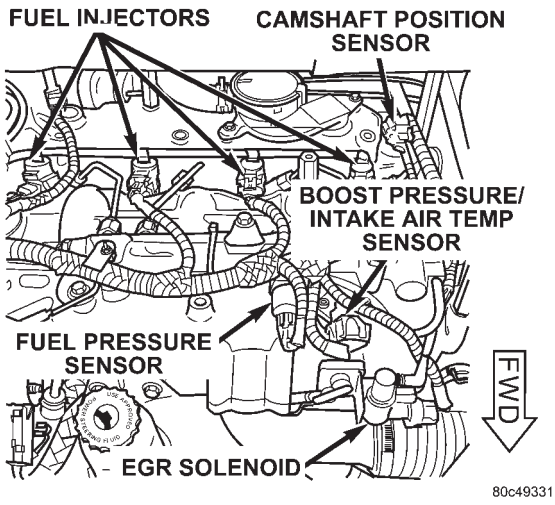
8.0 COMPONENT LOCATIONS

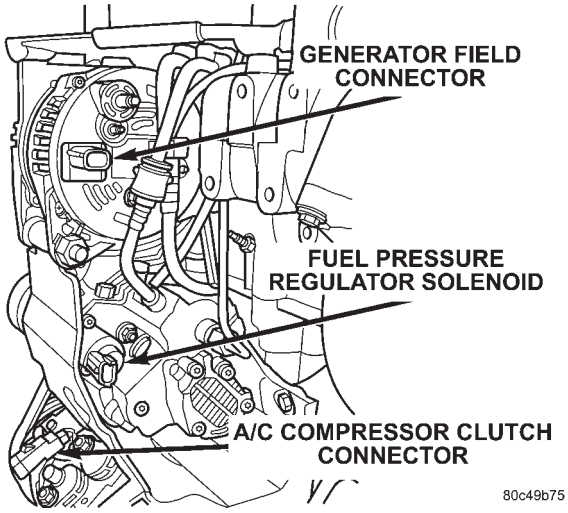
8.1 CONTROL MODULES



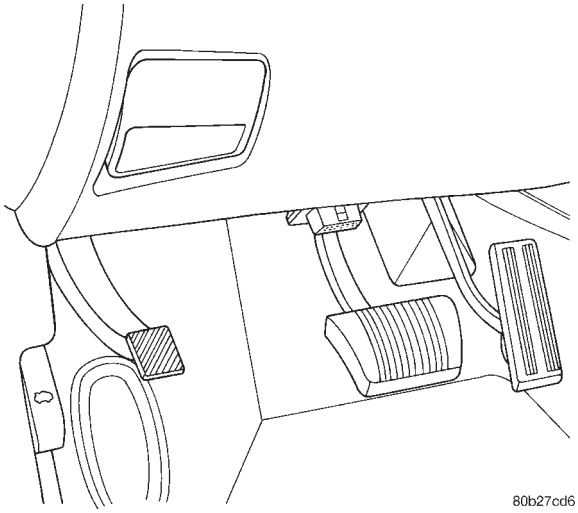


8.2 CONTROLS AND SOLENOIDS

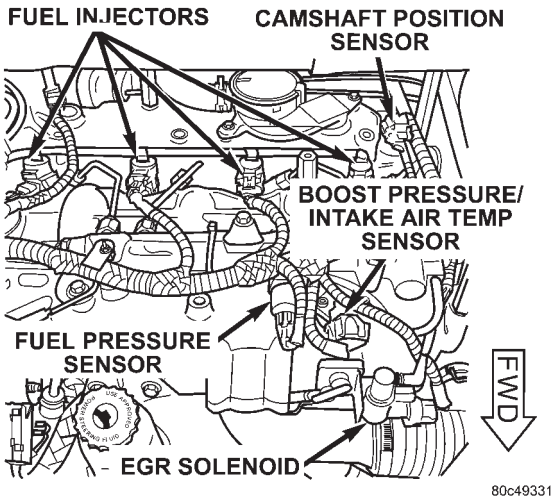


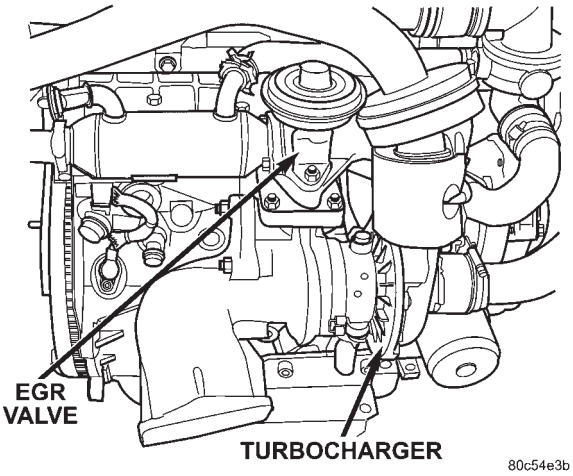


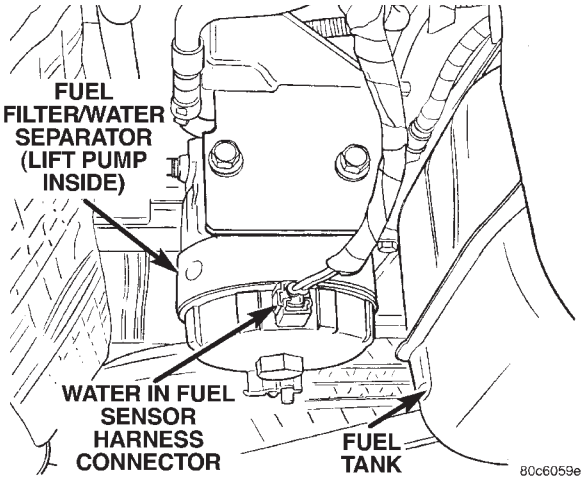
8.3 DATA LINK CONNECTOR



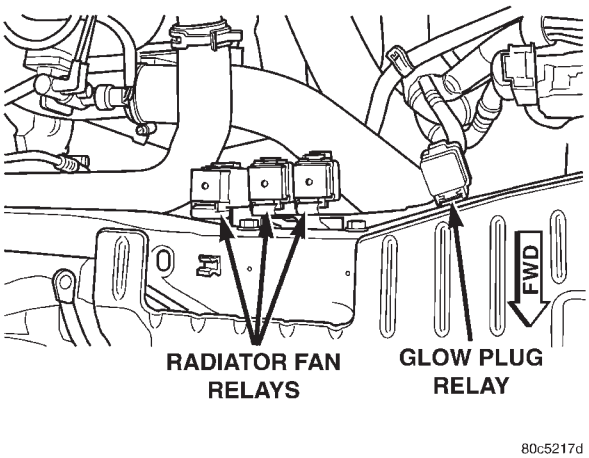
8.4 FUEL SYSTEM



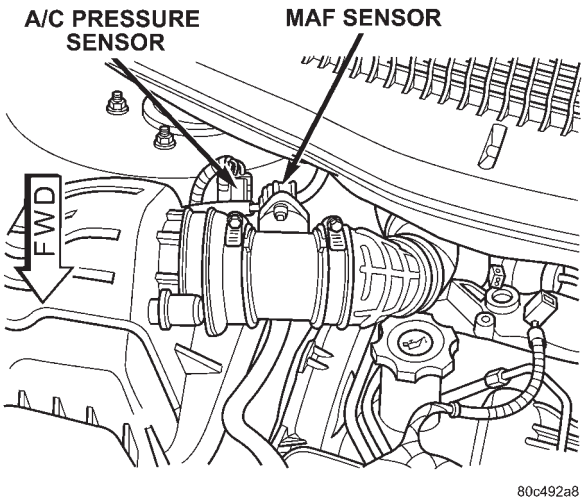


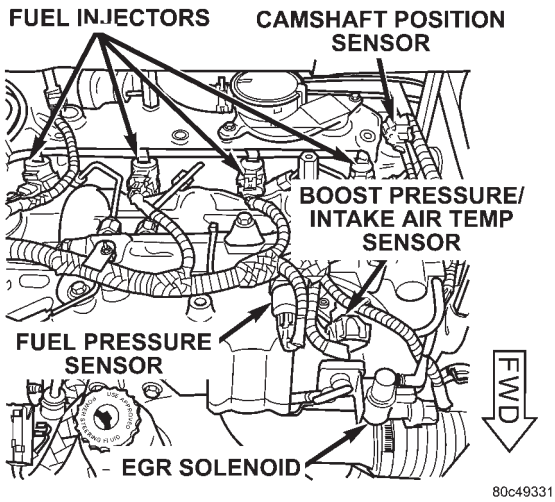


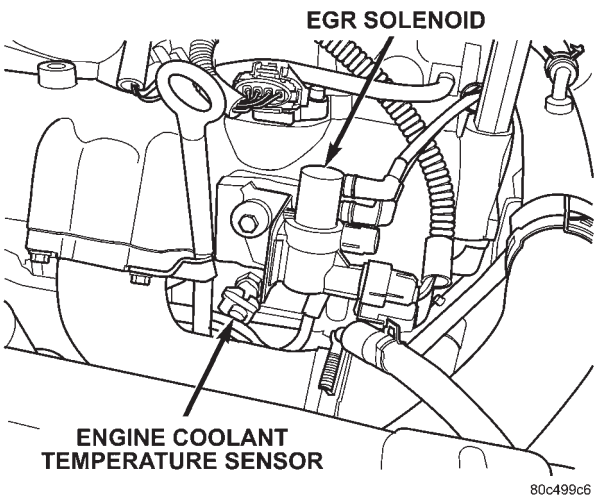
8.5 RELAYS



8.6 SENSORS


A/C PRESSURE SENSOR
MAF SENSOR
FWD
80c492a8


FUEL INJECTORS
CAMSHAFT POSITION SENSOR
BOOST PRESSURE/ INTAKE AIR TEMP SENSOR
FUEL PRESSURE SENSOR
FWD
EGR SOLENOID
80c49331


EGR SOLENOID
ENGINE COOLANT TEMPERATURE SENSOR
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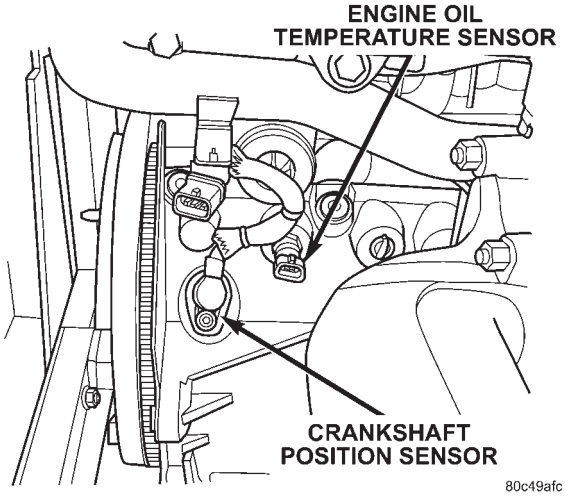
ENGINE OIL TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
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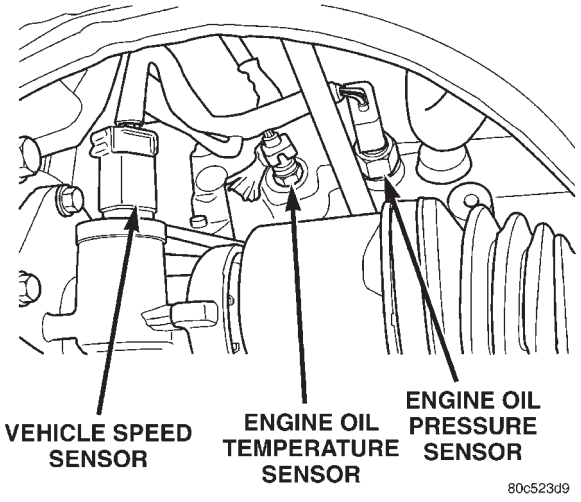
VEHICLE SPEED SENSOR
ENGINE OIL TEMPERATURE SENSOR
ENGINE OIL PRESSURE SENSOR
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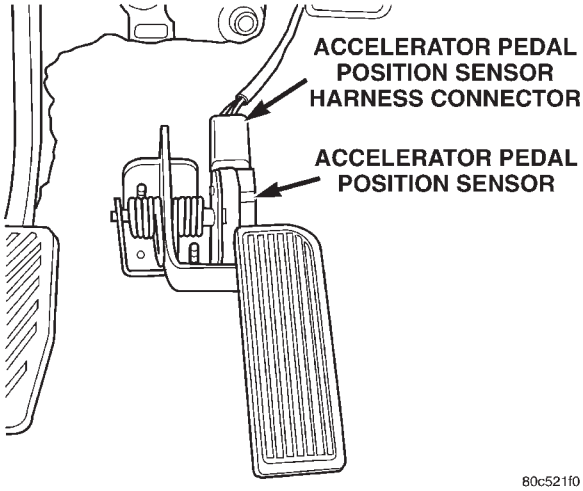
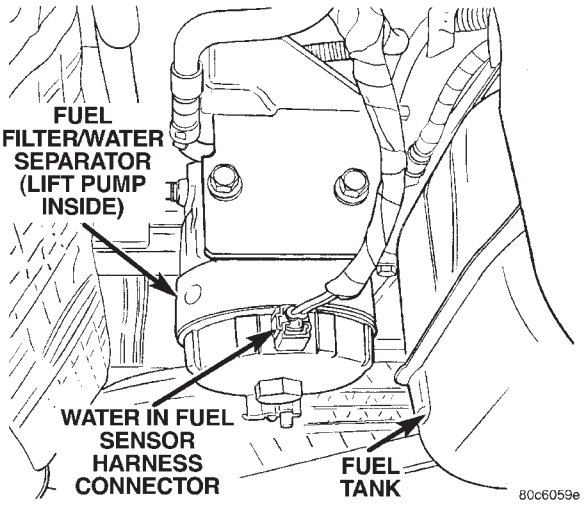
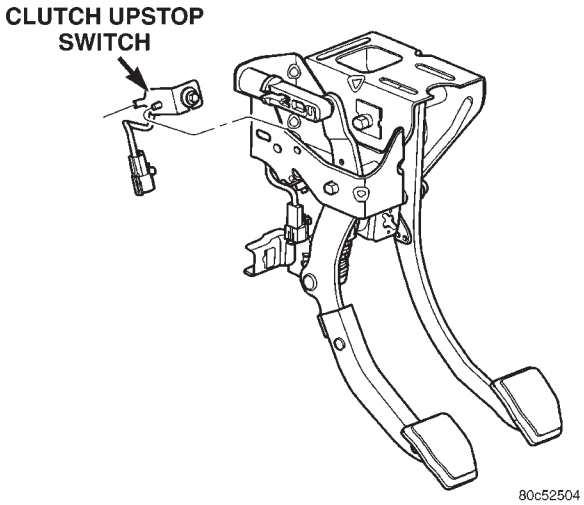

ACCELERATOR PEDAL POSITION SENSOR HARNESS CONNECTOR
ACCELERATOR PEDAL POSITION SENSOR
80c521f0

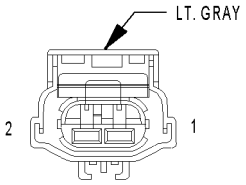
8.6 SENSORS (Continued)



8.7 SWITCHES



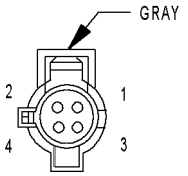
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - LT. GRAY 2 WAY

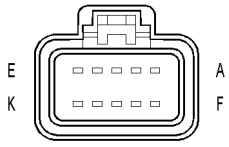
CAV	CIRCUIT	FUNCTION
1	C3 20DB/YL (DIESEL)	A/C COMPRESSOR CLUTCH RELAY OUTPUT
1	C3 20DB/YL (GAS)	A/C CLUTCH RELAY OUTPUT
2	Z153 18BK/GY	GROUND



A/C PRESSURE SENSOR

A/C PRESSURE SENSOR - GRAY 4 WAY

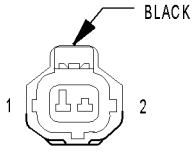
CAV	CIRCUIT	FUNCTION
1	C918 20BK/LB (DIESEL)	A/C PRESSURE SENSOR GROUND
1	K900 18DB/DG (GAS)	SENSOR GROUND
2	F855 20PK/YL (2.4L)	5 VOLT SUPPLY
2	F855 18PK/YL (3.3L/3.8L)	5 VOLT SUPPLY
2	F851 20LB/PK (DIESEL)	SENSOR REFERENCE VOLTAGE B
3	C18 20LB/BR (DIESEL)	A/C PRESSURE SENSOR SIGNAL
3	C18 18LB/BR (GAS)	A/C PRESSURE SIGNAL
4	-	-



ACCELERATOR PEDAL POSITION SENSOR (DIESEL)

ACCELERATOR PEDAL POSITION SENSOR (DIESEL) - 10 WAY

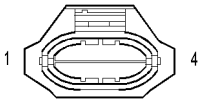
CAV	CIRCUIT	FUNCTION
A	-	-
B	-	-
C	-	-
D	K4 20BK/LB	SENSOR GROUND
E	K151 20WT	LOW IDLE POSITION SWITCH SENSE
F	-	-
G	K22 20OR/DB	ACCELERATOR PEDAL POSITION SENSOR SIGNAL NO. 1
H	K23 20BR/WT	ACCELERATOR PEDAL POSITION SENSOR SIGNAL NO. 2
J	K900 20DB/DG	SENSOR GROUND
K	F852 20VT/PK	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY



BATTERY TEMPERATURE SENSOR

BATTERY TEMPERATURE SENSOR - BLACK 2 WAY

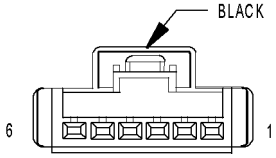
CAV	CIRCUIT	FUNCTION
1	K25 20BR/TN (DIESEL)	BATTERY TEMPERATURE SENSOR SIGNAL
1	K91 18DB/YL (GAS)	BATTERY TEMP SIGNAL
2	K900 20DB/DG (DIESEL)	SENSOR GROUND
2	K900 18DB/DG (GAS)	SENSOR GROUND



BOOST PRESSURE SENSOR (DIESEL)

BOOST PRESSURE SENSOR (DIESEL) - 4 WAY

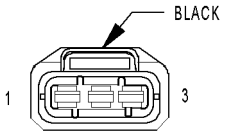
CAV	CIRCUIT	FUNCTION
1	K121 20DB	BOOST PRESSURE SENSOR GROUND
2	K21 20DB/LG	INTAKE AIR TEMPERATURE SENSOR SIGNAL
3	F851 20LB/PK	SENSOR REFERENCE VOLTAGE B
4	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - BLACK 6 WAY

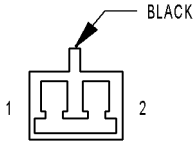
CAV	CIRCUIT	FUNCTION
1	A103 18GY/RD	FUSED B(+)
2	L50 18WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
2	L50 18WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
3	V30 20VT/WT (GAS)	S/C BRAKE SWITCH OUTPUT
4	V32 20VT/YL (GAS)	SPEED CONTROL SUPPLY
5	Z429 20BK/OR	GROUND
6	B29 20DG/WT	SECONDARY BRAKE SWITCH SIGNAL



CAMSHAFT POSITION SENSOR (DIESEL)

CAMSHAFT POSITION SENSOR (DIESEL) - BLACK 3 WAY

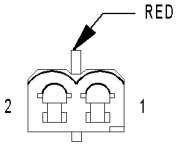
CAV	CIRCUIT	FUNCTION
1	K944 20BK/GY	CAMSHAFT POSITION SENSOR GROUND
2	K44 20DB/GY	CAMSHAFT POSITION SENSOR SIGNAL
3	K342 16BR/WT	ECM/PCM RELAY OUTPUT



CLUTCH PEDAL INTERLOCK SWITCH (MTX)

CLUTCH PEDAL INTERLOCK SWITCH (MTX) - BLACK 2 WAY

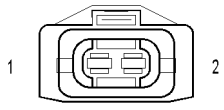
CAV	CIRCUIT	FUNCTION
1	T141 20YL/OR	FUSED IGNITION SWITCH OUTPUT (START)
2	T751 20YL (DIESEL)	FUSED IGNITION SWITCH OUTPUT (START)
2	Z429 20BK/OR (GAS)	GROUND



CLUTCH PEDAL UPSTOP SWITCH (DIESEL)

CLUTCH PEDAL UPSTOP SWITCH (DIESEL) - RED 2 WAY

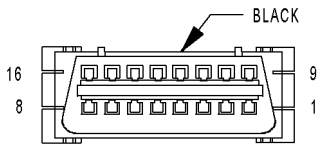
CAV	CIRCUIT	FUNCTION
1	K119 20DB/LG	CLUTCH PEDAL UPSTOP SWITCH SENSE
2	Z150 20BK/LG	GROUND



CRANKSHAFT POSITION SENSOR (DIESEL)

CRANKSHAFT POSITION SENSOR (DIESEL) - 2 WAY

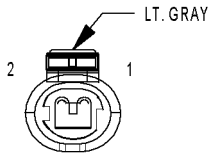
CAV	CIRCUIT	FUNCTION
1	K3 20BR/OR	CRANKSHAFT POSITION SENSOR SIGNAL NO. 1
2	K24 20BR/LB	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

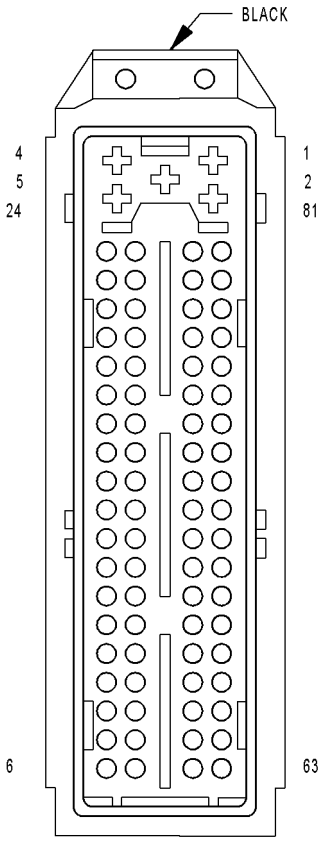
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20WT/VT	PCI BUS
3	-	-
4	Z11 20BK/LG	GROUND
5	Z111 20BK/WT	GROUND
6	-	-
7	D21 20WT/DG (DIESEL)	SCI TRANSMIT (ECM)
7	D21 20WT/DG (GAS)	SCI TRANSMIT (PCM)
8	-	-
9	D123 20WT/BR	FLASH PROGRAM ENABLE
10	-	-
11	-	-
12	D20 20WT/LG (GAS)	SCI RECEIVE (PCM)
13	-	-
14	-	-
15	D15 20DG/YL (EATX)	SCI TRANSMIT (TCM)
16	A105 20DB/RD	FUSED B(+)



EGR SOLENOID (DIESEL)

EGR SOLENOID (DIESEL) - LT. GRAY 2 WAY

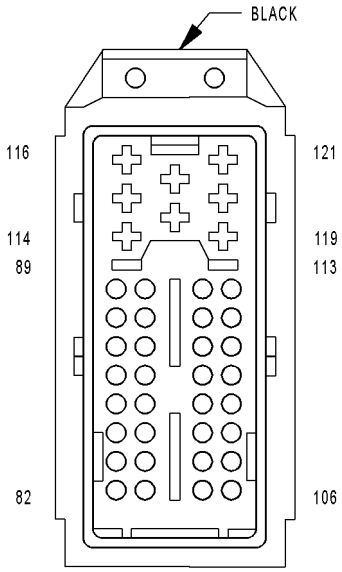
CAV	CIRCUIT	FUNCTION
1	K35 20GY/YL	EGR SOLENOID CONTROL
2	K342 16BR/WT	ECM/PCM RELAY OUTPUT



ENGINE CONTROL MODULE C1 (DIESEL)

ENGINE CONTROL MODULE C1 (DIESEL) - BLACK 81 WAY

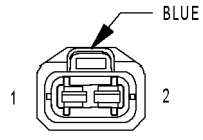
CAV	CIRCUIT	FUNCTION
1	Z130 14BK/BR	GROUND
2	Z131 14BK/DG	GROUND
3	K20 14BR/GY	GENERATOR FIELD CONTROL
4	K342 14BR/WT	ECM/PCM RELAY OUTPUT
5	K342 14BR/WT	ECM/PCM RELAY OUTPUT
6	-	-
7	D25 20WT/VT	PCI BUS
8	K944 20BK/GY	CAMSHAFT POSITION SENSOR SHIELD GROUND
9	K44 20DB/GY	CAMSHAFT POSITION SENSOR SIGNAL
10	-	-
11	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL
12	K55 20DB/OR	MASS AIR FLOW SENSOR SIGNAL
13	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
14	-	-
15	K22 20OR/DB	ACCELERATOR PEDAL POSITION SENSOR SIGNAL NO. 1
16	K80 20DB/TN	FUEL PRESSURE SENSOR GROUND
17	-	-
18	-	-
19	K342 20BR/WT	ECM/PCM RELAY OUTPUT
20	Z138 20BK/OR	GROUND
21	K900 20DB/DG	SENSOR GROUND
22	F202 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	F851 20LB/PK	SENSOR REFERENCE VOLTAGE B
24	K3 20BR/OR	CRANKSHAFT POSITION SENSOR SIGNAL NO. 1
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	G6 20VT/GY	ENGINE OIL PRESSURE SENSOR SIGNAL
31	F853 20LG/PK	WATER IN FUEL SENSOR SIGNAL
32	K25 20BR/TN	BATTERY TEMPERATURE SENSOR SIGNAL
33	-	-
34	K4 20BK/LB	SENSOR GROUND
35	F852 20VT/PK	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY
36	C18 20LB/BR	A/C PRESSURE SENSOR SIGNAL
37	-	-
38	V37 20VT/TN	SPEED CONTROL SWITCH SIGNAL
39	-	-
40	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
41	K21 20DB/LG	INTAKE AIR TEMPERATURE SENSOR SIGNAL
42	Z122 18WT	GROUND (DRAIN)
43	K24 20BR/LB	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2
44	-	-
45	-	-
46	-	-
47	L50 20WT/TN	PRIMARY BRAKE SWITCH SIGNAL
48	B29 20DG/WT	SECONDARY BRAKE SWITCH SIGNAL
49	T751 20YL	FUSED IGNITION SWITCH OUTPUT (START)
50	F855 20PK/YL	SENSOR REFERENCE VOLTAGE A
51	-	-
52	K121 20DB	BOOST PRESSURE SENSOR GROUND
53	-	-
54	K957 20BK/OR	MASS AIR FLOW SENSOR GROUND
55	N7 20DB/OR	VEHICLE SPEED SENSOR SIGNAL
56	C918 20BK/LB	A/C PRESSURE SENSOR GROUND
57	T10 20DG/LG (EATX)	TORQUE MANAGEMENT REQUEST SENSE
58	-	-
59	-	-
60	K9 20LB	FUEL PRESSURE SENSOR 5 VOLT SUPPLY
61	K51 20BR/WT	ECM/PCM RELAY CONTROL
62	-	-
63	D21 20WT/DG	SCI TRANSMIT (ECM)
64	K151 20WT	LOW IDLE POSITION SWITCH SENSE
65	-	-
66	K936 20BR/YL	ENGINE OIL PRESSURE SENSOR GROUND
67	-	-
68	-	-
69	C13 20LB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
70	N210 20DB/DG	LOW SPEED RADIATOR FAN RELAY CONTROL
71	-	-
72	N21 20DB/TN	LIFT PUMP RELAY CONTROL
73	-	-
74	T752 20DG/OR	STARTER MOTOR RELAY CONTROL
75	-	-
76	-	-
77	K152 20DB/WT	GLOW PLUG RELAY CONTROL
78	N122 20DB/YL	HIGH SPEED RADIATOR FAN DUAL RELAY CONTROL
79	-	-
80	K87 20BR	FUEL PRESSURE SOLENOID CONTROL
81	K87 20BR	FUEL PRESSURE SOLENOID CONTROL



ENGINE CONTROL MODULE C2 (DIESEL)

ENGINE CONTROL MODULE C2 (DIESEL) - BLACK 40 WAY

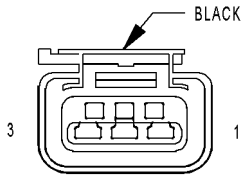
CAV	CIRCUIT	FUNCTION
80	-	-
81	-	-
82	-	-
83	K24 20BR/LB (EATX)	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2
84	-	-
85	-	-
86	-	-
87	-	-
88	K35 20GY/YL	EGR SOLENOID CONTROL
89	K35 20GY/YL	EGR SOLENOID CONTROL
90	-	-
91	-	-
92	-	-
93	-	-
94	-	-
95	-	-
96	-	-
97	-	-
98	-	-
99	-	-
100	-	-
101	-	-
102	-	-
103	-	-
104	-	-
105	-	-
106	-	-
107	-	-
108	-	-
109	-	-
110	-	-
111	-	-
112	T41 20DG/GY (EATX)	TRS T41 SENSE
112	K119 20DB/LG (MTX)	CLUTCH PEDAL UPSTOP SWITCH SENSE
113	-	-
114	-	-
115	K14 14LB/BR	FUEL INJECTOR NO. 4 CONTROL
116	K111 14DB/LB	COMMON INJECTOR DRIVER
117	-	-
118	K11 14WT/DB	FUEL INJECTOR NO. 1 CONTROL
119	K12 14TN	FUEL INJECTOR NO. 2 CONTROL
120	K13 14BR/LB	FUEL INJECTOR NO. 3 CONTROL
121	-	-



ENGINE COOLANT TEMP SENSOR (DIESEL)

ENGINE COOLANT TEMP SENSOR (DIESEL) - BLUE 2 WAY

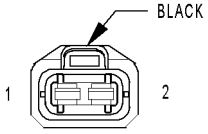
CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K900 20DB/DG	SENSOR GROUND



ENGINE OIL PRESSURE SENSOR (DIESEL)

ENGINE OIL PRESSURE SENSOR (DIESEL) - BLACK 3 WAY

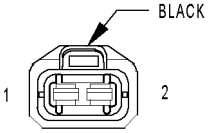
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	SENSOR REFERENCE VOLTAGE A
2	G6 20VT/GY	ENGINE OIL PRESSURE SENSOR SIGNAL
3	K936 20BR/YL	ENGINE OIL PRESSURE SENSOR GROUND



FUEL INJECTOR NO. 1 (DIESEL)

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

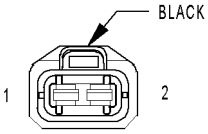
CAV	CIRCUIT	FUNCTION
1	K111 14DB/LB	COMMON INJECTOR DRIVER
2	K11 14WT/DB	FUEL INJECTOR NO. 1 CONTROL



FUEL INJECTOR NO. 2 (DIESEL)

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

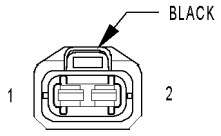
CAV	CIRCUIT	FUNCTION
1	K111 14DB/LB	COMMON INJECTOR DRIVER
2	K12 14TN	FUEL INJECTOR NO. 2 CONTROL



FUEL INJECTOR NO. 3 (DIESEL)

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

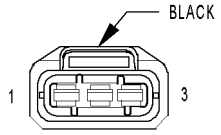
CAV	CIRCUIT	FUNCTION
1	K111 14DB/LB	COMMON INJECTOR DRIVER
2	K13 14BR/LB	FUEL INJECTOR NO. 3 CONTROL



FUEL INJECTOR NO. 4 (DIESEL)

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

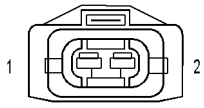
CAV	CIRCUIT	FUNCTION
1	K111 14DB/LB	COMMON INJECTOR DRIVER
2	K14 14LB/BR	FUEL INJECTOR NO. 4 CONTROL



FUEL PRESSURE SENSOR (DIESEL)

FUEL PRESSURE SENSOR (DIESEL) - BLACK 3 WAY

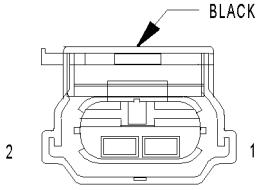
CAV	CIRCUIT	FUNCTION
1	K80 20DB/TN	FUEL PRESSURE SENSOR GROUND
2	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
3	K9 20LB	FUEL PRESSURE SENSOR 5 VOLT SUPPLY



FUEL PRESSURE SOLENOID (DIESEL)

FUEL PRESSURE SOLENOID (DIESEL) - 2 WAY

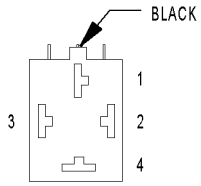
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	ECM/PCM RELAY OUTPUT
2	K87 16BR	FUEL PRESSURE SOLENOID CONTROL



GENERATOR

GENERATOR - BLACK 2 WAY

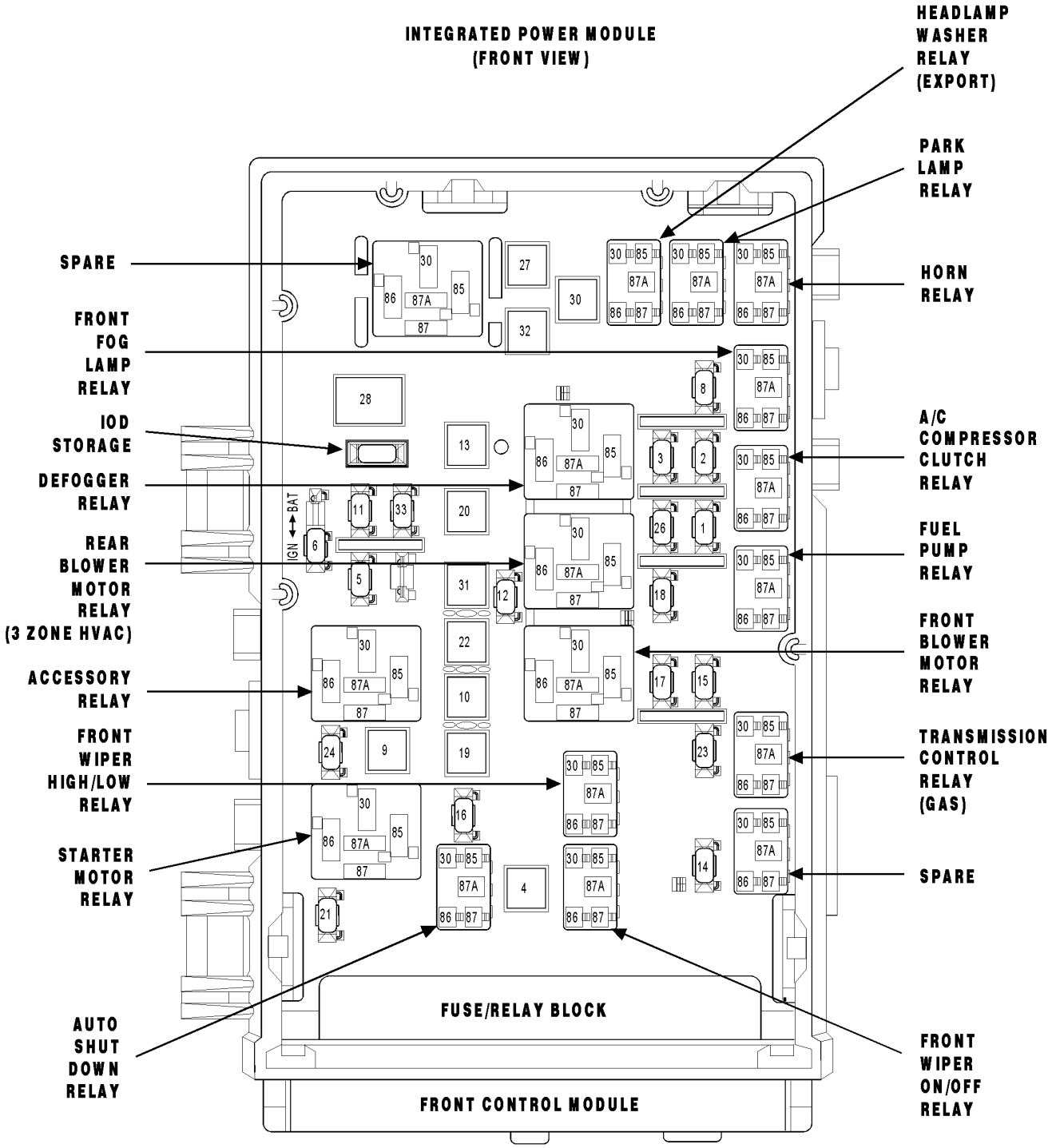
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT (DIESEL)	ECM/PCM RELAY OUTPUT
1	Z20 18BK (GAS)	GROUND
2	K20 14BR/GY (DIESEL)	GENERATOR FIELD CONTROL
2	K20 18BR/GY (GAS)	GEN FIELD CONTROL



GLOW PLUG RELAY (DIESEL)

GLOW PLUG RELAY (DIESEL) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	A202 10RD/WT	FUSED B(+)
2	K152 20DB/WT	GLOW PLUG RELAY CONTROL
3	K342 16BR/WT	ECM/PCM RELAY OUTPUT
4	K154 10BR/OR	GLOW PLUG RELAY OUTPUT


INTEGRATED POWER MODULE
(FRONT VIEW)
HEADLAMP WASHER RELAY (EXPORT)
PARK LAMP RELAY
SPARE
HORN RELAY
FRONT FOG LAMP RELAY
IOD STORAGE
A/C COMPRESSOR CLUTCH RELAY
DEFOGGER RELAY
FUEL PUMP RELAY
REAR BLOWER MOTOR RELAY (3 ZONE HVAC)
FRONT BLOWER MOTOR RELAY
ACCESSORY RELAY
TRANSMISSION CONTROL RELAY (GAS)
FRONT WIPER HIGH/LOW RELAY
SPARE
STARTER MOTOR RELAY
AUTO SHUT DOWN RELAY
FRONT WIPER ON/OFF RELAY
IGN
BAT
FUSE/RELAY BLOCK
FRONT CONTROL MODULE

FUSES (IPM)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	INTERNAL	FUSED B(+)
2	15A	INTERNAL	FUSED PARK LAMP RELAY OUTPUT
3	15A	INTERNAL	FUSED PARK LAMP RELAY OUTPUT
4	30A	INTERNAL	FUSED B(+)
5	20A	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
6	20A	F307 16LB/PK (ACCESSORY RELAY POSITION)	FUSED ACCESSORY RELAY OUTPUT
6	20A	F307 16LB/PK (BATTERY POSITION)	FUSED B(+)
8	20A	INTERNAL	FUSED B(+)
9	40A	INTERNAL	FUSED B(+)
10	40A	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT
11	20A	F302 18GY/PK	FUSED ACCESSORY RELAY OUTPUT
12	25A	C51 12LB/BR	FUSED REAR BLOWER MOTOR RELAY OUTPUT
13	40A	C15 12DB/WT	FUSED DEFOGGER RELAY OUTPUT
14	20A	INTERNAL	FUSED B(+) (I.O.D.)
15	20A	INTERNAL (DIESEL)	FUSED B(+)
15	20A	INTERNAL (EATX)	FUSED B(+)
16	25A	INTERNAL	FUSED B(+)
17	20A	INTERNAL	FUSED B(+)
18	15A	INTERNAL	FUSED B(+)
19	40A	A101 12VT/RD	FUSED B(+)
20	30A	A102 12WT/RD	FUSED B(+)
21	25A	A111 12DG/RD	FUSED B(+)
22	40A	A110 12OR/RD	FUSED B(+)
23	10A	A106 20LB/RD	FUSED B(+)
24	20A	A701 16BR/RD	FUSED B(+) (HAZARD)
26	20A	A103 18GY/RD	FUSED B(+)
27	40A	A112 12OR/RD	FUSED B(+)
28	40A	F30 12PK/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
30	40A	INTERNAL (EXPORT)	FUSED B(+)
31	40A	A113 12WT/RD	FUSED B(+)
32	40A	A115 12YL/RD	FUSED B(+)
33	15A	INTERNAL	FUSED ACCESSORY RELAY OUTPUT

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	C13 20LB/OR (DIESEL)	A/C COMPRESSOR CLUTCH RELAY CONTROL
85	C13 18LB/OR (GAS)	A/C CLUTCH RELAY CONTROL
86	K342 16BR/WT (DIESEL)	ECM/PCM RELAY OUTPUT
86	F202 20PK/GY (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	C3 20DB/YL	A/C COMPRESSOR CLUTCH RELAY OUTPUT
87A	-	-

ECM/PCM RELAY (DIESEL)

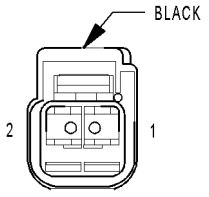
CAV	CIRCUIT	FUNCTION
30	K342 16BR/WT	ECM/PCM RELAY OUTPUT
85	K51 20BR/WT	ECM/PCM RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	INTERNAL	FUSED B(+)
87A	-	-

LIFT PUMP RELAY (DIESEL)

CAV	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	N21 20DB/TN	LIFT PUMP RELAY CONTROL
86	F202 18PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	N2 18DB/YL	LIFT PUMP RELAY OUTPUT
87A	-	-

STARTER MOTOR RELAY

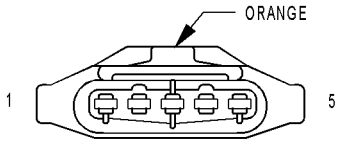
CAV	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	T752 20DG/OR (DIESEL)	STARTER MOTOR RELAY CONTROL
85	T752 18DG/OR (GAS)	STARTER MOTOR RELAY CONTROL
86	INTERNAL	FUSED IGNITION SWITCH OUTPUT (START)
87	T750 12YL/GY	STARTER MOTOR RELAY OUTPUT
87A	-	-



LIFT PUMP MOTOR (DIESEL)

LIFT PUMP MOTOR (DIESEL) - BLACK 2 WAY

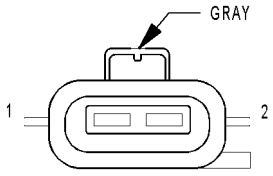
CAV	CIRCUIT	FUNCTION
1	N2 18OR	LIFT PUMP RELAY OUTPUT
2	Z201 18OR	GROUND



MASS AIR FLOW SENSOR (DIESEL)

MASS AIR FLOW SENSOR (DIESEL) - ORANGE 5 WAY

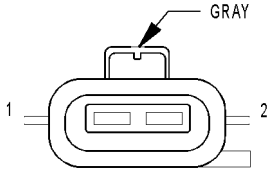
CAV	CIRCUIT	FUNCTION
1	-	-
2	K342 16BR/WT	ECM/PCM RELAY OUTPUT
3	K957 20BK/OR	MASS AIR FLOW SENSOR GROUND
4	F855 20PK/YL	SENSOR REFERENCE VOLTAGE A
5	K55 20DB/OR	MASS AIR FLOW SENSOR SIGNAL



RADIATOR FAN NO. 1 (DIESEL)

RADIATOR FAN NO. 1 (DIESEL) - GRAY 2 WAY

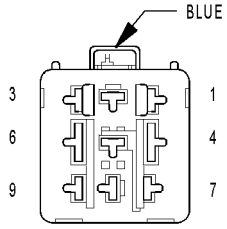
CAV	CIRCUIT	FUNCTION
1	N201 12DB/LG	RADIATOR FAN RELAY NO. 1 OUTPUT
2	N202 12DB/OR	RADIATOR FAN NO. 1 CONTROL



RADIATOR FAN NO. 2 (DIESEL)

RADIATOR FAN NO. 2 (DIESEL) - GRAY 2 WAY

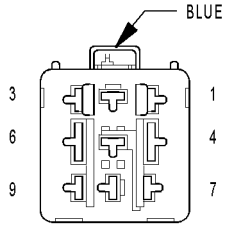
CAV	CIRCUIT	FUNCTION
1	N112 12DB/OR	RADIATOR FAN RELAY NO. 2 AND NO. 3 COMMON OUTPUT
2	Z823 12BK/DG	GROUND



RADIATOR FAN RELAY NO. 1 (DIESEL)

RADIATOR FAN RELAY NO. 1 (DIESEL) - BLUE 9 WAY

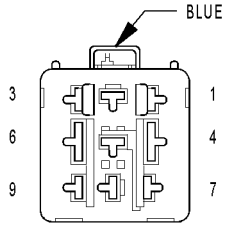
CAV	CIRCUIT	FUNCTION
1	-	-
2	N201 12DB/LG	RADIATOR FAN RELAY NO. 1 OUTPUT
3	-	-
4	K342 16BR/WT	ECM/PCM RELAY OUTPUT
5	-	-
6	N210 18DB/DG	LOW SPEED RADIATOR FAN RELAY CONTROL
7	-	-
8	A201 12RD/LG	FUSED B(+)
9	-	-



RADIATOR FAN RELAY NO. 2 (DIESEL)

RADIATOR FAN RELAY NO. 2 (DIESEL) - BLUE 9 WAY

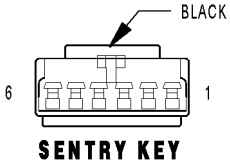
CAV	CIRCUIT	FUNCTION
1	-	-
2	N112 12DB/OR	RADIATOR FAN RELAY NO. 2 AND NO. 3 COMMON OUTPUT
3	-	-
4	K342 16BR/WT	ECM/PCM RELAY OUTPUT
5	-	-
6	N122 18DB/YL	HIGH SPEED RADIATOR FAN DUAL RELAY CONTROL
7	-	-
8	A112 12OR/RD	FUSED B(+)
9	-	-



RADIATOR FAN RELAY NO. 3 (DIESEL)

RADIATOR FAN RELAY NO. 3 (DIESEL) - BLUE 9 WAY

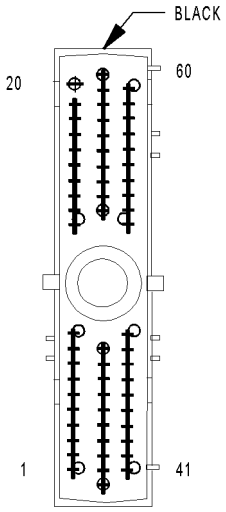
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z823 12BK/DG	GROUND
3	-	-
4	K342 16BR/WT	ECM/PCM RELAY OUTPUT
5	N112 12DB/OR	RADIATOR FAN RELAY NO. 2 AND NO. 3 COMMON OUTPUT
6	N122 18DB/YL	HIGH SPEED RADIATOR FAN DUAL RELAY CONTROL
7	-	-
8	N202 12DB/OR	RADIATOR FAN NO. 1 CONTROL
9	-	-



SENTRY KEY REMOTE ENTRY MODULE (SKREEM)

SENTRY KEY REMOTE ENTRY MODULE (SKREEM) - BLACK 6 WAY

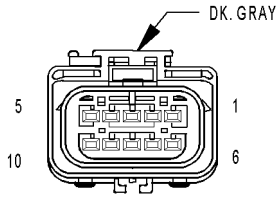
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20WT/VT	PCI BUS
3	-	-
4	F20 20PK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z120 22BK/WT	GROUND
6	A114 20GY/RD	FUSED B(+) (I.O.D.)



TRANSMISSION CONTROL MODULE (DIESEL)

TRANSMISSION CONTROL MODULE (DIESEL) - BLACK

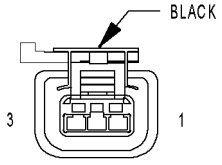
CAV	CIRCUIT	FUNCTION
1	T1 18DG/LB	TRS T1 SENSE
2	-	-
3	T3 18DG/DB	TRS T3 SENSE
4	-	-
5	-	-
6	K24 20BR/LB	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2
7	D15 20DG/YL	SCI TRANSMIT (TCM)
8	T751 20YL	FUSED IGNITION SWITCH OUTPUT (START)
9	T9 18DG/TN	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 20DG/LG	TORQUE MANAGEMENT REQUEST SENSE
11	F1 18PK/WT	FCM OUTPUT (UNLOCK-RUN-START)
12	K23 20BR/OR	ACCELERATOR PEDAL POSITION SENSOR SIGNAL NO. 2
13	T13 18DG/VT	SPEED SENSOR GROUND
14	T14 18DG/BR	OUTPUT SPEED SENSOR SIGNAL
15	T15 18YL/BR	TRANSMISSION CONTROL RELAY CONTROL
16	T16 18YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 18YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
18	-	-
19	T19 18YL/DB	2-4 SOLENOID CONTROL
20	T20 18DG/WT	L/R SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	T41 18DG/GY	TRS T41 SENSE
42	T42 18DG/YL	TRS T42 SENSE
43	D25 18WT/VT	PCI BUS
44	-	
45	-	
46	D123 20WT/OR	SCI RECEIVE (TCM)
47	T47 18YL/DG	2-4 PRESSURE SWITCH SENSE
48	-	-
49	-	-
50	T50 18YL/TN	LOW/REVERSE PRESSURE SWITCH SENSE
51	K900 20DB/DG	SENSOR GROUND
52	T52 18DG/WT	INPUT SPEED SENSOR SIGNAL
53	Z132 16BK/YL	GROUND
54	T54 18DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	-	-
56	A104 18YL/RD	FUSED B(+)
57	Z133 16BK/LG	GROUND
58	N7 20DB/OR	VEHICLE SPEED SENSOR SIGNAL
59	T59 18YL/LB	UNDERDRIVE SOLENOID CONTROL
60	T60 18YL/GY	OVERDRIVE SOLENOID CONTROL



TRANSMISSION RANGE SENSOR

TRANSMISSION RANGE SENSOR - DK. GRAY 10 WAY

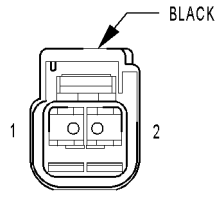
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	T13 18DG/VT	SPEED SENSOR GROUND
4	T54 18DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL
5	T41 18DG/GY (DIESEL)	TRS T41 SENSE
6	-	-
7	T1 18DG/LB	TRS T1 SENSE
8	T3 18DG/DB	TRS T3 SENSE
9	T42 18DG/YL	TRS T42 SENSE
10	T41 20DG/GY (DIESEL)	TRS T41 SENSE
10	T41 18DG/GY (GAS)	TRS T41 SENSE



VEHICLE SPEED SENSOR (MTX)

VEHICLE SPEED SENSOR (MTX) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL (2.4L)	5 VOLT SUPPLY
1	F202 18PK/GY (DIESEL)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	K900 18DB/DG (2.4L)	SENSOR GROUND
2	K900 20DB/DG (DIESEL)	SENSOR GROUND
3	N7 18DB/OR (2.4L)	VEHICLE SPEED SIGNAL
3	N7 20DB/OR (DIESEL)	VEHICLE SPEED SENSOR SIGNAL



WATER IN FUEL SENSOR (DIESEL)

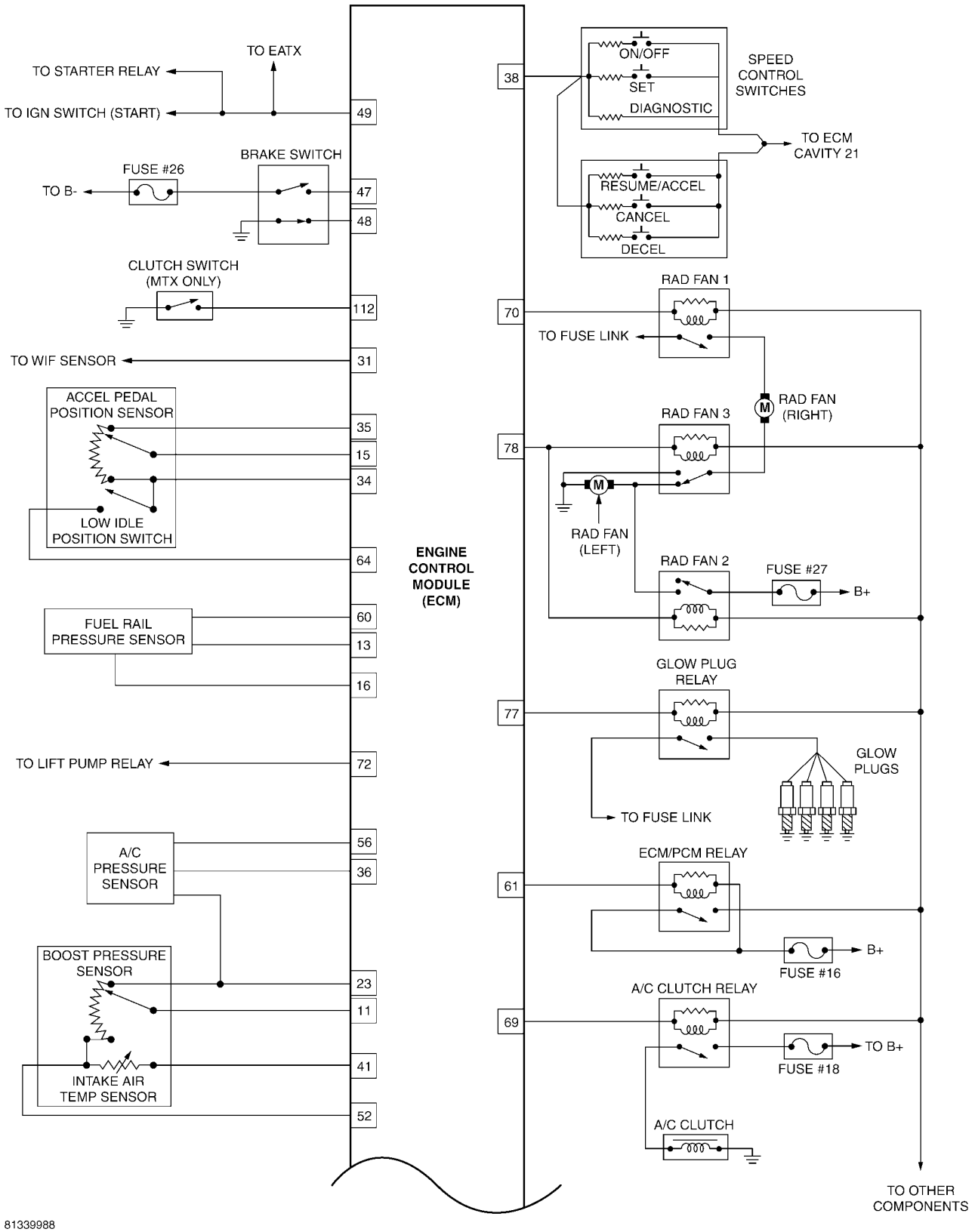
WATER IN FUEL SENSOR (DIESEL) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F853 20LG/RD	WATER IN FUEL SENSOR SIGNAL
2	K900 18RD	SENSOR GROUND

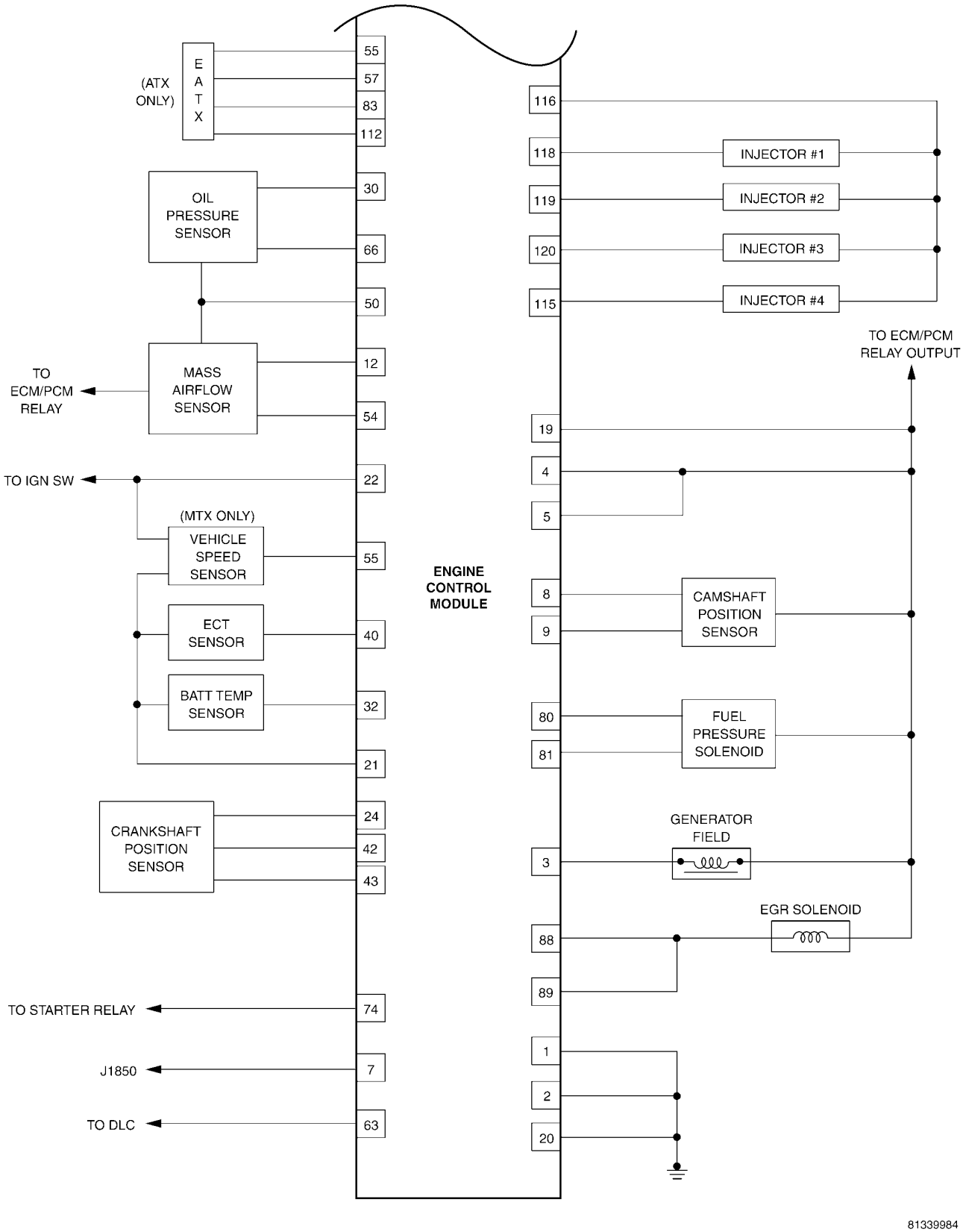
NOTES

10.0 SCHEMATIC DIAGRAMS

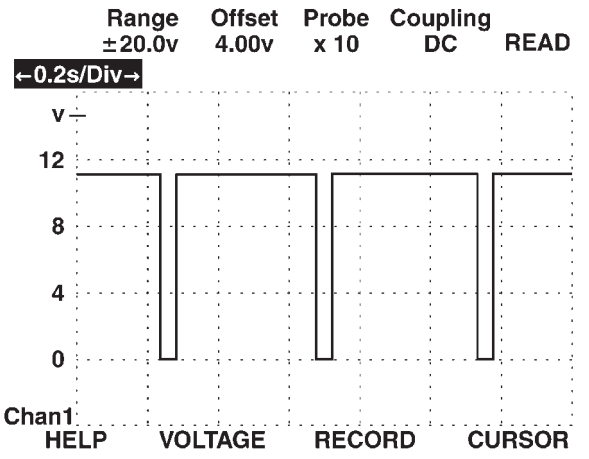
10.1 2003 RG 2.5L TURBO DIESEL



10.2 2003 RG 2.5L TURBO DIESEL

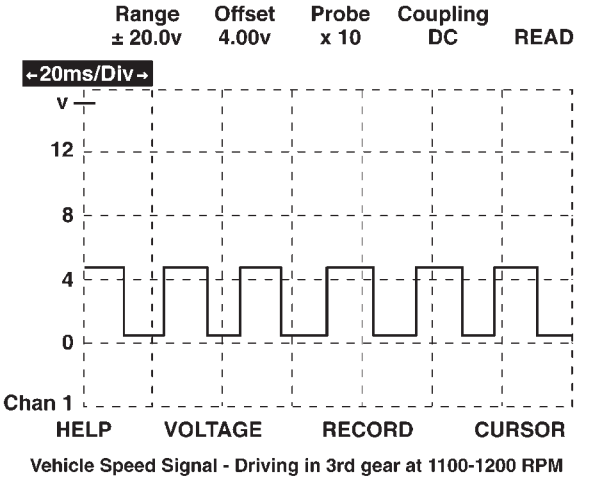


11.0 CHARTS AND GRAPHS



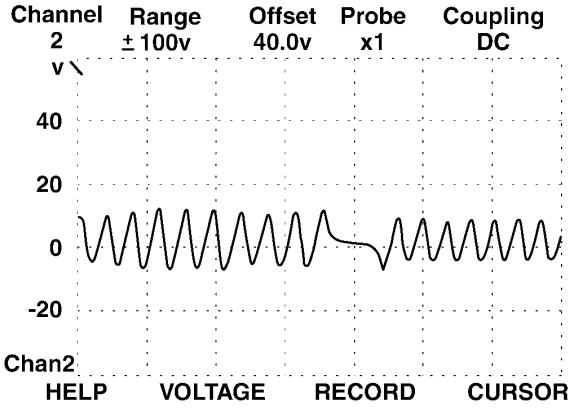
Camshaft Position Sensor Signal - During Engine Cranking

80c7708b



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

80bc7ab4



CRANKSHAFT POSITION SENSOR SIGNAL

811cbf3e

NOTES