

# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	SYSTEM COVERAGE	1
1.2	SIX-STEP TROUBLESHOOTING PROCEDURE	1
<b>2.0</b>	<b>IDENTIFICATION OF SYSTEM</b>	<b>1</b>
<b>3.0</b>	<b>SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION</b>	<b>1</b>
3.1	GENERAL DESCRIPTION	1
3.2	FUNCTIONAL OPERATION	2
3.2.1	FUEL CONTROL	2
3.2.2	ON-BOARD DIAGNOSTICS	2
3.2.3	OTHER CONTROLS	5
3.2.4	PCM OPERATING MODES	10
3.2.5	NON-MONITORED CIRCUITS	10
3.2.6	SKIS OVERVIEW	10
3.2.7	SKIM ON-BOARD DIAGNOSTICS	10
3.2.8	SKIS OPERATION	11
3.2.9	PROGRAMMING THE POWERTRAIN CONTROL MODULE	11
3.2.10	PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE	12
3.2.11	PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE	12
3.3	DIAGNOSTIC TROUBLE CODES	12
3.3.1	HARD CODE	12
3.3.2	INTERMITTENT CODE	13
3.3.3	STARTS SINCE SET COUNTER	13
3.3.4	DISTANCE SINCE MI SET	13
3.4	USING THE DRBIII®	13
3.5	DRBIII® ERROR MESSAGES AND BLANK SCREEN	13
3.5.1	DRBIII® DOES NOT POWER UP	14
3.5.2	DISPLAY IS NOT VISIBLE	14
<b>4.0</b>	<b>DISCLAIMERS, SAFETY, WARNINGS</b>	<b>14</b>
4.1	DISCLAIMERS	14
4.2	SAFETY	14
4.2.1	TECHNICIAN SAFETY INFORMATION	14
4.2.2	VEHICLE PREPARATION FOR TESTING	14
4.2.3	SERVICING SUB ASSEMBLIES	14
4.2.4	DRBIII® SAFETY INFORMATION	14
4.3	WARNINGS AND CAUTIONS	15
4.3.1	ROAD TEST WARNINGS	15
4.3.2	VEHICLE DAMAGE CAUTIONS	15
<b>5.0</b>	<b>REQUIRED TOOLS AND EQUIPMENT</b>	<b>15</b>
<b>6.0</b>	<b>GLOSSARY OF TERMS</b>	<b>16</b>
<b>7.0</b>	<b>DIAGNOSTIC INFORMATION AND PROCEDURES</b>	<b>17</b>
	<b>COMMUNICATION</b>	
	*NO RESPONSE FROM PCM (PCI BUS) - NGC	18
	*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC	19

## TABLE OF CONTENTS - Continued

*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE .....	22
*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC .....	24
*PCI BUS COMMUNICATION FAILURE .....	27

### **DRIVEABILITY - NGC**

INTERMITTENT CONDITION .....	30
P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT .....	31
P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW .....	35
P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW .....	35
P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH .....	37
P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH .....	37
P0033-SURGE VALVE SOLENOID CIRCUIT .....	40
P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION .....	42
P0071-AMBIENT TEMP SENSOR PERFORMANCE .....	48
P0072-AMBIENT TEMP SENSOR LOW .....	51
P0073-AMBIENT TEMP SENSOR HIGH .....	53
P0107-MAP SENSOR LOW .....	55
P0108-MAP SENSOR HIGH .....	58
P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE .....	61
P0112-INTAKE AIR TEMPERATURE SENSOR LOW .....	64
P0113-INTAKE AIR TEMPERATURE SENSOR HIGH .....	66
P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE .....	68
P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW .....	71
P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH .....	73
P0122-THROTTLE POSITION SENSOR #1 LOW .....	75
P0123-THROTTLE POSITION SENSOR #1 HIGH .....	78
P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL ..	81
P0128-THERMOSTAT RATIONALITY .....	83
P0129-BAROMETRIC PRESSURE OUT-OF-RANGE .....	88
P0131-O2 SENSOR 1/1 VOLTAGE LOW .....	92
P0137-O2 SENSOR 1/2 VOLTAGE LOW .....	92
P0132-O2 SENSOR 1/1 VOLTAGE HIGH .....	95
P0138-O2 SENSOR 1/2 VOLTAGE HIGH .....	95
P0133-O2 SENSOR 1/1 SLOW RESPONSE .....	98
P0139-O2 SENSOR 1/2 SLOW RESPONSE .....	98
P0135-O2 SENSOR 1/1 HEATER PERFORMANCE .....	100
P0141-O2 SENSOR 1/2 HEATER PERFORMANCE .....	100
P0171-FUEL SYSTEM 1/1 LEAN .....	103
P0172-FUEL SYSTEM 1/1 RICH .....	108
P0201-FUEL INJECTOR #1 .....	112
P0202-FUEL INJECTOR #2 .....	112
P0203-FUEL INJECTOR #3 .....	112
P0204-FUEL INJECTOR #4 .....	112
P0234-OVERBOOST PERFORMANCE .....	115
P1106-BARO SOLENOID PERFORMANCE .....	115
P1188 TIP SENSOR PERFORMANCE .....	115
P0243-WASTEGATE SOLENOID CIRCUIT .....	119
P0300-MULTIPLE CYLINDER MISFIRE .....	122
P0301-CYLINDER #1 MISFIRE .....	122
P0302-CYLINDER #2 MISFIRE .....	122
P0303-CYLINDER #3 MISFIRE .....	122
P0304-CYLINDER #4 MISFIRE .....	122
P0315-NO CRANK SENSOR LEARNED .....	130

## TABLE OF CONTENTS - Continued

P0325-KNOCK SENSOR #1 CIRCUIT .....	132
P0335-CRANKSHAFT POSITION SENSOR CIRCUIT .....	135
P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT .....	140
P0340-CAMSHAFT POSITION SENSOR CIRCUIT .....	144
P0344-CAMSHAFT POSITION SENSOR INTERMITTENT .....	149
P0420-CATALYTIC 1/1 EFFICIENCY .....	153
P0440-GENERAL EVAP SYSTEM FAILURE .....	154
P0441-EVAP PURGE SYSTEM PERFORMANCE .....	159
P0442-EVAP SYSTEM MEDIUM LEAK .....	161
P0455-EVAP SYSTEM LARGE LEAK .....	161
P0443-EVAP PURGE SOLENOID CIRCUIT .....	166
P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW .....	169
P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH .....	172
P0456-EVAP SYSTEM SMALL LEAK .....	174
P0461-FUEL LEVEL SENSOR #1 PERFORMANCE .....	176
P0462-FUEL LEVEL SENSOR #1 LOW .....	178
P0463-FUEL LEVEL SENSOR #1 HIGH .....	178
P0480-COOLING FAN 1 CONTROL CIRCUIT .....	179
P0481-COOLING FAN 2 CONTROL CIRCUIT (NON-TURBO) .....	179
P0481-COOLING FAN 2 CONTROL CIRCUIT (TURBO) .....	181
P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW .....	184
P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH .....	185
P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (AUTO TRANS) .....	187
P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (MANUAL TRANS) .....	188
P0506-IDLE SPEED LOW PERFORMANCE .....	190
P0507-IDLE SPEED HIGH PERFORMANCE .....	190
P0519-IDLE SPEED PERFORMANCE .....	190
P0508-IAC VALVE SENSE CIRCUIT LOW .....	192
P0509-IAC VALVE SENSE CIRCUIT HIGH .....	195
P0513-INVALID SKIM KEY .....	197
P0516-BATTERY TEMPERATURE SENSOR LOW .....	199
P0517-BATTERY TEMPERATURE SENSOR HIGH .....	201
P0522-OIL PRESSURE SENSOR LOW .....	203
P0551-POWER STEERING SWITCH PERFORMANCE .....	205
P0562-BATTERY VOLTAGE LOW .....	207
P0563-BATTERY VOLTAGE HIGH .....	210
P0572-BRAKE SWITCH #1 CIRCUIT LOW .....	212
P0573-BRAKE SWITCH #1 CIRCUIT HIGH .....	214
P0581-SPEED CONTROL SWITCH #1 HIGH .....	216
P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT .....	218
P0586-SPEED CONTROL VENT SOLENOID CIRCUIT .....	220
P0594-SPEED CONTROL SERVO POWER CIRCUIT .....	222
P0600-SERIAL COMMUNICATION LINK .....	225
P0601-INTERNAL MEMORY CHECKSUM INVALID .....	225
P0622-GENERATOR FIELD CONTROL CIRCUIT .....	226
P0627-FUEL PUMP RELAY CIRCUIT .....	228
P0630-VIN NOT PROGRAMMED IN PCM .....	230
P0632-ODOMETER NOT PROGRAMMED IN PCM .....	231
P0633-SKIM KEY NOT PROGRAMMED IN PCM .....	232
P0645-A/C CLUTCH RELAY CIRCUIT .....	233
P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT .....	235
P0685-ASD RELAY CONTROL CIRCUIT .....	238
P0688-ASD RELAY SENSE CIRCUIT LOW .....	240

## TABLE OF CONTENTS - Continued

P0700-TRANSMISSION CONTROL SYSTEM/READ TRANSMISSION DTCS ON THE DRBIII® .....	243
P0833-CLUTCH RELEASED SWITCH CIRCUIT .....	244
P0850-PARK/NEUTRAL SWITCH PERFORMANCE .....	246
P1105-TIP SENSOR SOLENOID CIRCUIT .....	247
P1115-GENERAL TEMP SENSOR PERFORMANCE .....	249
P1189-TIP SENSOR CIRCUIT LOW .....	253
P1190-TIP SENSOR CIRCUIT HIGH .....	256
P1593-SPEED CONTROL SWITCH STUCK .....	259
P1602-PCM NOT PROGRAMMED .....	262
P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION .....	263
P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE ..	263
P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY .....	263
P1696-EEPROM MEMORY WRITE DENIED/INVALID .....	264
P1697-EMR (SRI) MILEAGE NOT STORED .....	264
P1854-TIP BARO OUT OF RANGE .....	266
P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK .....	270
P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN .....	276
P2097-DOWN STREAM FUEL SYSTEM 1/2 RICH .....	276
P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION ..	279
P2305-IGNITION COIL #2 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION ..	279
P2503-CHARGING SYSTEM VOLTAGE LOW .....	282
U0101-NO TRANSMISSION BUS MESSAGE .....	285
U0155-NO CLUSTER BUS MESSAGE .....	287
U0168-NO SKIM BUS MESSAGES .....	288
U110C-NO FUEL LEVEL BUS MESSAGE .....	290
*CHECKING PCM POWER AND GROUND CIRCUITS .....	292
*CHECKING RAD FAN HIGH SPEED OPERATION (TURBO) .....	293
*CHECKING RAD FAN LOW SPEED OPERATION (TURBO) .....	295
*CHECKING RADIATOR FAN RELAY OUTPUT .....	298
*CHECKING THE A/C RELAY OUTPUT .....	300
 <b>SENTRY KEY IMMOBILIZER</b>	
ANTENNA FAILURE .....	302
COP FAILURE .....	302
EEPROM FAILURE .....	302
INTERNAL FAULT .....	302
RAM FAILURE .....	302
SERIAL LINK INTERNAL FAULT .....	302
STACK OVERFLOW FAILURE .....	302
PCM STATUS FAILURE .....	304
SERIAL LINK EXTERNAL FAULT .....	304
ROLLING CODE FAILURE .....	306
VIN MISMATCH .....	306
TRANSPONDER COMMUNICATION FAILURE .....	308
TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE .....	308
TRANSPONDER ID MISMATCH .....	308
TRANSPONDER RESPONSE MISMATCH .....	308
 <b>STARTING</b>	
*CHECKING FUEL DELIVERY .....	311
*CHECKING FUEL PRESSURE LEAK DOWN .....	314

## TABLE OF CONTENTS - Continued

*ENGINE CRANKS DOES NOT START .....	315
*ENGINE CRANKS DOES NOT START - 1.6L .....	323
*NO CRANK CONDITION. ....	330
*NO RESPONSE FROM PCM WITH A NO START CONDITION .....	333
*START AND STALL CONDITION .....	334
 <b>VERIFICATION TESTS</b>	
VERIFICATION TESTS.....	337
 <b>8.0 COMPONENT LOCATIONS.....</b>	<b>345</b>
<b>8.1 CONTROL MODULES AND PDC.....</b>	<b>345</b>
<b>8.2 CONTROLS AND SOLENOIDS .....</b>	<b>345</b>
<b>8.3 DATA LINK CONNECTOR .....</b>	<b>347</b>
<b>8.4 SENSORS .....</b>	<b>347</b>
<b>8.5 FUEL SYSTEM .....</b>	<b>349</b>
<b>8.6 SWITCHES/GAUGES .....</b>	<b>349</b>
 <b>9.0 CONNECTOR PINOUTS .....</b>	<b>351</b>
A/C COMPRESSOR CLUTCH - BLACK 2 WAY .....	351
A/C HIGH PRESSURE SWITCH - BLACK 2 WAY .....	351
A/C LOW PRESSURE SWITCH (2.0L LHD) - DK. GREEN 2 WAY.....	351
A/C LOW PRESSURE SWITCH (2.4L TURBO) - DK. GREEN 2 WAY .....	351
A/C LOW PRESSURE SWITCH (RHD) - BLACK 2 WAY.....	352
AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY .....	352
BATTERY TEMPERATURE SENSOR - BLACK 2 WAY .....	352
BRAKE LAMP SWITCH - BLACK 6 WAY .....	352
CAMSHAFT POSITION SENSOR - BLACK 3 WAY .....	353
CLOCKSPRING - GREEN 7 WAY .....	353
CLUTCH INTERLOCK/UPSTOP SWITCH (MTX) - BLACK 3 WAY.....	353
CRANKSHAFT POSITION SENSOR - BLACK 3 WAY.....	353
DATA LINK CONNECTOR - WHITE 16 WAY .....	354
ENGINE COOLANT TEMP SENSOR (2.0L) - BLACK 2 WAY .....	354
ENGINE COOLANT TEMP SENSOR (2.4L TURBO) - BLACK 2 WAY .....	354
ENGINE OIL PRESSURE SWITCH - LT. GREEN 2 WAY .....	354
EVAP/PURGE SOLENOID - BLACK 2 WAY .....	355
FUEL INJECTOR NO. 1 - BLACK 2 WAY .....	355
FUEL INJECTOR NO. 2 - BLACK 2 WAY .....	355
FUEL INJECTOR NO. 3 - BLACK 2 WAY .....	355
FUEL INJECTOR NO. 4 - BLACK 2 WAY .....	355
FUEL PUMP MODULE - LT. GRAY 4 WAY .....	356
FUSES (FB LHD) .....	358
FUSES (FB RHD) .....	360
GENERATOR (2.0L) - BLACK 2 WAY .....	360
GENERATOR (2.4L TURBO) - LT. GRAY 2 WAY .....	360
GENERATOR (GENERATOR SIDE) .....	361
IDLE AIR CONTROL MOTOR (2.0L/2.4L TURBO) - BLACK 2 WAY .....	361
IGNITION COIL - BLACK 3 WAY .....	361
INLET AIR TEMPERATURE SENSOR - BLACK 2 WAY.....	361
INSTRUMENT CLUSTER - BLACK 26 WAY.....	362
KNOCK SENSOR - BLACK 2 WAY .....	362
MANIFOLD ABSOLUTE PRESSURE SENSOR (2.0L) - GRAY 3 WAY.....	363

## TABLE OF CONTENTS - Continued

MANIFOLD ABSOLUTE PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY	.363
MANIFOLD TUNING VALVE SOLENOID (RT) - BLACK 2 WAY	.363
OXYGEN SENSOR 1/1 UPSTREAM - BLACK 4 WAY	.363
OXYGEN SENSOR 1/2 DOWNSTREAM - BLACK 4 WAY	.364
OXYGEN SENSOR CONNECTOR (COMPONENT SIDE) - 4 WAY	.364
FUSES (PDC)	.366
A/C COMPRESSOR CLUTCH RELAY	.366
AUTOMATIC SHUT DOWN RELAY	.366
FUEL PUMP RELAY	.367
MANIFOLD TUNING VALVE RELAY (RT)	.367
RADIATOR FAN CONTROL RELAY (2.4L TURBO)	.367
RADIATOR FAN HIGH RELAY (2.4L TURBO)	.367
RADIATOR FAN RELAY (2.0L)	.367
STARTER MOTOR RELAY	.367
POWERTRAIN CONTROL MODULE C1 - BLACK 38 WAY	.368
POWERTRAIN CONTROL MODULE C2 (2.0L) - ORANGE 38 WAY	.369
POWERTRAIN CONTROL MODULE C3 - WHITE 38 WAY	.370
RADIATOR FAN MOTOR (2.0L) - BLACK 2 WAY	.371
RADIATOR FAN MOTOR (2.4L TURBO) - BLACK 4 WAY	.371
SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY	.371
SPEED CONTROL SERVO - BLACK 4 WAY	.371
SURGE SOLENOID (2.4L TURBO) - BLACK 2 WAY	.372
THROTTLE INLET PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY	.372
THROTTLE INLET PRESSURE SOLENOID (2.4L TURBO) - BLACK 2 WAY	.372
THROTTLE POSITION SENSOR (2.0L) - BLACK 3 WAY	.372
THROTTLE POSITION SENSOR (2.4L TURBO) - NATURAL 3 WAY	.373
TURBO BOOST GAUGE LAMP (2.4L TURBO) - NATURAL 2 WAY	.373
VEHICLE SPEED SENSOR - BLACK 3 WAY	.373
WASTEGATE SOLENOID (2.4L TURBO) - BLACK 2 WAY	.373
<b>10.0 SCHEMATIC DIAGRAMS</b>	<b>.375</b>
<b>10.1 2004 PL 2.0L ENGINE</b>	<b>.375</b>
<b>10.2 2004 SRT-4 2.4L ENGINE</b>	<b>.377</b>
<b>11.0 CHARTS AND GRAPHS</b>	<b>.379</b>



**NOTE (NGC)**

The 2004 PL is equipped with the Powertrain Control Module and Transmission Control Module combined in a single control module. This module is the Next Generation Controller (NGC) for DaimlerChrysler and will be referred to as the Powertrain Control Module (PCM).

The PCM has four color coded connectors C1 through C4, (C1 - BLK, C2 - ORANGE, C3 - WHITE, C4 - GREEN), with each connector containing 38 pins.

Two tools are required to diagnose and repair the PCM terminals and harness connectors:

1. Miller #3638 Terminal Removal Pick must be used to release the connector terminals or harness and connector damage will occur.
2. Miller #8815 Pinout Box must be used to probe the PCM terminals or terminal damage will occur.

**1.0 INTRODUCTION**

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

Please follow the recommendations below when choosing your diagnostic path.

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

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

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

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 sys-

tems may be enhanced. READ THIS DIAGNOSTIC INFORMATION BEFORE TRYING TO DIAGNOSE A VEHICLE CODE. It is recommended that you review the entire diagnostic information to become familiar with all new and changed diagnostic procedures.

If you have any comments or recommendations after reviewing the diagnostic information, 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 the 2003 PL vehicle equipped with the 2.0L and 2.4L Turbo Engines.

**1.2 SIX-STEP TROUBLESHOOTING PROCEDURE**

Diagnosis of the powertrain control module (PCM) is done in six basic steps:

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

**2.0 IDENTIFICATION OF SYSTEM**

The Powertrain Control Module (PCM) monitors and controls:

- Fuel System
- Idle Air Control System
- Ignition System
- Charging System
- Speed Control System
- Cooling system

**3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION****3.1 GENERAL DESCRIPTION**

These Sequential Fuel Injection (SFI) engine systems have the latest in technical advances. The OBDII/Euro Stage III OBD diagnostics incorporated with the Powertrain Control Module (PCM) are intended to assist the field technician in repairing vehicle problems by the quickest means.

## GENERAL INFORMATION

### 3.2 FUNCTIONAL OPERATION

#### 3.2.1 FUEL CONTROL

The PCM controls the air/fuel ratio of the engine by varying fuel injector on time. Air flow is calculated using the speed density method using engine speed, manifold absolute pressure, and air temperature change.

Different fuel calculation strategies are used depending on the operational state of the engine. During crank mode, a longer pulse width fuel pulse is delivered followed by fuel pulses determined by a crank time strategy. Cold engine operation is determined via an open loop strategy until the O<sub>2</sub> sensors have reached operating temperature. At this point, the strategy enters a closed loop mode where fuel requirements are based upon the state of the O<sub>2</sub> sensors, engine speed, MAP, throttle position, air temperature, battery voltage, and coolant temperature.

#### 3.2.2 ON-BOARD DIAGNOSTICS

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

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

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

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input

voltage is not within specifications and other trouble code criteria are met, a trouble code will be stored in the PCM memory.

The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII/Euro Stage III OBD. These OBDII/Euro Stage III OBD Diagnostics control the functions necessary to meet the requirements of California OBDII, Federal OBD regulation and European regulation. These requirements specify the inclusion of a Malfunction Indicator Light (MIL) located on the instrument panel. The purpose of the MIL is to inform the vehicle operator in the event of a malfunction of any emission system or component failure.

#### MIL Lamp Strategy

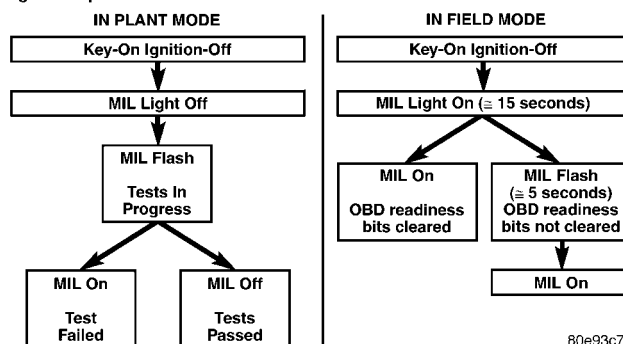
I/M Readiness OK to test = **Key On Engine OFF**

– MIL Lamp will remain on until the engine is started or Ignition is turned off.

I/M not ready for testing = **Key On Engine OFF**

– MIL Lamp on solid for (15) seconds then MIL Lamp will flash on/off for (5) seconds then it will remain on until the vehicle is started or the Ignition is turned off.

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



80e93c7e



## OBD II/EURO STAGE III OBD MONITOR INFORMATION

Comprehensive Components Monitor	Major Monitors Non Fuel Control & Non Misfire	Major Monitors Fuel Control & Misfire
Run constantly	Run Once Per Trip	Run Constantly
Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
One Trip Faults - Turns On The MIL and Sets DTC After One Failure	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures
Priority 3	Priority 1 or 3	Priority 2 or 4
All Checked For Continuity	Done Stop Testing = Yes	<div><b>Fuel Control Monitor</b> Monitors Fuel Control System For:  Fuel System Lean Fuel System Rich  Requires 3 Consecutive <i>Fuel System Good Trips</i> To Extinguish The MIL</div>
Open	Oxygen Sensor Heater Oxygen Sensor Response	
Short To Ground		
Short To Voltage		
Inputs Checked For Rationality	<div>Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault</div>	<div><b>Misfire Monitor</b> Monitors For Engine Misfire at:  1000 RPM Counter (Type B) **200 RPM Counter (Type A)  Requires 3 Consecutive <i>Misfire Good Trips</i> To Extinguish the MIL  **Type A misfire is a two trip failure. The MIL will illuminate and blink at the first failure.</div>
Outputs Checked For Functionality	Evaporative Emission System	
Requires 3 Consecutive <i>Global/Alternate Good Trips</i> to Extinguish the MIL*	Requires 3 Consecutive <i>Global Good Trips</i> to Extinguish the MIL*	
*40 Warm Up Cycles are required to erase DTC's <i>after</i> the MIL has been extinguished.		

## GENERAL INFORMATION

---

### OBDII Monitor Run Process NGC Vehicle

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

#### **\*\*NOTE\*\***

- A. Once the monitor run process has begun, do not turn off the ignition. By turning the ignition key off, monitor enabling conditions will be lost. Only the 02 Heater Monitor runs after key off.
- B. By performing a Battery Disconnect, or Selecting Erase DTCs, the CARB Readiness and all additional OBD information will be cleared.

#### Monitor Preliminary Checks:

1. Plug a DRBIII into the vehicle's DLC.
2. Turn the ignition, KEY ON-ENGINE OFF. Watch for MIL lamp illumination during the bulb check. MIL lamp must have illuminated, if not, repair MIL lamp.
3. On the DRB III Select #1 DRB III Standalone.
4. Select #1 1998-2004 Diagnostics
5. Select #1 Engine
6. Select #2 DTCs and Related Functions
7. Select #1 Read DTCs
  - \*Verify that No Emissions Related DTCs are Present.
  - \*If an Emissions DTC is Present, the OBD II Monitors may not run and the CARB Readiness will not update.
  - \*The Emissions related DTC, will need to be repaired, then cleared. By clearing DTCs, the OBD Monitors will need to be run and completed to set the CARB Readiness Status.
8. Return to Engine Select Function Menu and Select #9, OBD II Monitors.
9. Select #2 CARB Readiness Status.

Do all the CARB Readiness Status Locations read YES?

- \*YES, then all monitors have been completed and this vehicle is ready to be I/M or Emission Tested.
- \*NO, then the following procedure needs to be followed to run/complete all available monitors.

#### **\*\*NOTE\*\***

- A. Only the monitors, which are **not** YES in the CARB Readiness Status, need to be completed.
- B. Specific criteria need to be met for each monitor. Each monitor has a Pre-Test screen to assist in

running the monitor. For additional information, refer to the Chrysler Corporation Technical Training Workbook title On Board Diagnostics, part number 81-699-97094.

The most efficient order to run the monitors has been outlined below, including suggestions to aid the process.

### A. NATURAL VACUUM LEAK DETECTION WITH PURGE MONITOR

This monitor requires a cool down cycle, usually an overnight soak for at least 8 hours without the engine running. The ambient temperature must decrease overnight – parking the vehicle outside is advised. To run this test the fuel level must be between 15-85% full. For the monitor run conditions select the EVAP MON PRE-TEST in the DRB III®, OBD II Monitors Menu. The Purge monitor will run if the small leak test reports a pass. Criteria for NVLD monitor.

1. Engine off time greater than one hour
2. Fuel Level between 15% and 85%
3. Start Up ECT and IAT within 10°C (18°F).
4. Vehicle started and run until Purge Monitor reports a result.

**NOTE: If the vehicle does not report a result and the conditions were correct, it may take up to two weeks to fail the small leak monitor. DO NOT use this test to attempt to determine a fault. Use the appropriate service information procedure for finding a small leak. If there are no faults and the conditions are correct this test will run and report a pass. Note the Small leak test can find leaks less than 10 thousandths of an inch. If a small leak is present it takes approximately one week of normal driving to report a failure.**

### B. CATALYST/O2 MONITOR

With NGC, Catalyst and O2 Monitor information are acquired and processed at the same time. Most vehicles will need to be driven at highway speed (<50 mph) for a few minutes. Some trucks run the monitor at idle in drive. If the vehicle is equipped with a manual transmission, using 4<sup>th</sup> gear may assist in meeting the monitor running criteria. For the monitor run conditions, select the BANK 1 CAT MON PRE-TEST in the DRB III®, OBD II Monitors Menu.

### C. EGR MONITOR

The EGR monitor now runs in a closed throttle decel or at idle on a warm vehicle. However, it is necessary to maintain the TPS, Map and RPM ranges to allow the monitor to complete itself. For

the monitor run conditions, select the EGR PRE-TEST in the DRB III®, OBD II Monitors Menu.

#### D. O2 SENSOR HEATER MONITOR

This monitor is now continuously running once the heaters are energized. Pass information will be processed at power down. For the monitor run conditions, select the O2S HEATER MON PRE-TEST in the DRB III®, OBD II Monitors Menu.

### 3.2.3 OTHER CONTROLS

#### CHARGING SYSTEM (NGC)

The charging system is turned on when the engine is started. The Generator field is controlled by the PCM using a 12-volt high-side driver and a body ground circuit. The Generator output voltage is determined by the PCM. When more system voltage is needed, the PCM will apply a longer duty cycle using the 12-volt high-side drive and shortens duty cycle or none at all when less voltage is needed.

#### O2 SENSOR (NGC)

The O2 system with ignition on and engine off has a normalized O2 voltage of around 5 volts as displayed on the DRBIII or measured with a high impedance voltmeter. As the O2 sensor starts generating a signal the voltage will move towards 2.5 volts. The voltage will typically vary between 2.5 volts and 3.5 volts on a normal running engine. The goal voltage is also typically between 2.5 and 3.5 volts. This implies that the 0-volt through 1-volt range that you are used to is still valid, only it is shifted up by a 2.5 volt offset. This 2.5 volt supply is being delivered through the sensor return line.

#### SPEED CONTROL SYSTEM

The PCM controls vehicle speed by operation of the speed control servo vacuum and vent solenoids. Energizing the vacuum solenoid applies vacuum to the servo to increase throttle position. Operation of the vent solenoid slowly releases the vacuum allowing throttle position to decrease. A special vacuum dump solenoid allows immediate release of the throttle during speed control operation.

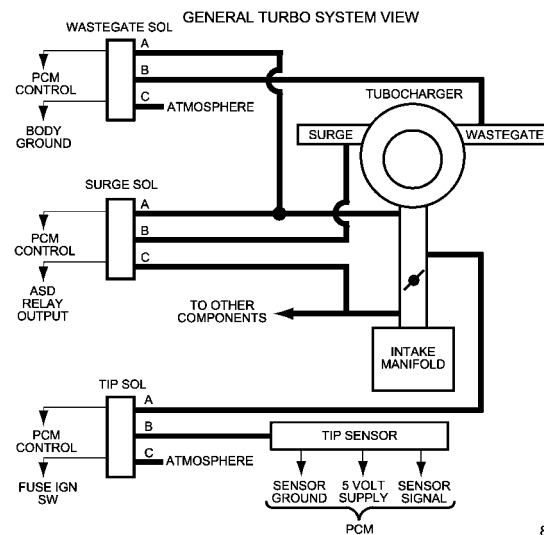
Speed control may be cancelled by braking, driver input using the speed control switches, shifting into neutral, excessive engine speed (wheels spinning), or turning the ignition off.

**NOTE: If two speed control switches are selected simultaneously, the PCM will detect an illegal switch operation and turn the speed control off.**

#### TURBOCHARGER SYSTEM 2.4L (NGC)

The turbocharger is a performance part and must not be tampered with. The wastegate bracket is an integral part of the turbocharger. Tampering with the wastegate components can reduce durability by increasing cylinder pressure and thermal loading due to incorrect inlet and exhaust manifold pressure. Poor fuel economy and failure to meet regulatory emissions laws may also result. Increasing the turbocharger boost WILL NOT increase engine power. The turbocharger is an exhaust-driven supercharger, which increases the pressure and density of the air entering the engine. With the increase of air entering the engine, more fuel can be injected into the cylinders, which creates more power during combustion. Refer to the Service Manual information for description and operation of the Turbo system. The Turbo system consists of the following components.

- Turbocharger with Surge Valve and Wastegate Actuators
- Surge Valve Solenoid
- Throttle Inlet Pressure (TIP) Solenoid
- Wastegate Solenoid
- Throttle Inlet Pressure (TIP) Sensor



80f44cf7

#### NATURAL VACUUM LEAK DETECTION (NVLD) (NGC)

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC) starting in 2002 M.Y. This new system replaces the leak detection pump as the method of

## GENERAL INFORMATION

---

evaporative system leak detection. The current CARB requirement is to detect a leak equivalent to a 0.020" (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the "Gas Law". This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure.

In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

### THE NVLD UTILIZES THE GAS LAW PRINCIPLES

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic. When the vacuum in the system exceeds about 1" H<sub>2</sub>O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the PCM. The PCM, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

### THE NVLD DEVICE AND HOW IT FUNCTIONS

The NVLD Assembly is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister.

The normally open vacuum switch will close with about 1" H<sub>2</sub>O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3" to 6" H<sub>2</sub>O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative. The solenoid actuates the valve to unseal the canister vent while the engine is

running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the NVLD Assembly is a diaphragm that will open the seal with pressure in the evaporative system. The seal will be opened at about 0.5" H<sub>2</sub>O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to "breathe" during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The NVLD Assembly itself has 3 wires: Switch sense, solenoid driver and ground. It also includes a resistor to protect the switch from a short to battery or a short to ground. The PCM utilizes a high-side driver to energize and duty-cycle the solenoid.

### THE PCM'S ROLE IN NVLD DIAGNOSIS:

The integral part of the diagnostic system that makes engine-off leak detection possible is a special circuit in the PCM controller. After the vehicle is turned off, a special part of the controller stays alive and monitors for an NVLD switch closure. This circuit within the PCM is very specific in its function and consumes very little power. If a switch closure is detected, it will log the event and time from key-off, and then power down. This information will be processed at the next key cycle.

### NVLD LEAK DETECTION

#### Small Leak Test (Passive)

If, after a specified delay after key off (perhaps 5 minutes), the switch closes or is closed, the test will be passed, indicating that there is no leak. The PCM records the switch closure. The NVLD circuit in the PCM will shut down for the remainder of that particular engine off (soak) period. When the engine is started, the switch closure is recorded as a "Pass," and the timers that are recording accumulated time are reset.

This diagnostic test can take at least a week to mature a leak fault. A week has been chosen for this because the vehicle will have been exposed to the largest possible drive scenarios before a decision is made (most vehicles should see both daily work and weekend driving cycles). This also satisfies CARB's stated goal of getting 3 MIL illuminations within a month for 0.020" (0.5 mm) leak detection diagnostic.

The diagnostics will log engine run time and engine off time to determine when a week has

elapsed. There is a limit on the total amount of run time that is applied to the one-week timer. There is also a limit on the total soak time that will be allowed to be applied to the one-week timer. There will be a limit on the amount of accrued run time during one specific drive that can be applied to the one-week timer.

The enabling criteria to run this monitor are:

- Fuel level less than 85%
- Ambient temperature greater than 40 °F (4.4 °C)

### **Rationality Tests**

1. The rationality check of the switch, solenoid and seal will be performed as follows:
  - At key-on, the NVLD solenoid will be energized to vent any vacuum that may be trapped in the evaporative system from the previous soak. This should result in an open switch condition.
  - The solenoid will be de-energized (to seal the system) at the point where purge begins. The system / NVLD component rationality passes for that drive cycle if the switch closes after purge begins.
  - The solenoid is then re-energized for the remainder of the drive cycle.
  - If the switch events are not seen in a certain period of time, the rationality check will have failed (2 trip rule).
2. Purge Flow:

The above rationality check is considered sufficient to confirm purge solenoid function and conformance with the purge flow test requirement. The Purge Flow Monitor is passed based on switch activity when purge is turned on or based on a rich fuel control shift when purge is turned on.

### **Medium and Large Leak Test (Intrusive)**

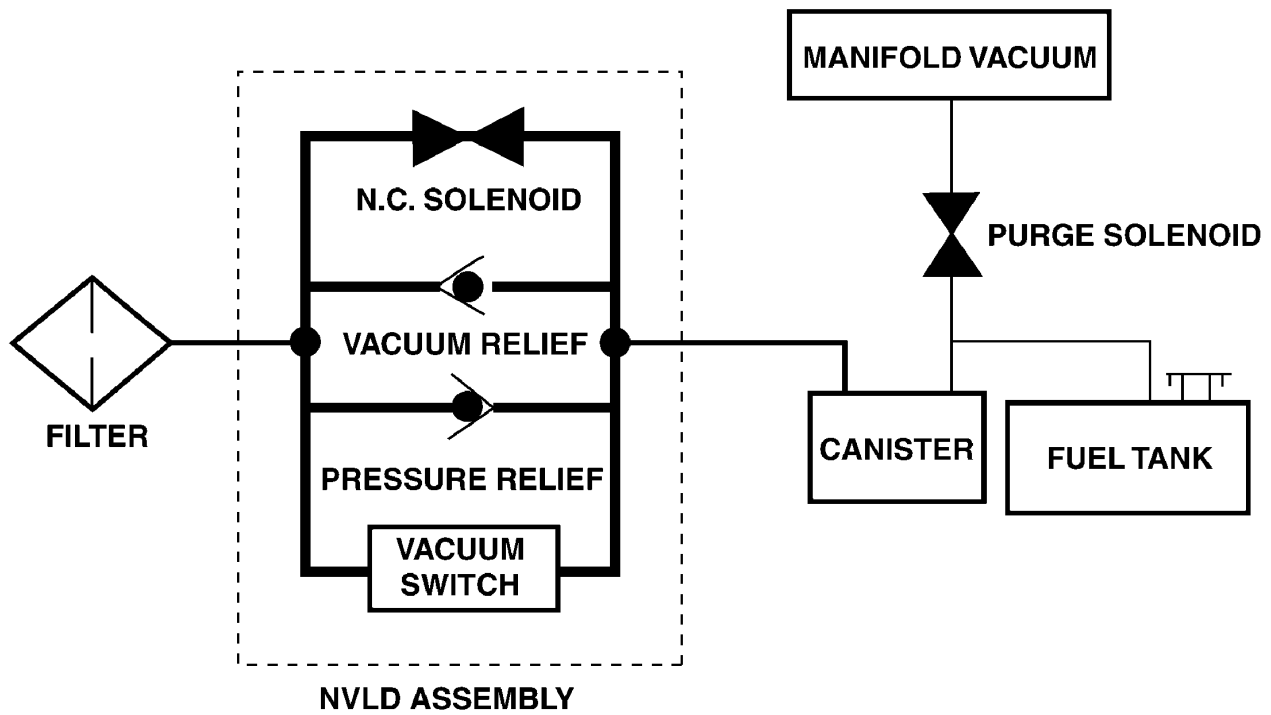
**NOTE: This intrusive test will only be run if the Small Leak (passive) test fails, or is inconclusive (the switch does not close)**

Enabling Conditions:

- 40 °F to 90 °F
- Engine temperature at startup within 10 °F of the ambient temperature
- Fuel level less than 85%

The intrusive Medium and Large leak are conducted as follows:

- De-energize the NVLD solenoid to seal the canister vent.
- Activate purge shortly after closed loop. Pull the tank vacuum past the vacuum switch point (1" H<sub>2</sub>O vacuum) of the NVLD for a specific time while tracking the standard purge flow rate.
- Turn purge off and determine how long it takes to decay the tank vacuum and reopen the switch. Determine the leak size from the time it took to reopen the switch. Note: Fuel level is an important determining factor.
- If the switch does not close, a more aggressive purge flow will be applied to determine if it is a very large leak, missing fuel cap, problem with the NVLD device, purge flow problem, etc...



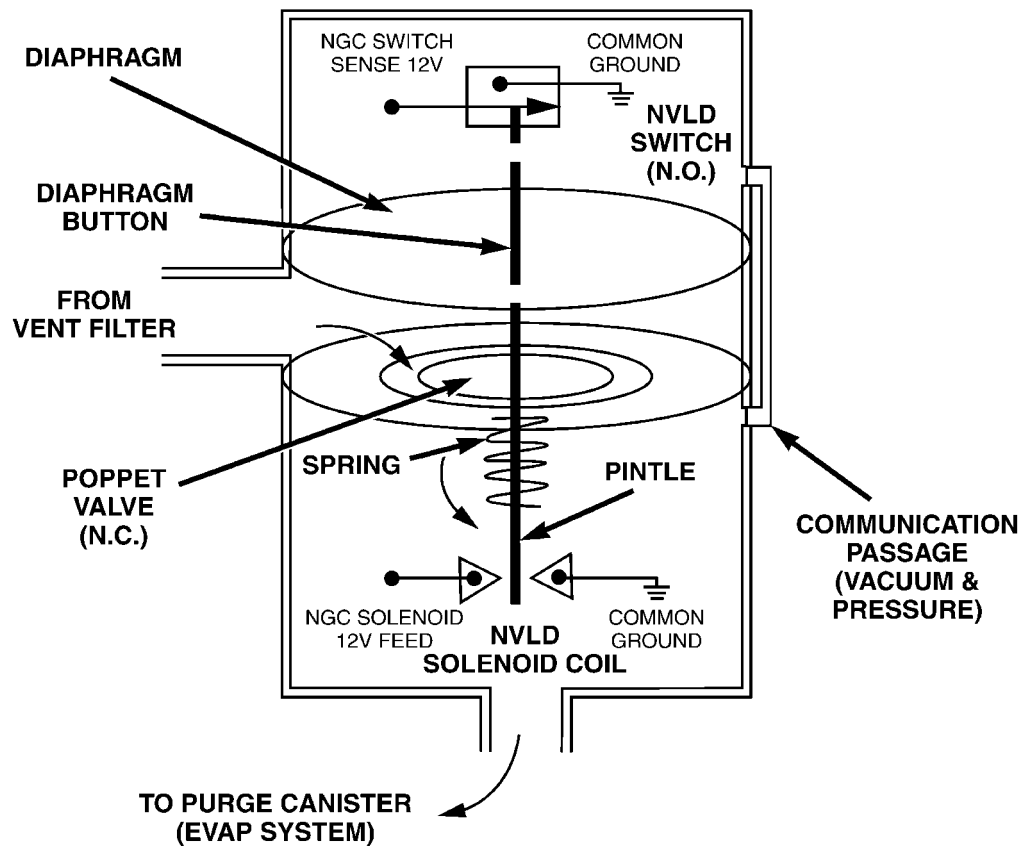
## NATURAL VACUUM LEAK DETECTION SYSTEM

80dceb8e

*FIGURE 1*



## NVLD ASSEMBLY INTERNAL SCHEMATIC



NVLD Switch Closure happens at 1" H<sub>2</sub>O (Water) Vacuum (+ - 12% when new). Vacuum draws the Diaphragm up closing the Switch.

- **PRESSURE RELIEF:** The Poppet Valve is spring loaded closed (up). It opens at 1" H<sub>2</sub>O Pressure. Pressure from the Purge Canister (EVAP System) enters the top of the diaphragm chamber via an internal communication passage. Pressure then pushes the Diaphragm down unseating the Poppet Valve allow the EVAP pressure to exit to the Vent Filter.
- **VACUUM RELIEF:** The Poppet Valve is spring loaded closed (up). The Poppet Valve begins to open at 3" - 4" H<sub>2</sub>O Vacuum, and is completely open at 6" H<sub>2</sub>O (flows 70 Liters per Minute). Vacuum acts on the bottom of the Poppet Valve & draws it down to open the Purge Canister (EVAP System) to the Vent Filter.

NVLD Solenoid has a Resistance of 8 Ohms (+ - 0.5 Ohm) at 68 Degrees F. When Energized, it pulls the Pintle down thus opening the Poppet Valve and connects the Purge Canister with the Vent Filter (Atmosphere).

FIGURE 2

80dceb68

### 3.2.4 PCM OPERATING MODES

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

There are two types of engine control operation: **open loop** and **closed loop**.

In **open loop** operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In **closed loop** operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

### 3.2.5 NON-MONITORED CIRCUITS

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

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

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

**Fuel Injectors** – The PCM cannot detect if a fuel injector is clogged, the pintle is sticking, or the wrong injectors are installed.(\*)

**Fuel Requirements** – Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may re-

sult in starting and driveability problems. See individual symptoms and their definitions in Section 6.0 (Glossary of Terms).

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

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

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

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

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

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

### 3.2.6 SKIS OVERVIEW

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

### 3.2.7 SKIM ON-BOARD DIAGNOSTICS

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

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

### 3.2.8 SKIS OPERATION

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

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

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

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

**VIN** - Vehicle Identification Number

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

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

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

- bulb checks at ignition on

- to alert the vehicle operator to a SKIS malfunction
- customer key programming mode

For all faults except transponder faults and VTSS LED remains on steady. In the event of a transponder fault the LED flashes at a rate of 1 Hz (once per second). If a fault is present the LED will remain on or flashing for the complete ignition cycle. If a fault is stored in SKIM memory which prevents the system from operating properly, the PCM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the PCM disables the starter relay until the fault is corrected.

### 3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

**Important Note:** Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal failure to components (i.e. 12-volt pull-ups, drivers and ground sensors). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

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

The SKIS Secret Key is an I.D. code that is unique to each SKIS. This code is programmed and stored in the SKIM, engine controller and transponder chip (ignition key). When replacing the PCM it is necessary to program the secret key into the PCM.

**NOTE:** After replacing the PCM, you must program pinion factor.

**NOTE:** 2.4L Turbo Manual Transmission. After replacing the PCM, you must program pinion factor.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select PCM REPLACED.
4. Enter secured access mode by entering the vehicle four-digit PIN.

## GENERAL INFORMATION

---

**NOTE:** If three attempts are made to enter the secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the run position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

5. Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

### 3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

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

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

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

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

### 3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

3. Select PROGRAM IGNITION KEYS.
4. Enter secured access mode by entering the vehicle four-digit PIN.

**NOTE:** A maximum of eight keys can be learned to each SKIM AT ONE TIME. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

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

**Programming Not Attempted** - The DRBIII® attempts to read the programmed key status and there are no keys programmed in the SKIM memory.

**Programming Key Failed** - (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder
- ignition key is programmed to another vehicle.

**8 Keys Already Learned, Programming Not Done** - SKIM transponder ID memory is full.

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

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

## 3.3 DIAGNOSTIC TROUBLE CODES

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

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

### 3.3.1 HARD CODE

A diagnostic trouble code that comes back within one cycle of the ignition key is a hard code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the DTC is a hard code at the beginning of each test. When it is not a hard code, an intermittent test must be performed.

DTC's that are for OBDII/Euro Stage III OBD monitors will not set with just the ignition key on. Comparing these to non-emission DTC's, they will seem like an intermittent. These DTC's require a



set of parameters to be performed (The DRBIII® pre-test screens will help with this for MONITOR DTC's), this is called a TRIP. All OBDII/Euro Stage III OBD DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These DTC's require three successful, no failures, TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the DTC. For further explanation of TRIPS, Pre-test screens, Warm-up cycles, and the use of the DRBIII®, refer to the On Board Diagnostic training booklet #81-699-97094.

### 3.3.2 INTERMITTENT CODE

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

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

### 3.3.3 STARTS SINCE SET COUNTER

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

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

When there are no trouble codes stored in memory, the DRBIII® will display NO DTC's Detected and the reset counter will show STARTS since clear = XXX.

### 3.3.4 DISTANCE SINCE MI SET

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

1. If the MI is illuminated due to a fault, the distance count is updated (i.e. it is counting).

2. If there is a stale MI fault (i.e. the fault is still frozen in memory but the MI has been extinguished due to 3 good trips), the distance count is held (i.e. frozen).
3. If the distance count is being held due to (Item 2.) and the fault is cleared, the distance is cleared (set to zero).
4. If the distance count is being held due to (Item 2.) and another MI occurs, the distance count is reset (to) and begins updating anew.
5. If a fault occurs while the MI is already illuminated due to a previous fault (the distance count is updating), then the distance count continues to update w/out interruption.
6. If the MI is flashing due to active misfire and there is an active fault (i.e. matured fault for which 3 good trips have not occurred), the distance count behaves as the MI in ON.
7. If the MI is flashing due to active misfire and there is no active fault (i.e. the MI is flashing for a 1 malf.), the distance count behaves as if the MI is off (because it is not yet a matured fault).
8. The distance count is cleared whenever the fault is cleared. (Via 40 warm up cycles, or via scan tool).

### 3.4 USING THE DRBIII®

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

### 3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

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

- User-Requested WARM Boot or User-Requested COLD Boot

If the DRBIII® should display any other error message, record the entire display and call the Star Center for information and assistance. This is a sample of such an error message display:

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

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

## GENERAL INFORMATION

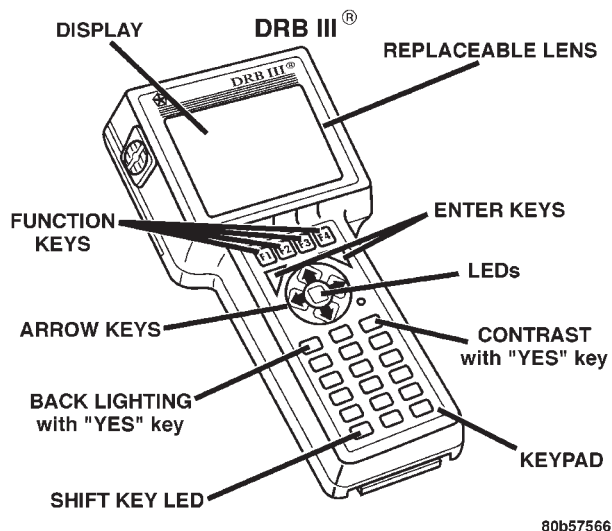
### 3.5.1 DRBIII® DOES NOT POWER UP

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

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, and inoperative DRBIII® may be the result of faulty cable or vehicle wiring.

### 3.5.2 DISPLAY IS NOT VISIBLE

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



## 4.0 DISCLAIMERS, SAFETY, WARNINGS

### 4.1 DISCLAIMERS

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

## 4.2 SAFETY

### 4.2.1 TECHNICIAN SAFETY INFORMATION

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

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

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

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

### 4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

### 4.2.3 SERVICING SUB ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

### 4.2.4 DRBIII® SAFETY INFORMATION

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

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

- Do not use the DRBIII® if it has been damaged.



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

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

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

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

### 4.3 WARNINGS AND CAUTIONS

#### 4.3.1 ROAD TEST WARNINGS

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

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

#### 4.3.2 VEHICLE DAMAGE CAUTIONS

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

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

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

### 5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool  
Evaporative System Diagnostic Kit #6917  
fuel filler adapter #8382  
fuel pressure adapter (C-6631) or #6539  
fuel pressure kit (C-4799-B) or #5069  
fuel release hose (C-4799-1)  
Min Air flow fitting #6714  
Pinout Box (Miller #8815)

jumper wires

ohmmeter

oscilloscope

vacuum gauge

voltmeter

12 volt test light minimum 25 ohms resistance with probe #6801

**CAUTION:** A 12 volt test light should not be used for the following circuits, damage to the powertrain controller will occur.

- 5 Volt Supply
- J1850 PCI Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

## GENERAL INFORMATION

---

### 6.0 GLOSSARY OF TERMS

<b>ABS</b>	anti-lock brake system	<b>LDP</b>	leak detection pump
<b>backfire, popback</b>	fuel ignites in either the intake or the exhaust system	<b>MAP</b>	manifold absolute pressure sensor
<b>CKP</b>	crank position sensor	<b>MIL</b>	malfunction indicator lamp
<b>CMP</b>	camshaft position sensor	<b>MTV</b>	manifold tuning valve
<b>cuts out, misses</b>	a steady pulsation or the inability of the engine to maintain a consistent rpm	<b>NGC</b>	next generation controller
<b>DLC</b>	data link connector (previously called engine diagnostic connector)	<b>O2S</b>	oxygen sensor
<b>detonation, spark knock</b>	a mild to severe ping, especially under loaded engine conditions	<b>PCI</b>	programmable communication interface
<b>ECT</b>	engine coolant temperature sensor	<b>PCM</b>	powertrain control module
<b>EGR</b>	exhaust gas recirculation valve and system	<b>PCV</b>	positive crankcase ventilation
<b>generator</b>	previously called alternator	<b>PEP</b>	peripheral expansion port
<b>hard start</b>	The engine takes longer than usual to start, even though it is able to crank normally.	<b>poor fuel economy</b>	There is significantly less fuel mileage than other vehicles of the same design and configuration
<b>hesitation, sag, stumble</b>	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.	<b>rough, unstable, or erratic idle stalling</b>	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called hunting). This condition may cause stalling if it is severe enough.
<b>IAT</b>	intake/inlet air temperature sensor	<b>SBEC</b>	single board engine controller
<b>IAC</b>	idle air control motor	<b>SKIM</b>	sentry key immobilizer module
<b>JTEC</b>	Combined engine and transmission control module	<b>SKIS</b>	sentry key immobilizer system
<b>lack of power, sluggish</b>	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.	<b>start &amp; stall</b>	The engine starts but immediately dies.
		<b>surge</b>	engine rpm fluctuation without corresponding change in throttle position sensor
		<b>TIP</b>	throttle inlet pressure
		<b>TPS</b>	throttle position sensor
		<b>TRS</b>	transmission range sensor
		<b>VSS</b>	vehicle speed sensor/signal

---

# 7.0

## DIAGNOSTIC INFORMATION AND PROCEDURES

## Symptom:

**\*NO RESPONSE FROM PCM (PCI BUS) - NGC**

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

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on.</p> <p><b>NOTE: As soon as one or more module communicates with the DRB, answer the question.</b></p> <p>With the DRB, enter Anti-Lock Brakes.</p> <p>With the DRB, enter Electro/Mechanical Cluster (MIC).</p> <p>With the DRB, enter Passive Restraints then Airbag.</p> <p>Were you able to establish communications with any of the modules?</p> <p>Yes → Go To 2</p> <p>No → Refer to symptom PCI Bus Communication Failure in the Communications category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>With the DRB read the Powertrain DTC's. This is to ensure power and grounds to the PCM are operational.</p> <p><b>NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (PCM SCI only) symptom path.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes.</p> <p>Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable.</p> <p>With the DRBIII® select Pep Module Tools.</p> <p>Select lab scope.</p> <p>Select Live Data.</p> <p>Select 12 volt square wave.</p> <p>Press F2 for Scope.</p> <p>Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete.</p> <p>Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the appropriate terminal of special tool #8815.</p> <p>Turn the ignition on.</p> <p>Observe the voltage display on the DRB Lab Scope.</p> <p>Does the voltage pulse from 0 to approximately 7.5 volts?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the PCI Bus circuit for an open.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**Symptom:**

**\*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC**

POSSIBLE CAUSES
CHECK PCM POWERS AND GROUNDS
PCM SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
PCM SCI RECEIVE CIRCUIT SHORTED TO VOLTAGE
PCM SCI CIRCUITS SHORTED TOGETHER
PCM SCI TRANSMIT CIRCUIT SHORTED TO GROUND
PCM SCI RECEIVE CIRCUIT SHORTED TO GROUND
PCM SCI RECEIVE CIRCUIT OPEN
PCM SCI TRANSMIT CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	<p>Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category.</p> <p><b>NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.</b></p> <p><b>NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.</b></p> <p>Did the vehicle pass this test?</p> <p>Yes → Go To 2</p> <p>No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Turn the ignition off.</p> <p>Disconnect the DRBIII® from the DLC.</p> <p>Disconnect the PCM harness connectors.</p> <p>Turn the ignition on.</p> <p>Measure the voltage of the PCM SCI Transmit circuit at the Data Link harness connector (cav 7).</p> <p>Is the voltage above 1.0 volt?</p> <p>Yes → Repair the PCM SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the DRBIII® from the DLC.</p> <p>Disconnect the PCM harness connectors.</p> <p>Turn the ignition on.</p> <p>Measure the voltage of the PCM SCI Receive circuit at the Data Link harness connector (cav 12).</p> <p>Is the voltage above 1.0 volt?</p> <p>Yes → Repair the PCM SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p>	All

## \*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC — Continued

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.  Disconnect the DRBIII® from the DLC.  Disconnect the PCM harness connectors.  Measure the resistance between the PCM SCI Transmit circuit and the PCM SCI Receive circuit at the Data Link harness connector (cavs 7 and 12).  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short between the PCM SCI Transmit and the PCM SCI Receive circuits.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.  Disconnect the PCM harness connectors.  Disconnect the DRBIII® from the DLC.  Measure the resistance between ground and the PCM SCI Transmit circuit at the Data Link harness connector (cav 7).  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the PCM SCI Transmit circuit for a short to ground.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.  Disconnect the PCM harness connector.  Disconnect the DRBIII® from the DLC.  Measure the resistance between ground and the PCM SCI Receive circuit in the Data Link harness connector (cav 12).  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the PCM SCI Receive circuit for a short to ground.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.  Disconnect the PCM harness connector.  Disconnect the DRBIII® from the DLC.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the PCM SCI Receive circuit from the Data Link harness connector (cav 12) to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the PCM SCI Receive circuit for an open.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All



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

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Disconnect the DRBIII® from the DLC.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the PCM SCI Transmit circuit from the Data Link harness connector (cav 7) to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the PCM SCI Transmit circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
9	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### \*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Electro/Mech Cluster (MIC). Was the DRB able to I/D or communicate with the MIC?  Yes → Go To 2  No → Refer to the symptom list for problems related to no communication with the MIC. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Measure the resistance between ground and the ground circuit. Is the resistance below 5.0 ohms?  Yes → Go To 3  No → Repair the ground circuit for an open. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the SKIM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated?  Yes → Go To 4  No → Repair the Fused Ignition Switch Output circuit for an open. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. Is the test light illuminated?  Yes → Go To 5  No → Repair the Fused B+ circuit for an open. Perform SKIS VERIFICATION.	All

**\*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE —**  
**Continued**

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

## Symptom:

**\*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC**

POSSIBLE CAUSES
NO RESPONSE FROM TRANSMISSION CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT(S) OPEN
PCI BUS CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on.</p> <p><b>Note: As soon as one or more module communicates with the DRB, answer the question.</b></p> <p>With the DRB, attempt to communicate with the Instrument Cluster.</p> <p>With the DRB, attempt to communicate with the Airbag Control Module.</p> <p>Was the DRB able to I/D or establish communications with both of the modules?</p> <p>Yes → Go To 2</p> <p>No → Refer to the Communications category and perform the appropriate symptom.</p> <p>Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All
2	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Turn the ignition on.</p> <p>Using a 12-volt test light connected to ground, probe both Fused Ignition Switch Output circuits (cavs 11 and 12) in the appropriate terminal of special tool #8815.</p> <p><b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b></p> <p>Is the test light illuminated for both circuits?</p> <p>Yes → Go To 3</p> <p>No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams located in the Service Information.</p> <p>Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All

**\*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC —**  
**Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Using a 12-volt test light connected to ground, probe the Fused B(+) circuit in the appropriate terminal of special tool #8815.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>  Is the test light illuminated?</p> <p>Yes → Go To 4</p> <p>No → Repair the Fused B(+) circuit for an open. Refer to the wiring diagrams located in the Service Information.  Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All
4	<p>Turn the ignition off.  Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Using a 12-volt test light connected to 12-volts, probe each ground circuit in the appropriate terminal of special tool #8815.  <b>NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.</b>  Is the light illuminated at all ground circuits?</p> <p>Yes → Go To 5</p> <p>No → Repair the Ground circuit(s) for an open. Check the main ground connection to engine block and/or chassis. Refer to the wiring diagrams located in the Service Information.  Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All

## \*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC — Continued

TEST	ACTION	APPLICABILITY
5	<p><b>Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.</b></p> <p>Disconnect the PCM harness connectors.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes.</p> <p>Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable.</p> <p>With the DRBIII® select Pep Module Tools.</p> <p>Select lab scope.</p> <p>Select Live Data.</p> <p>Select 12 volt square wave.</p> <p>Press F2 for Scope.</p> <p>Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete.</p> <p>Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the appropriate terminal of special tool #8815.</p> <p>Turn the ignition on.</p> <p>Observe the voltage display on the DRB Lab Scope.</p> <p>Does the voltage pulse from 0 to approximately 7.5 volts?</p> <p>Yes → Go To 6</p> <p>No → Repair the PCI Bus circuit for an open. Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All
6	<p>Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits.</p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the service information. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR.</p> <p>Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.</p>	All



**Symptom:**
**\*PCI BUS COMMUNICATION FAILURE**
**POSSIBLE CAUSES**

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

TEST	ACTION	APPLICABILITY
1	<p><b>Note: Determine which modules this vehicle is equipped with before beginning.</b></p> <p><b>Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.</b></p> <p>Turn the ignition on.</p> <p>Using the DRB, attempt to communicate with the following control modules:</p> <p>Airbag Control Module</p> <p>SKIM (SENTRY KEY IMMOBILIZER)</p> <p>MIC (INSTRUMENT CLUSTER)</p> <p>Was the DRBIII® able to communicate with one or more Module(s)?</p> <p>Yes → Go To 2</p> <p>No → Go To 3</p>	All
2	<p>Turn the ignition off.</p> <p><b>Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.</b></p> <p><b>Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</b></p> <p><b>Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.</b></p> <p>Were any problems found?</p> <p>Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Test Complete.</p>	All

## \*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the PCM harness connector. Note: If equipped with NGC follow the caution below.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Disconnect the DRB from the Data Link Connector (DLC).            Disconnect the negative battery cable.            Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the PCM harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the PCI Bus circuit for an open.            Perform BODY VERIFICATION TEST - VER 1.</p>	All
4	<p><b>NOTE: Reconnect the PCM harness connector and the negative battery cable.</b>            Turn the ignition on.            Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC).            Is the voltage above 7.0 volts?</p> <p>Yes → Go To 5</p> <p>No → Go To 6</p>	All
5	<p>Turn the ignition off.            Using a voltmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground.  <b>Note: When performing the next step turn the ignition off (wait one minute) before disconnecting any module. When the module is disconnected turn the ignition on to check for a short to voltage.</b>            Turn the ignition on.            While monitoring the voltmeter, disconnect each module the vehicle is equipped with one at a time.            Is the voltage steadily above 7.0 volts with all the modules disconnected?</p> <p>Yes → Repair the PCI Bus circuit for a short to voltage.            Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Replace the module that when disconnected the short to voltage was eliminated.            Perform BODY VERIFICATION TEST - VER 1.</p>	All

**\*PCI BUS COMMUNICATION FAILURE — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the negative battery cable.            Using a ohmmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground.            While monitoring the ohmmeter, disconnect each module the vehicle is equipped with one at a time.  <b>NOTE: Total bus resistance to ground thru all of the modules is typically between 350 to 1000 ohms. The more modules on the bus, the lower the total bus resistance will be.</b>            Is the resistance below 150.0 ohms with all the modules disconnected?</p> <p>Yes → Repair the PCI Bus circuit for a short to ground.            Perform BODY VERIFICATION TEST - VER 1.</p> <p>No → Replace the module that when disconnected the short to ground was eliminated.            Perform BODY VERIFICATION TEST - VER 1.</p>	All

## Symptom: INTERMITTENT CONDITION

### POSSIBLE CAUSES

INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p><b>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.</b></p> <p>Refer to any Technical Service Bulletins (TSBs) that may apply.</p> <p>Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.</p> <p><b>CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Inspect and clean all PCM, engine, and chassis grounds.</p> <p>If numerous trouble codes were set, use a wire schematic to help you find any common ground or supply circuits.</p> <p>For any Relay DTCs, actuate the Relay with the DRBIII® and wiggle the related wire harness to try to interrupt the actuation.</p> <p>For intermittent Evaporative Emission trouble codes perform a visual and physical inspection of the related parts including hoses and the Fuel cap.</p> <p>A co-pilot, data recording, and/or lab scope should be used to help diagnose intermittent conditions.</p> <p>Use the DRBIII® to perform a System Test if one applies to failing component.</p> <p>Were any problems found during the above inspections?</p> <p>Yes → Repair as necessary</p> <p>No → Test Complete.</p>	All

**Symptom:****P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT****When Monitored and Set Condition:****P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT**

When Monitored: Engine cranking and Engine running

Set Condition: Powertrain Control Module detects an error when the camshaft position is out of phase with the crankshaft position. One trip fault.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

CHECKING INTERMITTENT CMP SIGNAL WITH LAB

CMP WIRE HARNESS INSPECTION

TONE WHEEL/PULSE RING INSPECTION

CKP WIRE HARNESS INSPECTION

TONE WHEEL/PULSE RING INSPECTION

INTERMITTENT CKP SIGNAL

CAMSHAFT POSITION SENSOR

CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>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.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            With the DRBIII®, erase DTCs.            Start the engine and run until operating temp is reached. (Closed Loop)            If the DTC does not reset it may be necessary to take the vehicle on a test drive.            Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the CMP harness connector.</p> <p><b>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.</b></p> <p>Start the engine.</p> <p>Observe the lab scope screen.</p> <p>Are there any irregular or missing signals?</p> <p>Yes → Go To 3</p> <p>No → Go To 6</p>	All
3	<p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight.</p> <p>Refer to any TSBs that may apply.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the Camshaft Position Sensor.</p> <p>Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement.</p> <p>Were any problems found?</p> <p>Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Camshaft Position Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>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.</b></p> <p>Start the engine.</p> <p>Gently tap on the Cam Position Sensor and wiggle the Sensor.</p> <p>Ignition on, engine not running.</p> <p>Inspect the Sensor harness connector, PCM harness connector, Sensor connector, and PCM connector for loose, bent, corroded, or pushed out pins/terminals.</p> <p>Inspect the related wire harness and the splices in the (K44) CMP circuits.</p> <p>Did the DTC reset?</p> <p>Yes → Repair the wiring/connector concerns as needed or replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All



**P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the CKP harness connector.</p> <p><b>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.</b></p> <p>Start the engine.</p> <p>Observe the lab scope screen.</p> <p>Are there any irregular or missing signals?</p> <p>Yes → Go To 8</p> <p>No → Go To 11</p>	All
8	<p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight.</p> <p>Refer to any TSBs that may apply.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off.</p> <p>Remove the Crankshaft Position Sensor.</p> <p>Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.</p> <p>Were any problems found?</p> <p>Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All
10	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued**

TEST	ACTION	APPLICABILITY
11	<p><b>NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.</b></p> <p><b>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.</b></p> <p>Start the engine. Gently tap on the Crank Position Sensor and wiggle the CKP Sensor. Turn the ignition off. Inspect the Sensor harness connector, PCM harness connector, Sensor connector, and PCM connector for loose, bent, corroded, or pushed out pins/terminals. Inspect the related wire harness and the splices in the (K24) CKP circuits. Were any problems found?</p> <p>Yes → Repair the wiring/connector concerns as needed or replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All

**Symptom List:****P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW****P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW**

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

**When Monitored and Set Condition:****P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW**

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

Set Condition: Desired state does not match Actual state.

**P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW**

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

Set Condition: Desired state does not match Actual state.

**POSSIBLE CAUSES**

O2 SENSOR HEATER OPERATION  
 O2 HEATER ELEMENT  
 O2 HEATER CONTROL CIRCUIT  
 O2 HEATER CONTROL SHORTED TO GROUND  
 PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 3 No → Go To 2	All

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

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p><b>NOTE: Allow the O2 Sensor to cool down before continuing the test. The O2 Sensor voltage should stabilize at 5.0 volts. Raising the hood may help in reducing under hood temps quicker.</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the O2 Heater Test.</p> <p>With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes.</p> <p>Does the O2 Sensor voltage stay above 4.5 volts?</p> <p>Yes → Go To 3</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off.</p> <p><b>NOTE: Allow the O2 sensor to cool down to room temperature.</b></p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Measure the resistance across the O2 Sensor Heater element component side.</p> <p><b>NOTE: Heater Resistance Specification: 1/1 and 2/1 = 3.0 to 4.0 ohms or 1/2 and 2/2 = 4.0 to 5.0 ohms.</b></p> <p>Is the O2 Sensor Heater element within specification?</p> <p>Yes → Go To 4</p> <p>No → Replace the O2 Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the O2 Heater Test.</p> <p>Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit in the O2 Sensor harness connector.</p> <p>Does the test illuminate brightly and flash on and off?</p> <p>Yes → Replace the O2 Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Disconnect the PCM harness connector.</p> <p>Measure the resistance between ground and the O2 Heater Control circuit in the O2 Sensor harness connector.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the O2 Sensor Heater Control circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:****P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH****P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH**

**Test Note:** All symptoms listed above are diagnosed using the same tests.  
 The title for the tests will be **P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH**.

**When Monitored and Set Condition:****P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH**

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

Set Condition: The O2 heater voltage is out of range high. One trip fault.

**P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH**

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

Set Condition: The O2 heater voltage is out of range high. One trip fault.

**POSSIBLE CAUSES**

O2 SENSOR HEATER OPERATION  
 O2 HEATER ELEMENT  
 O2 HEATER GROUND CIRCUIT OPEN  
 O2 SENSOR  
 O2 HEATER CONTROL SHORTED TO VOLTAGE  
 O2 HEATER CONTROL CIRCUIT OPEN  
 PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 3 No → Go To 2	All

# P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p><b>NOTE: Allow the O2 Sensor to cool down before continuing the test. The O2 Sensor voltage should stabilize at 5.0 volts. Raising the hood may help in reducing under hood temps quicker.</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the O2 Heater Test.</p> <p>With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes.</p> <p>Does the O2 Sensor voltage stay above 4.5 volts?</p> <p>Yes → Go To 3</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off.</p> <p><b>NOTE: Allow the O2 sensor to cool down to room temperature.</b></p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Measure the resistance across the O2 Sensor Heater element component side.</p> <p><b>NOTE: Heater Resistance Specification: 1/1 and 2/1 = 3.0 to 4.0 ohms or 1/2 and 2/2 = 4.0 to 5.0 ohms.</b></p> <p>Is the O2 Sensor Heater element within specification?</p> <p>Yes → Go To 4</p> <p>No → Replace the O2 Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the O2 Heater Test.</p> <p>Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit in the O2 Sensor harness connector.</p> <p>Does the test illuminate brightly and flash on and off?</p> <p>Yes → Go To 5</p> <p>No → Go To 6</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Measure the resistance between engine ground and the O2 Heater ground circuit in the O2 Sensor harness connector.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the O2 Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the O2 Heater ground circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector.            Disconnect the PCM harness connector.            Ignition on, engine not running.            Measure the voltage on the O2 Heater Control circuit at the O2 Sensor harness connector.            Does the voltmeter indicate any voltage present?</p> <p>Yes → Repair the short to voltage in the O2 Heater Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the O2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the O2 Heater Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0033-SURGE VALVE SOLENOID CIRCUIT

#### When Monitored and Set Condition:

#### P0033-SURGE VALVE SOLENOID CIRCUIT

When Monitored: Ignition on or engine running. Battery voltage greater than 10 volts.

Set Condition: The PCM will set the DTC if the actual state of the solenoid does not match the intended state.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

SURGE VALVE SOLENOID OPERATION

(A142) ASD RELAY OUTPUT CIRCUIT

(K150) SURGE SOL CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K150) SURGE SOL CONTROL CIRCUIT OPEN

(K150) SURGE SOL CONTROL CIRCUIT SHORTED TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.            With the DRBIII®, read PCM DTCs and record the related Freeze Frame data.            Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.            Disconnect the Surge Valve Solenoid harness connector.            Using a 12-volt test light, jumper across the Surge Valve harness connector.  <b>NOTE: While actuating the solenoid wiggle the related wiring harness.</b>            Turn the ignition on.            With the DRBIII®, actuate the Surge Valve Solenoid.            Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Replace the Surge Valve Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0033-SURGE VALVE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Surge Valve Solenoid harness connector.            Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit in the harness connector.            Turn the ignition on.            With the DRBIII®, actuate the ASD Relay.            Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Go To 4</p> <p>No → Repair the (A142) ASD Relay Output circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the Surge Valve Solenoid harness connector.            Disconnect the PCM harness connectors.            Turn the ignition on.            Measure the voltage of the (K150) Surge Sol Control circuit in the Surge Valve Solenoid harness connector.            Does the voltmeter indicate any voltage present?</p> <p>Yes → Repair the short to voltage in the (K150) Surge Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Surge Valve Solenoid harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K150) Surge Sol Control circuit from the Surge Valve Solenoid harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K150) Surge Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the Surge Valve Solenoid harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K150) Surge Sol Control circuit at the Surge Valve Solenoid harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K150) Surge Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

### Symptom:

### **P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION**

---

### When Monitored and Set Condition:

#### **P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION**

When Monitored: With the engine running and no MAP Sensor or TP Sensor DTC's set.

Set Condition: The PCM determines a valid range in which the TP Sensor should be, at a given RPM/Load. The actual TP Sensor voltage is then compared to this value. If the TP Sensor voltage does not fall within the expected range within a predetermined time an error will be detected. Two Trip Fault.

#### **POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

HIGH RESISTANCE IN MAP (K7) 5 VOLT SUPPLY CIRCUIT

RESISTANCE TO GROUND IN MAP (K7) 5 VOLT SUPPLY CIRCUIT

MAP SENSOR

HIGH RESISTANCE IN (K1) MAP SIGNAL CIRCUIT

RESISTANCE TO GROUND IN (K1) MAP SIGNAL CIRCUIT

HIGH RESISTANCE IN (K4) MAP GROUND CIRCUIT

PCM

TP SENSOR OPERATION

HIGH RESISTANCE IN TP SENSOR (K6) 5 VOLT SUPPLY CIRCUIT

RESISTANCE TO GROUND IN TP SENSOR (K6) 5 VOLT SUPPLY CIRCUIT

TP SENSOR

HIGH RESISTANCE IN (K22) TP SIGNAL CIRCUIT

RESISTANCE TO GROUND IN (K22) TP SENSOR SIGNAL CIRCUIT

HIGH RESISTANCE IN TP (K167) SENSOR GROUND CIRCUIT

PCM

## P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.</b></p> <p><b>NOTE: The throttle plate and linkage must be free from binding and carbon build up, ensure the throttle plate is at the idle position.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Start the engine.            With the DRBIII®, monitor the MAP Sensor voltage.            Snap the throttle.            Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at WOT?</p> <p>Yes → Go To 3</p> <p>No → Go To 11</p>	All
3	<p>Ignition on, engine not running.            With the DRBIII®, monitor the TP Sensor voltage while slowly depressing the throttle pedal from the idle position to the wide open throttle position.            Does the voltage start approximately at 0.8 volts and go above 3.5 volts with a smooth transition?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K6) 5 Volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the TP Sensor (K6) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.                      Disconnect the TP Sensor harness connector.                      Disconnect the PCM harness connector.                      Measure the resistance between ground and the (K6) 5 Volt Supply circuit at the TP Sensor harness connector.                      Is the resistance above 100k ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the (K6) 5 Volt Supply circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.                      Disconnect the TP Sensor harness connector.                      With the DRBIII®, monitor the TP Sensor voltage.                      Ignition on, engine not running.                      Connect a jumper wire between the (K22) TP Signal circuit and the (K4) Sensor ground circuit .                      Does the TP Sensor voltage change from approximately 4.9 volts to below 0.5 of a volt?</p> <p>Yes → Replace the Throttle Position Sensor.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.                      Disconnect the TP Sensor harness connector.                      Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>                      Measure the resistance of the (K22) TP Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.                      Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the (K22) TP Signal circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.                      Disconnect the TP Sensor harness connector.                      Disconnect the PCM harness connector.                      Measure the resistance between ground and the (K22) TP Signal circuit in the TP Sensor harness connector.                      Is the resistance above 100k ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the (K22) TP Sensor Signal circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



## P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
9	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 10</p> <p>No → Repair the (K167) Sensor Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
10	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
11	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K7) 5 Volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 12</p> <p>No → Repair the MAP (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
12	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K7) 5 Volt Supply circuit at the MAP Sensor harness connector.            Is the resistance above 100k ohms?</p> <p>Yes → Go To 13</p> <p>No → Repair the short to ground in the (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued**

TEST	ACTION	APPLICABILITY
13	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  With the DRBIII®, monitor the MAP Sensor voltage.  Ignition on, engine not running.  Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit .  Cycle the ignition switch from off to on.  With the DRBIII®, monitor the MAP Sensor voltage.  Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 volt?</p> <p>Yes → Replace the MAP Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 14</p>	All
14	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 15</p> <p>No → Repair the (K1) MAP Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
15	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector.  Is the resistance above 100k ohms?</p> <p>Yes → Go To 16</p> <p>No → Repair the (K1) MAP Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
16	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K4) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 17</p> <p>No → Repair the (K4) Sensor Ground circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued**

TEST	ACTION	APPLICABILITY
17	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0071-AMBIENT TEMP SENSOR PERFORMANCE

#### When Monitored and Set Condition:

#### P0071-AMBIENT TEMP SENSOR PERFORMANCE

**When Monitored:** Engine off time is greater than 480 minutes. Ambient temperature is greater than -23°C (-9°F).

**Set Condition:** After a calibrated amount of cool down time, the PCM compares the ECT Sensor, IAT Sensor and the Ambient Air Temperature Sensor values. If the Ambient Air Temperature Sensor value is not within 10°C (53°F) of the other two temperature sensors an error is detected. Two Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

(K145) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

AMBIENT AIR TEMPERATURE SENSOR VOLTAGE BELOW 0.1 VOLT

(K145) AAT SIGNAL CIRCUIT OPEN

(K4) SENSOR GROUND CIRCUIT OPEN

(K145) AAT SIGNAL CIRCUIT SHORTED TO GROUND

(K145) AAT SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND

PCM LOW

PCM HIGH

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: After repairing this DTC, the AAT sensor value will not refresh until either the ignition is OFF for more than 5 hours or the vehicle has been driven at a speed greater than 20 MPH for more than 2 minutes.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals</b></p> <p>Turn the ignition off.            Disconnect the Ambient Air Temp Sensor harness connector.            Ignition on, engine not running.            Measure the voltage of the (K145) AAT Signal circuit in the Ambient Air Temperature Sensor harness connector.            Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the Ambient Air Temperature Sensor voltage.            Is the voltage above 4.9 volts?</p> <p>Yes → Go To 4</p> <p>No → Go To 7</p>	All
4	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Using a jumper wire, jumper across the Ambient Air Temperature Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the Ambient Air Temperature voltage.            Is the voltage below 0.1 volt?</p> <p>Yes → Replace the Ambient Air Temperature Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K145) AAT Signal circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K167) Sensor ground circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the (K4) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K145) AAT Signal circuit.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K145) AAT Signal circuit and the (K167) Sensor ground circuit in the Ambient Air Temperature Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K4) Sensor ground shorted to the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom:****P0072-AMBIENT TEMP SENSOR LOW****When Monitored and Set Condition:****P0072-AMBIENT TEMP SENSOR LOW**

When Monitored: The ignition key on.

Set Condition: Ambient Temperature Sensor is less than .04 of a volt at the PCM. One Trip Fault.

**POSSIBLE CAUSES**

AMBIENT AIR TEMPERATURE SENSOR VOLTAGE BELOW .04 VOLTS

AMBIENT AIR TEMPERATURE SENSOR INTERNAL FAILURE

(K145) AAT SIGNAL CIRCUIT SHORTED TO GROUND

(K145) AAT SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: After repairing this DTC, the AAT sensor value will not refresh until either the ignition is OFF for more than 5 hours or the vehicle has been driven at a speed greater than 20 MPH for more than 2 minutes.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature Sensor voltage. Is the voltage below .04 of a volt?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read Ambient Air Temperature Sensor voltage. Is the voltage between 4.8 and 5.2 volts?</p> <p>Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

## P0072-AMBIENT TEMP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K145) AAT Signal circuit in the Ambient Air Temperature Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Ambient Air Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K145) AAT Signal circuit and the (K167) Sensor ground circuit in the Ambient Air Temperature Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K4) Sensor ground shorted to the (K145) AAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0073-AMBIENT TEMP SENSOR HIGH****When Monitored and Set Condition:****P0073-AMBIENT TEMP SENSOR HIGH**

When Monitored: The ignition key on.

Set Condition: The Ambient Temperature Sensor voltage is greater than 4.9 volts. One Trip Fault.

**POSSIBLE CAUSES**

AMBIENT AIR TEMPERATURE SENSOR VOLTAGE ABOVE 4.9 VOLTS

(K145) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

AMBIENT AIR TEMPERATURE SENSOR INTERNAL FAILURE

(K145) AAT SIGNAL CIRCUIT OPEN

(K4) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: After repairing this DTC, the AAT sensor value will not refresh until either the ignition is OFF for more than 5 hours or the vehicle has been driven at a speed greater than 20 MPH for more than 2 minutes.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature Sensor voltage. Is the voltage above 4.9 volts?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K145) AAT Signal circuit in the Ambient Air Temperature Sensor harness connector. Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0073-AMBIENT TEMP SENSOR HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.                      Disconnect the Ambient Air Temperature Sensor harness connector.                      Connect a jumper wire between the (K145) AAT Signal circuit and the (K167) Sensor ground circuit in the Ambient Air Temperature Sensor harness connector.                      Ignition on, engine not running.                      With the DRBIII®, read Ambient Air Temperature Sensor voltage.                      Is the voltage below 1.0 volt?</p> <p>Yes → Replace the Ambient Air Temperature Sensor.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.                      Disconnect the Ambient Air Temperature Sensor harness connector.                      Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>                      Measure the resistance of the (K145) AAT Signal circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.                      Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K145) AAT Signal circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.                      Disconnect the Ambient Air Temperature Sensor harness connector.                      Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>                      Measure the resistance of the (K167) Sensor ground circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.                      Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K4) Sensor ground circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>                      If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:**  
**P0107-MAP SENSOR LOW**

**When Monitored and Set Condition:**

**P0107-MAP SENSOR LOW**

When Monitored: Ignition on. TPS voltage less than 1.2 volts. Battery voltage greater than 10 volts.

Set Condition: The MAP sensor signal voltage is less than 0.782 of a volt for 1.7 seconds. One trip Fault.

**POSSIBLE CAUSES**

MAP SENSOR VOLTAGE BELOW .078 VOLTS

(K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

(K7) 5 VOLT SUPPLY CIRCUIT OPEN

MAP SENSOR INTERNAL FAILURE

(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

(K1) MAP SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT

PCM (K7) 5 VOLT SUPPLY CIRCUIT

PCM (K1) MAP SENSOR SIGNAL CIRCUIT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below .078 of a volt?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5 volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.75 to 5.2 volts?  Yes → Go To 3  No → Go To 7	All

# P0107-MAP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Ignition on, engine not running.  With the DRBIII®, monitor the MAP Sensor voltage.  Is the voltage between 4.5 and 5.2 volts?</p> <p>Yes → Replace the MAP Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K1) MAP Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between the (K1) MAP Signal circuit and the (K4) Sensor ground circuit in the MAP Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K4) Sensor ground shorted to the (K1) MAP Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance of the (K7) 5 volt Supply circuit in the MAP Sensor harness connector to ground.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K7) 5 volt Supply circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All

**P0107-MAP SENSOR LOW — Continued**

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K7) 5 volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the open in the (K7) 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
9	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



## Symptom: P0108-MAP SENSOR HIGH

### When Monitored and Set Condition:

#### P0108-MAP SENSOR HIGH

When Monitored: Ignition on. TP sensor voltage less than 1.2 volts for greater than 1.7 seconds. Battery voltage greater than 10 volts

Set Condition: The MAP sensor signal voltage is greater than 4.92 volts for 1.7 seconds. One trip Fault.

### POSSIBLE CAUSES

MAP SENSOR VOLTAGE ABOVE 4.9 VOLTS

(K1) MAP SIGNAL CIRCUIT SHORTED TO (K7) 5 VOLT SUPPLY CIRCUIT

(K1) MAP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

MAP SENSOR INTERNAL FAILURE

(K1) MAP SIGNAL CIRCUIT OPEN

(K4) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.9 volts?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (K1) MAP Signal circuit and the (K7) 5-Volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the (K1) MAP Signal circuit for a short to the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P0108-MAP SENSOR HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Ignition on, engine not running.            Measure the voltage of the (K1) MAP Signal circuit in the MAP Sensor harness connector.            Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K1) MAP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit.            With the DRBIII®, monitor the MAP Sensor voltage.            Ignition on, engine not running.            Is the voltage below 1.0 volt?</p> <p>Yes → Replace the MAP Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K1) MAP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the (K4) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## P0108-MAP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE****When Monitored and Set Condition:****P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE**

**When Monitored:** Engine off time is greater than 480 minutes. Ambient temperature is greater than -23°C (-9°F).

**Set Condition:** After a calibrated amount of cool down time, the PCM compares the ECT Sensor, IAT Sensor and the Ambient Air Temperature Sensor values. If the IAT Sensor value is not within calibrated temperature amount of the other two temperature sensors an error is detected. Two Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

IAT SENSOR VOLTAGE BELOW 0.1 VOLTS

(K21) IAT SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

(K21) IAT SIGNAL SHORTED TO GROUND

(K21) IAT SIGNAL CIRCUIT SHORTED TO (K167) SENSOR GROUND

PCM HIGH

PCM LOW

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. <b>NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.</b> Ignition on, engine not running. Measure the voltage on the (K21) IAT Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

## P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage above 4.9 volts?  Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Using a jumper wire, jumper across the IAT Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage below 0.1 volt?  Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 6 No → Repair the open in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K167) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC. No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

## P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off.            Disconnect the IAT Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K21) IAT Signal circuit in the IAT Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K21) IAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the IAT Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K4) Sensor ground circuit and the (K21) IAT Sensor Signal circuit at the IAT Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K167) Sensor ground circuit shorted to the (K21) IAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0112-INTAKE AIR TEMPERATURE SENSOR LOW**

## When Monitored and Set Condition:

### **P0112-INTAKE AIR TEMPERATURE SENSOR LOW**

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature (IAT) sensor voltage is less than 0.1 of a volt.  
One trip Fault.

## POSSIBLE CAUSES

IAT SENSOR VOLTAGE BELOW 0.1 VOLT

IAT SENSOR INTERNAL FAILURE

(K21) IAT SIGNAL SHORTED TO GROUND

(K21) IAT SIGNAL SHORTED TO (K167) SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage below 0.1 volt?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the IAT harness connector. Ignition on, engine not running. With the DRBIII®, read IAT Sensor voltage. Is the voltage between 4.8 and 5.2 volts?</p> <p>Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K21) IAT Signal circuit at the IAT Sensor harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All



**P0112-INTAKE AIR TEMPERATURE SENSOR LOW — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Disconnect the IAT Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K21) IAT Sensor Signal circuit and the (K4) Sensor ground circuit in the IAT Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K167) Sensor ground shorted to the (K21) IAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0113-INTAKE AIR TEMPERATURE SENSOR HIGH**

## When Monitored and Set Condition:

### **P0113-INTAKE AIR TEMPERATURE SENSOR HIGH**

When Monitored: With the ignition on.

Set Condition: The Intake Air Temperature (IAT) sensor voltage at the PCM is greater than 4.9 volts. One trip Fault.

## POSSIBLE CAUSES

IAT SENSOR VOLTAGE ABOVE 4.9 VOLTS

(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

IAT SENSOR INTERNAL FAILURE

(K21) IAT SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT Sensor voltage. Is the voltage above 4.9 volts?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K21) IAT Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P0113-INTAKE AIR TEMPERATURE SENSOR HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the IAT harness connector.            Connect a jumper wire between the (K21) IAT Signal circuit and the (K4) Sensor ground circuit in the IAT harness connector.            Ignition on, engine not running.            With the DRBIII®, read IAT voltage.            Is the voltage below 1.0 volt?</p> <p>Yes → Replace the IAT Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the IAT Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K21) IAT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the IAT Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K167) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE

#### When Monitored and Set Condition:

#### P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE

When Monitored: Engine off time is greater than 480 minutes. Ambient temperature is greater than -23°C (-9°F).

Set Condition: After a calibrated amount of cool down time, the PCM compares the ECT Sensor, IAT Sensor and the Ambient Air Temperature Sensor values. If the ECT Sensor value is not within calibrated temperature amount of the other two temperature sensors an error is detected. Two Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

ECT SENSOR VOLTAGE BELOW 0.1 VOLT

(K2) ECT SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND

(K2) ECT SIGNAL SHORTED TO (K167) SENSOR GROUND

PCM HIGH

PCM LOW

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The PCM compares IAT, AAT and ECT to determine if they are within a calibrated temp of one another. Using a block heater that does not meet OEM specifications or that is not installed at the proper location can defeat the algorithm in the PCM.</b></p> <p>Ignition on, engine not running.</p> <p><b>NOTE: Check with the customer to determine if such a block heater is installed on the vehicle.</b></p> <p>With the DRBIII®, read DTCs and record the related Freeze Frame data.</p> <p>Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.  <b>NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.</b>            Ignition on, engine not running.            Measure the voltage on the (K2) ECT Signal circuit in the ECT Sensor harness connector.            Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K2) ECT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the ECT Sensor voltage.            Is the voltage above 4.9 volts?</p> <p>Yes → Go To 4</p> <p>No → Go To 7</p>	All
4	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Using a jumper wire, jumper across the ECT Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the ECT Sensor voltage.            Is the voltage below 0.1 volt?</p> <p>Yes → Replace the ECT Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K2) ECT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the ECT harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K167) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool # 8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the (K167) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Disconnect the ECT Sensor harness connector.            Turn the ignition off.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K2) ECT Signal circuit in the ECT Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K2) ECT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K2) ECT Sensor Signal circuit and the (K167) Sensor ground circuit at the ECT Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K167) Sensor ground shorted to the (K2) ECT Sensor Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW****When Monitored and Set Condition:****P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW**

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is less than 0.1 of a volt. One Trip Fault.

**POSSIBLE CAUSES**

ECT SENSOR VOLTAGE BELOW 0.1 VOLTS

ECT SENSOR INTERNAL FAILURE

(K2) ECT SIGNAL SHORTED TO GROUND

(K2) ECT SIGNAL SHORTED TO (K167) SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage below 0.1 volt?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the ECT harness connector. Ignition on, engine not running. With the DRBIII®, read ECT Sensor voltage. Is the voltage between 4.8 and 5.2 volts?  Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K2) ECT Signal circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the ground shorted to the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All



**P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K2) ECT Sensor Signal circuit and the (K167) Sensor ground circuit in the ECT Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K167) Sensor ground shorted to the (K2) ECT Sensor Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH****When Monitored and Set Condition:****P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH**

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature (ECT) sensor voltage at the PCM is greater than 4.9 volts. One trip Fault.

**POSSIBLE CAUSES**

ECT SENSOR VOLTAGE ABOVE 4.9 VOLTS

(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

ECT SENSOR INTERNAL FAILURE

(K2) ECT SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the ECT Sensor voltage. Is the voltage above 4.9 volts?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K2) ECT Signal circuit in the ECT Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the ECT harness connector.            Connect a jumper wire between the (K2) ECT Signal circuit and the (K4) Sensor ground circuit in the ECT harness connector.            Ignition on, engine not running.            With the DRBIII®, read ECT Sensor voltage.            Is the voltage below 1.0 volt?</p> <p>Yes → Replace the ECT Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K2) ECT Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the ECT Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K167) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K167) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0122-THROTTLE POSITION SENSOR #1 LOW****When Monitored and Set Condition:****P0122-THROTTLE POSITION SENSOR #1 LOW**

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is less than 0.0978 of a volt.  
One Trip Fault.

**POSSIBLE CAUSES**

THROTTLE POSITION SENSOR SWEEP

INTERMITTENT CONDITION

(K6) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

(K6) 5 VOLT SUPPLY CIRCUIT OPEN

TP SENSOR INTERNAL FAILURE

(K22) TP SIGNAL CIRCUIT SHORTED TO GROUND

(K22) TP SIGNAL CIRCUIT SHORTED TO (K167) SENSOR GROUND CIRCUIT

PCM (K6) 5 VOLT SUPPLY CIRCUIT

PCM (K22) TP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 0.2 of a volt?  Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5 volt Supply circuit in the TP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts?  Yes → Go To 3 No → Go To 7	All

**P0122-THROTTLE POSITION SENSOR #1 LOW — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            With the DRBIII®, monitor the TP Sensor voltage.            Ignition on, engine not running.            Is the voltage above 4.5 volts?</p> <p>Yes → Replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the TP harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K22) TP Signal circuit at the TP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K22) TP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K22) TPS Signal circuit and the (K167) Sensor ground circuit in the TPS harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to (K4) Sensor ground in the (K22) TP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K6) 5 volt Supply circuit in the TP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K6) 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All

**P0122-THROTTLE POSITION SENSOR #1 LOW — Continued**

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K6) 5 volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the open in the (K6) 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
9	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
10	<p>Ignition on, engine not running.            With the DRBIII®, monitor the Throttle Position Sensor voltage.            Slowly open the throttle from the idle position to the wide open throttle position.            Does voltage start at approximately 0.7 of a volt and go above 3.5 volts with a smooth transition?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0123-THROTTLE POSITION SENSOR #1 HIGH**

## When Monitored and Set Condition:

### **P0123-THROTTLE POSITION SENSOR #1 HIGH**

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is greater than 4.4721 volts.  
One Trip Fault.

## POSSIBLE CAUSES

THROTTLE POSITION SENSOR SWEEP  
INTERMITTENT CONDITION  
(K22) TP SIGNAL CIRCUIT SHORTED TO (K7) 5 VOLT SUPPLY CIRCUIT  
(K22) TP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE  
TP SENSOR INTERNAL FAILURE  
(K167) SENSOR GROUND CIRCUIT OPEN  
(K22) TP SIGNAL CIRCUIT OPEN  
PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Ensure the throttle is fully closed and free from binding or carbon build up.</b> Start the engine. With the DRBIII®, read the TP Sensor voltage. Is the voltage above 4.5 volts?</p> <p>Yes → Go To 2 No → Go To 8</p>	All
2	<p>Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (K22) TP Signal circuit and the (K7) 5 Volt Supply circuit in the TP Sensor harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to the (K7) 5 volt Supply circuit in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All



**P0123-THROTTLE POSITION SENSOR #1 HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K22) TP Signal circuit in the TP Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Connect a jumper wire between the (K22) TP Signal circuit and the (K4) Sensor ground circuit. With the DRBIII®, monitor the TP Sensor voltage. Ignition on, engine not running. Is the voltage below 0.5 of a volt?  Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 5	All
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K167) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	Turn the ignition off. Disconnect the TP harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K22) TP Signal circuit from the TP harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 7  No → Repair the open in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

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

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Ignition on, engine not running.            With the DRBIII®, monitor the TP Sensor voltage.            Slowly open the throttle from the idle position to the wide open throttle position.            Does voltage start at approximately 0.7 of a volt and go above 3.5 volts with a smooth transition?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL****When Monitored and Set Condition:****P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL**

When Monitored: With battery voltage greater than 10.4 volts, after engine is started.

Set Condition: The engine temperature does not go above a calibrated value. Failure time depends on start-up coolant temperature and ambient temperature. (i.e. 2 minutes for a start temp of 10°C (50°F) or up to 5 minutes for a vehicle with a start-up temp of -7°C (20°F). Two Trip Fault.

**POSSIBLE CAUSES**

LOW COOLANT LEVEL

THERMOSTAT OPERATION

ENGINE COOLANT TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.</b></p> <p><b>NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.</b></p> <p><b>NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.</b></p> <p><b>Note: Extremely cold outside ambient temperatures may have caused this DTC to set.</b></p> <p><b>WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.</b></p> <p>Check the coolant system to make sure that the coolant is in good condition and at the proper level.</p> <p>Is the coolant level and condition OK?</p> <p>Yes → Go To 2</p> <p>No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

# P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL — Continued

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: This test works best if performed on a cold engine (cold soak).</b>  Ignition on, engine not running.  With the DRBIII®, read the ECT Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.  <b>Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.</b>  Start the Engine.  During engine warm-up, monitor the ECT Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.  <b>NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ECT Deg in the DRB sensor should stay relatively close to each other.</b>  Using the appropriate service information, determine the proper opening temperature of the thermostat.  Did the thermostat open at the proper temperature?</p> <p>Yes → Go To 3</p> <p>No → Replace the thermostat.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Ignition on, engine not running.  With the DRBIII®, read the ECT Sensor temperature value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.  <b>Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.</b>  Start the Engine.  During engine warm-up, monitor the ECT Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.  <b>NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ECT Sensor Temperature in the DRBIII® sensors should stay relatively close to each other.</b>  Is the thermometer reading relatively close to the DRBIII® ECT Sensor reading?</p> <p>Yes → Test Complete.</p> <p>No → Replace the Engine Coolant Temperature Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0128-THERMOSTAT RATIONALITY****When Monitored and Set Condition:****P0128-THERMOSTAT RATIONALITY**

When Monitored: The engine running. During cold start.

Set Condition: The PCM predicts a coolant temperature value that it will compare to the actual coolant temperature. If the two coolant temperature values are not within 10°C (18°F) of each other an error is detected. Two Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

LOW COOLANT LEVEL

OTHER POSSIBLE CAUSES

SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

MONITOR ENGINE COOLANT TEMPERATURE

TEMPERATURE SENSOR VOLTAGE BELOW 0.1 VOLT

SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

SIGNAL CIRCUIT SHORTED TO GROUND

SIGNAL CIRCUIT SHORTED TO SENSOR GROUND

PCM LOW

PCM HIGH

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If any ECT, AAT, CMP or CKP sensor DTCs have set along with P0128, diagnose them first before continuing.</b></p> <p><b>NOTE: Ensure that Pinion Factor has been programmed correctly into the PCM.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0128-THERMOSTAT RATIONALITY — Continued**

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.</b></p> <p><b>NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.</b></p> <p><b>NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.</b></p> <p><b>Note: Extremely cold outside ambient temperatures may have caused this DTC to set.</b></p> <p><b>WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.</b></p> <p>Check the coolant system to make sure that the coolant is in good condition and at the proper level.</p> <p>Is the coolant level and condition OK?</p> <p>Yes → Go To 3</p> <p>No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Using the appropriate service information, determine the proper opening temperature of the thermostat.</p> <p><b>NOTE: It is important that the thermostat meets all OEM specifications. An incorrect thermostat or an improperly installed thermostat will cause this DTC to set.</b></p> <p><b>NOTE: This test works best if performed on a cold engine (cold soak).</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, monitor the Engine Coolant temperature. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.</p> <p><b>NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.</b></p> <p>Start the Engine.</p> <p>During engine warm-up, monitor the ECT Deg value on the DRBIII®. The temperature change should be a smooth transition from start up to normal operating temp 82°C (180°F) . Also monitor the actual coolant temperature with a thermometer.</p> <p><b>NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ECT Deg on the DRBIII® should stay within 10° (18°F) of each other.</b></p> <p>If the thermostat does not open at the proper temperature, replace the thermostat.</p> <p>If the monitored Engine Coolant Temperature transition from cold to hot was not smooth or if the temperature value on the DRBIII® was not within 10°C (18°F) of the thermometer reading during warm-up, replace the ECT Sensor.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition on.</p> <p>With the DRBIII®, read and record the AAT Sensor Temperature value</p> <p>Using the DRB Temperature Probe #CH7050, measure the ambient air temperature near the AAT sensor.</p> <p>Is the AAT Sensor value with 5°C (9°F) of the temperature probe reading?</p> <p>Yes → Go To 5</p> <p>No → Go To 7</p>	All

**P0128-THERMOSTAT RATIONALITY — Continued**

TEST	ACTION	APPLICABILITY
5	<p><b>WARNING: MAKE SURE THE ENGINE COOLING SYSTEM IS COOL BEFORE REMOVING THE PRESSURE CAP OR ANY HOSE. SEVERE PERSONAL INJURY MAY RESULT FROM ESCAPING HOT COOLANT. THE COOLING SYSTEM IS PRESSURIZED WHEN HOT.</b></p> <p>Turn the ignition on.</p> <p>With the DRBIII®, read and record the ECT Sensor Temperature value</p> <p>Using the DRB Temperature Probe #CH7050, measure the engine coolant temperature.</p> <p>Is the ECT Sensor value with 5°C (9°F) of the temperature probe reading?</p> <p>Yes → Go To 6</p> <p>No → Go To 7</p>	All
6	<p>Inspect the Temperature sensors for any physical damage.</p> <p>Inspect the engine coolant. Ensure the coolant is at the proper level. Refer to the Service Information COOLING.</p> <p>Ensure the Temperature sensors are properly mounted.</p> <p>Ensure the CMP and CKP sensors are mounted properly. Check the connectors for any signs of damage.</p> <p><b>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.</b></p> <p>Refer to any Technical Service Bulletins (TSBs) that may apply.</p> <p>With the engine running at normal operating temperature, monitor the Temperature sensor parameters while wiggling the wire harness. Look for parameter values to change.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.</p> <p><b>CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Inspect and clean all PCM, engine, and chassis grounds.</p> <p>Were any problems found during the above inspections?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All
7	<p><b>NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals</b></p> <p>Turn the ignition off.</p> <p>Disconnect the applicable Temperature Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the Signal circuit in the applicable Temperature Sensor harness connector.</p> <p>Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All

# P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.  Disconnect the applicable Temperature Sensor harness connector.  Ignition on, engine not running.  With the DRBIII®, read the Temperature Sensor voltage.  Is the voltage above 4.9 volts?</p> <p>Yes → Go To 9  No → Go To 12</p>	All
9	<p>Turn the ignition off.  Disconnect the applicable Temperature Sensor harness connector.  Using a jumper wire, jumper across the Temperature Sensor harness connector.  Ignition on, engine not running.  With the DRBIII®, read the Temperature voltage.  Is the voltage below 0.1 volt?</p> <p>Yes → Replace the applicable Temperature Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 10</p>	All
10	<p>Turn the ignition off.  Disconnect the applicable Temperature Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the Signal circuit from the Temperature Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 11  No → Repair the open in the Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
11	<p>Turn the ignition off.  Disconnect the applicable Temperature Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the Sensor ground circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Repair the open in the Sensor ground circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**P0128-THERMOSTAT RATIONALITY — Continued**

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Signal circuit in the Temperature harness connector. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 13	All
13	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Signal circuit and the Sensor ground circuit in the Temperature Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the Sensor ground shorted to the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

## Symptom:

### P0129-BAROMETRIC PRESSURE OUT-OF-RANGE

#### When Monitored and Set Condition:

#### P0129-BAROMETRIC PRESSURE OUT-OF-RANGE

**When Monitored:** With the ignition key on. No Cam or Crank signal within 75 ms. Engine speed at less than 250 RPM.

**Set Condition:** The PCM senses the voltage from the MAP sensor to be greater than 4.9 volts (2.4 volts Turbo) but below 2.28 volts (1.2 Turbo) of a volt for 300 milliseconds. One Trip Fault.

#### POSSIBLE CAUSES

IAC SIGNAL CIRCUIT LOW  
 IAC SIGNAL CIRCUIT HIGH  
 INTERMITTENT CONDITION  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND  
 (K7) 5 VOLT SUPPLY CIRCUIT OPEN  
 MAP SENSOR INTERNAL FAILURE  
 (K1) MAP SIGNAL CIRCUIT OPEN  
 (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND  
 PCM (K7) 5 VOLT SUPPLY CIRCUIT  
 PCM (K1) MAP SIGNAL

TEST	ACTION	APPLICABILITY
1	<b>NOTE: Refer to any TSBs that may apply to this DTC before proceeding.</b> Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage greater than 4.9 volts (2.4 volts turbo).  Yes → Go To 3 No → Go To 2	All
2	Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 2.28 volts (1.2 volts Turbo).  Yes → Go To 3 No → Go To 12	All

**P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts?  Yes → Go To 4  No → Go To 8	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above 2.2 volts?  Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 7	All
7	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

# P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Ignition on, engine not running.  Measure the voltage of the (K7) 5 Volt Supply circuit in the MAP Sensor harness connector.  Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K7) 5 Volt Supply circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the (K7) 5 Volt Supply circuit at the MAP Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K7) 5 Volt Supply circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off.  Disconnect the MAP Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K7) 5 Volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 11</p> <p>No → Repair the open in the (K7) 5 Volt Supply circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
11	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
12	<p>Start the engine.  <b>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.</b>  Allow the engine to idle.  With the DRBIII®, read the IAC Current.  Is the IAC Current below 146 mA?</p> <p>Yes → Refer to P0508 - IAC Valve Sense Low  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 13</p>	All

**P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued**

TEST	ACTION	APPLICABILITY
13	<p>Start the engine. <b>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.</b> Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA?</p> <p>Yes → Refer to P0509 - IAC Valve Sense Circuit High Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

### Symptom List:

**P0131-O2 SENSOR 1/1 VOLTAGE LOW**

**P0137-O2 SENSOR 1/2 VOLTAGE LOW**

---

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

---

### When Monitored and Set Condition:

#### **P0131-O2 SENSOR 1/1 VOLTAGE LOW**

When Monitored: Engine Running.

Set Condition: The oxygen sensor signal voltage is below 2.402 volts for 9 seconds. Two trip Fault.

#### **P0137-O2 SENSOR 1/2 VOLTAGE LOW**

When Monitored: Engine Running.

Set Condition: The oxygen sensor signal voltage is below 2.402 volts for 9 seconds. Two trip Fault.

---

### POSSIBLE CAUSES

O2 SENSOR BELOW 2.52 VOLTS

O2 SENSOR

O2 RETURN CIRCUIT SHORTED TO GROUND

O2 SIGNAL CIRCUIT SHORTED TO GROUND

O2 SIGNAL CIRCUIT SHORTED TO O2 RETURN CIRCUIT

O2 SIGNAL SHORTED TO HEATER GROUND CIRCUIT

PCM RETURN CIRCUIT

PCM SIGNAL CIRCUIT

---

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

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to ground, the DRBIII® will display all O2 Sensor voltage readings low. The O2 Sensor that is shorted to ground will display a voltage reading near or at 0 volts.</b></p> <p><b>NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.</b></p> <p><b>NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.</b></p> <p>Start the engine.  Allow the engine to reach normal operating temperature.  With the DRBIII®, read the O2 Sensor voltage.  Is the voltage below 2.52 volts?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Ignition on, engine not running.  With the DRBIII®, monitor the O2 Sensor voltage.  Is the O2 Sensor voltage above 4.8 volts?</p> <p>Yes → Go To 3</p> <p>No → Go To 5</p>	All
3	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Ignition on, engine not running.  Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector.  Is the voltage at 2.5 volts?</p> <p>Yes → Replace the O2 Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the O2 Return circuit in the O2 Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the O2 Return circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → <b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.</b>  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

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

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the O2 Signal circuit in the O2 Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the O2 Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between the O2 Signal circuit and the O2 Return circuit in the O2 Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the O2 Return circuit shorted to the O2 Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between the O2 Signal circuit and the Heater ground circuit in the O2 Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the Heater Ground circuit shorted to the O2 Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom List:****P0132-O2 SENSOR 1/1 VOLTAGE HIGH****P0138-O2 SENSOR 1/2 VOLTAGE HIGH**

---

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

---

**When Monitored and Set Condition:****P0132-O2 SENSOR 1/1 VOLTAGE HIGH**

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 350°C (662°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts. Two trip fault.

**P0138-O2 SENSOR 1/2 VOLTAGE HIGH**

When Monitored: The engine running for 119 seconds. O2 Sensor Heater Temperature is greater than 350°C (662°F). Battery voltage greater than 10.99 volts.

Set Condition: The Oxygen Sensor voltage is above 3.9902 volts. Two trip fault.

**POSSIBLE CAUSES**

O2 SENSOR VOLTAGE ABOVE 3.7 VOLTS  
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
O2 SENSOR RETURN CIRCUIT SHORTED TO VOLTAGE  
O2 SENSOR  
O2 SENSOR SIGNAL CIRCUIT OPEN  
O2 SENSOR RETURN CIRCUIT OPEN  
PCM

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

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to voltage, the DRBIII® will display all O2 Sensor voltage readings high.</b></p> <p><b>NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.</b></p> <p><b>NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.</b></p> <p>Start the engine.  Allow the engine to reach normal operating temperature.  With the DRBIII®, read the O2 Sensor voltage.  Is the voltage above 3.7 volts?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector</p> <p><b>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.</b></p> <p>Start the engine and allow the engine to idle.  Measure the voltage on the O2 Sensor Signal circuit in the O2 Sensor harness connector.</p> <p><b>NOTE: Measure the voltage in reference to ground, not the O2 Sensor Return circuit.</b></p> <p>Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to voltage in the O2 Sensor Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector  Disconnect the PCM harness connectors.  Turn the ignition on.  Measure the voltage on the O2 Sensor Return circuit in the O2 Sensor harness connector.</p> <p>Is there any voltage present?</p> <p>Yes → Repair the short to voltage in the O2 Sensor Return circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Disconnect the O2 Sensor harness connector.  Connect a jumper wire between the O2 Sensor Signal circuit and the O2 Sensor Return circuit in the O2 Sensor harness connector.  Ignition on, engine not running.  With the DRBIII®, monitor the O2 Sensor voltage.  Is the voltage between 2.3 and 2.7 volts with the jumper wire in place?</p> <p>Yes → Replace the O2 Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All

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

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open O2 Sensor Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the O2 Sensor Return circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open O2 Sensor Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

### Symptom List:

**P0133-O2 SENSOR 1/1 SLOW RESPONSE**

**P0139-O2 SENSOR 1/2 SLOW RESPONSE**

---

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

---

### When Monitored and Set Condition:

#### **P0133-O2 SENSOR 1/1 SLOW RESPONSE**

When Monitored: Start and drive vehicle greater than 20 MPH and less than 55 MPH.  
Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F)  
Catalytic Converter Temperature greater than 600°C (1112°F) EVAP Purge active.

Set Condition: The PCM monitors the state of change of the front O2 sensor and the rear O2 sensor. The PCM will then compare the differences between both readings, if the differences are greater than a calibrated amount the PCM will record a fault. Two trip failure.

#### **P0139-O2 SENSOR 1/2 SLOW RESPONSE**

When Monitored: Start and drive vehicle greater than 20 MPH and less than 55 MPH.  
Throttle open for a minimum 120 seconds. Coolant Temp greater than 70°C (158°F)  
Catalytic Converter Temperature greater than 600°C

Set Condition: The O2 sensor voltage does not switch properly from lean to rich during monitoring. Two Trip Fault.

---

### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

EXHAUST LEAK

O2 SIGNAL CIRCUIT

O2 RETURN CIRCUIT

O2 SENSOR

**P0133-O2 SENSOR 1/1 SLOW RESPONSE — Continued**

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected.</b></p> <p><b>NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.</b></p> <p><b>NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.</b></p> <p><b>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Start the engine.            Inspect the exhaust system for leaks between the engine and the O2 Sensors.            Are there any exhaust leaks?</p> <p>Yes → Repair or replace the leaking exhaust parts as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off            Disconnect the O2 Sensor harness connector.            Ignition on, engine not running.            Measure the voltage on the O2 Signal circuit in the O2 Sensor harness connector.            Is the voltage between 4.5 and 5.2 volts?</p> <p>Yes → Go To 4</p> <p>No → Check the O2 Signal circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector.            Ignition on, engine not running.            Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector.            Is the voltage at 2.5 volts?</p> <p>Yes → Check the O2 Return circuit for damage, short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>If there are no possible causes remaining, view repair.</p> <p>Repair            Replace the O2 Sensor            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom List:

**P0135-O2 SENSOR 1/1 HEATER PERFORMANCE**

**P0141-O2 SENSOR 1/2 HEATER PERFORMANCE**

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

## When Monitored and Set Condition:

### **P0135-O2 SENSOR 1/1 HEATER PERFORMANCE**

When Monitored: Engine Running and Heater duty cycle greater than 0%

Set Condition: O2 Heater Temperature does not reach 350°C (662°F) within 90 second during monitoring conditions. Two Trip Fault.

### **P0141-O2 SENSOR 1/2 HEATER PERFORMANCE**

When Monitored: Engine Running and Heater duty cycle greater than 0%.

Set Condition: O2 Heater Temperature does not reach 350°C (662°F) within 90 second during monitoring conditions. Two Trip Fault.

## POSSIBLE CAUSES

O2 SENSOR HEATER OPERATION  
O2 HEATER ELEMENT  
O2 HEATER GROUND CIRCUIT OPEN  
O2 HEATER CONTROL CIRCUIT OPEN  
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter display and equal to zero?  Yes → Go To 3 No → Go To 2	All

**P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p><b>NOTE: Allow the O2 Sensor to cool down before continuing the test. The O2 voltage should stabilize at 5.0 volts. Raising the hood may help in reducing under hood temps.</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the O2 Heater Test.</p> <p>With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes.</p> <p>Does the voltage stay above 4.5 volts?</p> <p>Yes → Go To 3</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p><b>NOTE: Allow the O2 sensor to cool down to room temperature.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Measure the resistance across the O2 Sensor Heater element component side.</p> <p><b>NOTE: Heater Resistance Specification: 3 to 20 ohms for Upstream and Downstream O2 Sensors.</b></p> <p>Is the resistance within the specifications?</p> <p>Yes → Go To 4</p> <p>No → Replace the O2 Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Measure the resistance between an engine ground and the O2 Heater Ground circuit in the O2 Sensor harness connector.</p> <p>Is the resistance below 0.5 of an ohm?</p> <p>Yes → Go To 5</p> <p>No → Repair the open/high resistance in the O2 Heater Ground circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the O2 Sensor harness connector.</p> <p>Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance of the O2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 0.5 of an ohm?</p> <p>Yes → Go To 6</p> <p>No → Repair the open/high resistance in the O2 Heater Control circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom:****P0171-FUEL SYSTEM 1/1 LEAN****When Monitored and Set Condition:****P0171-FUEL SYSTEM 1/1 LEAN**

**When Monitored:** With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F, altitude below 8500 ft and fuel level greater than 15%.

**Set Condition:** If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO  
 RESTRICTED FUEL SUPPLY LINE  
 FUEL PUMP INLET STRAINER PLUGGED  
 FUEL PUMP MODULE  
 O2 SENSOR  
 O2 SIGNAL CIRCUIT  
 O2 RETURN CIRCUIT  
 O2 SENSOR HEATER OPERATION  
 THROTTLE POSITION SENSOR SWEEP  
 MAP SENSOR OPERATION  
 ECT SENSOR OPERATION  
 ENGINE MECHANICAL PROBLEM  
 FUEL CONTAMINATION/EXHAUST LEAK

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</b>  <b>NOTE: Diagnose any Misfire DTC(s) first, if set along with the fuel system DTC.</b>            Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

# P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
2	<p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge.  Ignition on, engine not running.  With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.  <b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b>  Turn the ignition off.  Choose a conclusion that best matches your fuel pressure reading.</p> <p style="padding-left: 40px;">Within Specification  Go To 3</p> <p style="padding-left: 40px;">Below Specification  Go To 12</p> <p><b>Caution: Stop All Actuations.</b></p>	All
3	<p><b>NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected.</b>  <b>NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.</b></p> <p>Start the engine.  Allow the engine to reach normal operating temperature.  With the DRBIII®, read the O2 Sensor voltage.  Is the voltage switching between 2.5 and 3.4 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Go To 9</p>	All
4	<p>Turn the ignition off.  <b>NOTE: Allow the O2 Sensor to cool down before continuing the test. The O2 voltage should stabilize at 5.0 volts. Raising the hood may help in reducing under hood temps.</b></p> <p>Ignition on, engine not running.  With the DRBIII®, actuate the O2 Heater Test.  With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes.  Does the voltage stay above 4.5 volts?</p> <p style="padding-left: 40px;">Yes → Replace the O2 Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
5	<p>Ignition on, engine not running.  With the DRBIII®, read the TP Sensor voltage.  While monitoring the DRBIII®, slowly open and close the throttle.  Does the voltage increase and decrease smoothly?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Replace the Throttle Position Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0171-FUEL SYSTEM 1/1 LEAN — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Connect a Vacuum Gauge to a Manifold Vacuum source.            Start the engine.            Allow the engine to idle.  <b>Note: If engine will not idle, maintain a constant RPM above idle.</b>            With the DRBIII® in Sensors, read the MAP Sensor vacuum value.            Is the DRBIII® reading within 1" of the Vacuum Gauge reading?</p> <p>Yes → Go To 7</p> <p>No → Replace the MAP Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p><b>Note: For this test to be valid, the thermostat must be operating correctly.</b>  <b>Note: This test works best if performed on a cold engine (cold soak)</b>            Ignition on, engine not running.            With the DRBIII®, read the Engine Coolant Temperature (ECT) Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.  <b>Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.</b>            Start the Engine.            During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temperature 82°C (180°F). The value should reach at least 82°C (180°F).            Did the ECT value increase with a smooth transition and did it reach at least 82°C?</p> <p>Yes → Go To 8</p> <p>No → Replace the Engine Coolant Temperature Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Check for any of the following conditions/mechanical problems.            AIR INDUCTION SYSTEM - must be free from leaks.            ENGINE VACUUM - must be at least 13 inches in neutral            ENGINE VALVE TIMING - must be within specifications            ENGINE COMPRESSION - must be within specifications            ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.            ENGINE PCV SYSTEM - must flow freely            TORQUE CONVERTER STALL SPEED - must be within specifications            POWER BRAKE BOOSTER - no internal vacuum leaks            FUEL - must be free of contamination            FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector            Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All

**P0171-FUEL SYSTEM 1/1 LEAN — Continued**

TEST	ACTION	APPLICABILITY
9	<p>Ignition on, engine not running.                      Disconnect the O2 Sensor harness connector.                      With the DRBIII®, monitor the O2 Sensor voltage.                      The O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected.                      Using a jumper wire, jump the O2 Signal circuit to the O2 Return circuit at the O2 Sensor harness connector.  <b>NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.</b>                      Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?</p> <p>Yes → Replace the O2 Sensor                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off.                      Disconnect the O2 Sensor harness connector.                      Ignition on, engine not running.                      With the DRBIII®, monitor the O2 Sensor voltage.                      Is the voltage above 4.8 volts?</p> <p>Yes → Go To 11</p> <p>No → Check the O2 Signal circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
11	<p>Turn the ignition off.                      Disconnect the O2 Sensor harness connector.                      Ignition on, engine not running.                      Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector.                      Is the voltage at 2.5 volts?</p> <p>Yes → Check the fuel system for contaminants. Also, check the exhaust system for any leaks.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Check the O2 Return circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0171-FUEL SYSTEM 1/1 LEAN — Continued**

TEST	ACTION	APPLICABILITY
12	<p>Turn the ignition off.</p> <p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.</p> <p>Attach a fuel pressure test gauge to the T fitting on the tool #6539</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Is the fuel pressure within specification?</p> <p>Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 13</p> <p><b>Caution: Stop All Actuations.</b></p>	All
13	<p>Turn the ignition off.</p> <p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 14</p>	All
14	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0172-FUEL SYSTEM 1/1 RICH**

## When Monitored and Set Condition:

### **P0172-FUEL SYSTEM 1/1 RICH**

**When Monitored:** With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F and altitude below 8500 ft.

**Set Condition:** If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO  
 O2 SENSOR HEATER OPERATION  
 O2 SENSOR  
 EVAP PURGE SOLENOID OPERATION  
 O2 SIGNAL CIRCUIT  
 O2 RETURN CIRCUIT  
 MAP SENSOR OPERATION  
 ECT SENSOR OPERATION  
 ENGINE MECHANICAL PROBLEM  
 FUEL FILTER/PRESSURE REGULATOR  
 PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0172-FUEL SYSTEM 1/1 RICH — Continued**

TEST	ACTION	APPLICABILITY
2	<p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge.            Ignition on, engine not running.            With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.  <b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b>            Turn the ignition off.            Choose a conclusion that best matches your fuel pressure reading.</p> <p style="padding-left: 40px;">Within Specification Go To 3</p> <p style="padding-left: 40px;">Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p><b>Caution: Stop All Actuations.</b></p>	All
3	<p><b>NOTE: If one of the O2 Sensors Signal or Return circuits are shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected.</b>  <b>NOTE: After the repairs have been made, verify proper O2 Sensor operation.</b>  <b>If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.</b></p> <p>Start the engine.            Allow the engine to reach normal operating temperature.            With the DRBIII®, read the O2 Sensor voltage.            Is the voltage switching between 2.5 and 3.4 volts?</p> <p style="padding-left: 40px;">Yes → Go To 4</p> <p style="padding-left: 40px;">No → Go To 9</p>	All
4	<p>Turn the ignition off.  <b>NOTE: Allow the O2 Sensor to cool down before continuing the test. The O2 voltage should stabilize at 5.0 volts. Raising the hood may help in reducing under hood temps.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, actuate the O2 Heater Test.            With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes.            Does the voltage stay above 4.5 volts?</p> <p style="padding-left: 40px;">Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the hoses at the Evap Purge Solenoid.            Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side.            Did the Evap Purge Solenoid hold vacuum?</p> <p style="padding-left: 40px;">Yes → Go To 6</p> <p style="padding-left: 40px;">No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

# P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.  Connect a Vacuum Gauge to a Manifold Vacuum source.  Start the engine.  Allow the engine to idle.  <b>Note: If engine will not idle, maintain a constant RPM above idle.</b>  With the DRBIII® in Sensors, read the MAP Sensor vacuum value.  Is the DRB reading within 1" of the Vacuum Gauge reading?</p> <p>Yes → Go To 7</p> <p>No → Replace the MAP Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p><b>Note: For this test to be valid, the thermostat must be operating correctly.</b>  <b>Note: This test works best if performed on a cold engine (cold soak)</b>  Ignition on, engine not running.  With the DRBIII®, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.  <b>Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.</b>  Start the Engine.  During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F).  Did the Engine Coolant Temperature value increase a smooth transition and did it reach at least 82°C</p> <p>Yes → Go To 8</p> <p>No → Replace the Engine Coolant Temperature Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Check for any of the following conditions/mechanical problems.  AIR INDUCTION SYSTEM - must be free from restrictions.  ENGINE VACUUM - must be at least 13 inches in neutral  ENGINE VALVE TIMING - must be within specifications  ENGINE COMPRESSION - must be within specifications  ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.  ENGINE PCV SYSTEM - must flow freely  TORQUE CONVERTER STALL SPEED - must be within specifications  POWER BRAKE BOOSTER - no internal vacuum leaks  FUEL - must be free of contamination  FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector  Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All



**P0172-FUEL SYSTEM 1/1 RICH — Continued**

TEST	ACTION	APPLICABILITY
9	<p>Ignition on, engine not running.            Disconnect the O2 Sensor harness connector.            With the DRBIII®, monitor the O2 Sensor voltage.            The O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected.            Using a jumper wire, jump from the O2 Signal circuit to the O2 Return circuit in the O2 Sensor harness connector.  <b>NOTE: The voltage should drop from 5.0 volts down to 2.5 volts with the jumper wire connected.</b>            Did the O2 Sensor voltage drop from 5 volts to 2.5 volts?</p> <p>Yes → Replace the O2 Sensor            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector.            Turn the ignition on.            Measure the voltage of the O2 Signal circuit in the O2 Sensor harness connector.            Is the voltage above 4.8 volts?</p> <p>Yes → Check the O2 Signal circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.            Disconnect the O2 Sensor harness connector.            Turn the ignition on.            Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector.            Is the voltage at 2.5 volts?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Check the O2 Return circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:**

**P0201-FUEL INJECTOR #1**  
**P0202-FUEL INJECTOR #2**  
**P0203-FUEL INJECTOR #3**  
**P0204-FUEL INJECTOR #4**

---

**Test Note: All symptoms listed above are diagnosed using the same tests.**  
**The title for the tests will be P0201-FUEL INJECTOR #1.**

---

**When Monitored and Set Condition:**

**P0201-FUEL INJECTOR #1**

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off. One Trip Fault.

**P0202-FUEL INJECTOR #2**

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off. One Trip Fault.

**P0203-FUEL INJECTOR #3**

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off. One Trip Fault.

**P0204-FUEL INJECTOR #4**

When Monitored: With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off. One Trip Fault.

---

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO  
ASD RELAY OUTPUT CIRCUIT  
FUEL INJECTOR  
INJECTOR CONTROL CIRCUIT OPEN  
INJECTOR CONTROL CIRCUIT SHORTED TO GROUND  
PCM

**P0201-FUEL INJECTOR #1 — Continued**

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.            Disconnect the Fuel Injector harness connector.            Ignition on, engine not running.            With the DRBIII®, actuate the ASD Relay.            Using a 12-volt test light connected to ground, backprobe the ASD Relay Output circuit at the Fuel Injector harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 3</p> <p>No → Repair the open or high resistance in the ASD Relay Output circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off.            Disconnect the Fuel Injector harness connector.            Ignition on, engine not running.            Using a 12-volt test light connected to 12-volts, backprobe the Injector Control circuit.            With the DRBIII®, actuate the Fuel Injector.            Does the test light blink/flicker?</p> <p>Yes → Replace the Fuel Injector.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Fuel Injector harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the Injector Control circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the Injector Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## P0201-FUEL INJECTOR #1 — Continued

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.                      Disconnect the Fuel Injector harness connector.                      Disconnect the PCM harness connectors.                      Measure the resistance between ground and the Injector Control circuit at the Fuel Injector harness connector.                      Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the Injector Control circuit.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>                      If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:****P0234-OVERBOOST PERFORMANCE****P1106-BARO SOLENOID PERFORMANCE****P1188 TIP SENSOR PERFORMANCE**

**Test Note:** All symptoms listed above are diagnosed using the same tests. The title for the tests will be **P0234-OVERBOOST PERFORMANCE**.

**When Monitored and Set Condition:****P0234-OVERBOOST PERFORMANCE**

When Monitored: With the engine running.

Set Condition: The TIP Sensor signal indicates excessive boost pressure.

**P1106-BARO SOLENOID PERFORMANCE**

When Monitored: With the engine in turbocharger boost mode.

Set Condition: The PCM does not detect sufficient difference between TIP Sensor signal and BARO Pressure signal during turbocharger boost mode.

**P1188 TIP SENSOR PERFORMANCE**

When Monitored: During the engine turbocharger boost and non-boost modes.

Set Condition: Non-boost Mode: PCM detects a significant difference between TIP Sensor signal and BARO Pressure signal. Boost Mode: The TIP Sensor is unable to read correct boost level.

**POSSIBLE CAUSES**

CHECKING FOR OTHER DTCS

CHECKING THE HOSES AND TUBING

CHECKING THE VACUUM SUPPLY TO SURGE SOLENOID

CONFIRM ALL SOLENOID TEST

GOOD TRIP EQUAL TO ZERO

SOLENOID #3 TEST

SOLENOID TEST #1

SOLENOID TEST #2

SOLENOID TEST #4

TURBOCHARGER

WASTEGATE ACTUATOR

**P0234-OVERBOOST PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p>	All
2	<p>Turn the ignition on. With the DRBIII®, read the PCM DTCs. <b>NOTE: If there are any other MAP Sensor or Throttle Inlet Pressure Sensor DTCs present, repair the other MAP Sensor or Throttle Inlet Pressure Sensors before continuing.</b> Does the DRB display any other DTCs?</p> <p>Yes → Refer to symptom list for problems related to MAP Sensor or Throttle Inlet Pressure Sensor.</p> <p>No → Go To 3</p>	All
3	<p><b>NOTE: The exhaust system must be free from any restriction to perform this test.</b> Check all of the tubes and hoses between the air cleaner and the intake manifold for loose connection, damage or restriction. Check all of the tubes connected to the intercooler for loose connection, damage or restriction. Check all of the tubes and hoses connected to the turbocharger, TIP Solenoid, Surge Solenoid and Wastegate Solenoid for loose connection, damage or restriction. <b>NOTE: Solenoid design and hose connections are identical for all three solenoids. It is possible to connect the hoses to the incorrect solenoid. Verify that hoses are connected to the correct solenoid.</b> Are any of these conditions evident?</p> <p>Yes → Repair or replace as necessary.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off. Disconnect the hoses from the Surge Solenoid. Connect a vacuum gauge to Surge Solenoid hose C. Allow the engine to reach normal operating temperature. Observe and note the vacuum gauge reading. Is the vacuum at idle above 15 inches?</p> <p>Yes → Go To 5</p> <p>No → Repair or replace as necessary.</p>	All
5	<p>Turn the ignition off. Using regulated air pressure slowly apply from 0 psi to 10 psi to the wastegate actuator while observing the wastegate actuator arm. <b>NOTE: The wastegate actuator arm should extend approximately 1/2 to 3/4 inches as air pressure is applied.</b> Does the wastegate actuator arm extend 1/2 to 3/4 inch when 10 psi air pressure is applied?</p> <p>Yes → Go To 6</p> <p>No → Replace the Turbocharger assembly in accordance with the Service Information.</p>	All

**P0234-OVERBOOST PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
6	<p><b>NOTE: This engine system utilizes three solenoids to control turbocharger operation. Perform the following four Solenoid Tests on each of the three solenoids one at a time.</b></p> <p>Turn the ignition off.            Disconnect the hoses from the appropriate Solenoid.            Install a plug on the Solenoid hose B connection point.            Connect a vacuum pump to the Solenoid hose A connection point.            With vacuum pump apply 20 inches of vacuum to the Solenoid hose A connection point.  <b>NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.</b>            Does vacuum read above 10 inches for at least 5 seconds?</p> <p>Yes → Go To 7            No → Replace the appropriate Solenoid.</p>	All
7	<p>Turn the ignition off.            Disconnect the hoses from the appropriate Solenoid.            Install a plug on the Solenoid hose C connection point.            Connect a vacuum pump to the Solenoid hose A connection point.            Attempt to apply 20 inches of vacuum to the Solenoid hose A connection point.  <b>NOTE: Vacuum should escape through the Solenoid hose B connection point.</b>            Does vacuum escape through the Solenoid hose B connection point?</p> <p>Yes → Go To 8            No → Replace the appropriate Solenoid.</p>	All
8	<p>Turn the ignition off.            Disconnect the hoses from the appropriate Solenoid.            Install a plug on Solenoid hose C connection point.            Connect a vacuum pump to the Solenoid hose B connection point.  <b>NOTE: For the result of this test to be accurate the solenoid must be turned on. Apply 12 volts and Ground to the appropriate solenoid terminals to turn the solenoid on.</b>            With vacuum pump apply 20 inches of vacuum to the Solenoid hose B connection point.  <b>NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.</b>            Does vacuum read above 10 inches for at least 5 seconds?</p> <p>Yes → Go To 9            No → Replace the appropriate Solenoid.</p>	All
9	<p>Turn the ignition off.            Disconnect the hoses from the appropriate Solenoid.            Install a plug on the Solenoid hose A connection point.            Connect a vacuum pump to the Solenoid hose B connection point.  <b>NOTE: For the result of this test to be accurate the solenoid must be turned on. Apply 12 volts and Ground to the appropriate solenoid terminals to turn the solenoid on.</b>            Attempt to apply 20 inches of vacuum to the Solenoid hose B connection point.  <b>NOTE: Vacuum should escape through the Solenoid hose C connection point.</b>            Does vacuum escape through the Solenoid hose C connection point?</p> <p>Yes → Go To 10            No → Replace the appropriate Solenoid.</p>	All

**P0234-OVERBOOST PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
10	<p>Did all the solenoids function correctly?</p> <p>Yes → Replace the Turbocharger assembly in accordance with the Service Information.</p> <p>No → Replace Solenoid(s) as necessary.</p>	All



**Symptom:****P0243-WASTEGATE SOLENOID CIRCUIT****When Monitored and Set Condition:****P0243-WASTEGATE SOLENOID CIRCUIT**

When Monitored: The ignition on or engine running. Battery voltage greater than 10 volts.

Set Condition: The PCM will set the DTC if the actual state of the solenoid does not match the intended state.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

WASTEGATE SOLENOID OPERATION

(Z1) WASTEGATE SOLENOID GROUND CIRCUIT

(K137) WASTE SOL CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K137) WASTEGATE SOL CONTROL CIRCUIT OPEN

(K137) WASTEGATE SOL CONTROL CIRCUIT SHORTED TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the Wastegate Solenoid harness connector. Using a 12-volt test light, jumper across the Wastegate Solenoid harness connector. <b>NOTE: While actuating the solenoid wiggle the related wiring harness.</b> With the DRBIII®, actuate the Wastegate Solenoid. Does the test light illuminate brightly and flash on and off?  Yes → Replace the Wastegate Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P0243-WASTEGATE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Wastegate Solenoid harness connector.            Using a 12-volt test light connected to battery voltage, probe the (Z1) Ground circuit in the Wastegate harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 4</p> <p>No → Repair the (Z1) Ground circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p><b>NOTE: The Wastegate Sol Control circuit is a high side control circuit. When the circuit is operating normally voltage will be present.</b></p> <p>Turn the ignition off.            Disconnect the Wastegate Solenoid harness connector.            Disconnect the PCM harness connectors.            Turn the ignition on            Measure the voltage of the (K137) Wastegate Sol Control circuit in the Wastegate Solenoid harness connector.            Does the voltmeter indicate any voltage present?</p> <p>Yes → Repair the short to voltage in the (K137) Wastegate Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Wastegate Solenoid harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K137) Wastegate Sol Control circuit from the Wastegate Solenoid harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K137) Wastegate Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the Wastegate Solenoid harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K137) Wastegate Sol Control circuit at the Wastegate Solenoid harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K137) Wastegate Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All

**P0243-WASTEGATE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:**

**P0300-MULTIPLE CYLINDER MISFIRE**

**P0301-CYLINDER #1 MISFIRE**

**P0302-CYLINDER #2 MISFIRE**

**P0303-CYLINDER #3 MISFIRE**

**P0304-CYLINDER #4 MISFIRE**

---

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0300-MULTIPLE CYLINDER MISFIRE.**

---

**When Monitored and Set Condition:**

**P0300-MULTIPLE CYLINDER MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.0% misfire rate is measured during two trips.

**P0301-CYLINDER #1 MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.0% misfire rate is measured during two trips.

**P0302-CYLINDER #2 MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.0% misfire rate is measured during two trips.

**P0303-CYLINDER #3 MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.0% misfire rate is measured during two trips.

**P0304-CYLINDER #4 MISFIRE**

When Monitored: Any time the engine is running, and the Target Learning Coefficient has been successfully updated.

Set Condition: When more than a 1.0% misfire rate is measured during two trips.

---

**POSSIBLE CAUSES**

INTERMITTENT MISFIRE

VISUAL AND PHYSICAL INSPECTION

---

**P0300-MULTIPLE CYLINDER MISFIRE — Continued**

<b>POSSIBLE CAUSES</b>	
IGNITION WIRE ASD RELAY OUTPUT CIRCUIT (COIL) ENGINE MECHANICAL PROBLEM IGNITION COIL COIL CONTROL CIRCUIT SPARK PLUG CHECKING FUEL PRESSURE FUEL PUMP INLET STRAINER PLUGGED RESTRICTED FUEL SUPPLY LINE FUEL PUMP MODULE CHECKING FUEL LEAK DOWN FUEL INJECTOR OPERATION ASD RELAY OUTPUT CIRCUIT (INJECTOR) FUEL INJECTOR INJECTOR CONTROL CIRCUIT PCM (IGNITION SYSTEM) PCM	

<b>TEST</b>	<b>ACTION</b>	<b>APPLICABILITY</b>
1	Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is there a misfire present?  Yes → Go To 2 No → Go To 18	All

## P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: Reviewing the vehicle repair history may aid in the repair of the misfire condition.</b></p> <p>Visually and physically inspect the engine for any of the following conditions.</p> <ul style="list-style-type: none"> <li>- Worn serpentine belt</li> <li>- Binding Engine-Driven accessories.</li> <li>- Misaligned water pump, P/S pump and A/C compressor pulleys</li> <li>- Improper CKP sensor mounting</li> <li>- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.</li> <li>- Vacuum leaks</li> <li>- Restricted Air Induction system</li> </ul> <p><b>NOTE: Verify the integrity of the powers and grounds for the PCM.</b></p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>Disconnect the Ignition wire from the spark plug.</p> <p><b>NOTE: Before continuing, inspect the ignition wire for damage or carbon tracking. Replace as necessary.</b></p> <p>Install a spark tester to the ignition wire.</p> <p>While cranking the engine, observe the spark coming from the spark tester.</p> <p><b>NOTE: A crisp blue spark should be generated that is able to jump the gap of the spark tester.</b></p> <p>Is good spark present?</p> <p>Yes → Go To 4</p> <p>No → Go To 14</p>	All
4	<p>Turn the ignition off.</p> <p>Remove the Spark Plug.</p> <p>Inspect the Spark Plug for the following conditions.</p> <ul style="list-style-type: none"> <li>- Cracks</li> <li>- Carbon Tracking</li> <li>- Foreign Material</li> <li>- Gap size out of specifications</li> <li>- Loose or broke electrode</li> </ul> <p><b>NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.</b></p> <p>Were any of the above condition present?</p> <p>Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All

**P0300-MULTIPLE CYLINDER MISFIRE — Continued**

TEST	ACTION	APPLICABILITY
5	<p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge. Start the engine and observe the fuel pressure reading. <b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b> Choose a conclusion that best matches your fuel pressure reading.</p> <p>Within Specification Go To 6</p> <p>Below Specification Go To 12</p> <p>Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.</b></p> <p>Turn the ignition off. <b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install special 5/16 fuel line adapter tool #6539. Attach a fuel pressure test gauge to the T fitting on the tool #6539 Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. <b>NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b> Using special tool #C4390, Hose Clamp Pliers, slowly clamp off the rubber hose on the Fuel Pressure adapter between the fuel pressure gauge and the fuel pump module. Monitor the fuel pressure gauge for a minimum of 5 minutes. <b>NOTE: The pressure should not fall below 241 KPa (35 psi)</b> Does the fuel pressure gauge fall below the above specification?</p> <p>Yes → Replace the leaking Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p><b>CAUTION: After each actuation of the Fuel Injector, start the engine to clear the cylinder of fuel. Failure to do so could cause engine damage.</b></p> <p>Install a Fuel Pressure Gauge to the fuel rail. Start the engine and allow the fuel pressure to reach maximum pressure. Turn the engine off, leaving the ignition on. Using the DRBIII®, actuate the Fuel Injector for the cylinder that indicated the misfire. Monitor the fuel pressure gauge. Does the fuel pressure gauge indicate a drop in fuel pressure?</p> <p>Yes → Go To 8</p> <p>No → Go To 9</p>	All

# P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
8	<p>Check for any of the following conditions/mechanical problems.</p> <p>ENGINE VACUUM - must be at least 13 inches in neutral</p> <p>ENGINE VALVE TIMING - must be within specifications</p> <p>ENGINE COMPRESSION - must be within specifications</p> <p>ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.</p> <p>ENGINE PCV SYSTEM - must flow freely</p> <p>TORQUE CONVERTER STALL SPEED - must be within specifications</p> <p>POWER BRAKE BOOSTER - no internal vacuum leaks</p> <p>FUEL - must be free of contamination</p> <p>Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 18</p>	All
9	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Injector harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the ASD Relay.</p> <p>Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit at the Fuel Injector harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 10</p> <p>No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
10	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Injector harness connector.</p> <p>Ignition on, engine not running.</p> <p>Using a 12-volt test light connected to 12-volts, probe the Injector Control circuit.</p> <p>With the DRBIII®, actuate the Fuel Injector.</p> <p>Does the test light blink/flicker?</p> <p>Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Injector harness connector.</p> <p>Disconnect the PCM harness connectors.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Check the Injector Control circuit.</p> <p>Was a problem found with the Injector Control circuit?</p> <p>Yes → Repair the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**P0300-MULTIPLE CYLINDER MISFIRE — Continued**

TEST	ACTION	APPLICABILITY
12	<p>Turn the ignition off.</p> <p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.</p> <p>Attach a fuel pressure test gauge to the T fitting on the tool #6539</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Is the fuel pressure within specification?</p> <p>Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 13</p>	All
13	<p>Turn the ignition off.</p> <p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Ensure the ground circuit is operating properly. Repair as necessary. Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
14	<p>Turn the ignition off.</p> <p>Remove the ignition wire.</p> <p>Measure the resistance of the ignition wire.</p> <p>Is the resistance below 10K ohms?</p> <p>Yes → Go To 15</p> <p>No → Replace the Ignition Wire. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
15	<p>Turn the ignition off.</p> <p>Disconnect the Ignition Coil harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the ASD Relay.</p> <p>Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit at the Ignition Coil harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 16</p> <p>No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0300-MULTIPLE CYLINDER MISFIRE — Continued**

TEST	ACTION	APPLICABILITY
16	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Control circuit.            Crank the engine for 5 second while observing the test light.            Does the test light blink/flicker?</p> <p>Yes → Replace the Ignition Coil.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 17</p>	All
17	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Check the Coil Control circuit.            Was a problem found with the Coil Control circuit?</p> <p>Yes → Repair the Coil Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0300-MULTIPLE CYLINDER MISFIRE — Continued**

TEST	ACTION	APPLICABILITY
18	<p><b>NOTE: The conditions that set the DTC are not present at this time.</b></p> <p><b>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.</b></p> <p>Refer to any Technical Service Bulletins (TSBs) that may apply.</p> <p>Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set.</p> <p>With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.</p> <p>Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.</p> <p><b>CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Inspect and clean all PCM, engine, and chassis grounds.</p> <p><b>NOTE: Reviewing the vehicle repair history may aid in the repair of the misfire condition.</b></p> <p>Visually and physically inspect the engine for any of the following conditions.</p> <ul style="list-style-type: none"> <li>- Worn serpentine belt</li> <li>- Binding Engine-Driven accessories.</li> <li>- Misaligned water pump, P/S pump and A/C compressor pulleys</li> <li>- Improper CKP sensor mounting</li> <li>- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.</li> <li>- Vacuum leaks</li> <li>- Restricted Air Induction system</li> </ul> <p>Were any of the above conditions present?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Test Complete.</p>	All

## Symptom:

### P0315-NO CRANK SENSOR LEARNED

## When Monitored and Set Condition:

### P0315-NO CRANK SENSOR LEARNED

When Monitored: Under closed throttle decel and A/C off. ECT above 75°C (167°F).  
Engine start time is greater than 50 seconds.

Set Condition: One of the CKP sensor target windows has more than 2.86% variance from the reference. One Trip Fault.

## POSSIBLE CAUSES

DTC VERIFICATION

TONE WHEEL/PULSE RING INSPECTION

WIRING HARNESS INSPECTION

CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check for any TSBs that may apply to this symptom.</b></p> <p>Ignition on, engine not running. With the DRBIII®, clear DTCs, and perform the PCM battery disconnect to reset the PCM. Start the engine. If the MIL has not yet illuminated, test drive the vehicle to try to get the code to reset. Does the code reset while cranking or during the test drive?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Visually inspect the CKP wire harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the CKP wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor is properly installed and the mounting bolt tight. Refer to any TSB that may apply. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0315-NO CRANK SENSOR LEARNED — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found?  Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	If there are no possible causes remaining, view repair.  Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

## Symptom:

### P0325-KNOCK SENSOR #1 CIRCUIT

#### When Monitored and Set Condition:

##### P0325-KNOCK SENSOR #1 CIRCUIT

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

Set Condition: The Knock Sensor circuit voltage falls below a minimum value. The minimum value is from a look-up table internal to the PCM and is based on engine rpm. DTC also sets if sensor output is approx 5.0 volts and the engine is running within idle range. One Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

KNOCK SENSOR CIRCUIT SHORTED TO VOLTAGE

KNOCK SENSOR CIRCUIT SHORTED TO GROUND

(K42) KS SIGNAL CIRCUIT OPEN

(K42) KS SIGNAL CIRCUIT SHORTED TO (K45) KS RETURN CIRCUIT

(K45) KS RETURN CIRCUIT OPEN

KNOCK SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the voltage of the (K42) Knock Sensor Signal circuit and the (K45) Knock Sensor Return circuit in the Knock Sensor harness connector. Is the voltage above 2.0 volts on either circuit?  Yes → Repair the short to voltage in the Knock Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P0325-KNOCK SENSOR #1 CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K42) and (K45) circuits at the Knock Sensor harness connector. Is the resistance to ground below 100 ohms on either circuit?  Yes → Repair the short to ground in the Knock Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K42) KS Signal circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 5  No → Repair the open in the (K42) KS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
5	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the resistance between the (K42) KS Signal circuit and the (K45) KS Return circuit in the Knock Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the (K42) KS Signal circuit for a short to (K45) KS Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K45) KS Return circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 7  No → Repair the open in the (K45) KS Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**P0325-KNOCK SENSOR #1 CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Replace the Knock Sensor. Ignition on, engine not running. With the DRBIII®, erase DTC. Attempt to operate the vehicle using the information noted in the Freeze Frame. With the DRBIII®, read DTC's. Does the DRBIII® display the DTC that was previously erased?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All



**Symptom:****P0335-CRANKSHAFT POSITION SENSOR CIRCUIT****When Monitored and Set Condition:****P0335-CRANKSHAFT POSITION SENSOR CIRCUIT**

When Monitored: Engine cranking.

Set Condition: No CKP signal is present during engine cranking, and at least 8 camshaft position sensor signals have occurred. One trip fault.

**POSSIBLE CAUSES**

CHECKING INTERMITTENT CMP SIGNAL WITH LAB  
 INTERMITTENT CKP SIGNAL  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND  
 (K7) 5 VOLT SUPPLY CIRCUIT OPEN  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE  
 (K24) CKP SIGNAL CIRCUIT SHORTED GROUND  
 (K24) CKP SIGNAL CIRCUIT OPEN  
 (K24) CKP SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 (K24) CKP SIGNAL SHORTED TO (K7) 5 VOLT SUPPLY CIRCUIT  
 (K4) SENSOR GROUND CIRCUIT OPEN  
 PCM - (K7) 5 VOLT SUPPLY  
 PCM - (K24) CKP SIGNAL  
 CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the CKP SYNC State. Does the DRBIII® display CKP SYNC state IN SYNC?  Yes → Go To 2 No → Go To 4	All

**P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the (K44) Camshaft Position (CMP) Sensor Signal circuit in the CMP harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Cam Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Look for any pulses generated by the CMP Sensor.</p> <p>Start the engine.</p> <p>Allow the engine to idle.</p> <p>Observe the lab scope screen.</p> <p>Did the CMP Sensor generate any erratic pulses?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Crank Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Look for any pulses generated by the CKP Sensor.</p> <p>Start the engine.</p> <p>Allow the engine to idle.</p> <p>Observe the lab scope screen.</p> <p>Did the CKP Sensor generate any pulses?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CKP Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the (K7) 5 Volt Supply circuit in the CKP Sensor harness connector.</p> <p>Is the voltage between 4.5 and 5.5 volts?</p> <p>Yes → Go To 5</p> <p>No → Go To 13</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the CKP Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the (24) CKP Signal circuit in the CKP Sensor harness connector.</p> <p>Is the voltage between 4.5 and 5.0 volts?</p> <p>Yes → Go To 6</p> <p>No → Go To 8</p>	All

**P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor Ground circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the (K4) Sensor Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p><b>NOTE: Inspect the slots on the flywheel for damage. If a problem is found repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K24) CKP Signal circuit in the CKP Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K24) CKP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K24) CKP Signal circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 10</p> <p>No → Repair the open in the (K24) CKP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
10	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Ignition on, engine not running.            Measure the voltage of the (K24) CKP Signal circuit in the CKP Sensor harness connector.            Is the voltage above 5.5 volts?</p> <p>Yes → Repair the short to battery voltage in the (K24) CKP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K24) CKP Signal circuit and the (K7) 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K24) CKP Signal circuit shorted to the (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 12</p>	All
12	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
13	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K7) 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 14</p>	All
14	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K7) 5 Volt Supply circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 15</p> <p>No → Repair the open in the (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
15	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Ignition on, engine not running.            Measure the voltage on the (K7) 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the voltage above 5.5 volts?</p> <p>Yes → Repair the short to battery voltage in the (K7) 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 16</p>	All
16	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:**

**P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT**

**When Monitored and Set Condition:**

**P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT**

When Monitored: Engine running or Cranking.

Set Condition: When the failure counter reaches 20. One Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

WIRING HARNESS INSPECTION

(K7) 5 VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND

TONE WHEEL/PULSE RING INSPECTION

CHECKING CAMSHAFT POSITION SENSOR SIGNAL WITH THE DRBIII® LAB

CRANKSHAFT POSITION SENSOR

(K24) CKP SIGNAL CIRCUIT OPEN

(K24) CKP SIGNAL CIRCUIT SHORT TO GROUND

(K24) CKP SIGNAL CIRCUIT SHORTED TO B+

(K24) CKP SIGNAL CIRCUIT SHORT TO (K7) 5 VOLTS

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.                      With the DRBIII®, read DTCs and record the related Freeze Frame data.                      Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
2	<p>With the DRBIII®, read and record Freeze Frame Data specific to the CKP signal, ECT, RPM, Sync state, vehicle speed, etc. Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the Sensor harness connector. <b>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.</b> Ignition on, engine not running. Observe the lab scope screen at least 1 minute and then start the vehicle. Continue observing the lab scope screen for an additional minute. Were there any irregular or missing signals?</p> <p>Yes → Go To 3 No → Go To 8</p>	All
3	<p>Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight. Refer to any TSBs that may apply. Were any of the above conditions present?</p> <p>Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC. No → Go To 4</p>	All
4	<p>Turn the ignition off. Disconnect the CKP Sensor connector. Ignition on, engine not running. Measure the voltage on the (K7) 5 Volt Supply circuit. Is the voltage between 4.5 and 5.5 volts?</p> <p>Yes → Go To 5 No → Repair the open or short to ground in the (K7) 5 Volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off. Carefully disconnect the Battery (-) Ground cable. Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found?</p> <p>Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC. No → Go To 6</p>	All

**P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
6	<p><b>NOTE: An intermittent glitch in the Camshaft Position Sensor can cause the P0339 to set.</b></p> <p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the Sensor harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Camshaft Position Sensor.</p> <p>While observing the lab scope screen.</p> <p>Start the engine.</p> <p>Observe the lab scope screen.</p> <p>Are there any irregular or missing signals?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.</p> <p>Disconnect the CKP Sensor connector.</p> <p>Disconnect the PCM connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance in the (K24) CKP Signal circuit between the CKP harness connector and the appropriate terminal of special tool #8815.</p> <p>Wiggle the wire harness while taking this measurement.</p> <p>Is the resistance below 1.0 ohm?</p> <p>Yes → Go To 9</p> <p>No → Repair the open/high resistance in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
9	<p>Turn the ignition off.</p> <p>Disconnect the PCM connector.</p> <p>Disconnect the CKP Sensor connector.</p> <p>Measure the resistance between ground and the (K24) CKP Signal circuit at the CKP Sensor harness connector.</p> <p>Wiggle the related wire harness while monitoring the resistance value.</p> <p>Does the resistance stay below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All



**P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
10	<p>Turn the ignition off.            Disconnect the CKP Sensor connector.            Ignition on, engine not running.            Measure the voltage on the (K24) CKP Signal circuit.            Wiggle the related wire harness while taking this measurement.            Does the voltage ever increase above 5.5 volts?</p> <p>Yes → Repair the short to B+ voltage in the (K24) CKP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Disconnect the CKP Sensor harness connector.            Measure the resistance between the (K7) 5 Volt Supply circuit and the (K24) CKP signal circuit at the CKP Sensor harness connector.            Wiggle the related wire harness while taking this measurement.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to the (K7) 5 Volt Supply circuit in the (K24) CKP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 12</p>	All
12	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, review repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0340-CAMSHAFT POSITION SENSOR CIRCUIT**

#### When Monitored and Set Condition:

#### **P0340-CAMSHAFT POSITION SENSOR CIRCUIT**

When Monitored: Engine cranking/running. Battery voltage greater than 10 volts.

Set Condition: At least 5 seconds or 2.5 engine revolutions have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal. One Trip Fault.

#### **POSSIBLE CAUSES**

INTERMITTENT CRANKSHAFT POSITION SENSOR SIGNAL  
 INTERMITTENT CAMSHAFT POSITION SENSOR SIGNAL  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND  
 (K7) 5 VOLT SUPPLY CIRCUIT OPEN  
 (K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE  
 (K44) CMP SIGNAL CIRCUIT SHORTED GROUND  
 (K44) CMP SIGNAL CIRCUIT OPEN  
 (K44) CMP SIGNAL CIRCUIT SHORTED TO VOLTAGE  
 (K44) CMP SIGNAL SHORTED TO (K7) 5 VOLT SUPPLY CIRCUIT  
 (K4) SENSOR GROUND CIRCUIT OPEN  
 PCM - (K7) 5 VOLT SUPPLY  
 PCM - (K44) CMP SIGNAL  
 CAMSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the CMP SYNC State. Does the DRBIII® display the CMP SYNC State IN SYNC?  Yes → Go To 2  No → Go To 4	All

**P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the (K24) CKP signal circuit in the CKP harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap the Crankshaft Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Start the engine.</p> <p>Allow the engine to idle.</p> <p>Observe the lab scope screen.</p> <p>Did the CKP Sensor generate any erratic pulses?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Camshaft Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Start the engine.</p> <p>Allow the engine to idle.</p> <p>Observe the lab scope screen.</p> <p>Did the CMP Sensor generate any erratic pulses?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CMP Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the (K7) 5 Volt Supply circuit in the CMP Sensor harness connector.</p> <p>Is the voltage between 4.5 and 5.5 volts?</p> <p>Yes → Go To 5</p> <p>No → Go To 13</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the CMP Sensor harness connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage of the (K44) CMP Signal circuit in the CMP Sensor harness connector.</p> <p>Is the voltage between 4.5 and 5.0 volts?</p> <p>Yes → Go To 6</p> <p>No → Go To 8</p>	All

# P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.  Disconnect the CMP Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K4) Sensor Ground circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the (K4) Sensor Ground circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p><b>NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Camshaft Position Sensor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.  Disconnect the CMP Sensor harness connector.  Disconnect the PCM harness connector.  Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K44) CMP Signal circuit  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off.  Disconnect the CMP Sensor harness connector.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K44) CMP Signal circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 10</p> <p>No → Repair the open in the (K44) CMP Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K44) CMP Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 11	All
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance between the (K44) CMP Signal circuit and the (K7) 5 Volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 5.0 ohms?  Yes → Repair the (K44) CMP Signal circuit shorted to the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 12	All
12	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
13	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K7) 5 Volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 14	All
14	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K7) 5 Volt Supply circuit between the CMP Sensor harness connector and the special tool #8815 terminal. Is the resistance below 5.0 ohms?  Yes → Go To 15  No → Repair the open in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the CMP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5 Volt Supply circuit in the CMP Sensor harness connector. Is the voltage above 5.5 volts?  Yes → Repair the short to battery voltage in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 16	All
16	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**Symptom:****P0344-CAMSHAFT POSITION SENSOR INTERMITTENT****When Monitored and Set Condition:****P0344-CAMSHAFT POSITION SENSOR INTERMITTENT**

When Monitored: Engine running or Cranking.

Set Condition: When the failure counter reaches 20. One Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

WIRING HARNESS INSPECTION

(K7) 5 VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND

TONE WHEEL/PULSE RING INSPECTION

CHECKING CKP SIGNAL WITH THE DRBIII® LAB

CAMSHAFT POSITION SENSOR

(K44) CMP SIGNAL CIRCUIT OPEN

(K44) CMP SIGNAL CIRCUIT SHORT TO GROUND

(K44) CMP SIGNAL CIRCUIT SHORTED TO B+

(K44) CMP SIGNAL CIRCUIT SHORT TO (K7) 5 VOLTS

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector. <b>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.</b> Ignition on, engine not running. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals?  Yes → Go To 3  No → Go To 8	All

**P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires.</p> <p>Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.</p> <p>Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight.</p> <p>Refer to any TSBs that may apply.</p> <p>Were any of the above conditions present?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the CMP Sensor connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage on the (K7) 5 Volt Supply circuit.</p> <p>Is the voltage between 4.5 and 5.5 volts?</p> <p>Yes → Go To 5</p> <p>No → Repair the open or short to ground in the (K7) 5 Volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.</p> <p>Carefully disconnect the Battery (-) Ground cable.</p> <p>Remove the Camshaft Position Sensor.</p> <p>Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement.</p> <p>Were any problems found?</p> <p>Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: An intermittent glitch in the Crankshaft Position Sensor can cause the P0344 to set.</b></p> <p>Turn the ignition off.</p> <p>With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP Sensor harness connector.</p> <p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p>Wiggle the related wire harness and lightly tap on the Crank Position Sensor.</p> <p>Observe the lab scope screen.</p> <p>Start the engine.</p> <p>Observe the lab scope screen.</p> <p>Are there any irregular or missing signals?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All



**P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
7	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Camshaft Position Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.</p> <p>Disconnect the CMP Sensor connector.</p> <p>Disconnect the PCM connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance in the (K44) CMP Signal circuit from the CMP harness connector to the appropriate terminal of special tool #8815.</p> <p>Wiggle the related wire harness while taking this measurement.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the open/high resistance in the (K44) CMP Signal circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
9	<p>Turn the ignition off.</p> <p>Disconnect the PCM connector.</p> <p>Disconnect the CMP Sensor connector.</p> <p>Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector.</p> <p>Wiggle the related wire harness while monitoring the resistance value.</p> <p>Does the resistance stay below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K44) CMP Signal circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 10</p>	All
10	<p>Turn the ignition off.</p> <p>Disconnect the CMP Sensor connector.</p> <p>Ignition on, engine not running.</p> <p>Measure the voltage on the (K44) CMP Signal circuit.</p> <p>Wiggle the related wire harness while taking this measurement.</p> <p>Does the voltage ever increase above 5.5 volts?</p> <p>Yes → Repair the short to B+ voltage in the (K44) CMP Signal circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 11</p>	All
11	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connector.</p> <p>Disconnect the CMP harness connector.</p> <p>Measure the resistance between the (K7) 5 Volt Supply circuit and the (K44) CMP signal circuit in the CMP harness connector.</p> <p>Wiggle the related wire harness while taking this measurement.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to the (K7) 5 Volt Supply circuit in the (K44) CMP Signal circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 12</p>	All

**P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued**

TEST	ACTION	APPLICABILITY
12	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0420-CATALYTIC 1/1 EFFICIENCY**

---

**When Monitored and Set Condition:****P0420-CATALYTIC 1/1 EFFICIENCY**

When Monitored: Engine Run time greater than 90 seconds. Engine Coolant greater than 70°C (158°F) Vehicle speed greater than 20 MPH and less than 55 MPH. Engine Speed greater than 1216 RPM and less than 1952 RPM.

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one. One Trip Fault.

## Symptom:

### **P0440-GENERAL EVAP SYSTEM FAILURE**

#### When Monitored and Set Condition:

#### **P0440-GENERAL EVAP SYSTEM FAILURE**

When Monitored: Engine Running. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F)

Set Condition: The PCM does not see the NVLD switch close during the medium/large leak test. The PCM will then increase the vacuum supply to the EVAP system by increasing flow through the EVAP Purge valve. If the switch does not close with an increase in vacuum, an error is detected. Two Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO  
 VISUAL AND PHYSICAL INSPECTION  
 EVAP PURGE SOLENOID VACUUM SUPPLY INSPECTION  
 EVAP PURGE SOLENOID STUCK CLOSED  
 NVLD SWITCH OPERATION  
 (Z1) GROUND CIRCUIT OPEN  
 NVLD ASSEMBLY  
 (K107) NVLD SWITCH SIGNAL CIRCUIT OPEN  
 EVAPORATIVE EMISSION LEAK DETECTION  
 PCM  
 PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0440.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0440-GENERAL EVAP SYSTEM FAILURE — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> <li>- Hoses disconnected or left off</li> <li>- Holes or cracks</li> <li>- Loose seal points</li> <li>- Evidence of damaged components</li> <li>- Incorrect routing of hoses and tubes</li> <li>- Fuel Cap left off or bad gasket seal</li> </ul> <p>Were any of the above conditions found?</p> <p style="padding-left: 40px;">Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Go To 3</p>	All
3	<p>Turn the ignition off.</p> <p>Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Ensure the vacuum port at the throttle body is free from any blockage.</p> <p>Were any problems found?</p> <p style="padding-left: 40px;">Yes → Repair the vacuum supply, hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Go To 4</p>	All
4	<p>Disconnect the vacuum supply hoses from the EVAP Purge Solenoid.</p> <p>Using a hand vacuum pump, apply 10 in Hg to the "CAN" side of the EVAP Purge Solenoid.</p> <p>Ignition on, engine not running.</p> <p>Observe the vacuum gauge.</p> <p>With the DRBIII®, actuate the EVAP Purge Solenoid .</p> <p>Does the vacuum drop when the solenoid is actuated?</p> <p style="padding-left: 40px;">Yes → Go To 5</p> <p style="padding-left: 40px;">No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Reconnect all vacuum hoses.</p> <p>Start the engine and allow it to idle.</p> <p>Using the DRBIII®, perform the NVLD FORCED MONITOR TEST.</p> <p>Monitor the NVLD Switch state.</p> <p><b>NOTE: As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released from the EVAP system the Switch state will return to OPEN.</b></p> <p>Did the NVLD Switch operate as described above?</p> <p style="padding-left: 40px;">Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p style="padding-left: 40px;">No → Go To 6</p>	All

**P0440-GENERAL EVAP SYSTEM FAILURE — Continued**

TEST	ACTION	APPLICABILITY
6	<p>To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD).</p> <p><b>WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.</b></p> <p><b>NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.</b></p> <p>Connect the red power lead of EELD to the battery positive terminal and the black ground lead to battery negative terminal.</p> <p><b>NOTE: See Charts and Graph support material EELD Calibration Setup for an example.</b></p> <p>Block the vent hose of the EVAP Canister.</p> <p>Connect shop air to the EELD.</p> <p>Set the smoke/air control switch to AIR.</p> <p>Insert the tester's AIR supply tip (clear hose) into the .040 orifice on the tester's control panel.</p> <p>Press the remote smoke/air start button.</p> <p>Position the red flag on the air flow meter so it is aligned with the indicator ball.</p> <p>When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute.</p> <p>Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install the #8404-ADP service adapter in the NVLD filter line.</p> <p>Connect the Air supply hose from the EELD to the service port.</p> <p>Press the remote button to activate AIR flow.</p> <p><b>NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve, this may indicate high flow and will require 4 to 5 minutes to fill.</b></p> <p>Compare the flow meter indicator ball reading to the red flag.</p> <p>ABOVE the red flag indicates a leak present.</p> <p>BELOW the red flag indicates a sealed system.</p> <p>Is the indicator ball above the red flag?</p> <p>Yes → Go To 7</p> <p>No → Go To 8</p>	All

**P0440-GENERAL EVAP SYSTEM FAILURE — Continued**

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.</b></p> <p>To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).</p> <p>Remove the Air supply hose from the service port.</p> <p>Connect the SMOKE supply tip (black hose) to the service port.</p> <p>Set the smoke/air control switch to SMOKE.</p> <p><b>NOTE: The flow meter indicator ball will not move at this point.</b></p> <p>Press the remote smoke/air start button.</p> <p><b>NOTE: Ensure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.</b></p> <p><b>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</b></p> <p>While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.</p> <p>If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that are left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.</p> <p><b>NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke or dye may or may not be visual. Introducing smoke into the filtered side of the canister may assist in locating the leak.</b></p> <p>Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p> <p>No → <b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.</b> Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.</p> <p>Disconnect the NVLD electrical harness connector.</p> <p>Check connectors - Clean/repair as necessary.</p> <p>Using a jumper wire, jumper across the (K107) NVLD Switch Sense circuit and the (Z1) Ground circuit in the NVLD electrical harness connector.</p> <p>Monitor the NVLD Switch state on the DRBIII®.</p> <p>Does the Switch change from OPEN to CLOSED.</p> <p>Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All

**P0440-GENERAL EVAP SYSTEM FAILURE — Continued**

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the NVLD electrical harness connector. Measure the resistance between the (Z1) Ground circuit and ground. Is the resistance below 5.0 ohms?  Yes → Go To 10  No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
10	Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms?  Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Repair the open in the (K107) NVLD Switch Signal Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All



**Symptom:****P0441-EVAP PURGE SYSTEM PERFORMANCE****When Monitored and Set Condition:****P0441-EVAP PURGE SYSTEM PERFORMANCE**

When Monitored: Cold start test. Engine Running. Small Leak Test Passed.

Set Condition: The PCM activates the EVAP Purge solenoid gradually increases to maximum flow. During flow, the PCM looks for the NVLD switch to close. If the PCM does not see the NVLD switch close at maximum flow an error is detected. Two Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

INTERMITTENT CONDITION

CHECKING EVAP PURGE SOLENOID FUNCTIONALITY

EVAP PURGE SOLENOID VACUUM SUPPLY

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0441.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p><b>NOTE: After disconnecting the Evap Purge vacuum connections, inspect the lines and solenoid for any signs of contamination or foreign materials.</b></p> <p>Using a hand vacuum pump, apply 10 in Hg to "CAN" side of the EVAP Purge Solenoid.            Ignition on, engine not running.            Observe the vacuum gauge.            With the DRBIII®, actuate the EVAP Purge Solenoid .            Does the vacuum drop when the solenoid is actuated?</p> <p>Yes → Go To 3</p> <p>No → Replace the Evap Purge Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0441-EVAP PURGE SYSTEM PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum port at the throttle body for any damage or plugging. Were any problems found?</p> <p>Yes → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:****P0442-EVAP SYSTEM MEDIUM LEAK****P0455-EVAP SYSTEM LARGE LEAK**

---

**Test Note:** All symptoms listed above are diagnosed using the same tests. The title for the tests will be **P0442-EVAP SYSTEM MEDIUM LEAK**.

---

**When Monitored and Set Condition:****P0442-EVAP SYSTEM MEDIUM LEAK**

**When Monitored:** Engine Running. Cold start test. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs when small leak test is maturing.

**Set Condition:** The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD switch. Once the NVLD switch is closed, the PCM turns the EVAP Purge solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time for a Medium leak an error is detected. Two Trip Fault.

**P0455-EVAP SYSTEM LARGE LEAK**

**When Monitored:** Engine Running. Cold start test. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs when small leak test is maturing.

**Set Condition:** The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD switch. Once the NVLD switch is closed, the PCM turns the EVAP Purge solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time for a Large leak an error is detected. Two Trip Fault.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

VISUAL AND PHYSICAL INSPECTION

EVAPORATIVE EMISSION LEAK DETECTION

EVAP PURGE SOLENOID OPERATION

NVLD SWITCH OPERATION

# P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.</b></p> <p><b>NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.</b></p> <p>Ignition on, engine not running.  With the DRBIII®, read DTCs and record the related Freeze Frame data.  Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Go To 7</p>	All
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the follow conditions:</p> <ul style="list-style-type: none"> <li>- Holes or cracks</li> <li>- Loose seal points</li> <li>- Evidence of damaged components</li> <li>- Incorrect routing of hoses and tubes</li> <li>- Fuel Cap gasket seal</li> </ul> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary.  Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p> <p>No → Go To 3</p>	All

**P0442-EVAP SYSTEM MEDIUM LEAK — Continued**

TEST	ACTION	APPLICABILITY
3	<p>To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD).</p> <p><b>WARNING: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.</b></p> <p><b>NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.</b></p> <p>Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal.</p> <p><b>NOTE: See Charts and Graph support material EELD Calibration Setup for an example.</b></p> <p>Block the vent hose of the EVAP Canister.</p> <p>Connect shop air to the EELD.</p> <p>Set the smoke/air control switch to AIR.</p> <p>Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).</p> <p>Press the remote smoke/air start button.</p> <p>Position the red flag on the air flow meter so it is aligned with the indicator ball.</p> <p>When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM.</p> <p>Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install the #8404-ADP service adapter in the NVLD filter line.</p> <p>Connect the Air supply hose from the EELD to the service port.</p> <p>Press the remote button to activate AIR flow.</p> <p><b>NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill</b></p> <p>Compare the flow meter indicator ball reading to the red flag.</p> <p>ABOVE the red flag indicates a leak present.</p> <p>BELOW the red flag indicates a sealed system.</p> <p>Is the indicator ball above the red flag?</p> <p>Yes → Go To 4</p> <p>No → Go To 7</p>	All

# P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
4	<p><b>NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.</b></p> <p>To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).</p> <p>Remove the Air supply hose from the service port.</p> <p>Connect the SMOKE supply tip (black hose) to the service port.</p> <p>Set the smoke/air control switch to SMOKE.</p> <p><b>NOTE: The flow meter indicator ball will not move in the smoke mode.</b></p> <p>Press the remote smoke/air start button.</p> <p><b>NOTE: Ensure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.</b></p> <p><b>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</b></p> <p>While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.</p> <p>If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.</p> <p><b>NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.</b></p> <p>Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the vacuum hoses at the Evap Purge Solenoid.</p> <p>Using a hand vacuum pump, apply 10 in Hg to the "CAN" of the EVAP Purge Solenoid.</p> <p><b>NOTE: Monitor the vacuum gauge for at least 15 seconds.</b></p> <p>Does the EVAP Purge Solenoid hold vacuum?</p> <p>Yes → Go To 6</p> <p>No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p>	All

**P0442-EVAP SYSTEM MEDIUM LEAK — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Reconnect all vacuum hoses.            Start the engine.            Allow the engine to idle.            Using the DRBIII®, perform the NVLD FORCED MONITOR TEST.            Monitor the NVLD Switch.  <b>As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released from the EVAP system the Switch state will return to OPEN.</b>            Did the NVLD Switch operate as described above?</p> <p>Yes → Go To 7</p> <p>No → Replace the NVLD Assembly.            Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p>	All
7	<p><b>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.</b>            Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.            Refer to any Technical Service Bulletins (TSB) that may apply.  <b>NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.</b>            Perform a visual and physical inspection of the entire Evaporative Emission system.            Check for the following conditions:</p> <ul style="list-style-type: none"> <li>- Holes or cracks</li> <li>- Loose seal points</li> <li>- Evidence of damaged components</li> <li>- Incorrect routing of hoses and tubes</li> <li>- Fuel Cap gasket seal</li> </ul> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 6 - NGC.</p> <p>No → Test Complete.</p>	All

## Symptom:

### P0443-EVAP PURGE SOLENOID CIRCUIT

#### When Monitored and Set Condition:

#### P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: The ignition on or engine running. Battery voltage greater than 10 volts.

Set Condition: The PCM will set a trouble code if the actual state of the solenoid does not match the intended state.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

EVAP PURGE SOLENOID OPERATION

(K52) EVAP PURGE SOL CONTROL CIRCUIT OPEN

(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

(K108) EVAP PURGE SOL RETURN CIRCUIT OPEN

(K108) EVAP PURGE SOL RETURN CIRCUIT SHORTED TO GROUND

POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jumper across the EVAP Purge Solenoid harness connector. With the DRBIII®, actuate the EVAP Purge Solenoid. Does the test light flash on and off?</p> <p>Yes → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All



**P0443-EVAP PURGE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Evap Purge Solenoid harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K52) Evap Purge Solenoid Control circuit from the Evap Purge Solenoid harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the (K52) Evap Purge Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the Evap Purge Solenoid harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K52) Evap Purge Sol Control circuit at the Evap Purge Solenoid harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K52) Evap Purge Solenoid Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the Evap Purge Solenoid harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K108) Evap Purge Sol Return circuit from the Evap Purge Solenoid harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K108) Evap Purge Sol Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the Evap Purge Solenoid harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K108) Evap Purge Sol Return circuit at the Evap Purge Solenoid harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K108) Evap Purge Solenoid Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All

**P0443-EVAP PURGE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW****When Monitored and Set Condition:****P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW**

When Monitored: Immediately after engine start up.

Set Condition: The PCM activates the NVLD Solenoid. If the PCM does not see the NVLD switch open, an error is detected. One Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

NVLD SWITCH OPERATION

NVLD ASSEMBLY

(K52) EVAP PURGE SOL CONTROL CIRCUIT SHORTED TO GROUND

(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

EVAP PURGE SOLENOID LEAKS/STUCK OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Ignition on, engine not running. Using a 12-volt test light, jumper across the EVAP Purge Solenoid harness connector. With the DRBIII®, actuate the EVAP Purge Solenoid. Does the test light flash on and off?  Yes → Go To 3  No → Go To 7	All

**P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
3	<p><b>NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.</b></p> <p>Turn the ignition off.            Disconnect the vacuum hoses at the Evap Purge Solenoid.            Using a hand vacuum pump, apply 10 in Hg to the "CAN" of the EVAP Purge Solenoid.</p> <p><b>NOTE: Monitor the vacuum gauge for at least 15 seconds.</b></p> <p>Does the EVAP Purge Solenoid hold vacuum?</p> <p>Yes → Go To 4</p> <p>No → Replace the Evap Purge Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Ignition on, engine not running.            Using the DRBIII®, monitor the NVLD Switch State.            Does the DRBIII® display the NVLD state OPEN?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition on.            Using the DRBIII®, monitor the NVLD Switch State.            Disconnect the NVLD electrical connector.            Does the Switch change from CLOSED to OPEN?</p> <p>Yes → Replace the NVLD Assembly.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the NVLD electrical harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K107) NVLD Switch Signal circuit in the NVLD Assembly harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K107) NVLD Switch Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → <b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.</b>            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Disconnect the EVAP Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance between ground and the (K52) EVAP Purge Sol Control circuit at the EVAP Purge Solenoid harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K52) EVAP Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH

#### When Monitored and Set Condition:

#### P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH

When Monitored: Engine Running.

Set Condition: If the PCM does not see the NVLD switch close during test, an error is detected. One Trip Fault.

#### POSSIBLE CAUSES

NVLD SWITCH OPERATION

(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO (K106) NVLD SOL CONTROL CIRCUIT  
NVLD ASSEMBLY

(Z1) GROUND CIRCUIT OPEN

(K107) NVLD SWITCH SIGNAL CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>Start the engine. Allow the engine to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch state. <b>NOTE: As the test runs, the NVLD Switch should go from an OPEN state to a CLOSED state and then return to OPEN when the test is complete.</b> Did the NVLD Switch operate as described above?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off. Disconnect the NVLD electrical harness connector. Ignition on, engine not running. Measure the voltage on the (K107) NVLD Switch Signal circuit in the NVLD electrical harness connector. Is the voltage above 5.5 volts?</p> <p>Yes → Repair short to battery voltage in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the NVLD electrical harness connector.            Measure the resistance between the (K107) NVLD Switch Signal circuit and (K106) NVLD Sol Control circuit in the NVLD electrical harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K107) NVLD Switch Signal circuit shorted to the (K106) NVLD Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the NVLD electrical harness connector.            Using a jumper wire, jumper across the NVLD Switch Signal circuit and the Ground circuit.            Monitor the NVLD Switch state on the DRBIII®.            Does the Switch change from OPEN to CLOSED?</p> <p>Yes → Replace the NVLD Assembly.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the NVLD electrical harness connector.            Measure the resistance between the (Z1) Ground circuit and ground.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (Z1) Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the NVLD electrical harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of special tool # 8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the (K107) NVLD Switch Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0456-EVAP SYSTEM SMALL LEAK

#### When Monitored and Set Condition:

#### P0456-EVAP SYSTEM SMALL LEAK

When Monitored: Ignition off. Fuel Level less than 88%. Ambient Temperature between 4°C to 43°C (39°F to 109°F)

Set Condition: Due to temperature changes a vacuum is created in the fuel tank and EVAP system. With the EVAP system sealed, the PCM monitors the NVLD switch. If the NVLD switch does not close within a calibrated amount of time an error is detected.

#### POSSIBLE CAUSES

INTERMITTENT CONDITION

VISUAL AND PHYSICAL INSPECTION

EVAPORATIVE EMISSION LEAK DETECTION

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The difference in ambient temperature, outside temp VS shop temp, may conceal a leak, it is best to perform this test after the vehicle's temperature has stabilized in the work area.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2 No → Go To 4</p>	All
2	<p>Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions:</p> <ul style="list-style-type: none"> <li>- Holes or cracks</li> <li>- Loose seal points</li> <li>- Evidence of damaged components</li> <li>- Incorrect routing of hoses and tubes</li> <li>- Fuel Cap gasket seal</li> </ul> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All



**P0456-EVAP SYSTEM SMALL LEAK — Continued**

TEST	ACTION	APPLICABILITY
3	<p><b>NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.</b></p> <p>Use the Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).            Connect the SMOKE supply tip (black hose) to the service port, (if equipped) or install the #8404-ADP service adapter in the NVLD filter line..            Set the smoke/air control switch to SMOKE.            Block the vent hose of the EVAP Canister.  <b>NOTE: The flow meter indicator ball will not move at this point.</b>            Press the remote smoke/air start button.  <b>NOTE: Ensure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.</b>  <b>NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.</b>            While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.            If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that are left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.  <b>NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke or dye may or may not be visual. Introducing smoke into the filtered side of the canister may assist in locating the leak.</b>            Was a leak found?</p> <p>Yes → Repair or replace the leaking component as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p><b>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.</b></p> <p>Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set.            Refer to any Technical Service Bulletins (TSB) that may apply.  <b>NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.</b>            Perform a visual and physical inspection of the entire Evaporative Emission system.            Check for the following conditions:</p> <ul style="list-style-type: none"> <li>- Holes or cracks</li> <li>- Loose seal points</li> <li>- Evidence of damaged components</li> <li>- Incorrect routing of hoses and tubes</li> <li>- Fuel Cap gasket seal</li> </ul> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All

## Symptom:

### **P0461-FUEL LEVEL SENSOR #1 PERFORMANCE**

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

#### **P0461-FUEL LEVEL SENSOR #1 PERFORMANCE**

When Monitored: TEST #1: With the ignition on, the fuel level is compared to the previous key down after a 20 second delay. TEST #2: The PCM monitor the fuel level at ignition on.

Set Condition: TEST #1: If the PCM does not see a difference in fuel level of greater than 0.1 volt the test will fail. TEST #2: If the PCM does not see a change in the fuel level of .1765 over a set amount of miles the test will fail. Two Trip Fault.

#### **POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

VISUALLY INSPECT FUEL TANK

(G4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND

(G4) FUEL LEVEL SIGNAL CIRCUIT OPEN

(Z2) GROUND CIRCUIT OPEN

INTERNAL INSPECTION OF THE FUEL TANK

FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Diagnose P0462 or P0463 first, if set along with P0461.</b>  <b>NOTE: Inspect the Fuel Pump Module harness connector for any corrosion or damage.</b>            Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving.            Is the Fuel Tank OK?</p> <p>Yes → Go To 3</p> <p>No → Replace the Fuel Tank as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0461-FUEL LEVEL SENSOR #1 PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance between ground and the (G4) Fuel Level Signal circuit at the Fuel Pump Module harness connector. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the (G4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance of the (G4) Fuel Level Signal circuit from the Fuel Pump Module harness connector to the BCM harness connector. Is the resistance below 5.0 ohms?  Yes → Go To 5  No → Repair the open in the (G4) Fuel Level Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the (Z2) Ground circuit from the Fuel Pump Module harness connector to ground. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (Z2) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	<b>WARNING: The fuel system is under a constant pressure even with the engine off. Before opening the fuel system the fuel pressure must be release. Relieve the fuel pressure in accordance with the service information.</b> Remove the Fuel Tank in accordance with the Service Information. Remove the Fuel Pump Module. Visually inspect the inside of the Fuel Tank for any obstructions or deformities. Inspect the Fuel Pump Module Float arm for damage. Were any problems found?  Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 7	All
7	If there are no possible causes remaining, view repair.  Repair Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**Symptom List:**

**P0462-FUEL LEVEL SENSOR #1 LOW**

**P0463-FUEL LEVEL SENSOR #1 HIGH**

**Test Note:** All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be **P0462-FUEL LEVEL SENSOR #1 LOW**.

**When Monitored and Set Condition:**

**P0462-FUEL LEVEL SENSOR #1 LOW**

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage goes below 0.1961 volts for more than 5 seconds. One Trip Fault.

**P0463-FUEL LEVEL SENSOR #1 HIGH**

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage at the PCM goes above 4.7 volts for more than 5 seconds. One Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero?</p> <p>Yes → Refer to the Instrument Cluster Category and perform the Fuel Sensor Open or Short symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0480-COOLING FAN 1 CONTROL CIRCUIT****P0481-COOLING FAN 2 CONTROL CIRCUIT (NON-TURBO)****When Monitored and Set Condition:****P0480/P0481-COOLING FAN 1/2 CONTROL CIRCUIT**

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit. One Trip Fault.

**POSSIBLE CAUSES**

LOW SPEED RADIATOR FAN RELAY OPERATION

FUSED B+ FEED CIRCUITS

LOW SPEED RADIATOR FAN RELAY RESISTANCE

LOW SPEED RAD FAN RELAY CONTROL CIRCUIT OPEN

LOW SPEED RAD FAN RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 2	All
2	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Ignition on, engine not running. Measure the voltage of the Fused B+ Feed circuit in the PDC. Is the voltage above 11.0 volts?  Yes → Go To 3  No → Repair the (A16) Fused B+ Output circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

# P0480-COOLING FAN 1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Remove the Radiator Fan Relay from the PDC.  Measure the resistance of the Radiator Fan Relay between the Fused Ignition Switch Output terminal and the Rad Fan Relay Control terminal.  Is the resistance between 60 to 85 ohms?</p> <p>Yes → Go To 4</p> <p>No → Replace the Radiator Fan Relay.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.  Remove the Radiator Fan Relay from the PDC.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (C24) Rad Fan Relay Control circuit from the PDC to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (C24) Rad Fan Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.  Remove the Radiator Fan Relay from the PDC.  Disconnect the PCM harness connector.  Measure the resistance between ground and the Low Speed Rad Fan Control circuit at the PDC.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the Rad Fan Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0481-COOLING FAN 2 CONTROL CIRCUIT (TURBO)****When Monitored and Set Condition:****P0481-COOLING FAN 2 CONTROL CIRCUIT**

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuits. One Trip Fault.

**POSSIBLE CAUSES**

RADIATOR FAN RELAYS 2 AND 3 OPERATION

FUSED IGNITION SWITCH OUTPUT CIRCUIT

RADIATOR FAN RELAY #2 CONTROL CIRCUIT OPEN BEFORE THE SPLICE

RADIATOR FAN RELAY #3 CONTROL CIRCUIT OPEN BEFORE SPLICE

RADIATOR FAN RELAY CONTROL CIRCUITS SHORT TO GROUND

RADIATOR FAN RELAY CONTROL CIRCUIT OPEN AFTER THE SPLICE

RADIATOR FAN RELAY #2 OR #3

PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Are both Radiator Fan operating at high speed?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 2	All
2	Turn the ignition off. Remove both of the Radiator Fan Relays (#2 and #3) from the PDC. Turn the ignition on. <b>NOTE: A voltage measurement must be taken at both Radiator Fan Relay Fused Ignition Switch Output circuits in the PDC.</b> Measure the voltage of the Fused Ignition Switch Output circuit at the radiator Fan Relay connector in the PDC. Is the voltage above 11.0 volts at both relay connectors?  Yes → Go To 3  No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**P0481-COOLING FAN 2 CONTROL CIRCUIT (TURBO) — Continued**

TEST	ACTION	APPLICABILITY
3	<p><b>NOTE: Both Radiator Fan Relays must be removed from the PDC during the following steps.</b></p> <p>Turn the ignition on.</p> <p>Using the DRBIII®, actuate the High Speed Radiator Fan Relay.</p> <p>Using a test light connected to battery voltage, probe both of the Radiator Fan Relay Control circuits (relays #2 and #3).</p> <p><b>NOTE: The test light should flash at both control circuits.</b></p> <p>Choose a conclusion that best matches the result of the above test.</p> <p>Does NOT flash for Relay #2 (ONLY).  Repair the open in the Radiator Fan Relay #2 Control circuit between the PDC and the splice.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>Does NOT flash for Relay #3 (ONLY).  Repair the open in the Radiator Fan Relay #3 Control circuit between the PDC and the splice.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>Does NOT flash for both #2 and #3 Relays  Go To 4</p> <p>Flashes at both Relays.  Install a substitute relay in place of the Radiator Fan Relays #2 and #3 to determine the faulty relay. Replace the appropriate Radiator Fan Relay.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p><b>NOTE: Both Radiator Fan Relays must be removed from the PDC during the following steps.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connector.</p> <p>Measure the resistance between ground and the Radiator Fan Relay #2 Control circuit in the PDC.</p> <p>Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the Radiator Fan Relay Control circuits.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All



**P0481-COOLING FAN 2 CONTROL CIRCUIT (TURBO) — Continued**

TEST	ACTION	APPLICABILITY
5	<p><b>NOTE: Both Radiator Fan Relays must be removed from the PDC during the following steps.</b></p> <p>Turn the ignition off.</p> <p>Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance of the Radiator Fan Relay #3 Control circuit from the PDC to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the Radiator Fan Relay Control circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:**

**P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW**

**When Monitored and Set Condition:**

**P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW**

When Monitored: Engine Running.

Set Condition: The PCM detects a short in the NVLD Canister vent solenoid circuits. One trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

NVLD SOLENOID

(K106) NVLD SOLENOID CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the NVLD electrical harness connector. Measure the resistance of the NVLD Solenoid coil. Is the resistance between 7.5 to 8.5 ohms?</p> <p>Yes → Go To 3</p> <p>No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K106) NVLD Sol Control circuit at the NVLD electrical harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K106) NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH****When Monitored and Set Condition:****P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH**

When Monitored: Engine Running.

Set Condition: The PCM detects an open in the NVLD Canister vent solenoid circuits.  
One trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

NVLD SOLENOID

(K106) NVLD SOL CONTROL CIRCUIT SHORT TO BATTERY VOLTAGE

(K106) NVLD SOL CONTROL CIRCUIT OPEN

(Z1) GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Measure the resistance of the NVLD Solenoid coil. Is the resistance between 7.5 to 8.5 ohms?  Yes → Go To 3  No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

# **P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH —** **Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage on the (K106) NVLD Sol Control circuit in the NVLD Assembly harness connector. Is the voltage above 1.0 volt?  Yes → Repair the short to battery voltage in the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K106) NVLD Sol Control circuit from the NVLD Assembly harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 5  No → Repair the open in the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
5	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Measure the resistance between the (Z1) Ground circuit and ground. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**Symptom:****P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (AUTO TRANS)****When Monitored and Set Condition:****P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (AUTO TRANS)**

**When Monitored:** Engine running. Transmission not in park or neutral. Brakes not applied. Engine run time greater than 10 seconds.

**Set Condition:** The PCM does not see vehicle speed signal from the transmission control side of the PCM. Two Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

TRANSMISSION DTC(S)

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Ensure that the Pinion Factor has been programmed and the correct tire size has been programmed in before continuing.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present?</p> <p>Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (MANUAL TRANS)**

## When Monitored and Set Condition:

### **P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (MANUAL TRANS)**

When Monitored: With the engine running. Transmission not in park or neutral. Engine rpm greater than 1500.

Set Condition: The PCM does not receive a vehicle speed sensor signal for more than 11 seconds. 2 consecutive trips.

### POSSIBLE CAUSES

VEHICLE SPEED SENSOR OPERATION  
 (K7) 5 VOLT SUPPLY CIRCUIT OPEN  
 (G7) VSS SIGNAL CIRCUIT SHORTED TO GROUND  
 (G7) VSS SIGNAL CIRCUIT OPEN  
 PCM VSS SIGNAL  
 (K4) SENSOR GROUND CIRCUIT OPEN  
 VEHICLE SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	Raise the drive wheels off the ground. <b>WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.</b> Start the engine. With the DRBIII®, monitor the Vehicle Speed Sensor Place the transmission in any forward gear. Allow the wheels to rotate. Does the DRBIII® display vehicle speed above 0 MPH/KMH?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 2	All
2	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the (K7) 5 Volt Supply circuit in the VSS harness connector. Is the voltage above 4.6 volts?  Yes → Go To 3  No → Repair the (K7) 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (MANUAL TRANS)**

— Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the (G7) VSS Signal circuit in the VSS harness connector. Is the voltage between 4.5 to 5.0 volts?  Yes → Go To 4 No → Go To 5	All
4	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the (K4) Sensor ground circuit between the VSS harness connector and ground. Is the resistance below 5.0 ohms?  Yes → Remove and inspect the Pinion Gear. If OK, replace the Vehicle Speed Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Repair the (K4) Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
5	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (G7) Vehicle Speed Sensor Signal circuit in the VSS harness connector to ground. Is the resistance below 100 ohms?  Yes → Repair the (G7) VSS Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 6	All
6	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (G7) VSS Signal circuit between the VSS harness connector and to the appropriate terminal of special tool #8815. Is the resistance below 5 ohms?  Yes → Go To 7  No → Repair the (G7) VSS Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
7	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair,  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

### Symptom List:

**P0506-IDLE SPEED LOW PERFORMANCE**

**P0507-IDLE SPEED HIGH PERFORMANCE**

**P0519-IDLE SPEED PERFORMANCE**

---

**Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0506-IDLE SPEED LOW PERFORMANCE.**

---

### When Monitored and Set Condition:

#### **P0506-IDLE SPEED LOW PERFORMANCE**

When Monitored: Engine Running. During an idle condition.

Set Condition: If the engine RPM does not come within a calibratable low limit of the target idle speed, a failure timer will increment. When the appropriate failure timer reaches its maximum threshold without sign of RPM trending towards control, a soft fail is generated. When a calibratable number of the soft fails is reached, a 1 trip fault is set. When two 1 trip faults occur in a row, the DTC is set and the MIL illuminates.

#### **P0507-IDLE SPEED HIGH PERFORMANCE**

When Monitored: Engine Running. During an idle condition.

Set Condition: If the engine RPM does not come within a calibratable high limit of the target idle speed, a failure timer will increment. When the appropriate failure timer reaches its maximum threshold without sign of RPM trending towards control, a soft fail is generated. When a calibratable number of the soft fails is reached, a 1 trip fault is set. When two 1 trip faults occur in a row, the DTC is set and the MIL illuminates.

#### **P0519-IDLE SPEED PERFORMANCE**

When Monitored: With the engine idling and the transmission in drive, if automatic. There must not be a MAP sensor trouble code or a Throttle Position Sensor trouble code.

Set Condition: The engine idle is not within 200 rpm above or 100 rpm below the target idle for 50 seconds. Two trip fault.

---

### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

PCV SYSTEM

IAC MOTOR PASSAGES

VACUUM LEAKS

AIR INDUCTION SYSTEM

THROTTLE BODY AND THROTTLE LINKAGE



**P0506-IDLE SPEED LOW PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Visually and Physically inspect the PCV system.            Check for the PCV valve disconnected.            Check for an incorrect PCV valve. The PCV valve must meet OEM specifications.            Damage vacuum hose.            Were any of the above condition found?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition off.            Remove the IAC Motor.            Inspect the IAC Motor and passages for any obstructions or damage to motor.            Were any problems found?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Start the engine.            Inspect the vehicle for external vacuum leaks.            Inspect the engine for internal vacuum leaks.            Were any vacuum leaks found?</p> <p>Yes → Repair the vacuum leak as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Inspect the Air Induction System for the following problems.            Restrictions: Dirty Air Cleaner, Foreign material trapped in the air intake tube, etc.            Leaks: Air Intake tube connection, Air Cleaner housing, etc.            Were any problems found?</p> <p>Yes → Repair or replace as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p>Inspect the throttle body plate carbon build up or other restrictions.            Inspect the throttle linkage for binding and smooth operation.            Ensure the throttle plate is resting on the stop at idle.            Were any problems found?</p> <p>Yes → Repair or replace as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All

## Symptom:

### P0508-IAC VALVE SENSE CIRCUIT LOW

## When Monitored and Set Condition:

### P0508-IAC VALVE SENSE CIRCUIT LOW

When Monitored: Engine running. Battery voltage greater than 10 volts.

Set Condition: The IAC sense circuit is less than 175 mA. One Trip Fault.

## POSSIBLE CAUSES

IAC MOTOR OPERATION

IAC MOTOR

(K610) IAC MOTOR CONTROL CIRCUIT SHORTED TO GROUND

(K961) IAC RETURN CIRCUIT OPEN

(K961) IAC RETURN CIRCUIT SHORTED TO GROUND

(K610) IAC MOTOR CONTROL CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.</b></p> <p>Start the engine.  Allow the engine to idle.  With the DRBIII®, read the IAC Current.  Is the IAC Current below 146 mA?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.  Disconnect the IAC Motor harness connector.  Remove the IAC Motor.</p> <p><b>NOTE: Inspect the IAC air passages for restriction and damage to the IAC valve.</b></p> <p>Measure the resistance across the IAC Motor pin terminals (component).  Is the resistance 9.7 +/- 1.0 ohms?</p> <p>Yes → Go To 3</p> <p>No → Replace the IAC Motor.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0508-IAC VALVE SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K961) IAC Signal circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the (K961) IAC Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K961) IAC Signal in the IAC Motor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K961) IAC Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Disconnect the PCM harness connectors.            Measure the resistance between ground and the (K610) IAC Motor Control circuit in the IAC Motor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K610) IAC Motor Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Disconnect the PCM harness connectors.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K610) IAC Return circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the (K610) IAC Motor Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0508-IAC VALVE SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0509-IAC VALVE SENSE CIRCUIT HIGH****When Monitored and Set Condition:****P0509-IAC VALVE SENSE CIRCUIT HIGH**

When Monitored: Engine running. Battery voltage greater than 10 volts.

Set Condition: The IAC sense circuit is greater than 980 mA. One Trip Fault.

**POSSIBLE CAUSES**

IAC MOTOR OPERATION

IAC MOTOR

(K961) IAC RETURN CIRCUIT SHORTED TO VOLTAGE

(K610) IAC MOTOR CONTROL CIRCUIT SHORTED TO VOLTAGE

(K961) IAC RETURN CIRCUIT SHORTED TO (K610) IAC MOTOR CONTROL CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.</b></p> <p>Start the engine. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the IAC Motor harness connector. With the DRBIII®, monitor the IAC Current. Turn the ignition on. Does the DRBIII® display IAC Current at 0mA?</p> <p>Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0509-IAC VALVE SENSE CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Turn the ignition on.            With the DRBIII®, actuate the ASD Relay.            Measure the voltage of the (K961) IAC Return circuit in the IAC Motor harness connector.            Is the voltage above 0.5 of a volt?</p> <p>Yes → Repair the short to voltage in the (K961) IAC Return circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Turn the ignition on.            With the DRBIII®, actuate the ASD Relay.            Measure the voltage of the (K610) IAC Motor Driver circuit in the IAC Motor harness connector.            Is the voltage above 0.5 of a volt?</p> <p>Yes → Repair the short to voltage in the (K610) IAC Motor Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.            Disconnect the IAC Motor harness connector.            Measure the resistance across the IAC Motor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K961) IAC Motor Return circuit short to the (K610) IAC Motor Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:**  
**P0513-INVALID SKIM KEY**

**When Monitored and Set Condition:**

**P0513-INVALID SKIM KEY**

When Monitored: Ignition on.

Set Condition: The PCM detects an invalid SKIM key.

**POSSIBLE CAUSES**

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the PCM DTCs. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2 No → Go To 7	All
2	With the DRBIII®, attempt to communicate with the SKIM. Turn the ignition on. Can the DRBIII® communicate with the SKIM?  Yes → Go To 3 No → Refer to the No Communication category. Perform SKIS VERIFICATION.	All
3	Turn the ignition on. With the DRBIII®, check for SKIM DTCs. Are any DTCs present in the SKIM?  Yes → Refer to SKIM category for the related symptom(s). Perform SKIS VERIFICATION. No → Go To 4	All
4	Turn the ignition on. With the DRBIII®, display the VIN that is programmed in the PCM. Has a VIN been programmed into the PCM?  Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform SKIS VERIFICATION.	All

**P0513-INVALID SKIM KEY — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition on.            With the DRBIII®, display the VIN that is programmed in the PCM.            Was the correct VIN programmed into the PCM?</p> <p>Yes → Go To 6</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform SKIS VERIFICATION.</p>	All
6	<p>Turn the ignition off.            Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information.            Turn the ignition on.            With the DRBIII®, erase all SKIM and PCM DTCs.            Attempt to start and idle the engine.            With the DRBIII®, read the PCM DTCs.            Does the DRBIII® display this code?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All
7	<p><b>NOTE: You must obtain the SKIM pin number.</b>  <b>NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.</b>  <b>NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.</b></p> <p>Turn the ignition on.            Verify the correct VIN is programmed into the PCM and SKIM.            Turn the ignition off.            With the next customer key turn the ignition key on and crank the engine to start.            With the DRBIII®, read the PCM DTCs. Look for P0513.            Is the Good Trip Counter for DTC P0513 displayed and equal to 0?</p> <p>Yes → Replace the Ignition Key.            Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p> <p><b>NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.</b></p>	All



**Symptom:****P0516-BATTERY TEMPERATURE SENSOR LOW****When Monitored and Set Condition:****P0516-BATTERY TEMPERATURE SENSOR LOW**

When Monitored: Ignition on.

Set Condition: Battery temperature sensor voltage below 0.1 of a volt.

**POSSIBLE CAUSES**

BATTERY TEMP SENSOR VOLTAGE BELOW 0.1 VOLTS

BATTERY TEMP SENSOR INTERNAL FAILURE

(K118) BATTERY TEMP SIGNAL SHORTED TO GROUND

(K118) BATTERY TEMP SIGNAL SHORTED TO (K167) SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: After repairing a Battery Temp DTC, the Battery Temp value will not be refreshed until either the ignition is OFF for more than 3 hours or the vehicle is driven above 10 MPH for more than 10 minutes.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read the Battery Temp Sensor voltage. Is the voltage below 0.1 volt?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Ignition on, engine not running. With the DRBIII®, read Battery Temp Sensor voltage. Does the Battery Temp Sensor voltage read approximately 5.0 volts?</p> <p>Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0516-BATTERY TEMPERATURE SENSOR LOW — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Battery Temp Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K118) Battery Temp Signal circuit in the Battery Temp Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K118) Battery Temp Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Battery Temp Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the (K118) Battery Temp Signal circuit and the (K167) Sensor ground circuit in the Battery Temp Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K167) Sensor ground shorted to the (K118) Battery Temp Sensor Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0517-BATTERY TEMPERATURE SENSOR HIGH****When Monitored and Set Condition:****P0517-BATTERY TEMPERATURE SENSOR HIGH**

When Monitored: Ignition on.

Set Condition: Battery temperature voltage above 4.9 volts.

**POSSIBLE CAUSES**

BATTERY TEMP VOLTAGE ABOVE 4.9 VOLTS

(K118) BATTERY TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

BATTERY TEMP SENSOR INTERNAL FAILURE

(K118) BATTERY TEMP SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: After repairing a Battery Temp DTC, the Battery Temp value will not be refreshed until either the ignition is OFF for more than 3 hours or the vehicle is driven above 10 MPH for more than 10 minutes.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read the Battery Temp Sensor voltage. Is the voltage above 4.9 volts?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K118) Battery Temp Signal circuit in the Battery Temp Sensor harness connector. Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0517-BATTERY TEMPERATURE SENSOR HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Battery Temp harness connector.            Connect a jumper wire between the Battery Temp Signal circuit and the Sensor ground circuit in the Battery Temp harness connector.            Ignition on, engine not running.            With the DRBIII®, read the Battery Temp Sensor voltage.            Is the voltage below 1.0 volt?</p> <p>Yes → Replace the Battery Temp Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Battery Temp Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K118) Battery Temp Signal circuit from the Battery Temp Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K118) Battery Temp Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the Battery Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K167) Sensor ground circuit from the Battery Temp Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K167) Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0522-OIL PRESSURE SENSOR LOW****When Monitored and Set Condition:****P0522-OIL PRESSURE SENSOR LOW**

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

Set Condition: The oil pressure sensor voltage at PCM goes below 0.1 volts for 0.5 of a second.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

OIL PRESSURE SENSOR INTERNAL FAILURE

(G6) OPS SIGNAL CIRCUIT OPEN

(G6) OPS SIGNAL CIRCUIT SHORTED TO VOLTAGE

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Diagnose and repair any other Sensor Voltage High DTCs before performing this test.</b></p> <p>Turn the ignition on, with the engine not running, for a minimum of 90 seconds. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector.</p> <p><b>NOTE: When there is no oil pressure present, the Oil Pressure Sensor contacts are normally closed.</b></p> <p><b>NOTE: Engine must be off for a minimum of 90 seconds to allow for the oil pressure to bleed down.</b></p> <p>Measure the resistance between the Oil Pressure Sensor signal circuit terminal in the Oil Pressure Sensor and ground. Is the resistance above 5 ohms?</p> <p>Yes → Replace the Oil Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0522-OIL PRESSURE SENSOR LOW — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the Oil Pressure Sensor signal circuit at the Oil Pressure Sensor harness connector. Is the voltage above 11.0 volts?  Yes → Go To 4 No → Go To 5	All
4	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the voltage of the Oil Pressure Sensor signal circuit at the Oil Pressure Sensor harness connector. Is there any voltage present?  Yes → Repair the (G6) Oil Pressure Sensor signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
5	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (G6) Oil Pressure Sensor signal circuit from the Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 100 ohms?  Yes → Repair the open (G6) Oil Pressure Sensor signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**Symptom:****P0551-POWER STEERING SWITCH PERFORMANCE****When Monitored and Set Condition:****P0551-POWER STEERING SWITCH PERFORMANCE**

When Monitored: Engine running. Vehicle speed at 50 MPH (80.5 Kmh) or greater. Coolant temperature above 20°C (68°F).

Set Condition: The power steering pressure switch remains open for 40 seconds or greater while both the vehicle speed is at 50 MPH (80.5 Kmh) and the engine coolant temperature above 20°C (68°F). Two trip fault.

**POSSIBLE CAUSES**

GOOD TRIP COUNTER = 0

POWER STEERING PRESSURE SWITCH (Z12) GROUND CIRCUIT OPEN

(K10) PSP SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

(K10) PSP SWITCH SIGNAL CIRCUIT OPEN

POWER STEERING PRESSURE SWITCH

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
2	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Measure the resistance between Ground and the PSP Switch (Z12) ground circuit at the Power Steering Pressure Switch connector. Is the resistance below 5.0 ohms?  Yes → Go To 3  No → Repair the open in the PSP Switch (Z1) ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All

**P0551-POWER STEERING SWITCH PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Power Steering Pressure Switch harness connector.            Disconnect the PCM harness connector(s).            Measure the resistance between ground and the (K10) PSP Switch Signal circuit at the Switch connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K10) PSP Switch Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Power Steering Pressure Switch harness connector.            Disconnect the PCM harness connector(s).  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure resistance of Power Steering (K10) PSP Switch Signal circuit from the Power Steering Pressure Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K10) PSP Switch Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the Power Steering Pressure Switch harness connector.            Ignition on, engine not running.            Connect a Jumper Wire to the (K10) PSP Switch Signal circuit at harness connector.            Using the DRBIII®, while monitoring the Power Steering Pressure Switch.            Touch the Jumper Wire to the Ground circuit at the Power Steering Pressure Switch harness connector several times.            Did the Power Steering Pressure Switch status change from Hi to Low?</p> <p>Yes → Replace the Power Steering Pressure Switch.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All



**Symptom:**  
**P0562-BATTERY VOLTAGE LOW**

**When Monitored and Set Condition:**

**P0562-BATTERY VOLTAGE LOW**

When Monitored: The engine running. The engine speed greater than 380 RPM.

Set Condition: Battery voltage is less than 11.5 volts for 10 seconds. Battery Lamp will illuminate. The Battery Lamp will turn off if the battery voltage recovers to 12.04 volts or greater, due to reduction of load, increased RPM or an intermittent condition.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

B+ CIRCUIT HIGH RESISTANCE

GENERATOR GROUND HIGH RESISTANCE

GENERATOR OPERATION

(Z1) GENERATOR FIELD GROUND CIRCUIT OPEN

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND

(K20) GEN FIELD CONTROL CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.</b></p> <p><b>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.</b></p> <p>Turn the ignition off.</p> <p><b>NOTE: Ensure the generator drive belt is in good operating condition.</b></p> <p><b>NOTE: Inspect the fuses in the PDC. If a fuse is found to be open use the wiring diagram/schematic as a guide, inspect the wiring and connectors for damage.</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, read DTCs and record the related Freeze Frame data.</p> <p>Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All

## P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	<p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p><b>NOTE: Ensure all wires are clear of the engine's moving parts.</b></p> <p>Measure the voltage between the Generator B+ Terminal and the Battery+ Post.</p> <p>Start the engine.</p> <p>Is the voltage above 0.4 of a volt?</p> <p>Yes → Repair the B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 3</p>	All
3	<p><b>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.</b></p> <p>Start the engine.</p> <p>Allow the engine to reach normal operating temperature.</p> <p><b>NOTE: Ensure all wires are clear of the engine's moving parts.</b></p> <p>Measure the voltage between the Generator case and Battery ground post.</p> <p>Is the voltage above 0.1 of a volt?</p> <p>Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test light, jumper it across the Generator Field harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the Generator Field Driver circuit.</p> <p>Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test connected to battery voltage, probe the Generator (Z1) Ground circuit in the Generator Field harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (Z1) Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All

**P0562-BATTERY VOLTAGE LOW — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Ignition on, engine not running.            Disconnect the Generator Field harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K20) Gen Field Control circuit in the Generator Field harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K20) Gen Field Control circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.            Disconnect the Generator Field harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K20) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the open in the (K20) Gen Field Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All
8	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All

**Symptom:**  
**P0563-BATTERY VOLTAGE HIGH**

**When Monitored and Set Condition:**

**P0563-BATTERY VOLTAGE HIGH**

When Monitored: With the ignition on. Engine RPM greater than 380 RPM.

Set Condition: The battery voltage is 1 volt greater than desired system voltage

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

GENERATOR OPERATION

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.</b></p> <p><b>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.</b></p> <p>Turn the ignition off.</p> <p><b>NOTE: Ensure the generator drive belt is in good operating condition.</b></p> <p><b>NOTE: Inspect the fuses in the PDC. If a fuse is found to be open use the wiring diagram/schematic as a guide, inspect the wiring and connectors for damage.</b></p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, read DTCs and record the related Freeze Frame data.</p> <p>Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All
2	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test light, jumper it across the Generator Field harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the Generator Field Driver circuit.</p> <p>Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Go To 4</p> <p>No → Go To 3</p>	All

**P0563-BATTERY VOLTAGE HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the voltage on the (K20) Gen Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt?  Yes → Repair the short to voltage in the (K20) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.  No → Go To 4	All
4	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All

**Symptom:**

**P0572-BRAKE SWITCH #1 CIRCUIT LOW**

**When Monitored and Set Condition:**

**P0572-BRAKE SWITCH #1 CIRCUIT LOW**

When Monitored: Ignition on.

Set Condition: When the PCM recognizes Brake Switch is mechanically stuck in the low/on position. One Trip Fault.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

BRAKE LAMP SWITCH OPERATION

(K29) BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Verify battery voltage is greater than 10 volts.</b>  Record Freeze Frame Data that was set by the related DTC before continuing.  With the DRBIII®, read DTCs and record the related Freeze Frame data.  Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Diagnostic category.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.  Remove the Brake Lamp Switch and disconnect the harness connector.  Measure the resistance between the (Z1) Ground circuit terminal and the (K29) Brake Switch Signal terminal at the Brake Lamp Switch.  Apply and release the brake pedal plunger while monitoring the ohmmeter.  Does the resistance change from below 5.0 ohms to an open circuit?</p> <p>Yes → Go To 3</p> <p>No → Replace the Brake Lamp Switch.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off.  Disconnect the PCM harness connectors.  Measure the resistance between ground and the (K29) Brake Switch Signal circuit in the Brake Lamp Switch harness connector.  Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (K29) Brake Switch Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All

**P0572-BRAKE SWITCH #1 CIRCUIT LOW — Continued**

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

## Symptom:

### **P0573-BRAKE SWITCH #1 CIRCUIT HIGH**

## When Monitored and Set Condition:

### **P0573-BRAKE SWITCH #1 CIRCUIT HIGH**

When Monitored: Ignition on.

Set Condition: When the PCM recognizes Brake Switch is stuck in the high/off position.  
One Trip Fault.

## POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO  
BRAKE LAMP SWITCH OPERATION  
(K29) BRAKE SWITCH SIGNAL CIRCUIT OPEN  
(Z1) GROUND CIRCUIT OPEN  
PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION in the symptom Diagnostic category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the (Z1) Ground circuit terminal and the (K29) Brake Switch Signal circuit terminal in the Brake Lamp Switch. Apply and release the brake pedal while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to an open circuit?</p> <p>Yes → Go To 3</p> <p>No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**P0573-BRAKE SWITCH #1 CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off. Disconnect the PCM harness connectors. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K29) Brake Switch Signal circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the (K29) Brake Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Measure the resistance between the (Z2) Ground circuit and ground at the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0581-SPEED CONTROL SWITCH #1 HIGH

## When Monitored and Set Condition:

### P0581-SPEED CONTROL SWITCH #1 HIGH

When Monitored: With the ignition key on. Battery voltage above 10 volts.

Set Condition: The PCM detects an open or short to voltage in the Speed Control Switch Signal circuit. One Trip Fault.

## POSSIBLE CAUSES

SPEED CONTROL SWITCH VOLTAGE HIGH

SPEED CONTROL SWITCHES

(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K4) SENSOR GROUND OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Do not press any of the Speed Control Switch buttons.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read the Speed Control voltage. Is the Speed Control voltage above 4.8 volt?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All
2	<p>Turn the ignition off. Remove the Speed Control Switches from the steering wheel. Measure the resistance across each Speed Control Switch. Monitor the ohmmeter while pressing each function button on each switch. Resume/Accel - 15,400 ohms Cancel - 909 +/- 9 ohms Decel (Coast) - 2940 +/- 30 ohms On/Off - 0 ohms Set - 6650 +/- 66 ohms Does the function on the Speed Control Switches have the correct ohm value?</p> <p>Yes → Go To 3</p> <p>No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All

**P0581-SPEED CONTROL SWITCH #1 HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Speed Control On/Off Switch harness connector.            Disconnect the Speed Control Resume/Accel Switch harness connector.            Disconnect the PCM harness connector.            Measure the voltage of the (V37) S/C Switch Signal circuit at the Speed Control harness connector.            Is the is the voltage above 5.0 volts?</p> <p>Yes → Repair the (V37) S/C Switch Signal circuit shorted to the battery voltage.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 4</p>	All
4	<p><b>NOTE: The measurement must be taken from both Speed Control Switch harness connector.</b>            Turn the ignition off.            Disconnect the Speed Control On/Off Switch harness connector.            Disconnect the Speed Control Resume/Accel Switch harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor Ground circuit from the Speed Control harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms for both measurement?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Repair the (K4) Sensor Ground circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All

**Symptom:**

**P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT**

**When Monitored and Set Condition:**

**P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT**

When Monitored: Ignition on. Speed Control active.

Set Condition: The PCM detects an open or short to voltage in the Speed Control Vacuum Control circuit. One Trip Fault.

**POSSIBLE CAUSES**

SPEED CONTROL SOLENOID OPERATION

SPEED CONTROL VACUUM SOLENOID

(V36) S/C VACUUM SOL CONTROL CIRCUIT SHORTED TO GROUND

(V36) S/C VACUUM SOL CONTROL CIRCUIT OPEN

PCM (VACUUM SOLENOID)

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.                      With the DRBIII®, read DTCs and record the related Freeze Frame data.                      With the DRBIII®, actuate the Speed Control Vacuum Solenoid and note operation.                      Does the Speed Control Vacuum Solenoid actuate properly?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.                      Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off.                      Disconnect the Speed Control Servo harness connector.                      Ignition on, engine not running.                      With the DRBIII®, actuate the Speed Control Vacuum Solenoid.                      Using a 12-volt test light connected to ground, probe the S/C Vacuum Control circuit.                      Does the test light illuminate brightly and flash?</p> <p>Yes → Replace the Speed Control Servo.                      Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 3</p>	All

**P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the S/C Servo harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (V36) S/C Vacuum Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool # 8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open/high resistance in the (V36) S/C Vacuum Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the S/C Servo harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (V36) S/C Vacuum Solenoid Control circuit at the Speed Control Servo harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (V36) S/C Vacuum Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All

## Symptom:

### P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

#### When Monitored and Set Condition:

#### P0586-SPEED CONTROL VENT SOLENOID CIRCUIT

When Monitored: Ignition on. Speed Control active.

Set Condition: The PCM detects an open or short to voltage in the Speed Control Vent Control circuit. One Trip Fault.

#### POSSIBLE CAUSES

SPEED CONTROL SOLENOID OPERATION

SPEED CONTROL VENT SOLENOID

(V35) S/C VENT SOL CONTROL CIRCUIT OPEN

(V35) S/C VENT SOL CONTROL CIRCUIT SHORTED TO GROUND

PCM (VENT SOLENOID)

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            With the DRBIII®, actuate the Speed Control Vent Solenoid and note operation.            Does the Speed Control Vent Solenoid operate properly?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off.            Disconnect the Speed Control Servo harness connector.            Ignition on, engine not running.            With the DRBIII®, actuate the Speed Control Vent Solenoid.            Using a 12-volt test light connected to ground, probe the (V35) Speed Control Vent Solenoid Control circuit in the Speed Control Servo harness connector.            Does the test light illuminate brightly and flash?</p> <p>Yes → Replace the Speed Control Servo.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 3</p>	All

**P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the S/C Servo harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (V35) S/C Vent Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open/high resistance in the (V35) S/C Vent Sol Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the S/C Servo harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (V35) S/C Vent Sol Control circuit at the Speed Control Servo harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (V35) Speed Control Vent Solenoid Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All

**Symptom:****P0594-SPEED CONTROL SERVO POWER CIRCUIT****When Monitored and Set Condition:****P0594-SPEED CONTROL SERVO POWER CIRCUIT**

When Monitored: With the ignition key on. The speed control switched on.

Set Condition: The PCM detects a open or short in the Speed Control Power Supply circuit. One Trip Fault.

**POSSIBLE CAUSES**

(V40) S/C BRAKE SWITCH OUTPUT CIRCUIT  
 (V32) S/C POWER SUPPLY CIRCUIT  
 (V32) S/C POWER SUPPLY CIRCUIT SHORTED TO GROUND  
 (V40) S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND  
 (V40) S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN  
 BRAKE LAMP SWITCH  
 PCM (S/C SOURCE CIRCUIT)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Ignition on, engine not running. <b>NOTE: It is necessary to PRESS and HOLD the Speed Control Switch in the ON position while checking for voltage.</b> Using a 12-volt test light connected to ground, probe the (V40) S/C Brake Switch Output terminal in the Servo Harness connector. Does the test light illuminate brightly?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 2	All



**P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Disconnect the Brake Lamp Switch harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (V32) S/C Power Supply circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 3</p> <p>No → Repair the open/high resistance in the (V32) S/C Power Supply circuit between the PCM and Brake Switch.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Disconnect the Brake Switch harness connector.            Measure the resistance between ground and the (V32) S/C Power Supply circuit in the Brake Switch harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the short to ground in the (V32) S/C Power Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the S/C Servo harness connector.            Disconnect the Brake Switch harness connector.            Measure the resistance of the (V40) S/C Brake Switch Output circuit from the Brake Switch harness connector to the S/C Servo harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open/high resistance in the (V40) S/C Brake Switch Output circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the Speed Control Servo harness connector.            Disconnect the Brake Switch harness connector.            Measure the resistance between ground and the (V40) S/C Brake Switch Output circuit at the Speed Control Servo harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the (V40) S/C Brake Switch Output circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All

**P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Disconnect the Brake Lamp Switch harness connector.</p> <p>Ignition on, engine not running.</p> <p>Using a 12-volt test light connected to ground, probe the (V32) Speed Control Power Supply circuit in the Brake Lamp Switch harness connector.</p> <p><b>NOTE: It is necessary to HOLD the Cruise Control Switch in the ON position to get an accurate reading.</b></p> <p>Does the test light illuminate brightly?</p> <p>Yes → Replace the Brake Lamp Switch.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:****P0600-SERIAL COMMUNICATION LINK****P0601-INTERNAL MEMORY CHECKSUM INVALID**

**Test Note:** All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be **P0600-SERIAL COMMUNICATION LINK**.

**When Monitored and Set Condition:****P0600-SERIAL COMMUNICATION LINK**

When Monitored: With the ignition on.

Set Condition: Internal Bus communication failure between the Engine and Transmission processors.

**P0601-INTERNAL MEMORY CHECKSUM INVALID**

When Monitored: With the ignition on.

Set Condition: Internal checksum for software failed, does not match calculated value.

**POSSIBLE CAUSES**

PCM INTERNAL OR SPI

TEST	ACTION	APPLICABILITY
1	<p>The Powertrain Control Module is reporting internal errors, view repair to continue.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### P0622-GENERATOR FIELD CONTROL CIRCUIT

#### When Monitored and Set Condition:

#### P0622-GENERATOR FIELD CONTROL CIRCUIT

When Monitored: With the ignition on. Engine running.

Set Condition: When the PCM tries to regulate the generator field with no result during monitoring. One Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO

GENERATOR OPERATION

(Z1) GEN FIELD GROUND CIRCUIT OPEN

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND

(K20) GEN FIELD CONTROL CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off.            Disconnect the Generator Field harness connector.            Using a 12-volt test light, jumper it across the Generator Field harness connector.            Ignition on, engine not running.            With the DRBIII®, actuate the Generator Field Driver circuit.            Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Replace the Generator.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 3</p>	All

**P0622-GENERATOR FIELD CONTROL CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Generator Field harness connector.            Using a 12-volt test connected to battery voltage, probe the (Z1) Gen Ground circuit in the Generator Field harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the (Z1) Gen Field Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the Generator Field harness connector.            Disconnect the PCM harness connector.            Measure the voltage on the (K20) Gen Field Control circuit in the Generator Field harness connector.            Is the voltage above 1.0 volts?</p> <p>Yes → Repair the short to voltage in the (K20) Gen Field Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition on.            Disconnect the Generator Field harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K20) Gen Field Control circuit in the Generator Field harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the (K20) Gen Field Control circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 6</p>	All
6	<p>Turn the ignition off.            Disconnect the Generator Field harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K20) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the (K20) Gen Field Control circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All
7	<p><b>NOTE: Before continuing, check the PCM connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All

## Symptom:

### P0627-FUEL PUMP RELAY CIRCUIT

#### When Monitored and Set Condition:

#### P0627-FUEL PUMP RELAY CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10.4 volts.

Set Condition: An open or shorted condition is detected in the fuel pump relay control circuit. One Trip Fault.

#### POSSIBLE CAUSES

FUEL PUMP RELAY OPERATION

(A14) FUSED IGNITION SWITCH OUTPUT CIRCUIT

FUEL PUMP RELAY RESISTANCE

(K31) FUEL PUMP RELAY CONTROL CIRCUIT OPEN

(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 2	All
2	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Ignition on, engine not running. Measure the voltage of the (A14) Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts?  Yes → Go To 3  No → Repair the (A14) Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
3	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Measure the resistance of the Fuel Pump Relay between the Fused Ignition Switch Output terminal and the Fuel Pump Relay Control terminal. Is the resistance between 70 to 90 ohms at 70°F (21°C)?  Yes → Go To 4  No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**P0627-FUEL PUMP RELAY CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.  Remove the Fuel Pump Relay from the PDC.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K31) Fuel Pump Relay Control circuit from the PDC to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K31) Fuel Pump Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.  Remove the Fuel Pump Relay from the PDC.  Measure the resistance between ground and the (K31) Fuel Pump Relay Control circuit in the PDC.  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K31) Fuel Pump Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:**

**P0630-VIN NOT PROGRAMMED IN PCM**

**When Monitored and Set Condition:**

**P0630-VIN NOT PROGRAMMED IN PCM**

When Monitored: Ignition on.

Set Condition: The VIN has not been programmed into the PCM.

**POSSIBLE CAUSES**

PROGRAMMING VIN INTO PCM

VERIFY PCM PROGRAMMING

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.                      With the DRBIII®, erase DTCs.                      Using the DRBIII®, program VIN into the PCM.                      Start the engine.  <b>NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.</b>                      Allow the engine to reach normal operating temperature.                      With the DRBIII®, read DTCs.                      Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → The VIN has been successfully programmed into the PCM. Test is complete.                      Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p><b>NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.</b>                      Cycle the ignition switch to the off position and then back to run.                      Attempt to program the PCM with the applicable information.                      Start the vehicle and allow it to reach normal operating temperatures.                      With the DRBIII®, read DTCs.                      Does the DTC reset?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → The VIN has been successfully programmed into the PCM. Test is complete.                      Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All



**Symptom:****P0632-ODOMETER NOT PROGRAMMED IN PCM****When Monitored and Set Condition:****P0632-ODOMETER NOT PROGRAMMED IN PCM**

When Monitored: Ignition on.

Set Condition: The mileage has not been programmed into the PCM.

**POSSIBLE CAUSES**

PROGRAMMING MILEAGE INTO PCM

VERIFY PCM PROGRAMMING

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program the mileage into the PCM. Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset?  Yes → Go To 2  No → The mileage has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	<b>NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.</b> Cycle the ignition switch to the off position and then back to run. Attempt to program the PCM with the applicable information. Start the vehicle and allow it to reach normal operating temperatures. With the DRBIII®, read DTCs. Does the DTC reset?  Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.  No → The mileage has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

**Symptom:**

**P0633-SKIM KEY NOT PROGRAMMED IN PCM**

**When Monitored and Set Condition:**

**P0633-SKIM KEY NOT PROGRAMMED IN PCM**

When Monitored: Ignition on.

Set Condition: The SKIM Key information has not been programmed into the PCM.

**POSSIBLE CAUSES**

PROGRAMMING SKIM KEY INTO PCM

VERIFY PCM PROGRAMMING

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running.                      With the DRBIII®, erase DTCs.                      Using the DRBIII®, program the SKIM Key information into the PCM.                      Start the engine.  <b>NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.</b>                      Allow the engine to reach normal operating temperature.                      With the DRBIII®, read DTCs.                      Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → The SKIM KEY information has been successfully programmed into the PCM. Test is complete.                      Perform SKIS VERIFICATION.</p>	All
2	<p><b>NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.</b>                      Cycle the ignition switch to the off position and then back to run.                      Attempt to program the PCM with the applicable information.                      Start the vehicle and allow it to reach normal operating temperatures.                      With the DRBIII®, read DTCs.                      Does the DTC reset?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform SKIS VERIFICATION.</p> <p>No → The SKIM Key Information has been successfully programmed into the PCM. Test is complete.                      Perform SKIS VERIFICATION.</p>	All

**Symptom:****P0645-A/C CLUTCH RELAY CIRCUIT****When Monitored and Set Condition:****P0645-A/C CLUTCH RELAY CIRCUIT**

**When Monitored:** With the ignition on. Battery voltage greater than 10 volts. A/C Switch on.

**Set Condition:** An open or shorted condition is detected in the A/C clutch relay control circuit. One Trip Fault.

**POSSIBLE CAUSES**

A/C CLUTCH RELAY OPERATION

(A17) FUSED IGNITION SWITCH OUTPUT CIRCUIT

A/C CLUTCH RELAY RESISTANCE

(C28) A/C CLUTCH RELAY CONTROL CIRCUIT OPEN

(C28) A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating?  Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.  No → Go To 2	All
2	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Ignition on, engine not running. Measure the voltage on the (A14) Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts?  Yes → Go To 3  No → Repair the open or short to ground in the (A17) Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All

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

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Remove the A/C Clutch Relay from the PDC.  Measure the resistance of the A/C Clutch Relay between the Fused Ignition Switch Output terminal and the A/C Clutch Relay Control terminal.  Is the resistance between 60 to 95 ohms?</p> <p>Yes → Go To 4</p> <p>No → Replace the A/C Clutch Relay.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
4	<p>Turn the ignition off.  Remove the A/C Clutch Relay from the PDC.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (C28) A/C Clutch Relay Control circuit from the PDC to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (C28) A/C Clutch Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
5	<p>Turn the ignition off.  Remove the A/C Clutch Relay from the PDC.  Measure the resistance between ground and the (C28) A/C Clutch Control circuit in the PDC.  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (C28) A/C Clutch Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

**Symptom:****P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT****When Monitored and Set Condition:****P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT**

**When Monitored:** With the ignition on. ASD Relay energized. Battery voltage greater than 10 volts.

**Set Condition:** The PCM senses the MTV is not at the desired state.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO  
 GROUND CIRCUIT OPEN  
 MTV RELAY OUTPUT CIRCUIT OPEN  
 FUSED B+ CIRCUIT  
 ASD RELAY OUTPUT CIRCUIT  
 MTV RELAY CONTROL CIRCUIT SHORTED TO GROUND  
 MTV RELAY  
 MTV RELAY CONTROL CIRCUIT OPEN  
 MANIFOLD TUNING VALVE SLOENOID  
 PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero?  Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.	All
2	Turn the ignition off. Disconnect the Manifold Tune Valve Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the MTV Relay Output circuit in the MTV Solenoid harness connector. With the DRBIII®, actuate the MTV Relay. Does the 12-volt test light illuminate brightly?  No → Go To 3 Yes → Go To 10	All

**P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Disconnect the MTV Solenoid harness connector.  Remove the MTV Relay from the PDC.  Measure the resistance of the MTV Relay Output circuit between the PDC and the MTV Solenoid harness connector.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4  No → Repair the MTV Relay Output circuit for an open.</p>	All
4	<p>Turn the ignition off.  Disconnect the MTV Relay from the PDC.  Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC.  Does the test light illuminate brightly?</p> <p>Yes → Go To 5  No → Repair the Fused B+ circuit.</p>	All
5	<p>Turn the ignition off.  Disconnect the MTV Relay from the PDC.  Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the PDC.  Turn the ignition on.  With the DRBIII®, actuate the MTV Relay.  Does the test light illuminate brightly?</p> <p>Yes → Go To 6  No → Repair the ASD Relay Output circuit.</p>	All
6	<p>Turn the ignition off.  Disconnect the MTV Relay from the PDC.  Turn the ignition on.  Using a 12-volt test light connected to battery voltage, probe the MTV Relay Control circuit in the PDC.  With the DRBIII®, actuate the MTV Relay.  Does the 12-volt test light flash on and off?</p> <p>No → Go To 7  Yes → Replace the MTV Relay.</p>	All
7	<p>Turn the ignition off.  Disconnect the PCM harness connector.  Disconnect the MTV Relay from the PDC.  Measure the resistance of the MTV Relay Control circuit to ground.  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the MTV Relay Control circuit for a short to ground.  No → Go To 8</p>	All

**P0660-MANIFOLD TUNE VALVE SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Relay from the PDC. Measure the resistance of the MTV Relay Control circuit between the PCM harness connector and the PDC. Is the resistance below 5.0 ohms?  Yes → Go To 9  No → Repair the MTV Relay Control circuit for an open.	All
9	IF there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information.	All
10	Turn the ignition off. Disconnect the MTV Solenoid harness connector. Using a 12-volt test light connected to battery voltage, probe the ground circuit in the MTV Solenoid harness connector. Does the test light illuminate brightly?  Yes → Replace the Manifold Tuning Valve Solenoid.  No → Repair the ground circuit for an open.	All

## Symptom:

### P0685-ASD RELAY CONTROL CIRCUIT

#### When Monitored and Set Condition:

#### P0685-ASD RELAY CONTROL CIRCUIT

When Monitored: With ignition on. Battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the ASD relay control circuit.  
One trip Fault.

#### POSSIBLE CAUSES

ASD OPERATION

(A14) FUSED B+ CIRCUIT

ASD RELAY RESISTANCE

(K51) ASD RELAY CONTROL CIRCUIT OPEN

(K51) ASD RELAY CONTROL CIRCUIT SHORT TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	<p>Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off. Remove the ASD Relay from the PDC. Ignition on, engine not running. Measure the voltage of the (A14) Fused B+ circuits in the PDC. Is the voltage above 11.0 volts?</p> <p>Yes → Go To 3</p> <p>No → Repair the (A14) Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay between the Fused B+ terminal and the ASD Relay Control terminal. Is the resistance between 60 to 85 ohms?</p> <p>Yes → Go To 4</p> <p>No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**P0685-ASD RELAY CONTROL CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.  Remove the ASD Relay from the PDC.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K51) ASD Control circuit from the PDC to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (K51) ASD Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.  Remove the ASD Relay from the PDC.  Measure the resistance between ground and the (K51) ASD Relay Control circuit in the PDC.  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the (K51) ASD Relay Control circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 6</p>	All
6	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### **P0688-ASD RELAY SENSE CIRCUIT LOW**

#### When Monitored and Set Condition:

##### **P0688-ASD RELAY SENSE CIRCUIT LOW**

When Monitored: With ignition key on. Battery voltage greater than 10 volts.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized. One Trip Fault.

#### POSSIBLE CAUSES

VERIFY ASD DTC

ASD RELAY

(A14) FUSED B+ CIRCUIT

(A142) ASD RELAY OUTPUT CIRCUIT OPEN

(A142) ASD RELAY OUTPUT CIRCUIT OPEN

PCM NO START

PCM START

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Diagnose P0685 - Auto Shutdown Relay Control Circuit first if set along with this DTC.</b></p> <p>With the DRBIII®, erase the DTC.</p> <p>Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. It may be necessary to repeat several times.</p> <p>Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Attempt to start the engine.</p> <p>Does the engine start.</p> <p>Yes → Go To 3</p> <p>No → Go To 5</p>	All

**P0688-ASD RELAY SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Remove the ASD Relay from the PDC.  Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (A142) ASD Output circuit from the PDC to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the open in the (A142) ASD Relay Output circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
4	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>  If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.  Install a substitute relay in place of the ASD Relay.  Ignition on, engine not running.  With the DRBIII®, erase DTCs.  Attempt to start the engine.  With the DRBIII®, read DTCs.  Does the DTC reset?</p> <p>Yes → Go To 6</p> <p>No → Replace the ASD Relay.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.  Remove the ASD Relay from the PDC.  Measure the voltage of the (A14) Fused B+ circuit in the PDC.  Is the voltage above 11.0 volts?</p> <p>Yes → Go To 7</p> <p>No → Repair the (A14) Fused B+ circuit. Inspect the related fuse and repair as necessary.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P0688-ASD RELAY SENSE CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (A142) ASD Output circuit from the PDC to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P0700-TRANSMISSION CONTROL SYSTEM/READ TRANSMISSION DTCS ON THE DRBIII®**

TEST	ACTION	APPLICABILITY
1	<p>This is an informational DTC letting you know that a DTC(s) is stored in the Transmission Control Module.</p> <p>Erase this DTC from the PCM after all Transmission DTC(s) have been repaired.</p> <p>Using the DRBIII®, read the Transmission Controller DTC and refer to the Transmission Category and perform the appropriate symptom.</p> <p>PCM Diagnostic Information complete.</p> <p>Continue</p> <p>Test Complete.</p>	All

## Symptom:

### P0833-CLUTCH RELEASED SWITCH CIRCUIT

#### When Monitored and Set Condition:

#### P0833-CLUTCH RELEASED SWITCH CIRCUIT

**When Monitored:** During crank or when engine speed is between 1500-2880 RPM and vehicle speed is greater than 25 MPH.

**Set Condition:** A short to ground is detected during startup. An open circuit is detected when engine Speed is between 1500-2880 RPM, vehicle speed is >25 MPH, and delta throttle is >1.1 volts for 4 seconds. This cycle must repeat 5 times per trip for 2 trips.

#### POSSIBLE CAUSES

CLUTCH PEDAL POSITION SWITCH OPERATION

CLUTCH PEDAL POSITION SWITCH

CLUTCH UPSTOP SIGNAL CIRCUIT OPEN

CLUTCH UPSTOP SIGNAL CIRCUIT SHORTED TO GROUND

(Z12) GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	<p>With the DRBIII®, monitor the Clutch Upstop Switch. Depress the Clutch Pedal completely to the floor and release all the way up several times. Did the Clutch Upstop Switch state change open to closed?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Disconnect the Clutch Pedal Position Switch harness connector. Connect a jumper wire between the Ground circuit and the Clutch Upstop Switch Signal circuit in the Clutch Pedal Position Switch harness connector. With the DRBIII®, monitor the Clutch Upstop Switch status. Did the Clutch Upstop Switch status change from Open to Closed?</p> <p>Yes → Replace the Clutch Pedal Position Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P0833-CLUTCH RELEASED SWITCH CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.            Disconnect the Clutch Pedal Position Switch harness connector.            Disconnect the PCM harness connector.            Measure the resistance of the Clutch Upstop Signal circuit in the Clutch Pedal Position Switch harness connector to ground.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the Clutch Upstop circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.            Disconnect the Clutch Pedal Position Switch harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the Clutch Upstop Signal circuit between the Clutch Pedal Position Switch harness connector and the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the Clutch Upstop Signal circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect Clutch Pedal Position Switch harness connector.            Using a 12-volt test light connected to 12-volts, probe the (Z12) ground circuit in the Clutch Pedal Position Switch harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the (Z12) ground circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P0850-PARK/NEUTRAL SWITCH PERFORMANCE

#### When Monitored and Set Condition:

#### P0850-PARK/NEUTRAL SWITCH PERFORMANCE

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

Set Condition: The PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation. Two Trip Fault.

#### POSSIBLE CAUSES

GOOD TRIP EQUAL TO ZERO  
TRANSMISSION DTC(S)  
PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check the TCM for DTCs. Diagnose any DTCs related to the TRS that may have set in the TCM.</b> Ignition on, engine not running. <b>NOTE: Before continuing, ensure that communication can be established with the TCM. If the DRBIII® can not communicate with the TCM refer to the Communication Category and preform the appropriate symptom.</b> With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present?</p> <p>Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → <b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Module in accordance with the Service Information.</b> Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom:****P1105-TIP SENSOR SOLENOID CIRCUIT****When Monitored and Set Condition:****P1105-TIP SENSOR SOLENOID CIRCUIT**

**When Monitored:** The ignition on or the engine running. Battery voltage greater than 10.4 volts or in turbo boost mode.

**Set Condition:** The PCM will set the DTC if the actual state of the solenoid does not match the intended state.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

TIP SOLENOID OPERATION

(F12) FUSED IGNITION SWITCH OUTPUT CIRCUIT

(K55) TIP SOL CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K55) TIP SOL CONTROL CIRCUIT OPEN

(K55) TIP SOL CONTROL CIRCUIT SHORTED TO GROUND

PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the TIP Solenoid harness connector. Using a 12-volt test light, jumper across the TIP Solenoid harness connector. <b>NOTE: While actuating the solenoid wiggle the related wiring harness.</b> With the DRBIII®, actuate the TIP Solenoid. Does the test light illuminate brightly and flash on and off?  Yes → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P1105-TIP SENSOR SOLENOID CIRCUIT — Continued**

TEST	ACTION	APPLICABILITY
3	Disconnect the TIP Solenoid harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the (F12) Fused Ignition Switch Output circuit. Does the test light illuminate brightly?  Yes → Go To 4  No → Repair the (F12) Fused Ignition Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
4	Turn the ignition off. Disconnect the TIP Solenoid harness connector. Disconnect the PCM harness connectors. Turn the ignition on Measure the voltage of the (K55) TIP Sol Control circuit in the TIP Solenoid harness connector. Does the voltmeter indicate any voltage present?  Yes → Repair the short to voltage in the (K55) TIP Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Solenoid harness connector. Disconnect the PCM harness connectors. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K55) TIP Sol Control circuit from the TIP Solenoid harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (K55) TIP Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	Turn the ignition off. Disconnect the TIP Solenoid harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the (K55) TIP Sol Control circuit at the TIP Solenoid harness connector. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the (K55) TIP Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 7	All
7	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

**Symptom:****P1115-GENERAL TEMP SENSOR PERFORMANCE****When Monitored and Set Condition:****P1115-GENERAL TEMP SENSOR PERFORMANCE**

**When Monitored:** Engine off time is greater than 480 minutes. Ambient temperature is greater than -23°C (-9°F).

**Set Condition:** After a calibrated amount of cool down time, the PCM compares the ECT Sensor, IAT Sensor and the Ambient Air Temperature Sensor values. If the difference between (AAT and IAT), (AAT and ECT) and (ECT and IAT) are all greater than a calibrated value, this DTC will set.

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

OTHER POSSIBLE CAUSES

SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

TEMPERATURE SENSOR VOLTAGE BELOW 1.0 VOLT

SIGNAL CIRCUIT OPEN

SENSOR GROUND CIRCUIT OPEN

SIGNAL CIRCUIT SHORTED TO GROUND

SIGNAL CIRCUIT SHORTED TO SENSOR GROUND

PCM LOW

PCM HIGH

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The PCM compares IAT, AAT and ECT to determine if they are within a calibrated temp of one another. Using a block heater that does not meet OEM specifications or that is not installed at the proper location can defeat the algorithm in the PCM.</b></p> <p>Ignition on, engine not running.</p> <p><b>NOTE: It requires more than one temperature sensor input for this DTC to set. After a repair has been made, all temperature sensors must be checked again using the DRBIII® temperature probe.</b></p> <p>With the DRBIII®, read DTCs and record the related Freeze Frame data.</p> <p>Is the Good Trip displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition on.            With the DRBIII®, read and record the AAT Sensor Temperature value            Using the DRB Temperature Probe #CH7050, measure the ambient air temperature near the AAT sensor.            Is the AAT Sensor value within 5°C (9°F) of the temperature probe reading?</p> <p>Yes → Go To 3            No → Go To 6</p>	All
3	<p>Turn the ignition on.            With the DRBIII®, read and record the IAT Sensor Temperature value            Remove the IAT sensor.            Using the DRB Temperature Probe #CH7050, measure the temperature inside the IAT sensor opening.            Is the IAT Sensor value within 5°C (9°F) of the temperature probe reading?</p> <p>Yes → Go To 4            No → Go To 6</p>	All
4	<p><b>WARNING: MAKE SURE THE ENGINE COOLING SYSTEM IS COOL BEFORE REMOVING THE PRESSURE CAP OR ANY HOSE. SEVERE PERSONAL INJURY MAY RESULT FROM ESCAPING HOT COOLANT. THE COOLING SYSTEM IS PRESSURIZED WHEN HOT.</b></p> <p>Turn the ignition on.            With the DRBIII®, read and record the ECT Sensor Temperature value            Using the DRB Temperature Probe #CH7050, measure the engine coolant temperature.            Is the ECT Sensor value with 5°C (9°F) of the temperature probe reading?</p> <p>Yes → Go To 5            No → Go To 6</p>	All
5	<p>Inspect the Temperature sensors for any physical damage.            Inspect the engine coolant. Ensure the coolant is at the proper level. Refer to the Service Information COOLING.            Ensure the Temperature sensors are properly mounted.  <b>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.</b>            Refer to any Technical Service Bulletins (TSBs) that may apply.            With the engine running at normal operating temperature, monitor the Temperature sensor parameters while wiggling the wire harness. Look for parameter values to change.            Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.  <b>CAUTION: NEVER PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Inspect and clean all PCM, engine, and chassis grounds.            Were any problems found during the above inspections?</p> <p>Yes → Repair as necessary            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Test Complete.</p>	All

**P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
6	<p><b>NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals</b></p> <p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Ignition on, engine not running.            Measure the voltage of the Signal circuit in the applicable Temperature Sensor harness connector.            Is the voltage above 5.2 volts?</p> <p>Yes → Repair the short to battery voltage in the Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 7</p>	All
7	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the Temperature Sensor voltage.            Is the voltage above 4.9 volts?</p> <p>Yes → Go To 8</p> <p>No → Go To 11</p>	All
8	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Using a jumper wire, jumper across the Temperature Sensor harness connector.            Ignition on, engine not running.            With the DRBIII®, read the Temperature voltage.            Is the voltage below 1.0 volt?</p> <p>Yes → Replace the applicable Temperature Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the Signal circuit from the Temperature Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 10</p> <p>No → Repair the open in the Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued**

TEST	ACTION	APPLICABILITY
10	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the Sensor ground circuit from the Ambient Air Temperature Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the open in the Sensor ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
11	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the Signal circuit in the Temperature harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the short to ground in the Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 12</p>	All
12	<p>Turn the ignition off.            Disconnect the applicable Temperature Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between the Signal circuit and the Sensor ground circuit in the Temperature Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the Sensor ground shorted to the Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P1189-TIP SENSOR CIRCUIT LOW****When Monitored and Set Condition:****P1189-TIP SENSOR CIRCUIT LOW**

When Monitored: Ignition on. Throttle Position Sensor voltage less than 1.2 volts.  
Battery voltage greater than 10 volts.

Set Condition: The TIP Sensor signal voltage is less than 0.0782 volts for 1.7 seconds.  
One trip Fault.

**POSSIBLE CAUSES**

TIP SENSOR VOLTAGE BELOW .078 VOLTS

(K6) 5 VOLT SUPPLY CIRCUIT SHORT TO GROUND

(K6) 5 VOLT SUPPLY CIRCUIT SHORT TO SENSOR GROUND

(K6) 5 VOLT SUPPLY OPEN

TIP SENSOR INTERNAL FAILURE

(A23) TIP SIGNAL CIRCUIT SHORTED TO GROUND

(A23) TIP SIGNAL CIRCUIT SHORTED TO (K167) SENSOR GROUND CIRCUIT

PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the TIP Sensor voltage. Is the voltage below .078 of a volt?  Yes → Go To 2  No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition off. Disconnect the TIP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K6) 5 Volt Supply circuit in the TIP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts?  Yes → Go To 3  No → Go To 6	All

**P1189-TIP SENSOR CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TIP Sensor harness connector. Ignition on, engine not running. With the DRBIII®, monitor the TIP Sensor voltage. Is the voltage between 4.5 and 5.2 volts?  Yes → Replace the TIP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (A23) TIP Sensor signal circuit at the TIP Sensor harness connector and ground. Is the resistance below 100 ohms?  Yes → Repair the short to ground in the (A23) TIP Sensor signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (A23) TIP Sensor signal circuit and the (K167) Sensor ground circuit in the TIP Sensor harness connector. Is the resistance below 100 ohms?  Yes → Repair the (A23) TIP Sensor signal circuit for a short to the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 9	All
6	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K6) 5 Volt Supply circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 100 ohms?  Yes → Go To 7  No → Repair the open (K6) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All



**P1189-TIP SENSOR CIRCUIT LOW — Continued**

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off.            Disconnect the TIP Sensor harness connector.            Disconnect the PCM Harness connector.            Measure the resistance between the (K6) 5 Volt Supply circuit in the TIP Sensor harness connector and ground.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K6) 5 Volt Supply circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the TIP Sensor harness connector.            Measure the resistance between the (K6) 5 Volt Supply circuit and the (K167) Sensor Ground circuit in the TIP Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the (K6) 5 Volt Supply circuit for a short to the (K167) Sensor Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 9</p>	All
9	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### P1190-TIP SENSOR CIRCUIT HIGH

#### When Monitored and Set Condition:

#### P1190-TIP SENSOR CIRCUIT HIGH

When Monitored: Ignition on. TP sensor voltage less than 1.2 volts. Battery voltage greater than 10 volts.

Set Condition: The TIP signal voltage is greater than 4.92 volts for 1.7 seconds. One trip Fault.

#### POSSIBLE CAUSES

TIP SENSOR VOLTAGE ABOVE 4.9 VOLTS

(A23) TIP SIGNAL CIRCUIT SHORTED TO (K6) 5 VOLT SUPPLY CIRCUIT

(A23) TIP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

TIP SENSOR INTERNAL FAILURE

(K153) TIP SIGNAL CIRCUIT OPEN

(K167) SENSOR GROUND CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>Start the engine. With the DRBIII®, read the TIP Sensor voltage. Is the voltage above 4.9 volts?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (A23) TIP Signal circuit and the (K6) 5 Volt Supply circuit in the TIP Sensor harness connector. Is the resistance below 100 ohms?</p> <p>Yes → Repair the (A23) TIP Signal circuit for a short to the (K6) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**P1190-TIP SENSOR CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TIP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K153) TIP Signal circuit in the TIP Sensor harness connector. Is the voltage above 5.2 volts?  Yes → Repair the short to battery voltage in the (A23) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 4	All
4	Turn the ignition off. Disconnect the TIP Sensor harness connector. Connect a jumper wire between the (A23) TIP Sensor Signal circuit and the (K167) Sensor ground circuit. With the DRBIII®, monitor the TIP Sensor voltage. Ignition on, engine not running. Is the voltage below 1.0 volt?  Yes → Replace the TIP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K153) TIP Signal circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 6  No → Repair the open in the (K153) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
6	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K167) Sensor ground circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 7  No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

# **P1190-TIP SENSOR CIRCUIT HIGH — Continued**

TEST	ACTION	APPLICABILITY
7	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b></p> <p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P1593-SPEED CONTROL SWITCH STUCK****When Monitored and Set Condition:****P1593-SPEED CONTROL SWITCH STUCK**

When Monitored: Ignition on.

Set Condition: S/C Switch is mechanically stuck in the On/Off, Resume/Accel, or Set position for too long. One trip fault.

**POSSIBLE CAUSES**

SPEED CONTROL SWITCH STATUS

SPEED CONTROL SWITCHES

(V37) S/C SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

(V37) S/C SIGNAL CIRCUIT OPEN

(K4) SENSOR GROUND OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p>Start the engine. With the DRBIII®, monitor each switch function for the Speed Control Switches. Press and release each Speed Control Button.</p> <ul style="list-style-type: none"> <li>- Resume/Accel</li> <li>- Cancel</li> <li>- Decel (Coast)</li> <li>- On/Off</li> <li>- Set</li> </ul> <p>Does each switch function change status when pressing and then depressing each switch?</p> <p>Yes → Refer to the INTERMITTENT CONDITION Symptom in the Diagnostic category. Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 2</p>	All

**P1593-SPEED CONTROL SWITCH STUCK — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off.  Remove the Speed Control Switches from the steering wheel.  Measure the resistance across each Switch Control Switch.  Monitor the ohmmeter while pressing each function button on each switch.  Resume/Accel - 15,400 ohms  Cancel - 909 +/- 9 ohms  Decel (Coast) - 2940 +/- 30 ohms  On/Off - 0 ohms  Set - 6650 +/- 66 ohms  Does the function on the Speed Control Switches have the correct resistance value?</p> <p>Yes → Go To 3</p> <p>No → Replace the Speed Control Switch that had the incorrect resistance value.  Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All
3	<p>Measure the voltage on the (V37) S/C Signal circuit at the Speed Control harness connector.  Is the is the voltage above 5.0 volts?</p> <p>Yes → Repair the short to battery voltage in the (V37) S/C Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p> <p>No → Go To 4</p>	All
4	<p><b>NOTE: The measurement must be taken from both Speed Control Switch harness connector.</b>  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (V37) S/C Signal circuit from the Speed Control harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms for both measurement?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (V37) S/C Signal circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All
5	<p><b>NOTE: The measurement must be taken from both Speed Control Switch harness connectors.</b>  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>  Measure the resistance of the (K4) Sensor ground circuit from the Speed Control harness connector to the appropriate terminal of special tool #8815.  Is the resistance below 5.0 ohms for both measurements?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K4) Sensor ground circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 4 - NGC.</p>	All

**P1593-SPEED CONTROL SWITCH STUCK — Continued**

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

## Symptom:

### **P1602-PCM NOT PROGRAMMED**

## When Monitored and Set Condition:

### **P1602-PCM NOT PROGRAMMED**

When Monitored: Ignition on.

Set Condition: The PCM has not been programmed.

## POSSIBLE CAUSES

PCM NOT PROGRAMMED  
 VERIFY PCM PROGRAMMING  
 PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, erase DTCs. With the DRBIII® program the PCM. Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset?  Yes → Go To 2  No → The PCM has been successfully programmed. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	<b>NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.</b> Cycle the ignition switch to the off position and then back to run. Attempt to program the PCM. Start the vehicle and allow it to reach normal operating temperatures. With the DRBIII®, read DTCs. Does the DTC reset?  Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.  No → The PCM has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All



**Symptom List:****P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION****P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE****P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY**

**Test Note:** All symptoms listed above are diagnosed using the same tests. The title for the tests will be **P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION**.

**When Monitored and Set Condition:****P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY**

When Monitored: During cold start.

Set Condition: Compares shut down time to coolant temperature.

**POSSIBLE CAUSES**

FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)

PCM INTERNAL FAULTURE

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition off. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Turn the ignition to run. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Off-Run-Start) cavity C1-12 circuit at the appropriate terminal of the special tool #8815. <b>NOTE: If the test light illuminates, wiggle the wiring harness to ensure that the problem is not an intermittent wiring problem.</b> Does the test light illuminate brightly?</p> <p>Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Check all related fuses. Repair the Fused Ignition Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**Symptom List:**

**P1696-EEPROM MEMORY WRITE DENIED/INVALID**

**P1697-EMR (SRI) MILEAGE NOT STORED**

**Test Note:** All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be **P1696-EEPROM MEMORY WRITE DENIED/INVALID**.

**When Monitored and Set Condition:**

**P1696-EEPROM MEMORY WRITE DENIED/INVALID**

When Monitored: With the ignition on continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed. Also checks at power down.

**P1697-EMR (SRI) MILEAGE NOT STORED**

When Monitored: With the ignition on continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at power down.

**POSSIBLE CAUSES**

DRB DISPLAYS WRITE FAILURE  
DRB DISPLAYS WRITE REFUSED 2ND TIME  
DRB DISPLAYS SRI MILEAGE INVALID  
COMPARE SRI MILEAGE WITH ODOMETER

TEST	ACTION	APPLICABILITY
1	<p>With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Failure?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 2</p>	All
2	<p>With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Refused?</p> <p>Yes → Go To 3</p> <p>No → Go To 4</p>	All

**P1696-EEPROM MEMORY WRITE DENIED/INVALID — Continued**

TEST	ACTION	APPLICABILITY
3	<p>With the DRBIII®, perform the SRI Memory Test a second time.  <b>NOTE: Retest the SRI Memory two more times.</b>  Does the DRBIII® display Write Refused again?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All
4	<p>With the DRBIII®, perform the SRI Memory Test.  Does the DRBIII® display SRI Mileage Invalid?</p> <p>Yes → Update the mileage and retest the SRI Memory.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 5</p>	All
5	<p>Compare the SRI Mileage stored with the Instrument Panel Odometer.  Is the mileage within the specified range displayed on the DRBIII®?</p> <p>Yes → Test Complete.</p> <p>No → Update the mileage and retest the SRI Memory.  Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### P1854-TIP BARO OUT OF RANGE

## When Monitored and Set Condition:

### P1854-TIP BARO OUT OF RANGE

When Monitored: With the ignition on and engine speed less than 250 rpm.

Set Condition: The PCM senses the voltage from the MAP sensor to be greater than 4.9 volts (2.4 volts for Turbo) or below 2.28 volts (1.2 volts for Turbo) for 400 milliseconds. Two Trip Fault.

## POSSIBLE CAUSES

CHECKING FOR OTHER DTCS  
 CHECKING THE HOSES AND TUBING  
 GOOD TRIP EQUAL TO ZERO  
 SOLENOID TEST #1  
 SOLENOID TEST #2  
 SOLENOID TEST #3  
 SOLENOID TEST #4  
 THROTTLE INLET PRESSURE SENSOR  
 (A23) TIP SIGNAL CIRCUIT OPEN  
 (K167) SENSOR GROUND CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read PCM DTCs and record the related Freeze Frame data. Is the Good Trip displayed and equal to zero?  Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
2	Turn the ignition on. With the DRBIII®, read the PCM DTCs. <b>NOTE: If there are any other MAP Sensor or Throttle Inlet Pressure Sensor DTCs present, repair the other MAP Sensor or Throttle Inlet Pressure Sensors before continuing.</b> Does the DRB display any other DTCs?  Yes → Refer to the symptom list and perform the appropriate diagnostic procedure. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → Go To 3	All

**P1854-TIP BARO OUT OF RANGE — Continued**

TEST	ACTION	APPLICABILITY
3	<p><b>NOTE: The exhaust system must be free from any restriction to perform this test.</b></p> <p>Check all of the tubes and hoses between the air cleaner and the intake manifold for loose connection, damage or restriction.</p> <p>Check all of the tubes connected to the intercooler for loose connection, damage or restriction.</p> <p>Check all of the tubes and hoses connected to the turbocharger, TIP Solenoid, Surge Solenoid and Wastegate Solenoid for loose connection, damage or restriction.</p> <p><b>NOTE: Solenoid design and hose connections are identical for all three solenoids. It is possible to connect the hoses to the incorrect solenoid. Verify that hoses are connected to the correct solenoid.</b></p> <p>Are any of these conditions evident?</p> <p>Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the TIP Sensor harness connector.</p> <p>Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance of the (A23) TIP Signal circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 10.0 ohms?</p> <p>Yes → Go To 5</p> <p>No → Repair the open in the (A23) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the TIP Sensor harness connector.</p> <p>Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Measure the resistance of the (K167) Sensor ground circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815.</p> <p>Is the resistance below 10.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P1854-TIP BARO OUT OF RANGE — Continued**

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the hoses from the TIP Solenoid.            Install a plug on the TIP Solenoid hose B connection point.            Connect a vacuum pump to the TIP Solenoid hose A connection point.            With vacuum pump apply 20 inches of vacuum to the TIP Solenoid hose A connection point.  <b>NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.</b>            Does vacuum read above 10 inches for at least 5 seconds?</p> <p>Yes → Go To 7</p> <p>No → Replace the TIP Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.            Disconnect the hoses from the TIP Solenoid.            Install a plug on the TIP Solenoid hose C connection point.            Connect a vacuum pump to the TIP Solenoid hose A connection point.            Attempt to apply 20 inches of vacuum to the TIP Solenoid hose A connection point.  <b>NOTE: Vacuum should escape through the Solenoid hose B connection point.</b>            Does vacuum escape through the Solenoid hose B connection point?</p> <p>Yes → Go To 8</p> <p>No → Replace the TIP Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
8	<p>Turn the ignition off.            Disconnect the hoses from the TIP Solenoid.            Install a plug on TIP Solenoid hose C connection point.            Connect a vacuum pump to the TIP Solenoid hose B connection point.  <b>NOTE: For the result of this test to be accurate the solenoid must be turned on. Apply 12 volts and Ground to the appropriate solenoid terminals to turn the solenoid on.</b>            With vacuum pump apply 20 inches of vacuum to the TIP Solenoid hose B connection point.  <b>NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.</b>            Does vacuum read above 10 inches for at least 5 seconds?</p> <p>Yes → Go To 9</p> <p>No → Replace the TIP Solenoid.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**P1854-TIP BARO OUT OF RANGE — Continued**

TEST	ACTION	APPLICABILITY
9	<p>Turn the ignition off.</p> <p>Disconnect the hoses from the TIP Solenoid.</p> <p>Install a plug on the TIP Solenoid hose A connection point.</p> <p>Connect a vacuum pump to the TIP Solenoid hose B connection point.</p> <p><b>NOTE: For the result of this test to be accurate the solenoid must be turned on. Apply 12 volts and Ground to the appropriate solenoid terminals to turn the solenoid on.</b></p> <p>Attempt to apply 20 inches of vacuum to the TIP Solenoid hose B connection point.</p> <p><b>NOTE: Vacuum should escape through the Solenoid hose C connection point.</b></p> <p>Does vacuum escape through the Solenoid hose C connection point?</p> <p>Yes → Replace the Throttle Inlet Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom:****P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK**

---

**When Monitored and Set Condition:****P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK**

When Monitored: Engine Running, during all drive modes.

Set Condition: If vacuum drops below 1.5 Hg with engine RPM greater than 2000 RPM at closed throttle.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VACUUM LEAK
HIGH RESISTANCE IN MAP (K7) 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN MAP (K7) 5 VOLT SUPPLY CIRCUIT
MAP SENSOR
HIGH RESISTANCE IN (K1) MAP SIGNAL CIRCUIT
RESISTANCE TO GROUND IN (K1) MAP SIGNAL CIRCUIT
HIGH RESISTANCE IN (K4) MAP GROUND CIRCUIT
PCM
TP SENSOR OPERATION
HIGH RESISTANCE IN (K6) TP SENSOR 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN (K6) TP SENSOR 5 VOLT SUPPLY CIRCUIT
TP SENSOR
HIGH RESISTANCE IN (K22) TP SIGNAL CIRCUIT
RESISTANCE TO GROUND IN (K22) TP SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN TP (K4) SENSOR GROUND CIRCUIT
PCM



## P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.</b></p> <p><b>NOTE: If the P0501 - No Vehicle Speed Signal is set along with this DTC, refer to the P0501 diagnostics before continuing.</b></p> <p><b>NOTE: The throttle plate and linkage must be free from binding and carbon build up, ensure the throttle plate is at the idle position, ensure the throttle plate is at the idle position.</b></p> <p>Ignition on, engine not running.            With the DRBIII®, read DTCs and record the related Freeze Frame data.            Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p><b>NOTE: This code is intended to shut down the engine if a large crack occurs in the intake manifold.</b></p> <p><b>NOTE: A large vacuum leak is most likely the cause of this DTC.</b></p> <p>Inspect the Intake Manifold for leaks and cracks.            Inspect the Power Brake Booster for any vacuum leaks.            Inspect the PCV system for proper operation or any vacuum leaks.            Were any vacuum leaks found?</p> <p>Yes → Repair the vacuum leak as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All
3	<p>Start the engine.            With the DRBIII®, monitor the MAP Sensor voltage.            Snap the throttle from wide open throttle to idle several times.            Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts?</p> <p>Yes → Go To 4</p> <p>No → Go To 12</p>	All
4	<p>Ignition on, engine not running.            With the DRBIII®, monitor the TP Sensor voltage while slowly depressing the throttle pedal from the idle position to the wide open throttle position.            Does the voltage start approximately at 0.8 volts and go above 3.5 volts with a smooth transition?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All

## P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K6) 5 volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 6</p> <p>No → Repair the (K6) TP Sensor 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K6) 5 volt Supply circuit at the TP Sensor harness connector.            Is the resistance above 100k ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the (K6) 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            With the DRBIII®, monitor the TP Sensor voltage.            Ignition on, engine not running.            Connect a jumper wire between the (K22) TP Signal circuit and the (K4) Sensor ground circuit .            Does the TP Sensor voltage change from approximately 4.9 volts to below 0.5 of a volt?</p> <p>Yes → Replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>Turn the ignition off.            Disconnect the TP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K22) TP Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the (K22) TP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K22) TP Signal circuit in the TP Sensor harness connector. Is the resistance above 100k ohms?  Yes → Go To 10  No → Repair the (K22) TP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
10	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K4) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 11  No → Repair the (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
11	<b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b> If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
12	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K7) 5 volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 13  No → Repair the MAP (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

## P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
13	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K7) 5 volt Supply circuit at the MAP Sensor harness connector.            Is the resistance above 100k ohms?</p> <p>Yes → Go To 14</p> <p>No → Repair the short to ground in the (K7) 5 volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
14	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            With the DRBIII®, monitor the MAP Sensor voltage.            Ignition on, engine not running.            Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K4) Sensor ground circuit .            Cycle the ignition switch from off to on.            With the DRBIII®, monitor the MAP Sensor voltage.            Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 volt?</p> <p>Yes → Replace the MAP Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 15</p>	All
15	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 16</p> <p>No → Repair the (K1) MAP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
16	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector.            Is the resistance above 100k ohms?</p> <p>Yes → Go To 17</p> <p>No → Repair the (K1) MAP Signal circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
17	<p>Turn the ignition off.            Disconnect the MAP Sensor harness connector.            Disconnect the PCM harness connector.  <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b>            Measure the resistance of the (K4) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 18</p> <p>No → Repair the (K4) Sensor Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
18	<p><b>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

**Symptom List:**

**P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN**

**P2097-DOWN STREAM FUEL SYSTEM 1/2 RICH**

---

**Test Note: All symptoms listed above are diagnosed using the same tests.  
The title for the tests will be P2096-DOWN STREAM FUEL  
SYSTEM 1/2 LEAN.**

---

**When Monitored and Set Condition:**

**P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN**

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F, altitude below 8500 ft and fuel level greater than 15%.

Set Condition: If the PCM adds downstream short term compensation to long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

**P2097-DOWN STREAM FUEL SYSTEM 1/2 RICH**

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above (-7°C)20°F and altitude below 8500 ft.

Set Condition: If the PCM adds downstream short term compensation to long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

---

**POSSIBLE CAUSES**

GOOD TRIP EQUAL TO ZERO

EXHAUST LEAK

ENGINE MECHANICAL PROBLEM

O2 SENSOR

O2 SIGNAL CIRCUIT

O2 RETURN CIRCUIT

FUEL CONTAMINATION

**P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN — Continued**

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check the vehicle repair history. If the O2 has been replaced ensure that the O2 sensor was properly installed and meets OEM specification.</b></p> <p><b>NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.</b></p> <p>Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
2	<p>Turn the ignition off.</p> <p><b>WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection.</b></p> <p>Visually and Physically inspect the for holes, cracks and blockage in the exhaust system. Is the exhaust system in good condition?</p> <p>Yes → Go To 3</p> <p>No → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
3	<p>Check for any of the following conditions/mechanical problems.</p> <p>AIR INDUCTION SYSTEM - must be free from leaks. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector</p> <p>Are there any engine mechanical problems?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Ignition on, engine not running. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. The O2 Sensor voltage should read 5.0 volts on the DRBIII® with the connector disconnected. Using a jumper wire, jump the O2 Signal circuit to the O2 Return circuit at the O2 Sensor harness connector. <b>NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.</b> Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?</p> <p>Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All

**P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off.                      Disconnect the O2 Sensor harness connector.                      Ignition on, engine not running.                      With the DRBIII®, monitor the O2 Sensor voltage.                      Is the voltage above 4.8 volts?</p> <p>Yes → Go To 6</p> <p>No → Check the O2 Signal circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.                      Disconnect the O2 Sensor harness connector.                      Ignition on, engine not running.                      Measure the voltage on the O2 Return circuit in the O2 Sensor harness connector.                      Is the voltage at 2.5 volts?</p> <p>Yes → Check the fuel system for contaminants.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Check the O2 Return circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module in accordance with the Service Information.                      Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom List:****P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION****P2305-IGNITION COIL #2 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION**

**Test Note:** All symptoms listed above are diagnosed using the same tests.  
 The title for the tests will be **P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION**.

**When Monitored and Set Condition:****P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION**

When Monitored: Engine Running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault.

**P2305-IGNITION COIL #2 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION**

When Monitored: Engine Running.

Set Condition: If PCM detects that the secondary ignition burn time is incorrect or not present an error is detected. One Trip Fault

**POSSIBLE CAUSES**

INTERMITTENT CONDITION  
 SPARK PLUG  
 IGNITION WIRE  
 IGNITION COIL OPERATION  
 IGNITION COIL DRIVER CIRCUIT OPEN  
 COIL CONTROL CIRCUIT SHORTED TO GROUND  
 PCM  
 (A142) ASD RELAY OUTPUT CIRCUIT  
 IGNITION COIL

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?  Yes → Go To 2 No → Go To 9	All

**P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION — Continued**

TEST	ACTION	APPLICABILITY
2	<p><b>NOTE: This test must be repeated for the adjacent ignition wire.</b>            Turn the ignition off.            Disconnect the ignition wire from the spark plug.  <b>NOTE: Before continuing inspect the ignition wire for damage or carbon tracking coil or the spark plug insulator boot. If a problem is found, replace the ignition wire.</b>            Install a spark tester to the ignition wire.            While cranking the engine observe the spark coming from the spark tester.  <b>NOTE: A crisp blue spark that is able to jumper the gap of the spark tester should be generated.</b>            Is a good spark generated?</p> <p>Yes → Ensure the cylinder is operating properly. If OK, replace the Spark Plug.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 3</p>	All
3	<p><b>NOTE: This test must be repeated for the adjacent ignition wire.</b>            Turn the ignition off.            Remove the ignition wire.            Measure the resistance of the ignition wire.            Is the resistance below 10K ohms?</p> <p>Yes → Go To 4</p> <p>No → Replace the Ignition Wire.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
4	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Turn the ignition on.            With the DRBIII®, actuate the ASD Relay.            Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit in the Ignition Coil harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the (A142) ASD Relay Output circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
5	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Driver circuit.            Crank the engine for 5 second while observing the test light.            Does the test light blink/flicker?</p> <p>Yes → Replace the Ignition Coil.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 6</p>	All

## P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION — Continued

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Disconnect the PCM harness connector.            Measure the resistance of the Coil Control circuit between the Ignition Coil harness connector and the special tool #8815 terminal.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 7</p> <p>No → Repair the Coil Control circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
7	<p>Turn the ignition off.            Disconnect the Ignition Coil harness connector.            Disconnect the PCM harness connector.            Measure the resistance between ground and the Coil Control circuit in the Ignition Coil harness connector.            Is the resistance below 100k ohms?</p> <p>Yes → Repair the Coil Control circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 8</p>	All
8	<p>NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
9	<p>Turn the ignition off.            Remove the Spark Plug.            Inspect the Spark Plug for the following conditions.</p> <ul style="list-style-type: none"> <li>- Cracks</li> <li>- Carbon Tracking</li> <li>- Foreign Material</li> <li>- Gap size out of specifications</li> <li>- Loose or broke electrode</li> </ul> <p><b>NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.</b>            Were any of the above condition present?</p> <p>Yes → Replace the Spark Plug.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

## Symptom:

### P2503-CHARGING SYSTEM VOLTAGE LOW

#### When Monitored and Set Condition:

#### P2503-CHARGING SYSTEM VOLTAGE LOW

When Monitored: The engine running. The engine speed greater than 1157 RPM.

Set Condition: The battery sensed voltage is 1 volt below the charging goal for 13.47 seconds. The PCM senses the battery voltage, turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set.

#### POSSIBLE CAUSES

CHARGING VOLTAGE BELOW 15.1 VOLTS

(A11) B+ CIRCUIT HIGH RESISTANCE

GENERATOR GROUND HIGH RESISTANCE

GENERATOR OPERATION

(Z1) GEN FIELD GROUND CIRCUIT OPEN

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

(K20) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND

(K20) GEN FIELD CONTROL CIRCUIT OPEN

PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.</b></p> <p>Turn the ignition off.</p> <p><b>NOTE: The battery must be fully charged.</b></p> <p><b>NOTE: The Generator belt tension and condition must be checked before continuing.</b></p> <p>Start the engine.</p> <p>Allow the idle to stabilize.</p> <p>With the DRBIII®, read the Target Charging Voltage.</p> <p>Is the Target Charging Voltage above 15.1 volts?</p> <p>Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 2</p>	All

**P2503-CHARGING SYSTEM VOLTAGE LOW — Continued**

TEST	ACTION	APPLICABILITY
2	<p><b>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.</b></p> <p>Ignition on, engine not running.</p> <p><b>NOTE: Ensure all wires are clear of the engine's moving parts.</b></p> <p>Start the engine.</p> <p>Measure the voltage between the (A11) Generator B+ Terminal and the Battery+ Post.</p> <p>Is the voltage above 0.4 of a volt?</p> <p>Yes → Repair the (A11) B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 3</p>	All
3	<p><b>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.</b></p> <p>Start the engine.</p> <p>Warm the engine to operating temperature.</p> <p><b>NOTE: Ensure all wires are clear of the engine's moving parts.</b></p> <p>Measure the voltage between the Generator case and Battery ground post.</p> <p>Is the voltage above 0.1 of a volt?</p> <p>Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test light, jumper it across the Generator Field harness connector.</p> <p>Ignition on, engine not running.</p> <p>With the DRBIII®, actuate the Gen Field Control circuit.</p> <p>Does the test light illuminate brightly and flash on and off?</p> <p>Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the Generator Field harness connector.</p> <p>Using a 12-volt test connected to battery voltage, probe the (Z1) Gen Field Ground circuit in the Generator Field harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the open in the (Z1) Gen Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.</p>	All

**P2503-CHARGING SYSTEM VOLTAGE LOW — Continued**

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the voltage on the (K20) Gen Field Control circuit at the Generator Field harness connector. Is the voltage above 1.0 volt?  Yes → Repair the short to voltage in the (K20) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.  No → Go To 7	All
7	Turn the ignition on. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K20) Gen Field Control circuit in the Generator Field harness connector. Is the resistance below 100 ohms?  Yes → Repair the (K20) Gen Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.  No → Go To 8	All
8	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the (K20) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of the special tool #8815. Is the resistance below 5.0 ohms?  Yes → Go To 9  No → Repair the open in the (K20) Generator Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All
9	If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All

**Symptom:****U0101-NO TRANSMISSION BUS MESSAGE****When Monitored and Set Condition:****U0101-NO TRANSMISSION BUS MESSAGE**

When Monitored: Equipped with automatic transmission. Engine Running Battery voltage greater than 10 volts.

Set Condition: No bus messages are received from the TCM for 20 seconds, two trips required.

**POSSIBLE CAUSES**

PCI BUS UNABLE TO COMMUNICATE WITH DRBIII®  
 (F12) FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)  
 INTERMITTENT CONDITION  
 PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If P1603 or P1604 are set along with this DTC, diagnose them first before continuing with U0101.</b></p> <p><b>NOTE: Before continuing, inspect all fuses and ensure that all power and ground circuits are operating properly.</b></p> <p><b>NOTE: Check all powers and grounds to the PCM before continuing.</b></p> <p>Turn the ignition on.            With the DRBIII®, erase DTCs.            Start the engine, allow the engine to run for at least 20 seconds with the gear selector in Drive. Repeat at least 2 times.            With the DRBIII®, read DTC's.            Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**U0101-NO TRANSMISSION BUS MESSAGE — Continued**

TEST	ACTION	APPLICABILITY
2	<p>Turn the ignition off. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Turn the ignition to run. Using a 12-volt test light connected to ground, probe the (F12) Fused Ignition Switch Output (Off-Run-Start) cavity C1-12 circuit at the appropriate terminal of the special tool #8815. <b>NOTE: If the test light illuminates, wiggle the wiring harness to ensure that the problem is not an intermittent wiring problem.</b> Does the test light illuminate brightly?</p> <p>Yes → Go To 3</p> <p>No → Check all related fuses. Repair the (F12) Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p><b>Note: Determine which modules this vehicle is equipped with before beginning.</b> <b>Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.</b> Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Instrument Cluster (MIC) Controller Antilock Brake (CAB) Was the DRB able to communicate with one or more Module(s)?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Refer to the Communication category and perform the PCI BUS COMMUNICATION FAILURE symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All



**Symptom:**  
**U0155-NO CLUSTER BUS MESSAGE**

**When Monitored and Set Condition:**

**U0155-NO CLUSTER BUS MESSAGE**

When Monitored: Engine Running.

Set Condition: No BUS messages received from the MIC (Instrument Cluster) for 20 seconds.

**POSSIBLE CAUSES**

DTC RESET  
 COMMUNICATE WITH CLUSTER  
 INSTRUMENT CLUSTER OPERATION  
 PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Start the engine on and off several times. Leave the engine running for at least 20 second each time. With the DRBIII®, read DTCs. Does the DTC reset?  Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Ignition on, engine not running. With the DRBIII®, attempt to communicate with the Instrument cluster. Can communication be established with the Instrument Cluster?  Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with cluster. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Start the engine Allow the engine to idle. Is the correct engine speed display (Tachometer) in the instrument cluster?  Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to the Instrument Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

**Symptom:**  
**U0168-NO SKIM BUS MESSAGES**

**When Monitored and Set Condition:**

**U0168-NO SKIM BUS MESSAGES**

When Monitored: Ignition on or Engine Running.

Set Condition: No BUS messages are received from the SKIM for 20 seconds.

**POSSIBLE CAUSES**

INTERMITTENT CONDITION

PCI BUS CIRCUIT OPEN FROM PCM TO SKIM

LOSS OF SKIM COMMUNICATION

SKIM/PCM

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on. With the DRBIII®, read the DTCs and record the related Freeze Frame data. Is the Good Trip Counter displayed and equal to zero?</p> <p>Yes → Go To 2</p> <p>No → Go To 5</p>	All
2	<p>Turn the ignition on. With the DRB III, attempt to communicate with the SKIM. <b>NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.</b> Was the DRB III able to communicate with the SKIM?</p> <p>Yes → Go To 3</p> <p>No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.</p>	All
3	<p>Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the PCI Bus circuit from the SKIM harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 4</p> <p>No → Repair the PCI Bus circuit between the PCM and the SKIM for an open. Perform SKIS VERIFICATION.</p>	All

**U0168-NO SKIM BUS MESSAGES — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.            Replace the Sentry Key Immobilizer Module in accordance with the Service Information.            Turn the ignition on.            Display and erase all PCM and SKIM DTCs.            Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle.            With the DRB, display PCM DTCs.            Does the DRB display the same DTC?</p> <p>Yes → Replace and program the PCM in accordance with the Service Information.            Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All
5	<p><b>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.</b></p> <p><b>NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.</b></p> <p>With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wire 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 wire harness. Look for any chafed, pierced, pinched, or partially broken wires.            Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.            Were any of the above conditions present?</p> <p>Yes → Repair as necessary.            Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All

## Symptom:

### U110C-NO FUEL LEVEL BUS MESSAGE

#### When Monitored and Set Condition:

#### U110C-NO FUEL LEVEL BUS MESSAGE

When Monitored: Ignition on.

Set Condition: No fuel level BUS messages received by the PCM for 20 seconds.

#### POSSIBLE CAUSES

DTC RESET  
 COMMUNICATE WITH CLUSTER  
 FUEL LEVEL BUS MESSAGE  
 PCI BUS CIRCUIT OPEN FROM PCM TO INSTRUMENT CLUSTER  
 INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: If a fuel level circuit or performance DTC is set along with U110C, diagnose the circuit/performance DTC before continuing.</b></p> <p>Turn the ignition on.            With the DRBIII®, erase DTCs.            Start the engine on and off several times. Leave the engine running for at least 20 second each time.            With the DRBIII®, read DTCs.            Does the DTC reset?</p> <p>Yes → Go To 2</p> <p>No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Ignition on, engine not running.            With the DRBIII®, attempt to communicate with the Instrument cluster.            Can communication be established with the Instrument Cluster?</p> <p>Yes → Go To 3</p> <p>No → Refer to the Communication Category and perform the appropriate symptom related to no communication with cluster.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition on.            Using the DRBIII®, read the Fuel Level parameter in the PCM.            Does the DRBIII® display a fuel level value?</p> <p>Yes → Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p>	All

**U110C-NO FUEL LEVEL BUS MESSAGE — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Instrument Cluster harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Measure the resistance of the PCI Bus circuit from the Instrument Cluster harness connector to the appropriate terminal of special tool #8815. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace Instrument Cluster in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the PCI Bus circuit between the PCM and the Instrument Cluster for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### \*CHECKING PCM POWER AND GROUND CIRCUITS

POSSIBLE CAUSES
(A14) PCM FUSED B+ CIRCUIT
(A41) PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
(Z12) PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The battery must be fully charged before continuing.</b></p> <p>Turn the ignition off. Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Using a 12-volt test light connected to ground, probe the (A14) PCM Fused B+ circuit in the Pinout Box. Does the test light illuminate brightly?</p> <p>Yes → Go To 2</p> <p>No → Repair the (A14) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Turn the ignition off. Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Turn the ignition on. Using a 12-volt test light connected to ground, probe the (A41) PCM Fused Ignition Switch Output circuit in the Pinout Box. Does the test light illuminate brightly?</p> <p>Yes → Go To 3</p> <p>No → Repair the (A41) Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition off. Disconnect the PCM harness connector.</p> <p><b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b></p> <p>Using a 12-volt test light connected to battery voltage, probe the (Z12) PCM ground circuits in the Pinout Box. Does the test light illuminate brightly?</p> <p>Yes → Test Complete.</p> <p>No → Repair the (Z12) PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**Symptom:****\*CHECKING RAD FAN HIGH SPEED OPERATION (TURBO)****POSSIBLE CAUSES**

GROUND CIRCUIT OPEN  
 RADIATOR FAN MOTOR  
 FUSED B+ CIRCUIT  
 RADIATOR FAN RELAY OUTPUT CIRCUIT  
 RAD FAN RELAY #1 OPERATION  
 RADIATOR FAN RELAY  
 RELAY #3 GROUND CIRCUIT OPEN (Z1)

TEST	ACTION	APPLICABILITY
1	<b>WARNING: The Checking Low Speed Fans Operation chart must be performed first before continuing.</b> Turn the ignition on. With the DRBIII®, actuate the High Speed Rad Fan Relay. Is the Rad Fan #1 operating  Yes → Go To 2 No → Go To 3	All
2	<b>NOTE: The High Speed Relay #2 must still be actuating.</b> Turn the ignition on. With the DRBIII®, actuate the Low Speed Rad Fan Relay #1. <b>NOTE: Both Fans should be operating at high speed.</b> Is the Rad Fan #2 operation at high speed?  Yes → The High Speed Fans are operating normal at this time. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.  No → At the Rad Fan Control Relay #3 connector in the PDC check the ground circuit (Z1) for an open. If OK, replace the Rad Fan Control Relay #3. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All
3	Turn the ignition off. Disconnect the Rad Fan #1 harness connector. Measure the resistance between the Ground circuit in the Radiator Fan harness connector to ground. Is the resistance below 5.0 ohms?  Yes → Go To 4  No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.	All

## \*CHECKING RAD FAN HIGH SPEED OPERATION (TURBO) — Continued

TEST	ACTION	APPLICABILITY
4	<p>Disconnect the Rad Fan #1 harness connector.  Turn the ignition on.  With the DRBIII®, actuate the High Speed Rad Fan Relay #2.  Measure the voltage of the Radiator Fan Relay Output circuit in the Radiator Fan harness connector.  Is the voltage above 11.0 volts?</p> <p>Yes → Replace the Radiator Fan Assembly.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p>Turn the ignition off.  Remove the High Speed Rad Fan Relay #2 from the PDC.  Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC.  Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Turn the ignition off.  Remove the High Speed Rad Fan Relay from the PDC.  Disconnect the Rad Fan #1 harness connector.  Measure the resistance of the High Speed Rad Fan Relay Output circuit between the PDC and the Radiator Fan harness connector.  Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Radiator Fan Relay.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Repair the High Speed Rad Fan Relay Output circuit for an open.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All



**Symptom:****\*CHECKING RAD FAN LOW SPEED OPERATION (TURBO)**

POSSIBLE CAUSES
FUSED B+ CIRCUIT OPEN
LOW SPEED FANS OPERATION
RADIATOR FAN RELAY #3
LOW SPEED RAD FAN OUTPUT SHORTED TO GROUND BETWEEN RELAY #2 AND FAN #2
LOW SPEED RAD FAN OUTPUT SHORTED TO GROUND FAN#2 AND RELAY #3
RAD FAN #1 SHORTED INTERNALLY
RADIATOR FAN RELAY 1 OR 3
LOW SPEED RAD OUTPUT CIRCUIT SHORTED TO GROUND BETWEEN RELAY #3 AND FAN#1
GROUND CIRCUIT OPEN
RAD FAN #1 OPEN
RAD FAN #2 OPEN

TEST	ACTION	APPLICABILITY
1	<p>Turn the ignition on.            With the DRBIII®, actuate the Low Speed Rad Relay.            Observe the Radiator Fans.            Choose a conclusion that best match the Radiator Fans operation.</p> <p>Both Fans operation at at low speed            Low Speed Radiator Fans are operation normally at this time.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>Fan #2 operating only            Go To 2</p> <p>Fans not Operating            Go To 6</p>	All
2	<p>Using the DRBIII®, actuate the Low Speed Fan Relay #1.            Turn the ignition on.            Remove the Rad Fan Relay Control #3 from the PDC.            Did the Fan #2 stop operating?</p> <p>Yes → Replace the Rad Fan Relay Control #3.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 3</p>	All

**\*CHECKING RAD FAN LOW SPEED OPERATION (TURBO) — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.  Remove the Low Speed Rad Fan Relay #1 from the PDC.  Disconnect the Rad Fan #2 harness connector.  Measure the resistance between ground and the Low Speed Rad Fan Relay Output circuit at the Low Speed Rad Fan Relay #1 connector in the PDC.  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the Low Speed Rad Fan Output circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Remove the Rad Fan Control Relay #3 from the PDC.  Disconnect the Rad Fan #2 harness connector.  Measure the resistance between ground and the Low Speed Rad Fan Relay Output circuit at the Rad Fan Control Relay #3 connector in the PDC terminal  Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the short to ground in the Low Speed Rad Fan Output circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 5</p>	All
5	<p><b>NOTE: All relays and connectors reconnected.</b>  Turn the ignition on.  With the DRBIII®, actuate the Low Speed Rad Relay.  <b>WARNING: Keep hands away from the Rad Fan when it is operating.</b>  Disconnect the Rad Fan #1 harness connector.  Is the Fan #2 still operating?</p> <p>Yes → Repair the Low Speed Rad Fan Output circuit for a short to ground.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Replace the Rad Fan Assembly.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
6	<p>Remove the Low Speed Relay #1 from the PDC.  Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC.  Does the test light illuminate brightly?</p> <p>Yes → Go To 7</p> <p>No → Repair the open in the Fused B+ circuit.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
7	<p>Turn the ignition off.  Install a substitute relay in place of Radiator Fan Relay No. 1.  Turn the ignition on.  With the DRB, actuate the Low Speed Rad Fan Relay.  <b>NOTE: Repeat the test above if the Rad Fans did not operate.</b>  Did the Rad Fan operate normally when the relay(s) were substituted?</p> <p>Yes → Replace the Radiator Fan Relay that allowed the Fans to operate normally.  Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Go To 8</p>	All

**\*CHECKING RAD FAN LOW SPEED OPERATION (TURBO) — Continued**

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.            Disconnect the Rad Fan #1 harness connector.            Measure the resistance of the ground circuit in the Rad Fan #1 harness connector to ground.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 9</p> <p>No → Repair the open in the Ground circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All
9	<p>Remove the Rad Fan Relay #3 from the PDC.            Turn the ignition on.            With the DRBIII®, actuate the Low Speed Rad Fan Relay#1.            Using a fused jumper wire connected to ground, probe the Low Speed Rad Relay Output in the Rad Fan Control Relay #3.            Does the Rad Fan #2 operate?</p> <p>Yes → Check for an open between the Relay #3 and the Rad Fan #1 in the Relay Output circuit. If OK, replace the Rad Fan Assembly.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p> <p>No → Check for an open between the Relay #2 and Relay #3 in the Relay Output circuit. If OK, replace the Rad Fan Assembly.            Perform POWERTRAIN VERIFICATION TEST VER - 5 - NGC.</p>	All

## Symptom:

### \*CHECKING RADIATOR FAN RELAY OUTPUT

POSSIBLE CAUSES
RADIATOR FAN RELAY OPERATION GROUND CIRCUIT OPEN RADIATOR FAN MOTOR FUSED B+ CIRCUIT RADIATOR FAN RELAY OUTPUT CIRCUIT RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan actuating?  Yes → The Radiator Fan System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.  No → Go To 2	All
2	Turn the ignition off. Disconnect the Radiator Fan harness connector. Measure the resistance between the Ground circuit in the Radiator Fan harness connector to ground. Is the resistance below 5.0 ohms?  Yes → Go To 3  No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
3	Disconnect the Radiator Fan harness connector. Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Measure the voltage of the Radiator Fan Relay Output circuit in the Radiator Fan harness connector. Is the voltage above 11.0 volts?  Yes → Replace the Radiator Fan Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.  No → Go To 4	All
4	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly?  Yes → Go To 5  No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All

**\*CHECKING RADIATOR FAN RELAY OUTPUT — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Disconnect the Radiator Fan harness connector. Measure the resistance of the Radiator Fan Relay Output circuit between the PDC and the Radiator Fan harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Repair the Radiator Fan Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

## Symptom:

### \*CHECKING THE A/C RELAY OUTPUT

POSSIBLE CAUSES
A/C CLUTCH RELAY OPERATION (Z1) GROUND CIRCUIT OPEN A/C CLUTCH (A17) FUSED B+ CIRCUIT (C3) A/C CLUTCH OUTPUT CIRCUIT A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.</b></p> <p>Turn the ignition on.  With the DRBIII®, actuate the A/C Clutch Relay.  Is the A/C Clutch actuating?</p> <p>Yes → The A/C Clutch System operating properly at this time.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 2</p>	All
2	<p>Turn the ignition off.  Disconnect the A/C Clutch harness connector.  Measure the (Z1) Ground circuit in the A/C Clutch harness connector to ground.  Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 3</p> <p>No → Repair the (Z1) Ground circuit for an open.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
3	<p>Disconnect the A/C Clutch harness connector.  Turn the ignition on.  With the DRBIII®, actuate the A/C Clutch Relay.  Measure the voltage of the A/C Clutch Relay Output circuit in the (C3) A/C Clutch harness connector.  Is the voltage above 11.0 volts?</p> <p>Yes → Replace the A/C Clutch.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Go To 4</p>	All
4	<p>Turn the ignition off.  Remove the A/C Clutch Relay from the PDC.  Using a 12-volt test light connected to ground, probe the (A17) Fused B+ circuit in the PDC.  Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the (A17) Fused B+ circuit. Inspect fuses and replace as necessary.  Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

**\*CHECKING THE A/C RELAY OUTPUT — Continued**

TEST	ACTION	APPLICABILITY
5	<p>Turn the ignition off. Disconnect the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the resistance of the (C3) A/C Clutch Relay Output circuit between the PDC and the A/C Clutch harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Repair the (C3) A/C Clutch Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

### **Symptom List:**

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

---

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

---

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

#### **ANTENNA FAILURE**

When Monitored: Every 250 milliseconds with the ignition on.

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

#### **COP FAILURE**

When Monitored: With the ignition on.

Set Condition: The COP timer is not reset by the micro controller every 65.5 milliseconds.

#### **EEPROM FAILURE**

When Monitored: With the ignition on.

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

#### **INTERNAL FAULT**

When Monitored: With the ignition on.

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

#### **RAM FAILURE**

When Monitored: With the ignition on.

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

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

When Monitored: With the ignition on.

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

#### **STACK OVERFLOW FAILURE**

When Monitored: With the ignition on.

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



# ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	<p><b>Note: This trouble code indicates an internal SKIM fault.</b></p> <p>With the DRBIII®, read and record the SKIM DTCs and then erase the SKIM DTCs. Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle.</p> <p>With the DRBIII®, read the SKIM DTCs.</p> <p>Did the same SKIM DTC return?</p> <p>Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.</p> <p>No → Test Complete.</p>	All

## Symptom List:

**PCM STATUS FAILURE**  
**SERIAL LINK EXTERNAL FAULT**

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

## When Monitored and Set Condition:

### PCM STATUS FAILURE

When Monitored: With the ignition on.

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

### SERIAL LINK EXTERNAL FAULT

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

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

## POSSIBLE CAUSES

INTERMITTENT WIRING HARNESS PROBLEM

WIRING HARNESS INSPECTION

SKIM/PCM

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

PCM STATUS FAILURE — Continued

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

## Symptom List:

**ROLLING CODE FAILURE  
VIN MISMATCH**

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

## When Monitored and Set Condition:

### ROLLING CODE FAILURE

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

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

### VIN MISMATCH

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

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

## POSSIBLE CAUSES

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

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

## ROLLING CODE FAILURE — Continued

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

### Symptom List:

**TRANSPONDER COMMUNICATION FAILURE**

**TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE**

**TRANSPONDER ID MISMATCH**

**TRANSPONDER RESPONSE MISMATCH**

---

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

---

### When Monitored and Set Condition:

#### **TRANSPONDER COMMUNICATION FAILURE**

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

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

#### **TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE**

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

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

#### **TRANSPONDER ID MISMATCH**

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

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

#### **TRANSPONDER RESPONSE MISMATCH**

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

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

---

### **POSSIBLE CAUSES**

CHECKING MULTIPLE KEY OPERATION

SKIM

INTERMITTENT WIRING HARNESS PROBLEM

REPLACE IGNITION KEY

---

**TRANSPONDER COMMUNICATION FAILURE — Continued**

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

## TRANSPONDER COMMUNICATION FAILURE — Continued

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



**Symptom:****\*CHECKING FUEL DELIVERY**

POSSIBLE CAUSES
FUEL PUMP RELAY FUEL PRESSURE OUT OF SPECS RESTRICTED FUEL SUPPLY LINE FUEL PUMP INLET STRAINER PLUGGED FUEL PUMP MODULE FUEL DELIVERY SYSTEM OPERATION FUEL PUMP RELAY FUSED B+ CIRCUIT (A141) FUEL PUMP RELAY OUTPUT CIRCUIT OPEN (Z1) FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. <b>Note: It may be necessary to use a mechanics stethoscope in the next step.</b> Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate?  Yes → Go To 2 No → Go To 5  <b>Caution: Stop All Actuations.</b>	All
2	Turn the ignition off. <b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b> Install a fuel gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. <b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b> Choose a conclusion that best matches your fuel pressure reading.  Below Specification Go To 3  Within Specification The Fuel Delivery System is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 1.  Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1.  <b>Caution: Stop All Actuations.</b>	All

**\*CHECKING FUEL DELIVERY — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.</p> <p>Attach a fuel pressure test gauge to the T fitting on the tool #6539</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Is the fuel pressure within specification now?</p> <p>Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p> <p><b>Caution: Stop All Actuations.</b></p>	All
4	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
5	<p>Turn the ignition off.</p> <p>Disconnect the fuel pump module harness connector.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p>Using a 12 volt test light connected to ground, probe the (A141) Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 6</p> <p>No → Go To 8</p> <p><b>Caution: Stop All Actuations.</b></p>	All
6	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Pump Module harness connector.</p> <p><b>Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.</b></p> <p>Using a test light connected to battery voltage, probe the (Z1) Fuel Pump ground circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 7</p> <p>No → Repair the open/high resistance in the (Z1) fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**\*CHECKING FUEL DELIVERY — Continued**

TEST	ACTION	APPLICABILITY
7	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Fuel Pump Module.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
8	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC.</p> <p>Does the test light illuminate?</p> <p>Yes → Go To 9</p> <p>No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
9	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>Disconnect the Fuel Pump Module harness connector.</p> <p><b>NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities</b></p> <p>Measure the resistance of the (A141) Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector.</p> <p>Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Fuel Pump Relay.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the (A141) Fuel Pump Relay Output circuit for an open.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### \*CHECKING FUEL PRESSURE LEAK DOWN

POSSIBLE CAUSES
CHECKING FUEL PRESSURE
FUEL PUMP MODULE
CHECKING FUEL LEAK DOWN

TEST	ACTION	APPLICABILITY
1	<p><b>Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge.</p> <p>Start the engine and observe the fuel pressure reading.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Turn the ignition off.</p> <p>Monitor the fuel pressure gauge for a minimum of 5 minutes.</p> <p><b>NOTE: The pressure should not fall below 241 KPa (35 psi)</b></p> <p>Does the fuel pressure gauge fall below the above specification?</p> <p>Yes → Go To 2</p> <p>No → Fuel System is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All
2	<p><b>NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.</b></p> <p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install special 5/16 fuel line adapter tool #6539.</p> <p>Attach a fuel pressure test gauge to the T fitting on the tool #6539</p> <p>Start the engine and allow the fuel system to reach maximum pressure.</p> <p>Turn the ignition off.</p> <p><b>NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Using special tool #C4390, Hose Clamp Pliers, slowly clamp off the rubber hose on the Fuel Pressure adapter between the fuel pressure gauge and the engine.</p> <p>Monitor the fuel pressure gauge for a minimum of 5 minutes.</p> <p><b>NOTE: The pressure should not fall below 241 KPa (35 psi)</b></p> <p>Does the fuel pressure gauge fall below the above specification?</p> <p>Yes → Check the Fuel Delivery System between the fuel gauge and the fuel pump module. Inspect the seal points and the fuel lines for signs of fuel leakage. Repair/Replace as necessary. If OK, replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p> <p>No → Check the Fuel Delivery System between the fuel gauge and the fuel pump module. Inspect the seal points and the fuel lines for signs of fuel leakage. Repair/Replace as necessary. If OK, replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.</p>	All

**Symptom:****\*ENGINE CRANKS DOES NOT START****POSSIBLE CAUSES**

NO START PRE-TEST  
POWERTRAIN FUSES OPEN  
FUEL PRESSURE OUT OF SPECS  
RESTRICTED FUEL SUPPLY LINE  
FUEL PUMP INLET STRAINER PLUGGED  
FUEL PUMP MODULE  
FUEL PUMP RELAY FUSED B+ CIRCUIT  
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN  
FUEL PUMP RELAY  
FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE  
FUEL PUMP MODULE  
5 VOLT SUPPLY CIRCUIT  
CKP SENSOR SIGNAL CIRCUIT OPEN  
CKP SENSOR SIGNAL CIRCUIT SHORTED GROUND  
CKP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
CKP SENSOR SIGNAL SHORTED TO 5 VOLT SUPPLY CIRCUIT  
SENSOR GROUND CIRCUIT OPEN  
ASD RELAY OUTPUT CIRCUIT  
CRANKSHAFT POSITION SENSOR  
IGNITION COIL  
IGNITION COIL DRIVER CIRCUIT OPEN  
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND  
PCM - COIL  
PCM - CKP SENSOR SIGNAL  
OTHER POSSIBLE CAUSES FOR NO START

## \*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
1	<p><b>Note: The following list of items must be checked before continuing with any no start tests.</b></p> <p>The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok.</p> <p>Make sure the PCM communicates with the DRBIII® and that there are no DTC's stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests.</p> <p>Read the PCM DTC's with the DRBIII®. If any DTC's are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM.</p> <p>Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and SKIM. If you are unable to establish communicate refer to the Communication category for the proper symptoms.</p> <p>The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). repair the DTC(s) before continuing.</p> <p>If no DTC's are found, using the DRBIII® select Clear PCM (Batt Disconnect).</p> <p>Crank the engine several times. Using the DRBIII®, read DTC's. If a DTC is present perform the DTC diagnostics before continuing.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 2</p>	All
2	<p>Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition.</p> <p>Are any of the fuses open?</p> <p>Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors, repair as necessary. Replace the Fuse. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p><b>Note: It may be necessary to use a mechanics stethoscope in the next step.</b></p> <p>Listen for fuel pump operation at the fuel tank.</p> <p>Does the Fuel Pump operate?</p> <p>Yes → Go To 4</p> <p>No → Go To 24</p> <p><b>Caution: Stop All Actuations.</b></p>	All

**\*ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
4	<p><b>NOTE: Repeat the following test at each Ignition wire. If spark is not present or is weak on only one or two Ignition wires, the problem may be the Ignition wire. Inspect all Ignition wires for proper operation.</b></p> <p>Turn the ignition off.            Disconnect the #1 Ignition wire.            Connect a spark plug tester to the end of the Ignition wire.            While cranking the engine, observe the spark tester.            Is spark present?</p> <p>Yes → Go To 5            No → Go To 9</p>	All
5	<p>Turn the ignition off.  <b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b>            Install a fuel pressure gauge.            Turn the ignition on.            With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.  <b>NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi).</b>            Choose a conclusion that best matches your fuel pressure reading.</p> <p>Below Specification            Go To 6</p> <p>Within Specification            Go To 8</p> <p>Above Specification            Replace the fuel filter/fuel pressure regulator.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p><b>Caution: Stop All Actuations.</b></p>	All
6	<p>Turn the ignition off.  <b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b>            Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.            Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.            Attach a fuel pressure test gauge to the T fitting on the tool #6539            Turn the ignition on.            With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.  <b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b>            Is the fuel pressure within specification now?</p> <p>Yes → Repair/replace fuel supply line as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 7</p> <p><b>Caution: Stop All Actuations.</b></p>	All

## \*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p>Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
8	<p>The following items need to be checked as a possible cause for a no start condition. Refer to any Technical Service Bulletins that may apply to the symptom.</p> <p>The spark plugs must be free from fuel, oil, coolant and/or any foreign material or deposits.</p> <p>The fuel must be free from contamination.</p> <p>The exhaust may be free from restrictions.</p> <p>The engine compression must be within specifications.</p> <p>The engine valve timing must be within specifications.</p> <p>The engine must be free from vacuum leaks.</p> <p>Were any of the above conditions found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All
9	<p>Turn the ignition on.</p> <p>With the DRBIII® in Sensors, select the RPM parameter.</p> <p>While cranking the engine monitor the RPM parameter.</p> <p>Does the DRBIII® display a RPM reading greater than 50 RPM and steady?</p> <p>Yes → Go To 10</p> <p>No → Go To 15</p>	All
10	<p>Turn the ignition off.</p> <p>Disconnect the Ignition Coil harness connector.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Relay.</p> <p>Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the Ignition Coil harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 11</p> <p>No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
11	<p>Turn the ignition off.</p> <p>Disconnect the Ignition Coil harness connector.</p> <p>Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Driver circuit.</p> <p>Crank the engine for 5 second while observing the test light.</p> <p>Does the test light blink/flicker?</p> <p>Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 12</p>	All



**\*ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ignition Coil driver circuit between the Ignition Coil harness connector and the PCM harness connector. Is the resistance below 5.0 ohms?  Yes → Go To 13  No → Repair the Ignition Coil driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
13	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ignition Coil driver circuit in the Ignition Coil harness connector. Is the resistance below 100k ohms?  Yes → Repair the Ignition Coil driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1.  No → Go To 14	All
14	If there are no possible causes remaining, view repair.  Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
15	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts?  Yes → Go To 16  No → Repair the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
16	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts?  Yes → Go To 17  No → Go To 19	All
17	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance between ground and the Sensor Ground circuit at the CKP Sensor harness connector. Is the resistance below 100 ohms?  Yes → Go To 18  No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

## \*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
18	<p><b>NOTE: Inspect the slots on the crank, tone wheel, for damage. If a problem is found repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
19	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connectors.            Measure the resistance of the CKP Sensor Signal circuit from the CKP Sensor harness connector to the PCM harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 20</p> <p>No → Repair the CKP Sensor Signal circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
20	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Measure the resistance between ground and the CKP Sensor Signal circuit at the CKP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the CKP Sensor Signal circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 21</p>	All
21	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Turn the ignition on.            Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector.            Is the voltage above 4.7 volts?</p> <p>Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 22</p>	All
22	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector(s).            Measure the resistance between the CKP Sensor Signal circuit and the 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the CKP Sensor Signal circuit shorted to the 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 23</p>	All

**\*ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
23	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
24	<p>Turn the ignition off.</p> <p>Disconnect the fuel pump module harness connector.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p>Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 25</p> <p>No → Go To 27</p> <p><b>Caution: Stop All Actuations.</b></p>	All
25	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Pump Module harness connector.</p> <p><b>Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.</b></p> <p>Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 26</p> <p>No → Repair the open/high resistance in the fuel pump ground circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
26	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Fuel Pump Module.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
27	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC.</p> <p>Does the test light illuminate?</p> <p>Yes → Go To 28</p> <p>No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**\*ENGINE CRANKS DOES NOT START — Continued**

TEST	ACTION	APPLICABILITY
28	<p>Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. <b>NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities</b> Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**Symptom:****\*ENGINE CRANKS DOES NOT START - 1.6L****POSSIBLE CAUSES**

FUEL PUMP RELAY  
NO START PRE-TEST  
OTHER POSSIBLE CAUSES FOR NO START  
POWERTRAIN FUSES OPEN  
FUEL PRESSURE OUT OF SPECS  
RESTRICTED FUEL SUPPLY LINE  
FUEL PUMP INLET STRAINER PLUGGED  
FUEL PUMP MODULE  
FUEL PUMP RELAY FUSED B+ CIRCUIT  
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN  
FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE  
FUEL PUMP MODULE  
5 VOLT SUPPLY CIRCUIT  
CKP SENSOR SIGNAL CIRCUIT SHORTED GROUND  
CKP SENSOR SIGNAL CIRCUIT OPEN  
CKP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE  
CKP SENSOR SIGNAL SHORTED TO 5 VOLT SUPPLY CIRCUIT  
SENSOR GROUND CIRCUIT OPEN  
CRANKSHAFT POSITION SENSOR  
PCM - CKP SENSOR SIGNAL

**\*ENGINE CRANKS DOES NOT START - 1.6L — Continued**

TEST	ACTION	APPLICABILITY
1	<p><b>Note: The following list of items must be checked before continuing with any no start tests.</b></p> <p>The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok.</p> <p>Make sure the PCM communicates with the DRBIII® and that there are no DTC's stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests.</p> <p>Read the PCM DTC's with the DRBIII®. If any DTC's are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM.</p> <p>Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and SKIM. If you are unable to establish communicate refer to the Communication category for the proper symptoms.</p> <p>The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). repair the DTC(s) before continuing.</p> <p>If no DTC's are found, using the DRBIII® select Clear PCM (Batt Disconnect).</p> <p>Crank the engine several times. Using the DRBIII®, read DTC's. If a DTC is present perform the DTC diagnostics before continuing.</p> <p>Were any problems found?</p> <p>Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Go To 2</p>	All
2	<p>Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition.</p> <p>Are any of the fuses open?</p> <p>Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors, repair as necessary. Replace the Fuse. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Go To 3</p>	All
3	<p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p><b>Note: It may be necessary to use a mechanics stethoscope in the next step.</b></p> <p>Listen for fuel pump operation at the fuel tank.</p> <p>Does the Fuel Pump operate?</p> <p>Yes → Go To 4</p> <p>No → Go To 18</p> <p><b>Caution: Stop All Actuations.</b></p>	All

**\*ENGINE CRANKS DOES NOT START - 1.6L — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi).</b></p> <p>Choose a conclusion that best matches your fuel pressure reading.</p> <p style="padding-left: 40px;">Below Specification Go To 5</p> <p style="padding-left: 40px;">Within Specification Go To 7</p> <p style="padding-left: 40px;">Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p><b>Caution: Stop All Actuations.</b></p>	All
5	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.</p> <p>Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.</p> <p>Attach a fuel pressure test gauge to the T fitting on the tool #6539</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Is the fuel pressure within specification now?</p> <p style="padding-left: 40px;">Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p style="padding-left: 40px;">No → Go To 6</p> <p><b>Caution: Stop All Actuations.</b></p>	All
6	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p style="padding-left: 40px;">Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p style="padding-left: 40px;">No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All

## \*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
7	<p>Turn the ignition on.            With the DRBIII® in Sensors, select the RPM parameter.            While cranking the engine monitor the RPM parameter.            Does the DRBIII® display a RPM reading greater than zero?</p> <p>Yes → Go To 8            No → Go To 9</p>	All
8	<p>The following items need to be checked as a possible cause for a no start condition. Refer to any Technical Service Bulletins that may apply to the symptom.            The spark plugs must be free from fuel, oil, coolant and/or any foreign material or deposits.            The fuel must be free from contamination.            The exhaust may be free from restrictions.            The engine compression must be within specifications.            The engine valve timing must be within specifications.            The engine must be free from vacuum leaks.            Were any of the above conditions found?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.            No → Test Complete.</p>	All
9	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Turn the ignition on.            Measure the voltage of the 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the voltage between 4.8 and 5.2 volts?</p> <p>Yes → Go To 10            No → Repair the 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
10	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Turn the ignition on.            Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector.            Is the voltage between 4.5 and 5.0 volts?</p> <p>Yes → Go To 11            No → Go To 13</p>	All
11	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Measure the resistance between ground and the Sensor Ground circuit at the CKP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Go To 12            No → Repair the Sensor Ground circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All



**\*ENGINE CRANKS DOES NOT START - 1.6L — Continued**

TEST	ACTION	APPLICABILITY
12	<p><b>NOTE: Inspect the slots on the crank, tone wheel, for damage. If a problem is found repair as necessary.</b>            If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Crankshaft Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
13	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Measure the resistance between ground and the CKP Sensor Signal circuit at the CKP Sensor harness connector.            Is the resistance below 100 ohms?</p> <p>Yes → Repair the CKP Sensor Signal circuit for a short to ground.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Go To 14</p>	All
14	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connectors.            Measure the resistance of the CKP Sensor Signal circuit from the CKP Sensor harness connector to the PCM harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 15</p> <p>No → Repair the CKP Sensor Signal circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
15	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Turn the ignition on.            Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector.            Is the voltage above 4.7 volts?</p> <p>Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Go To 16</p>	All
16	<p>Turn the ignition off.            Disconnect the CKP Sensor harness connector.            Disconnect the PCM harness connector(s).            Measure the resistance between the CKP Sensor Signal circuit and the 5 Volt Supply circuit in the CKP Sensor harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Repair the CKP Sensor Signal circuit shorted to the 5 Volt Supply circuit.            Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Go To 17</p>	All

## \*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
17	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
18	<p>Turn the ignition off.</p> <p>Disconnect the fuel pump module harness connector.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test.</p> <p>Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 19</p> <p>No → Go To 21</p> <p><b>Caution: Stop All Actuations.</b></p>	All
19	<p>Turn the ignition off.</p> <p>Disconnect the Fuel Pump Module harness connector.</p> <p><b>Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.</b></p> <p>Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector.</p> <p>Does the test light illuminate brightly?</p> <p>Yes → Go To 20</p> <p>No → Repair the open/high resistance in the fuel pump ground circuit.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
20	<p>If there are no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace the Fuel Pump Module.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All
21	<p>Turn the ignition off.</p> <p>Remove the Fuel Pump Relay from the PDC.</p> <p>With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC.</p> <p>Does the test light illuminate?</p> <p>Yes → Go To 22</p> <p>No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All

**\*ENGINE CRANKS DOES NOT START - 1.6L — Continued**

TEST	ACTION	APPLICABILITY
22	<p>Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. <b>NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities</b> Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p> <p>No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.</p>	All

## STARTING

### Symptom:

#### \*NO CRANK CONDITION

POSSIBLE CAUSES
REPAIR MECHANICAL CONDITION
TRANSMISSION RANGE SENSOR
BATTERY CIRCUIT RESISTANCE TOO HIGH
IGNITION SWITCH OUTPUT CIRCUIT OPEN
STARTER RELAY CONTROL CIRCUIT OPEN
STARTER RELAY OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT (START) CIRCUIT OPEN
STARTER
STARTER MOTOR RELAY
STARTER RELAY

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: Check all PCM powers and grounds before continuing.</b></p> <p><b>NOTE: Ensure that SKIS is operating properly. Check the SKIM for DTC. If a SKIM DTC(s) is present diagnose them first before continuing.</b></p> <p><b>WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.</b></p> <p>Turn the engine over by hand to ensure the engine is not seized.</p> <p>Is the engine able to turn over?</p> <p>Yes → Go To 2</p> <p>No → Repair the mechanical condition preventing the starter motor from cranking.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Turn the ignition off.</p> <p>Disconnect the PCM harness connectors.</p> <p>Move the Gear selector through all gear positions, from Park to 1st and back.</p> <p>While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit.</p> <p>Did the resistance change from above 10.0 ohms to below 10.0 ohms?</p> <p>Yes → Go To 3</p> <p>No → Replace the Transmission Range Sensor.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition off.</p> <p>Check the Battery Cables for high resistance using the service information procedure.</p> <p>Did either Battery Cable have a voltage drop greater than 0.2 volt?</p> <p>Yes → Repair the Battery circuit for high resistance.</p> <p>Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Go To 4</p>	All

**\*NO CRANK CONDITION — Continued**

TEST	ACTION	APPLICABILITY
4	<p>Turn the ignition off. Disconnect the PCM harness connector. <b>CAUTION: DO NOT PROBE THE PCM HARNESS CONNECTORS. PROBING THE PCM HARNESS CONNECTORS WILL DAMAGE THE PCM TERMINALS RESULTING IN POOR TERMINAL TO PIN CONNECTION. INSTALL MILLER SPECIAL TOOL #8815 TO PERFORM DIAGNOSIS.</b> Turn the ignition to the Start position. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Start) circuit in the appropriate terminal of special tool #8815. Does the test light illuminate brightly?</p> <p>Yes → Go To 5</p> <p>No → Repair the Fused Ignition Switch (Start) circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
5	<p>Turn ignition off. Remove the Starter Relay from PDC. <b>WARNING: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission, manual Transmission must be in neutral.</b> <b>Warning: The engine may be cranked in the next step. Keep away from moving engine parts.</b> Briefly connect a jumper wire between Starter Relay B+ circuit and the Starter Relay Output Circuits. Did the Starter Motor crank the engine?</p> <p>Yes → Go To 6</p> <p>No → Go To 9</p>	All
6	<p>Turn the ignition off. Remove the Starter Relay from the PDC. Turn the ignition on. Using a 12-volt test light, probe the Ignition Switch Output circuit in the Starter Relay connector. While observing 12-volt test light, hold ignition key in the start position. Does the test light illuminate brightly?</p> <p>Yes → Go To 7</p> <p>No → Repair the Ignition Switch Output circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
7	<p>Turn the ignition off. Remove the Starter Relay from the PDC. Disconnect the PCM harness connector. Measure the Starter Relay Control circuit between the Relay terminal and the PCM harness connector. Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 8</p> <p>No → Repair the Starter Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## \*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	<p>Turn the ignition off.            Install a substitute a Relay in the of the Starter Motor Relay.            Attempt to start the vehicle.            Does the engine crank over?</p> <p>Yes → Replace the Starter Motor Relay.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
9	<p>Turn ignition off.            Remove the Starter Relay from the PDC.            Disconnect the Starter Relay Output connector from the Starter Solenoid.            Measure the resistance of the Starter Relay Output circuit between the Relay and the Solenoid harness connector.            Is the resistance below 5.0 ohms?</p> <p>Yes → Go To 10</p> <p>No → Repair Starter Relay Output circuit for an open.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
10	<p>Turn the ignition off.            Remove the Starter Relay from the PDC.            Using a 12-volt test light connected to ground, probe the Fused B+ circuit at the Starter Relay terminal.            Does the test light illuminate brightly?</p> <p>Yes → Go To 11</p> <p>No → Repair the Fused B(+) Circuit for an open or high resistance.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
11	<p>If there are no other possible causes remaining, review repair.</p> <p>Repair</p> <p>Replace the Starter.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

**Symptom:****\*NO RESPONSE FROM PCM WITH A NO START CONDITION****POSSIBLE CAUSES**

PCM FUSED B+ CIRCUIT  
 PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT  
 PCM GROUND CIRCUITS  
 PCM

TEST	ACTION	APPLICABILITY
1	<p><b>NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.</b>  <b>NOTE: Ensure the ignition switch was on when trying to communicate with the PCM.</b>            Turn the ignition off.            Disconnect the PCM harness connector.            Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 2            No → Repair the Fused B+ circuit.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
2	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Turn the ignition on.            Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 3            No → Repair the Ignition Switch Output circuit            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
3	<p>Turn the ignition off.            Disconnect the PCM harness connector.            Using a 12-volt test light connected to battery voltage, probe all the PCM ground circuits in the PCM harness connector.            Does the test light illuminate brightly?</p> <p>Yes → Go To 4            No → Repair the PCM ground circuits.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
4	<p>If there is no possible causes remaining, view repair.</p> <p>Repair</p> <p>Replace and program the Powertrain Control Module in accordance with the Service Information.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## Symptom:

### \*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
FUEL PRESSURE OUT OF SPECS
TP SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR OPERATION
OTHER POSSIBLE CAUSES FOR START & STALL
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are any DTCs present?  Yes → Refer to the Driveability Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.  No → Go To 2	All
2	Turn the ignition on. <b>NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.</b> With the DRBIII®, read the SKIM codes. Are there any SKIM DTCs?  Yes → Refer to the Vehicle Theft category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.  No → Go To 3	All



**\*START AND STALL CONDITION — Continued**

TEST	ACTION	APPLICABILITY
3	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Install a fuel pressure gauge.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Choose a conclusion that best matches your fuel pressure reading.</p> <p style="padding-left: 40px;">Below Specification Go To 4</p> <p style="padding-left: 40px;">Within Specification Go To 6</p> <p style="padding-left: 40px;">Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p><b>Caution: Stop All Actuations.</b></p>	All
4	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.</p> <p>Install special 5/16 fuel line adapter tool #6539 between the disconnected fuel line and the fuel pump module.</p> <p>Attach a fuel pressure test gauge to the "T" fitting on tool #6539.</p> <p>Turn the ignition on.</p> <p>With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge.</p> <p><b>NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).</b></p> <p>Is the fuel pressure within specification now?</p> <p style="padding-left: 40px;">Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Go To 5</p> <p><b>Caution: Stop All Actuations.</b></p>	All
5	<p>Turn the ignition off.</p> <p><b>WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.</b></p> <p>Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.</p> <p>Is the Fuel Inlet Strainer plugged?</p> <p style="padding-left: 40px;">Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p style="padding-left: 40px;">No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All

## \*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
6	<p>Turn the ignition on.            With the DRBIII®, read TPS VOLTS.            While monitoring the DRBIII®, slowly open and close the Throttle.            Is the voltage change smooth?</p> <p>Yes → Go To 7</p> <p>No → Replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
7	<p>Turn the ignition on.            With the DRBIII®, read Throttle Position voltage. Throttle must be against stop.            Is the voltage 0.92 or less with the Throttle closed?</p> <p>Yes → Go To 8</p> <p>No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
8	<p><b>Note: For this test to be valid, the thermostat must be operating correctly.</b>  <b>Note: This test works best if performed on a cold engine (cold soaked).</b>  <b>NOTE: If the vehicle was allow to sit over night with no engine start, coolant temperature should be near ambient temperatures.</b></p> <p>Turn the ignition on.            With the DRBIII®, read the Engine Coolant Temperature value.  <b>Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.</b></p> <p>Start the engine.            During engine warm-up, monitor the Engine Coolant Temperature value. The temperature value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F).            Did the Engine Temperature value increase smoothly and did it reach at least 82° C (180° F)?</p> <p>Yes → Go To 9</p> <p>No → Replace the Engine Coolant Temperature Sensor.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p>	All
9	<p>The following additional items should be checked as a possible cause for a start and stall condition.            Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom.            Fuel must be free of contamination.            The exhaust system must be free of any restrictions.            The engine compression must be within specifications.            The engine valve timing must be within specifications.            The engine must be free from vacuum leaks.            The throttle body must be free of carbon buildup and dirt.            Do any of the above conditions exist?</p> <p>Yes → Repair as necessary.            Perform POWERTRAIN VERIFICATION TEST VER - 1.</p> <p>No → Test Complete.</p>	All

## Verification Tests

40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
<p><b>1. NOTE: After completion of the Transmission Verification Test, the Powertrain Verification Test must be performed. Refer to the Powertrain Category.</b></p> <p>2. Connect the DRBIII® to the Data Link Connector (DLC).</p> <p>3. Reconnect any disconnected components.</p> <p>4. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's.</p> <p>5. Perform *PRNDL FAULT CLEARING PROCEDURE after completion of repairs for P0706 CHECK SHIFTER SIGNAL.</p> <p>6. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT, above 43° C or 110° F.</p> <p>7. Check the transmission fluid and adjust if necessary. Refer to the Service Information for the Fluid Fill procedure.</p> <p><b>8. NOTE: If the Transmission Control Module or Torque Converter has been replaced, or if the Transmission has been repaired or replaced, it is necessary to perform the DRBIII® Quick Learn Procedure and reset the "Pinion Factor".</b></p> <p>9. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees.</p> <p>10. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown.</p> <p>11. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC is repaired.</p> <p>12. If equipped with AutoStick®, upshift and downshift several times using the AutoStick® feature during the road test.</p> <p><b>13. NOTE: Use the EATX OBDII task manager to run Good Trip time in each gear, this will confirm the repair and to ensure that the DTC has not re-matured.</b></p> <p>14. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test, return to the Symptom list and perform the appropriate symptom.</p> <p><b>15. NOTE: Erase P0700 DTC in the PCM to turn the MIL light off after making transmission repairs.</b></p> <p>Were there any Diagnostic Trouble Codes set during the road test?</p> <p>Yes → Repair is not complete, refer to the appropriate symptom.</p> <p>No → Repair is complete.</p>	All

BODY VERIFICATION TEST - VER 1	APPLICABILITY
<p>1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors.</p> <p><b>2. NOTE: If the SKIM or PCM was replaced, refer to the service information for proper programming procedures.</b></p> <p>3. If the Remote Keyless Entry module was replaced, using the DRBIII® select "Theft Alarm" "VTSS" "Miscellaneous" and "Configure Module". If the vehicle is equipped with VTSS, use the DRBIII® and enable VTSS.</p> <p>4. Program all RKE transmitters and other options as necessary.</p> <p>5. Ensure all accessories are turned off and the battery is fully charged.</p> <p>6. With the DRBIII®, record and erase all DTC's from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern.</p> <p>7. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTC's from ALL modules.</p> <p>Are any DTC's present or is the original condition still present?</p> <p>Yes → Repair is not complete, refer to the appropriate symptom.</p> <p>No → Repair is complete.</p>	All

## Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
<p><b>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</b></p> <p><b>2. NOTE: If the PCM has been replaced and the vehicle is equipped with a 2.4L Turbo, Manual Transmission, the Pinion Factor MUST be programmed into the PCM. Failure to do so will cause the speedometer to become inoperative or inaccurate.</b></p> <p><b>3. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></p> <p><b>4. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></p> <p>5. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>6. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary.</p> <p>7. Attempt to start the engine.</p> <p>8. If the No Start condition is still present, refer to the symptom list and perform the diagnostic testing as necessary. refer to and Technical Service Bulletins that may apply.</p> <p>9. Run the engine for one warm-up cycle to verify operation.</p> <p>10. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly.</p> <p>11. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	All

POWERTRAIN VERIFICATION TEST VER - 2 - NGC	APPLICABILITY
<p><b>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</b></p> <p><b>2. NOTE: If the PCM has been replaced and the vehicle is equipped with a 2.4L Turbo, Manual Transmission, the Pinion Factor MUST be programmed into the PCM. Failure to do so will cause the speedometer to become inoperative or inaccurate.</b></p> <p><b>3. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></p> <p><b>4. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></p> <p>5. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>6. With the DRBIII®, clear DTCs and Reset Memory all engine values.</p> <p>7. Run the engine for one warm-up cycle to verify proper operation.</p> <p>8. Road test the vehicle. Use all accessories that may be related to this repair.</p> <p>9. With the DRBIII®, confirm that no DTC's or Secondary Indicators are present and that all components are functioning properly.</p> <p>10. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present.</p> <p>11. If the symptom is still present, or any other symptom or DTC is present refer to the appropriate category and perform the corresponding symptom.</p> <p>12. Refer to any Technical Service Bulletins that may apply.</p> <p>13. If there are no DTCs present and all components are functional properly, the repair is complete.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	All

## Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 3 - NGC	APPLICABILITY
<p><b>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</b></p> <p><b>2. NOTE: If the PCM has been replaced and the vehicle is equipped with a 2.4L Turbo, Manual Transmission, the Pinion Factor MUST be programmed into the PCM. Failure to do so will cause the speedometer to become inoperative or inaccurate.</b></p> <p><b>3. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></p> <p><b>4. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></p> <p>5. Inspect the vehicle to ensure that all components related to the repair are connected properly.</p> <p>6. With the DRBIII®, clear DTCs.</p> <p>7. Perform generator output test. Refer to the appropriate service information as necessary.</p> <p>8. Start the engine and set engine speed to 2000 RPM for at least thirty seconds.</p> <p>9. Cycle the ignition key off and on.</p> <p>10. With the DRBIII®, read the DTCs. If the DTC returns, or any other symptom or DTC is present, refer to the appropriate category and perform the corresponding symptom.</p> <p>11. If there are no DTCs present and all components are functioning properly, the repair is complete.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>

## Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4 - NGC	APPLICABILITY
<p><b>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</b></p> <p><b>2. NOTE: If the PCM has been replaced and the vehicle is equipped with a 2.4L Turbo, Manual Transmission, the Pinion Factor MUST be programmed into the PCM. Failure to do so will cause the speedometer to become inoperative or inaccurate.</b></p> <p><b>3. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></p> <p><b>4. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></p> <p>5. Inspect the vehicle to ensure that all engine components are properly installed and connected.</p> <p>6. Connect the DRBIII® to the data link connector and erase all codes.</p> <p>7. Turn the speed control ON (if equipped, cruise light will be on).</p> <p>8. Press and release the SET Switch. If the speed control did not engage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>9. Press and hold the RESUME/ACCEL Switch. If the vehicle speed did not increase by at least 2 mph, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>10. Press and hold the COAST switch. The vehicle speed should decrease. If it did not decrease, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>11. Using caution, press and release the brake pedal. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>12. Bring the vehicle speed back up to 35 MPH.</p> <p>13. Press the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>14. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>15. Ensure vehicle speed is greater than 35 mph and release the SET Switch. If vehicle did not adjust and set a new vehicle speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>16. Press and release the CANCEL switch. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>17. Bring the vehicle speed back up above 35 mph and engage speed control.</p> <p>18. Turn the Speed Control Off. (Cruise light will be off). If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List.</p> <p>19. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete.</p> <p>Did the Speed Control pass the above test?</p> <p>Yes → Repair is complete.</p> <p>No → Repair is not complete, refer to appropriate symptom.</p>	<p>All</p>

## Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5 - NGC	APPLICABILITY
<p><b>1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed.</b></p> <p><b>2. NOTE: If the PCM has been replaced and the vehicle is equipped with a 2.4L Turbo, Manual Transmission, the Pinion Factor MUST be programmed into the PCM. Failure to do so will cause the speedometer to become inoperative or inaccurate.</b></p> <p><b>3. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></p> <p><b>4. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></p> <p><b>5. NOTE: When replacing an O2 Sensor, the PCM RAM memory must be cleared, either by disconnecting the PCM C-1 connector or momentarily disconnecting the battery negative terminal.</b></p> <p>6. The NGC (PCM) learns the characteristics of each O2 heater element and these old values should be cleared when installing a new O2 sensor. The customer may experience driveability issues if this is not performed.</p> <p>7. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.</p> <p>8. Connect the DRBIII® to the data link connector.</p> <p>9. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories.</p> <p>10. If a Comprehensive Component DTC was repaired, perform steps 5 - 8. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification.</p> <p>11. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes.</p> <p>12. If the Good Trip counter changed to one or more and there are no new DTC's, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®.</p> <p>13. If the repaired DTC has reset, the repair is not complete. Check for any related TSB's or flash updates and return to the Symptom list.</p> <p>14. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.</p> <p>15. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running).</p> <p>16. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®.</p> <p>17. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List.</p> <p>18. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.</p> <p>Are any DTCs present?</p> <p>Yes → Repair is not complete, refer to appropriate symptom.</p> <p>No → Repair is complete.</p>	<p>All</p>



## Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 6 - NGC	APPLICABILITY
<ol style="list-style-type: none"> <li>1. Install the Miller Tool #8404 Evaporative Emission Leak Detector (EELD). according to the instructions in the pervious DTC table.</li> <li>2. Set the smoke/air control switch to AIR.</li> <li>3. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).</li> <li>4. Press the remote smoke/air start button.</li> <li>5. Position the red flag on the air flow meter so it is aligned with the indicator ball.</li> <li>6. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM.</li> <li>7. Install the service port adapter #8404-14 on the vehicle's service port.</li> <li>8. Connect the Air supply hose from the EELD to the service port.</li> <li>9. Press the remote button to activate AIR flow.</li> <li><b>10. NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill.</b></li> <li>11. Compare the flow meter indicator ball reading to the red flag.</li> <li>12. ABOVE the red flag indicates a leak present.</li> <li>13. BELOW the red flag indicates a sealed system.</li> <li>14. If the indicator ball shows a leak present, perform the smoke test indicated in the previous test and identify the leak and repair. Perform this verification test when the repair is complete. Did the indicator ball indicate the a leak is present??</li> </ol> <p style="margin-left: 40px;">Yes → Repeat the DTC test to identify the leak and repair.</p> <p style="margin-left: 40px;">No → Repair is complete.</p>	All

POWERTRAIN VERIFICATION TEST VER-1 - 1.6L	APPLICABILITY
<ol style="list-style-type: none"> <li><b>1. NOTE: If the PCM has been replaced, it must be programmed with the latest calibration before continuing.</b></li> <li><b>2. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM.</b></li> <li><b>3. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.</b></li> <li>4. Inspect the vehicle to ensure that all components related to the repair are connected properly.</li> <li>5. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary.</li> <li>6. Attempt to start the engine.</li> <li>7. If the No Start condition is still present, refer to the symptom list and perform the diagnostic testing as necessary. refer to any Technical Service Bulletins that may apply.</li> <li>8. Run the engine for one warm-up cycle to verify operation.</li> <li>9. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly.</li> <li>10. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present?</li> </ol> <p style="margin-left: 40px;">Yes → Repair is not complete, refer to appropriate symptom.</p> <p style="margin-left: 40px;">No → Repair is complete.</p>	All



## Verification Tests — Continued

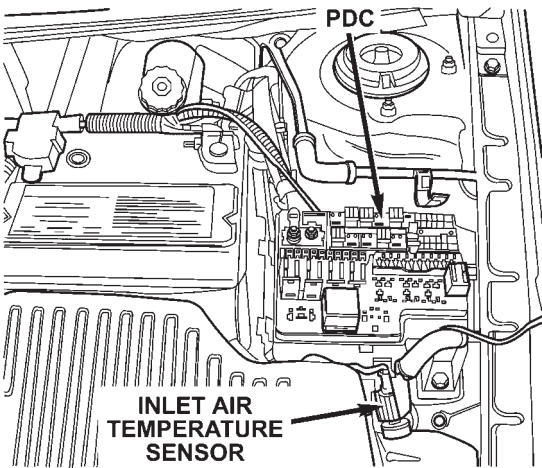
SKIS VERIFICATION	APPLICABILITY
<p>1. Reconnect all previously disconnected components and connectors.</p> <p>2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997).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

[illegible]

## 8.0 COMPONENT LOCATIONS

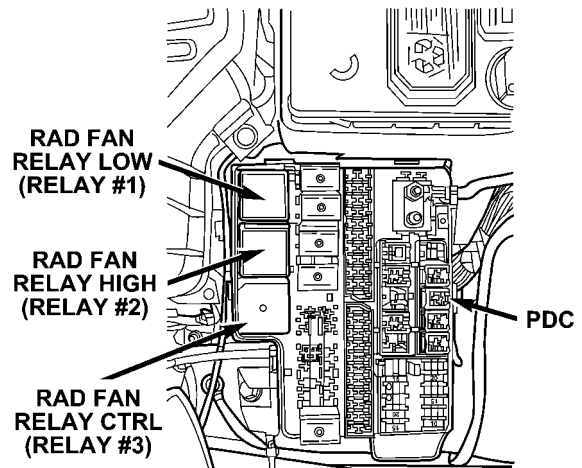
### 8.1 CONTROL MODULES AND PDC

2.0L

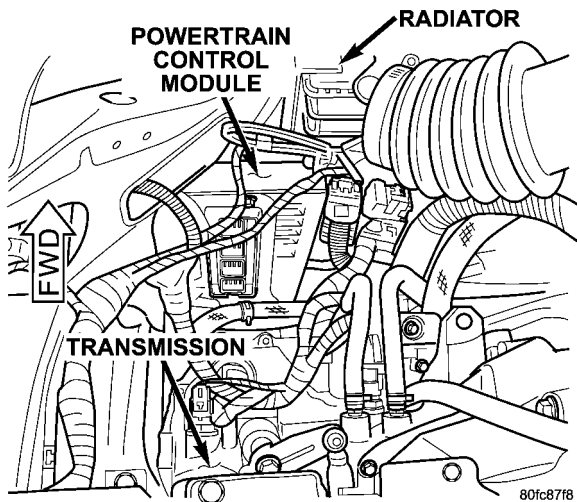


809658a5

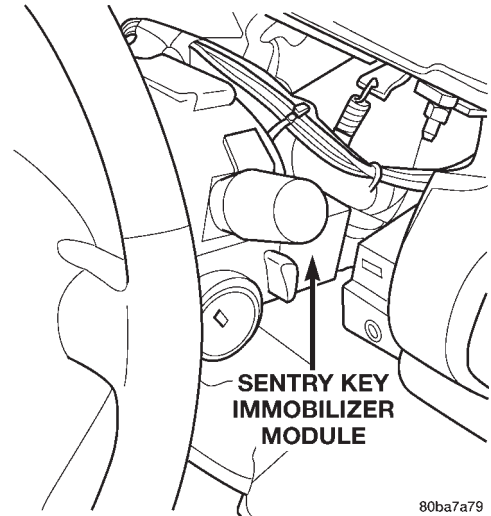
SRT-4



810a63c2



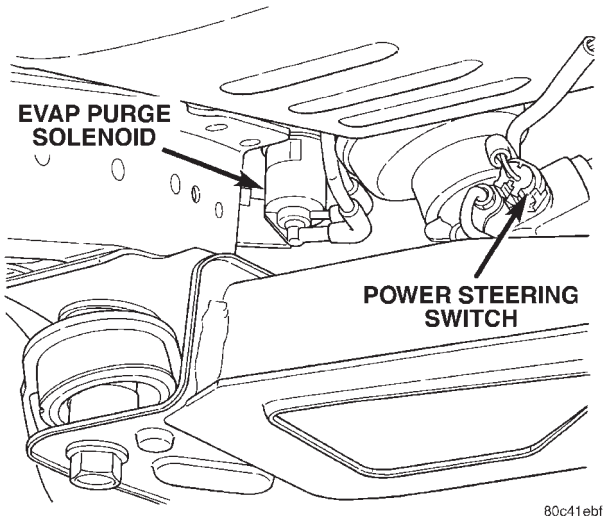
80fc87f8



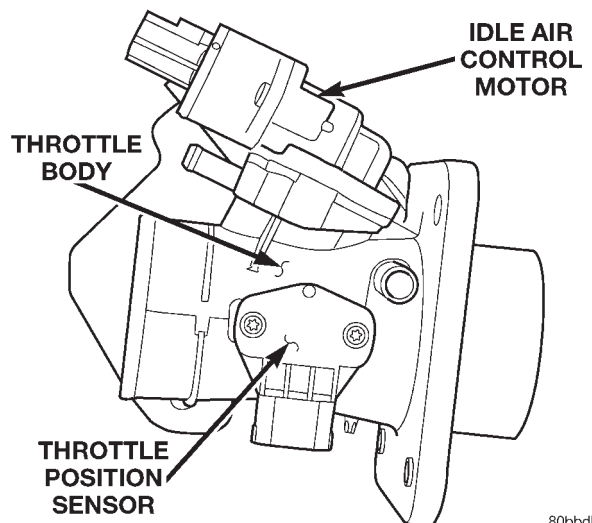
80ba7a79

### 8.2 CONTROLS AND SOLENOIDS

2.0L



80c41ebf

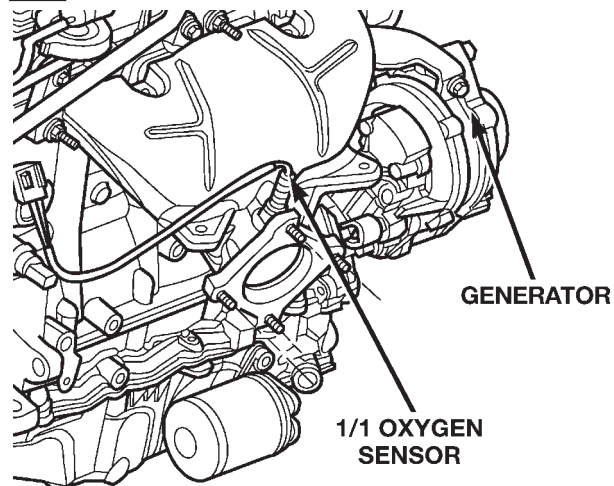


80bbdbd7

## COMPONENT LOCATIONS

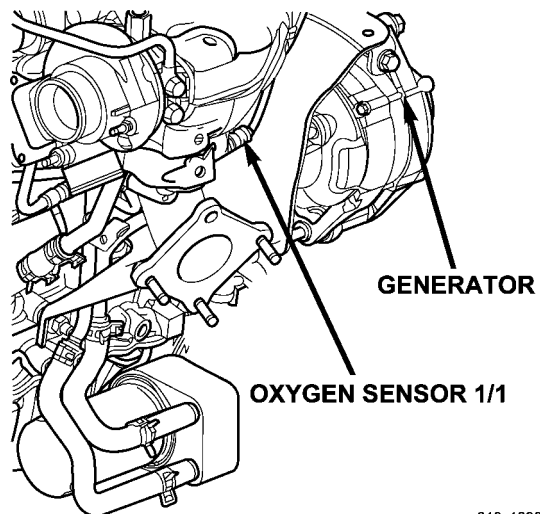
### 8.2 CONTROLS AND SOLENOIDS (Continued)

#### 2.0L



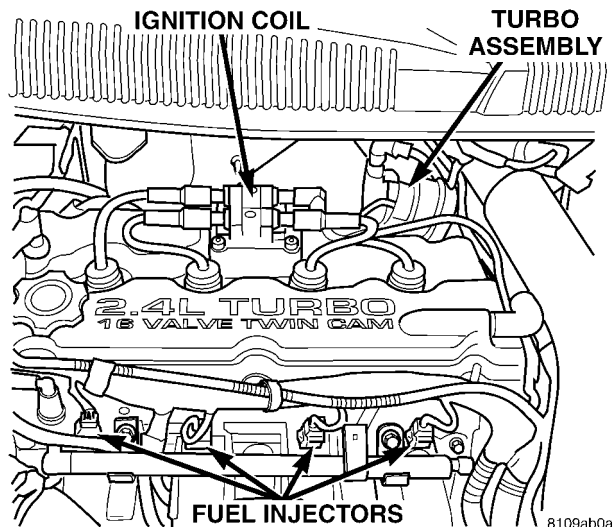
80c4b774

#### SRT-4



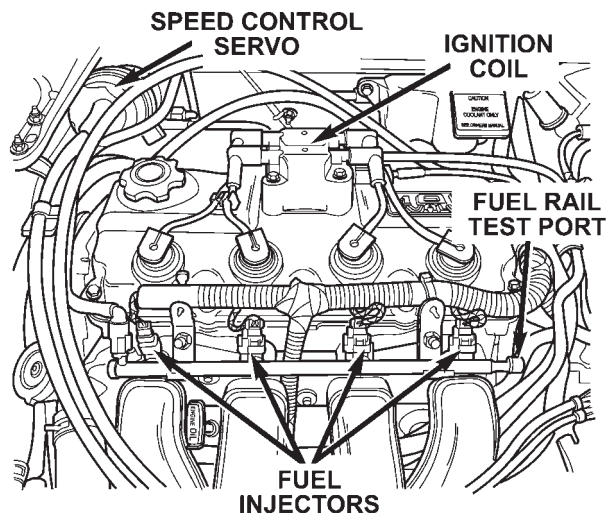
810c1390

#### SRT-4



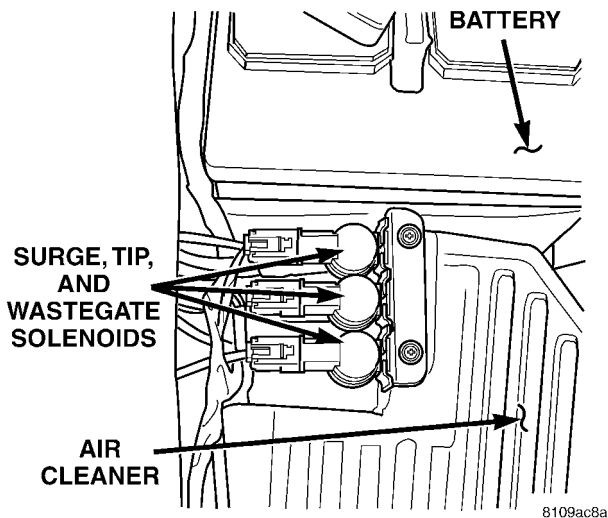
8109ab0a

#### 2.0L



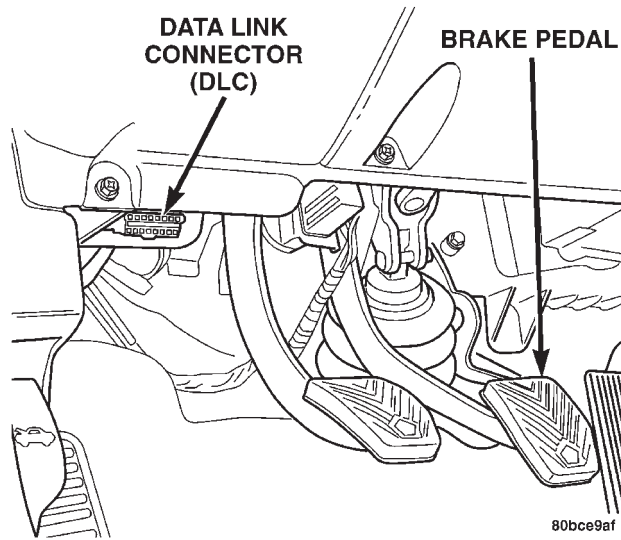
8096583a

#### SRT-4

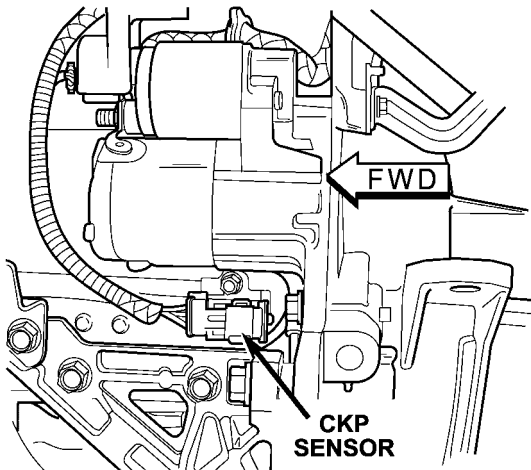


8109ac8a

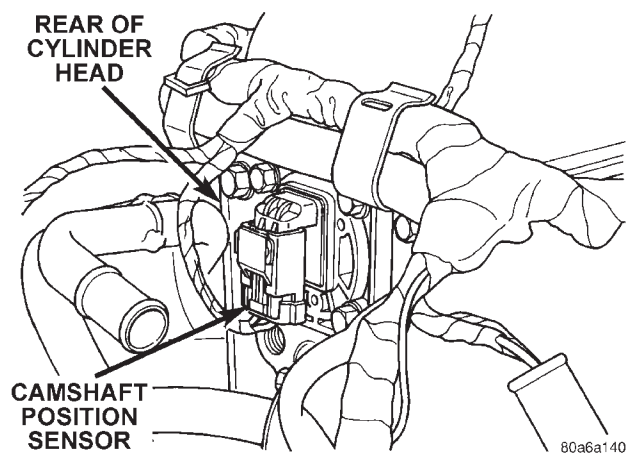
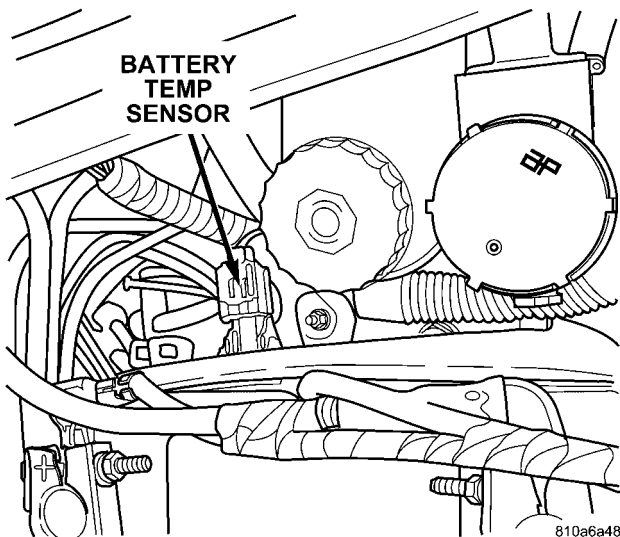
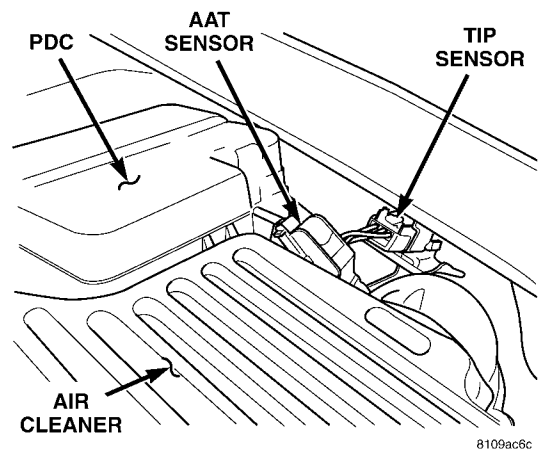
## 8.3 DATA LINK CONNECTOR



## 8.4 SENSORS



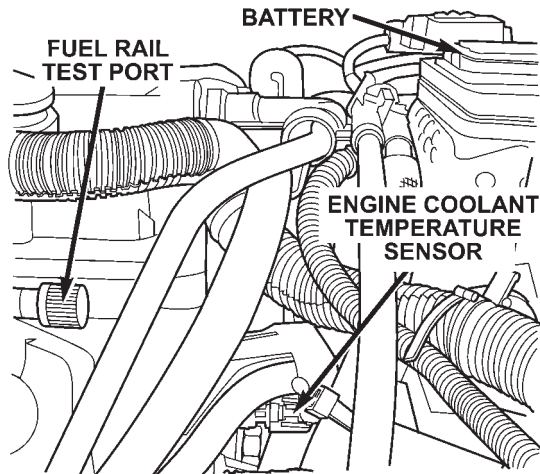
### SRT-4



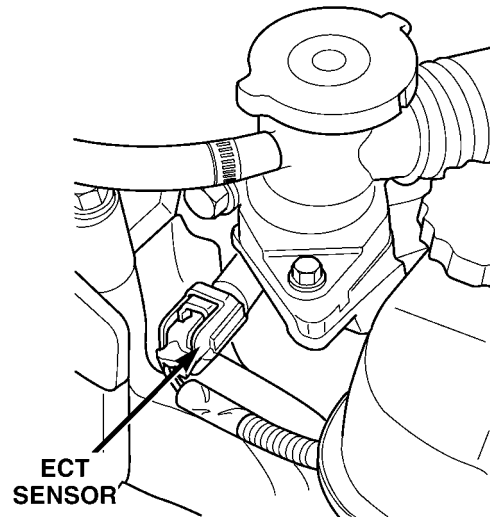
# COMPONENT LOCATIONS

## 8.4 SENSORS (Continued)

2.0L



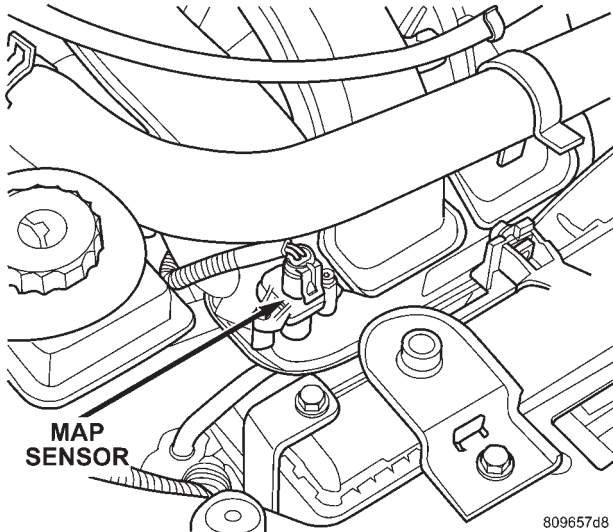
809666F3



8109ab29

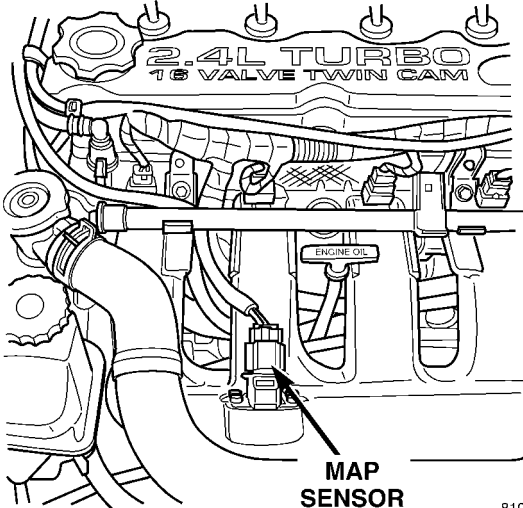
SRT-4

2.0L

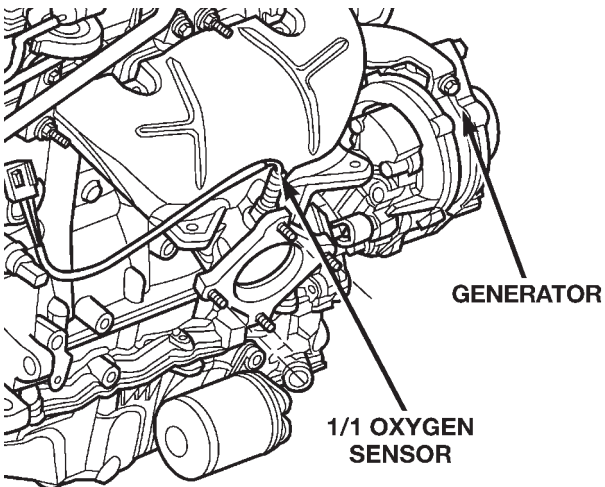


809657d8

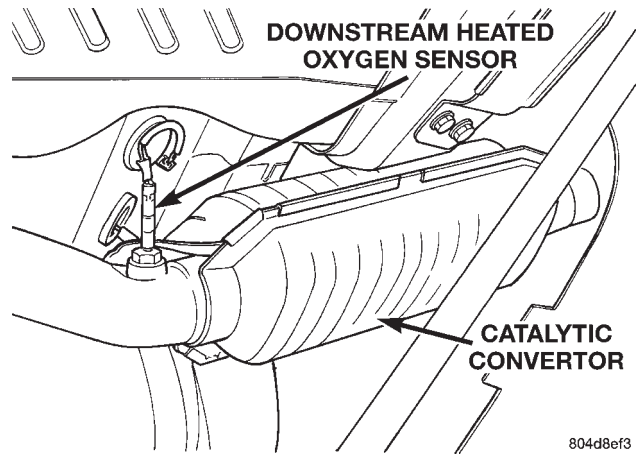
SRT-4



8109aae2



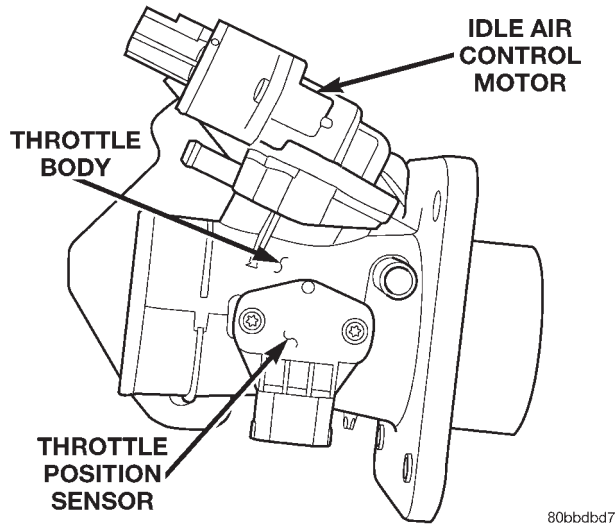
80c4b774



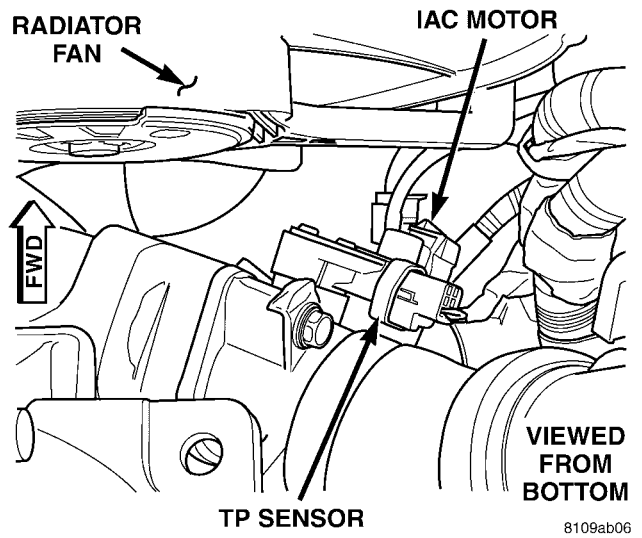
804d8ef3



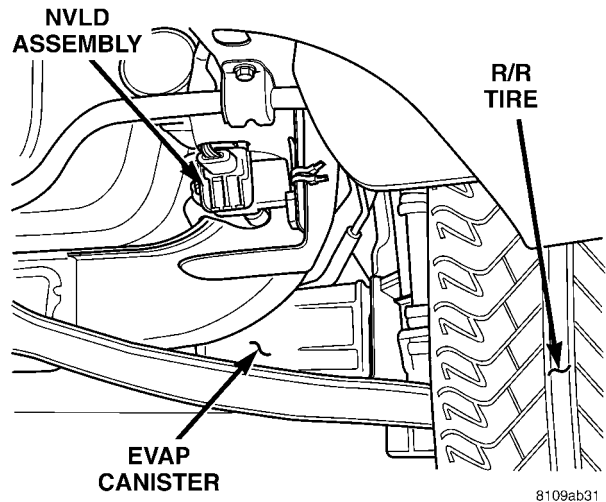
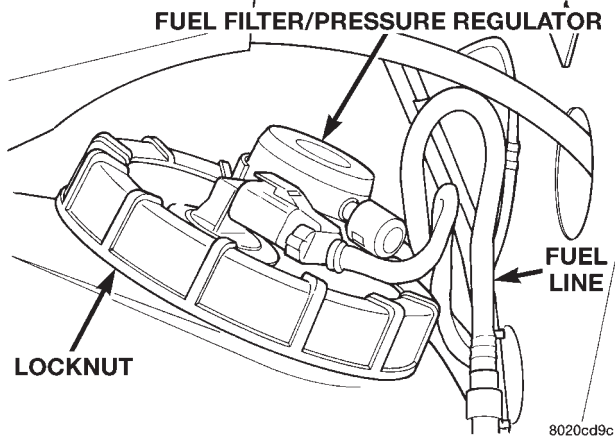
## 2.0L



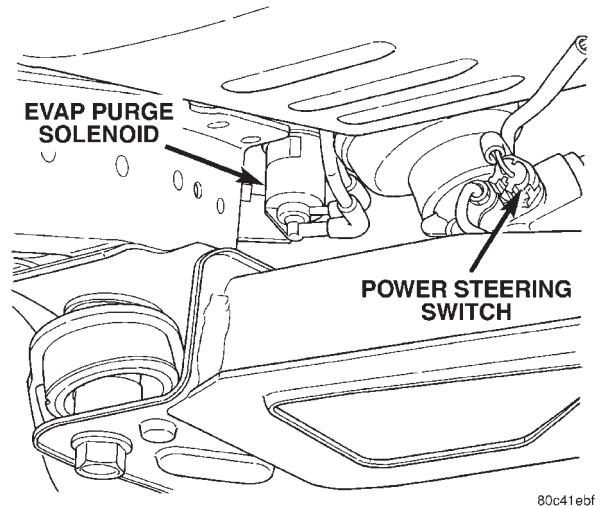
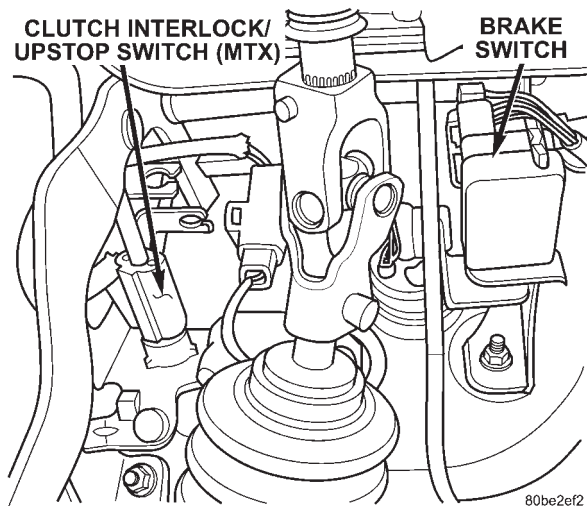
## SRT-4



## 8.5 FUEL SYSTEM



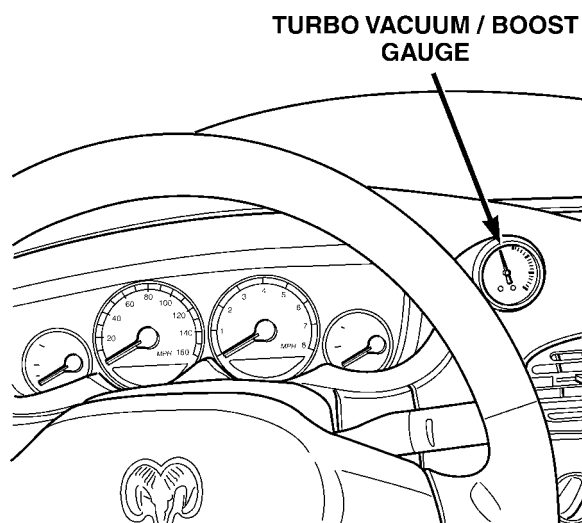
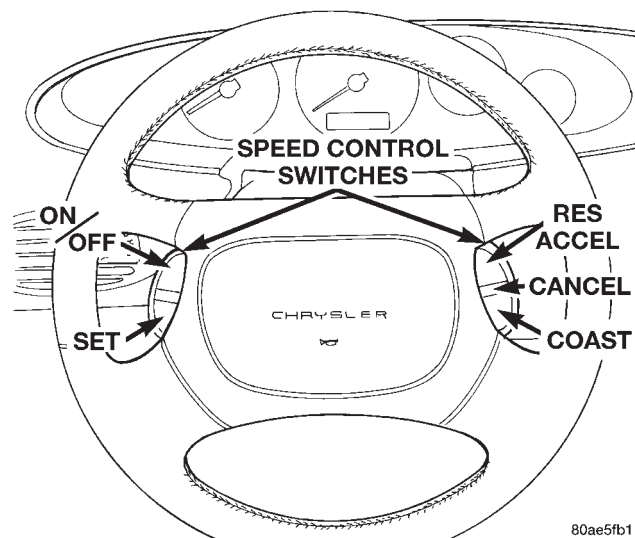
## 8.6 SWITCHES/GAUGES



## COMPONENT LOCATIONS

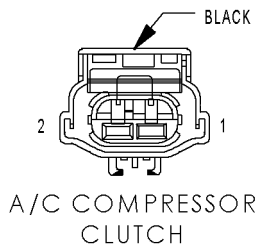
### 8.6 SWITCHES/GAUGES (Continued)

#### SRT-4





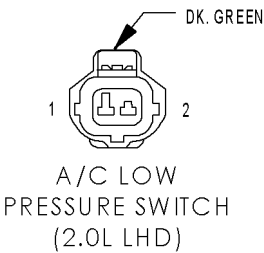
9.0 CONNECTOR PINOUTS



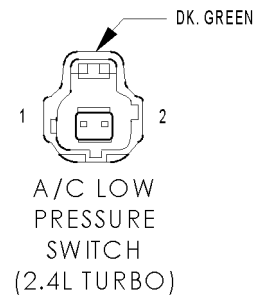
A/C COMPRESSOR CLUTCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C3 20DB/BK	A/C CLUTCH RELAY OUTPUT
2	Z1 20BK	GROUND



A/C HIGH PRESSURE SWITCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C20 20BR/OR (2.0L)	A/C SWITCH SENSE
1	C20 20BR (2.4L TURBO)	A/C SWITCH SENSE
2	C22 20DB/WT	PRESSURE SWITCH OUTPUT

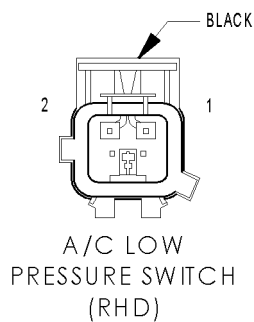


A/C LOW PRESSURE SWITCH (2.0L LHD) - DK. GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C22 20DB/WT	PRESSURE SWITCH OUTPUT
2	C21 20DB/OR	A/C SWITCH SENSE

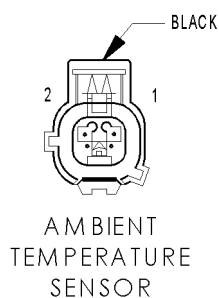


A/C LOW PRESSURE SWITCH (2.4L TURBO) - DK. GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C22 20DB/WT	PRESSURE SWITCH OUTPUT
2	C21 20DB/OR	A/C SWITCH SENSE

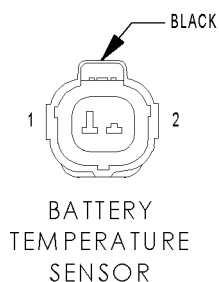
# CONNECTOR PINOUTS



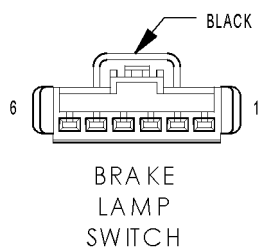
A/C LOW PRESSURE SWITCH (RHD) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C22 20DB/WT	PRESSURE SWITCH OUTPUT
2	C21 20DB/OR	A/C SWITCH SENSE



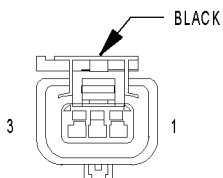
AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K145 20BR/OR	AAT SIGNAL
2	K167 20BK/YL (2.0L LHD EXPORT)	SENSOR GROUND 2
2	K167 20BR/YL (2.0L RHD/ EXCEPT EXPORT)	SENSOR GROUND 2
2	K167 20BR/YL (2.4L TURBO)	SENSOR GROUND 2



BATTERY TEMPERATURE SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K118 20PK/YL	BATTERY TEMP SIGNAL
2	K167 20BR/YL (2.0L)	SENSOR GROUND 2
2	K167 20BR/YL (2.4L TURBO)	SENSOR GROUND 2



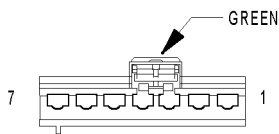
BRAKE LAMP SWITCH - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
3	V30 20DB/RD (2.0L)	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	V32 20YL/RD (2.0L)	S/C SUPPLY
5	Z1 20BK (2.0L)	GROUND
5	Z1 18BK (2.4L TURBO)	GROUND
6	K29 20WT/PK	BRAKE SWITCH SIGNAL
6	K29 20WT/PK (2.0L)	BRAKE SWITCH SIGNAL



CAMSHAFT  
POSITION  
SENSOR

CAMSHAFT POSITION SENSOR - BLACK 3 WAY

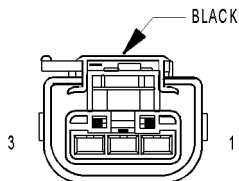
CAV	CIRCUIT	FUNCTION
1	K7 20OR (2.0L)	5 VOLT SUPPLY
1	K6 20VT/WT (2.4L TURBO)	5 VOLT SUPPLY
2	K4 20BK/LB (2.0L)	SENSOR GROUND
2	K167 20BR/YL (2.4L TURBO)	SENSOR GROUND 2
3	K44 20TN/YL	CMP SIGNAL



CLOCKSPRING

CLOCKSPRING - GREEN 7 WAY

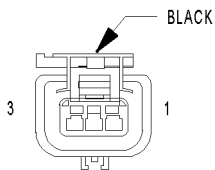
CAV	CIRCUIT	FUNCTION
1	R45 20DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 20BK/LB	DRIVER SQUIB 1 LINE 1
3	-	-
4	-	-
5	X3 22BK/RD	HORN RELAY CONTROL
6	V37 20RD/LG (2.0L SPEED CONTROL)	S/C SWITCH SIGNAL
7	K914 20BR/WT (2.0L SPEED CONTROL)	GROUND



CLUTCH  
INTERLOCK/UPSTOP  
SWITCH  
(MTX)

CLUTCH INTERLOCK/UPSTOP SWITCH (MTX) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K119 20LG/BK	CLUTCH UP SWITCH SIGNAL
2	Z1 20BK	GROUND
3	T141 20YL/RD	CLUTCH INTERLOCK SWITCH SIGNAL

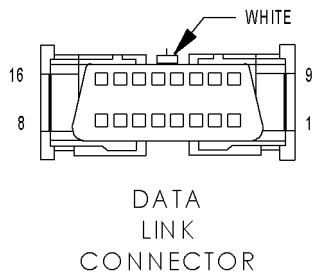


CRANKSHAFT  
POSITION  
SENSOR

CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

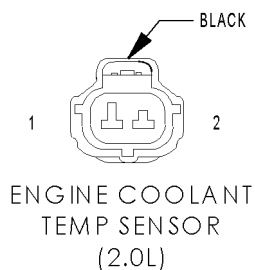
CAV	CIRCUIT	FUNCTION
1	K7 20OR	5 VOLT SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CKP SIGNAL

# CONNECTOR PINOUTS



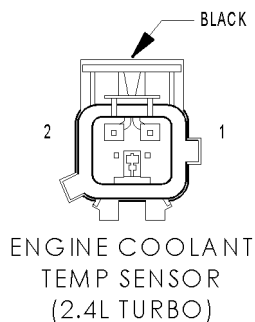
**DATA LINK CONNECTOR - WHITE 16 WAY**

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS (PCM)
3	-	-
4	Z12 20BK/TN	GROUND
5	Z12 20BK/TN	GROUND
6	-	-
7	D21 20PK	SCI TRANSMIT (PCM)
8	-	-
9	D6 20PK/LB (2.0L)	SCI RECEIVE (TCM)
10	-	-
11	-	-
12	D20 20LG	SCI RECEIVE (PCM)
13	-	-
14	-	-
15	D15 20WT/DG (2.0L)	SCI TRANSMIT (TCM)
16	A14 18RD/WT	FUSED B(+)



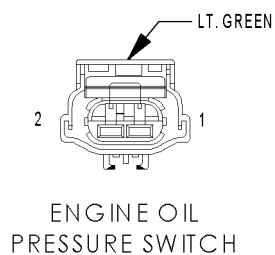
**ENGINE COOLANT TEMP SENSOR (2.0L) - BLACK 2 WAY**

CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K2 20VT/LG	ECT SIGNAL



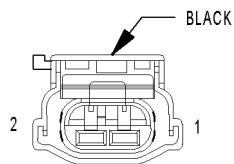
**ENGINE COOLANT TEMP SENSOR (2.4L TURBO) - BLACK 2 WAY**

CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K2 20TN/BK	ECT SIGNAL



**ENGINE OIL PRESSURE SWITCH - LT. GREEN 2 WAY**

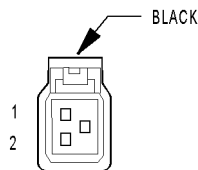
CAV	CIRCUIT	FUNCTION
1	G6 20GY	OIL PRESSURE SIGNAL
2	-	-



EVAP/PURGE  
SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY

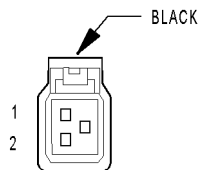
CAV	CIRCUIT	FUNCTION
1	K108 20WT/TN	EVAP/PURGE RETURN
2	K52 20PK/BK	EVAP/PURGE CONTROL



FUEL  
INJECTOR NO. 1

FUEL INJECTOR NO. 1 - BLACK 2 WAY

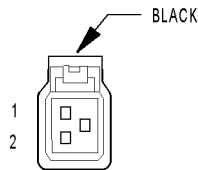
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	INJECTOR CONTROL NO. 1
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL  
INJECTOR NO. 2

FUEL INJECTOR NO. 2 - BLACK 2 WAY

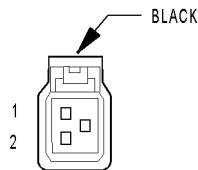
CAV	CIRCUIT	FUNCTION
1	K12 18TN	INJECTOR CONTROL NO. 2
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL  
INJECTOR NO. 3

FUEL INJECTOR NO. 3 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	INJECTOR CONTROL NO. 3
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT

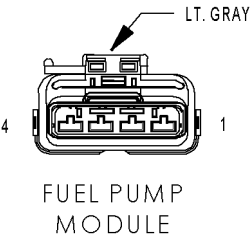


FUEL  
INJECTOR NO. 4

FUEL INJECTOR NO. 4 - BLACK 2 WAY

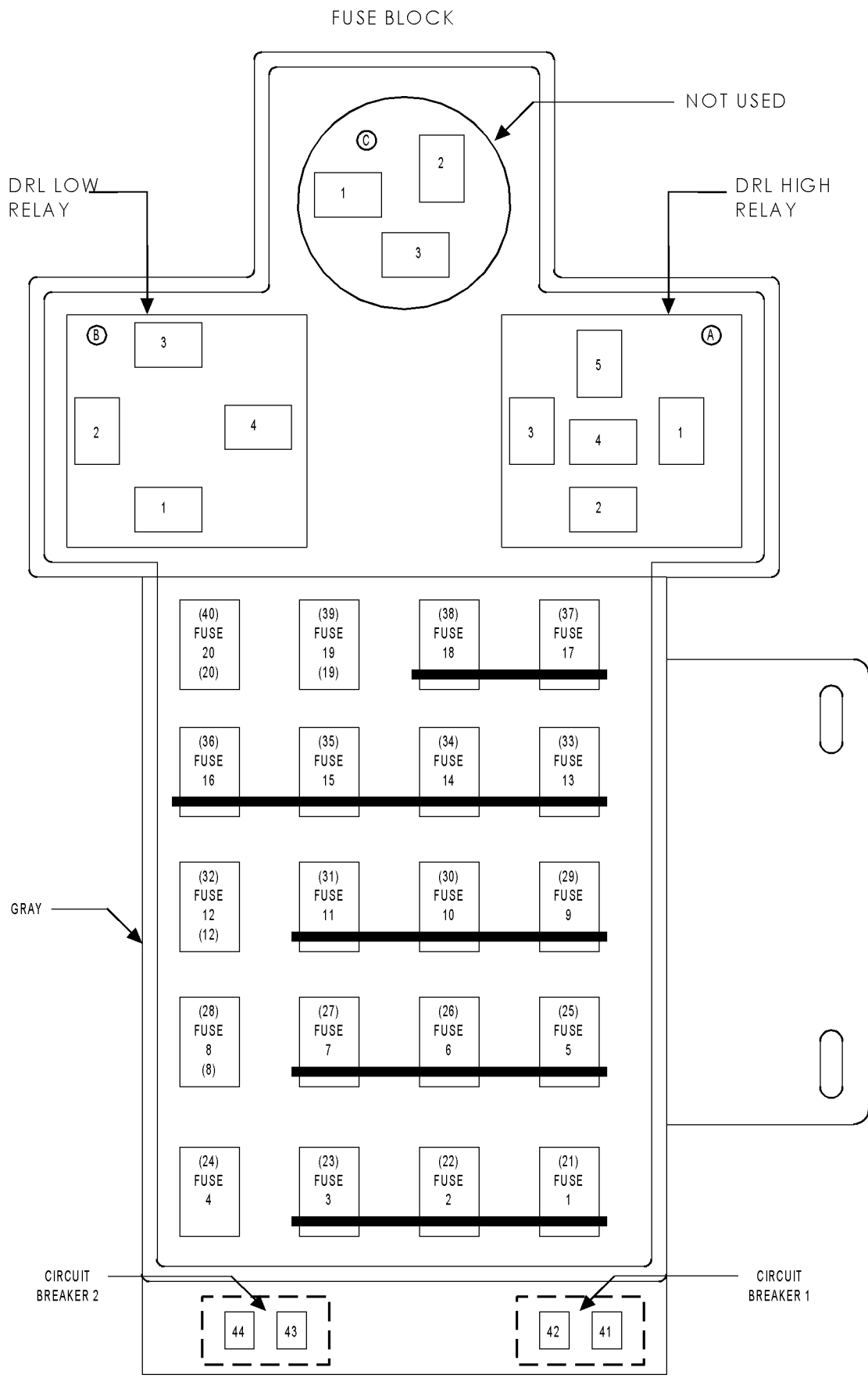
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	INJECTOR CONTROL NO. 4
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT

CONNECTOR PINOUTS



FUEL PUMP MODULE - LT. GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	Z2 20BK/LG	GROUND
3	G4 20DB	FUEL LEVEL SENSOR SIGNAL
4	A141 18DG/WT	FUEL PUMP RELAY OUTPUT



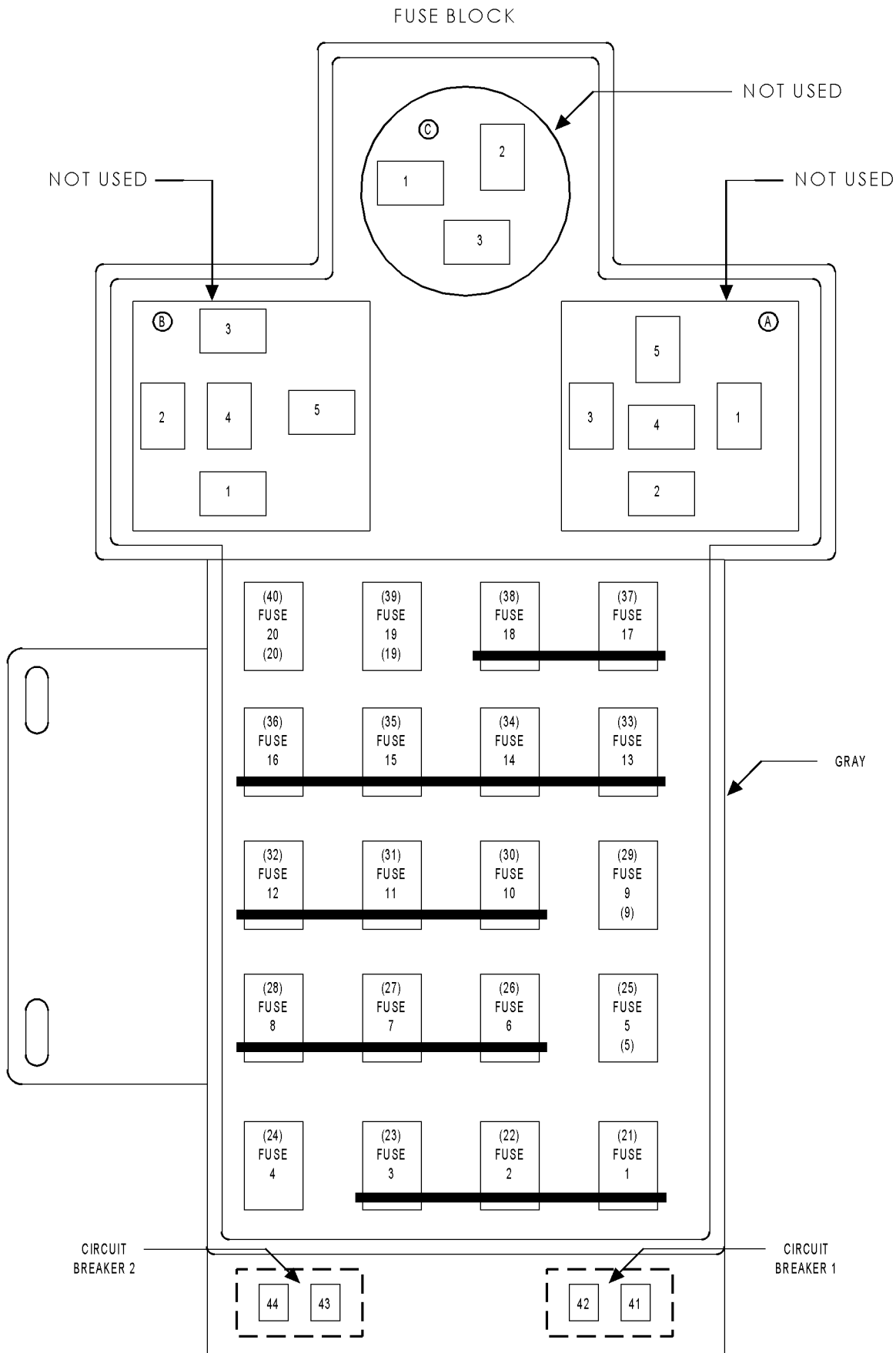
CONNECTOR PINOUTS

# CONNECTOR PINOUTS

## FUSES (FB LHD)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	10A	L6 20RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
1	10A	L6 20RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	20A	V6 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	20A	V6 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	20A	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	20A	F10 18YL/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
4	15A	M1 18PK	FUSED B(+)
5	10A	F25 20TN/LG	FUSED IGNITION SWITCH OUTPUT (RUN)
6	20A	C1 14DG	FUSED IGNITION SWITCH OUTPUT (RUN)
7	10A	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
7	10A	F20 20WT (DAYTIME RUNNING LAMPS)	FUSED IGNITION SWITCH OUTPUT (RUN)
8	15A	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
9	10A	F15 20DG/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	15A	F12 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	10A	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	10A	A81 20DG/RD (AUTOSTICK)	FUSED B(+)
13	-	-	-
14	20A	F35 18RD	FUSED B(+)
15	15A	F33 18PK/RD	FUSED B(+)
16	25A	F3 12LB/OR	FUSED B(+)
17	10A	L43 14VT	FUSED LEFT LOW BEAM OUTPUT
18	10A	L44 14VT/RD	FUSED RIGHT LOW BEAM OUTPUT
19	10A	L39 20LB	FRONT FOG LAMP SWITCH OUTPUT
19	10A	L39 20LB	FRONT FOG LAMP SWITCH OUTPUT
20	-	-	-

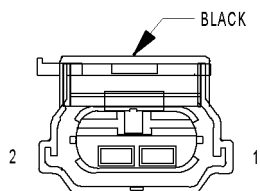




# CONNECTOR PINOUTS

## FUSES (FB RHD)

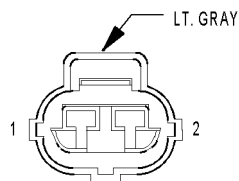
FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	10A	L6 20RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
1	10A	L6 20RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	20A	V6 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	20A	V6 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	20A	F10 18YL/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	20A	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
4	15A	M1 18PK	FUSED B(+)
5	15A	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
6	10A	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
7	20A	C1 14DG	FUSED IGNITION SWITCH OUTPUT (RUN)
8	10A	F25 20TN/LG	FUSED IGNITION SWITCH OUTPUT (RUN)
9	10A	A81 20DG/RD (AUTOSTICK)	FUSED B(+)
10	10A	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	15A	F12 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	10A	F15 20DG/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	20A	A120 16RD/LG	FUSED B(+)
14	20A	F35 18RD	FUSED B(+)
15	15A	F33 18PK/RD	FUSED B(+)
16	25A	F3 12LB/OR	FUSED B(+)
17	10A	L43 14VT	FUSED LEFT LOW BEAM OUTPUT
18	10A	L44 14VT/RD	FUSED RIGHT LOW BEAM OUTPUT
19	-	-	-
20	10A	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER SWITCH OUTPUT
20	10A	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER SWITCH OUTPUT



GENERATOR  
(2.0L)

### GENERATOR (2.0L) - BLACK 2 WAY

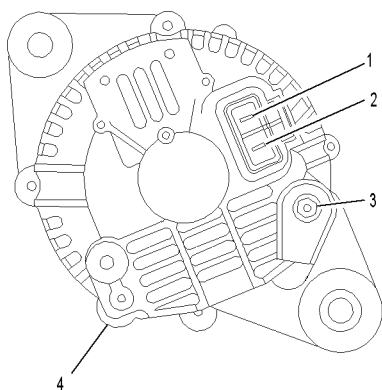
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K20 20DG	GEN FIELD CONTROL



GENERATOR  
(2.4L TURBO)

### GENERATOR (2.4L TURBO) - LT. GRAY 2 WAY

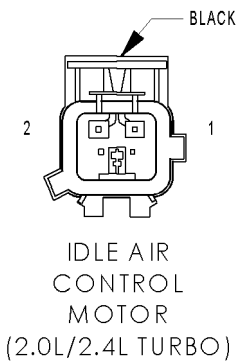
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K20 18DG	GEN FIELD CONTROL



GENERATOR  
(GENERATOR SIDE)

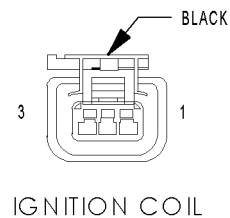
GENERATOR (GENERATOR SIDE)

CAV	CIRCUIT	FUNCTION
1	-	GROUND
2	-	GEN FIELD CONTROL
3	-	B(+) TERMINAL
4	-	CASE GROUND



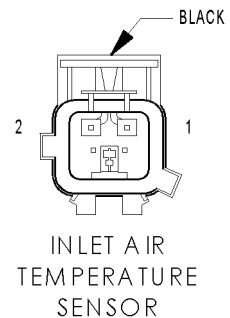
IDLE AIR CONTROL MOTOR (2.0L/2.4L TURBO) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K610 20VT/GY (2.0L)	IAC MOTOR CONTROL
1	K610 18VT/GY (2.4L TURBO)	IAC MOTOR CONTROL
2	K961 20BR/WT (2.0L)	IAC RETURN
2	K961 18BR/VT (2.4L TURBO)	IAC RETURN



IGNITION COIL - BLACK 3 WAY

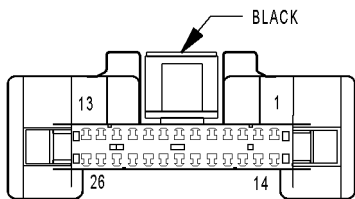
CAV	CIRCUIT	FUNCTION
1	K17 18DB/TN (2.0L)	COIL CONTROL NO. 2
1	K17 16DB/TN (2.4L TURBO)	COIL CONTROL NO. 2
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K19 18BK/GY (2.0L)	COIL CONTROL NO. 1
3	K19 16BK/GY (2.4L TURBO)	COIL CONTROL NO. 1



INLET AIR TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	IAT SIGNAL
2	K167 20BR/YL (2.0L)	SENSOR GROUND 2
2	K4 20BK/LB (2.4L TURBO)	SENSOR GROUND

# CONNECTOR PINOUTS



INSTRUMENT CLUSTER

## INSTRUMENT CLUSTER - BLACK 26 WAY

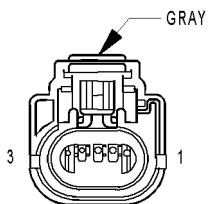
CAV	CIRCUIT	FUNCTION
1	L38 16BR/WT (EXPORT)	REAR FOG LAMP FEED
2	D25 20VT/YL	PCI BUS
3	M2 20YL	COURTESY LAMP CONTROL
4	L27 16WT/TN (DAYTIME RUNNING LAMPS)	FOG LAMP SWITCH SENSE
4	L39 20LB (EXCEPT EXPORT/EXCEPT DAYTIME RUNNING LAMPS)	FRONT FOG LAMP SWITCH OUTPUT
4	L39 16LB (EXPORT)	FRONT FOG LAMP SWITCH OUTPUT
5	G69 20BK/OR	VTSS INDICATOR DRIVER
6	E19 22RD	PANEL LAMPS DIMMER SIGNAL
7	G4 20DB	FUEL LEVEL SENSOR SIGNAL
8	-	-
9	G5 20DB/WT (AUTOSTICK)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	Z3 16BK/OR	GROUND
11	-	-
12	E2 22OR	PANEL LAMPS DRIVER
13	M9 20LB/OR	PASSENGER DOOR AJAR/RKE SENSE
14	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
15	F11 20RD/WT (AUTO-STICK)	IGNITION SWITCH OUTPUT (OFF-RUN-START)
15	G5 20DB/WT (EXCEPT AUTOSTICK)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
16	L161 18LG/OR (EXCEPT EXPORT)	LEFT TURN SIGNAL
17	L160 18TN/RD (EXCEPT EXPORT)	RIGHT TURN SIGNAL
18	L61 18LG	LEFT TURN SIGNAL
19	L60 18TN	RIGHT TURN SIGNAL
20	L4 16VT/WT (EXCEPT EXPORT)	DIMMER SWITCH LOW BEAM OUTPUT
21	M1 18PK	FUSED B(+)
22	G11 20WT/BK	RED BRAKE WARNING INDICATOR DRIVER
23	G26 22LB	KEY-IN IGNITION SWITCH SENSE
24	G75 20TN/BK (EXCEPT EXPORT)	LEFT FRONT DOOR AJAR SWITCH SENSE
24	G74 20TN/RD (EXPORT)	RIGHT FRONT DOOR AJAR SWITCH SENSE
25	G10 20LG/RD	SEAT BELT SWITCH SENSE
26	L3 16RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT



KNOCK SENSOR

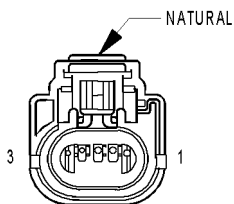
## KNOCK SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K42 20DB/LG	KS SIGNAL
2	K45 20BK/VT	KS RETURN



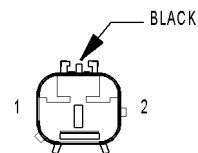
MANIFOLD ABSOLUTE  
PRESSURE SENSOR  
(2.0L)

MANIFOLD ABSOLUTE PRESSURE SENSOR (2.0L) - GRAY 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	K7 20OR	5 VOLT SUPPLY



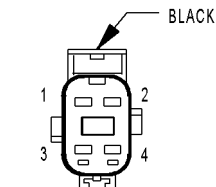
MANIFOLD ABSOLUTE  
PRESSURE SENSOR  
(2.4L TURBO)

MANIFOLD ABSOLUTE PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	K7 20OR	5 VOLT SUPPLY



MANIFOLD  
TUNING  
VALVE  
SOLENOID  
(RT)

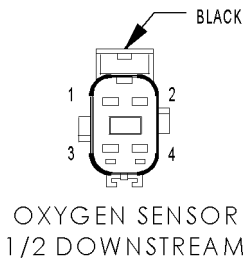
MANIFOLD TUNING VALVE SOLENOID (RT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K201 20BR/YL	MTV RELAY OUTPUT
2	Z1 18BK	GROUND



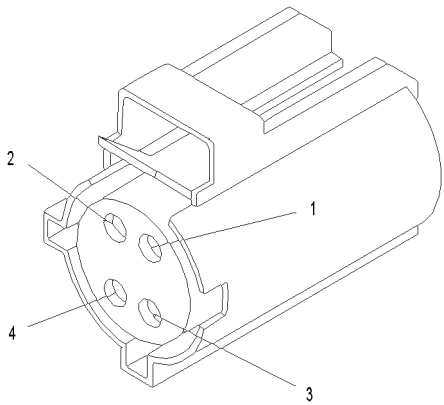
OXYGEN SENSOR  
1/1 UPSTREAM

OXYGEN SENSOR 1/1 UPSTREAM - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K99 18BR/OR	O2 1/1 HEATER CONTROL
3	K904 20DB/DG	O2 RETURN
4	K41 20BK/DG	O2 1/1 SIGNAL

# CONNECTOR PINOUTS



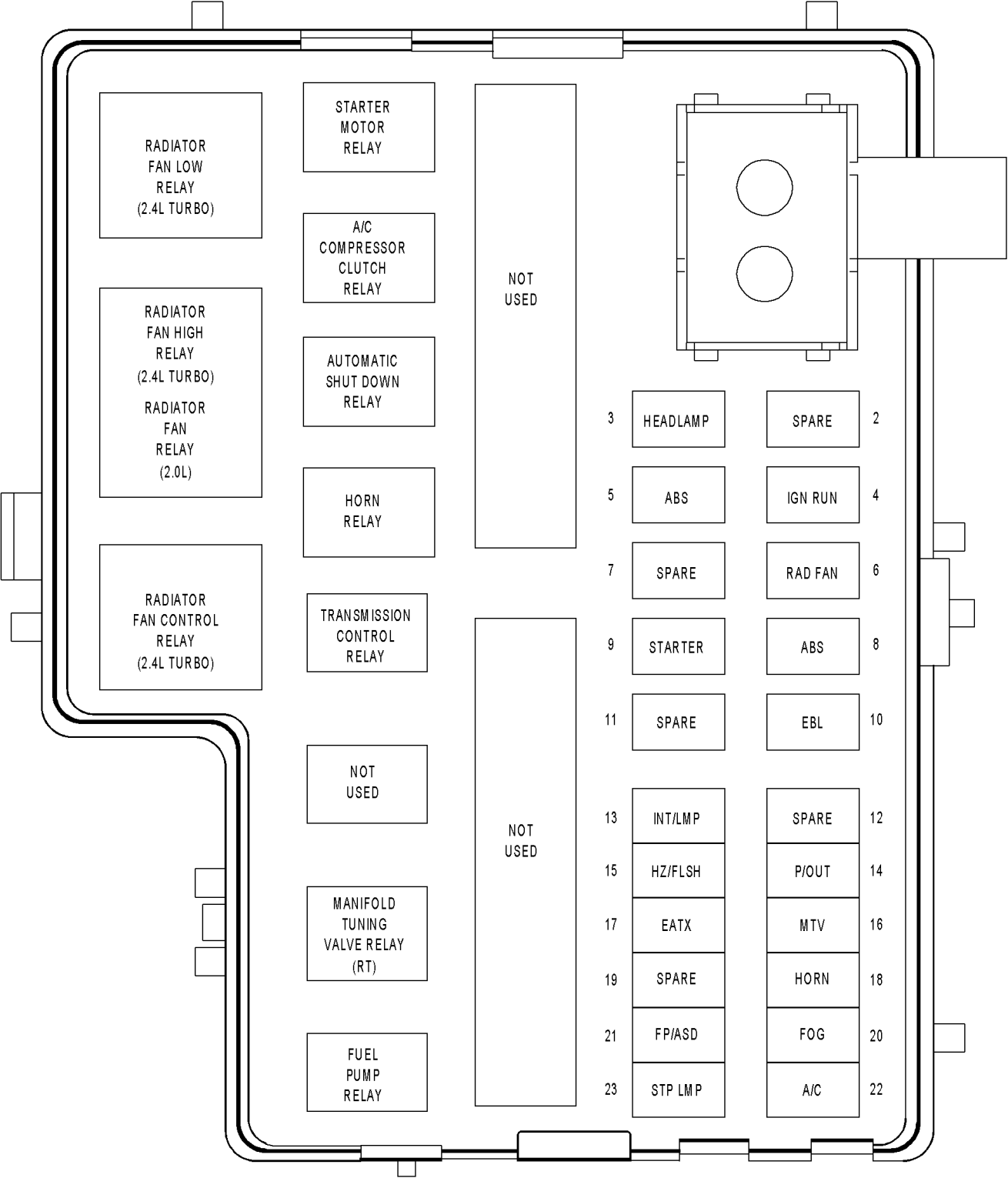
OXYGEN SENSOR 1/2 DOWNSTREAM - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK (2.0L)	GROUND
1	Z1 20BK (2.4L TURBO)	GROUND
2	K199 18BR/VT	O2 1/2 HEATER CONTROL
3	K904 20DB/DG	O2 RETURN
4	K141 20TN/WT	O2 1/2 SIGNAL



OXYGEN SENSOR CONNECTOR (COMPONENT SIDE) - 4 WAY		
CAV	CIRCUIT	FUNCTION
1	-	GROUND
2	-	O2 HEATER CONTROL
3	-	O2 RETURN
4	-	O2 SIGNAL

POWER DISTRIBUTION CENTER

CONNECTOR PINOUTS



# CONNECTOR PINOUTS

## FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	-	-	-
3	40A	A3 12RD/WT	FUSED B(+)
4	40A	A2 12PK/BK	FUSED B(+)
5	30A	A20 12RD/DB (ABS)	FUSED B(+)
6	30A	A16 14GY (2.0L)	FUSED B(+)
6	30A	A16 12GY (2.4L TURBO)	FUSED B(+)
7	-	-	-
8	40A	A10 12RD/DG (ABS)	FUSED B(+)
9	30A	A1 14RD	FUSED B(+)
10	40A	A4 10BK/RD (2.0L)	FUSED B(+)
10	40A	A4 10BK/PK (2.4L TURBO)	FUSED B(+)
11	-	-	-
12	-	-	-
13	20A	M11 16PK/LB	FUSED B(+)
14	20A	F1 16DB	FUSED B(+)
15	15A	A15 18WT (2.0L)	FUSED B(+)
15	15A	A15 18RD/PK (2.4L TURBO)	FUSED B(+)
16	15A	A200 18RD/BR (2.0L RT)	FUSED B(+)
17	20A	A30 16RD/WT (2.0L EATX)	FUSED B(+)
18	10A	F62 20RD (2.0L)	FUSED B(+)
18	10A	F62 20RD (2.0L)	FUSED B(+)
18	15A	F62 18RD (2.4L TURBO)	FUSED B(+)
18	15A	F62 18RD (2.4L TURBO)	FUSED B(+)
19	-	-	-
20	25A	F61 16WT/OR (EXPORT)	FUSED B(+)
21	20A	A14 16RD/WT	FUSED B(+)
22	10A	A17 20RD/BK	FUSED B(+)
23	15A	F32 18PK/DB	FUSED B(+)

## A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
29	C28 20DB/OR (2.0L)	A/C CLUTCH RELAY CONTROL
29	C28 18DB/OR (2.4L TURBO)	A/C CLUTCH RELAY CONTROL
30	A17 20RD/BK	FUSED B(+)
31	C3 20DB/BK	A/C CLUTCH RELAY OUTPUT
32	-	-
33	F12 18DB/WT (2.0L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
33	F12 18DB/RD (2.4L TURBO)	FUSED IGNITION SWITCH OUTPUT (RUN-START)

## AUTOMATIC SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
34	A14 18RD/WT	FUSED B(+)
35	A14 18RD/WT	FUSED B(+)
36	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
36	A142 18DG/OR (2.0L)	AUTOMATIC SHUT DOWN RELAY OUTPUT
37	-	-
38	K51 20DB/YL (2.0L)	AUTOMATIC SHUT DOWN RELAY CONTROL
38	K51 18DB/YL (2.4L TURBO)	AUTOMATIC SHUT DOWN RELAY CONTROL



## FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
59	F12 18DB/WT (2.0L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
59	F12 18DB/RD (2.4L TURBO)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
60	A14 18RD/WT	FUSED B(+)
61	A141 18DG/WT	FUEL PUMP RELAY OUTPUT
62	-	-
63	K31 20BR (2.0L)	FUEL PUMP RELAY CONTROL
63	K31 18BR (2.4L TURBO)	FUEL PUMP RELAY CONTROL

## MANIFOLD TUNING VALVE RELAY (RT)

CAV	CIRCUIT	FUNCTION
54	Z1 20BK	GROUND
55	A200 18RD/BR	FUSED B(+)
56	K201 20BR/YL	MTV RELAY OUTPUT
57	-	-
58	K200 20VT/OR	MTV CONTROL

## RADIATOR FAN CONTROL RELAY (2.4L TURBO)

CAV	CIRCUIT	FUNCTION
74	C27 18DB/PK	RAD FAN RELAY CONTROL
75	F12 18DB/RD	FUSED IGNITION SWITCH OUTPUT (RUN-START)
76	C116 12LG/WT	RAD FAN HIGH/LOW FEED
77	C23 12DG	RAD FAN CONTROL/HIGH RELAY OUTPUT
78	Z1 12BK	GROUND

## RADIATOR FAN HIGH RELAY (2.4L TURBO)

CAV	CIRCUIT	FUNCTION
69	C27 18DB/PK	HIGH SPEED RAD FAN RELAY CONTROL
69	C27 18DB/PK	HIGH SPEED RAD FAN RELAY CONTROL
70	F12 18DB/RD	FUSED IGNITION SWITCH OUTPUT (RUN-START)
71	A16 12GY	FUSED B(+)
72	-	-
73	C23 12DG	RAD FAN CONTROL/HIGH RELAY OUTPUT

## RADIATOR FAN RELAY (2.0L)

CAV	CIRCUIT	FUNCTION
69	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
70	C27 20DB/PK	RAD FAN RELAY CONTROL
71	C25 12YL	RAD FAN RELAY OUTPUT
72	-	-
73	A16 14GY	FUSED B(+)

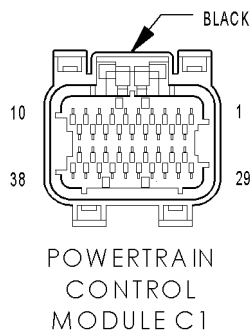
## STARTER MOTOR RELAY

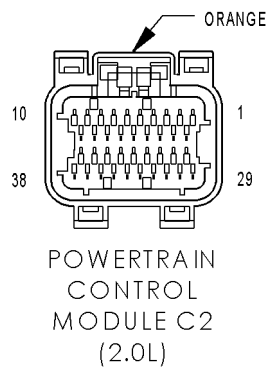
CAV	CIRCUIT	FUNCTION
24	A41 14YL	IGNITION SWITCH OUTPUT (START)
25	A1 14RD	FUSED B(+)
26	T40 14BR	ENGINE STARTER MOTOR RELAY OUTPUT
27	-	-
28	K90 20TN	STARTER RELAY CONTROL

# CONNECTOR PINOUTS

POWERTRAIN CONTROL MODULE C1 - BLACK 38 WAY

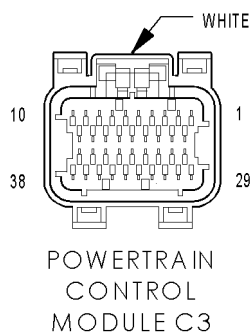
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	Z11 18BK/WT	GROUND
10	-	-
11	F12 18DB/WT (2.0L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	F12 18DB/RD (2.4L TURBO)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F11 20RD/WT (2.0L AUTO-STICK)	IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	F11 20RD/WT (2.0L EXCEPT AUTOSTICK)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	G7 20WT/OR	VEHICLE SPEED SIGNAL
14	G9 20GY/BK	BRAKE FLUID LEVEL SWITCH SENSE
15	K55 18LB (2.4L TURBO)	TIP SOL CONTROL
16	-	-
17	K150 18DB/YL (2.4L TURBO)	SURGE SOL CONTROL
18	Z12 18BK/TN	GROUND
19	-	-
20	G6 20GY	OIL PRESSURE SIGNAL
21	-	-
22	K145 20BR/OR	AAT SIGNAL
23	K153 18LB (2.4L TURBO)	TIP SIGNAL
24	-	-
25	D20 20LG	SCI RECEIVE (PCM)
26	D6 20PK/LB (2.0L)	SCI RECEIVE (TCM)
27	K6 20VT/WT (2.0L)	5 VOLT SUPPLY
27	K6 18VT/WT (2.4L TURBO)	5 VOLT SUPPLY
28	K137 18DB/GY (2.4L TURBO)	WASTEGATE SOL CONTROL
29	A14 18RD/WT	FUSED B(+)
30	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	D21 20PK	SCI TRANSMIT (PCM)
37	D15 20WT/DG (2.0L)	SCI TRANSMIT (TCM)
38	D25 20VT/YL	PCI BUS (PCM)





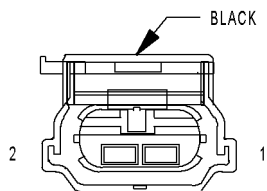
POWERTRAIN CONTROL MODULE C2 (2.0L) - ORANGE 38 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	K17 18DB/TN	COIL CONTROL NO. 2
10	K19 18BK/GY	COIL CONTROL NO. 1
11	K14 18LB/BR	INJECTOR CONTROL NO. 4
12	K13 18YL/WT	INJECTOR CONTROL NO. 3
13	K12 18TN	INJECTOR CONTROL NO. 2
14	K11 18WT/DB	INJECTOR CONTROL NO. 1
15	-	-
16	K200 20VT/OR (RT)	MTV CONTROL
17	K199 18BR/VT	O2 1/2 HEATER CONTROL
18	K99 18BR/OR	O2 1/1 HEATER CONTROL
19	K20 20DG	GEN FIELD CONTROL
20	K2 20VT/LG	ECT SIGNAL
21	K22 20OR/DB	TP SIGNAL
22	-	-
23	K1 20DG/RD	MAP SIGNAL
24	K45 20BK/VT	KS RETURN
25	K42 20DB/LG	KS SIGNAL
26	-	-
27	K4 20BK/LB	SENSOR GROUND
28	K961 20BR/WT	IAC RETURN
29	K7 20OR	5 VOLT SUPPLY
30	K21 20BK/RD	IAT SIGNAL
31	K41 20BK/DG	O2 1/1 SIGNAL
32	K904 20DB/DG	O2 RETURN
33	K141 20TN/WT	O2 1/2 SIGNAL
34	K44 20TN/YL	CMP SIGNAL
35	K24 20GY/BK	CKP SIGNAL
36	-	-
37	-	-
38	K610 20VT/GY	IAC MOTOR CONTROL

# CONNECTOR PINOUTS



POWERTRAIN CONTROL MODULE C3 - WHITE 38 WAY

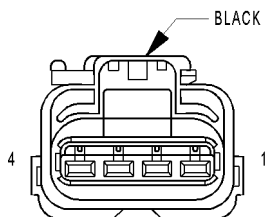
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K51 20DB/YL (2.0L)	AUTOMATIC SHUT DOWN RELAY CONTROL
3	K51 18DB/YL (2.4L TURBO)	AUTOMATIC SHUT DOWN RELAY CONTROL
4	C27 18DB/PK (2.4L TURBO)	HIGH SPEED RAD FAN RELAY CONTROL
5	V35 20LG/RD (2.0L)	S/C VENT CONTROL
6	C27 20DB/PK (2.0L)	RAD FAN RELAY CONTROL
6	C24 18DB/RD (2.4L TURBO)	RAD FAN LOW RELAY CONTROL
7	V32 20YL/RD (2.0L)	S/C SUPPLY
8	K106 20WT/DG (2.0L)	NVLD SOLENOID CONTROL
8	K106 18WT/DG (2.4L TURBO)	NVLD SOLENOID CONTROL
9	-	-
10	-	-
11	C28 20DB/OR (2.0L)	A/C CLUTCH RELAY CONTROL
11	C28 18DB/OR (2.4L TURBO)	A/C CLUTCH RELAY CONTROL
12	V36 20TN/RD (2.0L)	S/C VACUUM CONTROL
13	-	-
14	-	-
15	-	-
16	-	-
17	K167 20BR/YL (2.0L)	SENSOR GROUND 2
17	K167 18BR/YL (2.4L TURBO)	SENSOR GROUND 2
18	-	-
19	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
20	K52 20PK/BK	EVAP/PURGE CONTROL
21	T141 20YL/RD	CLUTCH INTERLOCK SWITCH SIGNAL
22	-	-
23	K29 20WT/PK	BRAKE SWITCH SIGNAL
24	C20 20BR/OR (2.0L)	A/C SWITCH SENSE
24	C20 20BR (2.4L TURBO)	A/C SWITCH SENSE
25	-	-
26	T44 20YL/LB (2.0L EATX)	AUTOSTICK DOWNSHIFT SWITCH SIGNAL
26	K119 20LG/BK (2.0L MTX/ 2.4L TURBO)	CLUTCH UP SWITCH SIGNAL
27	T5 20LG/LB (2.0L)	AUTOSTICK UPSHIFT SWITCH SIGNAL
28	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
29	K108 20WT/TN	EVAP/PURGE RETURN
30	K10 20DB/OR	PSP SWITCH SIGNAL
31	-	-
32	K118 20PK/YL	BATTERY TEMP SIGNAL
33	-	-
34	V37 20RD/LG (2.0L)	S/C SWITCH SIGNAL
35	K107 20OR (2.0L)	NVLD SWITCH SIGNAL
35	K107 18OR (2.4L TURBO)	NVLD SWITCH SIGNAL
36	-	-
37	K31 20BR (2.0L)	FUEL PUMP RELAY CONTROL
37	K31 18BR (2.4L TURBO)	FUEL PUMP RELAY CONTROL
38	K90 20TN	STARTER RELAY CONTROL



RADIATOR  
FAN MOTOR  
(2.0L)

RADIATOR FAN MOTOR (2.0L) - BLACK 2 WAY

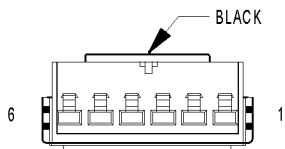
CAV	CIRCUIT	FUNCTION
1	C25 12YL	RAD FAN HIGH RELAY OUTPUT
2	Z1 14BK	GROUND



RADIATOR  
FAN MOTOR  
(2.4L TURBO)

RADIATOR FAN MOTOR (2.4L TURBO) - BLACK 4 WAY

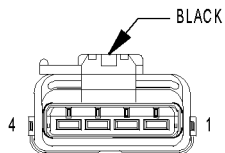
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	C23 12DG	RAD FAN CONTROL/HIGH RELAY OUTPUT
3	C116 12LG/WT	RAD FAN HIGH/LOW FEED
4	C25 12YL	RAD FAN LOW RELAY OUTPUT



SENTRY KEY  
IMMOBILIZER  
MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 22VT/YL	PCI BUS
3	-	-
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z2 20BK/LG	GROUND
6	M1 20PK	FUSED B(+)

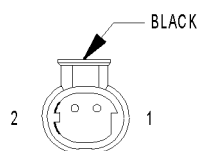


SPEED  
CONTROL SERVO

SPEED CONTROL SERVO - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	S/C VACUUM CONTROL
2	V35 20LG/RD	S/C VENT CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	Z1 20BK	GROUND

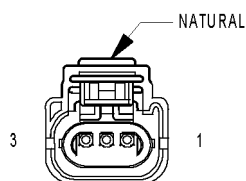
# CONNECTOR PINOUTS



**SURGE SOLENOID  
(2.4L TURBO)**

**SURGE SOLENOID (2.4L TURBO) - BLACK 2 WAY**

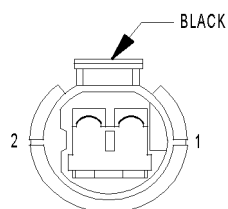
CAV	CIRCUIT	FUNCTION
1	K150 18DB/YL	SURGE SOL CONTROL
2	A142 16DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



**THROTTLE  
INLET PRESSURE  
SENSOR  
(2.4L TURBO)**

**THROTTLE INLET PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY**

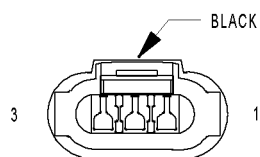
CAV	CIRCUIT	FUNCTION
1	K153 18LB	TIP SIGNAL
2	K167 20BR/YL	SENSOR GROUND 2
3	K6 18VT/WT	5 VOLT SUPPLY



**THROTTLE INLET  
PRESSURE  
SOLENOID  
(2.4L TURBO)**

**THROTTLE INLET PRESSURE SOLENOID (2.4L TURBO) - BLACK 2 WAY**

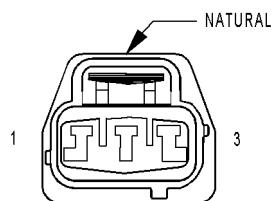
CAV	CIRCUIT	FUNCTION
1	K55 18LB	TIP SOL CONTROL
2	F12 20DB/RD	FUSED IGNITION SWITCH OUTPUT (RUN-START)



**THROTTLE POSITION  
SENSOR  
(2.0L)**

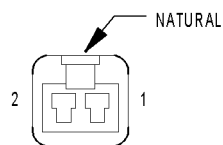
**THROTTLE POSITION SENSOR (2.0L) - BLACK 3 WAY**

CAV	CIRCUIT	FUNCTION
1	K167 20BR/YL	SENSOR GROUND 2
2	K22 20OR/DB	TP SIGNAL
3	K6 20VT/WT	5 VOLT SUPPLY



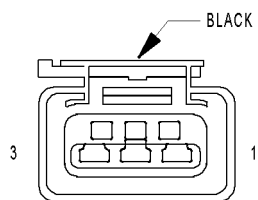
THROTTLE  
POSITION  
SENSOR  
(2.4L TURBO)

THROTTLE POSITION SENSOR (2.4L TURBO) - NATURAL 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K22 200R/DB	TP SIGNAL
3	K7 200R	5 VOLT SUPPLY



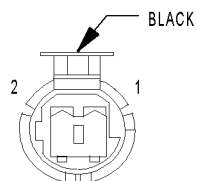
TURBO BOOST  
GAUGE LAMP  
(2.4L TURBO)

TURBO BOOST GAUGE LAMP (2.4L TURBO) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	E2 200R	PANEL LAMPS DRIVER
2	Z3 20BK/OR	GROUND



VEHICLE SPEED  
SENSOR

VEHICLE SPEED SENSOR - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K7 200R	5 VOLT SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	G7 20WT/OR	VEHICLE SPEED SIGNAL



WASTEGATE  
SOLENOID  
(2.4L TURBO)

WASTEGATE SOLENOID (2.4L TURBO) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K137 18DB/GY	WASTEGATE SOL CONTROL
2	Z1 20BK	GROUND

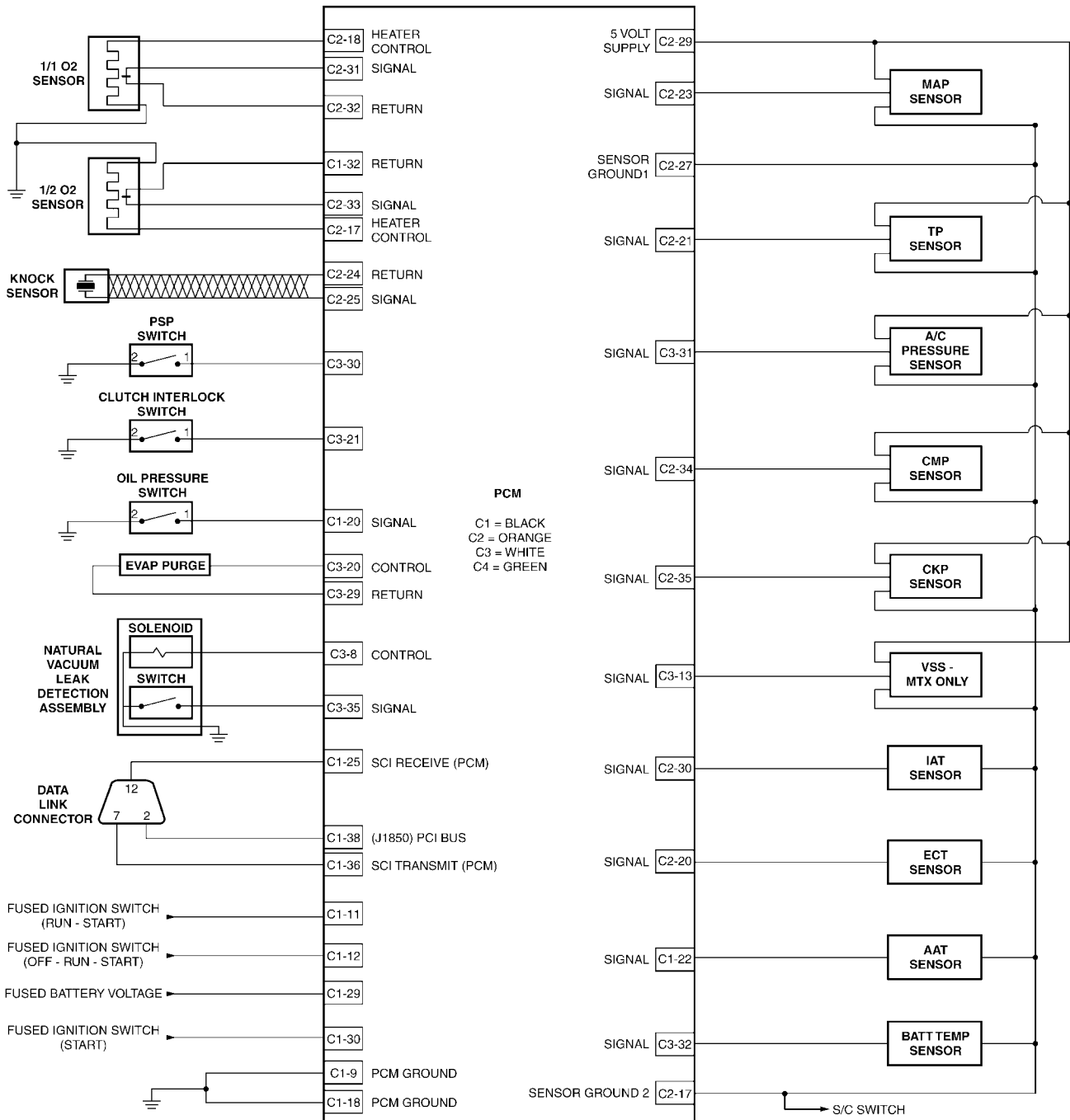
This image shows a full page of white paper with horizontal black lines, typical of notebook paper. The lines are evenly spaced and run across the width of the page. At the top center, there is a header area containing the word "NOTES" in a bold, black, sans-serif font.

## NOTES



## 10.0 SCHEMATIC DIAGRAMS

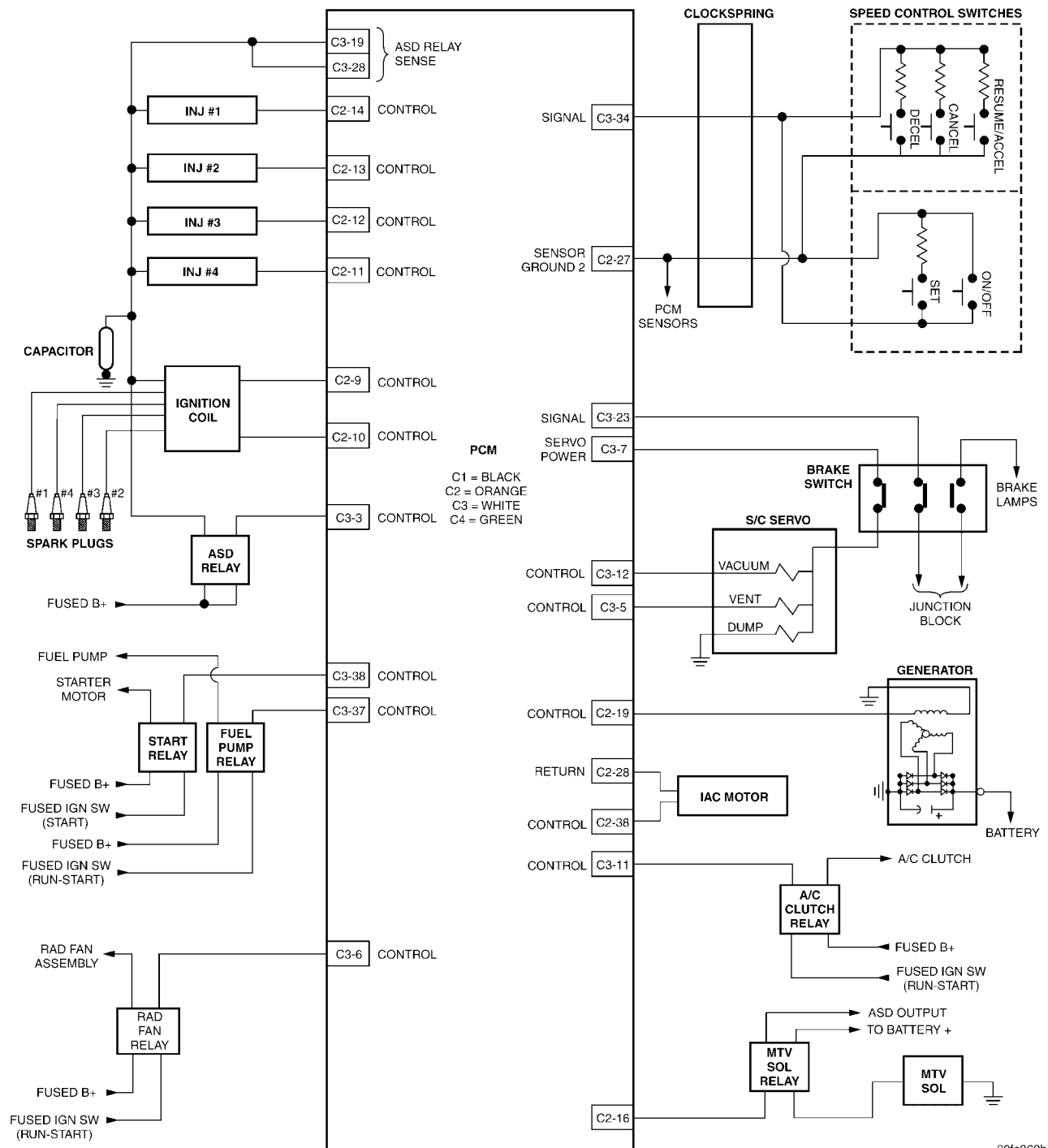
## 10.1 2004 PL 2.0L ENGINE



801c85e7

# SCHEMATIC DIAGRAMS

## 10.1 2004 PL 2.0L ENGINE (Continued)



80fc860b

The diagram illustrates the wiring for the PCM connector, showing the connection of various sensors and switches to specific pins. The pins are organized into four columns: C1-C4, C2-C4, C3-C4, and C2-C4. The components and their connections are as follows:

- 1/1 O2 SENSOR:** Connected to C2-18 (HEATER CONTROL) and C2-31 (SIGNAL).
- 1/2 O2 SENSOR:** Connected to C2-32 (O2 SENSOR RETURN) and C2-17 (HEATER CONTROL).
- KNOCK SENSOR:** Connected to C2-24 (RETURN) and C2-25 (SIGNAL).
- CLUTCH INTERLOCK SWITCH:** Connected to C3-21 and C3-26.
- OIL PRESSURE SWITCH:** Connected to C1-20 (SIGNAL).
- PSP SWITCH:** Connected to C3-30 (SIGNAL).
- BRAKE FLUID LEVEL SW:** Connected to C1-14 (SIGNAL).
- DATA LINK CONNECTOR:** Connected to C1-25 (SCI RECEIVE (PCM)), C1-38 ((J1850) PCI BUS), and C1-36 (SCI TRANSMIT (PCM)).
- FUSED IGNITION SWITCH (RUN - START):** Connected to C1-11.
- FUSED IGNITION SWITCH (OFF - RUN - START):** Connected to C1-12.
- FUSED BATTERY VOLTAGE:** Connected to C1-29.
- FUSED IGNITION SWITCH (START):** Connected to C1-30.
- PCM GROUND:** Connected to C1-9 and C1-18.
- 5-VOLT SUPPLY -1:** Connected to C2-29.
- SIGNAL:** Connected to C2-23.
- MAP SENSOR:** Connected to C2-23.
- TP SENSOR:** Connected to C3-31.
- A/C PRESSURE SENSOR:** Connected to C1-21.
- CMP SENSOR:** Connected to C2-34.
- ECT SENSOR:** Connected to C2-20.
- VSS:** Connected to C3-13.
- IAT SENSOR:** Connected to C2-30.
- SENSOR GROUND 1:** Connected to C2-27.
- SIGNAL:** Connected to C2-35.
- CAM SENSOR:** Connected to C2-35.
- SIGNAL:** Connected to C1-23.
- 5-VOLT SUPPLY -2:** Connected to C1-27.
- TIP SENSOR:** Connected to C1-27.
- SIGNAL:** Connected to C1-22.
- AAT SENSOR:** Connected to C1-22.
- SIGNAL:** Connected to C3-32.
- BATTERY TEMP SENSOR:** Connected to C3-32.
- SENSOR GROUND 2:** Connected to C3-17.

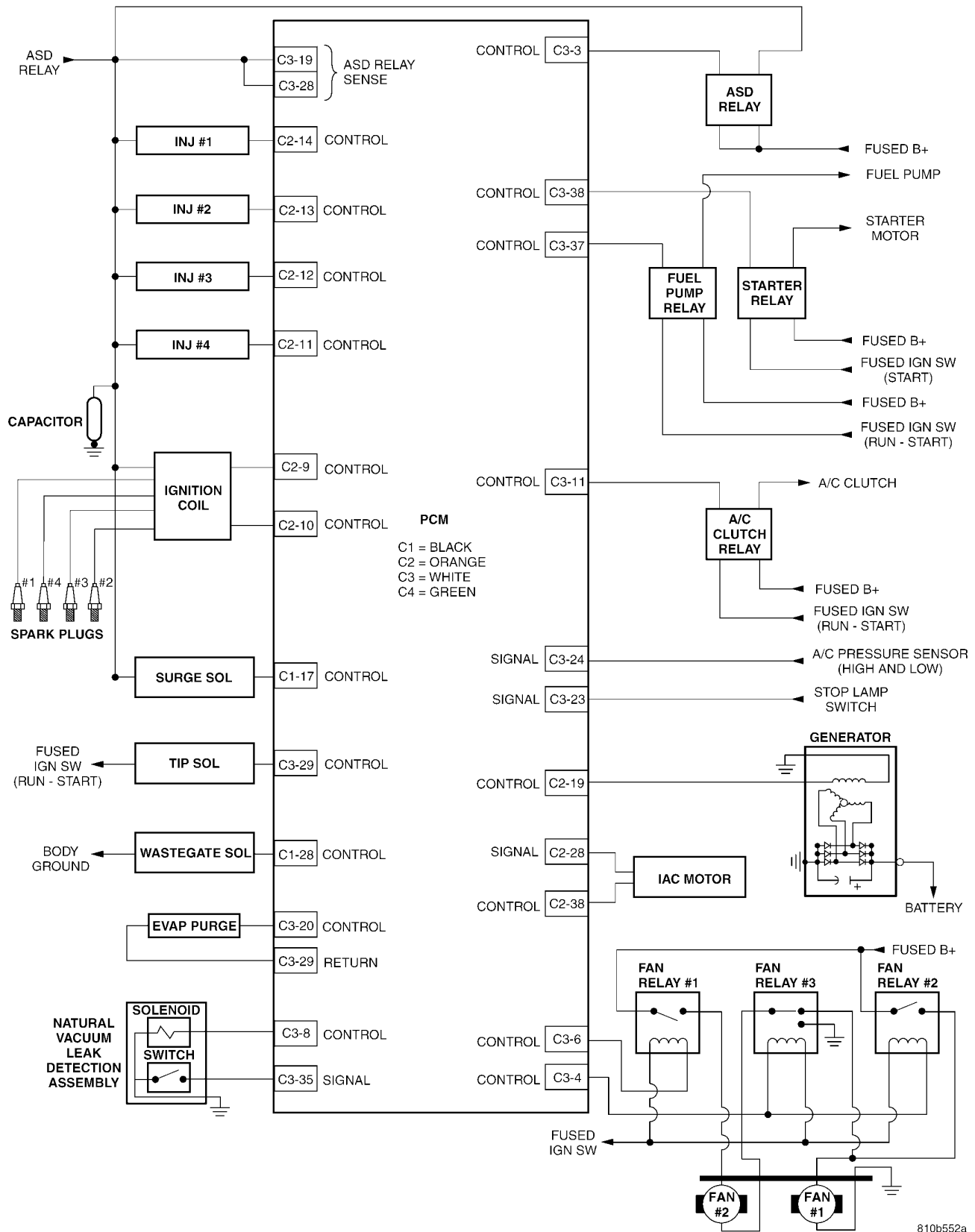
**Legend:**

- C1 = BLACK
- C2 = ORANGE
- C3 = WHITE
- C4 = GREEN

377

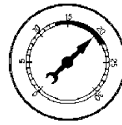
# SCHEMATIC DIAGRAMS

## 10.2 2004 SRT-4 2.4L ENGINE (Continued)



810b552a

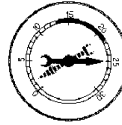
## 11.0 CHARTS AND GRAPHS



**NORMAL  
READING  
RANGE  
AT IDLE**



**BLOWN  
HEAD  
GASKET  
AT IDLE**



**NORMAL  
READING  
RAPID  
ACCELERATION/  
DECELERATION**



**WORN  
RINGS OR  
DILUTED OIL  
RAPID  
ACCELERATION/  
DECELERATION**



**LATE VALVE  
TIMING,  
VACUUM  
LEAK AT  
IDLE**



**RESTRICTED  
EXHAUST  
(DROPS  
TOWARD  
ZERO AS  
ENGINE RPM  
INCREASES)**



**POOR  
VALVE  
SEATING  
AT IDLE**



**STICKING  
VALVE  
AT IDLE**



**WORN VALVE  
GUIDES  
(STEADIES AS  
ENGINE  
SPEED  
INCREASES)**



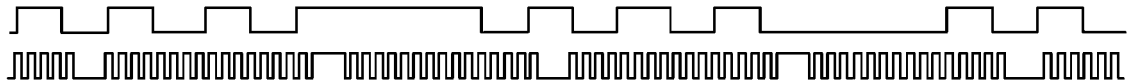
**WORN VALVE  
SPRINGS  
(MORE  
PRONOUNCED  
AS ENGINE  
SPEED  
INCREASES)**

0920606

### NGC TYPICAL SCOPE PATTERNS CAMSHAFT AND CRANKSHAFT SENSOR

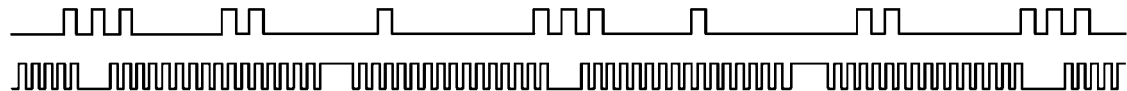
#### 4 CYL ENGINES

**CAM  
CRANK**



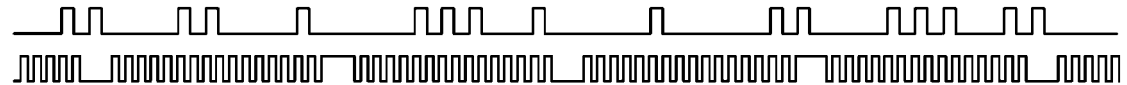
#### 6 CYL ENGINES

**CAM  
CRANK**



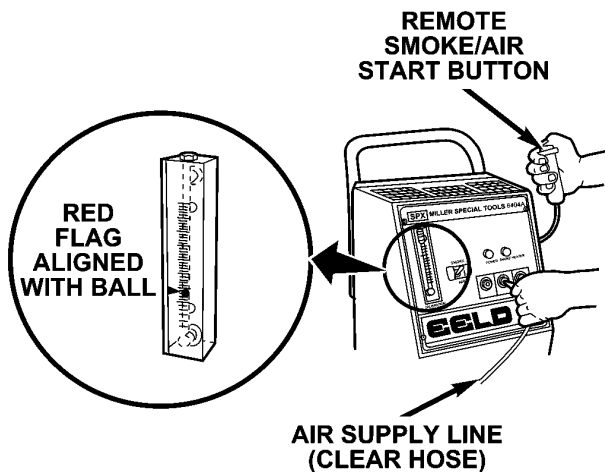
#### 8 CYL ENGINES

**CAM  
CRANK**

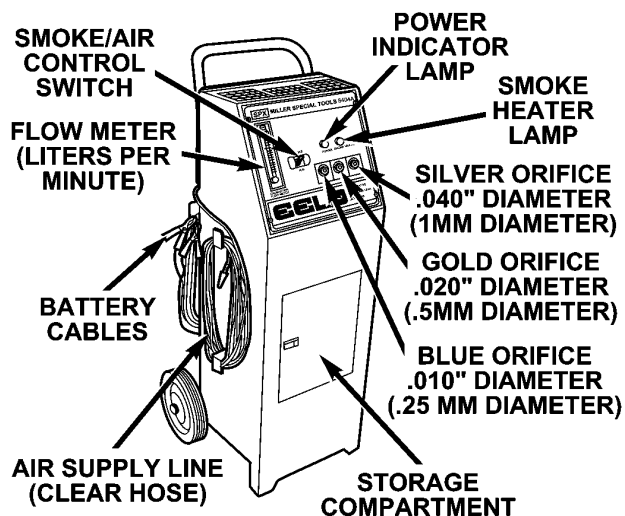


80dd1b34

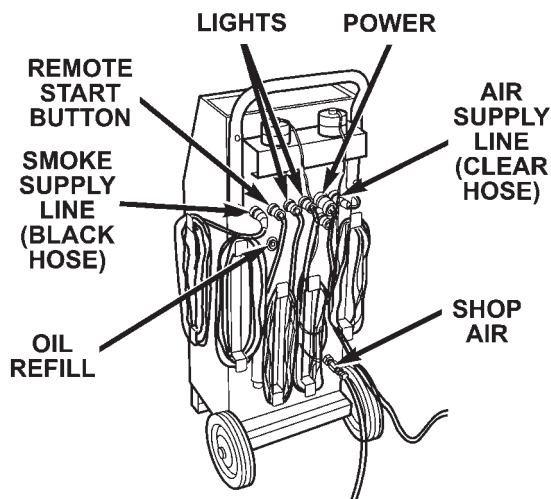
# CHARTS AND GRAPHS



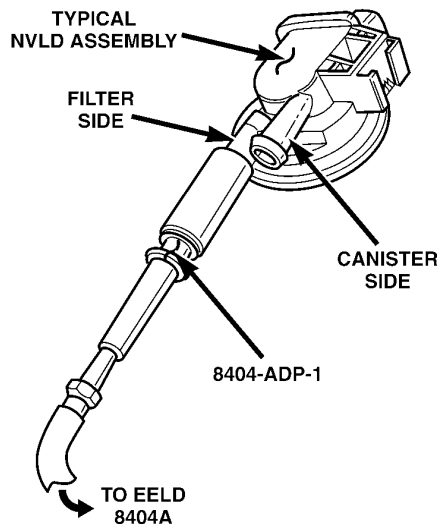
810f8370



810f81dd



80c38d69

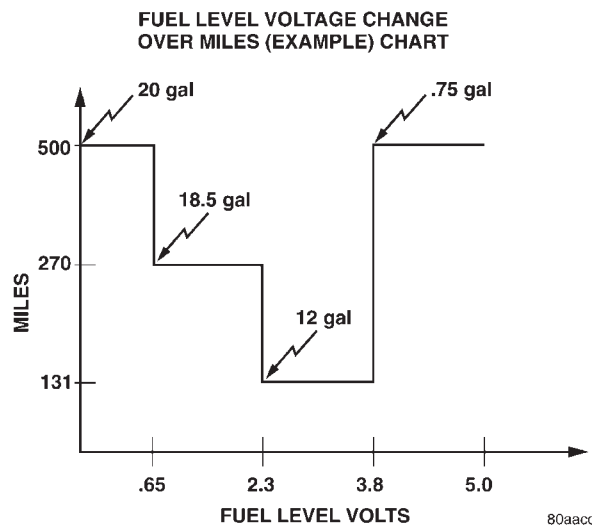
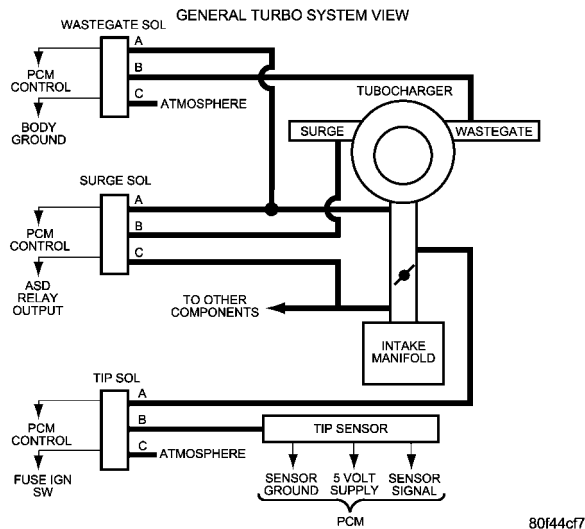


8110c38f

## O2 SENSOR CONFIGURATION

JR	4 CYLINDER	1/1	UPSTREAM
JR	4 CYLINDER	1/2	DOWNSTREAM
JR	2.7L V-6	1/1	REAR BANK UP
JR	2.7L V-6	1/2	REAR BANK DOWN
JR	2.7L V-6	2/1	FRONT BANK UP
JR	2.7L V-6	2/2	FRONT BANK DOWN
LH	V-6 ALL	1/1	RIGHT BANK UP
LH	V-6 ALL	1/2	RIGHT BANK DOWN
LH	V-6 ALL	2/1	LEFT BANK UP
LH	V-6 ALL	2/2	LEFT BANK DOWN
RS/RG	ALL	1/1	UPSTREAM
RS/RG	ALL	1/2	DOWNSTREAM
PL	ALL	1/1	UPSTREAM
PL	ALL	1/2	DOWNSTREAM
PR	3.5L	1/1	RIGHT BANK UP
PR	3.5L	1/2	RIGHT BANK DOWN
PR	3.5L	2/1	LEFT BANK UP
PR	3.5L	2/2	LEFT BANK DOWN
PT	ALL	1/1	UPSTREAM
PT	ALL	1/2	DOWNSTREAM

80aa3148



This image shows a full page of white paper with horizontal grey ruling lines. The word "NOTES" is printed at the top center in a bold, black, sans-serif font. Below the title, there are approximately 28 evenly spaced horizontal lines extending across the width of the page.