TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

NOTES

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 remote entry module (SKREEM) 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 2004 Sprinter vehicles equipped with the 2.7L common rail diesel engine.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the engine control module (ECM) and sentry key immobilizer system (SKREEM) 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 otherwise specified within a particular test.

2.0 IDENTIFICATION OF SYSTEM

The ECM is located to the left of the steering column behind the steering column opening cover. The sentry remote entry module (SKREEM) is attached to the rear of the instrument cluster.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

The 2.7L direct injection diesel engine system is equipped with the latest 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 with exhaust emission feedback. 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 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 is programmed to monitor different circuits of the diesel fuel injection system. This monitoring is called on-board diagnostics.

Certain criteria must be met for a diagnostic 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 have 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 is turned on the ECM activates the glow plug relay for a time period that is determined by engine coolant temperature, intake air temperature and battery voltage.

Engine Start-Up Mode

The ECM uses the intake air temperature sensor, 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. EGR valve control is performed using feedback from the oxygen sensor. An oxygen sensor is located in the exhaust manifold to sample oxygen content exiting the engine cylinders. The ECM uses the O2 sensor, along with other sensor inputs, to govern the amount of exhaust gas recirculation to reduce HC (HydroCarbons) and CO (Carbon Monoxide). Engine coolant is routed through the base of the EGR valve to provide additional cooling of the exhaust gas, which further helps the reductions of emissions. The EGR valve has a self-cleaning function. When the engine is shut off, the EGR valve rotates twice to reduce carbon deposits at the valve seat.

Overheat Production Mode

If the engine temperature is above 105°C (221°F) and vehicle speed is above 40 km/h (25 MPH) the ECM will limit fuel quantity for engine protection.

Limp-In Mode

The ECM utilizes different degrees of engine limp-in. The ECM is able to limit engine rpm, engine power output (turbo boost reduction), activate engine cooling fan or all of these functions based on the type of fault that is detected. Critical engine performance faults such as accelerator pedal position sensor fault will result in a fixed idle speed of approximately 680 rpm regardless of actual pedal position. Other less critical faults will result in power reduction throughout the full range of driving conditions.

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 SKREEM OVERVIEW

The sentry key remote entry module system (SKREEM) is designed to prevent unauthorized vehicle operation. The system consists of a sentry key remote entry module (SKREEM), ignition key(s) equipped with a transponder chip and the 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 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 CAN Bus messages. This monitoring is called On-Board Diagnostics. Certain criteria must be met for a DTC to be entered into SKREEM memory. The criteria may be a range of; input voltage, CAN Bus message or coded messages to the SKREEM. If all the criteria for monitoring a circuit or function are met and a fault is detected, a DTC will be stored in the SKREEM memory and the START ERROR indicator will be turned on in the instrument cluster.

3.2.6 SKREEM OPERATION

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

After responding to the coded message, the transponder sends a transponder ID message to the SKREEM. The SKREEM compares the transponder ID message to the available valid key codes in SKREEM memory (8 key maximum at any one time). After validating the ignition key the SKREEM sends a CAN Bus message request to the ECM, then waits for the ECM response. If the ECM does not respond, the SKREEM will send the request again. If the ECM does not respond again, the SKREEM will stop sending the request and store a trouble code in memory. If the ECM sends a correct response to the SKREEM, the SKREEM sends a valid/invalid key message to the ECM. The ECM will allow or disallow engine operation based on this message.

Secret Key - an electronically stored value (identification number) that is unique to each SKREEM. The secret key is stored in the SKREEM, ECM and all ignition key transponders.
Challenge - 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 ID message to the SKREEM.

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, MAF, 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 system 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. MAF, ECT, ENG OIL, 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.
boost pressure sensor - signal voltage too high
boost pressure sensor - signal voltage too high
boost pressure sensor - can message error
boost pressure sensor - plausibility
intake air temperature sensor - signal voltage too high
intake air temperature sensor - signal voltage too low
engine coolant temperature sensor - signal voltage too high
engine coolant temperature sensor - signal voltage too low
engine coolant temperature sensor - plausibility
engine coolant temperature sensor - plausibility with engine oil sensor
fuel temperature sensor - signal voltage too high
fuel temperature sensor - signal voltage too low
fuel pressure sensor - signal voltage too high
fuel pressure sensor - signal voltage too low
cylinder 1 injector - short to voltage
cylinder 1 injector - excessive current
cylinder 1 injector - open or short to ground
cylinder 2 injector - short to voltage
cylinder 2 injector - excessive current
cylinder 2 injector - open or short to ground
cylinder 3 injector - short to voltage
cylinder 3 injector - excessive current
cylinder 3 injector - open or short to ground
cylinder 4 injector - short to voltage
cylinder 4 injector - excessive current
cylinder 4 injector - open or short to ground
cylinder 5 injector - short to voltage
cylinder 5 injector - excessive current
cylinder 5 injector - open or short to ground
misfire detection - cylinder misfire
wheel speed sensor - can data bus message from abs plausibility
can data bus - can bus circuit fault
atmospheric pressure sensor - signal voltage too high
atmospheric pressure sensor - signal voltage too low
accel pedal position sensor #1 - signal voltage is too high
accel pedal position sensor #1 - signal voltage is too low
accel pedal position sensor #1 - plausibility
accel pedal position sensor #2 - signal voltage is too high
accel pedal position sensor #2 - signal voltage is too low
accel pedal position sensor #2 - plausibility
glow plug module - excessive current
glow plug module - incorrect timer
glow plug module - communication error
glow plug module - internal fault
engine control relay - shuts off too early
engine control relay - shuts off too late
sensor reference voltage 1 circuit - voltage too high
sensor reference voltage 1 circuit - voltage too low
ignition voltage - voltage error
ecm - voltage supply is too highecm - read/write error
ecm - read error
ecm - write error
ecm - incorrect value
immobilizer fault - ecm error
immobilizer -
immobilizer - authentication error
immobilizer - incorrect key
acm circuit fault
fuel pressure sensor - signal voltage too high
fuel pressure sensor - signal voltage too low
water in fuel sensor - missing signal
water in fuel sensor - water in fuel
engine oil sensor - signal voltage too high
engine oil sensor - signal voltage too low
engine oil sensor - oil temperature plausibility
engine oil sensor - plausibility
fuel rail pressure monitoring - maximum fuel flow quantity exceeded
fuel rail pressure monitoring - fuel flow below specified minimum quantity
fuel rail pressure monitoring - rail pressure too low
fuel rail pressure monitoring - rail pressure too high
fuel rail pressure monitoring - maximum pressure exceeded
fuel rail pressure monitoring - rail pressure too low
fuel rail pressure monitoring - rail pressure too low
fuel rail pressure monitoring - rail pressure too low
fuel rail pressure monitoring - rail pressure too high
intake pressure sensor - signal voltage too high
intake pressure sensor - signal voltage too low
intake pressure sensor - plausibility with atmospheric pressure sensor
engine oil sensor - oil level out of range
engine oil sensor - invalid oil level
engine oil sensor - oil level out of range
engine oil sensor - quality error
engine oil sensor - oil quality out of range
engine oil sensor - oil quality plausibility
engine oil sensor - water contamination
camshaft position sensor - open circuit
camshaft position sensor - open or short circuit
camshaft position sensor - signal missing
camshaft position sensor - signal plausibility
fuel rail pressure monitoring - rail pressure too high
fuel rail pressure monitoring - deceleration error
fuel rail pressure monitoring - rail pressure too high
O2 sensor - signal voltage too high
O2 sensor - signal voltage too high
O2 sensor - signal voltage too high
engine oil sensor - open circuit
engine oil sensor - signal error
engine oil sensor - synchronization errorengine oil

sensor - monitoring error
intake air temperature sensor - signal voltage too high
intake air temperature sensor - signal voltage too low
mass air flow sensor - supply voltage too high
mass air flow sensor - supply voltage too low
mass air flow sensor - air mass to high
mass air flow sensor - air mass too low
mass air flow sensor - signal voltage too high
mass air flow sensor - signal voltage too low
mass air flow sensor - signal circuit open or shorted
mass air flow sensor - signal ratio too high
mass air flow sensor - signal ratio too low
mass air flow sensor - reference voltage plausibility
O2 sensor - signal error
O2 sensor - plausibility
O2 sensor - O2 level too low
O2 sensor - signal plausibility
fuel pump relay - short to voltage
fuel pump relay - short to ground
fuel pump relay - open circuit
fuel pump relay - excessive current
starter relay circuit - short circuit
boost pressure solenoid - short circuit
boost pressure solenoid - open circuit
boost pressure solenoid - excessive current
misfire detection - cylinder #1 misfire
misfire detection - cylinder #2 misfire
misfire detection - cylinder #3 misfire
misfire detection - cylinder #4 misfire
misfire detection - cylinder #5 misfire
engine shut off - internal fault
engine shut off - voltage error #1
engine shut off - voltage error #2
injector actuation - short to ground or voltage
injector actuation - low side short to ground
injector actuation - general fault
injector actuation - short to ground or voltage
injector actuation - low side short to ground
injector actuation - general fault
glow plug preglow - open or short to voltage
glow plug preglow - short to ground
glow plug preglow - excessive current
glow plug cylinder #1 - open or shorted to voltage
glow plug cylinder #2 - open or shorted to voltage
glow plug cylinder #3 - open or shorted to voltage
glow plug cylinder #4 - open or shorted to voltage
glow plug cylinder #5 - open or shorted to voltage
ecm - injector control
ecm - injector control
cylinder injector #1 - open circuitcylinder injector #2 - open circuit
cylinder injector #3 - open circuit
cylinder injector #4 - open circuit
cylinder injector #5 - open circuit
fuel pressure solenoid - plausibility
starter relay circuit - short to ground
starter relay circuit - open or short to voltage
starter relay circuit - excessive current
fuel shutdown solenoid - open circuit
fuel shutdown solenoid - excessive current
fuel shutdown solenoid - short to voltage
fuel shutdown solenoid - short to ground

torque reduction message from abs - message error
torque reduction message from abs - can plausibility
torque reduction message from abs - torque request message error
torque reduction message from abs - message missing
torque reduction message from tcm - message incomplete
torque reduction message from tcm - can plausibility
torque reduction message from tcm - torque request message error
torque reduction message from tcm - plausibility
can bus message - brake signal plausibility #1
can bus message - brake signal plausibility #2
can bus message - abs/esp message missing or incorrect
can bus message - shifter module error
can bus message - tcm error
can bus message - message transmission error
tcm dtc - internal fault
tcm dtc - internal fault
tcm dtc - 2-3 solenoid fault
tcm dtc - 3-4 solenoid fault
tcm dtc - torque converter solenoid fault
tcm dtc - modulating pressure solenoid fault
tcm dtc - shift pressure solenoid fault
tcm dtc - valve voltage supply fault
tcm dtc - speed sensor voltage supply fault
tcm dtc - skreem can message fault
tcm dtc - rear wheel speed plausibility
tcm dtc - incorrect transmission ratio
tcm dtc - can message plausibility
tcm dtc - tcc excessive power consumption fault
tcm dtc - fault code error
tcm dtc - gear comparison fault
abs/esp message - external quantity control fault
steering angle sensor can message - plausibility #1
steering angle sensor can message - plausibility #2
steering angle sensor can message - plausibility #3
steering angle sensor can message - plausibility #4
can bus message - message missing
can bus message - instrument cluster plausibility-lateral accelerator sensor - plausibility
steering angle sensor can message - plausibility
can bus message - tcm fault
can bus message - tcm message missing
sensor reference voltage 2 circuit - voltage too high
sensor reference voltage 2 circuit - voltage too low
ecm - internal fault

ecm - internal fault
ecm - internal fault
ecm - internal fault
ecm - internal fault
crankshaft position sensor - plausibility
ecm - internal fault
ecm injector monitoring - undervoltage
ecm injector monitoring - internal fault
ecm injector monitoring - internal fault
ecm injector monitoring - internal fault
ecm - internal fault
ecm - internal fault
ecm - internal fault
ecm - internal fault
accelerator pedal position sensor - plausibility
ecm - internal fault
ecm - internal fault
sensor reference voltage 3 circuit - voltage too high
sensor reference voltage 3 circuit - voltage too low
speed control - vehicle speed plausibility
speed control - excessive acceleration
speed control - excessive deceleration
ecm - checksum error
ecm - checksum error
ecm - invalid data
ecm - invalid coding
ecm - internal fault
ecm - internal fault
crankshaft position sensor - plausibility
kickdown switch - plausibility
ecm coding error - manual transmission coded as auto transmission
ecm coding error - auto transmission coded as manual transmission
ecm coding error - write to eeprom error
ecm coding error - can bus circuit interruption
ecm internal voltage error - voltage too high
ecm internal voltage error - voltage too low
injection fault - torque limit
injection fault - quantity error
injection fault - excessive engine speed
O2 sensor - plausibility
ecm - internal fault
egr valve - flow rate too high
egr valve - flow rate too lowecm - internal fault
ecm - internal fault
ecm - internal fault
boost pressure - boost pressure too low
boost pressure - boost pressures too high
O2 sensor - circuit fault
fuel shutdown solenoid - open circuit
fuel shutdown solenoid - excessive current
fuel shutdown solenoid - short to voltage
boost pressure solenoid - short to ground
boost pressure solenoid - unknown error
egr valve circuit - short to ground
inlet port shutoff - short to ground
crankcase vent heater - short to ground
crankcase vent heater - short to voltage
crankcase vent heater - open circuit
crankcase vent heater - excessive current
start attempt - improper start attempt
boost pressure solenoid - short to voltage
boost pressure solenoid - short to ground
boost pressure solenoid - open circuit
boost pressure solenoid - excessive current
egr valve circuit - short to voltage
egr valve circuit - short to ground
egr valve circuit - open circuit
egr valve circuit - excessive current
inlet port shutoff - short to voltage
inlet port shutoff - short to ground
inlet port shutoff - open circuit
inlet port shutoff - excessive current
injector #1 quantity calibration - too large
injector #1 quantity calibration - too small
injector #1 quantity calibration - to large
injector #1 quantity calibration - too small
injector #2 quantity calibration - too large
injector #2 quantity calibration - too small
injector #2 quantity calibration - too large
injector #2 quantity calibration - too small
injector #3 quantity calibration - too large
injector #3 quantity calibration - too small
injector #3 quantity calibration - too large
injector #3 quantity calibration - too small
injector #4 quantity calibration - too large
injector #4 quantity calibration - too small
injector #4 quantity calibration - too large
injector #4 quantity calibration - too small
injector #5 quantity calibration - too large
injector #5 quantity calibration - too small
injector #5 quantity calibration - too large
injector #5 quantity calibration - too smallglow plug preglow - short to voltage
glow plug preglow - short to ground
glow plug preglow - error
glow plug module - time error
glow plug module - communication error
glow plug module - excessive temperature error
cmp/ckp position sensor - sync error
mass air flow sensor - plausibility

3.3.4 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.

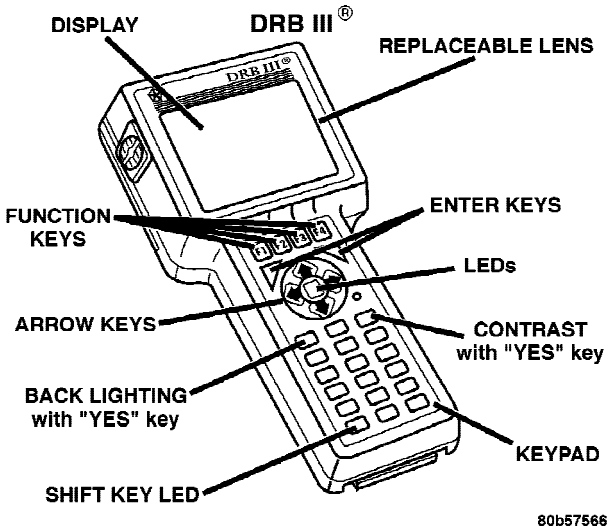
3.4.1 DRBIII® DOES NOT POWER UP

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 AREA 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 powertrain system problems, 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 the individuals performing the 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. At-

tempting 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 POSSIBLE 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 megaohms
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 on 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)
BCM	body control module
BP	boost pressure (sensor)
CKP	crankshaft position (sensor)

CMP	camshaft position (sensor)
CTM	central timer module
DLC	data link connector
ECM	engine control module
ECT	engine coolant temperature (sensor)
EGR	exhaust gas recirculation (solenoid/ valve)
EOS	engine oil sensor
IAT	intake air temperature (sensor)
IP	intake pressure sensor
MAF	mass air flow (sensor)
MIL	malfunction indicator lamp
ms	millisecond(s)
O2	oxygen sensor
PDC	power distribution center
S/C	speed control
SKREEM	sentry key remote entry module
SRC	signal range check
WIF	water in fuel (sensor)

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom List:

P0105-BOOST PRESSURE SENSOR CAN MESSAGE ERROR
P0105-BOOST PRESSURE SENSOR PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0105-BOOST PRESSURE SENSOR CAN MESSAGE ERROR.

POSSIBLE CAUSES
AIR FILTER
AIR RESTRICTION
INTERMITTENT CONDITION
CAN BUS COMMUNICATION DTCS
HIGH RESISTANCE IN THE BOOST PRESSURE SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN THE BOOST PRESSURE SENSOR GROUND CIRCUIT
CAN BUS CIRCUITS OPEN TO THE SHIFTER MODULE
HIGH RESISTANCE IN THE BOOST PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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. Test drive the vehicle. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 9	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

P0105-BOOST PRESSURE SENSOR CAN MESSAGE ERROR — 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	With the DRBIII®, read the active and stored DTCs for the Transmission Control Module. **NOTE: Due to capabilities of certain controllers that use the CAN Bus, not all modules report CAN Bus DTCs.** Is the TCM reporting active or stored CAN Bus communication DTCs related to the Shifter Module? Yes → Refer to symptom list to diagnose CAN Bus DTC in the TCM. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the Shifter Module harness connector. Disconnect the ECM harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance of both the CAN C Bus (+) circuit and the CAN C Bus (-) circuit between the Shifter Module harness connector and ECM harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 6 No → Repair the CAN C Bus (+) and/or CAN C Bus (-) circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Boost Pressure 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 high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All
7	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 8 No → Repair the Boost Pressure Sensor Ground circuit for high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All

P0105-BOOST PRESSURE SENSOR CAN MESSAGE ERROR — Continued

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

Symptom:

P0105-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0105-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: Boost Pressure Sensor Signal voltage is 4.9 volts or greater.

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: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 before diagnosing this DTC.** **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 rod are attached and functioning properly.** **NOTE: If a Boost Pressure Servo Motor DTC is present with this DTC, diagnose that 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

P0105-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 between ground and 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 Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage between ground and 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 **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
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

P0105-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 C2, 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 good terminal contact between the 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:

P0105-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0105-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: Boost Pressure Sensor Signal voltage is 0.2 volt or lower.

POSSIBLE CAUSES
INTERMITTENT CONDITION
BOOST PRESSURE SENSOR 5 VOLT SUPPLY CIRCUIT OPEN
BOOST PRESSURE 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	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 before diagnosing this DTC.** Turn the ignition on. With the DRB, read the Boost Pressure Sensor voltage. Is the voltage below 0.3 volt? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Turn the ignition on. Measure the voltage between ground and the Boost Pressure Sensor 5-Volt Supply circuit at the Boost Pressure Sensor harness connector. Is the voltage above 4.9 volts? Yes → Go To 3 No → Repair the Boost Pressure Sensor 5-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P0105-BOOST PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Turn the ignition on. Connect a jumper wire between the Boost Pressure Sensor Signal circuit and the Boost Pressure Sensor 5-Volt Supply circuit. With the DRB, read the Boost Pressure Sensor voltage. Is the Boost Pressure Sensor voltage above 4.5 volts? Yes → Replace the Boost Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Boost Pressure 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 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 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

P0105-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 List:

P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO HIGH
P2063-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO HIGH.

When Monitored and Set Condition:

P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature Sensor Signal voltage is above 4.83 volts.

P2063-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 4.83 volts.

POSSIBLE CAUSES
CHECK FOR ACTIVE DTC
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
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 5	All

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

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 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 IAT Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the ECM harness connector and the IAT 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 SIGNAL VOLTAGE TOO HIGH — 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:

P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO LOW
P2063-INTAKE AIR TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO LOW.

When Monitored and Set Condition:

P0110-INTAKE AIR TEMP SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature Sensor Signal voltage is below 0.073 volt for more than 60 seconds.

P2063-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 0.073 volt for more than 60 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR
INTAKE AIR TEMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
INTAKE AIR TEMP SENSOR SIGNAL 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. 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

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

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the 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 Intake Air Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the 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 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

P0110-INTAKE AIR TEMP SENSOR 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 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 PLAUSIBILITY

POSSIBLE CAUSES
ECT SENSOR
ECT SENSOR - COLD
ECT SENSOR - HOT
HGH RESISTANCE IN ECT SENSOR CIRCUITS
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 → Go To 2 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
2	**NOTE: The engine temperature must be below 50°C (120°F) for this test.** **NOTE: The thermostat must be operating correctly for this test to be valid.** With the DRBIII® in Sensors, read and note the engine coolant temperature. Using a temperature probe, measure the engine block temperature near the ECT Sensor. Are the readings within 7°C (13°F) of each other? Yes → Go To 3 No → Go To 4	All
3	**NOTE: The thermostat must be operating correctly for this test to be valid.** Start the engine and bring the engine to operating temperature (thermostat open). Turn the engine off and wait 10 minutes to allow the engine temperature to stabilize. Using a temperature probe, measure the engine block temperature near the ECT Sensor. With the DRBIII®, select Engine, then Sensors and read the engine coolant temperature. Are the readings within 7°C (13°F) of each other? Yes → Test Complete. No → Go To 4	All

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the ECT harness connector. Disconnect the ECM harness connectors. Measure the resistance of the ECT Sensor Signal circuit between the ECM harness connector and the ECT harness connector. 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 for each measurement? Yes → Replace the Engine Coolant Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ECT Sensor circuit(s) that measured above 10.0 ohms for high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT PLAUSIBILITY WITH ENGINE OIL SENSOR

When Monitored and Set Condition:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT PLAUSIBILITY WITH ENGINE OIL SENSOR

When Monitored: With the engine running.

Set Condition: The ECT Sensor signal indicates a different engine temperature than the EOS Sensor.

POSSIBLE CAUSES
CURRENT DTC
ECT SENSOR
ECT SENSOR - COLD
ECT SENSOR - HOT
ENGINE OIL SENSOR SENSOR
HGH RESISTANCE IN ECT SENSOR CIRCUITS
ENGINE COLD TOO LONG

TEST	ACTION	APPLICABILITY
1	Verify that the coolant level is correct. Start the engine. **NOTE: The thermostat must be operating correctly for this test to be valid.** With the DRBIII®, erase ECM DTCs. 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 → Go To 2 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
2	Turn the ignition on. With the DRBIII®, read the ECM DTCs. Did this DTC return after performing the previous test? Yes → Go To 3 No → Check for possible connecor or wiring problems at the ECT sensor that may cause an intermittent problem. Repair as necessary. Test Complete. Perform ROAD TEST VERIFICATION - VER-2.	All

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT PLAUSIBILITY WITH ENGINE OIL SENSOR — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The engine temperature must be below 50°C (120°F) for this test.** **NOTE: The thermostat must be operating correctly for this test to be valid.** With the DRBIII® in Sensors, read and note the engine coolant temperature. Using a temperature probe, measure the engine block temperature near the ECT Sensor. Are the readings within 7°C (13°F) of each other? Yes → Go To 4 No → Go To 5	All
4	**NOTE: The thermostat must be operating correctly for this test to be valid.** Start the engine and bring the engine to operating temperature (thermostat open). Turn the engine off and wait 10 minutes to allow the engine temperature to stabilize. Using a temperature probe, measure the engine block temperature near the ECT Sensor. With the DRBIII®, select Engine, then Sensors and read the engine coolant temperature. Are the readings within 7°C (13°F) of each other? Yes → Replace the Engine Oil Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 5	All
5	Disconnect the ECT harness connector. Disconnect the ECM harness connectors. Measure the resistance of the ECT Sensor Signal circuit between the ECM harness connector and the ECT harness connector. 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 for each measurement? Yes → Replace the Engine Coolant Temperature Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ECT Sensor circuit(s) that measured above 10.0 ohms for high resistance. 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 4.98 volts for more than 3 seconds.

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 4.90 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. Measure the voltage on the ECT Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the ECT Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

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

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

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

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

Symptom:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored and Set Condition:

P0115-ENGINE COOLANT TEMP SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature Sensor Signal voltage is below 0.1 volt for more than 3 seconds.

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

TEST	ACTION	APPLICABILITY
1	**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 0.1 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 and Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL TEMPERATURE SENSOR GROUND CIRCUIT OPEN
FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
FUEL TEMPERATURE SENSOR
FUEL TEMPERATURE 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 Fuel Temperature Sensor voltage. Is the Fuel Temperature Sensor voltage above 4.80 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Temperature Sensor harness connector. Turn the ignition on. Measure the voltage on the Fuel Temperature Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the Fuel Temperature Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Temperature Sensor harness connector. Connect a jumper wire between the Fuel Temperature Sensor harness connector cavities. Turn the ignition on. With the DRB, read the Fuel Temperature Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Fuel 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 Fuel Temperature Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Temperature Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the Fuel Temperature 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 Fuel Temperature Sensor harness connector. Measure the resistance of the Fuel 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 Fuel 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 List:

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO LOW
P2625-FUEL TEMPERATURE SENSOR PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO LOW.

When Monitored and Set Condition:

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

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

P2625-FUEL TEMPERATURE SENSOR PLAUSIBILITY

When Monitored: With the ignition on.

Set Condition: The Mass Air Flow Sensor Signal voltage is above 4.8 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL TEMPERATURE SENSOR
FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
FUEL 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 Fuel Temperature Sensor voltage. Is the Fuel Temperature Sensor voltage below 0.10 volt? Yes → Go To 2 No → Go To 5	All

P0180-FUEL TEMPERATURE SENSOR CIRCUIT - SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Fuel Temperature Sensor harness connector. Turn the ignition on. With the DRB, read the Fuel Temperature Sensor voltage. Is the voltage above 4.0 volts? Yes → Replace the Fuel Temperature Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Temperature Sensor harness connector. Measure the resistance between ground and the Fuel temperature Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Fuel 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 Fuel Temperature Sensor harness connector. Measure the resistance between the Fuel 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 Fuel Temperature Sensor Signal and Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO HIGH

P2008-FUEL PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be 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
FUEL PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
FUEL PRESSURE SENSOR
ENGINE CONTROL MODULE

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

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH-PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** **NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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 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 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 Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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

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

TEST	ACTION	APPLICABILITY
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 Fuel Pressure Sensor 5-Volt Supply circuit. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the Fuel Pressure Sensor 5-volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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

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

TEST	ACTION	APPLICABILITY
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
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 List:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW

P2008-FUEL PRESSURE SENSOR CIRCUIT SIGNAL VOLTAGE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW.

When Monitored and Set Condition:

P0190-FUEL PRESS SENSOR CIRCUIT MALF SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

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

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

TEST	ACTION	APPLICABILITY
1	**WARNING: THE FUEL INJECTION PUMP SUPPLIES HIGH-PRESSURE FUEL TO EACH INDIVIDUAL INJECTOR THROUGH HIGH-PRESSURE FUEL LINES. FUEL UNDER HIGH PRESSURE CAN PENETRATE SKIN AND CAUSE PERSONAL INJURY. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING.** **NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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 List:

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT
P0201-CYLINDER 1-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND
P0201-CYLINDER 1-INJECTOR CIRCUIT SHORTED TO VOLTAGE
P0202-CYLINDER 2-INJECTOR CIRCUIT EXCESSIVE CURRENT
P0202-CYLINDER 2-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND
P0202-CYLINDER 2-INJECTOR CIRCUIT SHORTED TO VOLTAGE
P0203-CYLINDER 3-INJECTOR CIRCUIT EXCESSIVE CURRENT
P0203-CYLINDER 3-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND
P0203-CYLINDER 3-INJECTOR CIRCUIT SHORTED TO VOLTAGE
P0204-CYLINDER 4-INJECTOR CIRCUIT EXCESSIVE CURRENT
P0204-CYLINDER 4-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND
P0204-CYLINDER 4-INJECTOR CIRCUIT SHORTED TO VOLTAGE
P0205-CYLINDER 5-INJECTOR CIRCUIT EXCESSIVE CURRENT
P0205-CYLINDER 5-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND
P0205-CYLINDER 5-INJECTOR CIRCUIT SHORTED TO VOLTAGE
P2123-INJECTOR CIRCUIT FAULT
P2123-INJECTOR CIRCUIT LOW SIDE SHORTED TO GROUND
P2123-INJECTOR CIRCUIT SHORTED TO GROUND OR VOLTAGE
P2124-INJECTOR CIRCUIT FAULT
P2124-INJECTOR CIRCUIT LOW SIDE SHORTED TO GROUND
P2124-INJECTOR CIRCUIT SHORTED TO GROUND OR VOLTAGE
P2141-CYLINDER #1 INJECTOR OPEN CIRCUIT
P2142-CYLINDER #2 INJECTOR OPEN CIRCUIT
P2143-CYLINDER #3 INJECTOR OPEN CIRCUIT
P2144-CYLINDER #4 INJECTOR OPEN CIRCUIT
P2145-CYLINDER #5 INJECTOR OPEN CIRCUIT

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

When Monitored and Set Condition:

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current through the Cylinder #1 Injector driver when on.

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT — Continued

P0201-CYLINDER 1-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND

When Monitored: With the engine running.

Set Condition: The ECM detects an open or short to ground on the Cylinder #1 Injector circuit.

P0201-CYLINDER 1-INJECTOR CIRCUIT SHORTED TO VOLTAGE

When Monitored: With the engine running.

Set Condition: The ECM detects a short to voltage on the Cylinder #1 Injector circuit.

P0202-CYLINDER 2-INJECTOR CIRCUIT EXCESSIVE CURRENT

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current through the Cylinder #2 Injector driver when on.

P0202-CYLINDER 2-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND

When Monitored: With the engine running.

Set Condition: The ECM detects an open or short to ground on the Cylinder #2 Injector circuit.

P0202-CYLINDER 2-INJECTOR CIRCUIT SHORTED TO VOLTAGE

When Monitored: With the engine running.

Set Condition: The ECM detects a short to voltage on the Cylinder #2 Injector circuit.

P0203-CYLINDER 3-INJECTOR CIRCUIT EXCESSIVE CURRENT

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current through the Cylinder #3 Injector driver when on.

P0203-CYLINDER 3-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND

When Monitored: With the engine running.

Set Condition: The ECM detects an open or short to ground on the Cylinder #3 Injector circuit.

P0203-CYLINDER 3-INJECTOR CIRCUIT SHORTED TO VOLTAGE

When Monitored: With the engine running.

Set Condition: The ECM detects a short to voltage on the Cylinder #3 Injector circuit.

P0204-CYLINDER 4-INJECTOR CIRCUIT EXCESSIVE CURRENT

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current through the Cylinder #4 Injector driver when on.

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT — Continued

P0204-CYLINDER 4-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND

When Monitored: With the engine running.

Set Condition: The ECM detects an open or short to ground on the Cylinder #4 Injector circuit.

P0204-CYLINDER 4-INJECTOR CIRCUIT SHORTED TO VOLTAGE

When Monitored: With the engine running.

Set Condition: The ECM detects a short to voltage on the Cylinder #4 Injector circuit.

P0205-CYLINDER 5-INJECTOR CIRCUIT EXCESSIVE CURRENT

When Monitored: With the engine running.

Set Condition: The ECM detects excessive current through the Cylinder #5 Injector driver when on.

P0205-CYLINDER 5-INJECTOR CIRCUIT OPEN OR SHORTED TO GROUND

When Monitored: With the engine running.

Set Condition: The ECM detects an open or short to ground on the Cylinder #5 Injector circuit.

P0205-CYLINDER 5-INJECTOR CIRCUIT SHORTED TO VOLTAGE

When Monitored: With the engine running.

Set Condition: The ECM detects a short to voltage on the Cylinder #5 Injector circuit.

POSSIBLE CAUSES
CHECKING ECM POWER AND GROUNDS
CHECKING THE ENGINE CONTROL RELAY SYSTEM
ENGINE CONTROL MODULE
INTERMITTENT CONDITION
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO VOLTAGE
FUEL INJECTOR CONTROL CIRCUIT SHORTED TO GROUND
FUEL INJECTOR CIRCUITS SHORTED TOGETHER
FUEL INJECTOR CONTROL CIRCUIT OPEN
FUEL INJECTOR

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT — 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 8	All
2	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Choose the appropriate result. Test light is on for all circuits. Go To 3 Test light is on for 1 or 2 circuits Repair the Engine Control Relay Output circuit(s) that did not illuminate brightly for an open. Perform ROAD TEST VERIFICATION - VER-2. Light off for all circuits. Refer to symptom Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect all of the Cylinder Fuel Injector harness connectors. Disconnect the ECM harness connectors. Remove the Engine Control Relay from Fuse Block No.1 Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector in Fuse Block No.1. Turn the ignition on. Measure the voltage of all of the 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 4	All

P0201-CYLINDER 1-INJECTOR CIRCUIT EXCESSIVE CURRENT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Fuel Injector harness connectors. Measure the resistance between ground and all of the 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
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect all of the Cylinder Fuel Injector harness connectors. Measure the resistance between Fuel Injector No. 1 harness connector cavities 1 and 2. Repeat the previous step for injectors 2, 3, 4, and 5. 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 6	All
6	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 7 No → Repair the appropriate Fuel Injector Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Replace the Cylinder Fuel Injector that was identified in the DTC 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 EXCESSIVE CURRENT — 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:
P0300-MISFIRE DETECTED

When Monitored and Set Condition:

P0300-MISFIRE DETECTED

When Monitored: With the engine running.

Set Condition: The ECM detects multiple misfires from one or more cylinders.

POSSIBLE CAUSES
ENGINE COMPRESSION
FUEL INJECTOR QUANTITY
INJECTOR LEAKAGE
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.** With the DRBIII®, erase ECM DTCs. Test drive the vehicle and attempt to duplicate the problem. With the DRB, read ECM DTC's. Did this DTC set again? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. With the DRBIII®, perform the Cylinder Compression Test. Is the cylinder compression within specification for all cylinders? Yes → Go To 3 No → Repair as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. With the DRBIII®, perform the Injector Quantity Test. Is the Injector Quantity within specification for all cylinders? Yes → Go To 4 No → Repair or replace as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P0300-MISFIRE DETECTED — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Perform the INJECTOR LEAKAGE TEST in accordance with the Service Information. Were any problems found? Yes → Repair or replace as necessary in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	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:

P0500-WHEEL SPEED SENSOR PLAUS - CAN BUS MESSAGE FROM ABS

When Monitored and Set Condition:

P0500-WHEEL SPEED SENSOR PLAUS - CAN BUS MESSAGE FROM ABS

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
CHECK FOR RELATED CONTROLLER ANTILOCK BRAKES DTCS
CHECK FOR RELATED TRANSMISSION CONTROL MODULE DTCS
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If the ECM displays multiple CAN Bus related DTC's, check the CAN Bus circuits at the ECM harness connector for proper connection before continuing with this test.** **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. With the DRB, read the ECM DTC's. Does the DRB display this DTC? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB, check for Controller Antilock Brakes DTCs. **NOTE: The ECM Receives vehicle speed messages via CAB Bus from the ABS module. An interruption on the CAN Bus can cause this fault to set.** Are any related CAB DTCs present? Yes → Refer to symptom list for problems related to CAB DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P0500-WHEEL SPEED SENSOR PLAUS - CAN BUS MESSAGE FROM ABS — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The TCM Receives vehicle speed messages via CAB Bus from the ABS module. An interruption on the CAN Bus can cause this fault to set.** Turn the ignition on. With the DRB, check the TCM for DTCs. Are any ABS CAN Bus Message or Vehicle Speed related TCM DTCs present? Yes → Replace the CAB in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
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:

P0600-CAN DATA BUS - BUS CIRCUIT FAULT

When Monitored and Set Condition:

P0600-CAN DATA BUS - BUS CIRCUIT FAULT

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INTERMITTENT CONDITION
CAN BUS COMMUNICATION DTCS
CAN BUS CIRCUITS OPEN TO TCM

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. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 4	All
2	With the DRBIII®, read the active and stored DTCs for all modules that use CAN Bus communication. **NOTE: Due to capabilities of certain controllers that use the CAN Bus, not all modules report CAN Bus DTCs.** **NOTE: If a total CAN Bus failure transpires, there will be multiple CAN Bus DTCs present in many modules. If the other modules are reporting Engine CAN Bus message faults or DTC's related to ECM CAN messages ONLY, answer No for the following question.** Are other modules reporting active or stored CAN Bus communication DTCs? Yes → Refer to symptom list for problems related to CAN Bus Failure. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

P0600-CAN DATA BUS - BUS CIRCUIT FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the TCM C2 harness connector. Disconnect the ECM harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance of both the CAN C Bus (+) circuit and the CAN C Bus (-) circuit between the TCM C2 harness connector and ECM harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Replace the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the CAN C Bus (+) and/or CAN C Bus (-) circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	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 BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH
P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW
P1617- ECM READ/WRITE ERROR
P1617- ECM WRITE ERROR
P1617-ECM INCORRECT VALUE
P1617-ECM READ ERROR
P2122-INTERNAL ERROR ENGINE SHUT OFF
P2139-ECM INJECTOR OUTPUT STAGE
P2140-ECM INJECTOR OUTPUT STAGE
P2153-STARTER RELAY CIRCUIT ECM THERMAL OVERLOAD
P2197-FUEL QUANTITY SOLENOID ECM THERMAL OVERLOAD
P2214-CAN MESSAGE ERROR
P2319-ECM INTERNAL ERROR 1
P2319-ECM INTERNAL ERROR 2
P2319-ECM INTERNAL ERROR 3
P2319-ECM INTERNAL ERROR 4
P2321-ECM INTERNAL ERROR 5
P2323-ECM INTERNAL ERROR
P2324-ECM INJECTOR MONITORING 1
P2324-ECM INJECTOR MONITORING 2
P2324-ECM INJECTOR MONITORING 3
P2324-ECM INJECTOR MONITORING 4
P2324-ECM INJECTOR UNDERVOLTAGE
P2325-ECM INTERNAL ERROR 1
P2325-ECM INTERNAL ERROR 2
P2325-ECM INTERNAL ERROR 3
P2325-ECM INTERNAL ERROR 4
P2329-ECM INTERNAL ERROR 1
P2330-ECM INTERNAL ERROR 1
P2342-ECM INTERNAL ERROR 1
P2342-ECM INTERNAL ERROR 2
P2350-INTERNAL VOLTAGE ERROR
P2352-INJECTION FAULT - QUANTITY ERROR
P2352-INJECTION FAULT - TORQUE LIMIT
P2352-INJECTION FAULT EXCESSIVE ENGINE SPEED
P2354-ECM INTERNAL FAULT
P2356-ECM INTERNAL ERROR
P2357-ECM INTERNAL ERROR
P2358-ECM INTERNAL ERROR
P2500-FUEL PRESSURE SOLENOID CIRCUIT EXCESSIVE CURRENT
P2514-CRANKCASE VENT HEATER EXCESSIVE CURRENT
P2526-BOOST PRESSURE SERVO MOTOR EXCESSIVE CURRENT

P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH — Continued
P2527-EGR VALVE EXCESSIVE CURRENT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH.

When Monitored and Set Condition:

P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM internal Atmospheric Pressure Sensor is faulty.

P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM internal Atmospheric Pressure Sensor is faulty.

P2500-FUEL PRESSURE SOLENOID CIRCUIT EXCESSIVE CURRENT

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INTERMITTENT CONDITION

P1105-ATMOSPHERIC PRESSURE SENSOR SIGNAL 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.** **NOTE: This DTC indicates an internal ECM problem except in the case of DTC P2352 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
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY
P1222-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO HIGH
P1222-ACC PEDAL POSITION SENSOR 1 CKT SIGNAL VOLTAGE TOO LOW
P1234-ACC PEDAL POSITION SENSOR 2 CIRCUIT PLAUSIBILITY
P1234-ACC PEDAL POSITION SENSOR 2 CKT SIGNAL VOLTAGE TOO HIGH
P1234-ACC PEDAL POSITION SENSOR 2 CKT SIGNAL VOLTAGE TOO LOW
P2327-APP SENSOR PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY.

POSSIBLE CAUSES
ACCELERATOR PEDAL POSITION SENSOR
ECM - APP SENSOR 1 5-VOLT SUPPLY CIRCUIT
SENSOR GROUND OPEN (APP SENSOR)
INTERMITTENT CONDITION
APP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
APP SENSOR SIGNAL CIRCUIT OPEN
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND
APP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
VERIFY APP SENSOR OPERATION
APP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
APP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
ECM - SENSOR GROUND OPEN
APP SENSOR CIRCUIT SHORTED TO VOLTAGE
APP SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
ECM - APP SENSOR SIGNAL CIRCUIT

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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 APP Sensor is a device that contains 2 separate potentiometer type sensors. Each sensor has its own 5-volt supply circuit, sensor ground circuit and signal circuit. The APP Sensor no longer incorporates a low-idle switch.** **NOTE: The APP Sensor 2 signal should always be approximately 1/2 the voltage of the APP Sensor 1 signal.** Turn the ignition on. Using a voltmeter, backprobe the APP Sensor 1 and APP Sensor 2 Signal circuits at the APP Sensor harness connector with the accelerator pedal in the at rest position. Is the voltage between 0.28 and 0.37 volt for sensor 1 and 0.10 and 0.19 volt for sensor 2? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. Fully depress the accelerator pedal. Using a voltmeter backprobe the APP Sensor harness connector and read the voltage for APP Sensor 1 and APP Sensor 2 Signal circuits. Is the voltage between 4.45 and 4.75 volts for #1 and 2.15 and 2.45 volts for #2? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition on. With the DRB, read the APP Sensor 1 and APP Sensor 2 percentages (%). With the accelerator pedal in the idle position, slowly depress the accelerator pedal until the pedal is fully depressed. **NOTE: The percentage readings for APP Sensors 1 and 2 should increase smoothly as the pedal is depressed.** **NOTE: This test can also performed using a voltmeter by back probing each APP Sensor Signal circuit at the APP Sensor harness connector and observing the voltmeter for a smooth voltage change through the entire pedal travel.** Does the percentage (voltage) increase smoothly for both readings with the accelerator pedal travel? Yes → Go To 4 No → Replace the Accelerator Pedal Position Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — 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 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
5	**NOTE: Perform the rest of this diagnostic procedure on the individual APP Sensor Potentiometer (1 or 2) that did not display the correct voltages in the previous test.** Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5-Volt Supply circuit in the APP Sensor harness connector. Is the voltage between 4.7 and 5.3 volts? Yes → Go To 6 No → Go To 14	All
6	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 7 No → Go To 10	All
7	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the APP Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the App Sensor Ground circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 8	All

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
8	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 9 No → Repair the APP Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the APP Sensor harness connector. Using a 12-volt test light connected to 12-volts, check the Sensor Ground circuit of the appropriate potentiometer. Does the test light illuminate brightly? Yes → Replace the Accelerator Pedal Position Sensor. 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
10	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 11 No → Repair the APP Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All
11	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 12	All
12	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 13	All

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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
14	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Accelerator Pedal Position Sensor 5-volt Supply circuit. Is the resistance below 10.0 ohms? Yes → Go To 15 No → Repair the Accelerator Pedal Position Sensor 5-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
15	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Accelerator Pedal Position Sensor 5-Volt Supply circuit and both Sensor Ground circuits in the APP Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 16 No → Repair the 5-Volt Supply circuit for a short to the Sensor Ground circuit. 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 between ground and the Accelerator Pedal Position Sensor 5-volt Supply circuit. Is the resistance below 1000 ohms? Yes → Repair the Accelerator Pedal Position Sensor 5-Volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 17	All

P1222-ACC PEDAL POSITION SENSOR 1 CKT PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the Accelerator Pedal Position Sensor 5-Volt Supply circuit in the ECM harness connector. Is the voltage above 1.0 volt? Yes → Repair the Accelerator Pedal Position 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

Symptom List:

P1482-GLOW PLUG MODULE - COMMUNICATION ERROR
P2537-GLOW PLUG CONTROL CIRCUIT PREGLOW FAULT
P2537-GLOW PLUG CONTROL CIRCUIT PREGLOW SHORT TO GROUND
P2537-GLOW PLUG CONTROL CIRCUIT PREGLOW SHORT TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1482-GLOW PLUG MODULE - COMMUNICATION ERROR.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
GLOW PLUG CONTROL SIGNAL CIRCUIT OPEN
GLOW PLUG CONTROL SIGNAL CIRCUIT SHORTED TO GROUND
GLOW PLUG CONTROL SIGNAL CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG 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.** Turn the ignition on. With the DRB, erase ECM DTCs. Perform several engine run cycles, turning the ignition off for at least 20 seconds between each engine run cycle. Turn the ignition on. 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 Glow Plug Module harness connectors. Disconnect the ECM harness connectors. Measure the resistance of the Glow Plug Control Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 3 No → Repair the Glow Plug Control Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P1482-GLOW PLUG MODULE - COMMUNICATION ERROR — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Glow Plug Module harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and the Glow Plug Control Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 4 No → Repair the Glow Plug Control Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Glow Plug Module harness connectors. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Measure the voltage of the Glow Plug Control Signal circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Glow Plug Control Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Replace the Glow Plug Module in accordance with the Service Information. 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 → Test Complete.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1482-GLOW PLUG MODULE - EXCESS CURRENT
P2133-GLOW PLUG FAILURE-CYLINDER #1
P2134-GLOW PLUG FAILURE-CYLINDER #2
P2135-GLOW PLUG FAILURE-CYLINDER #3
P2136-GLOW PLUG FAILURE-CYLINDER #4
P2137-GLOW PLUG FAILURE-CYLINDER #5

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1482-GLOW PLUG MODULE - EXCESS CURRENT.

POSSIBLE CAUSES
GLOW PLUG
GLOW PLUG CONTROL CIRCUIT OPEN
GLOW PLUG CONTROL CIRCUIT SHORTED TO GROUND
GLOW PLUG CONTROL CIRCUIT SHORTED TO VOLTAGE
GLOW PLUG 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.** Turn the ignition on. With the DRB, erase ECM DTCs. Perform several ignition cycles leaving the ignition on for at least 10 seconds then off for 10 seconds. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect each Glow Plug harness connector. Disconnect the Glow Plug Module harness connector. Measure the resistance of each Glow Plug Control circuit. Is the resistance below 10.0 ohms for each circuit? Yes → Go To 3 No → Repair the appropriate Glow Plug Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P1482-GLOW PLUG MODULE - EXCESS CURRENT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect each Glow Plug harness connector. Disconnect the Glow Plug Module harness connector. Measure the resistance between ground and each Glow Plug Control circuit. Is the resistance below 1000.0 ohms for any of the measurements? Yes → Repair the appropriate Glow Plug Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect each Glow Plug harness connector. Disconnect the Glow Plug Module harness connector. Turn the ignition on. Measure the voltage of each Glow Plug Control circuit. Is the voltage below 1.0 volt for each circuit? Yes → Go To 5 No → Repair the appropriate Glow Plug Control circuit for a short to voltage Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. With the DRBIII®, erase ECM DTCs. Refer to the Service Information and perform the Glow Plug Test on each Glow plug. Did each Glow Plug pass the test? Yes → Replace the Glow Plug Module. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the appropriate Glow Plug in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P1482-GLOW PLUG MODULE - INCORRECT TIMER
P1482-GLOW PLUG MODULE - INTERNAL FAULT
P2538-GLOW PLUG MODULE COMMUNICATION ERROR
P2538-GLOW PLUG MODULE EXCESSIVE CURRENT ERROR
P2538-GLOW PLUG MODULE TIMER ERROR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1482-GLOW PLUG MODULE - INCORRECT TIMER.

POSSIBLE CAUSES
GLOW PLUG 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 Glow Plug Control Module problem or an incorrect Glow Plug Module has been installed.** 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 Glow Plug Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All

P1482-GLOW PLUG MODULE - INCORRECT TIMER — 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:
P1610-ENGINE CONTROL RELAY SHUTS OFF TOO EARLY

When Monitored and Set Condition:

P1610-ENGINE CONTROL RELAY SHUTS OFF TOO EARLY

When Monitored: During after-run.

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

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for additional DTCs. Are other DTCs present? Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**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

P1610-ENGINE CONTROL RELAY SHUTS OFF TOO EARLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off. Install a substitute relay in place of the Engine Control Relay. Perform several ignition key cycles, pausing for at least 10 seconds between each cycle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 4 No → Replace the Engine Control Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the Engine Control Relay. Disconnect the ECM harness connectors. Measure the resistance of the Engine Control Relay Control circuit while wiggling the wiring harness and connectors between the ECM and the Fuse Block #1. Was the resistance above 10.0 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the Engine Control 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:

P1610-ENGINE CONTROL RELAY SHUTS OFF TOO LATE

When Monitored and Set Condition:

P1610-ENGINE CONTROL RELAY SHUTS OFF TOO LATE

When Monitored: During after-run.

Set Condition: The internal ECM timer determines that the Engine Control Relay remains on for more than 2.0 seconds after the ECM has turned off the Engine Control Relay.

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, check for additional DTCs. Are other DTCs present? Yes → Refer to the Symptom List for diagnosis of the other DTCs before continuing. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**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

P1610-ENGINE CONTROL RELAY SHUTS OFF TOO LATE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Install a substitute relay in place of the Engine Control 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 Engine Control Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the Engine Control Relay. Disconnect the ECM harness connectors. Measure the resistance between ground and the Engine Control Relay Control circuit while wiggling the wiring harness and connectors. Was the resistance below 1000.0 ohms at any time while wiggling the wiring harness and connectors? Yes → Repair the Engine Control 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 Engine Control Relay. Turn the ignition on. Measure the voltage of the Engine Control 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 Engine Control Relay Output circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P1610-ENGINE CONTROL RELAY 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:
P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO HIGH

When Monitored and Set Condition:

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to voltage on the APP Sensor 5-volt Supply circuit or the CMP Sensor 5-volt Supply circuit.

POSSIBLE CAUSES
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY 1 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. Turn the ignition off for 10 seconds. Start the engine. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the APP and CMP Sensors for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the APP and CMP Sensor harness connectors. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector in Fuse Block No.1. Turn the ignition on. Measure the voltage at ECM harness connector cavities C1-38, C1-37, C2-13, C2-24 and C2-25. Is the voltage above 1.0 volt for any of the measurements? Yes → Repair the circuit(s) that measured above 1.0 volt 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	**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:

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO LOW

When Monitored and Set Condition:

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to ground on the APP Sensor 5-volt Supply circuit or the CMP Sensor 5-volt Supply circuit.

POSSIBLE CAUSES
APP SENSOR
CMP SENSOR
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY 1 SHORTED TO GROUND
ACCEL PEDAL POSITION SENSOR 5-VOLT SUPPY CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
CAMSHAFT POSITION SENSOR 5-VOLT SUPPLY CIRCUIT 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, 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 8	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the APP and CMP Sensors for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the APP and CMP Sensor harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and ECM harness connector cavities C1-38, C1-37, C2-13, C2-24 and C2-25. Is the voltage below 1000 ohms for any of the measurements? Yes → Repair the circuit(s) that measured below 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the CMP Sensor 5-volt Supply circuit at the CMP Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Camshaft Position Sensor 5-volt Supply 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 the 5-volt Supply circuit and each of the Sensor Ground circuits at the APP Sensor harness connector. Is the resistance above 1000 ohms for both measurements? Yes → Go To 6 No → Repair the APP Sensor 5-volt Supply circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRB display this DTC? Yes → Go To 7 No → Replace the APP Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

P1611-SENSOR SUPPLY 1 VOLTAGE IS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read 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 → Replace the Camshaft Position Sensor. 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:
P1612-IGNITION VOLTAGE - VOLTAGE ERROR

POSSIBLE CAUSES
CHECK THE ECM POWER AND GROUNDS
ENGINE CONTROL MODULE
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	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 → Go To 2 No → Go To 3	All
2	Refer to symptom Checking the ECM Power and Grounds. Are the ECM Power and Ground circuits o.k.? Yes → Replace the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair as necessary. 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:

P1615-ECM VOLTAGE SUPPLY IS TOO HIGH
P1615-ECM VOLTAGE SUPPLY IS TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1615-ECM VOLTAGE SUPPLY IS TOO HIGH.

When Monitored and Set Condition:

P1615-ECM VOLTAGE SUPPLY IS TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage above 16 volts on the Battery Supply circuit(s).

P1615-ECM VOLTAGE SUPPLY IS TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects voltage below 8.0 volts on the ECM Battery Supply circuit(s).

POSSIBLE CAUSES
CHECKING ECM POWER AND GROUNDS
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 DRB, erase ECM DTCs. **NOTE: This DTC may be caused by a charging system problem. Refer to the Service Information and verify proper charging system operation before continuing.** Test drive the vehicle. Turn the ignition on. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 3	All

P1615-ECM VOLTAGE SUPPLY IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Refer to the symptom list and perform the Checking the ECM Power and Ground test. Were any problem found with the ECM powers and grounds? Yes → Repair as necessary. 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
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:

P1630-IMMOBILIZER
P1630-IMMOBILIZER
P1630-IMMOBILIZER
P1630-IMMOBILIZER
P2201-IMMOBILIZER CAN MESSAGE ERROR
P2243-NO MESSAGE RECEIVED FROM SKREEM

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1630-IMMOBILIZER.

POSSIBLE CAUSES
CHECKING SKREEM DTC'S
OPEN CAN BUS CIRCUITS
SKREEM 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.** 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 4	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the SKREEM and read SKREEM DTCs. **NOTE: If the DRB is unable to communicate with the SKREEM, refer to the appropriate test in the Communication category** Are there any SKREEM DTC's? Yes → Repair SKREEM DTC's as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1630-IMMOBILIZER — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the SKREEM Module harness connector. Disconnect the ECM harness connectors. Measure the resistance of each CAN Bus circuit between the ECM harness connector and the SKREEM harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Replace and program the SKREEM Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the open CAN Bus circuit(s) between the ECM and the SKREEM. 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:
P1681-ACM CIRCUIT FAULT

POSSIBLE CAUSES
AIRBAG CONTROL MODULE
INTERMITTENT CONDITION
ACM SIGNAL 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.** With the DRB, check the Airbag Module for proper communication and DTCs. If there are any ACM DTCs, repair them prior to continuing this test. Turn the ignition on. With the DRB, erase ECM DTCs. Start the engine. 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. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the ACM Signal circuit. Is the voltage below 1.0 volt? Yes → Replace the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P1681-ACM CIRCUIT FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Refer to the Service Information and disconnect the ACM harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay from the Fuse Block No.1 Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector in Fuse Block No.1. Turn the ignition on. Measure the voltage of the ACM Signal circuit. Is the voltage below 1.0 volt? Yes → Replace and program the Airbag Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the ACM Signal 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:

P2009-WATER IN FUEL SENSOR - WATER IN FUEL
P2009-WATER IN FUEL SENSOR SIGNAL ERROR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2009-WATER IN FUEL SENSOR - WATER IN FUEL.

POSSIBLE CAUSES
12-VOLT SUPPLY CIRCUIT OPEN
CHECKING ECM POWER AND GROUNDS
CHECKING THE ENGINE CONTROL RELAY SYSTEM
ECM - WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECM - WATER IN FUEL SENSOR SIGNAL SHORT TO GROUND
SENSOR GROUND CIRCUIT OPEN
WATER IN FUEL SENSOR FAILURE
WATER IN FUEL SENSOR SIGNAL CIRCUIT OPEN
WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO 12-VOLT SUPPLY
WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
WATER IN FUEL SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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: If you are here due to a P2009 indicating "Water In The Fuel Filter" DTC, ensure that the fuel system is not contaminated with water or other fluids before continuing.** **NOTE: If the fuel system is contaminated, refer to the Service Information to remove fuel, clean system and refill with known good fuel.** 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 11	All

P2009-WATER IN FUEL SENSOR - WATER IN FUEL — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Choose the appropriate result. Test light is on for all circuits. Go To 3 Test light is on for 1 or 2 circuits Repair the Engine Control Relay Output circuit(s) that did not illuminate brightly for an open. Perform ROAD TEST VERIFICATION - VER-2. Light off for all circuits. Refer to symptom Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Water In Fuel Sensor harness connector. Turn the ignition on. Measure the voltage of the Water In Fuel 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 6 Voltage is below 4.7 volts. Go To 8	All
4	Turn the ignition off. Disconnect the In Fuel Level Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the Water In Fuel Sensor Signal circuit. Is the voltage below 1.0 volt? Yes → Go To 5 No → Repair the Water In Fuel Sensor Signal circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P2009-WATER IN FUEL SENSOR - WATER IN FUEL — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Water In Fuel Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the 12-volt supply circuit and the Water In Fuel 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 Water In Fuel Sensor Signal circuit for a short to the 12-volt Supply circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Water In Fuel Sensor harness connector. Measure the resistance of the 12-Volt Supply circuit between the ECM harness connector and the Water In Fuel Sensor harness connector. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the 12-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Water In Fuel Sensor harness connector. Measure the resistance of the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Replace the Water In Fuel Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Water In Fuel Sensor harness connector. Measure the resistance of the Water In Fuel Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 9 No → Repair the Water In Fuel Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
9	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Water In Fuel Sensor harness connector. Measure the resistance between ground and the Water In Fuel Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 10 No → Repair the Water In Fuel Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P2009-WATER IN FUEL SENSOR - WATER IN FUEL — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Water In Fuel Sensor harness connector. Measure the resistance between Sensor Ground and the Water In Fuel 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 Water In Fuel Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
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. 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:

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW
P2065-MASS AIR FLOW SENSOR SUPPLY VOLTAGE TOO HIGH
P2065-MASS AIR FLOW SENSOR SUPPLY VOLTAGE TOO LOW
P2066-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO HIGH
P2066-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW
P2067-MASS AIR FLOW SENSOR SIGNAL CIRCUIT OPEN OR SHORTED
P2067-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO HIGH
P2067-MASS AIR FLOW SENSOR SIGNAL VOLTAGE TOO LOW
P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO ERROR
P2633-MAF SENSOR SIGNAL PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW.

When Monitored and Set Condition:

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

P2066-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO HIGH

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

P2066-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

P2067-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 4.8 volts.

P2067-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.

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW — Continued

P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO ERROR

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

POSSIBLE CAUSES
12 VOLT SUPPLY CIRCUIT OPEN
CHECKING THE ENGINE CONTROL RELAY SYSTEM
ECM - 5-VOLT SUPPLY CIRCUIT
MASS AIRFLOW SENSOR
SENSOR GROUND OPEN
INTERMITTENT CONDITION
MAF SENSOR 5 VOLT SUPPLY CIRCUIT OPEN
MAF SENSOR SIGNAL CIRCUIT OPEN
MAF 5 VOLT SUPPLY CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
MAF SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECM SENSOR GROUND CIRCUIT OPEN
MAF SENSOR 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAF SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
MAF SENSOR 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
MAF SENSOR CIRCUIT SHORTED TO VOLTAGE
ECM - MAF SENSOR SIGNAL CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 before diagnosing this DTC.** **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.** **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 17	All

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Check the ECM for other ECM DTC's related to circuits that are open, shorted to ground or low voltage problems.** Does the DRB also display these type of DTC's? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Turn the ignition on. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C1 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly for each circuit? Yes → Go To 4 No → Refer to symptom list and perform Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
4	**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 MAF Sensor 5 Volt Supply circuit in MAF Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 5 No → Go To 13	All
5	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 6	All
6	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 7 No → Repair the MAF Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
7	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 8	All
8	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 9	All
9	Turn the ignition off. Disconnect the MAF Sensor harness connector. Connect a jumper wire between MAF Sensor Signal circuit and the 5-volt supply 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 10 No → 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 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 11 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
11	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 12 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the MAF Sensor harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the 12 Volt Supply circuit in the MAF Sensor harness connector Does the test light illuminate brightly? Yes → Replace the MAF Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the 12 Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
13	Turn the ignition off. Disconnect the MAF 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 14 No → Repair the MAF Sensor 5 Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
14	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the MAF Sensor 5 Volt Supply circuit and the Sensor Ground circuit at the MAF Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 15 No → Repair the MAF 5 Volt Supply circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
15	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the MAF Sensor 5 Volt Supply circuit at the MAF harness connector. Is the resistance below 1000 ohms? Yes → Repair the MAF Sensor 5 Volt Supply circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 16	All

P2011-MASS AIR FLOW SENSOR PLAUSIBILITY AIR MASS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
16	Turn the ignition off. Disconnect the MAF Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the MAF Sensor 5 Volt Supply circuit in the ECM harness connector. Is the voltage above 1.0 volt? Yes → Repair the MAF 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
17	**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:

P2014-ENGINE OIL SENSOR OIL TEMPERATURE PLAUSIBILITY
P2014-ENGINE OIL SENSOR SIGNAL PLAUSIBILITY
P2014-ENGINE OIL SENSOR SIGNAL VOLTAGE IS TOO HIGH
P2014-ENGINE OIL SENSOR SIGNAL VOLTAGE IS TOO LOW
P2040-ENGINE OIL SENSOR CIRCUIT INVALID LEVEL
P2040-ENGINE OIL SENSOR CIRCUIT LEVEL OUT OF RANGE
P2040-ENGINE OIL SENSOR CIRCUIT LEVEL OUT OF RANGE
P2041-ENGINE OIL SENSOR POOR OIL QUALITY
P2041-ENGINE OIL SENSOR QUALITY MEASUREMENT ERROR
P2041-ENGINE OIL SENSOR QUALITY PLAUSIBILITY
P2042-ENGINE OIL SENSOR WATER CONTAMINATION
P2061-ENGINE OIL SENSOR OPEN CIRCUIT
P2062-ENGINE OIL SENSOR SIGNAL ERROR
P2062-ENGINE OIL SENSOR SYNCHRONIZATION ERROR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2014-ENGINE OIL SENSOR OIL TEMPERATURE PLAUSIBILITY.

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

P2014-ENGINE OIL SENSOR OIL TEMPERATURE PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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 engine oil must be at the proper level for this test to be valid. Refer to the Service Information and ensure the engine oil level is at the specified level.** 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
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. Turn the ignition off. **NOTE: This DTC implies that the engine may be contaminated by water, engine coolant or other material due to a mechanical or service failures such as failed gaskets, seals, cracks or incorrectly installed components.** Inspect the engine for conditions referred to in the above note. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Engine Oil Sensor harness connector. Turn the ignition on. Measure the voltage of the Engine Oil 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

P2014-ENGINE OIL SENSOR OIL TEMPERATURE PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Engine Oil Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the Engine Oil 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 Engine Oil 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 Engine Oil Sensor harness connector. Measure the resistance of the 5-Volt Supply circuit between the ECM harness connector and the Engine Oil Sensor harness connector. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the 5-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Engine Oil Sensor harness connector. Measure the resistance of the Sensor Ground circuit. Is the resistance below 10.0 ohms? Yes → Replace the Engine Oil 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 Engine Oil Sensor harness connector. Measure the resistance of the Engine Oil Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 8 No → Repair the Engine Oil 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 Engine Oil Sensor harness connector. Measure the resistance between ground and the Engine Oil Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 9 No → Repair the Engine Oil Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P2014-ENGINE OIL SENSOR OIL TEMPERATURE PLAUSIBILITY — Continued

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

Symptom List:

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED
P2016-FUEL RAIL PRESSURE MALFUNCTION FUEL FLOW BELOW MINIMUM QUANTITY
P2017-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE IS TOO LOW
P2018-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE IS TOO HIGH
P2019-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL PRESSURE EXCEEDED
P2019-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE IS TOO LOW
P2020-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE IS TOO LOW
P2021-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE TOO LOW
P2023-FUEL RAIL PRESSURE MALFUNCTION RAIL PRESSURE TOO HIGH
P2047-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL PRESSURE EXCEEDED
P2049-FUEL RAIL PRESSURE MALFUNCTION DECELERATION ERROR
P2051-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL PRESSURE EXCEEDED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED.

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
CHECKING THE FUEL DELIVERY SYSTEM
FUEL INJECTOR(S)
FUEL PRESSURE SOLENOID
FUEL PRESSURE SOLENOID
FUEL PUMP

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED — Continued

POSSIBLE CAUSES
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
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

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED — Continued

TEST	ACTION	APPLICABILITY
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
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

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED — Continued

TEST	ACTION	APPLICABILITY
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
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 QUANTITY 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 misfire 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

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED — Continued

TEST	ACTION	APPLICABILITY
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
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 QUANTITY 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

P2015-FUEL RAIL PRESSURE MALFUNCTION MAXIMUM FUEL FLOW EXCEEDED — Continued

TEST	ACTION	APPLICABILITY
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. Did this DTC set again? Yes → Go To 16 No → Test Complete.	All
16	Turn the ignition off. Replace the Fuel Quantity 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

Symptom:
P2025-INTAKE PRESSURE SENSOR PLAUSIBILITY

When Monitored and Set Condition:

P2025-INTAKE PRESSURE SENSOR PLAUSIBILITY

When Monitored: With the ignition on.

Set Condition: The Intake Pressure Sensor signal does not agree with the Atmospheric Pressure Sensor signal in the ECM.

POSSIBLE CAUSES
AIR FILTER
AIR RESTRICTION
INTERMITTENT CONDITION
HIGH RESISTANCE IN THE INTAKE PRESSURE SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN THE INTAKE PRESSURE SENSOR GROUND CIRCUIT
HIGH RESISTANCE IN THE INTAKE PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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. Test drive the vehicle. With the DRB, read ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 7	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

P2025-INTAKE PRESSURE SENSOR PLAUSIBILITY — 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. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Intake Pressure Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the Intake Pressure Sensor Signal circuit for high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Intake 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 Intake Pressure Sensor Ground circuit for high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Intake Pressure Sensor 5-volt Supply 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 Intake Pressure Sensor 5 Volt Supply circuit for high resistance. Perform ROAD TEST VERIFICATION - VER-2.	All

P2025-INTAKE PRESSURE SENSOR PLAUSIBILITY — 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:
P2025-INTAKE PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH

POSSIBLE CAUSES
INTERMITTENT CONDITION
INTAKE PRESSURE SENSOR GROUND CIRCUIT SHORTED TO VOLTAGE
INTAKE PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
INTAKE PRESSURE SENSOR GROUND CIRCUIT OPEN
INTAKE PRESSURE SENSOR
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 Boost Pressure Servo Motor and Servo Motor rod are attached and functioning properly.** 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 7	All
2	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Turn the ignition on. Measure the voltage between ground and the Intake Pressure Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Go To 3 No → Go To 4	All

P2025-INTAKE PRESSURE SENSOR SIGNAL VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage between ground and the Intake Pressure Sensor Signal circuit. Is the voltage above 1.0 volt? Yes → Repair the Intake 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 Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage between ground and the Intake Pressure Sensor Ground circuit. Is the voltage above 1.0 volt? Yes → Repair the Intake 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 Intake 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 Intake Pressure Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. **NOTE: Ensure all harness connectors are connected.** Turn the ignition on. Measure the voltage of the Intake Pressure Sensor Signal circuit by back probing ECM harness connector. Is the voltage above 4.85 volts? Yes → Replace the Intake Pressure Sensor. 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

P2025-INTAKE PRESSURE SENSOR 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:

P2025-INTAKE PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW

POSSIBLE CAUSES
INTERMITTENT CONDITION
INTAKE PRESSURE SENSOR 5 VOLT SUPPLY
INTAKE PRESSURE SENSOR
INTAKE PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
INTAKE PRESSURE SENSOR SIGNAL AND GROUND CIRCUITS SHORTED TOGETHER
ENGINE CONTROL MODULE
INTAKE PRESSURE SENSOR SIGNAL CIRCUIT 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.** **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 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 7	All
2	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Turn the ignition on. Measure the voltage between ground and the Intake Pressure Sensor 5 Volt Supply circuit. Is the voltage above 4.8 volts? Yes → Go To 3 No → Repair the Intake Pressure Sensor 5 Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2025-INTAKE PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Intake Pressure Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 4 No → Repair the Intake Pressure Sensor Signal circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Intake Pressure Sensor Signal circuit and Sensor Ground circuit. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Intake Pressure Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the Intake Pressure Sensor Signal circuit. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Intake Pressure Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Intake Pressure Sensor harness connector. Turn the ignition on. Connect a jumper wire between the Intake Pressure Sensor Signal and Intake Pressure Sensor 5 Volt Supply circuits. With the DRB, read the Intake Pressure Sensor voltage. Is the voltage above 4.5 volts? Yes → Replace the Intake Pressure Sensor. 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

P2025-INTAKE PRESSURE SENSOR SIGNAL VOLTAGE TOO LOW — Continued

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

Symptom List:

P2038-O2 SENSOR CIRCUIT FAULT
P2057-O2 SENSOR SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH
P2058-O2 SENSOR SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH
P2059-O2 SENSOR SIGNAL CIRCUIT SIGNAL VOLTAGE TOO HIGH
P2090-O2 SENSOR PLAUSIBILITY
P2090-O2 SENSOR SIGNAL FAULT
P2091-O2 SENSOR LOW O2 CONCENTRATION
P2091-O2 SENSOR SIGNAL PLAUSIBILITY
P2195-O2 SENSOR HEATER CIRCUIT FAULT
P2353-O2 SENSOR PLAUSIBILITY
P2366-O2 CIRCUIT FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2038-O2 SENSOR CIRCUIT FAULT.

POSSIBLE CAUSES
CHECKING CIRCUIT INTEGRITY
ECM
O2 SENSOR
O2 SENSOR CIRCUIT SHORT TO GROUND
O2 SENSOR CIRCUIT SHORT TO VOLTAGE
O2 SENSOR CIRCUIT SHORT TOGETHER
O2 SENSOR OPEN CIRCUIT
POWER SUPPLY OPEN
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 DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Test drive the vehicle. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 9	All

P2038-O2 SENSOR CIRCUIT FAULT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Using the Service Information wiring diagrams, inspect the wiring and connectors between the ECM and the O2 sensor for damage, corrosion, poor terminal contact or other problems. Were any problems found? Yes → Clean, repair or replace as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Power Supply circuit at the O2 harness connector cavity 4. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Power Supply circuit for an open or short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the ECM harness connectors. Perform the following resistance measurements from the O2 harness connector to the ECM harness connector. O2 Sensor Cavity 1 to ECM Cavity C1-15. O2 Sensor Cavity 2 to ECM Cavity C1-40. O2 Sensor Cavity 3 to ECM Cavity C1-72. O2 Sensor Cavity 5 to ECM Cavity C1-62. O2 Sensor Cavity 6 to ECM Cavity C1-39. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 5 No → Repair the circuit(s) that measured above 10.0 ohms for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and O2 Sensor harness connector cavities 1, 2, 3, 5, and 6. Is the resistance above 1000 ohms for each measurement? Yes → Go To 6 No → Repair the circuit(s) that measured below 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P2038-O2 SENSOR CIRCUIT FAULT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the ECM harness connectors. **NOTE: The circuits connecting the O2 Sensor and the ECM are single circuits and do not contain any splices. There should be NO continuity from one circuit to the other.** Using an ohmmeter, check the O2 Sensor circuits for shorts together (resistance below 1000 ohms).. Is the resistance from any O2 Sensor circuit to another below 1000 ohms? Yes → Repair the circuits that measured below 1000 ohms for a short together. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of O2 Sensor harness connector cavities 1, 2, 3, 5, and 6. Is the voltage below 1.0 volts for each measurement? Yes → Go To 8 No → Repair the circuit(s) that measured below 1000 ohms for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Replace the O2 Sensor in accordance with the Service Information. Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Replace the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

P2038-O2 SENSOR CIRCUIT FAULT — Continued

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

Symptom List:

P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN CIRCUIT
P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN OR SHORT CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN CIRCUIT.

POSSIBLE CAUSES
5-VOLT SUPPLY CIRCUIT OPEN
CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
DAMAGED CMP SENSOR OR CAMSHAFT
ECM
ECM - CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
SENSOR GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
CMP SENSOR SIGNAL CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
CMASHAFT POSITION SENSOR
ECM SENSOR GROUND CIRCUIT OPEN
CMP SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 before diagnosing this DTC.** **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 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 cranking the engine for at least 7 seconds. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 4 No → Go To 2	All

P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, erase the ECM DTCs. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Does the DRBIII® display this DTC? Yes → Go To 3 No → Go To 13	All
3	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Turn the ignition on. Measure the voltage of the CMP 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 10	All
4	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the CMP Position 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 Camshaft Position 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 CMP Sensor harness connector. Measure the resistance of the 5-Volt Supply circuit between the ECM harness connector and the CMP Sensor harness connector. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the 5-Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Sensor Ground circuit between the CMP Sensor harness connector and the ECM harness connector. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Sensor Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition on. Disconnect the ECT Sensor harness connector. Disconnect the Camshaft Position Sensor harness connector. Connect one end of a jumper wire to the ECT Sensor signal circuit in the ECT 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 Engine Coolant Temp volts. Is the voltage below 0.5 volt? Yes → Go To 8 No → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Remove the CMP Sensor. Inspect the 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 9	All
9	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

P2043-CAMSHAFT POSITION SENSOR CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the CMP Sensor Signal circuit. Is the resistance below 10.0 ohms? Yes → Go To 11 No → Repair the CMP Sensor Signal circuit for an open Perform ROAD TEST VERIFICATION - VER-2.	All
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and the CMP Sensor Signal circuit. Is the resistance below 1000 ohms? Yes → Repair the CMP Sensor Signal circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 12	All
12	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the CMP Sensor Signal circuit and the Sensor Ground circuit at the CMP Sensor harness connector. Is the resistance below 1000 ohms? Yes → Repair the CMP Sensor Signal and Sensor Ground circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2. No → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
13	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Remove the CMP Sensor and the CKP Sensor, checking for loose mounting screws and debris on the sensor magnets that can corrupt the sensor signal. 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:

P2045-CRANKSHAFT POSITION SENSOR CIRCUIT LOST SIGNAL
P2045-CRANKSHAFT POSITION SENSOR CIRCUIT SIGNAL PLAUSIBILITY
P2322-CRANKSHAFT POSITION SENSOR PLAUSIBILITY
P2343-CKP PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2045-CRANKSHAFT POSITION SENSOR CIRCUIT LOST SIGNAL.

POSSIBLE CAUSES
CKP MOUNTING AND FLYWHEEL
CRANKSHAFT POSITION SENSOR
ENGINE CONTROL MODULE
OPEN SHIELD CIRCUIT
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

P2045-CRANKSHAFT POSITION SENSOR CIRCUIT LOST SIGNAL — 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	Refer to the Service Information to ensure the Engine Drive Gears/Sprocket are installed correctly and the camshaft and crankshaft gears are timed correctly. 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

P2045-CRANKSHAFT POSITION SENSOR CIRCUIT LOST SIGNAL — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 both circuits? Yes → Go To 8 No → Replace the Crankshaft Position Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
8	Turn the ignition off. Inspect the CKP Sensor Shield circuit. Were any problems found? Yes → Repair the Shield circuit as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 9	All
9	Turn the ignition off. Inspect the CKP Sensor for signs of damage or improper/loose attachment to the engine. Inspect the flywheel for excessive dirt contamination or tooth damage which can cause improper CKP Sensor signal output. Where any of these problems found? Yes → Repair or replace as necessary. 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:

P2062-ENGINE OIL SENSOR MONITORING ERROR

POSSIBLE CAUSES
ENGINE OIL SENSOR
VERIFY THE CURRENT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Check the engine oil level. Add or remove as necessary to obtain proper engine oil level. Start the engine and allow it to reach operating temperature. Test drive the vehicle. With the DRBIII®, read the ECM DTCs. Did this DTC set again? Yes → Replace the Engine Oil Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Test complete. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO LARGE
P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO SMALL

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO LARGE.

When Monitored and Set Condition:

P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO LARGE

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO SMALL

When Monitored: With the ignition on.

Set Condition: The ECM detects a rationality problem with the MAF Sensor.

POSSIBLE CAUSES
MASS AIRFLOW SENSOR
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**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 → Replace the MAF Sensor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All

P2068-MASS AIR FLOW SENSOR PLAUSIBILITY SIGNAL RATIO TOO LARGE — 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 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:

P2100-FUEL PUMP RELAY CIRCUIT OPEN CIRCUIT
P2100-FUEL PUMP RELAY CIRCUIT SHORTED TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2100-FUEL PUMP RELAY CIRCUIT OPEN CIRCUIT.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ENGINE CONTROL RELAY OUTPUT 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 DRBIII®, erase the ECM DTCs. Crank and attempt to start the engine several times. With the DRBIII®, read the active ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Remove the Fuel Lift Pump Relay. Turn the ignition on. Using a 12-volt test light connected to ground, check the Engine Control Relay Output circuit. Did the test light illuminate brightly? Yes → Go To 3 No → Refer to Checking the ECM Power and Grounds for the related symptom(s). Perform ROAD TEST VERIFICATION - VER-2.	All

P2100-FUEL PUMP RELAY CIRCUIT OPEN 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. 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 5 No → Repair the Fuel Lift Pump Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Remove the Fuel Lift Pump Relay. Disconnect the ECM harness connectors. Measure the resistance of the Fuel Lift Pump Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fuel Lift Pump Relay Control 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 List:

P2100-FUEL PUMP RELAY CIRCUIT SHORTED TO VOLTAGE
P2100-FUEL PUMP RELAY EXCESSIVE CURRENT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2100-FUEL PUMP RELAY CIRCUIT SHORTED TO VOLTAGE.

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

P2100-FUEL PUMP RELAY CIRCUIT SHORTED TO VOLTAGE — 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. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 → Replace and program the Engine Control Module in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Fuel Lift Pump Relay Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom List:

P2104-STARTER RELAY CIRCUIT SHORT CIRCUIT
P2152-STARTER RELAY CIRCUIT SHORT TO GROUND
P2153-STARTER RELAY CIRCUIT OPEN OR SHORTED TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2104-STARTER RELAY CIRCUIT SHORT CIRCUIT.

When Monitored and Set Condition:

P2104-STARTER RELAY CIRCUIT SHORT CIRCUIT

When Monitored: During engine crank attempt.

Set Condition: The ECM detects too much current on the Starter Motor Relay Control circuit.

POSSIBLE CAUSES
CHECKING THE ENGINE CONTROL RELAY SYSTEM
INTERMITTENT CONDITION
SUBSTITUTE STARTER RELAY
STARTER RELAY CONTROL CIRCUIT SHORTED TO GROUND
STARTER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ENGINE CONTROL MODULE
STARTER RELAY CONTROL CIRCUIT 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 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 8	All

P2104-STARTER RELAY CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 before diagnosing this DTC.** **NOTE: Check the ECM for other ECM DTC's related to circuits that are open, shorted to ground or low voltage problems.** Does the DRB also display these type of DTC's? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Turn the ignition on. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly for each circuit? Yes → Go To 4 No → Refer to symptom list and perform Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Install a substitute relay in place of the 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 5 No → Replace the Starter Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Remove the Starter Relay. Disconnect the ECM harness connectors. Measure the resistance of the Starter Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the Starter Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Remove the Starter Relay. Disconnect the ECM harness connectors. Measure the resistance between ground and the Starter Relay Control circuit. Is the resistance above 1000 ohms? Yes → Go To 7 No → Repair the Starter Relay Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All

P2104-STARTER RELAY CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the Starter Relay. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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
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:

P2110-BOOST PRESSURE SERVO MOTOR CIRCUIT SHORT CIRCUIT
P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT EXCESSIVE CURRENT
P2526-BOOST PRESSURE SERVO MOTOR SHORT TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2110-BOOST PRESSURE SERVO MOTOR CIRCUIT SHORT CIRCUIT.

When Monitored and Set Condition:

P2110-BOOST PRESSURE SERVO MOTOR CIRCUIT SHORT CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects a short to battery on the Boost Pressure Servo Motor Control circuit.

POSSIBLE CAUSES
INTERMITTENT CONDITION
BOOST PRESSURE SERVO MOTOR
BOOST PRESSURE SERVO MOTOR CONTROL SHORT TO VOLTAGE
ENGINE CONTROL MODULE - INTERNAL
ENGINE CONTROL MODULE - INTERNAL SHORT TO VOLTAGE

P2110-BOOST PRESSURE SERVO MOTOR CIRCUIT SHORT CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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. 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 Boost Pressure Servo Motor harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Does the DRB display BOOST PRESSURE SERVO MOTOR OPEN CIRCUIT? Yes → Replace the Boost Pressure Servo Motor. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Boost Pressure Servo Motor harness connector. Turn the ignition on. Measure the voltage of the Boost Pressure Servo Motor 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
4	Turn the ignition off. Disconnect the Boost Pressure Servo Motor harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the Boost Pressure Servo Motor 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 Boost Pressure Servo Motor Control circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P2110-BOOST PRESSURE SERVO MOTOR CIRCUIT SHORT CIRCUIT — 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:

P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT OPEN CIRCUIT
P2510-BOOST PRESSURE SERVO MOTOR SHORT TO GROUND
P2526-BOOST PRESSURE SERVO MOTOR OPEN CIRCUIT
P2526-BOOST PRESSURE SERVO MOTOR SHORT TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT OPEN CIRCUIT.

When Monitored and Set Condition:

P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT OPEN CIRCUIT

When Monitored: With the ignition on.

Set Condition: The ECM detects an open or short to ground on the Boost Pressure Servo Motor Control circuit.

POSSIBLE CAUSES
CHECKING THE ENGINE CONTROL RELAY SYSTEM
INTERMITTENT CONDITION
12 VOLT SUPPLY CIRCUIT OPEN
BOOST PRESSURE SERVO MOTOR CONTROL CIRCUIT SHORTED TO GROUND
BOOST PRESSURE SERVO MOTOR CONTROL CKT OPEN
BOOST PRESSURE SERVO MOTOR
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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. Test drive the vehicle. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 8	All

P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Check the ECM for other ECM DTC's related to circuits that are open, shorted to ground or low voltage problems.** Does the DRB also display these type of DTC's? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C1 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly for each circuit? Yes → Go To 4 No → Refer to symptom list and perform Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Boost Pressure Servo Motor harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the 12 Volt Supply circuit in the Boost Pressure Servo Motor harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the 12 Volt Supply circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Boost Pressure Servo Motor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Boost Pressure Servo Motor Control circuit in the Boost Pressure Servo Motor harness connector and ground. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Boost Pressure Servo Motor Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the Boost Pressure Servo Motor harness connector. Disconnect the ECM harness connectors. Measure the resistance of the Boost Pressure Servo Motor Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the Boost Pressure Servo Motor Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2112-BOOST PRESSURE SERVO MOTOR CIRCUIT OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Install a substitute Boost Pressure Servo Motor in place of the vehicle's Boost Pressure Servo Motor. **NOTE: Ensure the ECM and Boost Pressure Servo Motor harness connectors are connected.** Turn the ignition on. With the DRB, check for this DTC to set again. 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 → Replace the Boost Pressure Servo Motor. 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 List:

P2132-GLOW PLUG CONTROL MODULE CIRCUIT SHORTED TO GROUND
P2132-GLOW PLUG CONTROL MODULE CIRCUIT SHORTED TO VOLTAGE OR OPEN
P2132-GLOW PLUG CONTROL MODULE FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2132-GLOW PLUG CONTROL MODULE CIRCUIT SHORTED TO GROUND.

POSSIBLE CAUSES
BATTERY SUPPLY CIRCUIT OPEN
GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
GLOW PLUG 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. Repeat this test several times. Did this DTC set again? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect the Glow Plug Control Module harness connector. Using a 12-volt test light connected to 12-volts, check the Ground circuit at the Glow Plug Control Module harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Glow Plug Control Module Ground circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2132-GLOW PLUG CONTROL MODULE CIRCUIT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Glow Plug Control Module harness connector. Using a 12-volt test light connected to ground, check the Battery Supply circuit at the Glow Plug Control Module harness connector. Does the test light illuminate brightly? Yes → Replace the Glow Plug Control Module. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Glow Plug Control Module Battery Supply 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 List:

P2151-FUEL PRESS SOLENOID SIGNAL IMPLAUSIBLE
P2500-FUEL PRESSURE SOLENOID CIRCUIT OPEN CIRCUIT
P2501-FUEL PRESSURE SOLENOID CIRCUIT SHORTED TO GROUND OR B+

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2151-FUEL PRESS SOLENOID SIGNAL IMPLAUSIBLE.

When Monitored and Set Condition:

P2500-FUEL PRESSURE SOLENOID CIRCUIT 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.

P2501-FUEL PRESSURE SOLENOID CIRCUIT SHORTED TO GROUND OR B+

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
CHECKING THE ENGINE CONTROL RELAY SYSTEM
INTERMITTENT CONDITION
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

P2151-FUEL PRESS SOLENOID SIGNAL IMPLAUSIBLE — 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	**NOTE: Check the ECM for other ECM DTC's related to circuits that are open, shorted to ground or low voltage problems.** Does the DRB also display these type of DTC's? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Turn the ignition on. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C1 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly for each circuit? Yes → Go To 4 No → Refer to symptom list and perform Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All

P2151-FUEL PRESS SOLENOID SIGNAL IMPLAUSIBLE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Fuel Pressure Solenoid harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control 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 5 No → Repair the Fuel Pressure Solenoid Control circuit for a short to voltage. 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 between ground and the Fuel Pressure Solenoid Control circuit. Measure the resistance between ground and the Fuel Pressure Solenoid 12-volt Supply Is the resistance above 1000 ohms for both measurements? Yes → Go To 6 No → Repair the Fuel Pressure Solenoid circuit(s) for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	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. Measure the resistance of the Fuel Pressure Solenoid 12-volt Supply circuit. Is the resistance below 10.0 ohms for both measurements? Yes → Go To 7 No → Repair the Fuel Pressure Solenoid circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2151-FUEL PRESS SOLENOID SIGNAL IMPLAUSIBLE — Continued

TEST	ACTION	APPLICABILITY
7	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 P2500-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 P2501-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 → 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 List:

P2197-FUEL QUANTITY SOLENOID OPEN CIRCUIT
P2198-FUEL QUANTITY SOLENOID SHORT TO VOLTAGE
P2199-FUEL QUANTITY SOLENOID SHORT TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2197-FUEL QUANTITY SOLENOID OPEN CIRCUIT.

POSSIBLE CAUSES
CHECKING ECM POWER AND GROUNDS
CHECKING THE ENGINE CONTROL RELAY SYSTEM
FUEL QUANTITY SOLENOID
FUEL QUANTITY SOLENOID CIRCUIT(S) SHORTED TO GROUND
FUEL QUANTITY SOLENOID CIRCUIT(S) SHORTED TO VOLTAGE
FUEL QUANTITY SOLENOID CIRCUIT(S) SHORTED TOGETHER
FUEL QUANTITY SOLENOID OPEN CIRCUIT(S)
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	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 → Go To 2 No → Go To 7	All

P2197-FUEL QUANTITY SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Choose the appropriate result. Test light is on for all circuits. Go To 3 Test light is on for 1 or 2 circuits Repair the Engine Control Relay Output circuit(s) that did not illuminate brightly for an open. Perform ROAD TEST VERIFICATION - VER-2. Light off for all circuits. Refer to symptom Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Quantity Solenoid harness connector. Measure the resistance of each of the Fuel Quantity Solenoid circuits between the ECM harness connector and the Fuel Quantity Solenoid harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 4 No → Repair the circuit(s) that measured above 10.0 ohms for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Quantity Solenoid harness connector. Measure the resistance between ground and each of the Fuel Quantity Solenoid circuits. Is the resistance above 1000 ohms for each measurement? Yes → Go To 5 No → Repair the circuit(s) that measured below 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Quantity Solenoid harness connector. Measure the resistance between the Fuel Quantity Solenoid circuits. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Fuel Quantity Solenoid circuits for a short together. Perform ROAD TEST VERIFICATION - VER-2.	All

P2197-FUEL QUANTITY SOLENOID OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the Fuel Quantity Solenoid harness connector. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage each of the Fuel Quantity Solenoid circuits. Is the voltage below 1.0 volt for each measurement? Yes → Replace the Fuel Quantity Solenoid in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the circuit(s) that measured above 1.0 volts for a short to voltage. 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:

P2203-TORQUE REDUCTION MESSAGE FROM ABS - CAN PLAUSIBILITY
P2203-TORQUE REDUCTION MESSAGE FROM ABS - MESSAGE ERROR
P2203-TORQUE REDUCTION MESSAGE FROM ABS - MESSAGES MISSING
P2203-TORQUE REDUCTION MESSAGE FROM ABS - NO COMMUNIOCATION
P2203-TORQUE REDUCTION MESSAGE FROM ABS - PLAUSIBILITY #1
P2203-TORQUE REDUCTION MESSAGE FROM ABS PLAUSIBILITY #2
P2208-ABS BRAKE SIGNAL CAN MESSAGE IMPLAUSIBLE
P2208-ABS CAN BRAKE SIGNAL PLAUSIBILITY
P2209-ABS CAN MESSAGE MISSING OR INCORRECT
P2253-STEERING ANGLE SENSOR PLAUSIBILITY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2203-TORQUE REDUCTION MESSAGE FROM ABS - CAN PLAUSIBILITY.

POSSIBLE CAUSES
CAB DTCS
ENGINE CONTROL MODULE
VERIFY CAB COMMUNICATION
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® attempt to communicate with the CAB. **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 CAB communicating with the DRB? Yes → Go To 2 No → Refer to the appropriate symptom in the Body Diagnostic Information. Perform BODY VERIFICATION TEST - VER 1.	All

P2203-TORQUE REDUCTION MESSAGE FROM ABS - CAN PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read the CAB DTCs. Are there any CAB DTCs? Yes → Refer to symptom list for problems related to CAB. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	**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 BODY VERIFICATION TEST - VER 1. No → Go To 4	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 BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

P2204-TORQUE REDUCTION MESSAGE FROM TCM - CAN PLAUSIBILITY
P2204-TORQUE REDUCTION MESSAGE FROM TCM - ENGINE STOP
P2204-TORQUE REDUCTION MESSAGE FROM TCM - MESSAGE ERROR
P2204-TORQUE REDUCTION MESSAGE FROM TCM - MESSAGES MISSING
P2204-TORQUE REDUCTION MESSAGE FROM TCM - PLAUSIBILITY
P2204-TORQUE REDUCTION MESSAGE FROM TCM - TCM DTC #1
P2204-TORQUE REDUCTION MESSAGE FROM TCM - TCM DTC #2

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2204-TORQUE REDUCTION MESSAGE FROM TCM - CAN PLAUSIBILITY.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
TCM DTCS
VERIFY TCM COMMUNICATION
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® attempt to communicate with the TCM. **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 TCM communicating with the DRB? Yes → Go To 2 No → Refer to the appropriate symptom in the Body Diagnostic Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. With the DRBIII®, read the TCM DTCs. Are there any TCM DTCs? Yes → Refer to symptom list for problems related to TCM. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

P2204-TORQUE REDUCTION MESSAGE FROM TCM - CAN PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
3	**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 BODY VERIFICATION TEST - VER 1. No → Go To 4	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 BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

P2210-ESM CAN MESSAGE MISSING OR INCORRECT
P2234-ABS DTC EXTERNAL QUANTITY CONTROL FAULT PRESENT
P2252-LATERAL ACCELERATOR SENSOR PLAUSIBILTY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2210-ESM CAN MESSAGE MISSING OR INCORRECT.

POSSIBLE CAUSES
ABS MODULE
CAN BUS CIRCUITS OPEN
INTERMITTENT CONDITION
ABS 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.** **NOTE: This DTC indicates a communication problem between the TCM and the ECM.** 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 → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to read ABS DTCs. **NOTE: If the DRB is unable to communicate with the ABS Module, refer to the symptom list for problem related to ABS Module Communication.** Are there any ABS DTCs? Yes → Refer to symptom list for problems related to ABS DTC's. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P2210-ESM CAN MESSAGE MISSING OR INCORRECT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ABS Module harness connectors. **NOTE: This code can be caused by an intermittent problem in the wiring and connectors to the ABS Module. Inspect the ABS harness connector and associated wiring for signs of poor terminal contact.** Turn the ignition on. Measure and note the voltage of both CAN Bus circuit at the ABS Module harness connector. Is the voltage between 2.2 volts and 2.8 volts for each measurement? Yes → Test Complete. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the CAN Bus circuit(s) 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 List:

P2211-ETC CAN MESSAGE MISSING OR INCORRECT
P2258-TCM MESSAGE ERROR
P2258-TCM NO CAN MESSAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2211-ETC CAN MESSAGE MISSING OR INCORRECT.

POSSIBLE CAUSES
CAN BUS CIRCUITS OPEN
TRANSMISSION CONTROL MODULE
INTERMITTENT CONDITION
TCM 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.** **NOTE: This DTC indicates a communication problem between the TCM and the ECM.** 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 → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to read TCM DTCs. **NOTE: If the DRB is unable to communicate with the TCM, refer to the symptom list for problem related to TCM Communication.** Are there any TCM DTCs? Yes → Refer to symptom list for problems related to TCM DTC's. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P2211-ETC CAN MESSAGE MISSING OR INCORRECT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TCM harness connectors. Turn the ignition on. Measure and note the voltage of both CAN Bus circuit at the TCM harness connector. **NOTE: This code can be caused by an intermittent problem in the wiring and connectors to the Transmission Control Module. Inspect the Transmission Control Module harness connector and associated wiring for signs of poor terminal contact.** Is the voltage between 2.2 volts and 2.8 volts for each measurement? Yes → Test Complete. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the CAN Bus circuit(s) 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 List:

P2217-TCM DTC INTERNAL FAULT PRESENT
P2218-TCM DTC 1-2 AND 4-5 SHIFT SOLENOID FAULT PRESENT
P2219-TCM DTC 2-3 SHIFT SOLENOID FAULT PRESENT
P2220-TCM DTC 3-4 SHIFT SOLENOID FAULT PRESENT
P2221-TCM DTC TORQUE CONVERTER CLUTCH SOLENOID FAULT PRESENT
P2222-TCM DTC MODULATING PRESSURE SOLENOID FAULT PRESENT
P2223-TCM DTC SHIFT PRESSURE SOLENOID FAULT PRESENT
P2224-TCM DTC VALVE VOLTAGE SUPPLY FAULT PRESENT
P2225-TCM DTC SPEED SENSOR VOLTAGE FAULT PRESENT
P2226-TCM DTC EWM CAN MESSAGE FAULT PRESENT
P2227-TCM DTC RIGHT REAR WHEEL SPEED IMPLAUSIBLE FAULT PRESENT
P2228-TCM DTC TRANSMISSION RATIO ERROR FAULT PRESENT
P2229-TCM DTC CAN MSG IMPLAUSIBLE FAULT PRESENT
P2230-TCM DTC TCC EXCESSIVE POWER CONSUMPTION FAULT PRESENT
P2231-TCM DTC NOT UNEQUIVOCAL FAULT PRESENT
P2232-TCM DTC NEGATIVE GEAR COMPARISON FAULT PRESENT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2217-TCM DTC INTERNAL FAULT PRESENT.

POSSIBLE CAUSES
VERIFY CURRENT DTC

P2217-TCM DTC INTERNAL FAULT PRESENT — 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.** **NOTE: This code was set in the ECM by the Transmission Control Module to indicate a transmission fault. Diagnosis of transmission faults should be done using the Transmission Diagnostic Information.** **NOTE: When repairs have been completed, the ECM and TCM must have codes cleared.** Turn the ignition on. With the DRBIII®, erase ECM DTCs only. With the DRBIII®, read ECM DTCs. Are there any TCM DTCs present in the ECM? Yes → Refer to Transmission Diagnostic Information for the related symptom(s). Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

P2240-ABS STEERING ANGLE SENSOR CAN MESSAGE IMPLAUSIBLE 1
P2240-ABS STEERING ANGLE SENSOR CAN MESSAGE IMPLAUSIBLE 2

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2240-ABS STEERING ANGLE SENSOR CAN MESSAGE IMPLAUSIBLE 1.

POSSIBLE CAUSES
CAN BUS CIRCUITS OPEN
STEERING ANGLE SENSOR
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 a communication problem between the Steering Angle Sensor and the ECM.** 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 → Go To 2 No → Go To 3	All
2	Turn the ignition off. Disconnect the Steering Angle Sensor harness connector. **NOTE: This code can be caused by an intermittent problem in the wiring and connectors to the Steering Angle Sensor. Inspect the Steering Angle Sensor harness connector and associated wiring for signs of poor terminal contact.** Turn the ignition on. Measure and note the voltage of both CAN Bus circuit at the Steering Angle Sensor harness connector. Is the voltage between 2.2 volts and 2.8 volts for each measurement? Yes → Test Complete. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the CAN Bus circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2240-ABS STEERING ANGLE SENSOR CAN MESSAGE IMPLAUSIBLE 1

— Continued

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

Symptom:
P2244-INSTRUMENT CLUSTER MESSAGE PLAUSIBILITY

POSSIBLE CAUSES
ENGINE CONTROL MODULE
INSTRUMENT CLUSTER DTCS
VERIFY INSTRUMENT CLUSTER COMMUNICATION
INTERMITTENT CONDITION

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 BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. With the DRBIII®, read the Instrument Cluster DTCs. Are there any Instrument Cluster DTCs? Yes → Refer to symptom list for problems related to Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	**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 BODY VERIFICATION TEST - VER 1. No → Go To 4	All

P2244-INSTRUMENT CLUSTER MESSAGE PLAUSIBILITY — 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 BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P2306-SENSOR SUPPLY 2 VOLTAGE IS TOO HIGH

POSSIBLE CAUSES
BOOST PRESSURE SENSOR
FUEL PRESSURE SENSOR
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY VOLTAGE 2 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. Turn the ignition off for 10 seconds. Start the engine. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the Boost Pressure Sensor and Fuel Pressure Sensor for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Boost Pressure Sensor and Fuel Pressure Sensor harness connectors. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector in Fuse Block No.1. Turn the ignition on. Measure the voltage at all circuits in the Fuel Pressure Sensor and Boost Pressure Sensor harness connector cavities. Is the voltage above 1.0 volt for any of the measurements? Yes → Repair the circuit(s) that measured above 1.0 volt for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P2306-SENSOR SUPPLY 2 VOLTAGE IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRB display this DTC? Yes → Go To 5 No → Replace the Fuel Pressure Sensor in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read 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 → Replace the Boost Pressure Sensor. 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:
P2306-SENSOR SUPPLY 2 VOLTAGE IS TOO LOW

POSSIBLE CAUSES
BOOST PRESSURE SENSOR
FUEL PRESSURE SENSOR
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY VOLTAGE 2 SHORTED TO GROUND
BOOST PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
ENGINE CONTROL MODULE
FUEL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

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 8	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the Boost Pressure Sensor and Fuel Pressure Sensor for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Boost Pressure Sensor and Fuel Pressure Sensor harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and all of the Fuel Pressure Sensor and Boost Pressure Sensor harness connector cavities. Is the voltage below 1000 ohms for any of the measurements? Yes → Repair the circuit(s) that measured below 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P2306-SENSOR SUPPLY 2 VOLTAGE IS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
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 at the Fuel Pressure Sensor harness connector. 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	Turn the ignition off. Disconnect the Boost Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the Boost Pressure Sensor Signal circuit at the Boost Pressure Sensor harness connector. 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 Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRB display this DTC? Yes → Go To 7 No → Replace the Boost Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the Fuel Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read 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 → Replace the Fuel Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

P2306-SENSOR SUPPLY 2 VOLTAGE IS 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:

P2332-SENSOR SUPPLY 3 VOLTAGE IS TOO LOW

POSSIBLE CAUSES
ENGINE OIL SENSOR
INTAKE AIR PRESSURE SENSOR
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY VOLTAGE 3 SHORTED TO GROUND
ENGINE CONTROL MODULE
ENGINE OIL SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
INTAKE AIR PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT

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 8	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the Intake Air Pressure Sensor and Engine Oil Sensors for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the Intake Air Pressure Sensor and Engine Oil Sensor harness connectors. Disconnect the ECM harness connectors. Measure the resistance between ground and all of the EOS and Intake Air Pressure Sensor harness connector cavities. Is the voltage below 1000 ohms for any of the measurements? Yes → Repair the circuit(s) that measured below 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P2332-SENSOR SUPPLY 3 VOLTAGE IS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Engine Oil Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the Engine Oil Sensor Signal circuit at the Engine Oil Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 5 No → Repair the Engine Oil Sensor Signal circuit for a short to the Sensor Ground circuit. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Intake Air Pressure Sensor harness connector. Disconnect the ECM harness connectors. Measure the resistance between the Sensor Ground circuit and the Intake Air Pressure Sensor Signal circuit at the Intake Air Pressure Sensor harness connector. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the Intake Air 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 Intake Air Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRB display this DTC? Yes → Go To 7 No → Replace the Intake Air Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
7	Turn the ignition off. Disconnect the Engine Oil Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read 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 → Replace the Engine Oil Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

P2332-SENSOR SUPPLY 3 VOLTAGE IS 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:

P2332-SENSOR SUPPLY 3 VOLTAGE IS TOO HIGH

POSSIBLE CAUSES
EO SENSOR
INTAKE AIR PRESSURE SENSOR
VISUAL WIRING AND CONNECTOR INSPECTION
INTERMITTENT CONDITION
SENSOR SUPPLY VOLTAGE 3 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. Turn the ignition off for 10 seconds. Start the engine. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Visually inspect the wiring and connectors associated with the Intake Air Pressure Sensor and Engine Oil Sensors for problems that may result in a short circuit. Were any problems found? Yes → Repair or replace wiring/connectors as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All

P2332-SENSOR SUPPLY 3 VOLTAGE IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Intake Air Pressure Sensor and Engine Oil Sensor harness connectors. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector in Fuse Block No.1. Turn the ignition on. Measure the voltage at all circuits in the Engine Oil Sensor and Intake Air Pressure Sensor harness connector cavities. Is the voltage above 1.0 volt for any of the measurements? Yes → Repair the circuit(s) that measured above 1.0 volt for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Engine Oil Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read ECM DTCs. Does the DRB display this DTC? Yes → Go To 5 No → Replace the Engine Oil Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Intake Air Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, erase ECM DTCs. Turn the ignition off for 10 seconds. Turn the ignition on. With the DRBIII®, read 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 → Replace the Intake Air Pressure Sensor. Perform ROAD TEST VERIFICATION - VER-2.	All

P2332-SENSOR SUPPLY 3 VOLTAGE IS 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 List:

P2333-S/C VEHICLE SPEED PLAUSIBILITY
P2338-S/C EXCESSIVE ACCELERATION
P2338-S/C EXCESSIVE DECELERATION

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2333-S/C VEHICLE SPEED PLAUSIBILITY.

POSSIBLE CAUSES
CAB DTCS
OPEN CAN BUS CIRCUITS
VERIFY CAB COMMUNICATION
WHEEL SPEED VERIFICATION
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.** With the DRBIII®, erase ECM DTCs. Test drive the vehicle and attempt to duplicate the problem. With the DRB, read ECM DTC's. Did this DTC set again? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRBIII® attempt to communicate with the CAB. **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 CAB communicating with the DRB? Yes → Go To 3 No → Refer to the appropriate symptom in the Body Diagnostic Information. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition on. With the DRBIII®, read the CAB DTCs. Are there any CAB DTCs? Yes → Refer to symptom list for problems related to CAB. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 4	All

P2333-S/C VEHICLE SPEED PLAUSIBILITY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the CAB Module harness connector. Disconnect the ECM harness connectors. Measure the resistance of each CAN Bus circuit between the ECM harness connector and the CAB harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 5 No → Repair the open CAN Bus circuit(s) between the ECM and the SKREEM. Perform ROAD TEST VERIFICATION - VER-2.	All
5	With the DRBIII®, perform the Wheel Speed Test of the ABS system. Were any problems found? Yes → Repair wheel speed signal problem as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P2339-ECM CHECKSUM ERROR #1
P2339-ECM CHECKSUM ERROR #2
P2339-ECM INVALID CODING
P2339-ECM INVALID DATA

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2339-ECM CHECKSUM ERROR #1.

POSSIBLE CAUSES
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: This DTC indicates that an error occurred during ECM programming.** Turn the ignition on. With the DRBIII®, erase ECM DTCs. Refer to the Service Information and attempt to reprogram the ECM. 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 → Test Complete.	All

Symptom:
P2344-KICKDOWN SWITCH PLAUSIBILITY

POSSIBLE CAUSES
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: If there are any Accelerator Pedal Position Sensor DTC's present, repair the APP Sensor DTC's before continuing.** Turn the ignition on. With the DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Test drive the vehicle. Be sure to completely depress the accelerator pedal several times to activate the Kickdown Switch. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Test Complete. No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom List:

P2347-AUTOMATIC TRANSMISSION CODED AS MANUAL TRANSMISSION
P2347-CAN BUS CIRCUIT INTERUPTION
P2347-MANUAL TRANSMISSIO CODED AS AUTO TRANSMISSION
P2347-WRITE ERROR TO EEPROM

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2347-AUTOMATIC TRANSMISSION CODED AS MANUAL TRANSMISSION.

POSSIBLE CAUSES
ENGINE CONTROL MODULE
VERIFY ECM PROGRAMMING

TEST	ACTION	APPLICABILITY
1	Turn the Ignition on. With the DRBIII®, erase the ECM DTCs. With the DRBIII®, verify that the ECM is properly coded for the options and components that the vehicle is equipped with. **NOTE: Reprogram the ECM with correct information if necessary.** Start and idle the engine. With the DRBIII®, read 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 → Test complete. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
P2351-ECM SUPPLY VOLTAGE TOO LOW

POSSIBLE CAUSES
ECM
ECM IGNITION CIRCUIT OPEN
STARTER OR LIFT PUMP RELAY CIRCUIT(S) SHORTED TO 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 DRB, erase ECM DTCs. Turn the ignition off for 10 seconds. Test drive the vehicle. Monitor the DRB 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. Remove the Starter Relay and disconnect the Fuel Lift Pump harness connector Measure the resistance between ground and the Starter Relay control circuit. Measure the resistance between ground and the Fuel Lift Pump Relay control circuit. Did both circuits measure above 1000 ohms? Yes → Go To 3 No → Repair the relay control circuit(s) that did not measure above 1000 ohms for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the ECM harness connectors. Using the Service Wiring Information determine which circuits in the ECM harness connector provide Ignition Switch power to the ECM. Turn the ignition on. Using a 12-volt test light connected to ground, check each Ignition Switch Output circuits in the ECM harness connectors. Does the test light illuminate brightly for each circuit? Yes → Replace the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Ignition Supply circuit as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

P2351-ECM SUPPLY VOLTAGE TOO LOW — 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:

P2355-EGR FLOW RATE IS TOO HIGH
P2355-EGR FLOW RATE IS TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2355-EGR FLOW RATE IS TOO HIGH.

POSSIBLE CAUSES
AIR FILTER
AIR RESTRICTION
CHECKING FOR AIR LEAKS
EGR ACTUATION - 1200 RPM
EGR VALVE
MAF SENSOR
MAF SENSOR READING - 3OOO RPM
INTERMITTENT CONDITION
EGR RESTRICTION

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 10	All
2	Start and idle the engine. With the DRBIII® in Sensors, read the MAF mg/strk and compare it to the MAF SPEC mg/strk with the engine at idle. **NOTE: The MAF Sensor reading should be within 5% of the MAF Spec reading.** Is the MAF Sensor reading within 5% of the MAF Spec? Yes → Go To 3 No → Go To 7	All

P2355-EGR FLOW RATE IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Place the transmission in Park or Neutral for this test. Start the engine and increase engine the engine speed to 3000 RPM. With the DRBIII® in Sensors, read the MAF mg/strk and compare it to the MAF SPEC mg/strk with the engine speed at 3000 RPM. **NOTE: The MAF Sensor reading should be within 5% of the MAF Spec reading.** Is the MAF Sensor reading within 5% of the MAF Spec? Yes → Go To 4 No → Go To 7	All
4	**NOTE: Inspect the complete exhaust system for restriction. Restrictions in the exhaust system can cause improper EGR flow. Repair as necessary** Allow the engine to idle until the engine reaches operating temperature. With the DRBIII®, actuate the EGR Positioner with the engine idling. **NOTE: The EGR Positioner will actuate from 5% to 95%. With the engine idling at approximately 680 RPM the MAF reading should switch a minimum of 200 mg/strk between 5% and 95% of EGR actuation.** Note the MAF readings. Does the MAF switch a minimum of 200 mg/strk between 5% and 95% of EGR actuation? Yes → Go To 5 No → Go To 6	All
5	Allow the engine to idle until the engine reaches operating temperature. With the DRBIII®, actuate the EGR Positioner with the engine speed at 1200 RPM. **NOTE: The EGR Positioner will actuate from 5% to 95%. With the engine speed at approximately 1200 RPM the MAF reading should switch a minimum of 200 mg/strk between 5% and 95% of EGR actuation.** Note the MAF readings. Does the MAF switch a minimum of 200 mg/strk between 5% and 95% of EGR actuation? Yes → No problem found. Test complete. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 6	All
6	Turn the ignition off. Remove the EGR valve and check the valve and flow passages for debris or other restrictions. Were any problems found? Yes → Clean or repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Replace the EGR Valve. Perform ROAD TEST VERIFICATION - VER-2.	All
7	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 8	All

P2355-EGR FLOW RATE IS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	**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.** **NOTE: Inspect the exhaust system and related tubes for damage, restriction or poor connection. Any of these conditions can cause a this DTC to set.** Turn the ignition off. Inspect the intake system, exhaust system and related tubes and connections. Were any problems found? Yes → Repair or replace as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 9	All
9	Turn the ignition off. Remove the Intake Air Temperature Sensor. Connect smoke machine 84-04 to the Intake Air Temperature Sensor port in the 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 → Replace the MAF Sensor. 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 List:

P2359-BOOST PRESSURE TOO HIGH
P2359-BOOST PRESSURE TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2359-BOOST PRESSURE TOO HIGH.

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

P2359-BOOST PRESSURE TOO HIGH — 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 Intake Air Temperature Sensor port in the 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 Boost Pressure Servo Motor in accordance with the Service Information. **NOTE: Ensure the ECM and Boost Pressure Servo Motor 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 List:

P2511-EGR VALVE SIGNAL CIRCUIT SHORTED TO GROUND
P2527-EGR VALVE SIGNAL CIRCUIT OPEN CIRCUIT
P2527-EGR VALVE SIGNAL CIRCUIT SHORTED TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2511-EGR VALVE SIGNAL CIRCUIT SHORTED TO GROUND.

POSSIBLE CAUSES
CHECKING THE ENGINE CONTROL RELAY SYSTEM
INTERMITTENT CONDITION
ENGINE CONTROL RELAY OUTPUT CIRCUIT OPEN
EGR VALVE CONTROL CIRCUIT SHORTED TO GROUND
EGR VALVE CONTROL CIRCUIT OPEN
EGR SOLENOID
ENGINE CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1611, P2306 or P2332 is present with this DTC, diagnose DTCs P1611, P2306 or P2332 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. 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 8	All
2	**NOTE: Check the ECM for other ECM DTC's related to circuits that are open, shorted to ground or low voltage problems.** Does the DRB also display these type of DTC's? Yes → Go To 3 No → Go To 4	All

P2511-EGR VALVE SIGNAL CIRCUIT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly for each circuit? Yes → Go To 4 No → Refer to symptom list and perform Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the EGR Valve harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Engine Control Relay Output circuit in the EGR Valve harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Engine Control Relay Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the EGR Valve harness connector. Disconnect the ECM harness connectors. Measure the resistance between the EGR Valve Control circuit in the EGR Valve harness connector and ground. Is the resistance above 1000 ohms? Yes → Go To 6 No → Repair the EGR Valve Control circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
6	Turn the ignition off. Disconnect the EGR Valve harness connector. Disconnect the ECM harness connectors. Measure the resistance of the EGR Valve Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 7 No → Repair the EGR Valve Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

P2511-EGR VALVE SIGNAL CIRCUIT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Install a substitute EGR Solenoid in place of the vehicle's EGR Solenoid. **NOTE: Ensure the ECM and EGR Valve harness connectors are connected.** Turn the ignition on. With the DRB, check for this DTC to set again. 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 → Replace the EGR Solenoid. 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 List:

P2514-CRANKCASE VENT HEATER OPEN CIRCUIT
P2514-CRANKCASE VENT HEATER SHORTED TO GROUND
P2514-CRANKCASE VENT HEATER SHORTED TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2514-CRANKCASE VENT HEATER OPEN CIRCUIT.

POSSIBLE CAUSES
CHECKING ECM POWER AND GROUNDS
CHECKING THE ENGINE CONTROL RELAY SYSTEM
INTERMITTENT CONDITION
CRANKCASE VENT HEATER SHORTED TO VOLTAGE
CRANKCASE VENT HEATER CIRCUIT SHORTED TO GROUND
CRANKCASE HEATER VENT CIRCUIT(S) OPEN
CRANCASE VENT HEATER
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.** **NOTE: The engine should be cold for this test to be accurate.** Turn the ignition on. With the DRB, erase ECM DTCs. Perform several engine run cycles, turning the ignition off for at least 10 seconds between each engine run cycle. Monitor the DRB for ECM DTCs. Did this DTC set again? Yes → Go To 2 No → Go To 7	All

P2514-CRANKCASE VENT HEATER OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Choose the appropriate result. Test light is on for all circuits. Go To 3 Test light is on for 1 or 2 circuits Repair the Engine Control Relay Output circuit(s) that did not illuminate brightly for an open. Perform ROAD TEST VERIFICATION - VER-2. Light off for all circuits. Refer to symptom Checking the ECM Power and Grounds. Perform ROAD TEST VERIFICATION - VER-2.	All
3	Turn the ignition off. Disconnect the Crankcase Vent Heater harness connector. Disconnect the ECM harness connectors. Measure the resistance of the both circuits between the Crankcase Vent Heater harness connector and the ECM harness connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 4 No → Repair the Crankcase Vent Heater circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Disconnect the Crankcase Vent Heater harness connector. Disconnect the ECM harness connectors. Measure the resistance between ground and both of the Crankcase Vent Heater circuits. Is the resistance above 1000 ohms for each circuit? Yes → Go To 5 No → Repair the Crankcase Vent Heater circuit(s) for a short to ground. Perform ROAD TEST VERIFICATION - VER-2.	All
5	Turn the ignition off. Disconnect the Crankcase Vent Heater harness connector. Disconnect the ECM harness connectors. Turn the ignition on. Measure the voltage of the both Crankcase Vent Heater circuits. Is the voltage below 1.0 volt for each circuit? Yes → Go To 6 No → Repair the Crankcase Vent Heater circuit for a short to voltage. Perform ROAD TEST VERIFICATION - VER-2.	All

P2514-CRANKCASE VENT HEATER OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Install a substitute Crankcase Vent Heater in place of the vehicle's existing Crankcase Vent Heater. **NOTE: Ensure the ECM and Crankcase Vent Heater harness connectors are connected.** With the engine cold, start and idle the engine. With the DRB, check for this DTC to set again. 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 → Replace the initial Crankcase Vent Heater. 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:
P2521-IMPROPER START ATTEMPT

POSSIBLE CAUSES
VERIFY ACTIVE DTC
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.** **NOTE: This DTC indicates that engine rotation has occurred without an ignition switch Start input. This can occurred when an attempt to start the vehicle using a push start method.** **NOTE: Consult with the customer to determine if a push start has been attempted.** 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 → Test complete. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:
P2527-EGR VALVE SIGNAL CIRCUIT SHORTED TO VOLTAGE

POSSIBLE CAUSES
INTERMITTENT CONDITION
EGR SOLENOID
EGR VALVE 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 Valve harness connector. Turn the ignition on. With the DRB, erase ECM DTCs. Monitor the DRB for ECM DTCs. Does the DRB display an EGR OPEN CIRCUIT DTC? Yes → Replace the EGR Solenoid. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 3	All
3	Turn the ignition off. Disconnect the EGR Valve harness connector. Turn the ignition on. Measure the voltage of the EGR Valve Control circuit at the EGR Valve 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

P2527-EGR VALVE SIGNAL CIRCUIT SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: If DTC P1611 or P2306 is present with this DTC, diagnose DTCs P1611 and P2306 before diagnosing this DTC.** Turn the ignition off. Disconnect the EGR Valve harness connector. Disconnect the ECM harness connectors. Remove the Engine Control Relay. Connect a jumper wire between cavity 30 and cavity 87 of the Engine Control Relay connector. Turn the ignition on. Measure the voltage of the EGR Valve 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 Valve 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 List:

P2531-FUEL INJECTOR 1 READ TOO LARGE
P2531-FUEL INJECTOR 1 READ TOO LARGE
P2531-FUEL INJECTOR 1 READ TOO SMALL
P2531-FUEL INJECTOR 1 READ TOO SMALL
P2532-FUEL INJECTOR 2 READ TOO LARGE
P2532-FUEL INJECTOR 2 READ TOO LARGE
P2532-FUEL INJECTOR 2 READ TOO SMALL
P2532-FUEL INJECTOR 2 READ TOO SMALL
P2533-FUEL INJECTOR 3 READ TOO LARGE
P2533-FUEL INJECTOR 3 READ TOO LARGE
P2533-FUEL INJECTOR 3 READ TOO SMALL
P2533-FUEL INJECTOR 3 READ TOO SMALL
P2534-FUEL INJECTOR 4 READ TOO LARGE
P2534-FUEL INJECTOR 4 READ TOO LARGE
P2534-FUEL INJECTOR 4 READ TOO SMALL
P2534-FUEL INJECTOR 4 READ TOO SMALL
P2535-FUEL INJECTOR 5 READ TOO LARGE
P2535-FUEL INJECTOR 5 READ TOO LARGE
P2535-FUEL INJECTOR 5 READ TOO SMALL
P2535-FUEL INJECTOR 5 READ TOO SMALL

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2531-FUEL INJECTOR 1 READ TOO LARGE.

POSSIBLE CAUSES
FUEL INJECTOR
INTERMITTENT CONDITION

P2531-FUEL INJECTOR 1 READ TOO LARGE — 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.** **NOTE: This DTC indicates an internal ECM problem except in the case of DTC P0606 where it may indicate a fuel injector problem. Using the Service Information, check the fuel injectors for leakage before replacing the ECM.** 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 the Fuel Injector identified in the DTC in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform ROAD TEST VERIFICATION - VER-2. No → Test Complete.	All

Symptom:
P2606-CMP/CKP SYNCHRONIZATION ERROR

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
3	Refer to the Service Information to ensure the Engine Drive Gears/Sprocket are installed correctly and the camshaft and crankshaft gears are timed correctly. 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

P2606-CMP/CKP SYNCHRONIZATION ERROR — Continued

TEST	ACTION	APPLICABILITY
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 P2043-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 P2045-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

P2606-CMP/CKP SYNCHRONIZATION ERROR — 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:

*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 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 FUEL QUANTITY SOLENOID CIRCUITS

POSSIBLE CAUSES
OPEN CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Fuel Quantity 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 Quantity Solenoid circuits between the ECM harness connector and the Fuel Quantity Solenoid harness connector. Is the resistance below 10.0 ohms for both measurements? Yes → Test Complete. No → Repair open circuit(s) as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

Symptom:

***CHECKING THE POWER AND GROUNDS**

POSSIBLE CAUSES
CHECKING THE ENGINE CONTROL RELAY SYSTEM
EC RELAY OUTPUT CIRCUIT
ECM GROUND CIRCUIT(S) OPEN
ECM OUTPUT SHORTED - FUSE 16
ENGINE CONTROL MODULE
ENGINE CONTROL RELAY
ENGINE CONTROL RELAY B+ SUPPLY
ENGINE CONTROL RELAY CONTROL CIRCUIT OPEN
ENGINE CONTROL RELAY CONTROL CIRCUIT SHORT TO VOLTAGE
ENGINE CONTROL RELAY OUTPUT CIRCUIT(S) OPEN
ENGINE CONTROL RELAY OUTPUT CKT SHORTED TO GROUND FUSE #16
ENGINE CONTROL RELAY OUTPUT CKT SHORTED TO GROUND FUSE #17
IGNITION SWITCH START OUTPUT CIRCUIT OPEN
IGNITION SWITCH START/RUN OUTPUT CIRCUIT OPEN
SHORTED COMPONENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the ECM harness connectors. Using a 12-volt test light connected to 12-volts, check each of the ECM ground circuits in ECM harness connector C2 cavities 2, 4 and 6. Did the test light illuminate brightly for each cavity? 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 switch to the Start position. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Start Output circuit in ECM C2 harness connector cavity 36. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Start Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE POWER AND GROUNDS — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECM harness connectors. Turn the ignition switch to the Start position. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Start/Run Output circuit in ECM C2 harness connector cavity 19. Repeat the previous step with the ignition switch in the Run position. Does the test light illuminate brightly in the Start and Run positions? Yes → Go To 4 No → Repair the Ignition Switch Start/Run Output circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
4	Turn the ignition off. Remove the Engine Control Relay from Fuse Block No. 1. Using a 12-volt test light connected to 12-volts, check the Engine Control Relay Control circuit in the Engine Control Relay connector in Fuse Block No. 1. Turn the ignition on. Does the test light illuminate? Yes → Go To 5 No → Go To 14	All
5	Turn the ignition off. Remove and inspect Fuse #17 from Fuse Block No.1. Is the fuse open? Yes → Go To 6 No → Go To 8	All
6	Turn the ignition off. Disconnect the ECM harness connectors. Disconnect the EGR Valve harness connector. Disconnect the Boost Pressure Solenoid harness connector. Remove the Starter Relay. Remove the Lift Pump Relay. Install a good fuse in place of Fuse #17 in Fuse Block No.1 Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Remove and inspect Fuse #17 in Fuse Block No. 1. Is the fuse open? Yes → Repair the Engine Control relay Output circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 7	All
7	**NOTE: A short circuit exists in one of the following: Lift Pump Relay, Starter Relay, EGR Valve, Boost Pressure Servo Motor or ECM.** View repair. Yes → Using the Service Information wiring check the listed components for short circuits. Replace the shorted component as necessary. Perform ROAD TEST VERIFICATION - VER-2.	All

*CHECKING THE POWER AND GROUNDS — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Remove and inspect Fuse #16 from Fuse Block No.1 Is the fuse open? Yes → Go To 9 No → Go To 11	All
9	Turn the ignition off. Disconnect the ECM harness connectors. Install a good fuse in place of Fuse #16 in Fuse Block No.1 Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Remove and inspect Fuse #16 from Fuse Block No.1. Is the fuse open? Yes → Repair the Engine Control Relay Output circuit for a short to ground. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 10	All
10	The Fuel Injectors, Crankcase Heater, Water In Fuel Sensor and related circuits can cause Fuse #16 in Fuse Block No.1 to open. Use the Service Information Wiring Diagrams and check these circuits/components for shorted circuits. Were any problems found. Yes → Repair or replace shorted circuit/component as necessary. 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
11	Turn the ignition off. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Control circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Choose the appropriate result. Test light is on for all circuits. Test Complete. Test light is on for 1 or 2 circuits Repair the Engine Control Relay Output circuit(s) for an open. Perform ROAD TEST VERIFICATION - VER-2. Light off for all circuits. Go To 12	All

*CHECKING THE POWER AND GROUNDS — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Substitute the Engine Control Relay with a known good relay. Disconnect the ECM harness connectors. Connect a jumper wire between ground and the Engine Control Relay Signal circuit in ECM C2 harness connector cavity 44. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Engine Control Relay Output circuits at the ECM C2 harness connector cavities 1, 3 and 5. Does the test light illuminate brightly? Yes → Replace the initial Engine Control Relay. Perform ROAD TEST VERIFICATION - VER-2. No → Go To 13	All
13	Turn the ignition off. Remove the Engine Control Relay from Fuse Block No.1 Using a 12-volt test light connected to ground, check both Battery (+) circuits at the Engine Control Relay connector in Fuse Block No.1 Does the test light illuminate brightly for each circuit? Yes → Repair the Engine Control Relay Output circuit for an open between the Engine Control Relay connector in Fuse Block No. 1 and ECM C2 harness connector cavities 1, 3 and 5. It may be necessary to replace the Fuse Block No. 1 to repair this circuit. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Battery (+) Supply circuits to the Engine Control Relay. Perform ROAD TEST VERIFICATION - VER-2.	All
14	Turn the ignition off. Remove the Engine Control Relay from Fuse Block No. 1. Disconnect the ECM harness connectors. Measure the resistance of the Engine Control Relay Control circuit. Is the resistance below 10.0 ohms? Yes → Go To 15 No → Repair the Engine Control Relay Control circuit for an open. Perform ROAD TEST VERIFICATION - VER-2.	All
15	Turn the ignition off. Remove the Engine Control Relay from Fuse Block No. 1. Disconnect the ECM harness connectors. Measure the voltage of the Engine Control Relay Control circuit. Is the voltage below 1.0 volts? Yes → Replace and program the ECM in accordance with the Service Information. Perform ROAD TEST VERIFICATION - VER-2. No → Repair the Engine Control Relay Control circuit for a short to voltage. 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 GEAR/SPROCKET
FUEL SUPPLY CONTAMINATION
FUEL SYSTEM PRESSURE MECHANICAL
FUEL SYSTEM RESTRICTION
GLOW PLUGS
SKIM 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.** **NOTE: A no-start condition may occur if the Fuel Temperature Sensor is shorted or if the Fuel Temperature Sensor Signal circuit is shorted to ground or shorted to Sensor Ground.** 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 SKIM DTC. Perform NO START VERIFICATION - VER-1. No → Go To 3	All
3	Using a temperature probe, check the vehicle temperature near the ECT Sensor. Turn the ignition on. With the DRBIII® in Sensors, read the ECT Sensor temperature. Compare the temperature probe reading with the DRBIII® reading. Are the two readings within 10°C of each other? Yes → Go To 4 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Prior to performing this test, be sure to check the Glow Plug Relay operation. Refer to CHECKING GLOW PLUG OPERATION for the related symptom(s).** Refer to the Service Information and check the Glow Plugs for proper operation. Are the Glow Plugs operating properly? Yes → Go To 5 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
5	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 6	All
6	Refer to the Service Information and perform the fuel pressure test. Is the fuel pressure within specification? Yes → Go To 7 No → Repair as necessary. Perform NO START VERIFICATION - VER-1.	All
7	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 → Go To 8	All
8	Turn the ignition off. Using the DRBIII® lab scope, backprobe the CMP Sensor Signal circuit at the ECM harness connector. Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRBIII®. **NOTE: Refer to Charts and Graphs to view a correct CMP Sensor signal.** Does the DRBIII® display a steady clean CMP Signal pattern? Yes → Go To 9 No → Perform Test for DTC P2043-Camshaft Position Sensor Circuit Static Plausibility. Perform NO START VERIFICATION - VER-1.	All
9	Turn the ignition off. Using the DRBIII® lab scope, backprobe both of the CKP Sensor Signal circuits at the ECM harness connector. **NOTE: Refer to Charts and Graphs to view a correct CKP Sensor signal.** Start the engine, if the engine will not start, crank the engine for several seconds while monitoring the DRBIII®. Does the DRBIII® display a steady clean CKP Signal pattern for each circuit? Yes → Go To 10 No → Perform Test for DTC P2045-Crankshaft Position Sensor Circuit Dynamic Plausibility. Perform NO START VERIFICATION - VER-1.	All

*ENGINE CRANKS BUT WILL NOT START — Continued

TEST	ACTION	APPLICABILITY
10	Refer to the Service Information to ensure the Engine Drive Gears/Sprocket are 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 → Replace and program the Engine Control Module in accordance with the Service Information. Perform NO START VERIFICATION - VER-1.	All

Symptom:

***ENGINE WILL NOT CRANK**

POSSIBLE CAUSES
BATTERY CABLE HIGH RESISTANCE
BATTERY CABLES
CHECKING ECM POWER AND GROUNDS
CHECKING FOR TCM CODES
ECM
ECM CODES PRESENT
IGNITION SWITCH OUTPUT (START) CIRCUIT OPEN
MECHANICAL PROBLEM
SKREEM CODES PRESENT
STARTER MOTOR
STARTER MOTOR RELAY
STARTER MOTOR RELAY CIRCUIT(S) OPEN
STARTER MOTOR RELAY CIRCUIT(S) SHORTED TO GROUND
STARTER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
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 off. Remove the Starter Motor Relay from the Fuse/Relay Block. Connect a test light between cavities 85 and 86 of the Starter Motor Relay connector in the Fuse/Relay Block connector. While observing the test light, attempt to start the engine. Did the test light illuminate when turning the ignition switch to the Crank position? Yes → Go To 3 No → Go To 8	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Starter Motor Relay from the Fuse/Relay Block. Using a 12-volt test light connected to ground, check the Ignition Switch Output (Start) circuit in the Starter Motor Relay connector in the Fuse/Relay Block while turning the ignition to the Crank/Start position. Did the test light illuminate while turning the ignition to the Crank/Start position? Yes → Go To 4 No → Repair the Ignition Switch Output (Start) circuit for an open. Perform NO START VERIFICATION - VER-1.	All
4	Turn the ignition off. Remove the Starter Motor Relay from the Fuse/Relay Block. Install a substitute relay in place of the Starter Motor Relay. Attempt to start the engine. Does the engine crank? Yes → Replace the Starter Motor Relay. Perform NO START VERIFICATION - VER-1. No → Go To 5	All
5	Turn the ignition off. Remove the Starter Motor Relay from the Fuse/Relay Block. Disconnect the Starter Motor Relay Output wire from the Starter Solenoid. Connect the Starter Motor Relay Output wire (at the Starter) to ground. Using a 12-volt test light connected to 12-volts, check the Starter Motor Relay Output circuit at the Starter Motor Relay connector in the Fuse/Relay Block. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Starter Relay Output circuit for an open. Perform NO START VERIFICATION - VER-1.	All
6	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 7	All
7	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

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
8	**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 9	All
9	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 10	All
10	Turn the ignition on. With the DRBIII®, read the TCM DTCs. Does the DRBIII® display any TCM DTCs? Yes → Refer to symptom list for problems related to TCM. Perform NO START VERIFICATION - VER-1. No → Go To 11	All
11	Perform the Checking the ECM Power and Grounds test. Were any problems found? Yes → Repair as necessary. Perform NO START VERIFICATION - VER-1. No → Go To 12	All
12	Turn the ignition off. Disconnect the ECM harness connectors. Remove the Starter Motor Relay from the Fuse/Relay Block Remove the Engine Control Relay from the Fuse Block No.1. Using a jumper wire, connect Engine Control Relay connector cavities 30 and 87 in the Fuse Block No.1. Turn the ignition on. Measure the voltage of the Starter Motor Relay Control circuit. Is the voltage above 1.0 volt? Yes → Repair the Starter Relay Control circuit for a short to voltage. Perform NO START VERIFICATION - VER-1. No → Go To 13	All

*ENGINE WILL NOT CRANK — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the ECM harness connectors. Remove the Starter Motor Relay from the Fuse/Relay Block. Measure the resistance of the Starter Motor Relay Control circuit between the ECM harness connector and the Fuse/Relay Block connector. Measure the resistance of the Starter Motor Relay 12-volt Supply circuit between the ECM harness connector and the Fuse/Relay Block connector. Is the resistance below 10.0 ohms for each measurement? Yes → Go To 14 No → Repair the Starter Motor Relay circuit(s) for an open. Perform NO START VERIFICATION - VER-1.	All
14	Turn the ignition off. Disconnect the ECM harness connectors. Remove the Starter Motor Relay from the Fuse/Relay Block. Measure the resistance between ground and the Starter Motor Relay Control circuit at the Fuse/Relay Block connector. Measure the resistance between ground and the Starter Motor Relay 12-volt Supply circuit at the Fuse/Relay Block connector. Is the resistance below 10.0 ohms for each measurement? Yes → Replace and program the Engine Control Module in accordance with the Service Information. Perform NO START VERIFICATION - VER-1. No → Repair the Starter Motor Relay circuit(s) for a short to ground. Perform NO START VERIFICATION - VER-1.	All

Verification Tests

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. Ensure that all accessories are turned off and the battery is fully charged. **3. NOTE: Refer to the service information for proper programming procedures if the ABM; ACM; ATC; CTM; ECM; IC; SKREEM; SLA; or SSM was replaced.** 4. If the SKREEM was replaced, program all RKE transmitters used with this vehicle. **5. NOTE: Perform the next 8 steps of this procedure if either diagnosing the Automatic Temperature Control (ATC) system or if repairs were made to the ATC system. All of the following criteria must be met in order to successfully run the ATC Function Test.** 6. With DRBIII®, record and erase ATC DTCs. 7. Place the shift lever in Park. 8. Start the engine. Allow the engine to reach normal operating temperature. 9. Set the blower to high speed. 10. Press the Air Conditioning switch On. 11. With the DRBIII®, verify that the ambient temperature is above 59°F (15°C), the refrigerant pressure is between 29 and 348 PSI (2 and 24 bar), the evaporator temperature is above 36.5°F (2.5°C), and the coolant temperature is above 158°F (70°C). 12. With the DRBIII® in ATC, select System Tests and select ATC Function Test. When the ATC Function Test is complete, proceed to the next step of this procedure. 13. With the DRBIII®, read active ATC DTCs. If any DTC is active or if the original condition is still present, proceed to the conclusion question and answer Yes. 14. With the DRBIII®, record and erase all DTCs from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern. 15. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTCs from ALL modules. Are any DTC's present or is the original condition still present? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

NAG1 TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. Reconnect any disconnected components. 2. Connect the DRBIII® to the Data Link Connector. 3. With the DRBIII®, erase ABS DTCs. 4. With the DRBIII®, erase ECM DTCs. 5. With the DRBIII®, erase Transmission DTCs. 6. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT, above 43° C (110° F). 7. Check the Transmission fluid and adjust if necessary. Refer to the Service Information for the proper Fluid Fill procedure. **8. NOTE: If internal repairs were performed and the shift quality is still poor, it may be necessary to check the internal repair. Also check for any TSBs and/or Controller Flash updates that may apply.** 9. ROAD TEST PROCEDURE 10. Road test the vehicle. Make fifteen to twenty 1-2, 2-3, 3-4 and 4-5 upshifts. 11. Perform these shifts from a standing start to 72 km/h (45 MPH) with a constant throttle opening of 20 to 25 degrees. 12. With speeds below 40 km/h (25 MPH), make five to eight wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 13. With the DRBIII®, read Transmission DTCs. Were there any Diagnostic Trouble Codes set? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

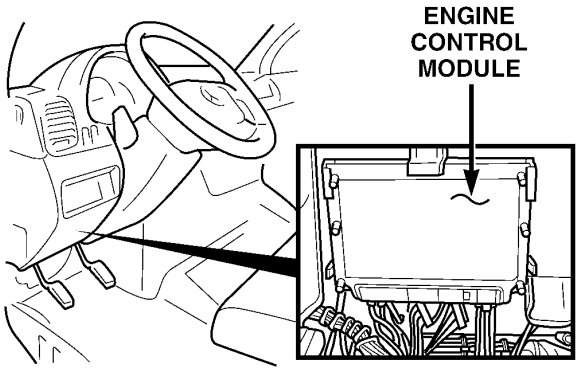
Verification Tests — Continued

NO START VERIFICATION - VER-1	APPLICABILITY
1. NOTE: IMPORTANT! If the Engine Control Module or Sentry Key Immobilizer Module has been replaced, ensure the programming 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 oil and filter. 4. With the DRB, erase all diagnostic trouble codes (DTCs). 5. Turn the ignition off for at least 10 seconds. 6. Attempt to start the engine. 7. If the engine is unable to start, look for any Technical Service Bulletins (TSBs) that may relate to this condition. Return to the Symptom List if necessary. 8. If the engine starts and continues to run, the repair is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

ROAD TEST VERIFICATION - VER-2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a non-DTC test, perform steps 3 and 4. 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 dealt with, return to the Symptom List and follow the diagnostic path for that DTC; otherwise, continue. 6. If the Engine Control Module (ECM) has not been changed, perform steps 7 and 8, otherwise, continue with step 9. 7. With the DRB 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, go at least 64 km/h (40 MPH). If this test is for an A/C Relay Control Circuit, drive the vehicle for at least 5 minutes with the A/C on. 13. At some point, stop the vehicle and turn the engine off for at least 10 seconds, then restart the engine and continue. 14. Upon completion of the road test, turn the engine off and check for DTCs with the DRB 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

8.0 COMPONENT LOCATIONS

8.1 CONTROL MODULES



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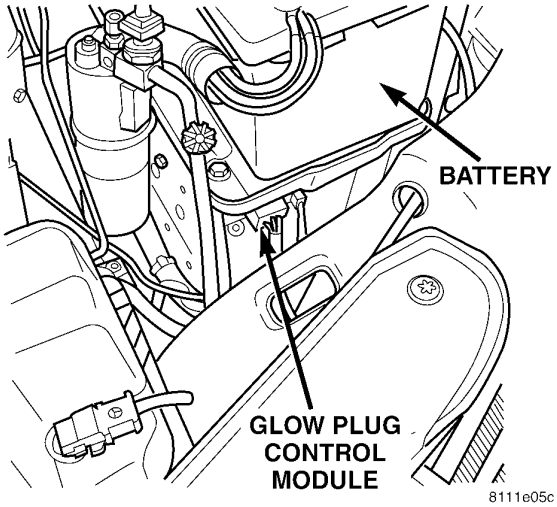

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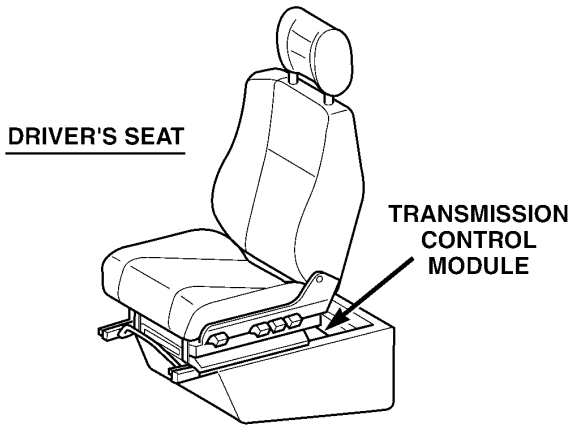

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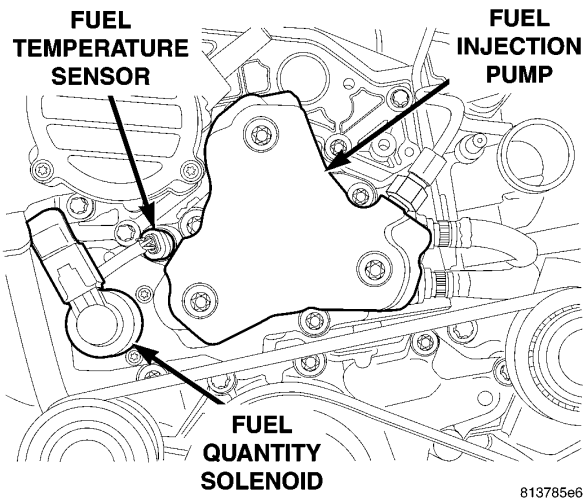
8.2 CONTROLS AND SOLENOIDS



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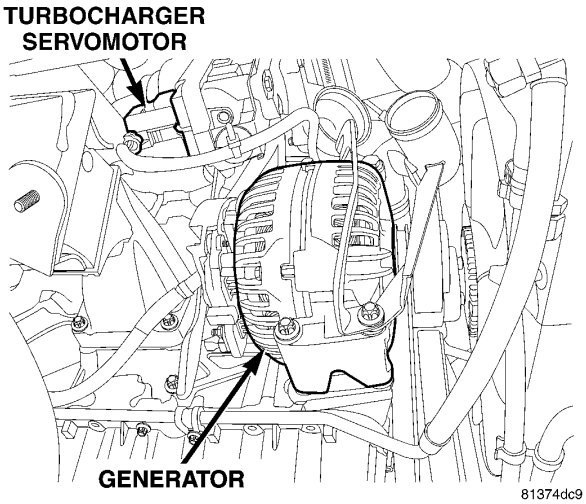

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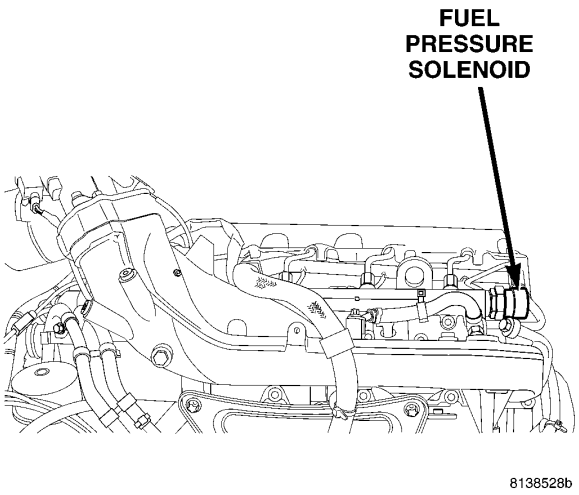
8.2 CONTROLS AND SOLENOIDS (Continued)



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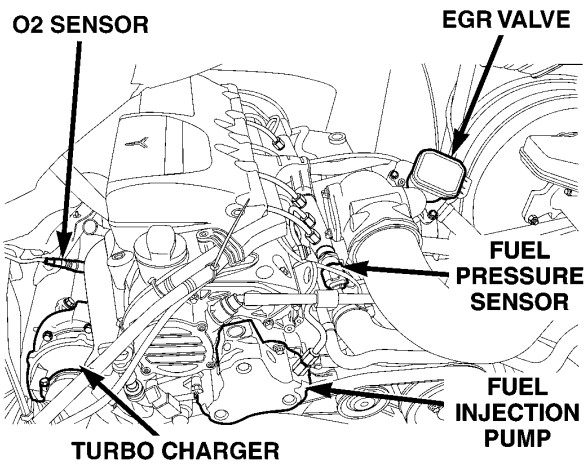

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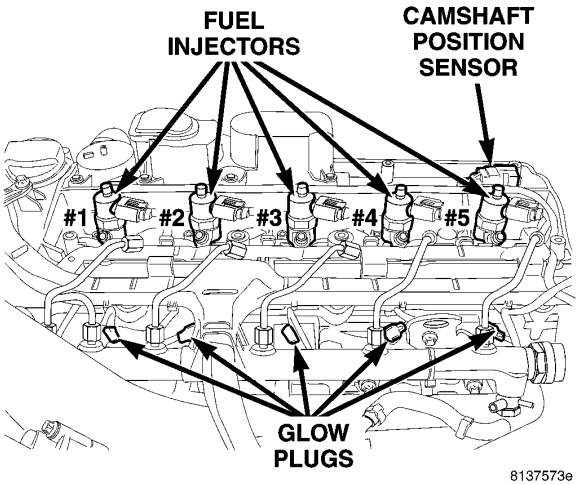

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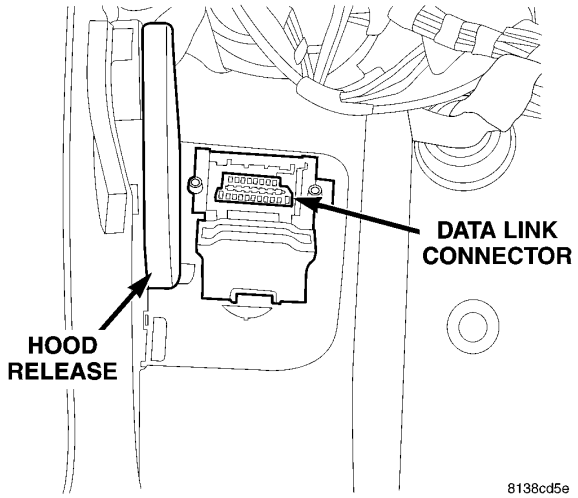
8.3 DATA LINK CONNECTOR



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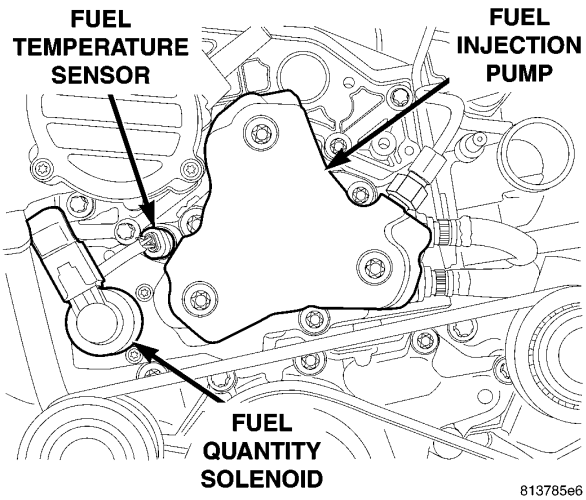
8.4 SENSORS


FUEL TEMPERATURE SENSOR
FUEL INJECTION PUMP
FUEL QUANTITY SOLENOID
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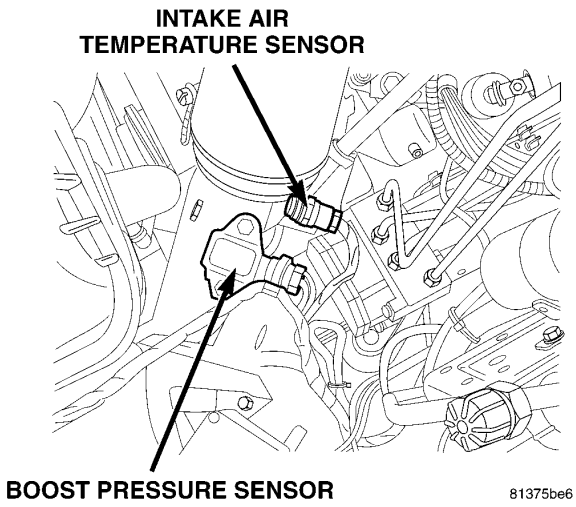
INTAKE AIR TEMPERATURE SENSOR
BOOST PRESSURE SENSOR
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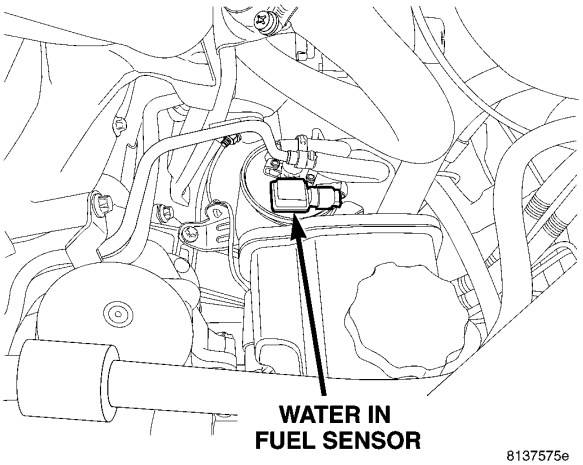
WATER IN FUEL SENSOR
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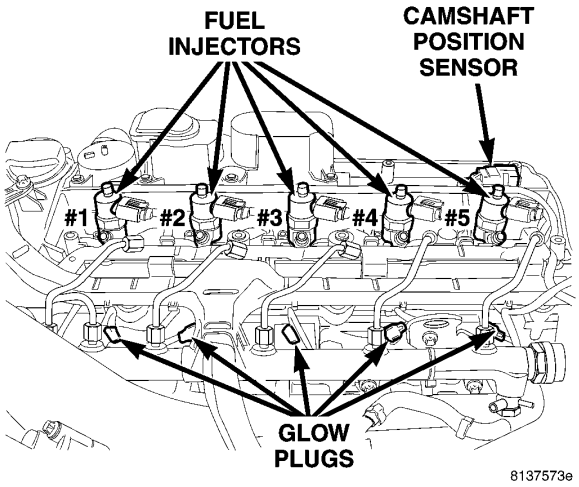
FUEL INJECTORS
CAMSHAFT POSITION SENSOR
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#2
#3
#4
#5
GLOW PLUGS
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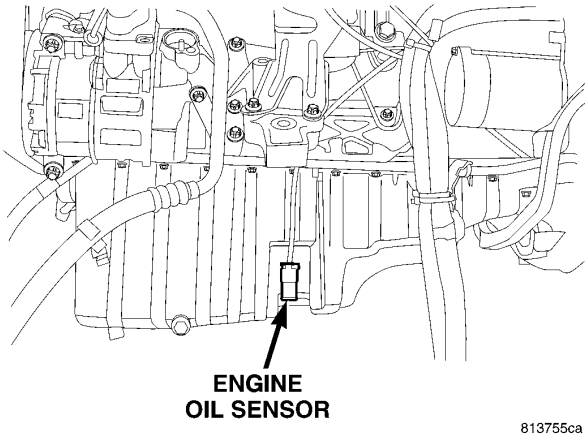
ENGINE OIL SENSOR
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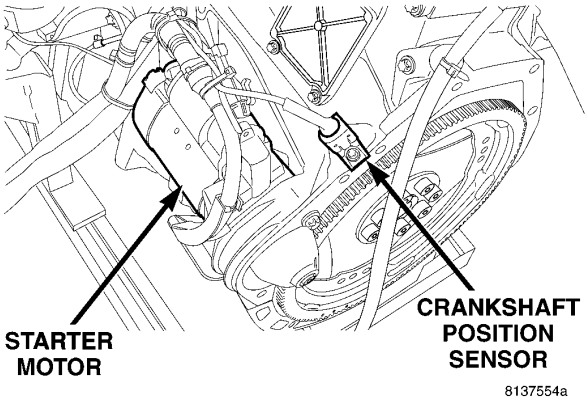
STARTER MOTOR
CRANKSHAFT POSITION SENSOR
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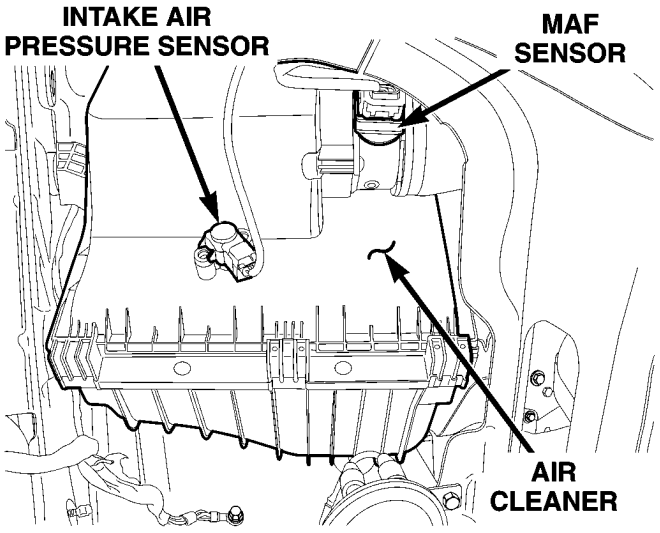
8.4 SENSORS (Continued)



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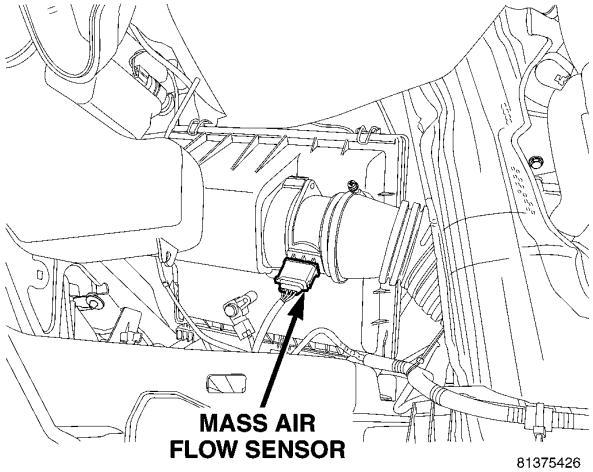

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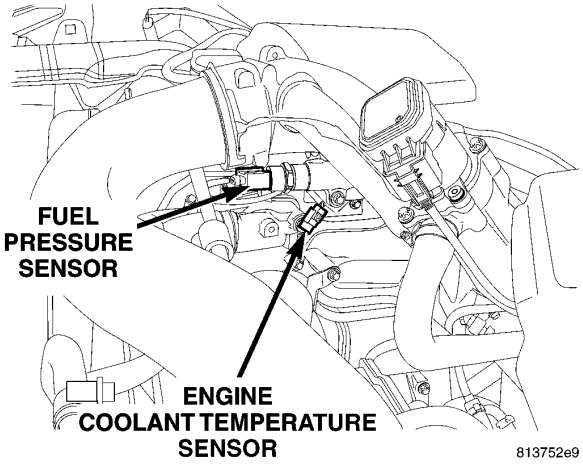

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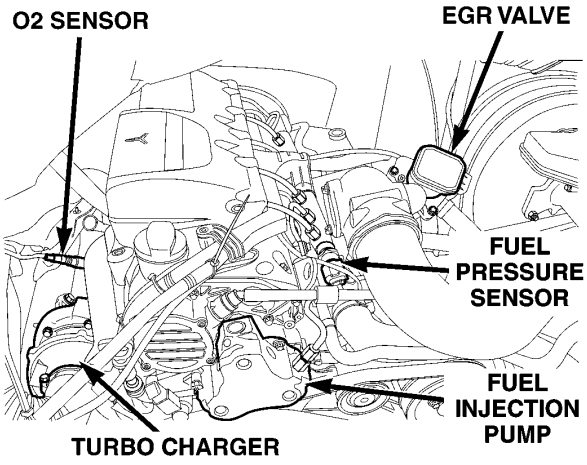

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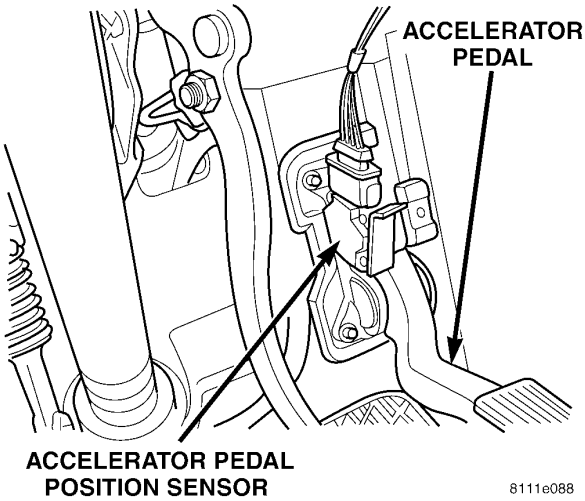

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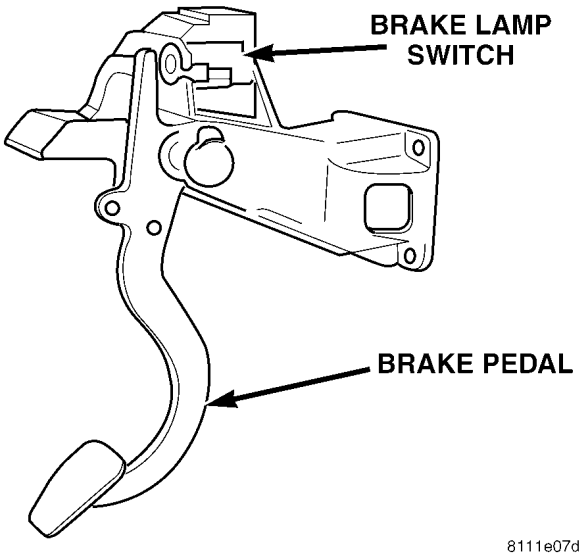
8.5 SWITCHES



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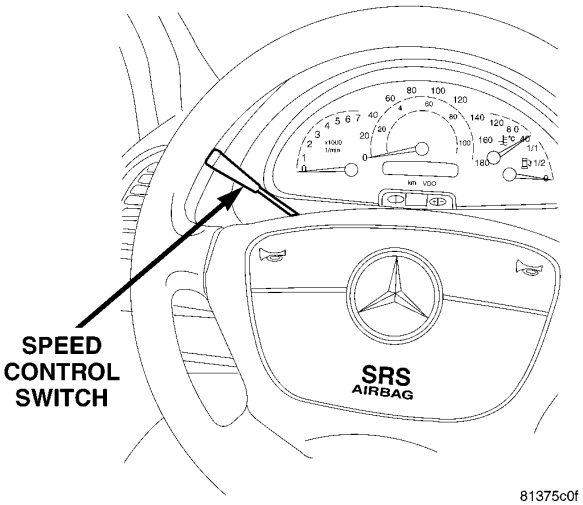

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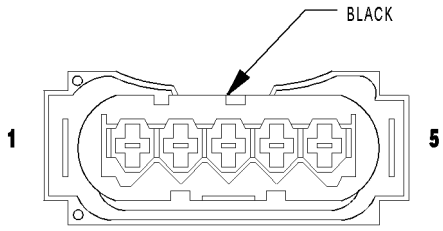
NOTES

9.0 CONNECTOR PINOUTS

CONNECTOR NOT AVAILABLE

ACCELERATOR PEDAL POSITION SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	18BL/RD	ACCEL PEDAL POSITION SENSOR 5 VOLT SUPPLY
2	18BR/BL	ACCEL PEDAL POSITION SENSOR GROUND NO. 1
3	18BL/DG	ACCEL PEDAL POSITION SENSOR SIGNAL NO. 1
4	18BR/GY	ACCEL PEDAL POSITION SENSOR GROUND NO. 2
5	18GY/DG	ACCEL PEDAL POSITION SENSOR GROUND NO. 2



ACCELERATOR PEDAL SENSOR SENSOR

ACCELERATOR PEDAL POSITION SENSOR (OBD)

CAV	CIRCUIT	FUNCTION
1	18BL/DG	ACCEL PEDAL POSITION SENSOR SIGNAL NO. 1
2	18BR/GY	ACCEL PEDAL POSITION SENSOR GROUND NO. 2
3	18GY/DG	ACCEL PEDAL POSITION SENSOR SIGNAL NO. 2
4	18BL/RD	ACCEL PEDAL POSITION SENSOR 5 VOLT SUPPLY
5	18BR/BL	ACCEL PEDAL POSITION SENSOR GROUND NO. 1

CONNECTOR NOT AVAILABLE

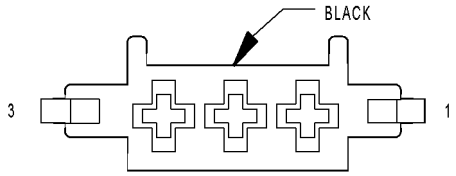
AIRBAG CONTROL MODULE - YELLOW

CAV	CIRCUIT	FUNCTION
1	20BL	DRIVER SEAT BELT TENSIONER LINE 2
2	20BR/YL	DRIVER SEAT BELT TENSIONER LINE 1
3	20BL	PASSENGER SEAT BELT TENSIONER LINE 2
4	20BR	PASSENGER SEAT BELT TENSIONER LINE 1
5	20BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
6	20BR	GROUND
7	20YL	AIRBAG WARNING INDICATOR DRIVER
9	20BK/RD	K-ACM
10	20DG	DRIVER AIRBAG SQUIB 1 LINE 2
11	20VT	DRIVER AIRBAG SQUIB 1 LINE 1
13	20BL/DG	PASSENGER AIRBAG SQUIB 1 LINE 2
14	20BR/DG	PASSENGER AIRBAG SQUIB 1 LINE 1
20	20DG	ENHANCED ACCIDENT REPORT DRIVER

CONNECTOR NOT AVAILABLE

BOOST PRESSURE SENSOR (EXCEPT OBD) - BLACK

CAV	CIRCUIT	FUNCTION
1	18BR/WT	BOOST PRESSURE SENSOR GROUND
2	18WT/DG	BOOST PRESSURE SENSOR SIGNAL
3	18WT/RD	BOOST PRESSURE SENSOR 5 VOLT SUPPLY



BRAKE LAMP SWITCH C2

BOOST PRESSURE SENSOR (OBD)

CAV	CIRCUIT	FUNCTION
1	18BR/WT	SENSOR GROUND
2	18WT/DG	BOOST PRESSURE SENSOR SIGNAL
3	18WT/RD	BOOST PRESSURE SENSOR 5 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

BOOST PRESSURE SERVOMOTOR (OBD)

CAV	CIRCUIT	FUNCTION
1	16YL/BK	S175 COMMON CIRCUIT
2	16YL/WT	GROUND
4	16YL/DG	BOOST PRESSURE SERVOMOTOR CONTROL

CONNECTOR NOT AVAILABLE

BOOST PRESSURE SOLENOID - BLACK

CAV	CIRCUIT	FUNCTION
1	20WT	BOOST PRESSURE SOLENOID CONTROL
2	20BR	BOOST PRESSURE SOLENOID 12 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

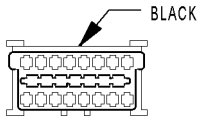
CAMSHAFT POSITION SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	20BR/DG	CAMSHAFT POSITION SENSOR GROUND
2	20YL/GY	CAMSHAFT POSITION SENSOR SIGNAL
3	18RD/BL (EXCEPT OBD)	CAMSHAFT POSITION SENSOR 12 VOLT SUPPLY
3	20RD/BL (OBD)	CAMSHAFT POSITION SENSOR 5 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

CONTROLLER ANTILOCK BRAKE

CAV	CIRCUIT	FUNCTION
1	12BR	GROUND
2	12RD	FUSED B(+)
5	14BR	GROUND
6	14RD	FUSED B(+)
11	18BL/BK	K-ABS/SHIFTER ASSEMBLY
12	18BK	LEFT FRONT WHEEL SPEED SENSOR (+)
14	20WT	LEFT REAR WHEEL SPEED SENSOR (+)
15	18BR	RIGHT FRONT WHEEL SPEED SENSOR(-)
16	18BK	RIGHT FRONT WHEEL SPEED SENSOR (+)
20	20WT	BRAKE SWITCH OUTPUT
23	18BK/RD	FUSED OPTIONAL EQUIPMENT RELAY OUTPUT
24	20DG/WT	CAN C BUS (+)
27	18BK/BL	TCS SWITCH (ASR) SENSE
28	18BR	LEFT FRONT WHEEL SPEED SENSOR (-)
29	20BR	LEFT REAR WHEEL SPEED SENSOR (-)
30	20BR	RIGHT REAR WHEEL SPEED SENSOR (-)
31	20YL	RIGHT REAR WHEEL SPEED SENSOR (+)
32	18BK/RD	BRAKE LAMP SWITCH OUTPUT
40	20DG	CAN C BUS (-)



DATA LINK CONNECTOR

CRANKSHAFT POSITION SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	20DG (EXCEPT OBD)	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2
1	20DG/WT (OBD)	CRANKSHAFT POSITION SENSOR SIGNAL NO. 1
2	20DG/WT (EXCEPT OBD)	CRANKSHAFT POSITION SENSOR SIGNAL NO. 1
2	20DG (OBD)	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2

CONNECTOR NOT AVAILABLE

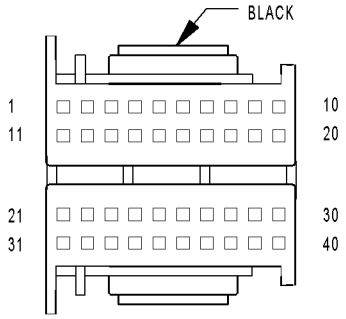
DATA LINK CONNECTOR - BLACK

CAV	CIRCUIT	FUNCTION
1	20WT/DG	K-SKREEM
3	20DG/YL	ENGINE RPM
4	20BR	GROUND
5	20BR	GROUND
7	20BL/YL	K-ECM
8	20BK/BL/DG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
9	20BL/BK	K-ABS/SHIFTER ASSEMBLY
11	20BL	K-TCM/RADIO
12	20GY/DG/RD	K-CTM/SSM
13	20BK/RD	K-ACM
15	20WT/GY	K-IC/ATC/HBM/CHM
16	20RD/YL	FUSED B(+)

CONNECTOR NOT AVAILABLE

EGR VALVE - BLACK

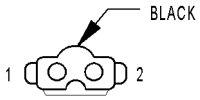
CAV	CIRCUIT	FUNCTION
1	20RD/YL (EXCEPT OBD)	EGR VALVE CONTROL
1	20DG/WT (OBD)	EGR VALVE CONTROL
2	16BK/GY (EXCEPT OBD)	FUSED ENGINE CONTROL RELAY OUTPUT
2	16BK/DG (OBD)	S175 COMMON CIRCUIT
3	18BR/BK (EXCEPT OBD)	SENSOR GROUND
3	20BR/DG (OBD)	SENSOR GROUND



ENGINE CONTROL MODULE C4 (EXCEPT OBD)

ENGINE CONTROL MODULE C1 (OBD)

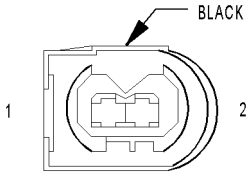
CAV	CIRCUIT	FUNCTION
1	16BL	FUEL INJECTOR NO. 1 HIGH-SIDE CONTROL
2	16BL/WT	FUEL INJECTOR NO. 4 HIGH-SIDE CONTROL
3	16DG	FUEL INJECTOR NO. 3 HIGH-SIDE CONTROL
4	20RD/WT	FUEL QUANTITY CONTROL VALVE 12 VOLT SUPPLY
8	18BL/GY	FUEL TEMPERATURE SENSOR SIGNAL
10	20RD/YL	ENGINE OIL SENSOR 5 VOLT SUPPLY
11	20GY/BL	ENGINE OIL SENSOR SIGNAL
12	20BR/RD	INTAKE PRESSURE SENSOR GROUND
13	20VT/DG	INTAKE PRESSURE SENSOR SIGNAL
14	20BR/DG	CAMSHAFT POSITION SENSOR GROUND
15	20DG/BK	ECM C1 CAV 15 TO 02 SENSOR CAV 1
20	18BK/YL	WATER IN FUEL SENSOR SIGNAL
21	18BK/RD	CRANKCASE HEATER SIGNAL
25	16BK	FUEL INJECTOR NO. 2 HIGH-SIDE CONTROL
26	16BK/WT	FUEL INJECTOR NO. 5 HIGH-SIDE CONTROL
28	18RD/BK	FUEL SHUTDOWN SOLENOID 12 VOLT SUPPLY
31	20YL/BL	MASS AIR FLOW SENSOR GROUND
32	18DG/BK	FUEL TEMPERATURE SENSOR GROUND
35	20BR/BK	SENSOR GROUND
36	20VT/RD	INTAKE PRESSURE SENSOR 5 VOLT SUPPLY
37	20RD/BL	CAMSHAFT POSITION SENSOR 5 VOLT SUPPLY
38	20YL/GY	CAMSHAFT POSITION SENSOR SIGNAL
39	20GY	ECM C1 CAV 39 TO 02 SENSOR CAV 6
40	20GY/WT	ECM C1 CAV 40 TO 02 CAV 2
49	16BK/VT	FUEL INJECTOR NO. 4 LOW-SIDE CONTROL
50	16BK/DG	FUEL INJECTOR NO. 3 LOW-SIDE CONTROL
51	16BK/YL	FUEL INJECTOR NO. 5 LOW-SIDE CONTROL
52	20BK/WT	FUEL QUANTITY CONTROL VALVE CONTROL
55	18BR	WATER IN FUEL SENSOR GROUND
56	20BR/WT	ENGINE COOLANT TEMPERATURE SENSOR GROUND
57	20DG/RD	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
59	20DG/VT	FUEL PRESSURE SENSOR SIGNAL
61	20BR/VT	MASS AIR FLOW SENSOR 5 VOLT SUPPLY
62	20DG/YL	ECM C1 CAV 62 TO 02 SENSOR CAV 5
72	20GY/BL	ECM C1 CAV 72 TO 02 SENSOR CAV 3
73	16BK/RD	FUEL INJECTOR NO. 1 LOW-SIDE CONTROL
74	16BK/BL	FUEL INJECTOR NO. 2 LOW-SIDE CONTROL
76	18BR/YL	FUEL SHUTDOWN SOLENOID CONTROL
79	18BR/RD	WATER IN FUEL SENSOR 12 VOLT SUPPLY
84	20BR/GY	FUEL PRESSURE SENSOR GROUND
85	20YL/DG	MASS AIR FLOW SENSOR SIGNAL
86	20RD/DG	FUEL PRESSURE SENSOR 5 VOLT SUPPLY
87	20DG/WT	CRANKSHAFT POSITION SENSOR SIGNAL NO. 1
88	20DG	CRANKSHAFT POSITION SENSOR SIGNAL NO. 2
90	20DG/WT	EGR VALVE CONTROL
91	20BK/BR	CRANKCASE HEATER GROUND
93	16YL/DG	CHARGE PRESSURE POSITIONER CONTROL



ENGINE COOLANT LEVEL SWITCH

ENGINE CONTROL MODULE C2 (OBD)

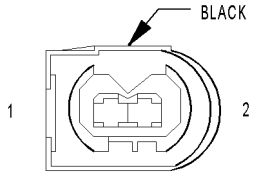
CAV	CIRCUIT	FUNCTION
1	16BK/RD	FUSED ENGINE CONTROL RELAY OUTPUT
2	14BR	GROUND
3	14BK/BL	FUSED ENGINE CONTROL RELAY OUTPUT
4	14BR	GROUND
5	14BK/BL	FUSED ENGINE CONTROL RELAY OUTPUT
6	14BR	GROUND
7	18RD	S/C SWITCH 12 VOLT SUPPLY
8	18BR/WT	HIGH IDLE ON SIGNAL
10	18WT/RD	BOOST PRESSURE SENSOR 5 VOLT SUPPLY
11	18WT/DG	BOOST PRESSURE SENSOR SIGNAL
12	18BR/WT	SENSOR GROUND
13	18GY/DG	ACCEL PEDAL POSITION SENSOR SIGNAL NO. 2
14	18BR/GY	ACCEL PEDAL POSITION SENSOR GROUND NO. 2
17	18BR/DG	KICKDOWN SWITCH SIGNAL
18	20DG/YL	ENGINE RPM
19	18BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
24	18BL/RD	ACCEL PEDAL POSITION SENSOR 5 VOLT SUPPLY
25	18BL/DG	ACCEL PEDAL POSITION SENSOR SIGNAL NO. 1
26	18BR/BL	ACCEL PEDAL POSITION SENSOR GROUND NO. 1
28	18BR/DG	INTAKE AIR TEMPERATURE SENSOR GROUND
31	20BL/YL	K-ECM
32	20DG	ENHANCED ACCIDENT REPORT DRIVER
36	18VT	IGNITION SWITCH OUTPUT (START)
37	18DG	ACCEL/SET SIGNAL
38	18BK	VERIFICATION SIGNAL
42	18DG/WT	INTAKE AIR TEMPERATURE SENSOR SIGNAL
43	18BK/RD	GLOW PLUG MODULE CONTROL
44	18YL/BL	ENGINE CONTROL RELAY SIGNAL
50	18YL	DECEL/SET SIGNAL
51	18GY	OFF SIGNAL
52	18BL	RESUME SIGNAL
53	20DG/WT	CAN C BUS (+)
54	20DG	CAN C BUS (-)
55	18BR/RD	FUEL PUMP RELAY CONTROL
58	18VT/DG	STARTER MOTOR RELAY CONTROL



FUEL INJECTOR NO. 1

ENGINE COOLANT TEMPERATURE SENSOR - BLACK

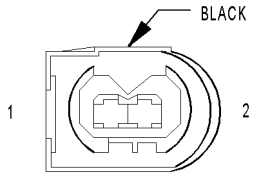
CAV	CIRCUIT	FUNCTION
1	20BR/WT	ENGINE COOLANT TEMPERATURE SENSOR GROUND
2	20DG/RD	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



FUEL INJECTOR NO. 2

ENGINE OIL SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	20GY/BL	ENGINE OIL SENSOR SIGNAL
2	20BR/BK	SENSOR GROUND
3	20RD/YL	ENGINE OIL SENSOR 5 VOLT SUPPLY



FUEL INJECTOR NO. 5

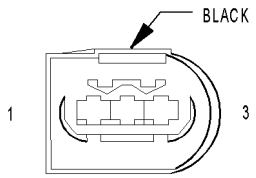
FUEL INJECTOR NO. 1 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/BL (EXCEPT OBD)	FUEL INJECTOR NO. 1 CONTROL
1	16BK/RD (ODB)	FUEL INJECTOR NO. 1 LOW-SIDE CONTROL
2	14BK (EXCEPT OBD)	COMMON INJECTOR DRIVER NO. 1
2	16BL (OBD)	FUEL INJECTOR NO. 1 HIGH-SIDE CONTROL

CONNECTOR NOT AVAILABLE

FUEL INJECTOR NO. 2 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/VT (EXCEPT OBD)	FUEL INJECTOR NO. 2 CONTROL
1	16BK/BL (OBD)	FUEL INJECTOR NO. 2 LOW-SIDE CONTROL
2	14BL (EXCEPT OBD)	COMMON INJECTOR DRIVER NO. 2
2	16BK (OBD)	FUEL INJECTOR NO. 2 HIGH-SIDE CONTROL



FUEL PRESSURE SENSOR

FUEL INJECTOR NO. 3 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/RD (EXCEPT OBD)	FUEL INJECTOR NO. 3 CONTROL
1	16BK/DG (OBD)	FUEL INJECTOR NO. 3 LOW-SIDE CONTROL
2	14BK (EXCEPT OBD)	COMMON INJECTOR DRIVER NO. 1
2	16DG (OBD)	FUEL INJECTOR NO. 3 HIGH-SIDE CONTROL

CONNECTOR NOT AVAILABLE

FUEL INJECTOR NO. 4 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/YL (EXCEPT OBD)	FUEL INJECTOR NO. 4 CONTROL
1	16BK/VT (OBD)	FUEL INJECTOR NO. 4 LOW-SIDE CONTROL
2	14BK (EXCEPT OBD)	COMMON INJECTOR DRIVER NO. 1
2	16BL/WT (OBD)	FUEL INJECTOR NO. 4 HIGH-SIDE CONTROL

CONNECTOR NOT AVAILABLE

FUEL INJECTOR NO. 5 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/DG (EXCEPT OBD)	FUEL INJECTOR NO. 5 CONTROL
1	16BK/YL (OBD)	FUEL INJECTOR NO. 5 LOW-SIDE CONTROL
2	14BL (EXCEPT OBD)	COMMON INJECTOR DRIVER NO. 2
2	16BK/WT (OBD)	FUEL INJECTOR NO. 5 HIGH-SIDE CONTROL

CONNECTOR NOT AVAILABLE

FUEL PRESSURE SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	20BR/GY	FUEL PRESSURE SENSOR GROUND
2	20DG/VT	FUEL PRESSURE SENSOR SIGNAL
3	20RD/DG	FUEL PRESSURE SENSOR 5 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

FUEL PRESSURE SOLENOID (EXCEPT OBD)

CAV	CIRCUIT	FUNCTION
1	20BK/WT	FUEL PRESSURE SOLENOID CONTROL
2	20RD/WT	FUEL PRESSURE SOLENOID 12 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

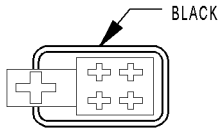
FUEL PUMP (OBD)

CAV	CIRCUIT	FUNCTION
1	14BK	FUEL PUMP RELAY OUTPUT
2	14BR	GROUND

CONNECTOR NOT AVAILABLE

FUEL PUMP RELAY (OBD)

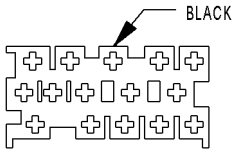
CAV	CIRCUIT	FUNCTION
30	14RD/BK	FUSED B(+)
85	18BR/RD	FUEL PUMP RELAY CONTROL
86	18BK/RD	S108 COMMON CIRCUIT
87	14BK	FUEL PUMP RELAY OUTPUT
87A	-	-



FUSE BLOCK NO. 1 C3

FUEL QUANTITY CONTROL VALVE (OBD)

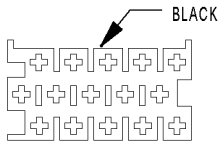
CAV	CIRCUIT	FUNCTION
1	20BK/WT	FUEL QUANTITY CONTROL VALVE CONTROL
2	18RD/BK	FUEL QUANTITY CONTROL VALVE 12 VOLT SUPPLY



FUSE BLOCK NO. 1 C4

FUEL SHUTDOWN SOLENOID

CAV	CIRCUIT	FUNCTION
1	20BR/YL (EXCEPT OBD)	FUEL SHUTDOWN SOLENOID CONTROL
1	18BR/YL (OBD)	FUEL SHUTDOWN SOLENOID CONTROL
2	18RD/BK	FUEL SHUTDOWN SOLENOID 12 VOLT SUPPLY



FUSE BLOCK NO. 1 C5

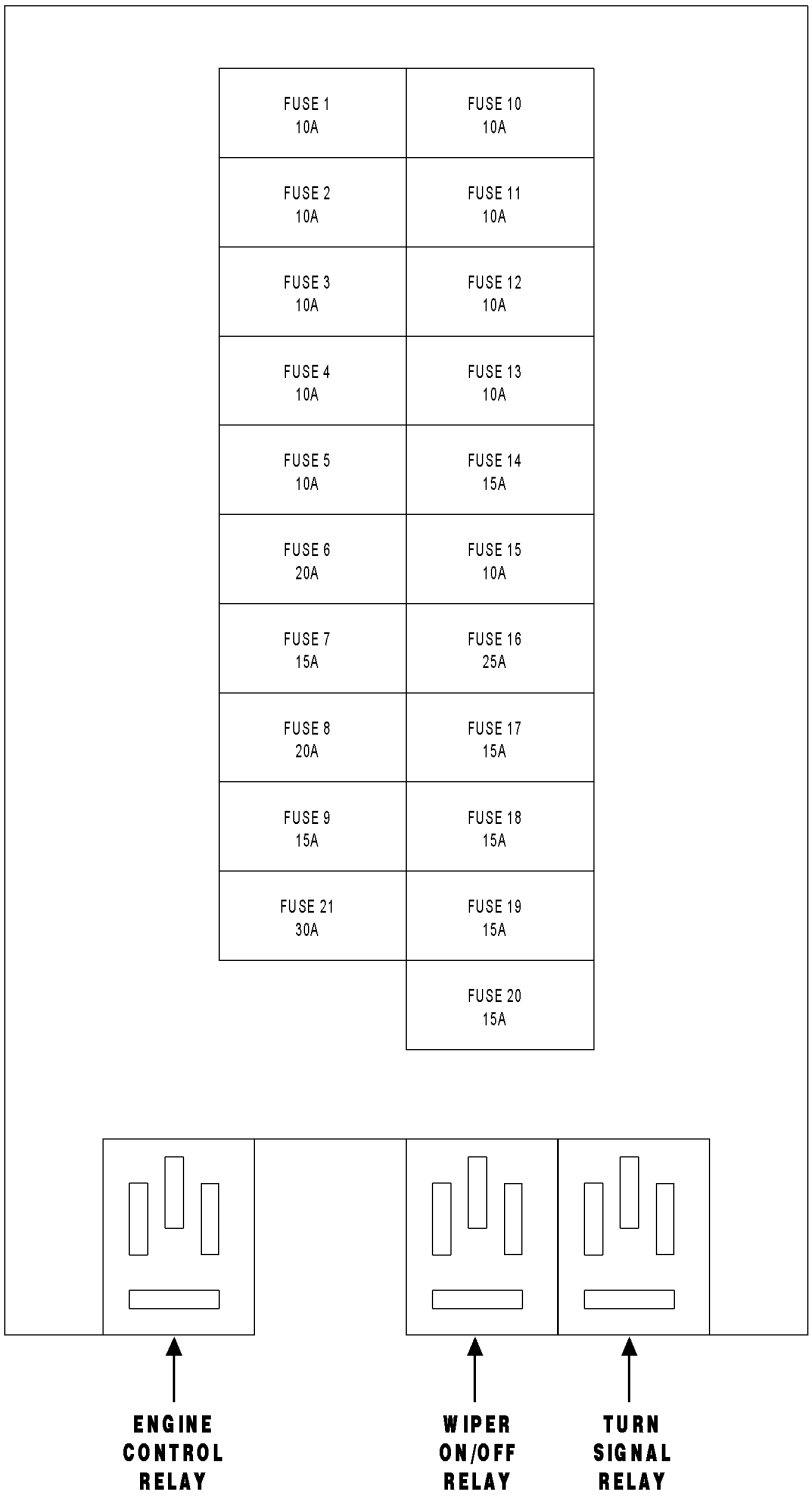
FUEL TEMPERATURE SENSOR

CAV	CIRCUIT	FUNCTION
1	18DG/BK	FUEL TEMPERATURE SENSOR GROUND
2	18BL/GY	FUEL TEMPERATURE SENSOR SIGNAL

ENGINE CONTROL RELAY (FUSE BLOCK NO. 1)

CAV	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	ENGINE CONTROL RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	INTERNAL	ENGINE CONTROL RELAY OUTPUT
87A	-	-

FUSE BLOCK NO. 1

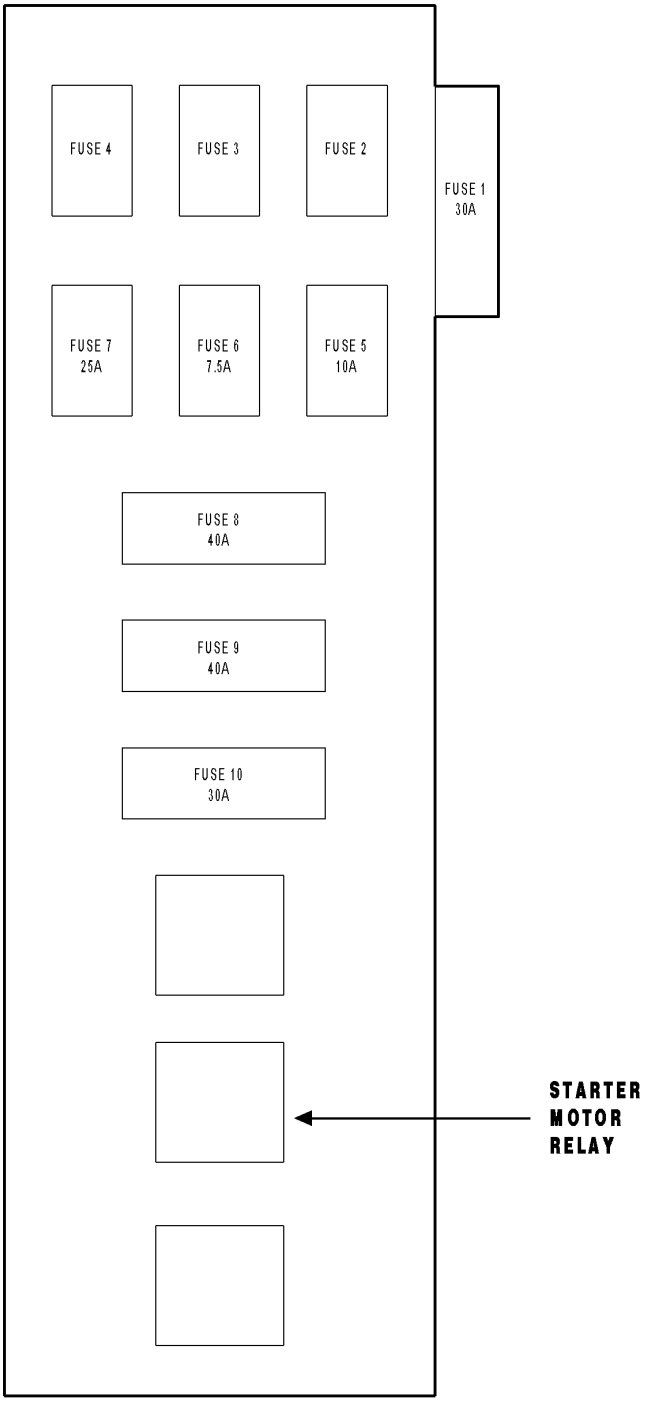


NOTE: THE FUSE AND RELAY LOCATIONS SHOWN HERE MAY VARY FROM VEHICLE TO VEHICLE.

STARTER MOTOR RELAY (FUSE/RELAY BLOCK)

CAV	CIRCUIT	FUNCTION
30	12BK/YL	STARTER MOTOR RELAY OUTPUT
85	18VT/DG	STARTER MOTOR RELAY CONTROL
86	18RD/BL (EXCEPT OBD)	STARTER MOTOR RELAY 12 VOLT SUPPLY
86	18BK/RD (OBD)	STARTER MOTOR RELAY 12 VOLT SUPPLY
87	12VT	IGNITION SWITCH OUTPUT (START)
87A	-	-

FUSE/ RELAY BLOCK



NOTE: THE FUSE AND RELAY LOCATIONS SHOWN HERE MAY VARY FROM VEHICLE TO VEHICLE.

CONNECTOR NOT AVAILABLE

GLOW PLUG CONTROL MODULE C1 - BLACK

CAV	CIRCUIT	FUNCTION
1	18BR	GROUND
2	18BK/RD	GLOW PLUG MODULE CONTROL

CONNECTOR NOT AVAILABLE

GLOW PLUG CONTROL MODULE C2 - BLACK

CAV	CIRCUIT	FUNCTION
1	14BK/DG	GLOW PLUG NO. 5 SUPPLY VOLTAGE
2	14BK/YL	GLOW PLUG NO. 4 SUPPLY VOLTAGE
3	14BK/RD	GLOW PLUG NO. 3 SUPPLY VOLTAGE
4	14BK/VT	GLOW PLUG NO. 2 SUPPLY VOLTAGE
5	14BK/BL	GLOW PLUG NO. 1 SUPPLY VOLTAGE

CONNECTOR NOT AVAILABLE

INTAKE AIR PRESSURE SENSOR (OBD)

CAV	CIRCUIT	FUNCTION
1	20BR/RD	INTAKE PRESSURE SENSOR GROUND
2	20VT/DG	INTAKE PRESSURE SENSOR SIGNAL
3	20VT/RD	INTAKE PRESSURE SENSOR 5 VOLT SUPPLY

CONNECTOR NOT AVAILABLE

KICK DOWN SWITCH - BLACK

CAV	CIRCUIT	FUNCTION
1	18BR/DG	KICKDOWN SWITCH SIGNAL
2	18BR (EXCEPT OBD)	SENSOR GROUND
2	18BR (OBD)	GROUND

CONNECTOR NOT AVAILABLE

LOW FUEL PRESSURE SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	18GY/DG	LOW FUEL PRESSURE SENSOR 5 VOLT SUPPLY
2	18GY/YL	LOW FUEL PRESSURE SENSOR GROUND
3	18GY/RD	LOW FUEL PRESSURE SENSOR SIGNAL

CONNECTOR NOT AVAILABLE

MASS AIR FLOW SENSOR - BLACK

CAV	CIRCUIT	FUNCTION
1	16YL/RD (OBD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	20YL/RD (EXCEPT OBD)	MASS AIR FLOW SENSOR 12 VOLT SUPPLY
2	20BR/VT (OBD)	MASS AIR FLOW SENSOR 5 VOLT SUPPLY
3	20BR/YL (EXCEPT OBD)	MASS AIR FLOW SENSOR GROUND
3	20YL/BL (OBD)	MASS AIR FLOW SENSOR GROUND
4	20BR/BK (EXCEPT OBD)	MASS AIR FLOW SENSOR 5 VOLT SUPPLY
4	20YL/DG (OBD)	MASS AIR FLOW SENSOR SIGNAL
5	20YL/DG (EXCEPT OBD)	MASS AIR FLOW SENSOR SIGNAL

CONNECTOR NOT AVAILABLE

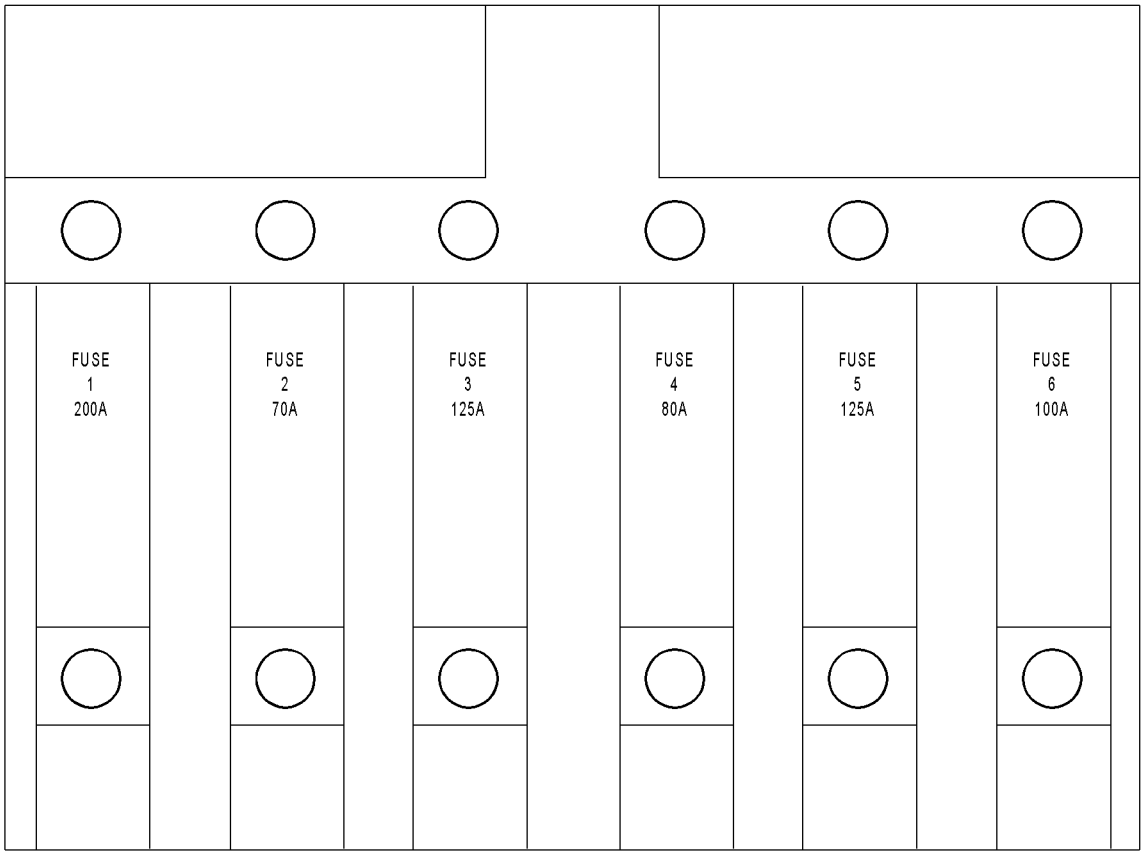
OXYGEN SENSOR (OBD)

CAV	CIRCUIT	FUNCTION
1	20DG/BK	ENGINE CONTROL MODULE C1 CAV 15 TO OXYGEN SENSOR CAV 1
2	20GY/WT	ENGINE CONTROL MODULE C1 CAV 40 TO OXYGEN SENSOR CAV 2
3	20GY/BL	ENGINE CONTROL MODULE C1 CAV 72 TO OXYGEN SENSOR CAV 3
4	20RD/DG	S175 COMMON CIRCUIT
5	20DG/YL	ENGINE CONTROL MODULE CAV 62 TO OXYGEN SENSOR CAV 5
6	20GY	ENGINE CONTROL MODULE CAV 39 TO OXYGEN SENSOR CAV 6

FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	200A	4RD	FUSED B(+)
2	70A	10RD	FUSED B(+)
3	125A	8RD	FUSED B(+)
4	80A	-	-
5	125A	8RD	FUSED B(+)
6	100A	8RD	FUSED B(+)

POWER DISTRIBUTION CENTER

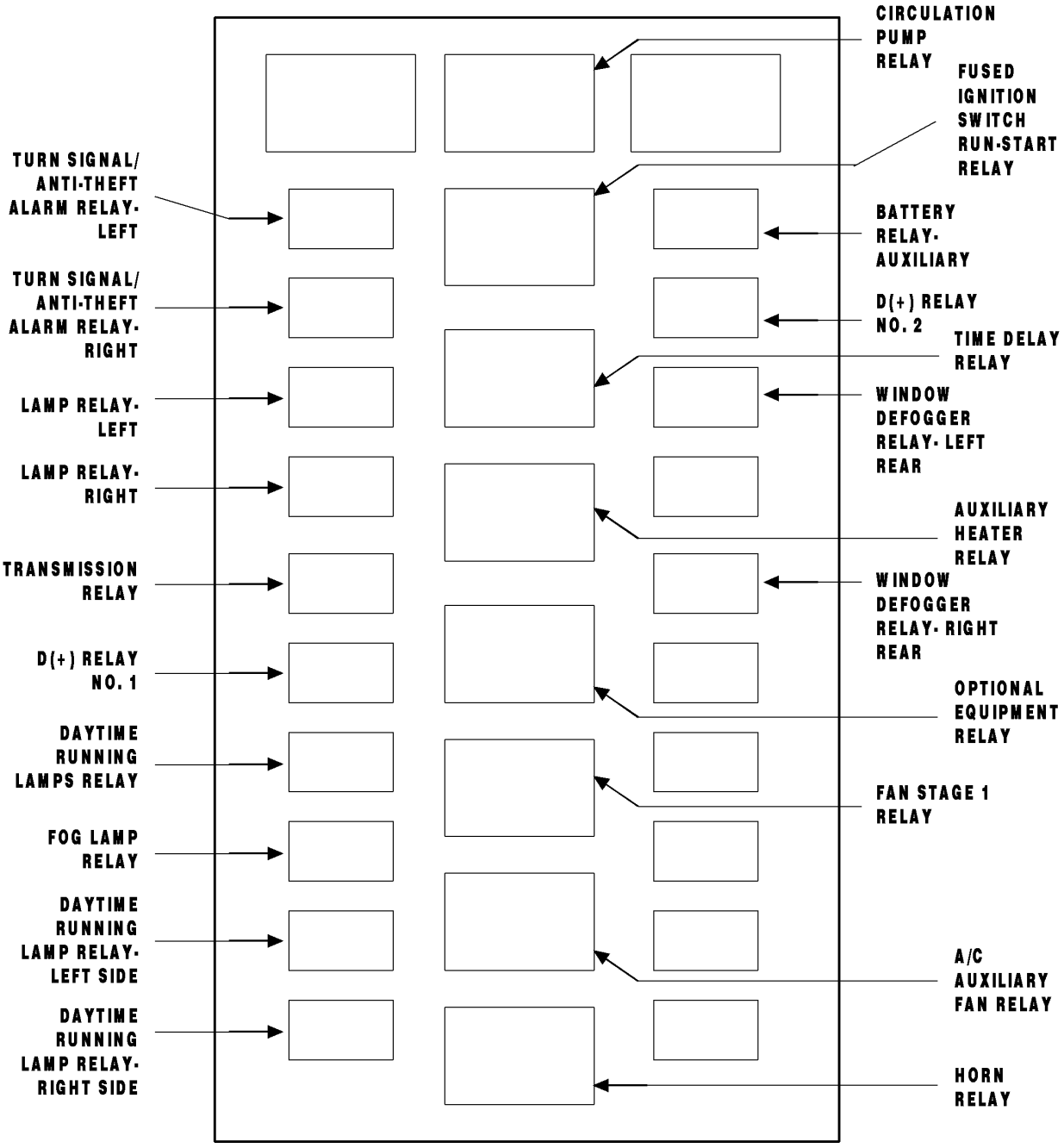


NOTE: THE FUSE POSITIONS SHOWN HERE MAY VARY FROM VEHICLE TO VEHICLE.

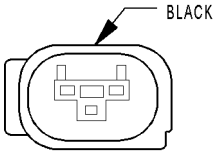
FUSED IGNITION SWITCH RUN-START RELAY (RELAY BLOCK)

CAV	CIRCUIT	FUNCTION
30	14RD	FUSED B(+)
85	18BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	16BR	GROUND
87	14BK/YL (RUN-START)	FUSED B(+)
87A	-	-

RELAY BLOCK



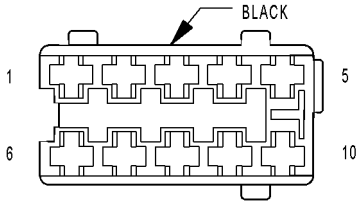
NOTE: THE RELAY LOCATIONS SHOWN HERE MAY VARY FROM VEHICLE TO VEHICLE.



SIREN

SENTRY KEY REMOTE ENTRY MODULE (SKREEM)

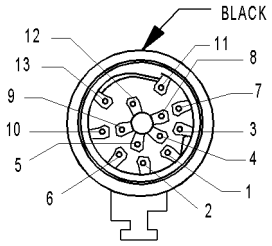
CAV	CIRCUIT	FUNCTION
1	18YL	RKE ANTENNA
2	16BR	GROUND
3	16RD/YL	FUSED B(+)
4	16BK/WT	LEFT TURN SIGNAL
5	20DG/WT	CAN C BUS (+)
6	20DG	CAN C BUS (-)
7	16BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	20WT/DG	K-SKREEM
9	16WT/BL/RD (EXCEPT VTSS)	RKE INTERFACE
9	16WT/BL/RD (VTSS)	SECURITY SYSTEM INTERFACE
10	18DG/YL	TURN SIGNAL/ANTI-THEFT ALARM RELAY-LEFT/RIGHT CONTROL
11	20BR	TRANSPONDER COIL (+)
12	-	TRANSPONDER COIL (-)



TCS
SWITCH
(ASR)

SPEED CONTROL SWITCH

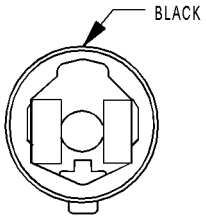
CAV	CIRCUIT	FUNCTION
1	18GY	OFF SIGNAL
2	18BK	VERIFICATION SIGNAL
3	18BL	RESUME SIGNAL
4	18YL	DECEL/SET SIGNAL
5	18DG	ACCEL/SET SIGNAL
6	18RD	S/C SWITCH 12 VOLT SUPPLY



TRANSMISSION
SOLENOID
ASSEMBLY

TRANSMISSION CONTROL MODULE C1 - BLACK

CAV	CIRCUIT	FUNCTION
1	20BL	K-TCM/RADIO
29	16BK/DG	TRANSMISSION RELAY OUTPUT
30	18BR	GROUND



TURN SIGNAL LAMP NO. 1-LEFT FRONT

TRANSMISSION CONTROL MODULE C2 - BLACK

CAV	CIRCUIT	FUNCTION
12	20BL/GY	N2 INPUT SPEED SENSOR
13	20BK/BL	SENSOR SUPPLY VOLTAGE
14	16WT	1-2/4-5 SOLENOID CONTROL
15	16YL	3-4 SOLENOID CONTROL
16	16WT/BL	2-3 SOLENOID CONTROL
17	16YL/BL	TCC SOLENOID CONTROL
33	20PK	SENSOR GROUND
34	20GY/BL	TEMPERATURE SENSOR-P/N SWITCH
35	20BL/DG	N3 INPUT SPEED SENSOR
36	16BR/GY	MODULATION PRESSURE SOLENOID CONTROL
37	16BK/RD	SHIFT PRESSURE SOLENOID CONTROL
38	16BK	SOLENOID SUPPLY VOLTAGE
H	20DG/WT	CAN C BUS (+)
L	20DG	CAN C BUS (-)

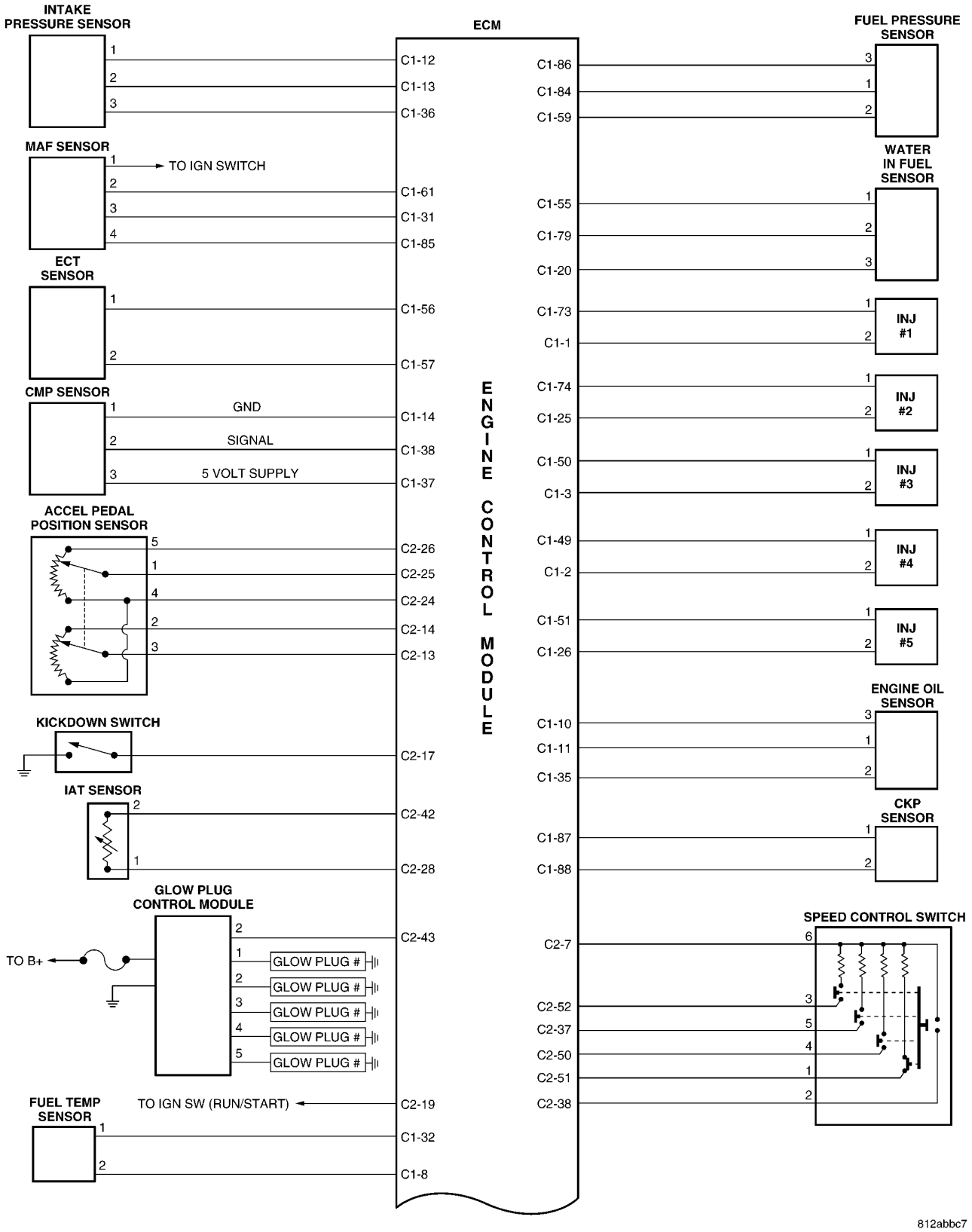
CONNECTOR NOT AVAILABLE

WATER IN FUEL SENSOR - BLACK

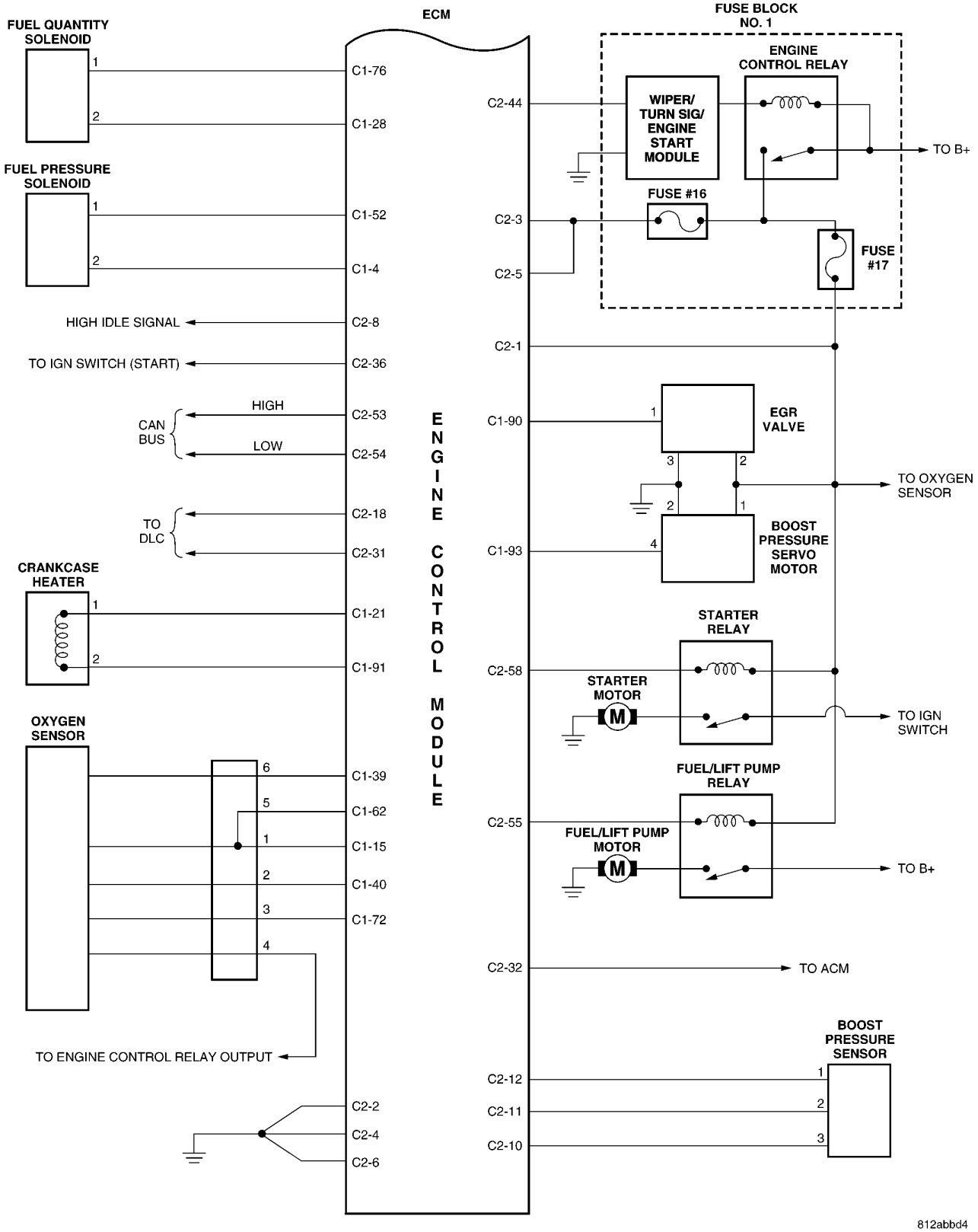
CAV	CIRCUIT	FUNCTION
1	18BR	WATER IN FUEL SENSOR SIGNAL
2	18BR/RD	WATER IN FUEL SENSOR 12 VOLT SUPPLY
3	18BK/YL	WATER IN FUEL SENSOR GROUND

10.0 SCHEMATIC DIAGRAMS

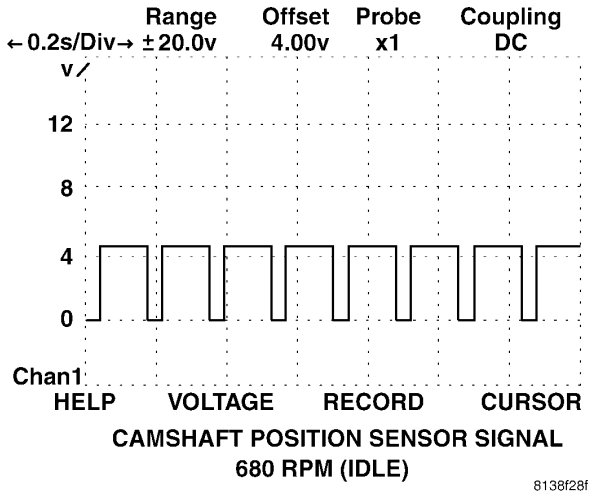
10.1 ENGINE CONTROL MODULE



10.2 ENGINE CONTROL MODULE

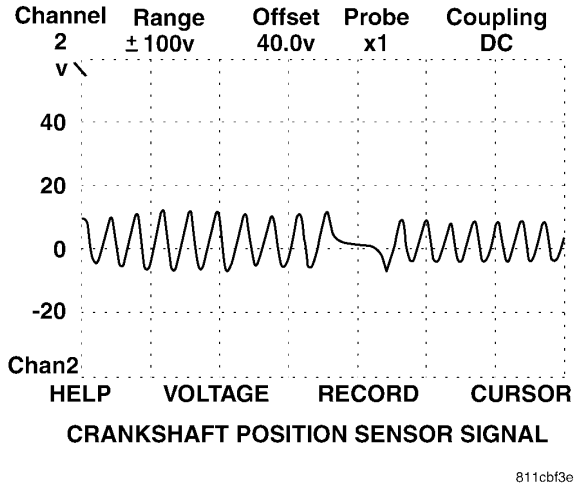


11.0 CHARTS AND GRAPHS



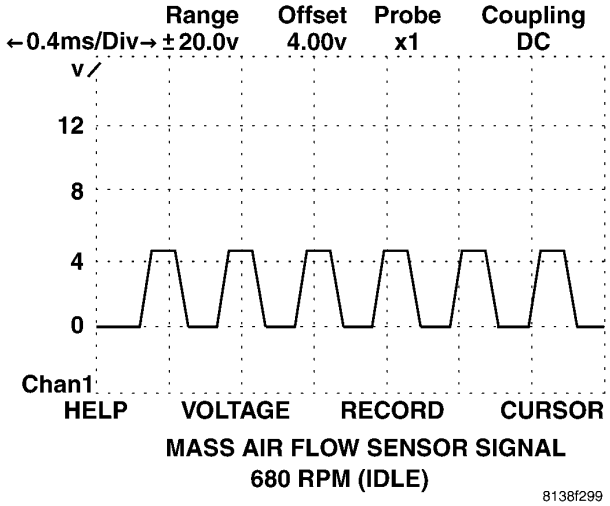
CAMSHAFT POSITION SENSOR SIGNAL
680 RPM (IDLE)

8138f28f



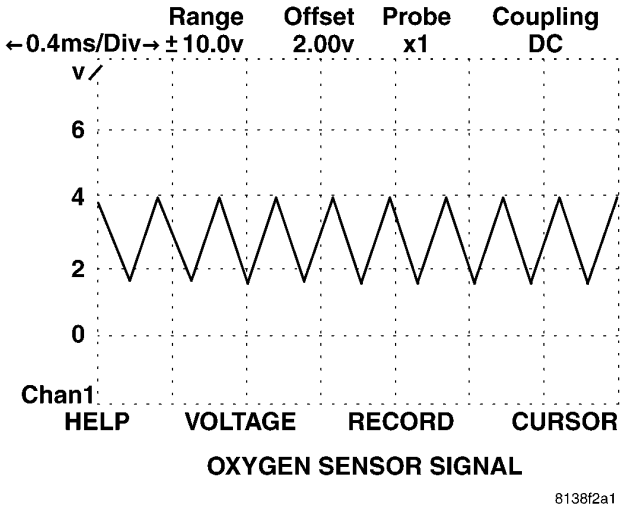
CRANKSHAFT POSITION SENSOR SIGNAL

811cbf3e



MASS AIR FLOW SENSOR SIGNAL
680 RPM (IDLE)

8138f299



OXYGEN SENSOR SIGNAL

8138f2a1

NOTES