TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 SYSTEM COVERAGE 1
1.2 SIX-STEP TROUBLESHOOTING PROCEDURE 1

2.0 IDENTIFICATION OF SYSTEM 1

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION 1

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 13
3.5.2 DISPLAY IS NOT VISIBLE 14

4.0 DISCLAIMERS, SAFETY, WARNINGS 14

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

5.0 REQUIRED TOOLS AND EQUIPMENT 15

6.0 GLOSSARY OF TERMS 16

7.0 DIAGNOSTIC INFORMATION AND PROCEDURES 17

COMMUNICATION
*NO RESPONSE FROM PCM (PCI BUS) - 1.6L 18
*NO RESPONSE FROM PCM (PCI BUS) - NGC 19

TABLE OF CONTENTS - Continued

*NO RESPONSE FROM PCM (PCM SCI ONLY) - NGC 20
*NO RESPONSE FROM PCM (SCI ONLY) - 1.6L 23
*NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE 25
*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC 27
*PCI BUS COMMUNICATION FAILURE 30

DRIVEABILITY - 1.6L GAS

P0016-CRANK AND CAM OUT-OF-SYNC 33
P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN 37
P0036-1/2 O2 SENSOR HEATER CIRCUIT OPEN 37
P0031-1/1 O2 SENSOR HEATER CIRCUIT LOW 40
P0037-1/2 O2 SENSOR HEATER CIRCUIT LOW 40
P0032-1/1 O2 SENSOR HEATER CIRCUIT HIGH 43
P0038-1/2 O2 SENSOR HEATER CIRCUIT HIGH 43
P0106-BARO PRESSURE OUT OF RANGE 46
P0107-MAP SENSOR VOLTAGE TOO LOW 49
P0108-MAP SENSOR VOLTAGE TOO HIGH 51
P0112-INTAKE AIR TEMP SENSOR TOO LOW 54
P0113-INTAKE AIR TEMP SENSOR TOO HIGH 56
P0117-ECT SENSOR VOLTAGE TOO LOW 59
P0118-ECT SENSOR VOLTAGE TOO HIGH 61
P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW 63
P0222-THROTTLE POSITION SENSOR CIRCUIT #2 LOW 63
P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH 67
P0223-THROTTLE POSITION SENSOR CIRCUIT #2 HIGH 67
P0125-CLOSED LOOP TEMP NOT REACHED 70
P0128-COOLANT THERMOSTAT 72
P0131-1/1 O2 SENSOR SHORTED TO GROUND 74
P0137-1/2 O2 SENSOR SHORTED TO GROUND 74
P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE 77
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE 77
P0133-1/1 O2 SENSOR SLOW RESPONSE 80
P0139-1/2 O2 SENSOR SLOW RESPONSE 80
P0134-1/1 O2 SENSOR STAYS AT CENTER 83
P0140-1/2 O2 SENSOR STAYS AT CENTER 83
P0171-1/1 FUEL SYSTEM LEAN 86
P0172-1/1 FUEL SYSTEM RICH 90
P0201-INJECTOR #1 CONTROL CIRCUIT OPEN 94
P0202-INJECTOR #2 CONTROL CIRCUIT OPEN 94
P0203-INJECTOR #3 CONTROL CIRCUIT OPEN 94
P0204-INJECTOR #4 CONTROL CIRCUIT OPEN 94
P0261-INJECTOR #1 CONTROL CIRCUIT LOW 97
P0264-INJECTOR #2 CONTROL CIRCUIT LOW 97
P0267-INJECTOR #3 CONTROL CIRCUIT LOW 97
P0270-INJECTOR #4 CONTROL CIRCUIT LOW 97
P0262-INJECTOR #1 CONTROL CIRCUIT HIGH 100
P0265-INJECTOR #2 CONTROL CIRCUIT HIGH 100
P0268-INJECTOR #3 CONTROL CIRCUIT HIGH 100
P0271-INJECTOR #4 CONTROL CIRCUIT HIGH 100
P0300-MULTIPLE CYLINDER MIS-FIRE 103
P0301-CYLINDER #1 MISFIRE 103
P0302-CYLINDER #2 MISFIRE 103
P0303-CYLINDER #3 MISFIRE 103

TABLE OF CONTENTS - Continued

P0304-CYLINDER #4 MISFIRE 103
P0315-NO CRANK LEARNED 107
P0325-KNOCK SENSOR #1 CIRCUIT 109
P0335-NO CRANK SIGNAL AT PCM 112
P0336-CRANKSHAFT POSITION SENSOR PERFORMANCE 116
P0340-NO CAM SIGNAL AT PCM 119
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY 123
P0444-EVAP PURGE SOLENOID CIRCUIT OPEN 126
P0458-EVAP PURGE SOLENOID LOW 128
P0459-EVAP PURGE SOLENIOD CIRCUIT HIGH 130
P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME 132
P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW 134
P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH 135
P0500-NO VEHICLE SPEED SENSOR SIGNAL 136
P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED 139
P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED 141
P0513-INVALID SKIM KEY 143
P0551-POWER STEERING SWITCH FAILURE 145
P0562-CHARGING SYSTEM VOLTAGE TOO LOW 147
P0563-CHARGING SYSTEM VOLTAGE TOO HIGH 150
P0572-BRAKE SWITCH CIRCUIT LOW 152
P0573-BRAKE SWITCH CIRCUIT HIGH 154
P0580-SPEED CONTROL SWITCH ALWAYS LOW 157
P0625-GENERATOR FIELD CONTROL CIRCUIT LOW 159
P0626-GENERATOR FIELD CONTROL CIRCUIT HIGH 161
P0628-FUEL PUMP RELAY CONTROL CIRCUIT LOW 163
P0629-FUEL PUMP RELAY CONTROL CIRCUIT HIGH 166
P0646-A/C CLUTCH RELAY CONTROL CIRCUIT LOW 168
P0647-A/C CLUTH RELAY CONTROL CIRCUIT HIGH 170
P0686-ASD RELAY CONTROL CIRCUIT LOW 172
P0687-ASD RELAY CONTROL CIRCUIT HIGH 175
P0688-ASD RELAY OUTPUT CIRCUIT LOW 177
P0690-ASD RELAY OUTPUT CIRCUIT HIGH 180
P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW 182
P0693-HIGH SPEED FAN RELAY CONTROL CIRCUIT LOW 182
P0692-LOW SPEED FAN RELAY CONTROL CIRCUIT HIGH 185
P0694-HIGH SPEED FAN RELAY CONTROL CIRCUIT HIGH 185
P0703-BRAKE LAMP SWITCH CIRCUIT PERFORMANCE 187
P0719-BRAKE LAMP SWITCH CIRCUIT LOW 190
P0724-BRAKE LAMP SWITCH CIRCUIT HIGH 193
P0833-CLUTCH UPSTOP SWITCH PERFORMANCE 195
P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE 197
P1136-1/2 HEATER ELEMENT RESISTANCE OUT OF RANGE 197
P1594-CHARGING SYSTEM VOLTAGE TOO HIGH 200
P1616-5V OUTPUT REFERENCE VOLTAGE #1 LOW 202
P1617-5V OUTPUT REFERENCE VOLTAGE #1 HIGH 204
P1618-5V OUTPUT REFERENCE VOLTAGE UNSTABLE 206
P1626-5V OUTPUT REFERENCE VOLTAGE #2 LOW 208
P1627-5V OUTPUT REFERENCE VOLTAGE #2 HIGH 210
P1628-5V OUTPUT REFERENCE VOLTAGE #1 UNSTABLE 212
P1653-PCI BUS SHORTED TO GROUND 214
P1654-PCI BUS SHORTED TO VOLTAGE 216
P1656-PCI BUS NOT AVAILABLE 218

P1686-NO SKIM BUS MESSAGE RECEIVED 220
P1687-NO CLUSTER BUS MESSAGE 222
P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT 223
P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE 226
P2107-ELECTRONIC THROTTLE CONTROL MODULE PROCESSOR. 228
P2108-ELECTRONIC THROTTLE CONTROL MODULE PERFORMANCE 228
P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW 229
P2127-ACCELERATOR PEDAL POSITION SENSOR #2 LOW. 229
P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH 233
P2128-ACCELERATOR PEDAL POSITION SENSOR #2 HIGH 233
P2135-THROTTLE POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION . . .236
P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION 239
P2300-IGNITION COIL #1 CIRCUIT LOW. 243
P2303-IGNITION COIL #2 CIRCUIT LOW. 243
P2301-IGNITION COIL #1 CIRCUIT HIGH 245
P2304-IGNITION COIL #2 CIRCUIT HIGH 245
*CHECKING PCM POWER AND GROUND CIRCUITS 248
*CHECKING RADIATOR FAN RELAY OUTPUT 249
*CHECKING THE A/C RELAY OUTPUT 251
*SPEED CONTROL SWITCH TEST 1.6L 253

DRIVEABILITY - NGC
INTERMITTENT CONDITION. 255
P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT 256
P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW 260
P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW 260
P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH 262
P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH 262
P0033-SURGE VALVE SOLENOID CIRCUIT 265
P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION. 267
P0071-AMBIENT TEMP SENSOR PERFORMANCE 273
P0072-AMBIENT TEMP SENSOR LOW 276
P0073-AMBIENT TEMP SENSOR HIGH. 278
P0107-MAP SENSOR LOW 280
P0108-MAP SENSOR HIGH. 283
P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE. 286
P0112-INTAKE AIR TEMPERATURE SENSOR LOW. 289
P0113-INTAKE AIR TEMPERATURE SENSOR HIGH 291
P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE. 293
P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW 296
P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH 298
P0122-THROTTLE POSITION SENSOR #1 LOW 300
P0123-THROTTLE POSITION SENSOR #1 HIGH. 303
P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL . .306
P0128-THERMOSTAT RATIONALITY 308
P0129-BAROMETRIC PRESSURE OUT-OF-RANGE 313
P0131-O2 SENSOR 1/1 VOLTAGE LOW 317
P0137-O2 SENSOR 1/2 VOLTAGE LOW 317
P0132-O2 SENSOR 1/1 VOLTAGE HIGH. 320
P0138-O2 SENSOR 1/2 VOLTAGE HIGH. 320
P0133-O2 SENSOR 1/1 SLOW RESPONSE 323
P0139-O2 SENSOR 1/2 SLOW RESPONSE 323

TABLE OF CONTENTS - Continued

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE 325
P0141-O2 SENSOR 1/2 HEATER PERFORMANCE 325
P0171-FUEL SYSTEM 1/1 LEAN. 327
P0172-FUEL SYSTEM 1/1 RICH 332
P0201-FUEL INJECTOR #1 336
P0202-FUEL INJECTOR #2 336
P0203-FUEL INJECTOR #3 336
P0204-FUEL INJECTOR #4 336
P0234-OVERBOOST PERFORMANCE. 339
P1106-BARO SOLENOID PERFORMANCE 339
P1188 TIP SENSOR PERFORMANCE 339
P0243-WASTEGATE SOLENOID CIRCUIT. 343
P0300-MULTIPLE CYLINDER MISFIRE 346
P0301-CYLINDER #1 MISFIRE 346
P0302-CYLINDER #2 MISFIRE 346
P0303-CYLINDER #3 MISFIRE 346
P0304-CYLINDER #4 MISFIRE 346
P0315-NO CRANK SENSOR LEARNED. 354
P0325-KNOCK SENSOR #1 CIRCUIT 356
P0335-CRANKSHAFT POSITION SENSOR CIRCUIT 359
P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT 364
P0340-CAMSHAFT POSITION SENSOR CIRCUIT 368
P0344-CAMSHAFT POSITION SENSOR INTERMITTENT 373
P0420-CATALYTIC 1/1 EFFICIENCY. 377
P0440-GENERAL EVAP SYSTEM FAILURE. 379
P0441-EVAP PURGE SYSTEM PERFORMANCE 384
P0442-EVAP SYSTEM MEDIUM LEAK. 386
P0455-EVAP SYSTEM LARGE LEAK 386
P0443-EVAP PURGE SOLENOID CIRCUIT 391
P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW 394
P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH. 397
P0456-EVAP SYSTEM SMALL LEAK 399
P0457-LOOSE FUEL CAP 401
P0461-FUEL LEVEL SENSOR #1 PERFORMANCE 405
P0462-FUEL LEVEL SENSOR #1 LOW 407
P0463-FUEL LEVEL SENSOR #1 HIGH 407
P0480-COOLING FAN 1 CONTROL CIRCUIT 408
P0481-COOLING FAN 2 CONTROL CIRCUIT 410
P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW. 412
P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH 413
P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (AUTO TRANS) 415
P0501-VEHICLE SPEED SENSOR #1 PERFORMANCE (MANUAL TRANS) 416
P0506-IDLE SPEED LOW PERFORMANCE 418
P0507-IDLE SPEED HIGH PERFORMANCE 418
P0508-IAC VALVE SENSE CIRCUIT LOW 420
P0509-IAC VALVE SENSE CIRCUIT HIGH. 423
P0513-INVALID SKIM KEY. 425
P0516-BATTERY TEMPERATURE SENSOR LOW 427
P0517-BATTERY TEMPERATURE SENSOR HIGH 429
P0522-OIL PRESSURE SENSOR LOW 431
P0551-POWER STEERING SWITCH PERFORMANCE 433
P0562-BATTERY VOLTAGE LOW 435
P0563-BATTERY VOLTAGE HIGH. 438

P0572-BRAKE SWITCH #1 CIRCUIT LOW. 440
P0573-BRAKE SWITCH #1 CIRCUIT HIGH 442
P0580-SPEED CONTROL SWITCH #1 LOW 444
P0581-SPEED CONTROL SWITCH #1 HIGH. 446
P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT 448
P0586-SPEED CONTROL VENT SOLENOID CIRCUIT 451
P0594-SPEED CONTROL SERVO POWER CIRCUIT 454
P0600-SERIAL COMMUNICATION LINK. 457
P0601-INTERNAL MEMORY CHECKSUM INVALID. 457
P0622-GENERATOR FIELD CONTROL CIRCUIT 458
P0627-FUEL PUMP RELAY CIRCUIT 460
P0630-VIN NOT PROGRAMMED IN PCM 462
P0632-ODOMETER NOT PROGRAMMED IN PCM. 463
P0633-SKIM KEY NOT PROGRAMMED IN PCM. 464
P0645-A/C CLUTCH RELAY CIRCUIT 465
P0685-ASD RELAY CONTROL CIRCUIT 467
P0688-ASD RELAY SENSE CIRCUIT LOW 469
P0700-TRANSMISSION CONTROL SYSTEM/READ TRANSMISSION DTCS ON THE DRBIII® 472
P0850-PARK/NEUTRAL SWITCH PERFORMANCE 473
P1105-TIP SENSOR SOLENOID CIRCUIT 474
P1115-GENERAL TEMP SENSOR PERFORMANCE. 476
P1187-THOTTLE INLET PRESSURE/MAP CORRELATION 480
P1189-TIP SENSOR CIRCUIT LOW 485
P1190-TIP SENSOR CIRCUIT HIGH. 488
P1593-SPEED CONTROL SWITCH STUCK. 491
P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION 494
P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE . . .494
P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY 494
P1696-EEPROM MEMORY WRITE DENIED/INVALID. 495
P1697-EMR (SRI) MILEAGE NOT STORED. 495
P1854-TIP BARO OUT OF RANGE. 497
P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK 501
P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN 507
P2097-DOWN STREAM FUEL SYSTEM 1/2 RICH 507
P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION . . .510
P2305-IGNITION COIL #2 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION . . .510
P2503-CHARGING SYSTEM VOLTAGE LOW 513
U0101-NO TRANSMISSION BUS MESSAGE. 516
U0155-NO CLUSTER BUS MESSAGE 518
U0168-NO SKIM BUS MESSAGES 519
U110C-NO FUEL LEVEL BUS MESSAGE 521
*CHECKING PCM POWER AND GROUND CIRCUITS 523
*CHECKING RADIATOR FAN RELAY OUTPUT 524
*CHECKING THE A/C RELAY OUTPUT 526

SENTRY KEY IMMOBILIZER
ANTENNA FAILURE 528
COP FAILURE. 528
EEPROM FAILURE. 528
INTERNAL FAULT. 528
RAM FAILURE. 528

SERIAL LINK INTERNAL FAULT 528
STACK OVERFLOW FAILURE. 528
PCM STATUS FAILURE 530
SERIAL LINK EXTERNAL FAULT 530
ROLLING CODE FAILURE. 532
VIN MISMATCH. 532
TRANSPONDER COMMUNICATION FAILURE 534
TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE 534
TRANSPONDER ID MISMATCH 534
TRANSPONDER RESPONSE MISMATCH 534

STARTING
*CHECKING FUEL DELIVERY. 537
*CHECKING FUEL PRESSURE LEAK DOWN 540
*CHECKING HARD START (FUEL DELIVERY SYSTEM) 541
*ENGINE CRANKS DOES NOT START - 1.6L 543
*ENGINE CRANKS DOES NOT START - 2.0L/2.4L 550
*NO CRANK CONDITION 1.6L 558
*NO CRANK CONDITION 2.0L/2.4L 562
*NO RESPONSE FROM PCM WITH A NO START CONDITION 565
*START AND STALL CONDITION 1.6L 566
*START AND STALL CONDITION 2.0L/2.4L 569

VERIFICATION TESTS
VERIFICATION TESTS 572

8.0 COMPONENT LOCATIONS 581

8.1 POWERTRAIN AND SKIM 581
8.2 CONTROL AND SOLENOIDS 581
8.3 DATA LINK CONNECTOR 583
8.4 SENSORS 583
8.5 FUEL SYSTEM 586
8.6 RELAYS 586
8.7 SWITCHES 587

9.0 CONNECTOR PINOUTS 589

A/C COMPRESSOR CLUTCH (GAS) - BLACK 2 WAY 589
A/C LOW PRESSURE SWITCH - DK. GREEN 2 WAY 589
A/C PRESSURE TRANSDUCER - 2 WAY 589
ACCELERATOR PEDAL POSITION SENSOR (1.6L/DIESEL) - 10 WAY 589
AMBIENT TEMPERATURE SENSOR (EXCEPT 2.4L BASE) - BLACK 2 WAY 590
AMBIENT TEMPERATURE SENSOR (NGC) - BLACK 2 WAY 590
BRAKE LAMP SWITCH (GAS) - GRAY 6 WAY. 590
CAMSHAFT POSITION SENSOR (DIESEL) - BLACK 3 WAY. 590
CAMSHAFT POSITION SENSOR (GAS) - BLACK 3 WAY 591
CLUTCH PEDAL POSITION SWITCH (UP) - BLACK 3 WAY 591
CRANKSHAFT POSITION SENSOR (GAS) - BLACK 3 WAY 591
DATA LINK CONNECTOR - BLACK 16 WAY 591
EGR SOLENOID (DIESEL) - 2 WAY 592
ENGINE COOLANT TEMPERATURE SENSOR (DIESEL) - BLACK 2 WAY 592
ENGINE COOLANT TEMPERATURE SENSOR (GAS) - BLACK 2 WAY 592
ENGINE OIL PRESSURE SWITCH - LT. GREEN 2 WAY 592

EVAP/PURGE SOLENOID (GAS) - BLACK 2 WAY 593
FUEL INJECTOR NO. 1 (GAS) - BLACK 2 WAY 593
FUEL INJECTOR NO. 2 (GAS) - BLACK 2 WAY 593
FUEL INJECTOR NO. 3 (GAS) - BLACK 2 WAY 593
FUEL INJECTOR NO. 4 (GAS) - BLACK 2 WAY 594
FUEL PUMP MODULE - LT. GRAY 4 WAY 594
GENERATOR (2.4L TURBO) - BLACK 2 WAY 594
GENERATOR (GAS EXCEPT 2.4L TURBO) - BLACK 2 WAY 594
IDLE AIR CONTROL MOTOR (2.4L) - BLACK 2 WAY 595
IGNITION COIL (GAS) - BLACK 3 WAY 595
INLET AIR TEMPERATURE SENSOR (GAS) - BLACK 2 WAY 595
KNOCK SENSOR (GAS) - BLACK 2 WAY 595
MANIFOLD ABSOLUTE PRESSURE SENSOR (GAS) - BLACK 3 WAY 596
NATURAL VACUUM LEAK DETECTION ASSEMBLY (EXCEPT EXPORT) - BLACK 3 WAY 596
OXYGEN SENSOR 1/1 UPSTREAM (GAS) - BLACK 4 WAY 596
OXYGEN SENSOR 1/2 DOWNSTREAM (GAS) - BLACK 4 WAY 596
A/C COMPRESSOR CLUTCH RELAY 598
AUTO SHUT DOWN RELAY 598
FUEL PUMP RELAY 598
HIGH SPEED RADIATOR FAN RELAY (2.4L TURBO) 598
HIGH SPEED RADIATOR FAN RELAY (EXCEPT 2.4L TURBO) 598
LOW SPEED RADIATOR FAN RELAY 599
POWERTRAIN CONTROL MODULE (1.6L) - BLACK 90 WAY 600
POWERTRAIN CONTROL MODULE C1 (NGC) - BLACK/BLACK 38 WAY 601
POWERTRAIN CONTROL MODULE C2 (NGC) - BLACK/ORANGE 38 WAY 602
POWERTRAIN CONTROL MODULE C3 (NGC) - BLACK/NATURAL 38 WAY 603
POWERTRAIN CONTROL MODULE C4 (NGC) - BLACK/GREEN 38 WAY 604
RADIATOR FAN MOTOR (2.4L TURBO) - DK. GRAY 4 WAY 605
RADIATOR FAN MOTOR (EXCEPT 2.4L TURBO) - BLACK 3 WAY 605
SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY 605
SPEED CONTROL SERVO (2.4L) - BLACK 4 WAY 605
SPEED CONTROL SWITCH - YELLOW 3 WAY 606
SURGE SOLENOID (2.4L TURBO) - BLACK 2 WAY 606
THROTTLE INLET PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY 606
THROTTLE INLET PRESSURE SOLENOID (2.4L TURBO) - BLACK 2 WAY 606
THROTTLE POSITION SENSOR (2.4L) - BLACK 3 WAY 607
VEHICLE SPEED SENSOR (GAS MTX) - BLACK 3 WAY 607
WASTEGATE SOLENOID (2.4L TURBO) - BLACK 2 WAY 607

10.0 SCHEMATIC DIAGRAMS 609

10.1 PT 1.6L ENGINE 609
10.2 PT 2.0L AND 2.4L ENGINES 611

11.0 CHARTS AND GRAPHS 615

IMPORTANT (NGC)

The PT 2.0/2.4 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 systems 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 2005 PT vehicle equipped with the 1.6L, 2.0L/2.4L and the 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.

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. Mass air flow is calculated using the speed density method using enigne 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 O2 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 O2 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.

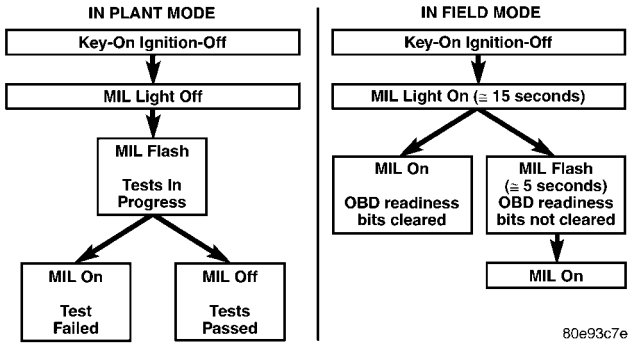
The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII/Euro Stage III OBD. These OBDII/Euro Stage III OBD Diagnostics control the functions necessary to meet the requirements of California OBDII, Federal OBD regulation and European regulation. These requirements 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 vehicle 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.



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 Open Short To Ground Short To Voltage	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* To Extinguish The MIL
Inputs Checked For Rationality Outputs Checked For Functionality	Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault	
	Evaporative Emission System	**Misfire Monitor** Monitors For Engine Misfire at: 1000 RPM Counter (Type B) **200 RPM Counter (Type A) Requires 3 Consecutive *Misfire Good Trips* To Extinguish the MIL **Type A misfire is a two trip failure. The MIL will illuminate and blink at the first failure.
Requires 3 Consecutive *Global/Alternate Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Global Good Trips* to Extinguish the MIL*	

***40 Warm Up Cycles** are required to erase DTC's *after* the MIL has been extinguished.

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. Press YES to agree to the License Agreement.
4. On the DRB III Select #1 DRB III Standalone.
5. Select #1 1998-2005 Diagnostics
6. Select #1 ALL (Except Below)
7. Select #1 Engine
8. Select #2 DTCs and Related Functions
9. 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.
10. Return to Engine Select Function Menu and Select #9, OBD II Monitors.
11. 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 4th 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. 02 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 applies 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.

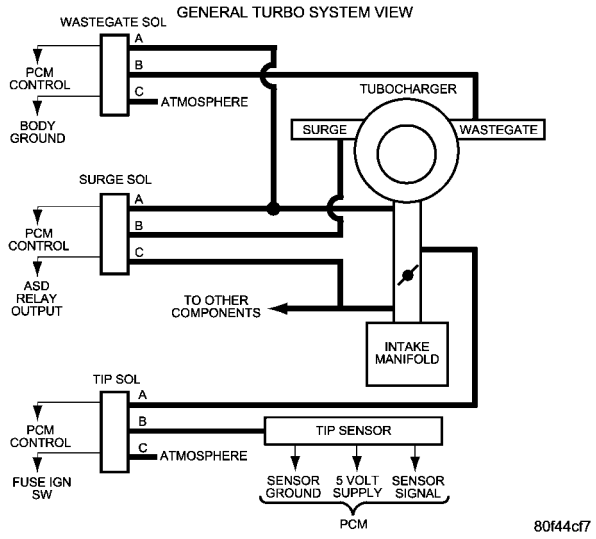
Speed control may be cancelled by braking, driver input using the speed control switches, shifting into neutral, excessive engine speed (wheels spinning), or turning the ignition off.

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 (NCG)

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 combusion. 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



NATURAL VACUUM LEAK DETECTION (NVLD) (NGC)

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that is used on vehicles equipped with the latest Powertrain Control Module (PCM), the Next Generation Controller (NGC) starting in 2002 M.Y. This new system replaces the leak detec-

tion pump as the method of 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″ H2O (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″ H2O (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″ H2O (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″ H2O (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 pass, 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)

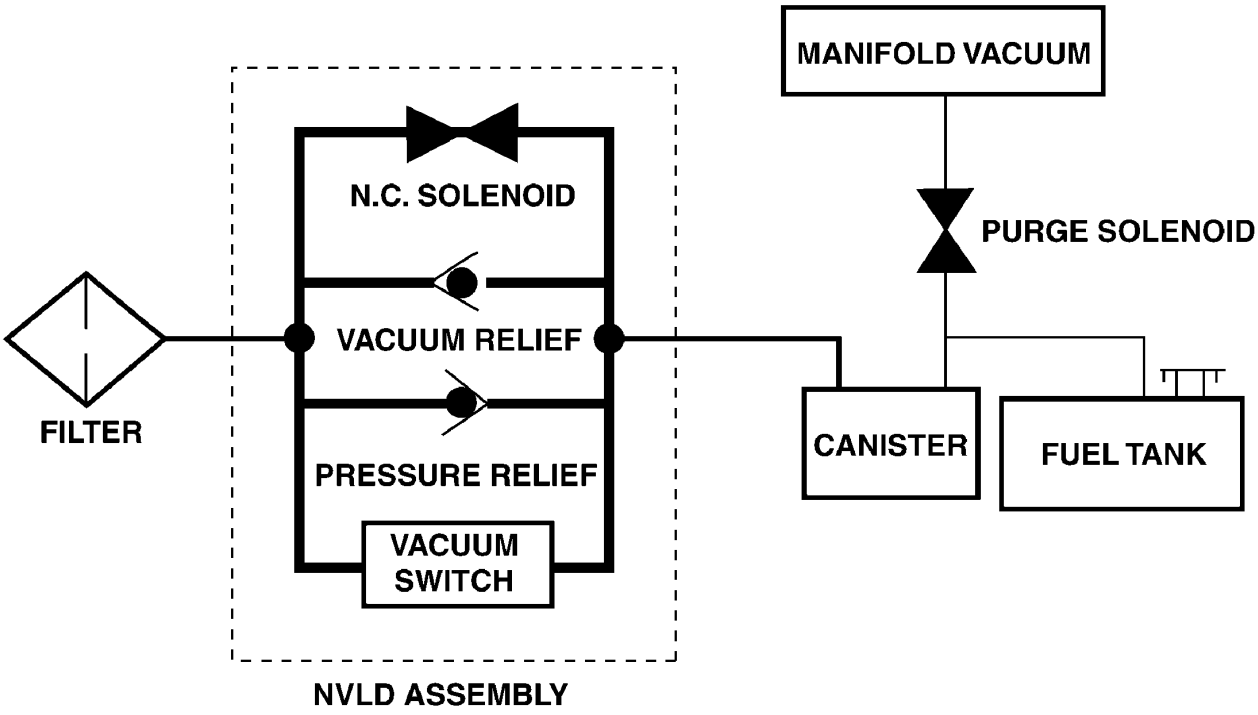
NOTE: This intrusive test will only be run if the Small Leak (passive) test fails, or is inconclusive (the switch does not close)

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″ H2O 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

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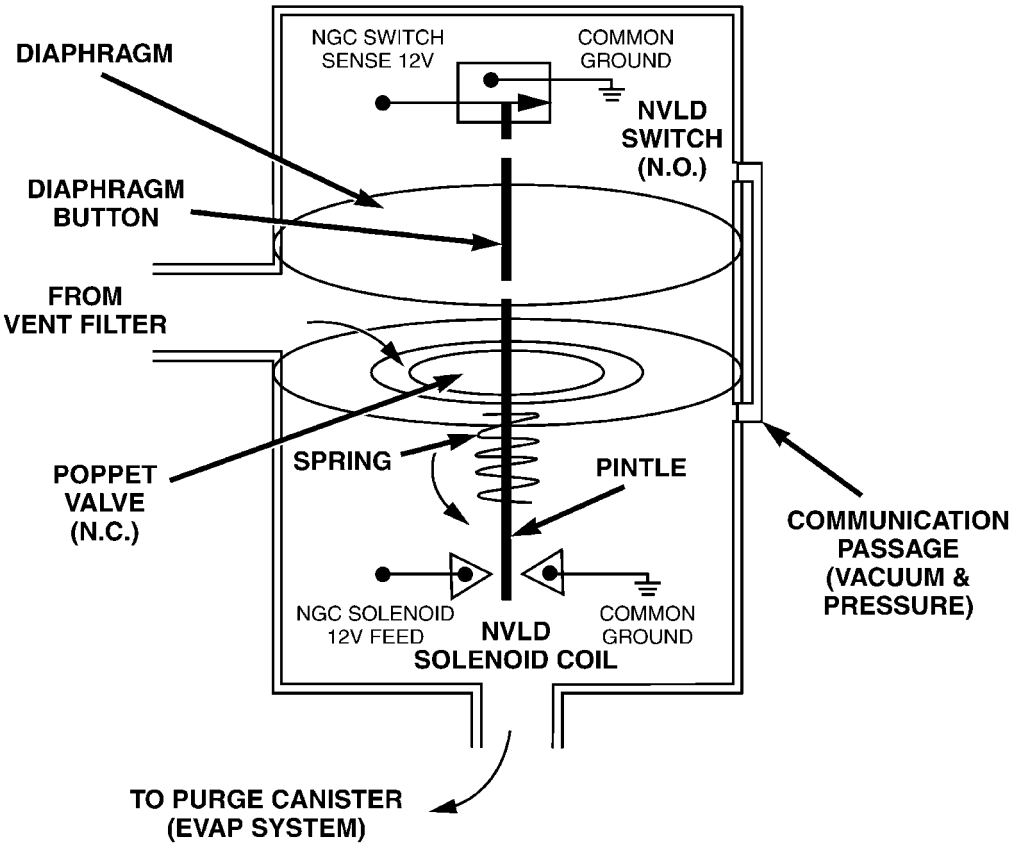
FIGURE 1

NVLD ASSEMBLY INTERNAL SCHEMATIC



NVLD Switch Closure happens at 1" H2O (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" H2O 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" H2O Vacuum, and is completely open at 6" H2O (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).

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FIGURE 2

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 result 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 the 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.

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, 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.
```

3.5.1 DRBIII® DOES NOT POWER UP

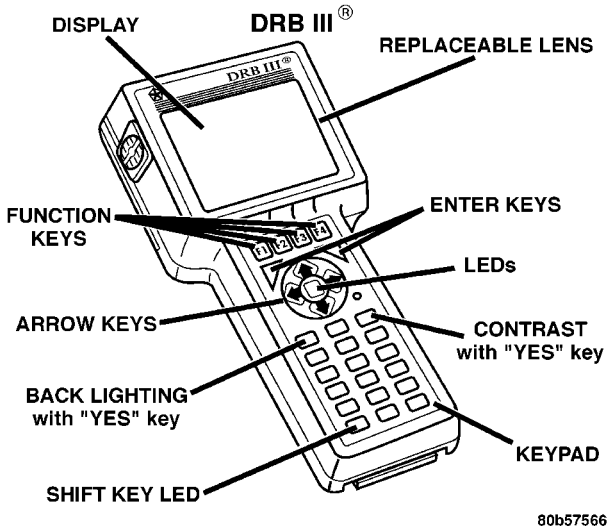
If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link

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 subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS 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

FUNCTION	INPUT LIMIT
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

6.0 GLOSSARY OF TERMS

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

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:

*NO RESPONSE FROM PCM (PCI BUS) - 1.6L

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Anti-Lock Brakes. With the DRB, enter Body then Electro/Mechanical Cluster (MIC). With the DRB, enter Passive Restraints then Airbag. Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
2	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (SCI only) symptom path.** **NOTE: If the vehicle will not start and the DRBIII® displays a no response message, refer to the appropriate symptom in the powertrain diagnostic procedures.** Turn the ignition off. Disconnect the PCM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCI Bus circuit in the PCM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

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	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Anti-Lock Brakes. With the DRB, enter Electro/Mechanical Cluster (MIC). With the DRB, enter Passive Restraints then Airbag. Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	With the DRB read the Powertrain DTC's. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (PCM SCI only) symptom path.** Turn the ignition off. Disconnect the PCM harness connectors. **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.** Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. 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. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Turn the ignition on. Measure the voltage of the PCM SCI Transmit circuit at the Data Link harness connector (cav 7). Is the voltage above 1.0 volt? Yes → Repair the PCM SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 3	All
3	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connectors. Turn the ignition on. Measure the voltage of the PCM SCI Receive circuit at the Data Link harness connector (cav 12). Is the voltage above 1.0 volt? Yes → Repair the PCM SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 4	All

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

TEST	ACTION	APPLICABILITY
4	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? Yes → Repair the short between the PCM SCI Transmit and the PCM SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 5	All
5	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? Yes → Repair the PCM SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 6	All
6	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? Yes → Repair the PCM SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. **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.** 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? Yes → Go To 8 No → Repair the PCM SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

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

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. **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.** 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? Yes → Go To 9 No → Repair the PCM SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - 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 - 1 - NGC.	All

Symptom:

***NO RESPONSE FROM PCM (SCI ONLY) - 1.6L**

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

TEST	ACTION	APPLICABILITY
1	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
2	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the SCI Transmit circuit at the DLC connector. Is the voltage above 1.0 volt? Yes → Repair the SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the SCI Receive circuit at the DLC connector. Is the voltage above 1.0 volt? Yes → Repair the SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Go To 4	All

*NO RESPONSE FROM PCM (SCI ONLY) - 1.6L — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the DRBIII® from the DLC. Disconnect the PCM harness connector. Measure the resistance between the SCI Transmit circuit and the SCI Receive circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the SCI Transmit and the SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance between ground and the SCI Receive circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance of the SCI Receive circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRBIII® from the DLC. Measure the resistance of the SCI Transmit circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

Symptom:

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

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE INSTRUMENT CLUSTER
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 Instrument Cluster? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the Instrument Cluster. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to 12-volts, probe the Ground circuit. Is the test light illuminated? 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	**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.** Disconnect the SKIM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the SKIM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Go To 6 No → Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All

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	Turn the ignition on. **Note: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, attempt to communicate with the Instrument Cluster. With the DRB, attempt to communicate with the Airbag Control Module. Was the DRB able to I/D or establish communications with both of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the appropriate symptom. Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. **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.** Turn the ignition on. 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. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the test light illuminated for both circuits? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. **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.** Using a 12-volt test light connected to ground, probe the Fused B(+) circuit in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the test light illuminated? Yes → Go To 4 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.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. **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.** Using a 12-volt test light connected to 12-volts, probe each ground circuit in the appropriate terminal of special tool #8815. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Is the light illuminated at all ground circuits? Yes → Go To 5 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.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE - NGC — Continued

TEST	ACTION	APPLICABILITY
5	**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.** Disconnect the PCM harness connectors. **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.** Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII® select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. 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. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Go To 6 No → Repair the PCI Bus circuit for an open. Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits. If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the service information. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1.	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	**Note: Determine which modules this vehicle is equipped with before beginning.** **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.** Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Airbag Control Module SKIM (SENTRY KEY IMMOBILIZER) MIC (INSTRUMENT CLUSTER) Was the DRBIII® able to communicate with one or more Module(s)? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM/ECM harness connector. Note: If equipped with NGC follow the caution below. **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.** 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/ECM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	**NOTE: Reconnect the PCM/ECM harness connector and the negative battery cable.** 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? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Using a voltmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground. **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.** 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? Yes → Repair the PCI Bus circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to voltage was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	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. **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.** Is the resistance below 150.0 ohms with all the modules disconnected? Yes → Repair the PCI Bus circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to ground was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

P0016-CRANK AND CAM OUT-OF-SYNC

When Monitored and Set Condition:

P0016-CRANK AND CAM OUT-OF-SYNC

When Monitored: With the engine running.

Set Condition: No Crank Sensor or CAM Sensor Electrical DTCs present. If the CAM Signal is in a Low State: No CAM Sensor polarity change between 17 and 40 crank teeth. Or, if the CAM Signal is in a High State: No CAM Sensor polarity change between 77 and 100 crank teeth.

POSSIBLE CAUSES
TONE WHEEL/PULSE RING INSPECTION
WIRING HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
CHECKING INTERMITTENT CKP SIGNAL WITH LAB
CHECKING INTERMITTENT CMP SIGNAL WITH LAB
CHECKING INTERMITTENT CKP WIRING WITH LAB SCOPE
CHECKING INTERMITTENT CMP WIRING WITH LAB SCOPE
INTERMITTENT CONDITION
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 11	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. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 6	All

P0016-CRANK AND CAM OUT-OF-SYNC — Continued

TEST	ACTION	APPLICABILITY
3	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 7 No → Go To 11	All
7	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All

P0016-CRANK AND CAM OUT-OF-SYNC — Continued

TEST	ACTION	APPLICABILITY
8	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 - 1.6L. No → Go To 9	All
9	Turn the ignition off. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
11	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Did the CKP Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 12	All
12	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 13	All

P0016-CRANK AND CAM OUT-OF-SYNC — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 14	All
14	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 15	All
15	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN
P0036-1/2 O2 SENSOR HEATER CIRCUIT OPEN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN.

When Monitored and Set Condition:

P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN

When Monitored: With the engine running and O2 Sensor heater duty cycle >70%.

Set Condition: When the PCM detects an open on the 1/1 O2 Sensor Heater Control circuit for more than 320 ms.

P0036-1/2 O2 SENSOR HEATER CIRCUIT OPEN

When Monitored: With the engine running and O2 Sensor heater duty cycle >70%.

Set Condition: When the PCM detects an open on the 1/2 O2 Sensor Heater Control circuit for more than 320 ms.

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER CONTROL CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 3 No → Go To 2	All
2	**NOTE: Allow the O2 Sensor voltage to stabilize between 0.4 and 0.6 volts before continuing the test.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volts? Yes → Go To 3 No → Go To 7	All

P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Allow the O2 Sensor voltage to stabilize between 0.4 and 0.6 volts before continuing the test.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element at the component side of the connector. **NOTE: Heater Resistance Specification for 1/1 and 1/2 O2 Sensor is from 3 to 20 ohms.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Heater Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Relay. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 6 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0030-1/1 O2 SENSOR HEATER CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0031-1/1 O2 SENSOR HEATER CIRCUIT LOW
P0037-1/2 O2 SENSOR HEATER CIRCUIT LOW

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

When Monitored and Set Condition:

P0031-1/1 O2 SENSOR HEATER CIRCUIT LOW

When Monitored: With the engine running and O2 Sensor operation >0.

Set Condition: When the PCM detects a short to ground on the 1/1 O2 Sensor Heater Control circuit for more than 160 ms.

P0037-1/2 O2 SENSOR HEATER CIRCUIT LOW

When Monitored: With the engine running and O2 Sensor operation >0.

Set Condition: When the PCM detects a short to ground on the 1/2 O2 Sensor Heater Control circuit for more than 160 ms.

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER CONTROL CIRCUIT SHORT TO GROUND
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 3 No → Go To 2	All
2	**NOTE: Allow the O2 Sensor voltage to stabilize to between 0.4 to 0.6 volts before continuing the test.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volts? Yes → Go To 3 No → Go To 7	All

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

TEST	ACTION	APPLICABILITY
3	**NOTE: Allow the O2 Sensor voltage to stabilize to between 0.4 and 0.6 volts before continuing the test.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element at the component side of the connector. **NOTE: Heater Resistance Specification for 1/1 and 1/2 O2 Sensor is from 3 to 20 ohms.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit between the O2 Sensor harness connector and ground. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Heater Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Relay. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 6 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

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

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0032-1/1 O2 SENSOR HEATER CIRCUIT HIGH
P0038-1/2 O2 SENSOR HEATER CIRCUIT HIGH

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

When Monitored and Set Condition:

P0032-1/1 O2 SENSOR HEATER CIRCUIT HIGH

When Monitored: With the engine running and O2 Sensor operation >0.

Set Condition: When the PCM detects a short to voltage on the 1/1 O2 Sensor Heater Control circuit for more than 320 ms.

P0038-1/2 O2 SENSOR HEATER CIRCUIT HIGH

When Monitored: With the engine running and O2 Sensor operation >0.

Set Condition: When the PCM detects a short to voltage on the 1/2 O2 Sensor Heater Control circuit for more than 320 ms.

POSSIBLE CAUSES
O2 SENSOR HEATER CONTROL CIRCUIT SHORTED TO ASD RELAY OUTPUT CIRCUIT
O2 HEATER ELEMENT
O2 SENSOR HEATER CONTROL CIRCUIT SHORT TO VOLTAGE
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Counter Indicator display NO? Yes → Go To 3 No → Go To 2	All
2	**NOTE: Allow the O2 Sensor voltage to stabilize to between 0.4 to 0.6 volts before continuing the test.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volt? Yes → Go To 3 No → Go To 7	All

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

TEST	ACTION	APPLICABILITY
3	**NOTE: Allow the O2 Sensor voltage to stabilize to between 0.4 to 0.6 volts before continuing the test.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element at the component side of the connector. **NOTE: Heater Resistance Specification for 1/1 and 1/2 O2 Sensor is from 3 to 20 ohms.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the O2 Sensor Heater Control circuit in the O2 Sensor harness connector. Is the voltage above 1.0 volt? Yes → Repair the O2 Sensor Heater Control circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Heater Control circuit and the ASD Relay Output circuit in the O2 Sensors harness connector. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Heater Control circuit short to the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

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

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0106-BARO PRESSURE OUT OF RANGE

When Monitored and Set Condition:

P0106-BARO PRESSURE OUT OF RANGE

When Monitored: With the ignition on, engine off or on, and no current TP Sensor faults, ETC faults, or Crank Sensor faults.

Set Condition: MAP Sensor less than 60kpa with key on and the engine has been off for more than 3 seconds. Engine speed less than 800 RPM and MAP below 20kpa. Engine speed less than 3500 RPM and MAP below 60kpa. Engine speed greater than 1000 RPM and MAP greater than 100kpa.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K6) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K6) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K6) 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR INTERNAL FAILURE
(K1) MAP SENSOR SIGNAL CIRCUIT OPEN
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
PCM (K6) 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 2.2 volts? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K6) 5-volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.8 to 5.2 volts? Yes → Go To 3 No → Go To 7	All

P0106-BARO PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage between 4.8 and 5.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K1) MAP Sensor Signal circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K1) MAP Sensor Signal circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K6) 5-volt Supply circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All

P0106-BARO PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K6) 5-volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 9	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K6) 5-volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on and no TPS DTCs present.

Set Condition: The MAP sensor signal voltage is below 0.0392 volt for more than 450 ms.

POSSIBLE CAUSES
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO (K901) SENSOR GROUND CIRCUIT
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR INTERNAL FAILURE
MAP SENSOR VOLTAGE BELOW .04 VOLTS
(K6) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K6) 5-VOLT SUPPLY CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below .04 volts? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K6) 5-volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.8 to 5.2 volts? Yes → Go To 5 No → Go To 3	All
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K6) 5-volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K6) 5-volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above .04 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K1) MAP Sensor Signal circuit between the MAP Sensor harness connector and ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 7	All
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (K1) MAP Sensor Signal circuit and the (K901) Sensor ground circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short between (K901) Sensor ground circuit and the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition on and no TPS DTCs present.

Set Condition: The MAP sensor signal voltage is greater than 4.96 volts for more than 450 ms.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO (K6) 5-VOLT SUPPLY CIRCUIT
(K1) MAP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
MAP SENSOR INTERNAL FAILURE
(K1) MAP SENSOR SIGNAL CIRCUIT OPEN
(K901) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.9 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the (K1) MAP Sensor Signal circuit and the (K6) 5-Volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to the (K6) 5-volt Supply circuit short to the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K1) MAP Sensor Signal circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the (K1) MAP Sensor Signal circuit and the (K901) MAP Sensor ground circuit. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. Is the voltage below 1.0 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K1) MAP Sensor Signal circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K1) MAP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K901) MAP Sensor ground circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K901) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** Inspect the vacuum port, ensure that it is clear from any obstructions. Ensure there is no physical damage to the MAP sensor and the vacuum port is free from obstructions. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0112-INTAKE AIR TEMP SENSOR TOO LOW

When Monitored and Set Condition:

P0112-INTAKE AIR TEMP SENSOR TOO LOW

When Monitored: With the ignition on.

Set Condition: Any time the Inlet Air Temp Sensor Signal circuit voltage is less than 0.10 volt.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR INTERNAL FAILURE
(K21) IAT SENSOR SIGNAL SHORTED TO GROUND
(K21) IAT SENSOR SIGNAL SHORTED TO (K921) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage below 0.10 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. With the DRBIII®, read IAT voltage. Is the voltage approximately 5 volts? Yes → Replace the Inlet Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K21) IAT Sensor Signal circuit in the IAT Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground (K21) Inlet Air Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0112-INTAKE AIR TEMP SENSOR TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	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 (K921) IAT Sensor ground circuit in the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to the (K921) Inlet Air Temperature Sensor ground circuit in the (K21) Inlet Air Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0113-INTAKE AIR TEMP SENSOR TOO HIGH

When Monitored and Set Condition:

P0113-INTAKE AIR TEMP SENSOR TOO HIGH

When Monitored: With the ignition on.

Set Condition: When the Inlet Air Temp Sensor Signal circuit voltage is greater than 4.9 volts for more than 5 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K21) IAT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
IAT SENSOR INTERNAL FAILURE
(K21) IAT SENSOR SIGNAL CIRCUIT OPEN
(K921) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage above 4.9 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. Measure the voltage of the (K21) IAT Sensor Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K21) Inlet Air Temperaturer Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0113-INTAKE AIR TEMP SENSOR TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAT harness connector. Connect a jumper wire between the (K21) IAT Sensor Signal circuit and the (K921) IAT Sensor ground circuit in the IAT harness connector. Turn the ignition on. With the DRBIII®, read IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the Inlet Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K21) IAT Sensor Signal circuit between the IAT Sensor harness connector and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 5 No → Repair the open in the (K21) Inlet Air Temperature Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K921) IAT Sensor ground circuit between the IAT Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K921) Sensor ground circuit . Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0113-INTAKE AIR TEMP SENSOR TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature (ECT) Sensor circuit voltage is less than 0.20 volt for more than 2.6 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECT SENSOR INTERNAL FAILURE
(K2) ECT SENSOR SIGNAL SHORTED TO GROUND
(K2) ECT SENSOR SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECT voltage. Is the voltage below 0.10 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT harness connector. Turn the ignition on. With the DRBIII®, read ECT voltage. Is the voltage approximately 5 volts? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. 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 Sensor Signal circuit. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0117-ECT SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	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 (K4) ETC Sensor ground circuit. Is the resistance below 100 ohms? Yes → Repair the short to the (K4) ETC Sensor Ground circuit in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	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 - 1.6L.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition on.

Set Condition: The Engine Coolant Temperature (ECT) Sensor circuit voltage is greater than 4.9 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K2) ECT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
ECT SENSOR INTERNAL FAILURE
(K2) ECT SENSOR SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECT voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. Measure the voltage of the (K2) ECT Sensor Signal circuit. Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECT harness connector. Connect a jumper wire between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT harness connector. Turn the ignition on. With the DRBIII®, read ECT voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance in the (K2) ECT Sensor Signal circuit between the ECT Sensor connector and the PCM connector. Is the resistance below 5 ohms? Yes → Go To 5 No → Repair the open in the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance in the (K4) ECT Sensor Ground circuit between the ECT Sensor connector and the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K4) ECT Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW
P0222-THROTTLE POSITION SENSOR CIRCUIT #2 LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW.

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW

When Monitored: With the ignition on.

Set Condition: Throttle Position Sensor #1 Signal circuit voltage is less than 0.30 volt for 25 ms.

P0222-THROTTLE POSITION SENSOR CIRCUIT #2 LOW

When Monitored: With the ignition on.

Set Condition: Throttle Position Sensor #2 Signal circuit voltage is less than 0.30 volt for 25 ms.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
TP SENSOR SIGNAL CIRCUIT OPEN
TP SENSOR #1 INTERNAL FAILURE
TP SENSOR #2 INTERNAL FAILURE
TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
TP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage values. Is either voltage reading below 0.30 volt? Yes → Go To 2 No → Go To 12	All

P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. Measure the voltage on the (F855) 5-volt Supply circuit. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 3 No → Go To 9	All
3	Is this test being performed to diagnose P0122 Throttle Position Sensor Circuit #1 Low? Yes - Continue to diagnose DTC P0122. Go To 4 No - Continue to diagnose DTC P0222. Go To 5	All
4	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. With the DRBIII®, monitor TPS #1 Input voltage. **NOTE: Voltage for TPS #1 should be above 4.5 volts with the connector disconnected.** Is the voltage for TPS #1 above 4.5 volts? Yes → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
5	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. With the DRBIII®, monitor TPS #2 Input voltage. Connect a jumper wire between the 5 Volt-Supply circuit and the TPS #2 Signal circuit in the ETC Assembly harness connector. Is the voltage for TPS #2 above 4.5 volts with the jumper wire in place? Yes → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance of the appropriate TPS Signal circuit. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the open TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the TP Sensor Signal circuit. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance between the TP Sensor Signal circuit and the Sensor Ground circuit. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 9	All
9	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance of the (F855) 5-volt Supply circuit. Is the resistance below 5 ohms? Yes → Go To 10 No → Repair the (F855) 5-volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance between the (F855) 5-volt Supply circuit and ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 11	All
11	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0122-THROTTLE POSITION SENSOR CIRCUIT #1 LOW — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition on. With the DRBIII®, use the ETC System Test to open and close the throttle. Fully open and fully close the throttle several times. Monitor the Throttle Position Sensor Input voltage. Is the voltage change smooth as the throttle opens and closes? Yes → Go To 13 No → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
13	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII®parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH
P0223-THROTTLE POSITION SENSOR CIRCUIT #2 HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH.

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH

When Monitored: With the ignition on.

Set Condition: Throttle Position Sensor Signal circuit voltage is greater than 4.9 volts for 25 ms.

P0223-THROTTLE POSITION SENSOR CIRCUIT #2 HIGH

When Monitored: With the ignition on.

Set Condition: Throttle Position Sensor #2 Signal circuit voltage is greater than 4.9 volts for 25 ms.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
TP SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
TP SENSOR INTERNAL FAILURE
(K922) SENSOR GROUND CIRCUIT OPEN
TP SENSOR SIGNAL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the TP Sensor voltage. Is the voltage above 4.5 volts? Yes → Go To 2 No → Go To 8	All

P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance between the TP Sensor Signal circuit and the 5 Volt Supply circuit. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. Measure the voltage of the TP Sensor Signal circuit. Is the voltage above 5.2 volts? Yes → Repair the Throttle Position Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the ETC Assembly harness connector. Connect a jumper wire between the TP Sensor Signal circuit and the TP Sensor Ground circuit. With the DRBIII®, monitor the TP Sensor voltage. Turn the ignition on. Is the voltage below 0.5 volt? Yes → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K922) TP Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K922) Throttle Position Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. Disconnect the ETC Assembly harness connector. Disconnect the PCM harness connector. Measure the resistance of the TP Sensor Signal circuit. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the Throttle Position Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0123-THROTTLE POSITION SENSOR CIRCUIT #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	Turn the ignition on. With the DRBIII®, use the ETC System Test to open and close the throttle. Fully open and fully close the throttle several times. Monitor the Throttle Position Sensor Input voltage. Is the voltage change smooth as the throttle opens and closes? Yes → Go To 9 No → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored and Set Condition:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored: With the engine running for at least 15 minutes, idling and no Engine Coolant Temperature Sensor or MAF Sensor DTCs.

Set Condition: The engine temperature does not go above 18°C (64°F). Two trips are required to set this DTC.

POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ENGINE COOLANT TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: If a ECT DTC set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a completely cold soaked engine.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **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.** Check the coolant system to make sure that the coolant has the proper mixture, is in good condition, and at the proper level. Is the coolant level and condition OK? Yes → Go To 2 No → Inspect the vehicle for a coolant leak, a pressure test may be necessary. Repair the leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0125-CLOSED LOOP TEMP NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
2	**Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. With the DRBIII®, read the Eng Coolant Temp 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Temp Deg value. The temperature 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. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg in the DRBIII® values should stay relatively close to each other.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 3 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition on. With the DRBIII®, read the Eng Coolant Temp 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Temp Deg value. The temperature 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. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg in the DRB values should stay relatively close to each other.** Does the actual coolant temperature and the reading on the DRBIII® remain relatively the same with a Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0128-COOLANT THERMOSTAT

When Monitored and Set Condition:

P0128-COOLANT THERMOSTAT

When Monitored: Key on, engine running. ECT at start between -6 C and 45 C. Idle % < 50% and Decel % < 50%.

Set Condition: ECT remains below calculated coolant temp for more than 6 seconds.

POSSIBLE CAUSES
COOLANT LEVEL
COOLANT TEMPERATURE
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**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.** Check coolant mixture and the cooling system level. If coolant level is low, check for visible leaks or perform a pressure test on the coolant system. Was the coolant level low and where any leaks found. Yes → Repair the coolant leak and/or fill coolant to the proper level. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 2	All
2	Start engine and let the vehicle warm up to operating temperature. **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.** With the DRBIII® in Inputs/Outputs, monitor the Coolant Temperature Sensor value. Does the coolant temperature increase normally and display within 5 degrees of Calculated Coolant Te Yes → Go To 3 No → Replace thermostat and fill coolant level to proper level. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0128-COOLANT THERMOSTAT — Continued

TEST	ACTION	APPLICABILITY
3	The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition. **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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's) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0131-1/1 O2 SENSOR SHORTED TO GROUND
P0137-1/2 O2 SENSOR SHORTED TO GROUND

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

When Monitored and Set Condition:

P0131-1/1 O2 SENSOR SHORTED TO GROUND

When Monitored: With the engine running for at least 2 minutes and in Closed Loop or Fuel Enrichment mode, engine coolant temp greater than 80°C (176°F), battery voltage at least 10 volts, engine speed <6000 RPM but not in deceleration, no ECT or MAP Sensor DTCs and no Misfire, Fuel System, Fuel Injector or Ignition Coil DTCs present.

Set Condition: The 1/1 Oxygen Sensor Signal circuit voltage is below 0.025 volt for more than 5 seconds.

P0137-1/2 O2 SENSOR SHORTED TO GROUND

When Monitored: With the engine running for at least 2 minutes, engine coolant temp greater than 80°C (176°F), battery voltage at least 10 volts, engine speed <6000 RPM but not during deceleration, no ECT or MAP Sensor DTCs and no Misfire, Fuel System, Fuel Injector or Ignition Coil DTCs present.

Set Condition: The 1/2 Oxygen Sensor Signal circuit voltage is below 0.05 volt for more than 10 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
O2 SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
O2 SENSOR SIGNAL SHORTED TO HEATER GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 0.05? Yes → Go To 2 No → Go To 7	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 0.05? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit in the O2 Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the O2 Sensor ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the O2 Sensor Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the O2 Sensor Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

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

When Monitored and Set Condition:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With the engine running for at least 2 minutes and battery voltage greater than 10 volts.

Set Condition: The 1/1 Oxygen Sensor Signal circuit voltage is greater than 1.14 volts for at least 20 msec.

P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With the engine running for at least 2 minutes and battery voltage greater than 10 volts.

Set Condition: The 1/2 Oxygen Sensor Signal circuit voltage is greater than 1.14 volts for 1030 msec

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL SHORTED TO VOLTAGE
O2 SENSOR SIGNAL OPEN
O2 SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Go To 7	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage below 1.2 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector Start the engine and allow the engine to idle. **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.** Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 1.2 volts? Yes → Repair the short to voltage in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor ground circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0133-1/1 O2 SENSOR SLOW RESPONSE
P0139-1/2 O2 SENSOR SLOW RESPONSE

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

When Monitored and Set Condition:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored: With the engine running for more than 2 minutes and in Closed Loop mode, battery voltage > 9.5 volts, fuel level >15%, engine speed >1760<3200 RPM, vehicle speed <110 km/h (68 MPH), air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) enable after engine temp >60°C (140°F), atmospheric pressure >700 hpa (psi), MAF >90<300 mg/tdc, MAF >32<100 kg/h and MAF change <10 kg/h, EVAP Purge duty cycle <50%, 1/1 O2 heater operational, 1/1 O2 heater duty cycle >12.5<100%, 1/2 O2 heater duty cycle >12.5<100% and no DTCs for engine misfire, ECT, MAP, CRK, IAT or CAM Sensor, nor Fuel System, VSS, 1/2 O2 Sensor and Heater, or EVAP Solenoid.

Set Condition: The 1/1 Oxygen Sensor Signal circuit average switching period > the PCM internal calibration table or the number of incomplete switches >40 before 35 complete O2 cycles (35 switches). Two trip fault.

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored: With the engine running for more than 1 minute, the coolant temp >75°C (167°F), fuel level >15%, baro pressure >700 hpa, battery voltage >9.0 Volts, air temp >-17.8°C (0°F) <-7°C (19.4°F) after coolant temp >70°C (158°F) and engine run time greater than 0 seconds or >-7°C (19.4°F), EVAP Purge Test off, engine in closed loop and under part load, MAF >32<90 kg/h and MAF change less than 10 kg/h, engine speed >1536<3392 RPM, vehicle speed >0<255 km/h, calculated exhaust gas temp >350°C (662°F)<976°C (1789°F) and no ECT Sensor, MAP Sensor, CRK Sensor, CAM Sensor, VSS, Air Temp Sensor, 1/2 O2 Sensor Heater or Signal, Fuel System, or Misfire DTCs present.

Set Condition: After 7 Controlled Stimuli Stabilization attempts, the 1/2 O2 Sensor does not cross 450 mV for 7.62 seconds. One trip fault. Two trips MIL.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Start the engine. Inspect the exhaust system for leaks between the engine and the O2 sensors. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing the O2 Sensor Signal circuit at the O2 Sensor harness connector and at the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe the O2 Sensor ground circuit between the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0134-1/1 O2 SENSOR STAYS AT CENTER
P0140-1/2 O2 SENSOR STAYS AT CENTER

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0134-1/1 O2 SENSOR STAYS AT CENTER.

When Monitored and Set Condition:

P0134-1/1 O2 SENSOR STAYS AT CENTER

When Monitored: With the engine running for more than 2 minutes, coolant temp at least 80°C (176°F), exhaust temp >400°C (572°F), engine speed <6000 RPM, the engine in Closed Loop or Decel Fuel Shut Off Active or Fuel Enrichment mode and the O2 Heater active and no O2 Heater DTCs.

Set Condition: The 1/1 O2 Sensor Signal circuit voltage is < .45 AND > .372 volt for at least 7020 msecs. One trip fault.

P0140-1/2 O2 SENSOR STAYS AT CENTER

When Monitored: With the engine running for more than 2 minutes, coolant temp at least 80°C (176°F), exhaust temp >300°C (572°F), engine speed <6000 RPM, O2 Heater active and no O2 Heater or MAP Sensor DTCs.

Set Condition: The 1/2 O2 Sensor Signal circuit voltage is < .45 AND > .37 volt for at least 7 seconds. One trip fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR GROUND CIRCUIT OPEN
O2 SENSOR SIGNAL OPEN
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 8	All

P0134-1/1 O2 SENSOR STAYS AT CENTER — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor ground circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Connect a test light to battery voltage, probe the O2 Sensor Signal circuit in the O2 Sensor harness connector. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 1.0 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0134-1/1 O2 SENSOR STAYS AT CENTER — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 7 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored and Set Condition:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the fuel level >15%, atmospheric pressure >700 hpa, battery voltage >9.0 volts, air temp >-17.8°C (0°F) <-7°C (19.4°F), coolant temp >69.75°C (157.6°F), MAF >0, canister load <50%, purge command = 0 or max, and no ECT, IAT, or MAP Sensor nor Canister Purge Solenoid DTCs present.

Set Condition: If fuel correction is 25% or higher, this DTC is set whenever the fault is detected and the MIL is turned on after the second trip with the fault present.

POSSIBLE CAUSES
INTERMITTENT CONDITION
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
O2 SENSOR HEATER OPERATION
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 10	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
2	**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.** Install a fuel pressure gauge to the fuel rail. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Below Specification Go To 7 **Caution: Stop All Actuations.**	All
3	Turn the ignition off. **NOTE: Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts before continuing this test.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 5 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
5	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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 Yes → Go To 6 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
7	Turn the ignition off. **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.** 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 disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the T fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8 **Caution: Stop All Actuations.**	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	**NOTE: Check for contaminants that may have damaged the O2 Sensor. Check for contaminated fuel, unapproved silicone, oil, and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS, OR FAN(S). DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help identify the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII parameters related to this DTC. Review Freeze Frame information. Try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for any broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0172-1/1 FUEL SYSTEM RICH

When Monitored and Set Condition:

P0172-1/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the fuel level >15%, atmospheric pressure >700 hpa, battery voltage >9.0 volts, air temp >-17.8°C (0°F) <-7°C (19.4°F), coolant temp >69.75°C (157.6°F), MAF >0, canister load <50%, purge command = 0 or max, and there are no Engine Coolant Temp Sensor, Intake Air Temp Sensor, MAP Sensor or Canister Purge Solenoid DTCs present.

Set Condition: If fuel correction is -20 or 24% depending on load, this DTC is set whenever the fault is detected and the MIL is turned on after the second trip with the fault present.

POSSIBLE CAUSES
GOOD TRIP INDICATED
O2 SENSOR HEATER OPERATION
O2 SENSOR
EVAP PURGE SOLENOID OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR SIGNAL CIRCUIT OPEN
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
2	**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.** Install a fuel pressure gauge to the fuel rail. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. **Caution: Stop All Actuations.**	All
3	Turn the ignition on **NOTE: Allow the O2 Sensor voltage several minutes to stabilize before continuing the test.** With the DRBIII®, read the O2 Sensor voltage. Is the voltage between 0.4 to 0.6 volts? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off. **NOTE: Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts before continuing the test.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	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? Yes → Go To 6 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 7 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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 Yes → Go To 8 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
9	Turn the ignition on. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage between 0.4 to 0.6 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 10	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Sensor Signal circuit between the PCM harness connector and the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Check for open in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
11	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Start the engine. Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 0.60 volt? Yes → Repair the O2 Sensor Signal for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 12	All
12	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom List:

P0201-INJECTOR #1 CONTROL CIRCUIT OPEN
P0202-INJECTOR #2 CONTROL CIRCUIT OPEN
P0203-INJECTOR #3 CONTROL CIRCUIT OPEN
P0204-INJECTOR #4 CONTROL CIRCUIT OPEN

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

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT OPEN

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is open. One trip fault and MIL.

P0202-INJECTOR #2 CONTROL CIRCUIT OPEN

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is open. One trip fault and MIL.

P0203-INJECTOR #3 CONTROL CIRCUIT OPEN

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is open. One trip fault and MIL.

P0204-INJECTOR #4 CONTROL CIRCUIT OPEN

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is open. One trip fault and MIL.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL INJECTOR
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT OPEN
PCM

P0201-INJECTOR #1 CONTROL CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Measure the resistance between the terminals of the Fuel Injector. Is the resistance between 11.4 to 13.8 ohms? Yes → Go To 3 No → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit in the Fuel Injector connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance of the Fuel Injector driver circuit between the Fuel Injector harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Fuel Injector driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0201-INJECTOR #1 CONTROL CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0261-INJECTOR #1 CONTROL CIRCUIT LOW
P0264-INJECTOR #2 CONTROL CIRCUIT LOW
P0267-INJECTOR #3 CONTROL CIRCUIT LOW
P0270-INJECTOR #4 CONTROL CIRCUIT LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0261-INJECTOR #1 CONTROL CIRCUIT LOW.

When Monitored and Set Condition:

P0261-INJECTOR #1 CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to ground. One trip fault and MIL.

P0264-INJECTOR #2 CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to ground. One trip fault and MIL.

P0267-INJECTOR #3 CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to ground. One trip fault and MIL.

P0270-INJECTOR #4 CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to ground. One trip fault and MIL.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL INJECTOR
ASD RELAY OUTPUT CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO GROUND
PCM

P0261-INJECTOR #1 CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Measure the resistance between the terminals of the Fuel Injector. Is the resistance between 11.4 to 12.6 ohms? Yes → Go To 3 No → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the injector connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 1000 ohms? Yes → Repair the Fuel Injector driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0261-INJECTOR #1 CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0262-INJECTOR #1 CONTROL CIRCUIT HIGH
P0265-INJECTOR #2 CONTROL CIRCUIT HIGH
P0268-INJECTOR #3 CONTROL CIRCUIT HIGH
P0271-INJECTOR #4 CONTROL CIRCUIT HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0262-INJECTOR #1 CONTROL CIRCUIT HIGH.

When Monitored and Set Condition:

P0262-INJECTOR #1 CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to voltage. One trip fault and MIL.

P0265-INJECTOR #2 CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to voltage. One trip fault and MIL.

P0268-INJECTOR #3 CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to voltage. One trip fault and MIL.

P0271-INJECTOR #4 CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: The PCM tests the injector circuit internally for more than 27 injector pulses and determines the circuit is shorted to voltage. One trip fault and MIL.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL INJECTOR
ASD RELAY OUTPUT CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO BATTERY VOLTAGE
PCM

P0262-INJECTOR #1 CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Measure the resistance between the terminals of the Fuel Injector. Is the resistance between 11.4 to 12.6 ohms? Yes → Go To 3 No → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the injector connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between the ASD Relay Output circuit and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 1000 ohms? Yes → Repair the Fuel Injector driver circuit for a short to the ASD Relay Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Measure the voltage of the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the voltage above 1.0 volt? Yes → Repair the Fuel Injector driver circuit for a short to battery voltage Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All

P0262-INJECTOR #1 CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MIS-FIRE
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 MIS-FIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MIS-FIRE

When Monitored: With the engine running, atmospheric pressure >700 hpa, fuel level >15%, battery voltage >9.0 volts, engine speed >600<6750 RPM, engine load > 0, engine not in fuel cutoff, and air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) and coolant temp at start >-17°C (1.4°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F), or air temp >-7°C (19.4°F) enable after coolant temp >70°C (158°F), and no ECT, CAM CRK MAP and IAT Sensor or Crank Sensor rationality, Crank Sensor Learn invalid, or System Voltage DTCs.

Set Condition: If total misfires detected are >8.5% during the first 1000 RPM or are 40% during any 200 RPM with no single cylinder or mulitiple cylinder misfire counters >80%. One trip with fault flashes MIL, second trip with fault present illuminates MIL solid.

P0301-CYLINDER #1 MISFIRE

When Monitored: With the engine running, atmospheric pressure >700 hpa, fuel level >15%, battery voltage >9.0 volts, engine speed >600<6750 RPM, engine load > 0, engine not in fuel cutoff, and air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) with coolant temp at start up >-17°C (1.4°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air and coolant temp at start up >-7°C (19.4°F) enable immediately and no ECT, CAM CRK MAP and IAT Sensor or Crank Sensor rationality, Crank Sensor Learn invalid, or System Voltage DTCs.

Set Condition: If total misfires detected are >7% during the first 1000 RPM or are >3% after the first 1000 RPM or are 25% during any 200 RPM with cylinder #1 misfire counter >80% and no other cylinder misfire counters >80%. One trip with fault flashes MIL, second trip with fault present illuminates MIL solid.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

P0302-CYLINDER #2 MISFIRE

When Monitored: With the engine running, atmospheric pressure >700 hpa, fuel level >15%, battery voltage >9.0 volts, engine speed >600<6750 RPM, engine load > 0, engine not in fuel cutoff, and air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) with coolant temp at start up >-17°C (1.4°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air and coolant temp at start up >-7°C (19.4°F) enable immediately and no ECT, CAM CRK MAP and IAT Sensor or Crank Sensor rationality, Crank Sensor Learn invalid, or System Voltage DTCs.

Set Condition: If total misfires detected are >7% during the first 1000 RPM or are >3% after the first 1000 RPM or are 25% during any 200 RPM with cylinder #2 misfire counter >80% and no other cylinder misfire counters >80%. One trip with fault flashes MIL, second trip with fault present illuminates MIL solid.

P0303-CYLINDER #3 MISFIRE

When Monitored: With the engine running, atmospheric pressure >700 hpa, fuel level >15%, battery voltage >9.0 volts, engine speed >600<6750 RPM, engine load > 0, engine not in fuel cutoff, and air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) with coolant temp at start up >-17°C (1.4°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air and coolant temp at start up >-7°C (19.4°F) enable immediately and no ECT, CAM CRK MAP and IAT Sensor or Crank Sensor rationality, Crank Sensor Learn invalid, or System Voltage DTCs.

Set Condition: If total misfires detected are >7% during the first 1000 RPM or are >3% after the first 1000 RPM or are 25% during any 200 RPM with cylinder #3 misfire counter >80% and no other cylinder misfire counters >80%. One trip with fault flashes MIL, second trip with fault present illuminates MIL solid.

P0304-CYLINDER #4 MISFIRE

When Monitored: With the engine running, atmospheric pressure >700 hpa, fuel level >15%, battery voltage >9.0 volts, engine speed >600<6750 RPM, engine load > 0, engine not in fuel cutoff, and air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) with coolant temp at start up >-17°C (1.4°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air and coolant temp at start up >-7°C (19.4°F) enable immediately and no ECT, CAM CRK MAP and IAT Sensor or Crank Sensor rationality, Crank Sensor Learn invalid, or System Voltage DTCs.

Set Condition: If total misfires detected are >7% during the first 1000 RPM or are >3% after the first 1000 RPM or are 25% during any 200 RPM with cylinder #4 misfire counter >80% and no other cylinder misfire counters >80%. One trip with fault flashes MIL, second trip with fault present illuminates MIL solid.

POSSIBLE CAUSES
MISFIRE DOESN'T REOCCUR
SECONDARY IGNITION OR MECHANICAL PROBLEM
ENGINE MECHANICAL PROBLEM

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

POSSIBLE CAUSES
FUEL SYSTEM PROBLEM
ERRATIC CAM/CRANK SENSOR SIGNALS
OTHER POSSIBLE CAUSES FOR MIS-FIRE
PCM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read and record the DTC and Freeze Frame information. With this information, attempt to duplicate the condition(s) when the DTC was set. When the vehicle is operating under conditions similar to when the DTC was set, refer to Misfire Monitor Info under OBDII Monitors. Are there any misfires currently detected? Yes → Go To 2 No → Go To 8	All
2	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Check for any of the following conditions/mechanical problems. 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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Start the engine and allow the engine to idle. With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
5	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**Note: Anything that affects the speed of the crankshaft can cause a misfire DTC.** The following are other possible causes for mis-fire: Injector harness connectors, secondary ignition problem, mechanical engine problem, PCM power grounds, irregular cam and crank signal, plugged injectors, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, or vacuum leak. Weak valve springs, carbon deposits on valves, or accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	**NOTE: The conditions that set the DTC are not present at this time.** An intermittent problem may have been caused by moisture in the secondary ignition. **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.** Using the DRBIII®, refer to DTC and Freeze Frame information and attempt to duplicate the conditions that set the Misfire DTC. Pay particular attention to the DTC setting conditions, such as speed, temp, load, and map vacuum. Are any misfires detected when operating under conditions similar to when the DTC was set? Yes → Restart diagnostics beginning with Test 2. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0315-NO CRANK LEARNED

When Monitored and Set Condition:

P0315-NO CRANK LEARNED

When Monitored: Engine running, no MAP, CKP, or CMP faults detected, Engine RPM > 2000 and < 3000, Engine State = Deceleration Fuel Cut Off, Transmission in gear, and CMP/CKP sync has been achieved.

Set Condition: When the Crank Sensor correction value is out of limits for > 1 sec, a one-trip DTC is set and the MIL is illuminated.

POSSIBLE CAUSES
INTERMITTENT CONDITION
TONE WHEEL/PULSE RING INSPECTION
WIRING HARNESS INSPECTION
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	**Note: Check for any TSB's that may apply to this symptom.** Turn the ignition on. With the DRBIII® in the Miscellaneous Functions menu, select Clear PCM Batt Disconnect to reset the PCM. Turn the ignition off for a minimum of 8 seconds. Turn the ignition on. With the DRBIII® under OBDII Monitors, refer to the Misfire Monitor Info screen. Test drive the vehicle. Watch for the Misfire Monitor Enabled line on the display to change from NO to YES. Does the Misfire Monitor Enabled line on the display change from NO to YES? Yes → Go To 2 No → Go To 3	All

P0315-NO CRANK LEARNED — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
3	Visually inspect the CKP wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the CKP wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	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 - 1.6L. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0325-KNOCK SENSOR #1 CIRCUIT

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K42) OR (K45) KNOCK SENSOR CIRCUIT SHORTED TO VOLTAGE
(K42) OR (K45) KNOCK SENSOR CIRCUIT SHORTED TO GROUND
(K42) KNOCK SENSOR SIGNAL CIRCUIT OPEN
(K42) KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO (K45) KNOCK SENSOR RETURN CIRCUIT
(K45) KNOCK SENSOR RETURN CIRCUIT OPEN
KNOCK SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 8	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 (K42) or (K45) Knock Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
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) Knock Sensor circuits in the Knock Sensor harness connector. Is the resistance to ground below 100 ohms on either circuit? Yes → Repair the short to ground in the (K42) or (K45) Knock Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K42) Knock Sensor Signal circuit between the Knock Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open (K42) Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the resistance between the (K42) Knock Sensor Signal circuit and the (K45) Knock Sensor Return circuit in the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to (K45) Knock Sensor Return circuit in the (K42) Knock Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K45) Knock Sensor Return circuit between the Knock Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open (K45) Knock Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	Turn the ignition off. Replace the Knock Sensor. Turn the ignition on. 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? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0335-NO CRANK SIGNAL AT PCM

When Monitored and Set Condition:

P0335-NO CRANK SIGNAL AT PCM

When Monitored: With the engine running and no CMP Sensor DTCs.

Set Condition: If the PCM detects no CKP Sensor pulses detected when syncronization is attempted with the CMP signal, it will set this DTC.

POSSIBLE CAUSES
CHECKING INTERMITTENT CKP SIGNAL WITH LAB
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K7) 5-VOLT SUPPLY CIRCUIT OPEN
(K7) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K24) CKP SENSOR SIGNAL CIRCUIT SHORTED GROUND
(K24) CKP SENSOR SIGNAL CIRCUIT OPEN
(K24) CKP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K24) CKP SENSOR SIGNAL SHORTED TO (K7) 5-VOLT SUPPLY CIRCUIT
(K924) SENSOR GROUND CIRCUIT OPEN
CRANKSHAFT POSITION SENSOR
PCM - (K24) CKP SENSOR SIGNAL
PCM - (K7) 5-VOLT SUPPLY

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs. Does the Good Trip Indicator display YES? Yes → Go To 2 No → Go To 3	All

P0335-NO CRANK SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: The conditions that set the DTC are not present at this time. The following tests may help in identifying the intermittent condition.** Turn the ignition on, engine not running. With the DRBIII® in the Dual Channel lab scope function, the lab scope probes, and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. Wiggle the related wiring harness and connections. Monitor the lab scope screen. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS. DO NOT STAND IN DIRECT LINE OF THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS, OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Lightly tap on the Crank Sensor and wiggle the CKP Sensor connector. Observe the lab scope screen. Look for any erratic pulses generated by the CKP Sensor. Did the CKP Sensor generate any erratic pulses? Yes → Carefully inspect the wiring harness and connections, repair as necessary, if ok, replace the Crank Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
3	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K7) 5-volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 4 No → Go To 12	All
4	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K24) CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 5 No → Go To 7	All
5	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance between ground and the (K924) Sensor Ground circuit at the CKP Sensor harness connector. Is the resistance below 10 ohms? Yes → Go To 6 No → Repair the open in the (K924) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0335-NO CRANK SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Inspect the slots on the crank, tone wheel, for damage. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	Turn the ignition off. Disconnect the CKP Sensor harness connector. Measure the resistance between ground and the (K24) CKP Sensor Signal circuit at the CKP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the (K24) CKP Sensor Signal circuit from the CKP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K24) CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage above 4.7 volts? Yes → Repair the short to voltage in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 10	All
10	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance between the (K24) CKP Sensor Signal circuit and the (K7) 5-volt Supply circuit in the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to (K7) 5-volt Supply circuit in the (K24) CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 11	All

P0335-NO CRANK SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
11	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
12	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the CKP Sensor harness connector. Measure the resistance between ground and the (K7) 5-volt Supply circuit at the CKP 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 - 1.6L. No → Go To 13	All
13	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector(s). Measure the resistance of the (K7) 5-volt Supply circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the open in the (K7) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
14	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K7) 5-volt Supply circuit in the CKP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the short to voltage in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 15	All
15	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0336-CRANKSHAFT POSITION SENSOR PERFORMANCE

When Monitored and Set Condition:

P0336-CRANKSHAFT POSITION SENSOR PERFORMANCE

When Monitored: With the engine running and no CMP Sensor DTCs.

Set Condition: If the PCM detects an incorrect amount of Crankshaft Sensor pulses when compared to the Camshaft Sensor pulses, it will set this DTC.

POSSIBLE CAUSES
CHECKING INTERMITTENT CMP SIGNAL WITH LAB
WIRING HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
WIRING HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
CHECKING INTERMITTENT CKP SIGNAL WITH LAB
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. With the DRBIII® in the Dual Channel Lab Scope function and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector and PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 2 No → Go To 5	All
2	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0336-CRANKSHAFT POSITION SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. With the DRBIII® Lab Scope in the Dual Channel function and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the PCM harness connector and in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Carefully wiggle the related wire harness and gently tap on the CMP sensor. Observe the lab scope screen. Look for any differences in the two patterns generated by the CMP Sensor. If the Channel 1 and Channel 2 patterns match and are erratic the Crank Position Sensor may need to be replaced. Is one pattern different than the other? Yes → Repair the wiring/connection concern. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. With the DRBIII® in the Dual Channel Lab Scope function and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector and PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 7 No → Go To 10	All

P0336-CRANKSHAFT POSITION SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	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 - 1.6L. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	**NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.** Turn the ignition off. With the DRBIII® in the Dual Channel Lab Scope function and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the PCM harness connector and CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Carefully wiggle the related wiring harness and gently tap on the CKP sensor. Compare the Channel 1 reading to the Channel 2 reading on the lab scope screen. Both of the readings should be the same. Were any of the above conditions present? Yes → Repair the wiring or connector concern. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0340-NO CAM SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM SIGNAL AT PCM

When Monitored: Engine cranking/running and no CRK Sensor DTCs.

Set Condition: At least 10 engine revolutions have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal polarity change.

POSSIBLE CAUSES
CHECKING INTERMITTENT CMP SIGNAL WITH LAB
(F854) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(F854) 5-VOLT SUPPLY CIRCUIT OPEN
(F854) 5-VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K44) CMP SENSOR SIGNAL CIRCUIT SHORTED GROUND
(K44) CMP SENSOR SIGNAL CIRCUIT OPEN
(K44) CMP SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K44) CMP SENSOR SIGNAL SHORTED TO (F854) 5-VOLT SUPPLY CIRCUIT
(K944) SENSOR GROUND CIRCUIT OPEN
PCM - (F854) 5-VOLT SUPPLY
PCM - (K44) CMP SENSOR SIGNAL
CAMSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs. Does the Good Trip Indicator display YES? Yes → Go To 2 No → Go To 3	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: At this time the conditions that set the DTC are not present at this time. The following tests may help in identifying the intermittent condition.** Turn the ignition off. With the DRBIII® lab scope probe, in the dual channel function, and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector and the CMP Sensor harness connector. Wiggle the related wiring harness and connections. Look for any pulses generated by the CMP while wiggling the harness and connectors. **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS. DO NOT STAND IN DIRECT LINE OF THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS, OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Wiggle the related wiring harness and connections. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses in either of the above tests? Yes → Check the wiring and connections that may cause the intermittent condition, if ok, replace the Cam Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
3	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on, engine off. Measure the voltage of the (F854) 5-volt Supply circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 4 No → Go To 12	All
4	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K44) CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 5 No → Go To 7	All
5	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K944) Sensor Ground circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K944) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K44) CMP Sensor Signal circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K44) CMP Sensor Signal circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K44) CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the short to voltage in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 10	All
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance between the (K44) CMP Sensor Signal circuit and the (F854) 5-volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to the (F854) 5-volt supply circuit in the (K44) CMP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 11	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
11	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 - 1.6L.	All
12	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (F854) 5-volt Supply circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the (F854) 5-volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 13	All
13	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the (F854) 5-Volt Supply circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the (F854) 5-volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
14	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the (F854) 5-volt Supply circuit in the CMP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the (F854) 5-volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 15	All
15	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored and Set Condition:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: With the engine running for more than 1 minute, fuel system in closed loop mode, battery voltage >9.0 volts, fuel level >15%, coolant temp >75°C (167°F), vehicle speed >0 km/h <255 km/h (158 mph), the engine speed >1536<3392 RPM, and MAF >32<90 kg/h with a change of 10 kg/h or less, atmospheric pressure >700 hpa, cannister purge test off, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F) enable after coolant temp >70°C (158°F), exhaust temp >350°C (662°F) <976°C (1789°F), and no ECT, MAP, CRK, CAM, VSS,IAT, 1/1 O2, 1/2 O2 Sensor nor fuel system or misfire DTCs present.

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.

POSSIBLE CAUSES
INTERMITTENT CONDITION
VISUALLY INSPECT CATALYTIC CONVERTER
EXHAUST LEAK
ENGINE MECHANICAL CONDITION
AGING O2 SENSOR
CATALYTIC CONVERTER

TEST	ACTION	APPLICABILITY
1	**NOTE: If any O2 Sensor DTC(s) are set along with the Catalytic Converter Efficiency DTC, diagnose the O2 Sensor DTC(s) before continuing.** **NOTE: Check for contaminants that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 7	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
2	Inspect the Catalytic Converter for the following conditions: Catalytic Converter damage, such as dents or holes. Severe discoloration of the Catalytic Converter caused by overheating. Catalytic Converter internal damage. Leaking Catalytic Converter. Were any problems found? Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Start the engine. Inspect the exhaust for leaks between the engine and the front O2 sensor(s). Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Check the exhaust for excessive smoke caused by an internal problem in the engine. Is a engine mechanical condition present? Yes → Repair the engine mechanical condition as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the vehicles repair history. Has the rear O2 Sensor been replace without replacing the front O2 Sensor? Yes → Replace the Front O2 Sensor as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	If there are no possible cause remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Check for contaminants that may have damaged the O2 Sensor and Catalytic Converter: including contaminated fuel, unapproved silicone, oil or coolant and repair as necessary.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** A new rear O2 Sensor along with a aging front O2 Sensor may cause the DTC to set. Review repair history of the vehicle and repair as necessary. With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0444-EVAP PURGE SOLENOID CIRCUIT OPEN

When Monitored and Set Condition:

P0444-EVAP PURGE SOLENOID CIRCUIT OPEN

When Monitored: Any time the key is on.

Set Condition: If the PCM detects an open circuit in the Purge Solenoid or in the circuit for > 280 ms, a one trip fault is set and the MIL is illuminated.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F12) OPEN 12-VOLT SUPPLY
OPEN PURGE SOLENOID
(K52) PURGE SOLENOID CONTROL CKT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine not running. **NOTE: Read and record any Freeze Frame Data.** With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on, engine not running. Using a test light connected to ground, backprobe the (F12) 12-volt supply circuit at the Purge Solenoid connector. Does the test light illuminate brightly. Yes → Go To 3 No → Repair the open or high resistance in the (F12) 12-volt supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Measure the resistance of the Evap Purge Solenoid . Is the resistance between 10.0 and 15.0 ohms? Yes → Go To 4 No → Replace the Evap Purge Solenoid Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0444-EVAP PURGE SOLENOID CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect Evap Purge Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K52) Evap Purge Solenoid Control circuit between the Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open or high resistance in the (K52) Purge Soleoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** Inspect the vacuum port, ensure that it is clear from any obstructions. Ensure there is no physical damage to the EVAP solenoid and the vacuum port is free from obstructions. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0458-EVAP PURGE SOLENOID LOW

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
EVAP PURGE SOLENOID
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
EVAP PURGE SOLENOID STUCK CLOSED
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the (K52) Evap Purge Solenoid control circuit in the Evap Purge Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K52) Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Measure the resistance between the terminals of the Evap Purge Solenoid. Is the resistance between 10.0 and 15.0 ohms? No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. Yes → Go To 4	All
4	Turn the ignition off. Disconnect the vacuum 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. Does the Evap Purge Solenoid hold vacuum? Yes → Go To 5 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0458-EVAP PURGE SOLENOID LOW — Continued

TEST	ACTION	APPLICABILITY
5	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Turn the ignition on. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 6 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the DRBIII® actuate the Evap Purge Solenoid. Perform a wiggle test on the circuit and listen for the solenoid to stop actuating. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0459-EVAP PURGE SOLENIOD CIRCUIT HIGH

When Monitored and Set Condition:

P0459-EVAP PURGE SOLENIOD CIRCUIT HIGH

When Monitored: Any time the key is on.

Set Condition: If the PCM detects a short to ground in the Purge Solenoid or in the circuit for > 280 ms, a one trip fault is set and the MIL is illuminated.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO B+
EVAP PURGE SOLENOID
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
EVAP PURGE SOLENOID STUCK CLOSED
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Turn ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (K52) Evap Purge Solenoid Control circuit. Does the test light illuminate brightly? Yes → Repair the the short to voltage in the (K52) Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Measure the resistance between the terminals of the Evap Purge Solenoid connector. Is the resistance between 10.0 and 15.0 ohms? No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. Yes → Go To 4	All

P0459-EVAP PURGE SOLENIOD CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the vacuum 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. Does the Evap Purge Solenoid hold vacuum? Yes → Go To 5 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Turn the ignition on. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 6 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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 cause remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the DRBIII® actuate the Evap Purge Solenoid. Perform a wiggle test on the circuit and listen for the solenoid to stop actuating. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME

When Monitored and Set Condition:

P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME

When Monitored: With the engine running and under part load. The fuel level must be between 0% and 100% and there must not be any Fuel Level Sensor electrical DTCs.

Set Condition: If the PCM detects the fuel level change <2% over 120 minutes, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
VISUALLY INSPECT FUEL TANK
(G4) FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(G4) FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN
(Z2) GROUND CIRCUIT OPEN
INTERNAL INSPECTION OF THE FUEL TANK
FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0462 or P0463 first, if set along with P0461.** Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 8	All
2	Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving. Is the Fuel Tank OK? Yes → Go To 3 No → Replace the Fuel Tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the (G4) Fuel Level Sensor Signal circuit in the Fuel Pump Module harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (G4) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0461-FUEL LEVEL UNIT NO CHANGE OVER TIME — Continued

TEST	ACTION	APPLICABILITY
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 Sensor Signal circuit between the Fuel Pump Module harness connector and the Instrument Cluster harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (G4) Fuel Level Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the (Z2) Ground circuit in 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 - 1.6L.	All
6	**WARNING: The fuel system is under a contant 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 servive information.** 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 problem found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. 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 - 1.6L.	All
8	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects the fuel level >100% for more than 4.5 minutes, it will set this DTC.

POSSIBLE CAUSES
GOOD TRIP INDICATED
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Refer to the Instrument Category and perform the appropriate symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **NOTE: Phsyically and Visually inspect the fuel tank for damage. if a problem is found repair or replace as necessary.** Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored and Set Condition:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects the fuel level >240 counts for more than 2 minutes, it will set this DTC.

POSSIBLE CAUSES
GOOD TRIP INDICATED
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Refer to the Instrument Category and perform the appropriate symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **NOTE: Phsyically and Visually inspect the fuel tank for damage. if a problem is found repair or replace as necessary.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0500-NO VEHICLE SPEED SENSOR SIGNAL

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED SENSOR SIGNAL

When Monitored: With the engine running

Set Condition: No vehicle speed signal for 6 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F857) 5-VOLT SUPPLY CKT OPEN
(G7) VEHICLE SPEED SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SENSOR SIGNAL CIRCUIT OPEN
PCM (G7) VSS SIGNAL
(N907) SENSOR GROUND CIRCUIT OPEN
VEHICLE SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	Raise the drive wheels off the ground. **WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.** Start the engine. If any MAP Sensor or TP Sensor faults are set, they must be diagnosed before continuing with the P0500 diagnostics. 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 → Go To 2 No → Go To 3	All

P0500-NO VEHICLE SPEED SENSOR SIGNAL — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** Remove and inspect the speedometer pinion gear, ensure the gear is free from damage. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
3	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the (F857) 5-volt Supply circuit in the VSS harness connector. Is the voltage above 5.0 volts? Yes → Go To 4 No → Repair the open or short to ground in the (F857) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Turn the ignition on. Measure the voltage of the Vehicle Speed Sensor Signal circuit in the VSS harness connector. Is the voltage between 4.5 to 5.0 volts? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Measure the resistance of the (N907) Sensor ground circuit between the VSS harness connector and ground. Is the resistance below 5.0 ohms? Yes → Remove and inspect the Speedometer Pinion Gear. If OK, replace the Vehicle Speed Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Repair the open in the (N907) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0500-NO VEHICLE SPEED SENSOR SIGNAL — Continued

TEST	ACTION	APPLICABILITY
6	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 short to ground in the (G7) Vehicle Speed Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 7	All
7	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 between the VSS harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the (G7) Vehicle Speed Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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, Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED

When Monitored and Set Condition:

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED

When Monitored: With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.

Set Condition: Engine speed is 100 RPM or more below idle speed for 7 seconds.

POSSIBLE CAUSES
AIR INDUCTION SYSTEM
THROTTLE BODY OPERATION
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If any other DTC's are present, they must be diagnosed and repaired before continuing this test.** Turn the ignition on, engine not running. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trap in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED — Continued

TEST	ACTION	APPLICABILITY
3	Inspect the throttle body plate for carbon build up or other restrictions. Inspect the throttle cable between the Accelerator Pedal and APPS is not binding and has smooth operation. Ensure the throttle plate is in the idle position. **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.** While the vehicle is running, lightly tap on ETC Motor, with your hand, and listen for idle to raise. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:
P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED

When Monitored and Set Condition:

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED

When Monitored: With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.

Set Condition: Engine speed is 200 RPM or more above idle speed for 7 seconds.

POSSIBLE CAUSES
AIR INDUCTION SYSTEM
VACUUM LEAKS
THROTTLE BODY OPERATION
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If any other DTC's are present, they must be diagnosed and repaired before continuing this test.** Turn the ignition on, engine not running. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trap in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Start the engine. Inspect the vehicle for external vacuum leaks. Inspect the engine for internal leaks. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED — Continued

TEST	ACTION	APPLICABILITY
4	Inspect the throttle body plate for carbon build up or other restrictions. Inspect the throttle cable between the Accelerator Pedal and APPS is not binding and has smooth operation. Ensure the throttle plate is resting on the stop at idle. **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.** While the vehicle is running, lightly tap on ETC Motor, with your hand, and listen for idle to raise. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0513-INVALID SKIM KEY

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

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the PCM DTCs. Does the Good Trip Indicator display NO? 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 DRB III communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the 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 → Repair all SKIM DTCs. 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
5	Turn the ignition on. With the DRBIII®, display the VIN that is programmed in the PCM. Was the correct VIN programmed into the PCM? Yes → Go To 6 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All

P0513-INVALID SKIM KEY — Continued

TEST	ACTION	APPLICABILITY
6	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. **NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** Attempt to start and idle the engine. With the DRBIII®, read the PCM DTCs. Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. Does the DRBIII® display this code? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
7	**NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** **NOTE: Ensure the customer is not attempting to use a non-SKIM duplicate key.** 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. Is the Starts Since Set counter displayed and equal to 0? Yes → Replace the Ignition Key. Perform SKIS VERIFICATION. No → Test Complete. **NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.**	All

Symptom:

P0551-POWER STEERING SWITCH FAILURE

When Monitored and Set Condition:

P0551-POWER STEERING SWITCH FAILURE

When Monitored: With the engine running, vehicle speed at least 48 km/h (29 MPH) and no VSS DTC.

Set Condition: With the vehicle above 48 km/h (29 MPH) for more than 60 seconds, the power steering pressure remains high.

POSSIBLE CAUSES
POWER STEERING PRESSURE SWITCH OPERATION
(Z1) GROUND CIRCUIT OPEN
(K10) POWER STEERING PRESSURE SWITCH SENSE CIRCUIT SHORTED TO GROUND
(K10) POWER STEERING PRESSURE SENSE CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Turn the ignition on. With the DRBIII®, monitor the Power Steering Pressure Switch. Using a jumper wire, connect one end to the Power Steering Pressure Switch Sense circuit. With the other end of the jumper tap the ground circuit in the Power Steering Pressure Switch harness connector. Does the Power Steering Pressure Switch display change from HI to LOW? Yes → Replace the Power Steering Pressure Switch Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 2	All
2	Turn the ignition off. Disconnect Power Steering Pressure Switch harness connector. Using a 12-volt test light connected to 12-volts, probe the (Z1) ground circuit in the Power Steering Pressure Switch harness connector. Does the test light illuminate? Yes → Go To 3 No → Repair the open in the (Z1) ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0551-POWER STEERING SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K10) Power Steering Pressure Switch Sense circuit in the PSP Switch harness. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K10) Power Steering Pressure Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K10) Power Steering Pressure Switch Sense circuit between the PSP Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K10) Power Steering Pressure Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0562-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored and Set Condition:

P0562-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored: With the engine running for more than 30 seconds.

Set Condition: When battery voltage is less than 11.5 volts for more than 5 seconds.

POSSIBLE CAUSES
(A11) B+ CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
INTERMITTENT CONDITION
(K20) GENERATOR FIELD DRIVER CIRCUIT OPEN
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
GENERATOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: Verify that the battery is fully charged and capable of passing a load test before continuing.** **NOTE: The Generator belt tension and condition must be checked before continuing.** Start the engine. Create a load on the charging system by turning on the headlights, windshield wipers, blower motor and rear defroster. Allow the idle to stabilize. With the DRBIII®, read and compare the voltage difference between the Target Charging Voltage and the Charging Voltage. **NOTE: Charging Voltage should be within 1.0 volt of the Target Charging Voltage.** Is the Charging Voltage within 1.0 volt or the Target Charging Voltage? Yes → Go To 8 No → Go To 2	All

P0562-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator B+ Terminal and the Positive Battery Post. Start the engine. Is the voltage above 0.4 volt? Yes → Repair the high resistance between the Generator and Battery in the (A11) B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Warm the engine to operating temperature. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 4	All
4	Start the engine. **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.** Turn on all accessories, manually set engine speed to 1600 RPM. With the DRBIII® in Sensors, compare Voltage Sense and Target Charging Voltage. Is there more than a 1.0 volt difference? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the (K20) Generator Field Driver circuit from the PCM harness connector to Generator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All

P0562-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Disconnect the Generator Field harness connector. Turn the ignition on. With the DRBIII® actuate the Generator Field Driver. Using a 12-volt test light connected to ground, probe the (A142) ASD Relay Output circuit in the Generator harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All
7	If there is no possible causes remaining, view repair. Yes → Repair or replace the Generator as necessary.. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Test Complete.	All

Symptom:

P0563-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0563-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored: With the engine running for more than 30 seconds.

Set Condition: When battery voltage is greater than 1 volt over target voltage for more than 5 seconds.

POSSIBLE CAUSES
TARGET VOLTAGE DIFFERS FROM BATTERY VOLTAGE
INTERMITTENT CONDITION
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Turn the ignition on. With DRBIII®, actuate the Generator Field Driver. With a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of Generator Field harness connector. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 5	All
2	With DRBIII®, stop all actuation. Turn the ignition on. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 13 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. With the DRBIII®, manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the Target Charging Voltage to the Battery Voltage reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 4	All

P0563-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Test Complete.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Measure resistance of the Generator Field Driver terminal pin of the Generator to ground. Is the resistance below 5.0 ohms? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Inspect the Generator Field Driver terminal on both the PCM connector. Check for corrosion, damage or terminal push out. 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 - 1.6L.	All

Symptom:

P0572-BRAKE SWITCH CIRCUIT LOW

When Monitored and Set Condition:

P0572-BRAKE SWITCH CIRCUIT LOW

When Monitored: With the engine running, vehicle speed >50 km/h (31 MPH), battery voltage >9.5 volts and no other brake switch DTCs present.

Set Condition: If the PCM detects no change from the Brake Switch Sense circuit input after coming to a complete stop, it will increment a counter. If the counter increments 10 times, the DTC will set and the MIL will illuminate.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F32) FUSED B+
(K29) BRAKE SWITCH SENSE CIRCUIT SHORT TO GROUND
BRAKE SWITCH CLOSED
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify battery voltage is greater than 9 volts.** Turn the ignition on. Record Freeze Frame Data that was set by the related DTC before continuing. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Brake Switch harness connector. Turn the ignition on, engine not running. With a 12-volt test light connected to ground, probe the (F32) B+ circuit at the Brake Switch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open or short to ground in the (F32) fused B+ circuit. Check the related fuse and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0572-BRAKE SWITCH CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Brake Switch harness connector. Measure the resistance between the (K29) Brake Switch Sense circuit and ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. With the ignition OFF, disconnect the PCM harness connector. Turn the ignition on, DO NOT attempt to start the engine. Using a 12-volt test light connected to ground, probe the Brake Lamp Switch Sense circuit in the PCM harness connector. Push and release the brake pedal. Does the test light blink on and off when the brake pedal is pressed and released? Yes → Go To 5 No → Replace the brake switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. **WARNING: Always turn the ignition off before connecting the PCM harness connector.**	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:

P0573-BRAKE SWITCH CIRCUIT HIGH

When Monitored and Set Condition:

P0573-BRAKE SWITCH CIRCUIT HIGH

When Monitored: With the engine running, vehicle speed >50 km/h (31 MPH), accelerator pedal position >25%, battery voltage >9.5 volts and no other brake switch DTCs present.

Set Condition: If the PCM detects a high Brake Switch Sense circuit input, it will increment a counter. If the counter increments 10 times this DTC will set and the MIL will illuminate.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F32) FUSED B+ CIRCUIT
(K29) BRAKE SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
(K29) BRAKE SWITCH SENSE CIRCUIT OPEN
(Z1) GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the (F32) Fused B+ circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the (F32) Fuse B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0573-BRAKE SWITCH CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Using a jumper wire, jumper between the Fused B+ circuit and ASD Relay Output circuit in the PDC. Turn the ignition on. Measure the voltage of the (K29) Brake Switch Sense circuit in the Brake Lamp Switch harness connector. Is the voltage above 1.0 volts? Yes → Repair the short to voltage in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K29) Brake Switch Sense circuit between the Brake Lamp Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the (Z1) Ground circuit in the Brake Lamp Switch harness connector to 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 - 4.	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense 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 open circuit? Yes → Go To 7 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0573-BRAKE SWITCH CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:

P0580-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored and Set Condition:

P0580-SPEED CONTROL SWITCH ALWAYS LOW

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

Set Condition: When switch voltage is less than 0.43 volts for 2 minutes.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SPEED CONTROL SWITCH
(V37) SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Speed Control voltage. Is the Speed Control voltage below 1.0 volts? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control Switch harness connector. Did the volt change to above 4.7 volts? Yes → Replace the Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (V37) Speed Control Switch Signal circuit in PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (V37) Speed Control Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

P0580-SPEED CONTROL SWITCH ALWAYS LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:

P0625-GENERATOR FIELD CONTROL CIRCUIT LOW

When Monitored and Set Condition:

P0625-GENERATOR FIELD CONTROL CIRCUIT LOW

When Monitored: With the engine running for more than 25 seconds.

Set Condition: When the Generator Field Circuit is open or shorted to ground.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
(K20) GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
(K20) GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD
GENERATOR FIELD COIL OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify that the battery is capable of passing a load test and is fully charged before continuing.** Turn the ignition on. With the DRBIII®, actuate the Generator Field Driver circuit. Using a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of the Generator. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Using a schematic as a guide, inspect the related Wiring and Connectors. Turn the ignition on, engine not running. With the DRBIII® clear DTCs. Actuate the Generator Field driver circuit. Wiggle test the wiring harness from the Generator to the PCM. With the DRBIII®, read DTC's. Did the DTC reset? Yes → Repair as necessary . Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Test Complete.	All

P0625-GENERATOR FIELD CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the (K20) Generator Field Driver circuit from PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the (K20) Generator Field Driver circuit from the PCM harness connector to the Generator Field harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All
5	Turn the ignition off. Disconnect the Generator Field harness connector. Measure resistance of the Generator Field Driver terminal on the Generator to ground. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance across the Generator Field Terminals at the Generator. Is the resistance above 15.0 ohms? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there is no more 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 - 1.6L.	All

Symptom:

P0626-GENERATOR FIELD CONTROL CIRCUIT HIGH

When Monitored and Set Condition:

P0626-GENERATOR FIELD CONTROL CIRCUIT HIGH

When Monitored: With the engine running for more than 25 seconds.

Set Condition: When the Generator Field circuit is shorted to B+.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
(K20) GENERATOR FIELD CKT SHORT TO VOLTAGE
GENERATOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify that the battery is capable of passing a load test and is fully charged before continuing.** Turn the ignition on. With the DRBIII®, actuate the Generator Field Driver circuit. Using a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of the Generator. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Using a schematic as a guide, inspect the related Wiring and Connectors. Turn the ignition on, engine not running. With the DRBIII® actuate the Generator Field Driver circuit. Wiggle the wiring harness from the Generator to PCM. With the DRBIII®, read DTC's. Did the DTC reset? Yes → Repair as necessary . Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Test Complete.	All
3	Turn the ignition off. Disconnect PCM harness connector. Turn the ignition on. Using a 12-volt test light connected to Ground, backprobe the (K20) Generator Field circuit at the PCM harness connector. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K20) Generator Field Driver circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 4	All

P0626-GENERATOR FIELD CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits. If there is no more possible causes remaining, view repair. Repair Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All

Symptom:

P0628-FUEL PUMP RELAY CONTROL CIRCUIT LOW

When Monitored and Set Condition:

P0628-FUEL PUMP RELAY CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects no voltage on the Fuel Pump Relay Control circuit for more than 3 seconds, it will set this DTC.

POSSIBLE CAUSES
FUEL PUMP RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
(F12) FUSED IGNITION SWITCH OUTPUT CIRCUIT
FUEL PUMP RELAY
(K31) FUEL PUMP RELAY CONTROL CIRCUIT OPEN
(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Fuel Pump Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0628-FUEL PUMP RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Turn the ignition on. Measure the voltage of the (F12) Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the (F12) Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Substitute the Fuel Pump Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (K31) Fuel Pump Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0628-FUEL PUMP RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (K31) Fuel Pump Relay Control circuit in the PDC to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0629-FUEL PUMP RELAY CONTROL CIRCUIT HIGH

When Monitored and Set Condition:

P0629-FUEL PUMP RELAY CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects high voltage on the Fuel Pump Relay Control circuit for more than 3 seconds, it will set this DTC.

POSSIBLE CAUSES
FUEL PUMP RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUEL PUMP RELAY
(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Fuel Pump Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0629-FUEL PUMP RELAY CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Substitute the Fuel Pump Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Operating? Yes → Go To 5 No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Remove the Fuel Pump Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, probe the (K31) Fuel Pump Relay Control circuit in the PDC. Does the test light illuminate? Yes → Repair the short to voltage in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0646-A/C CLUTCH RELAY CONTROL CIRCUIT LOW

When Monitored and Set Condition:

P0646-A/C CLUTCH RELAY CONTROL CIRCUIT LOW

When Monitored: Ignition On.

Set Condition: The PCM sense low voltage for more than 2.73 seconds.

POSSIBLE CAUSES
A/C RELAY INTERMITTENT OPERATION
(F12) FUSED B+ CIRCUIT
A/C CLUTCH RELAY
(C28) A/C CLUCH RELAY CONTROL CKT OPEN
(C28) A/C CLUTCH RELAY CONTROL CKT SHORT TO GD
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. **NOTE: The A/C Switch must be ON for the actuator to operate.** Is the A/C Clutch Relay operating? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR PULLEYS, BELTS, OR FANS. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set this DTC are not present at this time. The following list may help identify an intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII parameters related to this DTC. Wiggle test the related wiring harness. Look for parameter values to change or for the DTC to reset. Review Freeze Frame data related to this DTC. Try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSBs) that may apply. Inspect the related wiring harness. Look for chafed, pierced, pinched, or partially broken wires. Inspect the related harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Test Complete.	All

P0646-A/C CLUTCH RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Using a 12-volt test light connected to ground, probe the (F12) Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the short to ground or open in the (F12) Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Substitute the A/C Clutch Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the A/C/ Clutch Relay. Is the A/C Clutch Relay operating? Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (C28) A/C Clutch Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (C28) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All
6	Turn the ignition off. Remove the A/C Clutch relay from the PDC. Measure the resistance between ground and (C28) A/C Clutch Relay Control circuit at the PDC. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C28) A/C Cltuch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All

Symptom:

P0647-A/C CLUTH RELAY CONTROL CIRCUIT HIGH

When Monitored and Set Condition:

P0647-A/C CLUTH RELAY CONTROL CIRCUIT HIGH

When Monitored: Ignition On.

Set Condition: The PCM sense high voltage for more than 2.73 seconds.

POSSIBLE CAUSES
A/C CLUTCH RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
A/C CLUTCH RELAY
(C28) A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO B+
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the wiring harness from the A/C Clutch Relay to the PCM while the relay is actuating. Did the A/C Clutch Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 3	All

P0647-A/C CLUTH RELAY CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Install a substitute relay in place of the A/C Clutch Relay. Turn the ignition on. With the DRBIII®, erase DTCs. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the PCM harness connector. Measure the voltage in the (C28) A/C Clutch Relay Control circuit in the PDC. Is the voltage above 1 volt? Yes → Repair the short to voltage in the (C28) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All

Symptom:

P0686-ASD RELAY CONTROL CIRCUIT LOW

When Monitored and Set Condition:

P0686-ASD RELAY CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects no voltage on the ASD Relay Control circuit for more than 3.5 seconds, it will set this DTC.

POSSIBLE CAUSES
ASD RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
(A14) FUSED B+ CIRCUIT
ASD RELAY
(K51) ASD RELAY CONTROL CIRCUIT OPEN
(K51) ASD RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Wiggle the wiring harness from the ASD Relay to the PCM while the relay is actuating. Did the ASD Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0686-ASD RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Remove the ASD Relay from the PDC. Turn the ignition on. Measure the voltage of the (A14) Fused B+ circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the (A14) Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Substitute the ASD Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (K51) ASD Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5 ohms? Yes → Go To 7 No → Repair the open in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0686-ASD RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (K51) ASD Relay Control circuit in the PDC to ground. Is the resistance below 5.0 ohms. Yes → Repair the short to ground in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0687-ASD RELAY CONTROL CIRCUIT HIGH

When Monitored and Set Condition:

P0687-ASD RELAY CONTROL CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects high voltage on the ASD Relay Control circuit for more than 3.5 seconds, it will set this DTC.

POSSIBLE CAUSES
ASD RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
(K51) ASD RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
ASD RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Wiggle the wiring harness from the ASD Relay to the PCM while the relay is actuating. Did the ASD Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0687-ASD RELAY CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Turn the ignition on. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Using a 12-volt test light connected to ground, probe the (K51) ASD Relay Control circuit in the PDC. Does the test light illuminate? Yes → Repair the short to voltage in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Substitute the ASD Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0688-ASD RELAY OUTPUT CIRCUIT LOW

When Monitored and Set Condition:

P0688-ASD RELAY OUTPUT CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects no voltage on the ASD Relay Sense circuit for more than 3.5 seconds, it will set this DTC.

POSSIBLE CAUSES
(A142) ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
ASD RELAY
(A14) FUSED B+ CIRCUIT
(A142) ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0686 or P0687 - Auto Shutdown Relay Control Circuit first if set along with this DTC.** With the DRBIII®, erase the DTC. 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. Does the DTC reset? Yes → Go To 2 No → Go To 10	All
2	Attempt to start the engine. Does the engine start? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (A142) ASD Output circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Test Complete. No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0688-ASD RELAY OUTPUT CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Install a substitute relay in place of the ASD Relay. With the DRBIII®, erase DTCs. Attempt to start the engine. Does the engine start? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	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? Yes → Go To 6 No → Repair the (A14) Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (A142) ASD Output circuit in the PDC to ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the short to ground in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Check for the engine stumble, stall or quite running. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All

P0688-ASD RELAY OUTPUT CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the (A142) ASD Output circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Check for the engine stumble, stall or quite running. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0690-ASD RELAY OUTPUT CIRCUIT HIGH

When Monitored and Set Condition:

P0690-ASD RELAY OUTPUT CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects high voltage on the ASD Relay Sense circuit for more than 3.5 seconds, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(A142) ASD RELAY OUTPUT SENSE CIRCUIT SHORTED TO VOLTAGE
ASD RELAY
POWERTRAIN CONTROL MODULE INTERNAL SHORT TO VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0686 or P0687 - Auto Shutdown Relay Control Circuit first if set along with this DTC.** With the DRBIII®, erase the DTC. 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. Does the DTC reset? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Remove the ASD Relay from the PDC. Turn the ignition on. Measure the voltage of the (A142) ASD Relay Output circuit in the PDC. Is the voltage above 1.0 volts? Yes → Go To 3 No → Go To 4	All

P0690-ASD RELAY OUTPUT CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the (A142) ASD Relay Output circuit in the PDC. Is the voltage above 1.0 volts? Yes → Repair the short to voltage in the (A142) ASD Relay Output Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Ensure the ASD Relay is secured in the PDC. Turn the ignition on. **NOTE: The ASD Relay should switch ON at key on for approximately three seconds. If no ignition reference is seen, it should switch OFF.** Disconnect the #1 Fuel Injector harness connector. Measure the ASD Relay Output circuit in the Fuel Injector harness connector. Is the voltage above 1.0 volt? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Check for the engine stumble, stall or quite running. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW
P0693-HIGH SPEED FAN RELAY CONTROL CIRCUIT LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW.

When Monitored and Set Condition:

P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects no voltage on the Radiator Fan Relay Control circuit for more than 3 seconds, it will set this DTC.

P0693-HIGH SPEED FAN RELAY CONTROL CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects no voltage on the Radiator Fan Relay Control circuit for more than 3 seconds, it will set this DTC.

POSSIBLE CAUSES
RADIATOR FAN RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT
RADIATOR FAN RELAY
RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating? Yes → Go To 2 No → Go To 4	All

P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Wiggle the wiring harness from the Radiator Fan Relay to the PCM while the relay is actuating. Did the Radiator Fan Relay stop operating when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Substitute the Radiator Fan Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating? Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All

P0691-LOW SPEED FAN RELAY CONTROL CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the Radiator Fan Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Radiator Fan Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the Radiator Fan Relay Control circuit in the PDC to ground. Is the resistance below 100 ohms? Yes → Repair the Radiator Fan Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom List:

P0692-LOW SPEED FAN RELAY CONTROL CIRCUIT HIGH
P0694-HIGH SPEED FAN RELAY CONTROL CIRCUIT HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0692-LOW SPEED FAN RELAY CONTROL CIRCUIT HIGH.

When Monitored and Set Condition:

P0692-LOW SPEED FAN RELAY CONTROL CIRCUIT HIGH

When Monitored: With the ignition on and the Radiator Fan commanded on by the PCM.

Set Condition: If the PCM detects an open or high voltage on the Radiator Fan Relay Control circuit for more than 3 seconds, it will set this DTC.

P0694-HIGH SPEED FAN RELAY CONTROL CIRCUIT HIGH

When Monitored: With the ignition on and the Radiator Fan commanded on by the PCM.

Set Condition: If the PCM detects an open or high voltage on the Radiator Fan Relay Control circuit for more than 3 seconds, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
RADIATOR FAN RELAY INTERMITTENT OPERATION
RADIATOR FAN RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
RADIATOR FAN RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Wiggle the wiring harness from the Radiator Fan Relay to the PCM while the relay is actuating. Did the Radiator Fan Relay stop operating when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P0692-LOW SPEED FAN RELAY CONTROL CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
4	Turn the ignition off. Disconnect the PCM harness connector. Remove the Radiator Fan Relay from the PDC. Remove the ASD Relay from the PDC. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Radiator Fan Relay Control circuit in the PDC. Does the test light illuminate? Yes → Repair the Radiator Fan Relay Control circuit shorted to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Substitute the Radiator Fan Relay with a known good relay. Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan Relay operating? Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P0703-BRAKE LAMP SWITCH CIRCUIT PERFORMANCE

When Monitored and Set Condition:

P0703-BRAKE LAMP SWITCH CIRCUIT PERFORMANCE

When Monitored: With the engine running and battery volts above 9.5 volts. All other Brake Switch faults must not be set.

Set Condition: When Brake Switch 1 output is the same as Brake Switch 2 output for >25 seconds.

POSSIBLE CAUSES
INTERMITTENT OPERATION
(F32) FUSED B+ CIRCUIT
(K29) BRAKE SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
(K29) BRAKE SWITCH SENSE SHORTED TO GROUND
(K29) BRAKE SWITCH SENSE CIRCUIT OPEN
(Z1) GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: This DTC can be set if the vehicle operator "rides" the brake pedal. Check with vehicle operator to ensure that they are not resting one of their feet on the brake pedal while driving.** **NOTE: This DTC can be set if the brake pedal switch is not adjusted properly. Check brake pedal switch for proper adjustment before continuing.** With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, probe the (F32) Fused B+ circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the (F32) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0703-BRAKE LAMP SWITCH CIRCUIT PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K29) Brake Switch Sense circuit between the Brake Lamp Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K29) Brake Switch Sense circuit in the Brake Lamp Switch harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Using a jumper wire, jumper between the (F32) Fused B+ circuit and (A142) ASD Relay Output circuit in the PDC. Turn the ignition on. Measure the voltage of the (K29) Brake Switch Sense circuit in the Brake Lamp Switch harness connector. Is the voltage above 1.0 volts? Yes → Repair the short to voltage in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the (Z1) Ground circuit in the Brake Lamp Switch harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0703-BRAKE LAMP SWITCH CIRCUIT PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense 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 open circuit? Yes → Go To 8 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR PULLEYS, BELTS, OR FANS. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set this DTC are not present at this time. The following list may help identify an intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII parameters related to this DTC. Wiggle test the related wiring harness. Look for parameter values to change or for the DTC to reset. Review Freeze Frame data related to this DTC. Try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSBs) that may apply. Inspect the related wiring harness. Look for chafed, pierced, pinched, or partially broken wires. Inspect the related harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0719-BRAKE LAMP SWITCH CIRCUIT LOW

When Monitored and Set Condition:

P0719-BRAKE LAMP SWITCH CIRCUIT LOW

When Monitored: With the engine running, vehicle speed >50 km/h (31 MPH), battery voltage >9.5 volts.

Set Condition: If the PCM detects no change from the Brake Lamp Switch circuit input after coming to a complete stop, it will increment a counter. If the counter increments 10 times, the DTC will set and the MIL will illuminate.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F32) FUSED B+
(K29) BRAKE LAMP SWITCH SENSE CIRCUIT OPEN
(K29) BRAKE LAMP SWITCH SENSE SHORTED TO GROUND
(Z1) GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify battery voltage is greater than 9 volts.** Record Freeze Frame Data that was set by the related DTC before continuing. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect Brake Lamp Switch harness connector. Turn the ignition on, engine not running. Using a 12-volt test light connected to ground, check the (F32) Fused B+ circuit for voltage. Does the test light illuminate brightly. Yes → Go To 3 No → Repair the open or short to ground in the (F32) Fused B+ circuit. Check the related fuse in the PDC. If the fuse is open, check for a short to ground in the (F32) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0719-BRAKE LAMP SWITCH CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K29) Brake Lamp Switch Sense circuit between the Brake Lamp Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K29) Brake Lamp Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K29) Brake Lamp Switch Sense circuit in the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K29) Brake Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to 12-volts, probe the (Z1) Ground circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense 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 open circuit? Yes → Go To 7 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0719-BRAKE LAMP SWITCH CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0724-BRAKE LAMP SWITCH CIRCUIT HIGH

When Monitored and Set Condition:

P0724-BRAKE LAMP SWITCH CIRCUIT HIGH

When Monitored: With the engine running, vehicle speed >50 km/h (31 MPH), accelerator pedal position >25%, battery voltage >9.5 volts.

Set Condition: If the PCM detects a high Brake Lamp Switch circuit input, it will increment a counter. If the counter increments 10 times this DTC will set and the MIL will illuminate.

POSSIBLE CAUSES
(K29) BRAKE LAMP SENSE CKT SHORT TO B+
INTERMITTENT CONDITION
BRAKE LAMP SWITCH OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify battery voltage is greater than 9 volts.** Record Freeze Frame Data that was set by the related DTC before continuing. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. With a 12-volt test light connected to ground, probe the (K29) Brake Lamp Sense circuit. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (K29) Brake Lamp Switch Sense circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense 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 open circuit? Yes → Go To 4 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P0724-BRAKE LAMP SWITCH CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P0833-CLUTCH UPSTOP SWITCH PERFORMANCE

When Monitored and Set Condition:

P0833-CLUTCH UPSTOP SWITCH PERFORMANCE

When Monitored: With the engine running, Battery Voltage > 9.0 volts, Vehicle Speed < than 0 Km/h, then Vehicle Speed > 43Km/h, MAP > 90 mbar, and N > 3200 RPM.

Set Condition: Clutch Switch did not change status for more than 15 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
CLUTCH PEDAL POSITION SWITCH
(K119) CLUTCH UPSTOP SIGNAL CIRCUIT OPEN
(K119) CLUTCH UPSTOP SIGNAL CIRCUIT SHORTED TO GROUND
(Z12) GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, monitor the Clutch Upstop Switch. Press and release the Clutch Pedal several times. Does the Clutch Upstop Switch state change as the pedal is pressed and released? Yes → Go To 2 No → Go To 3	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

P0833-CLUTCH UPSTOP SWITCH PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	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. Does the Clutch Upstop Switch status change with the jumper in place? Yes → Replace the Clutch Pedal Position Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the Clutch Pedal Position Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K119) Clutch Upstop Signal circuit in the Clutch Pedal Position Switch harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (K119) Clutch Upstop circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the Clutch Pedal Position Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the (K119) Clutch Upstop Signal circuit between the Clutch Pedal Position Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (K119) Clutch Upstop Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	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? Yes → Go To 7 No → Repair the open in the (Z12) ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom List:

P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE
P1136-1/2 HEATER ELEMENT RESISTANCE OUT OF RANGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE.

When Monitored and Set Condition:

P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE

When Monitored: With the engine running, 1/1 O2 Sensor has reached 98% duty cycle at least once since cranking, MAF >32 kg/h <150 kg/h, catalyst temp >600°C (1112°F) <930°C (1706°F), battery voltage >9 <16 volts and no O2 Sensor electrical DTCs present.

Set Condition: If the PCM determines the 1/1 O2 Sensor resistance is <2 for more than 30 seconds.

P1136-1/2 HEATER ELEMENT RESISTANCE OUT OF RANGE

When Monitored: With the engine running, 1/1 O2 Sensor has reached 98% duty cycle at least once since cranking, MAF >32 kg/h <150 kg/h, catalyst temp >600°C (1112°F) <930°C (1706°F), battery voltage >9 <16 volts and no O2 Sensor electrical DTCs present.

Set Condition: If the PCM determines the 1/2 O2 Sensor resistance is <2 for more than 30 seconds.

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER GROUND CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 3 No → Go To 2	All

P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Relay. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volts? Yes → Go To 3 No → Go To 7	All
3	**NOTE: Allow the O2 sensor to cool down to room temperature.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. **NOTE: Heater Resistance Specification for 1/1 and 1/2 O2 Sensor is from 3 to 20 ohms.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between ground and the O2 Sensor Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open O2 Sensor Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 6 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P1135-1/1 O2 HEATER ELEMENT RESISTANCE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:
P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

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

Set Condition: Battery voltage is 1 volt greater than desired system voltage.

POSSIBLE CAUSES
TARGET VOLTAGE DIFFERS FROM BATTERY VOLTAGE
INTERMITTENT CONDITION
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Turn the ignition on. With DRBIII®, actuate the Generator Field Driver. With a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of Generator Field harness connector. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. With DRBIII®, stop all actuation tests. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 13.0 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. With the DRBIII®, manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the Target Charging Voltage to the Battery Voltage reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 4	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Test Complete.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Go To 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Measure resistance between ground and Field Driver terminal pin on the Generator. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L.	All

Symptom:

P1616-5V OUTPUT REFERENCE VOLTAGE #1 LOW

When Monitored and Set Condition:

P1616-5V OUTPUT REFERENCE VOLTAGE #1 LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage <4.75 volts on the 5 Volt Supply #1 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K6) 5-VOLT SUPPLY BELOW 4.75 VOLTS
(K6) 5-VOLT SUPPLY SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1616.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the (K6) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage below 4.75 Volts? Yes → Go To 3 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MAP Sensor harness connector. Measure the resistance of the (K6) 5-volt Supply circuit in the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P1616-5V OUTPUT REFERENCE VOLTAGE #1 LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1617-5V OUTPUT REFERENCE VOLTAGE #1 HIGH

When Monitored and Set Condition:

P1617-5V OUTPUT REFERENCE VOLTAGE #1 HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage >5.25 volts on the 5 Volt Supply #1 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(K6) 5-VOLT SUPPLY ABOVE 5.25 VOLTS
(K6) 5-VOLT SUPPLY CIRCUIT OPEN
(K6) 5-VOLT SUPPLY SHORTED TO VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1617.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the (K6) 5-volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 5.25 Volts? Yes → Go To 3 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MAP Sensor harness connector. Measure the resistance of the (K6) 5-volt Supply circuit between the PCM harness connector and the MAP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P1617-5V OUTPUT REFERENCE VOLTAGE #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MAP Sensor harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage of the (K6) 5-volt Supply circuit in the PCM harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (K6) 5-volt Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1618-5V OUTPUT REFERENCE VOLTAGE UNSTABLE

When Monitored and Set Condition:

P1618-5V OUTPUT REFERENCE VOLTAGE UNSTABLE

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage variance >.25 volts on the 5 Volt Supply #1 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
MAP SENSOR
(K6) 5-VOLT SUPPLY CIRCUIT HIGH RESISTANCE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1618.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the voltage between 4.80 and 5.20 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing between the (K6) 5-volt Supply circuit at the MAP Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance in the (K6) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P1618-5V OUTPUT REFERENCE VOLTAGE UNSTABLE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1626-5V OUTPUT REFERENCE VOLTAGE #2 LOW

When Monitored and Set Condition:

P1626-5V OUTPUT REFERENCE VOLTAGE #2 LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage <4.75 volts on the 5 Volt Supply #2 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F855) 5-VOLT SUPPLY BELOW 4.75 VOLTS
(F855) 5-VOLT SUPPLY SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1626.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. Measure the (F855) 5-volt Supply circuit at the TP Sensor harness connector. Is the voltage below 4.75 Volts? Yes → Go To 3 No → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the ETC Assembly harness connector. Measure the resistance of the (F855) 5-volt Supply circuit in the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (F855) 5-volt Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All

P1626-5V OUTPUT REFERENCE VOLTAGE #2 LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1627-5V OUTPUT REFERENCE VOLTAGE #2 HIGH

When Monitored and Set Condition:

P1627-5V OUTPUT REFERENCE VOLTAGE #2 HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage >5.25 volts on the 5 Volt Supply #2 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(F855) 5-VOLT SUPPLY ABOVE 5.25 VOLTS
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY SHORTED TO VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1627.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. Measure the voltage of the (F855) 5-volt Supply circuit at the ETC Assembly harness connector. Is the voltage above 5.25 Volts? Yes → Go To 3 No → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the ETC Assembly harness connector. Measure the resistance of the (F855) 5-volt Supply circuit between the PCM harness connector and the ETC Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P1627-5V OUTPUT REFERENCE VOLTAGE #2 HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the ETC Assembly harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage of the (F855) 5-volt Supply circuit in the PCM harness connector. Is the voltage above 1.0 volt? Yes → Repair the short to voltage in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1628-5V OUTPUT REFERENCE VOLTAGE #1 UNSTABLE

When Monitored and Set Condition:

P1628-5V OUTPUT REFERENCE VOLTAGE #1 UNSTABLE

When Monitored: With the ignition on.

Set Condition: If the PCM detects a voltage variance >.25 volts on the 5 Volt Supply #2 circuit for at least 100 ms, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ETC ASSEMBLY
(F855) 5-VOLT SUPPLY CIRCUIT HIGH RESISTANCE
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor DTC(s) first if set along with DTC P1628.** Turn the ignition on. With the DRBIII®, read the DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Disconnect the ETC Assembly harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit at the ETC Assembly harness connector. Is the voltage between 4.80 and 5.20 volts? Yes → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing the (F855) 5-volt Supply circuit in the ETC Assembly harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance in the (F855) 5-volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P1628-5V OUTPUT REFERENCE VOLTAGE #1 UNSTABLE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P1653-PCI BUS SHORTED TO GROUND

When Monitored and Set Condition:

P1653-PCI BUS SHORTED TO GROUND

When Monitored: With the ignition on.

Set Condition: If the PCM detects a short to ground on the PCI Bus for more than 5 seconds, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
INTERNAL CONTROLLER SHORT TO GD
PCI BUS SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Measure the resistance between Ground and the PCI Bus circuit at the Data Link Connector. Is the resistance below 100 ohms? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Monitor the short to ground on the PCI Bus circuit at the DLC. NOTE: A wide range of fluctuation in the resistance value may indicate BUS activity. It may be necessary to wait for all modules to sleep (stop communicating) in order to get an accurate reading. Disconnect the Airbag controller, Cluster, RKE, SKIM, Radio, Side Air Bag Module, and the PCM, one at a time, disconnecting the PCM last. NOTE: If the resistance never changes with all of the controllers disconnected, there is a short to ground in the harness. Does the resistance change from below 100 ohms to above 100 ohms when disconnecting any module? Yes → Replace and reprogram the specific Control Module that is causing the short to ground in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Repair the short to ground in the PCI Bus circuit. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

P1653-PCI BUS SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Test Complete.	All

Symptom:

P1654-PCI BUS SHORTED TO VOLTAGE

When Monitored and Set Condition:

P1654-PCI BUS SHORTED TO VOLTAGE

When Monitored: With the ignition on.

Set Condition: If the PCM detects a short to voltage on the PCI Bus for more than 5 seconds, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
INTERNAL CONTROLLER SHORT TO B+
PCI BUS SHORT TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine not running. Measure the voltage on the PCI Bus circuit at the Data Link Connector. Is the voltage above 8 volts? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on engine not running. Monitor the voltage on the PCI Bus circuit at the DLC. Disconnect Airbag controller, Cluster, RKE, SKIM, Radio, and the Side Air Bag Module, 1 at a time. If the voltage drops when disconnecting a specific component, replace that component for an internal short. Does the voltage stay above 7.5 volts with all the controllers disconnected? Yes → Repair the short to voltage in the PCI Bus circuit. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Replace and reprogram the specific Control Module that is causing the short to voltage in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

P1654-PCI BUS SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Test Complete.	All

Symptom:

P1656-PCI BUS NOT AVAILABLE

When Monitored and Set Condition:

P1656-PCI BUS NOT AVAILABLE

When Monitored: With the ignition on.

Set Condition: If the PCM determines the PCI Bus is not available for more than 5 seconds, it will set this DTC.

POSSIBLE CAUSES
INTERMITTENT CONDITION
OPEN PCI BUS CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine not running. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect PCM harness connector. Measure the resistance of the PCI Bus circuit from the PCM harness connector to the Data Link Connector. Is the resistance below 5 ohms? Yes → Go To 3 No → Repair the open PCI Bus circuit between the PCM harness connector and the Data Link Connector. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
3	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

P1656-PCI BUS NOT AVAILABLE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L. No → Test Complete.	All

Symptom:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored and Set Condition:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored: With the ignition on.

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

POSSIBLE CAUSES
SKIM/PCM
INTERMITTENT CONDITION
LOSS OF SKIM COMMUNICATION
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the PCM DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the SKIM. **NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.** Was the DRBIII® able to communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SKIM harness connector. Measure the resistance of the PCI Bus circuit between the PCM harness connector and the SKIM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit between the PCM and the SKIM for an open. Perform SKIS VERIFICATION.	All

P1686-NO SKIM BUS MESSAGE RECEIVED — Continued

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

Symptom:

P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: Engine Running.

Set Condition: No BUS messages received from the MIC (Instrument Cluster) for 20 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH CLUSTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read and record DTC and Freeze Frame information. Clear DTCs. Start the engine and turn it off several times, allowing the engine to run for at least 20 second each time. With the DRBIII®, read DTC's. Does the DTC reset? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the Instrument cluster. Can communication be established with the Instrument Cluster? Yes → Test Complete. No → Refer to the Communication Category and perform the appropriate symptom related to no communication with cluster. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All

Symptom:

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT

When Monitored and Set Condition:

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT

When Monitored: With the ignition on and the ETC Motor is not in Limp Home mode.

Set Condition: When the PCM detects an internal error with the ETC Motor.

POSSIBLE CAUSES
INTERMITTENT CONDITION
(V50) ETC POSITIVE CIRCUIT OPEN
(V50) ETC POSITIVE CIRCUIT SHORT TO GROUND
(V50) ETC POSITIVE CIRCUIT SHORT TO VOLTAGE
(V51) ETC NEGATIVE CIRCUIT OPEN
(V51) ETC NEGATIVE CIRCUIT SHORT TO GROUND
(V51) ETC NEGATIVE CIRCUIT SHORT TO VOLTAGE
ETC MOTOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine off. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect ECT harness connector. Disconnect PCM harness connector. Measure the resistance of the (V50) ETC Positive circuit between the ETC harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open in the (V50) ETC Positve circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect ETC harness connector. Disconnect PCM harness connector. Measure the resistance between ground and the (V50) ECT Positive circuit at the ETC harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V50) ETC Positve circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the ETC harness connector. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on, engine not running. With a 12-volt test light connected to ground, probe the (V50) ETC Positive circuit. Does the test light illuminate brightly. Yes → Repair the short to voltage in the (V50) ETC Positive circuit . Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect ECT harness connector. Disconnect PCM harness connector. Measure the resistance of the (V51) ETC Negative circuit between the ETC harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the (V51) ETC Negative circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition off. Disconnect ETC harness connector. Disconnect PCM harness connector. Measure the resistance between ground and the (V51) ETC Negative circuit at the ETC harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V51) ETC Negative circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 7	All

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect ETC harness connector. Disconnect PCM harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on, engine off. Using a 12-volt test light connected to ground, probe the (V51) ETC Negative circuit. Does the test light illuminate brightly? Yes → Repair the short to voltage in the (V51) ETC Negative circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	Turn the ignition off. Disconnect the ETC harness connector. Measure the resistance of the ETC Motor, Pins 4 and 6 of the ETC Motor component connector. Is the resistance between 3.0 and 5.0 ohms? Yes → Go To 9 No → Replace the Electronic Throttle Control Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE

When Monitored and Set Condition:

P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE

When Monitored: With the vehicle running, ETC Motor not in Limp Home mode, and the TPS adaptation is complete.

Set Condition: If the difference between TPS set point and TPS actual is 8 degrees for more than 405 msecs.

POSSIBLE CAUSES
ELECTRONIC THROTTLE CONTROL MOTOR OPERATION
INTERMITTENT CONDITION
THROTTLE POSITION WITHIN 2° DEGREES OF DESIRED THROTTLE POSITION

TEST	ACTION	APPLICABILITY
1	**NOTE: Before continuing visually inspect the throttle blade and bore for any obstructions. Repair as necessary.** Turn the ignition on, engine off. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 4	All
2	Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII® in Sensors, monitor the ACT THROTTLE POSITION and ETC TPS SETPOINT. Compare ACT THROTTLE POSITION and ETC TPS SETPOINT. Is the ACT THROTTLE POSITION within 2° degrees of the ETC TPS SETPOINT? Yes → Go To 3 No → Replace the Electronic Throttle Control Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	Turn the ignition on, engine off. With the DRBIII®, actuate the Electronic Throttle Control Motor. **NOTE: It may be necessary to use a mirror to see the throttle blade.** Observe the throttle blade. **NOTE: Ensure the motion of the throttle blade is smooth and that it open and closed fully.** Did the ETC motor operate properly? Yes → Go To 4 No → Replace the Electronic Throttle Control Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
4	NOTE: Visually inspect the throttle blade and bore for any obstructions that would not allow the ETC motor to operate properly. **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P2107-ELECTRONIC THROTTLE CONTROL MODULE PROCESSOR

P2108-ELECTRONIC THROTTLE CONTROL MODULE PERFORMANCE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2107-ELECTRONIC THROTTLE CONTROL MODULE PROCESSOR.

POSSIBLE CAUSES
REPROGRAM THE POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Using the DRBIII®, attempt to reprogram the Powertrain Control Module in accordance with the Service Information. Start the engine. Allow the engine to reach normal operating temperature. Operate the accelerator pedal. (do not exceed 3500 rpm) With the DRBIII®, read DTCs. Does this DTC reset? Yes → Replace and reprogram the Powertrain Contol Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW
P2127-ACCELERATOR PEDAL POSITION SENSOR #2 LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW.

When Monitored and Set Condition:

P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW

When Monitored: With the ignition on.

Set Condition: When the APP #1 voltage is < .2444 volts, or the circuit is shorted to ground or open for more than 120 msec.

P2127-ACCELERATOR PEDAL POSITION SENSOR #2 LOW

When Monitored: With the ignition on.

Set Condition: When the APP #2 voltage is < .2444 volts, or the circuit is shorted to ground or open for more than 120 msec.

POSSIBLE CAUSES
ACCELERATOR PEDAL POSITION SENSOR SWEEP
INTERMITTENT CONDITION
5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5-VOLT SUPPLY CIRCUIT OPEN
ACCELERATOR PEDAL POSITION SENSOR INTERNAL FAILURE
ACCELERATOR PEDAL POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ACCELERATOR PEDAL POSITION SENSOR SIGNAL CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
PCM 5 VOLT SUPPLY CIRCUIT
PCM APP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the APP Sensor Input voltage. Is the voltage below 0.25 volt? Yes → Go To 2 No → Go To 10	All

P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5-volt Supply circuit. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the APP Sensor Input voltage. NOTE: There is a pull-down resistor in the PCM load circuit that should pull the APP Signals down to approximately 0 volts when the connector is removed. Is the voltage approximately 0 volts? Yes → Replace the Accelerator Pedal Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the APP Sensor Signal circuit. Is the resistance below 100 ohms? Yes → Repair the Accelerator Pedal Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 5	All
5	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the APP Sensor Signal circuit and the Sensor Ground circuit. Is the resistance below 100 ohms? Yes → Repair the Accelerator Pedal Position Sensor Signal circuit for a short to the Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5-volt Supply circuit to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 8	All
8	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5-volt Supply circuit. Is the resistance below 5 ohms? Yes → Test Complete. No → Go To 9	All
9	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
10	Turn the ignition on. With the DRBIII®, monitor the APP Sensor Input voltage. Slowly press and release the Accelerator Pedal. Is the voltage change smooth as the Accelerator Pedal is pressed and released? Yes → Go To 11 No → Replace the Accelerator Pedal Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2122-ACCELERATOR PEDAL POSITION SENSOR # 1 LOW — Continued

TEST	ACTION	APPLICABILITY
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH
P2128-ACCELERATOR PEDAL POSITION SENSOR #2 HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH.

When Monitored and Set Condition:

P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH

When Monitored: With the ignition on.

Set Condition: When APP Sensor volts > 4.8192 because of a short to voltage.

P2128-ACCELERATOR PEDAL POSITION SENSOR #2 HIGH

When Monitored: With the ignition on.

Set Condition: When APP Sensor volts > 4.8192 because of a short to voltage.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY SHORTED TO BATTERY VOLTAGE
APP SENSOR SIGNAL SHORT TO 5 VOLT CIRCUIT
APP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
APP SENSOR SWEEP
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine not running. With the DRBIII® in Sensors, read the APP Sensor Input voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Go To 7	All

P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the APP Sensor harness connector. Remove the ASD Relay from the PDC. Connect a jumper wire between cavity 30 and 87 of the ASD Relay connector in the PDC. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the PCM harness connector. Is the voltage above 5.2 volts? Yes → Repair the 5 Volt Supply Circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All
3	Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the APP Sensor Signal circuit and the 5 Volt Supply circuit in the APP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the APP Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	Turn the ignition on. With the DRBIII® in Sensors, monitor the APP Sensor Input voltage. Slowly press and release the Accelerator Pedal. Is the voltage change smooth as the Accelerator Pedal is pressed and released? Yes → Go To 5 No → Replace the Accelerator Pedal Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of the APP Sensor Signal circuit in the APP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the APP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2123-ACCELERATOR PEDAL POSITION SENSOR #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

P2135-THROTTLE POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION

When Monitored and Set Condition:

P2135-THROTTLE POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION

When Monitored: With the ignition on.

Set Condition: When the difference between TP Sensor # 1 degrees and TP Sensor # 2 degrees is > 1.995

POSSIBLE CAUSES
INTERMITTENT CONDITION
TP SENSOR SIGNAL CIRCUIT HIGH RESISTANCE
5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE
GROUND SIGNAL CIRCUIT RESISTANCE
CHECKING TP SENSOR 1 AND 2 W/ LAB SCOPE
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII® in Sensors, read the TPS #1 and TPS #2 Input voltages. Add the TPS #1 and TPS #2 Input voltages together. **NOTE: When both voltages are added together they should equal approximately 5.0 volts.** Do the two voltages equal 5.0 +/- .25 volt. Yes → Go To 2 No → Go To 3	All

P2135-THROTTLE POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All
3	**NOTE: Repeat the following test on TPS #1 and TPS #2 signal circuits.** **NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the TPS Signal circuit in the ETC Assembly harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt on both circuits? Yes → Go To 4 No → Repair the high resistance in the TPS Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the 5 Volt Supply circuit in the ETC assembly harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2135-THROTTLE POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire contact.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the TPS Ground circuit in the ETC Assembly harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the resistance in the Ground Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	Turn the ignition on, engine not running. Use the DRBIII®/PEP Module as a Dual Channel Lab Scope with Miller Special tool #6801. Backprobe the TPS #1 Signal circuit in the ETC Assembly harness connector using Channel 1. Backprobe the TPS #2 Signal circuit in the ETC Assembly harness connector using Channel 2. Using the DRBIII®, perform the ETC System Test. While monitoring the scope pattern display, fully open and fully close the ETC. Compare the Scope Patterns on the DRB with the Charts and Graphs Typical TP Sensor Signal Scope Pattern. Does the actual scope pattern match the Typical TP Sensor Signal Scope Pattern? Yes → Go To 7 No → Replace the ETC Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

Symptom:

P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION

When Monitored and Set Condition:

P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION

When Monitored: With the ignition on.

Set Condition: When (APP#1 voltage - 1.7 x APP#2 voltage) >= .2 volts for 120 msecs, with P2122, P2123, P2127, and P2128 not present.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY SHORT TO VOLTAGE
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY SHORT TO GROUND
APP SENSOR SIGNAL CIRCUIT HIGH RESISTANCE
5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE
GROUND SIGNAL CIRCUIT RESISTANCE
CHECKING APPS 1 AND 2 W/ LAB SCOPE
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on, engine off. With the DRBIII®, read DTCs. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of each of the 5 Volt Supply circuits in the APP Sensor harness connector. Is the voltage above 5.2 volts for either measurement? Yes → Repair the short to voltage on the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 3	All

P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the APP Sensor harness connector. Turn the ignition on. Measure the voltage of each of the 5 Volt Supply circuits in the APP Sensor harness connector. Is the voltage between 4.5 and 5.2 volts? Yes → Go To 4 No → Go To 8	All
4	**NOTE: Repeat the following test on APP Sensor #1 and APP Sensor #2 signal circuits.** **NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire contact.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the APP Sensor Signal circuit in the APP Sensor harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance in the APP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**NOTE: Repeat the following test on APP Sensor #1 and APP Sensor #2 5 Volt Supply circuits.** **NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire contact.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the 5 Volt Supply circuit in the APP Sensor harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the high resistance in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
6	**NOTE: Repeat the following test on APP Sensor #1 and APP Sensor #2 Ground circuits.** **NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire contact.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Using a voltmeter, perform a voltage drop test by backprobing the APP Sensor Ground circuit in the APP Sensor harness connector and in the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 7 No → Repair the resistance in the Ground Sensor circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition on, engine not running. Use the DRBIII®/PEP Module as a Dual Channel Lab Scope with Miller Special tool #6801. Backprobe the APP Sensor #1 Signal circuit in the ETC Assembly harness connector using Channel 1. Backprobe the APP Sensor #2 Signal circuit in the ETC Assembly harness connector using Channel 2. Slowly press and release the Accelerator Pedal while monitoring the DRBIII® screen. Compare the Scope Pattern on the DRB with Charts and Graphs Typical APP Sensor Signal Scope Patterns. Does the scope pattern match the Typical APP Sensor Signal Scope Pattern? Yes → Go To 10 No → Replace the APP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
8	**NOTE: Perform this test on the 5 Volt Supply circuit that had a voltage reading of less than 4.5 volts.** Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the APP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
9	**NOTE: Perform this test on the 5 Volt Supply circuit that had a voltage reading of less than 4.5 volts.** Turn the ignition off. Disconnect the APP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the APP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 10	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2138-ACCELERATOR PEDAL POSITION SENSOR #1 AND #2 VOLTAGE CORRELATION — Continued

TEST	ACTION	APPLICABILITY
11	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **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.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P2300-IGNITION COIL #1 CIRCUIT LOW
P2303-IGNITION COIL #2 CIRCUIT LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2300-IGNITION COIL #1 CIRCUIT LOW.

When Monitored and Set Condition:

P2300-IGNITION COIL #1 CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects an open or short to ground on the Ignition Coil #1 Control circuit for more than 15 coil change requests, it will set this DTC.

P2303-IGNITION COIL #2 CIRCUIT LOW

When Monitored: With the ignition on.

Set Condition: If the PCM detects an open or short to ground on the Ignition Coil #2 Control circuit for more than 15 coil change requests, it will set this DTC.

POSSIBLE CAUSES
IGNITION COIL
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 5	All

P2300-IGNITION COIL #1 CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
2	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 ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	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? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	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 1000 ohms? Yes → Repair the Ignition Coil driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom List:

P2301-IGNITION COIL #1 CIRCUIT HIGH
P2304-IGNITION COIL #2 CIRCUIT HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P2301-IGNITION COIL #1 CIRCUIT HIGH.

When Monitored and Set Condition:

P2301-IGNITION COIL #1 CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects a short to voltage on the Ignition Coil #1 Control circuit for more than 15 coil change requests, it will set this DTC.

P2304-IGNITION COIL #2 CIRCUIT HIGH

When Monitored: With the ignition on.

Set Condition: If the PCM detects a short to voltage on the Ignition Coil #2 Control circuit for more than 15 coil change requests, it will set this DTC.

POSSIBLE CAUSES
ASD RELAY OUTPUT CIRCUIT
IGNITION COIL DRIVER CIRCUIT OPEN
IGNITION COIL
IGNITION COIL DRIVER CIRCUIT SHORTED TO ASD OUTPUT CIRCUIT
PCM
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Does the Good Trip Indicator display NO? Yes → Go To 2 No → Go To 7	All

P2301-IGNITION COIL #1 CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
2	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 ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
3	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? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 4	All
4	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 5 No → Repair the Ignition Coil driver circuit for a open. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All
5	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance between the Ignition Coil driver circuit and the ASD Relay Output circuit in the Ignition Coil harness connector. Is the resistance below 100 ohms? Yes → Repair the Ignition Coil driver circuit for a short to the ASD Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L.	All

P2301-IGNITION COIL #1 CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. 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. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L. No → Test Complete.	All

Symptom:

*CHECKING PCM POWER AND GROUND CIRCUITS

POSSIBLE CAUSES
PCM FUSED B+ CIRCUIT
PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	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 PCM harness connector cavity A-1. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
2	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 PCM harness connector cavity A-61. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to battery voltage, probe each of the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly for each circuit? Yes → Test Complete. No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER-1 - 1.6L.	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 - 1.6L. 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 - 1.6L.	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 - 1.6L. 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 - 1.6L.	All

*CHECKING RADIATOR FAN RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Repair the Radiator Fan Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All

Symptom:

*CHECKING THE A/C RELAY OUTPUT

POSSIBLE CAUSES
A/C CLUTCH RELAY OPERATION
GROUND CIRCUIT OPEN
A/C CLUTCH
FUSED B+ CIRCUIT
A/C CLUTCH OUTPUT CIRCUIT
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch actuating? Yes → The A/C Clutch System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 2	All
2	Turn the ignition off. Disconnect the A/C Clutch harness connector. Using a 12-volt test light connected to 12-volts, check the Ground circuit in the A/C Clutch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All
3	Disconnect the A/C Clutch harness connector. Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Using a 12-volt test light connected to ground, check the A/C Clutch Relay Output circuit in the A/C Clutch harness connector. Does the test light illuminate brightly? Yes → Replace the A/C Clutch. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Go To 4	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All

*CHECKING THE A/C RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	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 A/C Clutch Relay Output circuit between the PDC and the A/C Clutch harness connector. Is the resistance below 5.0 ohms? Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L. No → Repair the A/C Clutch Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L.	All

Symptom:
*SPEED CONTROL SWITCH TEST 1.6L

POSSIBLE CAUSES
INTERMITTENT CONDITION
S/C SW CKT SHORT TO VOLTAGE
S/C SW CKT OPEN
S/C SW CKT TO S/C SWITCH
SPEED CONTROL SWITCH
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in Sensors, read the S/C SWITCH STATUS. While monitoring the S/C SWITCH STATUS, move the Speed Control switch to each position, i.e., On/Off, Coast/Set, Cancel, etc. The S/C SWITCH STATUS should change appropriately as the switch is moved to each position. Does the Status change appropriately as the Speed Control switch is moved to each position? Yes → Go To 2 No → Go To 3	All
2	**NOTE: The following list may help in identifying an intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. With the DRBIII® in Sensors, monitor the S/C Switch Status while wiggle testing the related wiring harness. Look for parameter values to change and/or a DTC to set. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Technical Service Bulletins (TSB) that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All
3	Turn the ignition off. Disconnect the Clockspring harness connector. Turn the ignition on, engine not running. Measure the voltage of the Speed Control Switch circuit at the Clock Spring harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 4 No → Go To 6	All

*SPEED CONTROL SWITCH TEST 1.6L — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Turn the ignition on, engine not running. Measure the voltage of the Speed Control Switch circuit in the Speed Control Switch harness connector. Is the voltage between 4.8 and 5.2 volts? Yes → Go To 5 No → Check the wiring and connections between the Clockspring and the Speed Control switch. If ok, replace the Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Turn the ignition off. Disconnect the Clockspring connector. Start the engine. Measure the voltage of the Speed Control Switch circuit at the Clockspring connector. Is the voltage above 5.2 volts? Yes → Repair the S/C Switch circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Clockspring connector. Measure the resistance of the S/C Switch circuit between the PCM harness connector and the Clockspring connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open Speed Control Switch circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	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 - 4.	All

Symptom:
INTERMITTENT CONDITION

POSSIBLE CAUSES
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSBs) that may apply. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set. 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. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals. **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.** Inspect and clean all PCM, engine, and chassis grounds. If numerous trouble codes were set, use a wire schematic to help you find any common ground or supply circuits. For any Relay DTCs, actuate the Relay with the DRBIII® and wiggle the related wire harness to try to interrupt the actuation. For intermittent Evaporative Emission trouble codes perform a visual and physical inspection of the related parts including hoses and the Fuel cap. A co-pilot, data recording, and/or lab scope should be used to help diagnose intermittent conditions. Use the DRBIII® to perform a System Test if one applies to failing component. Were any problems found during the above inspections? Yes → Repair as necessary No → Test Complete.	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	**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.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 6	All
3	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. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Gently tap on the Cam Position Sensor and wiggle the Sensor. Ignition on, engine not running. 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 (K44) CMP circuits. Did the DTC reset? Yes → Repair the wiring/connector concerns as needed or replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit at the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 8 No → Go To 11	All
8	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. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSBs that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	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. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0016-CRANKSHAFT/CAMSHAFT TIMING MISALIGNMENT — Continued

TEST	ACTION	APPLICABILITY
11	**NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. 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? Yes → Repair the wiring/connector concerns as needed or replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	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
2	Turn the ignition off. 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. Is the O2 Sensor voltage above 4.5 volts? Yes → Go To 3 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. **NOTE: Heater Resistance Specification: 3 to 20 Ohms for Upstream and Downstream O2 Sensors.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit in the O2 Sensor harness connector. Does the test light illuminate brightly and flash bright to dim? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the O2 Heater Control circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the O2 Sensor Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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	Turn the ignition off. **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.** 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. **NOTE: When the O2 Sensor is cool, the voltage reading should be above 4.5 volts. After two minutes of actuation, the voltage should drop below 3.0 volts.** Does the O2 Sensor voltage change as described during the O2 Heater Test? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. **NOTE: Heater Resistance Specification: 3 to 20 ohms for Upstream and Downstream O2 Sensors.** Is the O2 Sensor Heater element within specification? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Ignition on, engine not running. With the DRBIII®, actuate the O2 Heater Test. Using a 12-volt test light connected to ground, probe the O2 Heater Control circuit in the O2 Sensor harness connector. Does the test illuminate brightly and flash on and off? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between engine ground and the O2 Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the open in the O2 Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
6	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? Yes → Repair the short to voltage in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	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.	All
2	Turn the ignition off. Disconnect the Surge Valve Solenoid harness connector. Using a 12-volt test light, jumper across the Surge Valve harness connector. **NOTE: While actuating the solenoid wiggle the related wiring harness.** Turn the ignition on. With the DRBIII®, actuate the Surge Valve Solenoid. Does the test light illuminate brightly and flash on and off? Yes → Replace the Surge Valve Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0033-SURGE VALVE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Go To 4 No → Repair the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	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? Yes → Repair the short to voltage in the (K150) Surge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Surge Valve Solenoid harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 6 No → Repair the open in the (K150) Surge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	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? Yes → Repair the short to ground in the (K150) Surge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.** **NOTE: The throttle plate and linkage must be free from binding and carbon build up, ensure the throttle plate is at the idle position.** 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.	All
2	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? Yes → Go To 3 No → Go To 11	All
3	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? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the TP Sensor (K6) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Go To 6 No → Repair the (K6) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	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? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 8 No → Repair the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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 9 No → Repair the (K22) TP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 10 No → Repair the (K167) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 12 No → Repair the MAP (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	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? Yes → Go To 13 No → Repair the short to ground in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
13	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 15 No → Repair the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	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? Yes → Go To 16 No → Repair the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 17 No → Repair the (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION — Continued

TEST	ACTION	APPLICABILITY
17	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 (18°F) of the other two temperartue 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
(K167) SENSOR GROUND CIRCUIT OPEN
(K145) AAT SIGNAL CIRCUIT SHORTED TO GROUND
(K145) AAT SIGNAL CIRCUIT SHORTED TO (K167) SENSOR GROUND
PCM LOW
PCM HIGH

TEST	ACTION	APPLICABILITY
1	**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.** 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.	All

P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals** 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? Yes → Repair the short to battery voltage in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Go To 4 No → Go To 7	All
4	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? Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0071-AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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? Yes → Repair the short to ground in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	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? Yes → Repair the (K167) Sensor ground shorted to the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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 (K167) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**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.** Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature Sensor voltage. Is the voltage below .04 of a volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0072-AMBIENT TEMP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Repair the short to ground in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Repair the (K167) Sensor ground shorted to the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K167) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**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.** Ignition on, engine not running. With the DRBIII®, read the Ambient Air Temperature 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.	All
2	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? Yes → Repair the short to battery voltage in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0073-AMBIENT TEMP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (K145) AAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.	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	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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. No → Go To 5	All
5	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? Yes → Repair the (K4) Sensor ground shorted to the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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? Yes → Repair the short to ground in the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0107-MAP SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 9 No → Repair the open in the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.	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. No → Go To 3	All

P0108-MAP SENSOR HIGH — 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 (K1) MAP Signal circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the short to battery voltage in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0108-MAP SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K4) SENSOR GROUND CIRCUIT OPEN
(K21) IAT SIGNAL SHORTED TO GROUND
(K21) IAT SIGNAL CIRCUIT SHORTED TO (K4) 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.	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. **NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.** 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. 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. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All
6	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0111-INTAKE AIR TEMPERATURE SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Repair the short to ground in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	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? Yes → Repair the (K4) Sensor ground circuit shorted to the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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 (K4) SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, read the IAT 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.	All
2	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? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Repair the short to ground in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0112-INTAKE AIR TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	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? Yes → Repair the (K4) Sensor ground shorted to the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K4) 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.	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. No → Go To 3	All

P0113-INTAKE AIR TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 5 No → Repair the open in the (K21) IAT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K4) SENSOR GROUND CIRCUIT OPEN
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL SHORTED TO (K4) SENSOR GROUND
PCM HIGH
PCM LOW

TEST	ACTION	APPLICABILITY
1	**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.** Ignition on, engine not running. **NOTE: Check with the customer to determine if such a block heater is installed on the vehicle.** 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.	All

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. **NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.** 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? Yes → Repair the short to battery voltage in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Go To 4 No → Go To 7	All
4	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? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0116-ENGINE COOLANT TEMPERATURE PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the ECT harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (K4) Sensor ground circuit from the ECT 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. No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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? Yes → Repair the short to ground in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	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 (K4) Sensor ground circuit at the ECT Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the (K4) Sensor ground shorted to the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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 (K4) 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.	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. 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. No → Go To 4	All

P0117-ENGINE COOLANT TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
4	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 (K4) Sensor ground circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the (K4) Sensor ground shorted to the (K2) ECT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K4) 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.	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. No → Go To 3	All

P0118-ENGINE COOLANT TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (K2) ECT Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (K4) Sensor ground circuit from the ECT 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 (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K7) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K7) 5 VOLT SUPPLY CIRCUIT OPEN
TP SENSOR INTERNAL FAILURE
(K22) TP SIGNAL CIRCUIT SHORTED TO GROUND
(K22) TP SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND CIRCUIT
PCM (K7) 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	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? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Repair the short to ground in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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 (K4) Sensor ground circuit in the TPS harness connector. Is the resistance below 100 ohms? Yes → Repair the short to (K4) Sensor ground in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K7) 5 volt Supply circuit in the TP 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. No → Go To 8	All

P0122-THROTTLE POSITION SENSOR #1 LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (K7) 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? Yes → Go To 9 No → Repair the open in the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	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? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(K22) TP SIGNAL CIRCUIT OPEN
(K4) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the throttle is fully closed and free from binding or carbon build up.** Start the engine. With the DRBIII®, read the TP Sensor voltage. Is the voltage above 4.5 volts? Yes → Go To 2 No → Go To 8	All
2	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? Yes → Repair the short to the (K7) 5 volt Supply circuit in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	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. 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. No → Go To 5	All
5	Turn the ignition off. Disconnect the TP harness connector. Disconnect the PCM harness connector. **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.** 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 6 No → Repair the open in the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 7 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **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.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **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.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 2 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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

TEST	ACTION	APPLICABILITY
2	**NOTE: This test works best if performed on a cold engine (cold soak).** 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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. **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.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 3 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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. **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.** Is the thermometer reading relatively close to the DRBIII® ECT Sensor reading? Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: If any ECT, AAT, CMP or CKP sensor DTCs have set along with P0128, diagnose them first before continuing.** **NOTE: Ensure that Pinion Factor has been programmed correctly into the PCM.** 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.	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **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.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **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.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 3 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Using the appropriate service information, determine the proper opening temperature of the thermostat. **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.** **NOTE: This test works best if performed on a cold engine (cold soak).** Ignition on, engine not running. 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. **NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. 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. **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.** If the thermostat does not open at the proper temperature, replace the thermostat. 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. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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 with 5°C (9°F) of the temperature probe reading? Yes → Go To 5 No → Go To 7	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
5	**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.** 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? Yes → Go To 6 No → Go To 7	All
6	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. Ensure the CMP and CKP sensors are mounted properly. Check the connectors for any signs of damage. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (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. **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.** Inspect and clean all PCM, engine, and chassis grounds. Were any problems found during the above inspections? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
7	**NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals** 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? Yes → Repair the short to battery voltage in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0128-THERMOSTAT RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
8	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? Yes → Go To 9 No → Go To 12	All
9	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? Yes → Replace the applicable Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 11 No → Repair the open in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. 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. 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.	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. 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 for Turbo) or below 2.28 volts (1.2 volts for Turbo) for 400 milliseconds. Two 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
MAP SENSOR INTERNAL OPEN
(K7) 5 VOLT SUPPLY CIRCUIT OPEN
(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	**NOTE: Refer to any TSBs that may apply to this DTC before proceeding.** Ignition on, engine not running. With the DRBIII®, read the MAP Sensor voltage. Is the voltage greater than 4.9 volts (2.4 volts for 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 for Turbo)? Yes → Go To 3 No → Go To 13	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 9	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 → Go To 5 No → Go To 6	All
5	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 7 No → Repair the open in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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. No → Go To 8	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued

TEST	ACTION	APPLICABILITY
8	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	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? Yes → Repair the short to battery voltage in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	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? Yes → Repair the short to ground in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 12 No → Repair the open in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE — Continued

TEST	ACTION	APPLICABILITY
13	Start the engine. **NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current below 146 mA? Yes → Refer to P0508 - IAC Valve Sense Low Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Start the engine. **NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA? Yes → Refer to P0509 - IAC Valve Sense Circuit High Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**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.** **NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.** **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.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Go To 3 No → Go To 5	All
3	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? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Repair the short to ground in the O2 Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All

P0131-O2 SENSOR 1/1 VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Repair the short to ground in the O2 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	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? Yes → Repair the O2 Return circuit shorted to the O2 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	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? Yes → Repair the Heater Ground circuit shorted to the O2 Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**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.** **NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.** **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.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine and allow the engine to idle. Measure the voltage on the O2 Sensor Signal circuit in the O2 Sensor harness connector. **NOTE: Measure the voltage in reference to ground, not the O2 Sensor Return circuit.** Is the voltage above 5.2 volts? Yes → Repair the short to voltage in the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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. Is there any voltage present? Yes → Repair the short to voltage in the O2 Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0132-O2 SENSOR 1/1 VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open O2 Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 02 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	**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.** **NOTE: It is important to perform the diagnostics on the O2 Sensor that set the DTC.** **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.** **NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** 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.	All
2	Start the engine. Inspect the exhaust system for leaks between the engine and the O2 Sensors. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Go To 4 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.	All
4	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? 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. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	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°FL) 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
2	Turn the ignition off. 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? Yes → Go To 3 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. **NOTE: Heater Resistance Specification: 3 to 20 ohms for Upstream and Downstream O2 Sensors.** Is the resistance within the specifications? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance between an engine ground and the O2 Heater Ground circuit in the O2 Sensor harness connector. Is the resistance below 0.5 of an ohm? Yes → Go To 5 No → Repair the open/high resistance in the O2 Heater Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 0.5 of an ohm? Yes → Go To 6 No → Repair the open/high resistance in the O2 Heater Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, terminal push out. Repair as necessary.** 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.	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	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **NOTE: Diagnose any Misfire DTC(s) first, if set along with the fuel system DTC.** 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.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
2	**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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Below Specification Go To 12 **Caution: Stop All Actuations.**	All
3	**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.** **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.** 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? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off. **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.** 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? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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 decease smoothly? Yes → Go To 6 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRBIII® reading within 1″ of the Vacuum Gauge reading? Yes → Go To 7 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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? Yes → Go To 8 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
9	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. **NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.** Did the O2 Sensor volts change from 5.0 volts to 2.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	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? Yes → Go To 11 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.	All
11	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? Yes → Check the fuel system for contaminants. Also, check the exhaust system for any leaks. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All

P0171-FUEL SYSTEM 1/1 LEAN — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. **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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13 **Caution: Stop All Actuations.**	All
13	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** 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.	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
2	**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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
3	**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.** **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.** 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? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off. **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.** 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? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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? Yes → Go To 6 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 7 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** 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. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** 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 Yes → Go To 8 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0172-FUEL SYSTEM 1/1 RICH — Continued

TEST	ACTION	APPLICABILITY
9	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. **NOTE: The voltage should drop from 5.0 volts down to 2.5 volts with the jumper wire connected.** Did the O2 Sensor voltage drop from 5 volts to 2.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	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? 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. No → Go To 11	All
11	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? 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. 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.	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	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.	All
2	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? Yes → Go To 3 No → Repair the open or high resistance in the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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? Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 5 No → Repair the open in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0201-FUEL INJECTOR #1 — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Repair the short to ground in the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 TEST #1
SOLENOID TEST #2
SOLENOID TEST #3
SOLENOID TEST #4
TURBOCHARGER
WASTEGATE ACTUATOR

P0234-OVERBOOST PERFORMANCE — Continued

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.	All
2	Turn the ignition on. With the DRBIII®, read the PCM DTCs. **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.** Does the DRB display any other DTCs? Yes → Refer to symptom list for problems related to MAP Sensor or Throttle Inlet Pressure Sensor. No → Go To 3	All
3	**NOTE: The exhaust system must be free from any restriction to perform this test.** 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. **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.** Are any of these conditions evident? Yes → Repair or replace as necessary. No → Go To 4	All
4	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? Yes → Go To 5 No → Repair or replace as necessary.	All
5	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. **NOTE: The wastegate actuator arm should extend approximately 1/2 to 3/4 inches as air pressure is applied.** Does the wastegate actuator arm extend 1/2 to 3/4 inch when 10 psi air pressure is applied? Yes → Go To 6 No → Replace the Turbocharger assembly in accordance with the Service Information.	All

P0234-OVERBOOST PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
6	**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.** 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. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 7 No → Replace the appropriate Solenoid.	All
7	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. **NOTE: Vacuum should escape through the Solenoid hose B connection point.** Does vacuum escape through the Solenoid hose B connection point? Yes → Go To 8 No → Replace the appropriate Solenoid.	All
8	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. **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.** With vacuum pump apply 20 inches of vacuum to the Solenoid hose B connection point. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 9 No → Replace the appropriate Solenoid.	All
9	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. **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.** Attempt to apply 20 inches of vacuum to the Solenoid hose B connection point. **NOTE: Vacuum should escape through the Solenoid hose C connection point.** Does vacuum escape through the Solenoid hose C connection point? Yes → Go To 10 No → Replace the appropriate Solenoid.	All

P0234-OVERBOOST PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
10	Did all the solenoids function correctly? Yes → Replace the Turbocharger assembly in accordance with the Service Information. No → Replace Solenoid(s) as necessary.	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.	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. **NOTE: While actuating the solenoid wiggle the related wiring harness.** 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. No → Go To 3	All

P0243-WASTEGATE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Go To 4 No → Repair the (Z1) Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: The Wastegate Sol Control circuit is a high side control circuit. When the circuit is operating normally voltage will be present.** 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? Yes → Repair the short to voltage in the (K137) Wastegate Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Wastegate Solenoid harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 6 No → Repair the open in the (K137) Wastegate Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	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? Yes → Repair the short to ground in the (K137) Wastegate Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0243-WASTEGATE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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

POSSIBLE CAUSES
IGNITION WIRE
ASD RELAY OUPUT 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

TEST	ACTION	APPLICABILITY
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	**NOTE: Reviewing the vehicle repair history may aid in the repair of the misfire condition.** Visually and physically inspect the engine for any of the following conditions. - Worn serpentine belt - Binding Engine-Driven accessories. - Misaligned water pump, P/S pump and A/C compressor pulleys - Improper CKP sensor mounting - Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc. - Vacuum leaks - Restricted Air Induction system **NOTE: Verify the integrity of the powers and grounds for the PCM.** Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	**NOTE: On the 3.5L engines, it may necessary to remove the upper intake to access some ignition coils. Once the ignition coil has been removed, the intake must be reinstall to be able to crank the engine.** Turn the ignition off. Disconnect the Ignition wire from the spark plug. **NOTE: Before continuing, inspect the ignition wire for damage or carbon tracking. Replace as necessary.** Install a spark tester to the ignition wire. While cranking the engine, observe the spark coming from the spark tester. **NOTE: A crisp blue spark should be generated that is able to jump the gap of the spark tester.** Is good spark present? Yes → Go To 4 No → Go To 14	All
4	Turn the ignition off. Remove the Spark Plug. Inspect the Spark Plug for the following conditions. - Cracks - Carbon Tracking - Foreign Material - Gap size out of specifications - Loose or broke electrode **NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.** Were any of the above condition present? Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
5	**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.** Install a fuel pressure gauge. Start the engine and observe the fuel pressure reading. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 6 Below Specification Go To 12 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **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.** 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. **NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** 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. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure gauge fall below the above specification? Yes → Replace the leaking Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**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.** **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.** 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? Yes → Go To 8 No → Go To 9	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
8	Check for any of the following conditions/mechanical problems. 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 Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 18	All
9	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, probe the ASD Relay Output circuit at the Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	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, probe the Injector Control circuit. With the DRBIII®, actuate the Fuel Injector. Does the test light blink/flicker? Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connectors. **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.** Check the Injector Control circuit. Was a problem found with the Injector Control circuit? Yes → Repair the Injector Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. **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.** 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 Ignition on, engine not running. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All
14	Turn the ignition off. Remove the ignition wire. Measure the resistance of the ignition wire. Is the resistance below 10K ohms? Yes → Go To 15 No → Replace the Ignition Wire. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Turn the ignition off. Disconnect the Ignition Coil harness connector. Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit at the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 16 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
16	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? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 17	All
17	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. **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.** Check the Coil Control circuit. Was a problem found with the Coil Control circuit? Yes → Repair the Coil Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All

P0300-MULTIPLE CYLINDER MISFIRE — Continued

TEST	ACTION	APPLICABILITY
18	**NOTE: The conditions that set the DTC are not present at this time.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (TSBs) that may apply. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set. 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. Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals. **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.** Inspect and clean all PCM, engine, and chassis grounds. **NOTE: Reviewing the vehicle repair history may aid in the repair of the misfire condition.** Visually and physically inspect the engine for any of the following conditions. - Worn serpentine belt - Binding Engine-Driven accessories. - Misaligned water pump, P/S pump and A/C compressor pulleys - Improper CKP sensor mounting - Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc. - Vacuum leaks - Restricted Air Induction system Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	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	**NOTE: Check for any TSBs that may apply to this symptom.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	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. 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.	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.	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. 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. No → Go To 4	All
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	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. No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	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? 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. No → Test Complete.	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	Turn the ignition off. 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. **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.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Cam Position Sensor. Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Start the engine. Allow the engine to idle. Observe the lab scope screen. Did the CMP Sensor generate any erratic pulses? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Crank Position Sensor. Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Start the engine. Allow the engine to idle. Observe the lab scope screen. Did the CKP Sensor generate any pulses? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (K7) 5 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Go To 5 No → Go To 13	All
5	Turn the ignition off. Disconnect the CKP Sensor harness connector. Ignition on, engine not running. Measure the voltage of the (24) CKP Signal circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 6 No → Go To 8	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 7 No → Repair the open in the (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Inspect the slots on the flywheel for damage. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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? Yes → Repair the short to ground in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 10 No → Repair the open in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
10	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? Yes → Repair the short to battery voltage in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	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? Yes → Repair the (K24) CKP Signal circuit shorted to the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	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? Yes → Repair the short to ground in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 15 No → Repair the open in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
15	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? Yes → Repair the short to battery voltage in the (K7) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	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.	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
2	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. **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.** 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? Yes → Go To 3 No → Go To 8	All
3	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? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? 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.	All
5	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? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: An intermittent glitch in the Camshaft Position Sensor can cause the P0339 to set.** Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit at the Sensor harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Camshaft Position Sensor. While observing the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the CKP Sensor connector. Disconnect the PCM connector. **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.** Measure the resistance in the (K24) CKP Signal circuit between the CKP harness connector and the appropriate terminal of special tool #8815. Wiggle the wire harness while taking this measurement. Is the resistance below 1.0 ohm? Yes → Go To 9 No → Repair the open/high resistance in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the PCM connector. Disconnect the CKP Sensor connector. Measure the resistance between ground and the (K24) CKP Signal circuit at the CKP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance stay below 100 ohms? Yes → Repair the short to ground in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
10	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? Yes → Repair the short to B+ voltage in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	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? Yes → Repair the short to the (K7) 5 Volt Supply circuit in the (K24) CKP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	**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, review repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the (K24) CKP signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap the Crankshaft Position Sensor. Observe the lab scope screen. Start the engine. Allow the engine to idle. Observe the lab scope screen. Did the CKP Sensor generate any erratic pulses? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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. **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.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Camshaft Position Sensor. Observe the lab scope screen. Start the engine. Allow the engine to idle. Observe the lab scope screen. Did the CMP Sensor generate any erratic pulses? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	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 between 4.5 and 5.5 volts? Yes → Go To 5 No → Go To 13	All
5	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 between 4.5 and 5.0 volts? Yes → Go To 6 No → Go To 8	All

P0340-CAMSHAFT POSITION SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 7 No → Repair the open in the (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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? Yes → Repair the short to ground in the (K44) CMP Signal circuit Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 10 No → Repair the open in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. 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. No → Go To 12	All
12	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. No → Go To 14	All
14	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	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. No → Go To 16	All
16	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.	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. **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.** 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	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the CMP 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? 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.	All
5	Turn the ignition off. Carefully disconnect the Battery (-) Ground cable. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: An intermittent glitch in the Crankshaft Position Sensor can cause the P0344 to set.** Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP Sensor harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. Wiggle the related wire harness and lightly tap on the Crank Position Sensor. Observe the lab scope screen. Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the CMP Sensor connector. Disconnect the PCM connector. **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.** Measure the resistance in the (K44) CMP Signal circuit from the CMP harness connector to the appropriate terminal of special tool #8815. Wiggle the related wire harness while taking this measurement. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open/high resistance in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the PCM connector. Disconnect the CMP Sensor connector. Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector. Wiggle the related wire harness while monitoring the resistance value. Does the resistance stay below 100 ohms? Yes → Repair the short to ground in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition off. Disconnect the CMP Sensor connector. Ignition on, engine not running. Measure the voltage on the (K44) CMP Signal circuit. Wiggle the related wire harness while taking this measurement. Does the voltage ever increase above 5.5 volts? Yes → Repair the short to B+ voltage in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the CMP harness connector. Measure the resistance between the (K7) 5 Volt Supply circuit and the (K44) CMP signal circuit in the CMP harness connector. Wiggle the related wire harness while taking this measurement. Is the resistance below 5.0 ohms? Yes → Repair the short to the (K7) 5 Volt Supply circuit in the (K44) CMP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT — Continued

TEST	ACTION	APPLICABILITY
12	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
VISUALLY INSPECT CATALYTIC CONVERTER
EXHAUST LEAK
ENGINE MECHANICAL CONDITION
AGING O2 SENSOR
CATALYTIC CONVERTER

TEST	ACTION	APPLICABILITY
1	**NOTE: A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the repair history of the vehicle before continuing.** **NOTE: If an O2 Sensor or Fuel System Lean DTC(s) is set along with the Catalytic Converter Efficiency DTC, diagnose the O2 Sensor DTC(s) before continuing.** **NOTE: Check for contaminates that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.** 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.	All

P0420-CATALYTIC 1/1 EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
2	Inspect the Catalytic Converter for the following damage. Damaged Catalytic Converter, dent and holes. Severe discoloration caused by overheating the Catalytic Converter. Catalytic Converter broke internally. Leaking Catalytic Converter. Were any problems found? Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start the engine. Inspect the exhaust for leaks between the engine and the O2 Sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Check the exhaust for excessive smoke caused by an internal problem in the engine. Is a engine mechanical condition present? Yes → Repair the engine mechanical condition as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the vehicles repair history. Has the rear O2 Sensor been replaced without replacing the front O2 Sensor? Yes → Replace the Front O2 Sensor as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

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	**NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0440.** 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.	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Hoses disconnected or left off - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap left off or bad gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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. Ensure the vacuum port at the throttle body is free from any blockage. Were any problems found? Yes → Repair the vacuum supply, hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Disconnect the vacuum supply hoses form the EVAP Purge Solenoid. Using a hand vacuum pump, apply 10 in Hg to the ″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? Yes → Go To 5 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Reconnect all vacuum hoses. Start the engine and allow it to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch state. **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.** Did the NVLD Switch operate as described above? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **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.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the .040 orifice on the tester's control panel. Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute. 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. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **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.** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 7 No → Go To 8	All

P0440-GENERAL EVAP SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	**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.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port. Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move at this point.** Press the remote smoke/air start button. **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.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** 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. **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.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. 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.	All
8	Turn the ignition off. Disconnect the NVLD electrical harness connector. Check connectors - Clean/repair as necessary. Using a jumper wire, jumper across the (K107) NVLD Switch Sense circuit and the (Z1) Ground circuit in the NVLD electrical harness connector. Monitor the NVLD Switch state on the DRBIII®. Does the Switch change from OPEN to CLOSED. Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	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.	All
10	Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. **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.** 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. No → Repair the open in the (K107) NVLD Switch Signal Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0441.** 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.	All
2	**NOTE: After disconnecting the Evap Purge vacuum connections, inspect the lines and solenoid for any signs of contamination or foreign materials.** 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? Yes → Go To 3 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0441-EVAP PURGE SYSTEM PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.** **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.** 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 7	All
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the follow conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
3	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **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.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. 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). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. 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. 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. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **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** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 4 No → Go To 7	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
4	**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.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port. Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move in the smoke mode.** Press the remote smoke/air start button. **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.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** 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 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. **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.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 5	All
5	**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 vent valve. Replace/repair as necessary.** 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. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Go To 6 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0442-EVAP SYSTEM MEDIUM LEAK — Continued

TEST	ACTION	APPLICABILITY
6	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. **As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released form the EVAP system the Switch state will return to OPEN.** Did the NVLD Switch operate as described above? Yes → Go To 7 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** 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. **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.** Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	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	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.	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 → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 4 No → Repair the open in the (K52) Evap Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	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? Yes → Repair the short to ground in the (K52) Evap Purge Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 6 No → Repair the open in the (K108) Evap Purge Sol Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	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? Yes → Repair the short to ground in the (K108) Evap Purge Solenoid Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 NLVD 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.	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	**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 vent valve. Replace/repair as necessary.** 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. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Go To 4 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Ignition on, engine not running. Using the DRBIII®, monitor the NVLD Switch State. Does the DRBIII® display the NVLD state OPEN? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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? Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	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? Yes → Repair the short to ground in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	All

P0452-NVLD PRESSURE SWITCH SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Repair the short to ground in the (K52) EVAP Purge Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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	Start the engine. Allow the engine to idle. Using the DRBIII®, perform the NVLD FORCED MONITOR TEST. Monitor the NVLD Switch state. **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.** Did the NVLD Switch operate as described above? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	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? Yes → Repair short to battery voltage in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0453-NVLD PRESSURE SWITCH SENSE CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Repair the (K107) NVLD Switch Signal circuit shorted to the (K106) NVLD Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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 6 No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the NVLD electrical harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the (K107) NVLD Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**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.** 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 4	All
2	Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0456-EVAP SYSTEM SMALL LEAK — Continued

TEST	ACTION	APPLICABILITY
3	**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.** 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. **NOTE: The flow meter indicator ball will not move at this point.** Press the remote smoke/air start button. **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.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** 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. **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.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** 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. **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.** Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0457-LOOSE FUEL CAP

When Monitored and Set Condition:

P0457-LOOSE FUEL CAP

When Monitored: Ignition on. Ambient temperature between 4°C and 32°C (39°F and 89°F) Closed Loop fuel system.

Set Condition: The PCM has detected an EVAP System leak after a fuel level increase. Two Trip Fault. Three good trips to turn off the MIL.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
LOOSE OR MISSING FUEL FILL CAP
INTERMITTENT CONDITION
NVLD SERVICE TEST
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID OPERATION
NVLD SWITCH OPERATION

TEST	ACTION	APPLICABILITY
1	**NOTE: After the PCM has determined the leak test inconclusive and sees an increase in fuel level, the PCM will request the GAS CAP indicator on to inform the customer that the gas fill cap is loose or off.** 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 - 6.	All
2	Perform a visual and physical inspection of the Fuel Fill Cap and the fill tube. Check for the follow conditions: - Improper installation of Fuel Fill Cap - Loose or missing Fuel Filler Cap - Holes or cracks - Damaged Locking tabs on Cap and/or fill tube - Damaged seal points on Cap and/or fill tube - Fuel Fill Cap gasket seal Were any of the above conditions found? Yes → Repair or replace the fuel fill cap as needed. Ensure proper fuel fill cap installation. Once the repair is complete continue to step 3. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the NVLD Service Test. Did the NVLD Service Test pass? Yes → Test Complete. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **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.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Block the vent hose of the EVAP Canister. Connect shop air to the EELD. Set the smoke/air control switch to AIR. 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). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. 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. 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. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **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** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 5 No → Go To 8	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
5	**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.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port. Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move in the smoke mode.** Press the remote smoke/air start button. **NOTE: Make sure 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.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** 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 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. **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.** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	**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 vent valve. Replace/repair as necessary.** 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. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the EVAP Purge Solenoid hold vacuum? Yes → Go To 7 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0457-LOOSE FUEL CAP — Continued

TEST	ACTION	APPLICABILITY
7	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. **As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released form the EVAP system the Switch state will return to OPEN.** Did the NVLD Switch operate as described above? Yes → Go To 8 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** 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. **NOTE: Make Ensure the gas cap meets OEM specifications.** Perform a visual and physical inspection of the entire Evaporative Emission system. Check for the following conditions: - Holes or cracks - Loose seal points - Evidence of damaged components - Incorrect routing of hoses and tubes - Fuel Cap gasket seal Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	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	**NOTE: Diagnose P0462 or P0463 first, if set along with P0461.** **NOTE: Inspect the Fuel Pump Module harness connector for any corrosion or damage.** 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.	All
2	Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving. Is the Fuel Tank OK? Yes → Go To 3 No → Replace the Fuel Tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. 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.	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.	All
6	**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.** 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. 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.	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	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Refer to the Instrument Cluster Category and perform the Fuel Sensor Open or Short symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0480-COOLING FAN 1 CONTROL CIRCUIT

When Monitored and Set Condition:

P0480-COOLING FAN 1 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
(A16) FUSED B+ FEED CIRCUITS
LOW SPEED RADIATOR FAN RELAY RESISTANCE
(C24) LOW SPEED RAD FAN RELAY CONTROL CIRCUIT OPEN
(C24) 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 Low Speed Radiator Fan Relay operating? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Ignition on, engine not running. Measure the voltage of the (A16) 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.	All

P0480-COOLING FAN 1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Measure the resistance of the Low Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the Low Speed Rad Fan Relay Control terminal. Is the resistance between 60 to 85 ohms? Yes → Go To 4 No → Replace the Low Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. **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.** Measure the resistance of the (C24) Low Speed Rad Fan Relay Control circuit from the PDC 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 (C24) Low Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance between ground and the (C24) Low Speed Rad Fan Control circuit at the PDC. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (C24) Low Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0481-COOLING FAN 2 CONTROL CIRCUIT

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 circuit. One trip Fault.

POSSIBLE CAUSES
HIGH SPEED RADIATOR FAN RELAY OPERATION
(A110) FUSED IGNITION SWITCH OUTPUT CIRCUIT
HIGH SPEED RADIATOR FAN RELAY RESISTANCE
(C27) HIGH SPEED RAD FAN RELAY CONTROL CIRCUIT OPEN
(C27) HIGH SPEED RAD FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Is the High Speed Radiator Fan Relay operating? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Turn the ignition on. Measure the voltage of the (A110) Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 3 No → Repair the (A110) Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0481-COOLING FAN 2 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Measure the resistance of the High Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the High Speed Rad Fan Relay Control terminal. Is the resistance between 60 to 85 ohms? Yes → Go To 4 No → Replace the High Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. **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.** Measure the resistance of the (C27) High Speed Rad Fan Relay Control circuit from the PDC 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 (C27) High Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance between ground and the (C27) High Speed Rad Fan Relay Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the (C27) High Speed Rad Fan Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair 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.	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	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.	All
2	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? Yes → Go To 3 No → Replace the NVLD Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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? Yes → Repair the short to ground in the (K106) NVLD Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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.	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.	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. No → Go To 4	All
4	Turn the ignition off. Disconnect the NVLD Assembly harness connector. Disconnect the PCM harness connector. **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.** 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.	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.	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Ensure that the Pinion Factor has been programmed and the correct tire size has been programmed in before continuing.** 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.	All
2	Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present? Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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. **WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.** 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. 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.	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. No → Repair the (K4) Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. No → Go To 6	All
6	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All
7	**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, Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0506-IDLE SPEED LOW PERFORMANCE
P0507-IDLE SPEED HIGH 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.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
PCV SYSTEM
IAC MOTOR PASSAGES
VACUUM LEAKS
AIR INDUCTION SYSTEM
THROTTLE BODY AND THROTTLE LINKAGE

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.	All

P0506-IDLE SPEED LOW PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
2	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Start the engine. Inspect the vehicle for external vacuum leaks. Inspect the engine for internal vacuum leaks. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	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? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	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	**NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Start the engine. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current below 146 mA? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the IAC Motor harness connector. Remove the IAC Motor. **NOTE: Inspect the IAC air passages for restriction and damage to the IAC valve.** Measure the resistance across the IAC Motor pin terminals (component). Is the resistance 9.7 +/- 1.0 ohms? Yes → Go To 3 No → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0508-IAC VALVE SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 4 No → Repair the open in the (K961) IAC Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	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? Yes → Repair the short to ground in the (K961) IAC Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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? Yes → Repair the short to ground in the (K610) IAC Motor Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 7 No → Repair the open in the (K610) IAC Motor Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0508-IAC VALVE SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.** Start the engine. Allow the engine to idle. With the DRBIII®, read the IAC Current. Is the IAC Current above 999 mA? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0509-IAC VALVE SENSE CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Repair the short to voltage in the (K961) IAC Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Repair the short to voltage in the (K610) IAC Motor Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	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? Yes → Repair the (K961) IAC Motor Return circuit short to the (K610) IAC Motor Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	Turn the ignition on. With the DRBIII®, display the VIN that is programmed in the PCM. Was the correct VIN programmed into the PCM? Yes → Go To 6 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
6	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? 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. No → Test Complete.	All
7	**NOTE: You must obtain the SKIM pin number.** **NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** 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? Yes → Replace the Ignition Key. Perform SKIS VERIFICATION. No → Test Complete. **NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.**	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	**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.** Ignition on, engine not running. With the DRBIII®, read the Battery Temp 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.	All
2	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? Yes → Replace the Battery Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0516-BATTERY TEMPERATURE SENSOR LOW — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Repair the short to ground in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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? Yes → Repair the (K167) Sensor ground shorted to the (K118) Battery Temp Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**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.** Ignition on, engine not running. With the DRBIII®, read the Battery Temp 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.	All
2	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? Yes → Repair the short to battery voltage in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0517-BATTERY TEMPERATURE SENSOR HIGH — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Replace the Battery Temp Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Battery Temp Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (K118) Battery Temp Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Battery Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 6 No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0522-OIL PRESSURE SENSOR LOW

When Monitored and Set Condition:

P0522-OIL PRESSURE SENSOR LOW

When Monitored: With the ignition on, engine not running or cranking, and battery voltage above 10.4 volts.

Set Condition: The Oil Pressure Sensor voltage at the PCM goes ABOVE 4.078 volts for 25 msec.

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	**NOTE: Diagnose and repair any other Sensor Voltage High DTCs before performing this test.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. **NOTE: When there is no oil pressure present, the Oil Pressure Sensor contacts are normally closed.** **NOTE: Engine must be off for a minimum of 90 seconds to allow for the oil pressure to bleed down.** Measure the resistance between the Oil Pressure Sensor signal circuit terminal in the Oil Pressure Sensor and ground. Is the resistance above 5 ohms? Yes → Replace the Oil Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	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. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Oil Pressure Sensor harness connector. Disconnect the PCM harness connector. **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.** 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. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 (Z1) 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 (Z1) 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	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? Yes → Repair the short to ground in the (K10) PSP Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connector(s). **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.** 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? Yes → Go To 5 No → Repair the open in the (K10) PSP Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
5	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? Yes → Replace the Power Steering Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	**NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.** **NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: Ensure the generator drive belt is in good operating condition.** **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.** 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 - 3 - NGC.	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator B+ Terminal and the Battery+ Post. Start the engine. Is the voltage above 0.4 of a volt? Yes → Repair the B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Allow the engine to reach normal operating temperature. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 of a volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 4	All
4	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? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 5	All
5	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test connected to battery voltage, probe the Generator (Z1) Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open in the (Z1) Generator Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All

P0562-BATTERY VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
6	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? Yes → Repair the (K20) Gen Field Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 7	All
7	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. **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.** 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 8 No → Repair the open in the (K20) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All
8	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	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	**NOTE: Ensure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.** **NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: Ensure the generator drive belt is in good operating condition.** **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.** 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 - 3 - NGC.	All
2	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? Yes → Go To 4 No → Go To 3	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	**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. 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. Three Global Good Trips to Clear.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
BRAKE LAMP SWITCH OPERATION
(K29) BRAKE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify battery voltage is greater than 10 volts.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Diagnostic category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Go To 3 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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? Yes → Repair the short to ground in the (K29) Brake Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0572-BRAKE SWITCH #1 CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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. Three good trips to turn off the MIL.

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	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 in the symptom Diagnostic category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	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? Yes → Go To 3 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0573-BRAKE SWITCH #1 CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connectors. **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.** 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? Yes → Go To 4 No → Repair the open in the (K29) Brake Switch Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Measure the resistance between the (Z2) Ground circuit and ground at the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z1) Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module in accordance Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0580-SPEED CONTROL SWITCH #1 LOW

When Monitored and Set Condition:

P0580-SPEED CONTROL SWITCH #1 LOW

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

Set Condition: The PCM detects the Speed Control Switch Signal circuit voltage is less than 0.43. One Trip Fault.

POSSIBLE CAUSES
SPEED CONTROL SWITCH VOLTAGE LOW
SPEED CONTROL SWITCH
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO (K4) SENSOR GROUND
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® in Sensors, read the S/C Switch Volts. Is the Speed Control voltage below 1.0 volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Ignition on, engine not running. With the DRBIII® in Sensors, monitor the S/C Switch Volts. Disconnect the Speed Control Switch harness connector. Did the voltage change to above 4.7 volts? Yes → Replace the Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All

P0580-SPEED CONTROL SWITCH #1 LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance between the (K4) Sensor ground circuit and the (V37) S/C Switch Signal circuit in the Speed Control Switch harness connector. Is the resistance below 5.0 ohms? Yes → Repair the (V37) S/C Switch Signal circuit for a short to the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance between the (V37) S/C Switch Signal circuit at the appropriate terminal of special tool #8815 and ground. Is the resistance below 5.0 ohms? Yes → Repair the (V37) S/C Switch Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	**NOTE: Before continuing, disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** 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 - 4.	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 SWITCH
(V37) S/C SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K4) SENSOR GROUND OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII® in Sensors, read the S/C Switch Volts. Is the Speed Control voltage above 4.8 volt? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
2	Turn the ignition off. Remove the Speed Control Switch per Service Information. With the DRBIII® in Sensors, monitor the S/C Switch Volts. With the S/C Switch disconnected, the S/C Switch Volts should equal 5.0 volts. Connect a jumper wire between the S/C Switch signal circuit and the ground circuit in the S/C Switch harness connector. With the jumper wire in place, the S/C Switch Volts should equal 0 volts. Does the S/CA Switch Volts display on the DRBIII® as described? Yes → Go To 3 No → Replace the Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0581-SPEED CONTROL SWITCH #1 HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connector. Measure the voltage of the (V37) S/C Switch Signal circuit in the Speed Control Switch harness connector. Is the is the voltage above 5.0 volts? Yes → Repair the (V37) S/C Switch Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (K4) Sensor Ground circuit from the Speed Control Switch 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 - 4. No → Repair the open (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	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
(V32) S/C SUPPLY CIRCUIT
SPEED CONTROL VACUUM SOLENOID
(V32) S/C SUPPLY SHORT TO GROUND
(V36) S/C VACUUM SOL CONTROL CIRCUIT SHORTED TO GROUND
(V32) S/C SUPPLY CIRCUIT OPEN
(V36) S/C VACUUM SOL CONTROL CIRCUIT OPEN
(Z155) S/C 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. With the DRBIII®, actuate the Speed Control Vacuum Solenoid and note operation. Does the Speed Control Vacuum Solenoid actuate properly? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vacuum Solenoid. Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 5 No → Go To 3	All

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Switch harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vacuum Solenoid. Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Brake Switch harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. Measure the resistance of the (Z115) S/C Ground circuit at the S/C Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z155) S/C Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	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 battery voltage, probe the S/C Vacuum Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 7 No → Repair the open/high resistance in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0582-SPEED CONTROL VACUUM SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Repair the short to ground in the (V36) S/C Vacuum Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
8	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (V32) S/C Supply circuit from the Brake Lamp Switch harness connector to the appropriate terminal of special tool # 8815. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open/high resistance in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
10	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** If the 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 - 4.	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
(V35) S/C VENT SOL CONTROL CIRCUIT OPEN
SPEED CONTROL SOLENOID OPERATION
(V32) S/C SUPPLY CIRCUIT
SPEED CONTROL VENT SOLENOID
(V32) S/C SUPPLY SHORT TO GROUND
(V35) S/C VENT SOL CONTROL CIRCUIT SHORTED TO GROUND
(V32) S/C SUPPLY CIRCUIT OPEN
(Z155) S/C GROUND CIRCUIT OPEN
PCM (VENT SOLENOID)

TEST	ACTION	APPLICABILITY
1	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 actuate properly? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All
2	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vent Solenoid. Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 5 No → Go To 3	All

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Switch harness connector. Turn the ignition on. Using the DRBIII®, actuate the S/C Vent Solenoid. Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Brake Switch harness connector. Does the test light illuminate brightly and flash on and off? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. Measure the resistance of the (Z115) S/C Ground circuit at the S/C Servo harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the (Z155) S/C Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	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 battery voltage, probe the (V35) Speed Control Vent Solenoid Control circuit in the Speed Control Servo harness connector. Does the test light illuminate brightly and flash on and off? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 8	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (V32) S/C Supply circuit from the Brake Lamp Switch 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/high resistance in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0586-SPEED CONTROL VENT SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V32) S/C Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 8	All
8	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 9 No → Repair the open/high resistance in the (V35) S/C Vent Sol Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	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? Yes → Repair the short to ground in the (V35) Speed Control Vent Solenoid Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	All
10	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** If the 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 - 4.	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
(V30) S/C BRAKE SWITCH OUTPUT CIRCUIT
(V32) S/C POWER SUPPLY CIRCUIT
(V30) S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTEDTO GROUND
(V32) S/C POWER SUPPLY CIRCUIT SHORTED TO GROUND
(V30) 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. **NOTE: It is necessary to PRESS and HOLD the Speed Control Switch in the ON position while checking for voltage.** Using a 12-volt test light connected to ground, probe the (V30) 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. No → Go To 2	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Brake Lamp Switch harness connector. **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.** 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? Yes → Go To 3 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.	All
3	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? Yes → Go To 4 No → Repair the short to ground in the (V32) S/C Power Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Switch harness connector. Measure the resistance between ground and the (V30) S/C Brake Switch Output circuit at the Speed Control Servo harness connector. Is the resistance below 100 ohms? Yes → Repair the short to ground in the (V30) S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the Brake Switch harness connector. Measure the resistance of the (V30) 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? Yes → Go To 6 No → Repair the open/high resistance in the (V30) S/C Brake Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0594-SPEED CONTROL SERVO POWER CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Disconnect the Brake Lamp Switch harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, probe the (V32) Speed Control Power Supply circuit in the Brake Lamp Switch harness connector. **NOTE: It is necessary to HOLD the Cruise Control Switch in the ON position to get an accurate reading.** Does the test light illuminate brightly? Yes → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	The Powertrain Control Module is reporting internal errors, view repair to continue. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	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 → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 2	All
2	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? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 3	All

P0622-GENERATOR FIELD CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	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? Yes → Go To 4 No → Repair the open in the (Z1) Gen Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All
4	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? Yes → Repair the short to voltage in the (K20) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 5	All
5	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 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Disconnect the PCM harness connector. **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.** 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 7 No → Repair the open in the (K20) Gen Field Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	All
7	**NOTE: Before continuing, check the PCM connector terminals for corrosion, damage, or terminal push out. Repair as necessary.** 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:

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. 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.	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.	All

P0627-FUEL PUMP RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	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? Yes → Repair the short to ground in the (K31) Fuel Pump Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program VIN into the PCM. Start the engine. **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.** Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 2 No → The VIN has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	**NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.** 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 - NGC. No → The VIN has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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 - NGC.	All
2	**NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.** 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 - NGC. No → The mileage has been successfully programmed into the PCM. Test is complete. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	Ignition on, engine not running. With the DRBIII®, erase DTCs. Using the DRBIII®, program the SKIM Key information into the PCM. Start the engine. **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.** Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 2 No → The SKIM KEY information has been successfully programmed into the PCM. Test is complete. Perform SKIS VERIFICATION.	All
2	**NOTE: The ignition switch must be left in the off position for a minimum of 10 seconds.** 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 SKIS VERIFICATION. No → The SKIM Key Information has been successfully programmed into the PCM. Test is complete. Perform SKIS VERIFICATION.	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	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? Yes → Go To 4 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (C28) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
5	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? Yes → Repair the short to ground in the (C28) A/C Clutch Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	Ignition on, engine not running. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	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? Yes → Go To 3 No → Repair the (A14) Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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? Yes → Go To 4 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0685-ASD RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the open in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	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? Yes → Repair the short to ground in the (K51) ASD Relay Control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Diagnose P0685 - Auto Shutdown Relay Control Circuit first if set along with this DTC.** With the DRBIII®, erase the DTC. 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. Does the DTC reset? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Attempt to start the engine. Does the engine start. Yes → Go To 3 No → Go To 5	All

P0688-ASD RELAY SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 4 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	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? Yes → Go To 6 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	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? Yes → Go To 7 No → Repair the (A14) Fused B+ circuit. Inspect the related fuse and repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0688-ASD RELAY SENSE CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 8 No → Repair the open in the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0700-TRANSMISSION CONTROL SYSTEM/READ TRANSMISSION DTCS ON THE DRBIII®

TEST	ACTION	APPLICABILITY
1	This is an informational DTC letting you know that a DTC(s) is stored in the Transmission Control Module. Erase this DTC from the PCM after all Transmission DTC(s) have been repaired. Using the DRBIII®, read the Transmission Controller DTC and refer to the Transmission Category and perform the appropriate symptom. PCM Diagnostic Information complete. Continue Test Complete.	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	**NOTE: Check the TCM for DTCs. Diagnose any DTCs related to the TRS that may have set in the TCM.** Ignition on, engine not running. **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.** 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.	All
2	Turn the ignition on. With the DRBIII®, check the Transmission DTCs. Are there any Transmission DTCs present? Yes → Refer to the appropriate Transmission DTC in the Transmission category. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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.	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. **NOTE: While actuating the solenoid wiggle the related wiring harness.** 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. 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.	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. No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Solenoid harness connector. Disconnect the PCM harness connectors. **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.** 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.	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. No → Go To 7	All
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**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.** Ignition on, engine not running. **NOTE: It requires more then 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.** 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.	All

P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
2	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? Yes → Go To 3 No → Go To 6	All
3	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? Yes → Go To 4 No → Go To 6	All
4	**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.** 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? Yes → Go To 5 No → Go To 6	All
5	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. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Refer to any Technical Service Bulletins (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. **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.** Inspect and clean all PCM, engine, and chassis grounds. Were any problems found during the above inspections? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals** 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? Yes → Repair the short to battery voltage in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	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? Yes → Go To 8 No → Go To 11	All
8	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? Yes → Replace the applicable Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 10 No → Repair the open in the Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1115-GENERAL TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the applicable Temperature Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? 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. No → Repair the open in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	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. No → Go To 12	All
12	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. 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.	All

Symptom:
P1187-THOTTLE INLET PRESSURE/MAP CORRELATION

When Monitored and Set Condition:

P1187-THOTTLE INLET PRESSURE/MAP CORRELATION

When Monitored: Ignition on.

Set Condition: The PCM compares the MAP and TIP sensor with the ignition on. If the sensors are not close in value a failure is recorded. The MAP and TIP should be within the range of 56kPa and 112 kPa with the ignition on. Two trip failure.

POSSIBLE CAUSES
COMPARING MAP AND TIP SENSORS
CHECKING FOR OTHER DTCS
CHECKING THE HOSES AND TUBING
(A23) TIP SIGNAL CIRCUIT OPEN
(K167) SENSOR GROUND CIRCUIT OPEN
SOLENOID TEST #1
SOLENOID TEST #2
SOLENOID TEST #3
SOLENOID TEST #4
THROTTLE INLET PRESSURE SENSOR
CHECKING VACUUM PASSAGE
(K7) 5 VOLT SUPPLY CIRCUIT
MAP SENSOR INTERNAL OPEN
(K1) MAP SIGNAL CIRCUIT OPEN
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Using the DRBIII®, monitor both the MAP and TIP kPa. **NOTE: The MAP and TIP should both be within the range of 56 kPa to 112 kPa.** Are either MAP or TIP out of range. Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1187-THOTTLE INLET PRESSURE/MAP CORRELATION — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, read the PCM DTCs. **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.** 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. No → Go To 3	All
3	Select the Sensor that was not within range (56 kPa - 112 kPa). TIP SENSOR Go To 4 MAP SENSOR Go To 11	All
4	Before continuing this test, visually inspect the TIP sensor connector for any damage or corrosion. Repair as necessary. **NOTE: The exhaust system must be free from any restriction to perform this test.** 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. **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.** Are any of these conditions evident? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (A23) TIP Signal circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 10.0 ohms? Yes → Go To 6 No → Repair the open in the (A23) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1187-THOTTLE INLET PRESSURE/MAP CORRELATION — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 10.0 ohms? Yes → Go To 7 No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 8 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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. **NOTE: Vacuum should escape through the Solenoid hose B connection point.** Does vacuum escape through the Solenoid hose B connection point? Yes → Go To 9 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	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. **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.** With vacuum pump apply 20 inches of vacuum to the TIP Solenoid hose B connection point. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 10 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1187-THOTTLE INLET PRESSURE/MAP CORRELATION — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the hoses from the TIP Solenoid. Install a plug on the TIP Solenoid hose A connection point. Connect a vacuum pump to the TIP Solenoid hose B connection point. **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.** Attempt to apply 20 inches of vacuum to the TIP Solenoid hose B connection point. **NOTE: Vacuum should escape through the Solenoid hose C connection point.** Does vacuum escape through the Solenoid hose C connection point? Yes → Replace the Throttle Inlet Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Before continuing this test, visually inspect the MAP sensor connector for any damage or corrosion. Repair as necessary. **NOTE: The exhaust system must be free from any restriction to perform this test.** Turn the ignition off. Remove the MAP Sensor. Visually inspect the vacuum passages on both the intake side and component. Ensure that it is free from any blockage. Was any blockage found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	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 13 No → Repair the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	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 4.5 volts? Yes → Go To 14 No → Go To 15	All

P1187-THOTTLE INLET PRESSURE/MAP CORRELATION — Continued

TEST	ACTION	APPLICABILITY
14	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 16 No → Repair the open in the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	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. No → Go To 17	All
17	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.	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. 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. 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. No → Go To 9	All
6	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All

P1189-TIP SENSOR CIRCUIT LOW — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Repair the (K6) 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	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? Yes → Repair the (K6) 5 Volt Supply circuit for a short to the (K167) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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
(A23) TIP SIGNAL CIRCUIT OPEN
(K167) SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the TIP 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.	All
2	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? Yes → Repair the (A23) TIP Signal circuit for a short to the (K6) 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	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 (A23) 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. 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. No → Go To 5	All
5	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (A23) 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 (A23) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All

P1190-TIP SENSOR CIRCUIT HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	Start the engine. With the DRBIII®, monitor each switch function for the Speed Control Switches. Press and release each Speed Control Button. - Resume/Accel - Cancel - Decel (Coast) - On/Off - Set Does each switch function change status when pressing and then depressing each switch? Yes → Refer to the INTERMITTENT CONDITION Symptom in the Diagnostic category. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	All

P1593-SPEED CONTROL SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
2	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? Yes → Go To 3 No → Replace the Speed Control Switch that had the incorrect resistance value. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
3	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? Yes → Repair the short to battery voltage in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	**NOTE: The measurement must be taken from both Speed Control Switch harness connector.** **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.** 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? Yes → Go To 5 No → Repair the open in the (V37) S/C Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
5	**NOTE: The measurement must be taken from both Speed Control Switch harness connectors.** **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.** 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? Yes → Go To 6 No → Repair the open in the (K4) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1593-SPEED CONTROL SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage or terminal push out. Repair as necessary.** 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. Repair Replace and program the Powertrain Control Module per Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	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 FAULURE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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. **NOTE: If the test light illuminates, wiggle the wiring harness to ensure that the problem is not an intermittent wiring problem.** Does the test light illuminate brightly? Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Check all related fuses. Repair the Fused Ignition Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Failure? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 2	All
2	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Refused? Yes → Go To 3 No → Go To 4	All

P1696-EEPROM MEMORY WRITE DENIED/INVALID — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the SRI Memory Test a second time. **NOTE: Retest the SRI Memory two more times.** Does the DRBIII® display Write Refused again? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Test Complete.	All
4	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display SRI Mileage Invalid? Yes → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 5	All
5	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRBIII®? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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
GOOD TRIP EQUAL TO ZERO
CHECKING FOR OTHER DTCS
CHECKING THE HOSES AND TUBING
(A23) TIP SIGNAL CIRCUIT OPEN
(K167) SENSOR GROUND CIRCUIT OPEN
SOLENOID TEST #1
SOLENOID TEST #2
SOLENOID TEST #3
SOLENOID TEST #4
THROTTLE INLET PRESSURE SENSOR

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.	All
2	Turn the ignition on. With the DRBIII®, read the PCM DTCs. **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.** 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. No → Go To 3	All

P1854-TIP BARO OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: The exhaust system must be free from any restriction to perform this test.** 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. **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.** Are any of these conditions evident? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (A23) TIP Signal circuit from the TIP Sensor harness connector to the appropriate terminal of special tool #8815. Is the resistance below 10.0 ohms? Yes → Go To 5 No → Repair the open in the (A23) TIP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the TIP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 10.0 ohms? Yes → Go To 6 No → Repair the open in the (K167) Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1854-TIP BARO OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
6	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. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 7 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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. **NOTE: Vacuum should escape through the Solenoid hose B connection point.** Does vacuum escape through the Solenoid hose B connection point? Yes → Go To 8 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	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. **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.** With vacuum pump apply 20 inches of vacuum to the TIP Solenoid hose B connection point. **NOTE: Vacuum reading should not drop below 10 inches within 5 seconds.** Does vacuum read above 10 inches for at least 5 seconds? Yes → Go To 9 No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1854-TIP BARO OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the hoses from the TIP Solenoid. Install a plug on the TIP Solenoid hose A connection point. Connect a vacuum pump to the TIP Solenoid hose B connection point. **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.** Attempt to apply 20 inches of vacuum to the TIP Solenoid hose B connection point. **NOTE: Vacuum should escape through the Solenoid hose C connection point.** Does vacuum escape through the Solenoid hose C connection point? Yes → Replace the Throttle Inlet Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the TIP Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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 (K7) TP SENSOR 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN (K7) 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	**NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.** **NOTE: If the P0501 - No Vehicle Speed Signal is set along with this DTC, refer to the P0501 diagnostics before continuing.** **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.** 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.	All
2	**NOTE: This code is intended to shut down the engine if a large crack occurs in the intake manifold.** **NOTE: A large vacuum leak is most likely the cause of this DTC.** 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? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	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? Yes → Go To 4 No → Go To 12	All
4	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? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** Measure the resistance of the (K7) 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? Yes → Go To 6 No → Repair the (K7) TP Sensor 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the (K7) 5 volt Supply circuit at the TP Sensor harness connector. Is the resistance above 100k ohms? Yes → Go To 7 No → Repair the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	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? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 9 No → Repair the (K22) TP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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.	All
10	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All
11	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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.	All

P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
13	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? Yes → Go To 14 No → Repair the short to ground in the (K7) 5 volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
14	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? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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 16 No → Repair the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	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? Yes → Go To 17 No → Repair the (K1) MAP Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P2074-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION - HIGH FLOW/VACUUM LEAK — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 18 No → Repair the (K4) Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
18	**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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	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	**NOTE: Check the vehicle repair history. If the O2 has been replace ensure that the O2 sensor was properly installed and meets OEM specification.** **NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** 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.	All
2	Turn the ignition off. **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.** Visually and Physically inspect the exhaust system for holes, cracks and/or blockage. Is the exhaust system is good condition? Yes → Go To 3 No → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	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. **NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.** Did the O2 Sensor volts change from 5.0 volts to 2.5 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P2096-DOWN STREAM FUEL SYSTEM 1/2 LEAN — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Go To 6 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.	All
6	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? Yes → Check the fuel system for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 5. 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.	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 CONTROL 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	**NOTE: This test must be repeated for the adjacent ignition wire.** Turn the ignition off. Disconnect the ignition wire from the spark plug. **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.** Install a spark tester to the ignition wire. While cranking the engine observe the spark coming from the spark tester. **NOTE: A crisp blue spark that is able to jumper the gap of the spark tester should be generated.** Is a good spark generated? Yes → Ensure the cylinder is operating properly. If OK, replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 3	All
3	**NOTE: This test must be repeated for the adjacent ignition wire.** Turn the ignition off. Remove the ignition wire. Measure the resistance of the ignition wire. Is the resistance below 10K ohms? Yes → Go To 4 No → Replace the Ignition Wire. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
4	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? Yes → Go To 5 No → Repair the (A142) ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
5	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? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 6	All

P2302-IGNITION COIL #1 SECONDARY CIRCUIT-INSUFFICIENT IONIZATION — Continued

TEST	ACTION	APPLICABILITY
6	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? Yes → Go To 7 No → Repair the Coil Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
7	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? Yes → Repair the Coil Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 8	All
8	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. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
9	Turn the ignition off. Remove the Spark Plug. Inspect the Spark Plug for the following conditions. - Cracks - Carbon Tracking - Foreign Material - Gap size out of specifications - Loose or broke electrode **NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.** Were any of the above condition present? Yes → Replace the Spark Plug. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	**NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: The battery must be fully charged.** **NOTE: The Generator belt tension and condition must be checked before continuing.** Start the engine. Allow the idle to stabilize. With the DRBIII®, read the Target Charging Voltage. Is the Target Charging Voltage above 15.1 volts? Yes → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 2	All

P2503-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Ignition on, engine not running. **NOTE: Ensure all wires are clear of the engine's moving parts.** Start the engine. Measure the voltage between the (A11) Generator B+ Terminal and the Battery+ Post. Is the voltage above 0.4 of a volt? Yes → Repair the (A11) B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 3	All
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Warm the engine to operating temperature. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 of a volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 4	All
4	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 Gen Field Control circuit. Does the test light illuminate brightly and flash on and off? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC. No → Go To 5	All
5	Turn the ignition off. Disconnect the Generator Field harness connector. Using a 12-volt test connected to battery voltage, probe the (Z1) Gen Field Ground circuit in the Generator Field harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the open in the (Z1) Gen Field Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3 - NGC.	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. **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.** 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	**NOTE: If P1603 or P1604 are set along with this DTC, diagnose them first before continuing with P1698.** **NOTE: Before continuing, inspect all fuses and ensure that all power and ground circuits are operating properly.** **NOTE: Check all powers and grounds to the PCM before continuing.** 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? Yes → Go To 2 No → Refer to the INTERMITTENT CONDITION symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

U0101-NO TRANSMISSION BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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. **NOTE: If the test light illuminates, wiggle the wiring harness to ensure that the problem is not an intermittent wiring problem.** Does the test light illuminate brightly? Yes → Go To 3 No → Check all related fuses. Repair the (F12) Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
3	**Note: Determine which modules this vehicle is equipped with before beginning.** **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.** 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)? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Refer to the Communication category and perform the PCI BUS COMMUNICATION FAILURE symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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 - NGC.	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 - NGC.	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 - NGC. No → Refer to the Instrument Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	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? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. With the DRB III, attempt to communicate with the SKIM. **NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.** Was the DRB III able to communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. **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.** 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? Yes → Go To 4 No → Repair the PCI Bus circuit between the PCM and the SKIM for an open. Perform SKIS VERIFICATION.	All

U0168-NO SKIM BUS MESSAGES — Continued

TEST	ACTION	APPLICABILITY
4	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? Yes → Replace and program the PCM in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running 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? Yes → Repair as necessary. Perform SKIS VERIFICATION. No → Test Complete.	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	**NOTE: If a fuel level circuit or performance DTC is set along with P1681, diagnose the circuit/performance DTC before continuing.** 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 - NGC.	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 - NGC.	All
3	Turn the ignition on. Using the DRBIII®, read the Fuel Level parameter in the PCM. Does the DRBIII® display a fuel level value? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 4	All

U110C-NO FUEL LEVEL BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Instrument Cluster harness connector. **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.** 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? Yes → Replace Instrument Cluster in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Repair the PCI Bus circuit between the PCM and the Instrument Cluster for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	**NOTE: The battery must be fully charged before continuing.** Turn the ignition off. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 2 No → Repair the (A14) Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 3 No → Repair the (A41) Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
3	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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? Yes → Test Complete. No → Repair the (Z12) PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	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? Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Repair the Radiator Fan Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	**NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch actuating? Yes → The A/C Clutch System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 2	All
2	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? Yes → Go To 3 No → Repair the (Z1) Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
3	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? Yes → Replace the A/C Clutch. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 4	All
4	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? Yes → Go To 5 No → Repair the (A17) Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All

*CHECKING THE A/C RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	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? Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Repair the (C3) A/C Clutch Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	**Note: This trouble code indicates an internal SKIM fault.** With the DRBIII®, read and record the SKIM DTCs and then erase the SKIM DTCs Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII® , read the SKIM DTCs. Did the same SKIM DTC return? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

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

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC exists when a PCM STATUS message was not received from the 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	**NOTE: Ensure the PCM has proper power and ground connections before continuing.** With the DRBIII®, read and record the SKIM DTCs then erase the SKIM DTCs. Turn the ignition off. Wait 2 minutes. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

PCM STATUS FAILURE — Continued

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

Symptom List:

ROLLING CODE FAILURE
VIN MISMATCH

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

When Monitored and Set Condition:

ROLLING CODE FAILURE

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the 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	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing.** Does the VIN recorded from the PCM match the VIN of the vehicle? Yes → Go To 3 No → Perform the PCM replaced to update the VIN in the PCM. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRBIII®, display and clear all 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? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → The repair is complete. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

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

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

When Monitored and Set Condition:

TRANSPONDER COMMUNICATION FAILURE

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

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

TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE

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

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

TRANSPONDER ID MISMATCH

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

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

TRANSPONDER RESPONSE MISMATCH

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

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

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

TRANSPONDER COMMUNICATION FAILURE — Continued

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

TRANSPONDER COMMUNICATION FAILURE — Continued

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

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. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 2 No → Go To 5 **Caution: Stop All Actuations.**	All
2	Turn the ignition off. **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.** Install a fuel gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** 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 - NGC. Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
5	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the (A141) Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Go To 8 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the (Z1) Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the open/high resistance in the (Z1) fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
8	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 9 No → Repair the Fuel Pump Realy Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
9	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. **NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities** Measure the resistance of the (A141) Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Repair the (A141) Fuel Pump Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

Symptom:
*CHECKING FUEL PRESSURE LEAK DOWN

POSSIBLE CAUSES
FUEL INJECTOR(S)
CHECKING FUEL PRESSURE
FUEL PUMP MODULE
CHECKING FUEL LEAK DOWN

TEST	ACTION	APPLICABILITY
1	**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.** Install a fuel pressure gauge. Start the engine and observe the fuel pressure reading. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure gauge fall below the above specification? Yes → Go To 2 No → Fuel System is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
2	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **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.** 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. **NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** 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. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure gauge fall below the above specification? Yes → Check the Fuel Delivery System between the fuel gauge and the fuel injectors. Inspect the seal points and the fuel lines for signs of fuel leakage. Repair/Replace as necessary. If OK, replace the leaking Fuel Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. 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.	All

Symptom:
*CHECKING HARD START (FUEL DELIVERY SYSTEM)

POSSIBLE CAUSES
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PUMP INLET STRAINER PLUGGED
FUEL INJECTOR(S)
FUEL PUMP MODULE
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **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.** Install a fuel gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 4	All
2	Turn the ignition off. **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.** Raise vehicle on hoist, and disconnect the fuel supply 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Visually and physically inspect the fuel supply lines between the fuel tank and the fuel rail. Repair/replace as necessary. If no problem is found replace the fuel filter. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Go To 3	All

*CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
4	Fuel pressure gauge still installed. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Ensure the fuel pressure is at maximum pressure. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure gauge fall below the above specification? Yes → Go To 5 No → Check the fuel for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	All
5	**NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **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.** 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. **NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** 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. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Does the fuel pressure gauge fall below the above specification? 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. No → Check the Fuel Delivery System between the fuel gauge and the fuel injectors. Inspect the seal points and the fuel lines for signs of fuel leakage. Repair/Replace as necessary. If OK, replace the leaking Fuel Injector(s). Perform POWERTRAIN VERIFICATION TEST VER - 2 - NGC.	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	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. An undercharged battery can produce invalid test results. If the battery is not fully charged, charge the battery and attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTCs to set that may have been erased due to a dead battery. Make sure that all power and ground circuits to the PCM are ok. Using the DRBIII®, attempt to communicate with the PCM. If the DRBIII® reports a No Response condition from the PCM, refer to the symptom list in the Communication category for the proper diagnostic tests. Using the DRBIII®, read DTCs in the PCM. If any DTCs are present, refer to the symptom list in the Driveability category for the proper diagnostic tests. Using the DRBIII®, attempt to communicate with the Instrument Cluster and the SKIM module. If the DRBIII® reports a No Response condition from either, refer to the symptom list in the Communication category for the proper diagnostic tests. Using the DRBIII®, read DTCs in the SKIM module. If any DTCs are present, refer to the symptom list in the Vehicle Theft/Security category for the proper diagnostic tests. If no DTCs are detected, use the DRBIII® to perform a PCM Battery Disconnect. Under Miscellaneous Functions, select Clear PCM (Batt Disconnect). Crank the engine several times. Using the DRBIII®, read DTCs in the PCM. If any DTCs are set, refer to the symptom list in the Driveability category for the proper diagnostic tests. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 2	All
2	Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition. Are any of the fuses open? 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 - NGC. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 4 No → Go To 18 **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **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.** Install a fuel pressure gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 5 Within Specification Go To 7 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. **Caution: Stop All Actuations.**	All
5	Turn the ignition off. **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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 6 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Go To 8 No → Go To 9	All
8	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Test Complete.	All
9	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 10 No → Repair the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
10	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 11 No → Go To 13	All
11	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 12 No → Repair the open Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
12	**NOTE: Inspect the slots on the crankshaft, tone wheel, for damage. If any problems are found, repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
13	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? Yes → Repair the CKP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 14	All
14	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? Yes → Go To 15 No → Repair the open CKP Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
15	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? Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 16	All
16	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? Yes → Repair the CKP Sensor Signal circuit shorted to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 17	All

*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
17	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 - NGC.	All
18	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 19 No → Go To 21 **Caution: Stop All Actuations.**	All
19	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 20 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
20	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
21	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 22 No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*ENGINE CRANKS DOES NOT START - 1.6L — Continued

TEST	ACTION	APPLICABILITY
22	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. **NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities** 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? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

Symptom:

***ENGINE CRANKS DOES NOT START - 2.0L/2.4L**

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 - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items must be checked before continuing with any no start tests.** 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. 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. 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. 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. 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. If no DTC's are found, using the DRBIII® select Clear PCM (Batt Disconnect). Crank the engine several times. Using the DRBIII®, read DTC's. If a DTC is present perform the DTC diagnostics before continuing. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 2	All
2	Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition. Are any of the fuses open? 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 - NGC. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 4 No → Go To 24 **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
4	**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.** 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? Yes → Go To 5 No → Go To 9	All
5	Turn the ignition off. **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.** Install a fuel pressure gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 6 Within Specification Go To 8 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **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.** 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. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 7 **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
8	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Test Complete.	All
9	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 50 RPM and steady? Yes → Go To 10 No → Go To 15	All
10	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 ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 11 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
11	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? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 12	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — 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 - NGC.	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 - NGC. 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 - NGC.	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 - NGC.	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 - NGC.	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
18	**NOTE: Inspect the slots on the crank, tone wheel, for damage. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
19	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? Yes → Go To 20 No → Repair the CKP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
20	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? Yes → Repair the CKP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 21	All
21	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? Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 22	All
22	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? Yes → Repair the CKP Sensor Signal circuit shorted to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 23	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
23	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 - NGC.	All
24	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 25 No → Go To 27 **Caution: Stop All Actuations.**	All
25	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 26 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
26	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
27	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 28 No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*ENGINE CRANKS DOES NOT START - 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
28	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. **NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities** 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? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

Symptom:
*NO CRANK CONDITION 1.6L

POSSIBLE CAUSES
TRANSMISSION RANGE SENSOR
REPAIR MECHANICAL CONDITION
CLUTCH SWITCH OPERATION
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	**NOTE: Make sure the battery is fully charged and in good condition before continuing. An undercharged battery can produce invalid test results.** **NOTE: Using the DRBIII®, read DTCs in the SKIM. If any DTCs are present, refer to the symptom list in the Vehicle Theft/Security category for the proper diagnostic tests.** **NOTE: Using the DRBIII®, read DTCs in the PCM. If any DTCs are present, refer to the symptom list in the Driveability category for the proper diagnostic tests.** **NOTE: Make sure that all power and ground circuits to the PCM are ok.** **WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** Attempt to turn the engine over by hand to verify that the engine is not seized. Does the engine turn over by hand? Yes → Go To 2 No → Repair the mechanical condition that is preventing the engine from turning over. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	Turn the ignition on. With the DRBIII® in Inputs/Outputs, monitor the Clutch Switch states while pressing and releasing the clutch pedal. Do the states change properly as the clutch pedal is pressed and released? Yes → Go To 3 No → Refer to the symptom list in the Driveability category and perform diagnostic tests for the Clutch Release Switch circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*NO CRANK CONDITION 1.6L — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 volt? Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the Fused Ignition Switch (Start) circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 6 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
6	Turn ignition off. Remove the Starter Relay from PDC. **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.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Relay B+ circuit and the Starter Relay Output Circuits. Did the Starter Motor crank the engine? Yes → Go To 7 No → Go To 10	All

*NO CRANK CONDITION 1.6L — Continued

TEST	ACTION	APPLICABILITY
7	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? Yes → Go To 8 No → Repair the Ignition Switch Output circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
8	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? Yes → Go To 9 No → Repair the Starter Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
9	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? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
10	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? Yes → Go To 11 No → Repair Starter Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
11	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? Yes → Go To 12 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*NO CRANK CONDITION 1.6L — Continued

TEST	ACTION	APPLICABILITY
12	If there are no other possible causes remaining, review repair. Repair Replace the Starter. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

Symptom:
*NO CRANK CONDITION 2.0L/2.4L

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	**NOTE: Check all PCM powers and grounds before continuing.** **NOTE: Ensure that SKIS is operating properly. Check the SKIM for DTC. If a SKIM DTC(s) is present diagnose them first before continuing.** **WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over? Yes → Go To 2 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 3 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
3	Turn the ignition off. Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 volt? Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 4	All

*NO CRANK CONDITION 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. **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.** 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? Yes → Go To 5 No → Repair the Fused Ignition Switch (Start) circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
5	Turn ignition off. Remove the Starter Relay from PDC. **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.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Relay B+ circuit and the Starter Relay Output Circuits. Did the Starter Motor crank the engine? Yes → Go To 6 No → Go To 9	All
6	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? Yes → Go To 7 No → Repair the Ignition Switch Output circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
7	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? Yes → Go To 8 No → Repair the Starter Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*NO CRANK CONDITION 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
8	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? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
9	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? Yes → Go To 10 No → Repair Starter Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
10	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? Yes → Go To 11 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
11	If there are no other possible causes remaining, review repair. Repair Replace the Starter. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	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	**NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.** **NOTE: Ensure the ignition switch was on when trying to communicate with the PCM.** 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? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
2	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? Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
3	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? Yes → Go To 4 No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
4	If there is 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 - NGC.	All

Symptom:
*START AND STALL CONDITION 1.6L

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 diagnostics for the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 2	All
2	Turn the ignition on. **NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** 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 - NGC. No → Go To 3	All

*START AND STALL CONDITION 1.6L — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **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.** Install a fuel pressure gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 4 Within Specification Go To 6 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **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.** 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 tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 5 **Caution: Stop All Actuations.**	All
5	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*START AND STALL CONDITION 1.6L — Continued

TEST	ACTION	APPLICABILITY
6	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? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
7	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? Yes → Go To 8 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
8	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** **NOTE: If the vehicle was allow to sit over night with no engine start, coolant temperature should be near ambient temperatures.** Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature value. **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** 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)? Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
9	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Test Complete.	All

Symptom:
*START AND STALL CONDITION 2.0L/2.4L

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 - NGC. No → Go To 2	All
2	Turn the ignition on. **NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** 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 - NGC. No → Go To 3	All

*START AND STALL CONDITION 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **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.** Install a fuel pressure gauge. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 4 Within Specification Go To 6 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **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.** 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 tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Go To 5 **Caution: Stop All Actuations.**	All
5	Turn the ignition off. **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.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All

*START AND STALL CONDITION 2.0L/2.4L — Continued

TEST	ACTION	APPLICABILITY
6	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? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
7	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? Yes → Go To 8 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
8	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** **NOTE: If the vehicle was allow to sit over night with no engine start, coolant temperature should be near ambient temperatures.** Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature value. **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** 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)? Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC.	All
9	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? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1 - NGC. No → Test Complete.	All

Verification Tests

40/41TE (NGC) TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. NOTE: After completion of the Transmission Verification Test, the Powertrain Verification Test must be performed. Refer to the Powertrain Category. 2. Connect the DRBIII® to the Data Link Connector (DLC). 3. Reconnect any disconnected components. 4. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. 5. Perform *PRNDL FAULT CLEARING PROCEDURE after completion of repairs for P0706 CHECK SHIFTER SIGNAL. 6. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT, above 43° C or 110° F. 7. Check the transmission fluid and adjust if necessary. Refer to the Service Information for the Fluid Fill procedure. **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″.** 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. 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. 11. For a specific DTC, drive the vehicle to the Symptom's When Monitored and Set Conditions to verify the DTC is repaired. 12. If equipped with AutoStick®, upshift and downshift several times using the AutoStick® feature during the road test. **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.** 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. **15. NOTE: Erase P0700 DTC in the PCM to turn the MIL light off after making transmission repairs.** Were there any Diagnostic Trouble Codes set during the road test? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. **2. NOTE: If the SKIM or PCM/ECM was replaced, refer to the service information for proper programming procedures.** **3. NOTE: PT27 ONLY: If a Window Regulator Module was replaced, close both doors, raise both door windows fully up and hold the switch in the up position for 2 additional seconds then use the DRBIII to ″Initialize Module″.** 4. Program all RKE transmitters and other options as necessary. 5. Ensure that all accessories are turned off and the battery is fully charged. 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. 7. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTC's from ALL modules. Are any DTC's present or is the original condition still present? Yes → Repair is not complete, refer to the appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

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

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

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1 - NGC	APPLICABILITY
1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed. **2. NOTE: If the PCM has been replace 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.** **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.** **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.** 5. Inspect the vehicle to ensure that all components related to the repair are connected properly. 6. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary. 7. Attempt to start the engine. 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. 9. Run the engine for one warm-up cycle to verify operation. 10. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly. 11. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

POWERTRAIN VERIFICATION TEST VER - 2 - 1.6L	APPLICABILITY
1. 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. **2. 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.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. With the DRBIII®, clear DTCs and Reset Memory for all engine values. 5. Run the engine for one warm-up cycle to verify proper operation. 6. Road test the vehicle. Use all accessories that may be related to this repair. 7. With the DRBIII®, confirm that no DTC's are present and that all components are functioning properly. 8. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present. 9. If the symptom is still present, or any other symptom or DTC is present refer to the appropriate category and perform the corresponding symptom. 10. Refer to any Technical Service Bulletins that may apply. 11. If there are no DTCs present and all components are functional properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 2 - NGC	APPLICABILITY
1. NOTE: After completing the Powertrain Verification Test the Transmission Verification Test must be performed. **2. NOTE: If the PCM has been replace 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.** **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.** **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.** 5. Inspect the vehicle to ensure that all components related to the repair are connected properly. 6. With the DRBIII®, clear DTCs and Reset Memory all engine values. 7. Run the engine for one warm-up cycle to verify proper operation. 8. Road test the vehicle. Use all accessories that may be related to this repair. 9. With the DRBIII®, confirm that no DTC's or Secondary Indicators are present and that all components are functioning properly. 10. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present. 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. 12. Refer to any Technical Service Bulletins that may apply. 13. If there are no DTCs present and all components are functional properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

POWERTRAIN VERIFICATION TEST VER - 3 - 1.6L	APPLICABILITY
1. 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. **2. 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.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. With the DRBIII®, clear DTCs. 5. Perform generator output test. Refer to the appropriate service information as necessary. 6. Start the engine and set engine speed to 2000 RPM for at least thirty seconds. 7. Cycle the ignition key off and on. 8. 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. 9. If there are no DTCs present and all components are functioning properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
1. 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. **2. 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.** 3. Inspect the vehicle to make sure that all components are properly installed and connected. 4. Using the DRBIII®, clear all DTCs. 5. Turn the Speed Control ON (if equipped, cruise light will be on). 6. Make sure vehicle speed is greater than 35 MPH. 7. Move the Speed Control switch to the COAST/SET position. The Speed Control should engage and maintain vehicle speed. 8. Move the Speed Control switch to RESUME/ACCEL position. The vehicle speed should increase by at least 2 mph. 9. Using caution, lightly press then release the brake pedal. The speed control should disengage. 10. Make sure vehicle speed is greater than 35 MPH. 11. Move the Speed Control Switch to the RESUME/ACCEL position. The vehicle should resume the previously set speed. 12. Move the Speed Control switch to the Coast/Set position. The vehicle should decelerate and maintain the new vehicle speed after deceleration. 13. Make sure vehicle speed is greater than 35 MPH and Speed Control is engaged. 14. Move the Speed Control switch to the CANCEL position. The Speed Control should disengage. 15. Make sure vehicle speed is greater than 35 MPH and Speed Control is engaged. 16. Turn the Speed Control OFF. The Speed Control should disengage. 17. If the vehicle passes all tests, the Speed Control system is functioning as designed. The repair is complete. 18. If the vehicle does not pass all tests, the repair is not complete. Refer to any TSBs that may apply and, if necessary, return to the Symptom List. Did the Speed Control pass the above test? Yes → Repair is complete. No → Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5 - 1.6L	APPLICABILITY
1. 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. **2. 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.** 3. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 4. Connect the DRBIII® to the data link connector. 5. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 6. 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. 7. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 8. If the Good Trip Indicator changed to YES and no DTCs have set, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 9. 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. 10. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. 11. With the DRBIII®, monitor the appropriate OBDII Monitor pre-test screen until all enabling conditions have been met, then switch to the appropriate monitor screen and observe the OBDII monitor in progress. 12. If the monitor passed and the Good Trip Indicator changed to YES, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 13. If the repaired OBDII DTC has reset or the OBDII monitor ran and did not pass, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List. 14. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

POWERTRAIN VERIFICATION TEST VER-1 - 1.6L	APPLICABILITY
1. NOTE: If the PCM has been replaced, it must be programmed with the latest calibration before continuing. **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.** **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.** 4. Inspect the vehicle to ensure that all components related to the repair are connected properly. 5. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary. 6. Attempt to start the engine. 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. 8. Run the engine for one warm-up cycle to verify operation. 9. With the DRBIII®, confirm that no DTCs are present and that all components are functioning properly. 10. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

ROAD TEST VERIFICATION - VER-2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a non-DTC test, perform steps 3 and 4. If not, proceed to step 5. 3. Check to see if the initial symptom still exists. If there are no trouble codes and the symptom no longer exists, the repair was successful and testing is now complete. 4. If the initial or another symptom exists, the repair is not complete. Check all pertinent Technical Service Bulletins (TSBs) and return to the Symptom List if necessary. 5. For previously read DTCs that have not been dealt with, return to the Symptom List and follow the diagnostic path for that DTC; otherwise, continue. 6. If the Engine Control Module (ECM) has not been changed, perform steps 7 and 8, otherwise, continue with step 9. 7. With the DRB III®, erase all diagnostic trouble codes (DTCs), then disconnect the DRB III®. 8. Turn the ignition off for at least 10 seconds. 9. If equipped with a Transfer Case Position Switch, perform step 10, otherwise, continue with step 11. 10. With the ignition switch on, place the Transfer Case Shift Lever in each gear position, stopping for 15 seconds in each position. 11. Ensure no DTCs remain by performing steps 12 through 15. 12. Road test the vehicle. For some of the road test, go at least 64 km/h (40 MPH). If this test is for an A/C Relay Control Circuit, drive the vehicle for at least 5 minutes with the A/C on. 13. At some point, stop the vehicle and turn the engine off for at least 10 seconds, then restart the engine and continue. 14. Upon completion of the road test, turn the engine off and check for DTCs with the DRB III®. 15. If the repaired DTC has set again, the repair is not complete. Check for any pertinent Technical Service Bulletins (TSBs) and return to the Symptom List. If there are no DTCs, the repair was successful and is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

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

Verification Tests — Continued

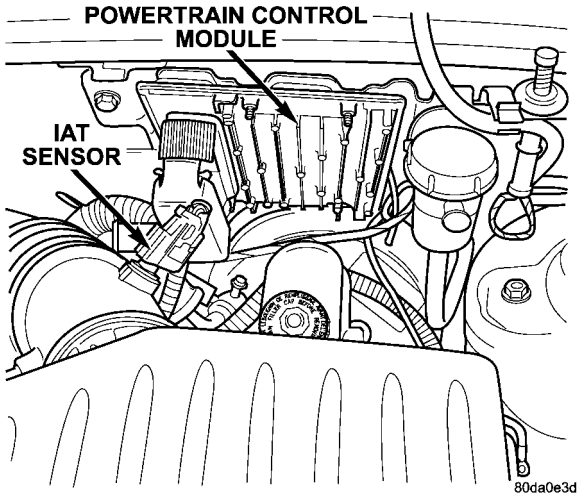
SPEED CONTROL VERIFICATION - VER-4	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. With the DRB, erase all diagnostic trouble codes (DTCs). 3. Road test the vehicle at a speed above 60 km/h (35 MPH). 4. Turn the speed control ON/OFF switch on. 5. Depress and release the SET switch. If the speed control does not engage, the repair is not complete, continue with step 12. 6. Quickly depress and release the RESUME/ACCEL switch. If the vehicle speed does not increase by 3 km/h (2 MPH), the repair is not complete, continue with step 12. 7. Using caution, depress and release the brake pedal. If the speed control does not disengage, the repair is not complete, continue with step 12. 8. With the vehicle speed at least 60 km/h (35 MPH), depress the RESUME/ACCEL switch. If the speed control does not resume at the previously set speed, the repair is not complete, continue with step 12. 9. Hold down the COAST switch. If the vehicle does not decelerate, the repair is not complete, continue with step 12. 10. While still holding down the COAST switch, ensure the vehicle speed is at least 60 km/h (35 MPH) and release the COAST switch. If the vehicle does not adjust and set a new vehicle speed, the repair is not complete, continue with step 12. 11. With the speed control engaged, depress the ON/OFF switch. If the speed control does not disengage, the repair is not complete, continue with step 12. 12. If the vehicle did not successfully perform all of the previous steps, check for Technical Service Bulletins (TSBs) that pertain to this speed control problem and then, if necessary, return to the Symptom List. 13. If the vehicle successfully performed all of the previous steps, the speed control system is now functioning as designed. The repair is now complete. Are any DTCs or symptoms remaining? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

NOTES

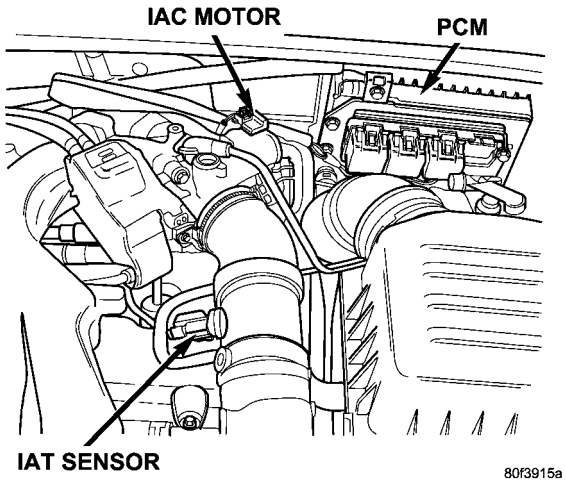
8.0 COMPONENT LOCATIONS

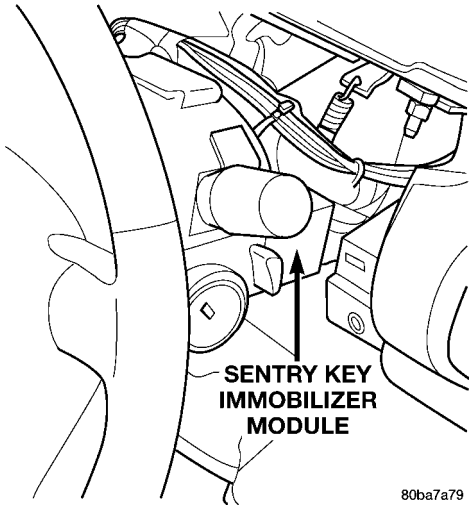
8.1 POWERTRAIN AND SKIM

1.6L



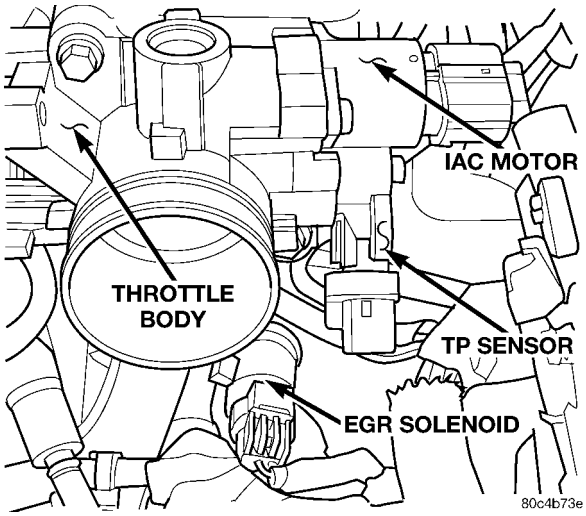
2.0/2.4L



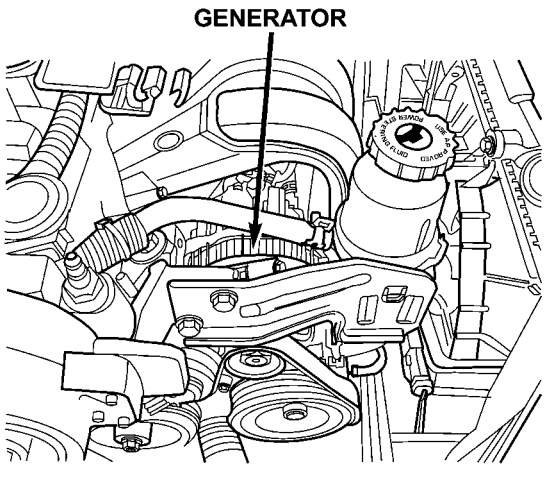


8.2 CONTROL AND SOLENOIDS

2.0L/2.4L

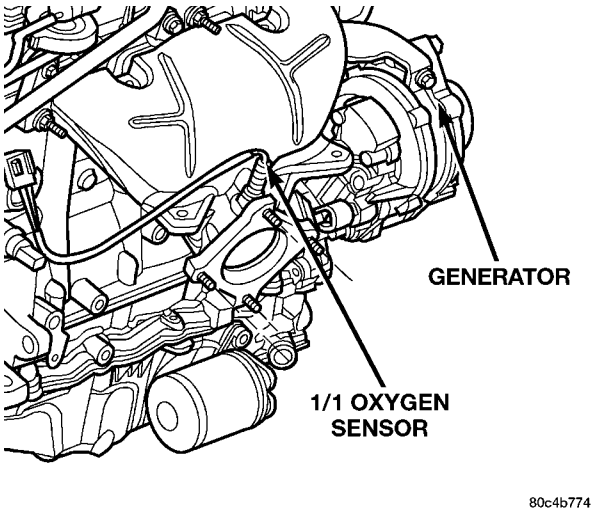


1.6L



8.2 CONTROL AND SOLENOIDS (Continued)

2.0L/2.4L



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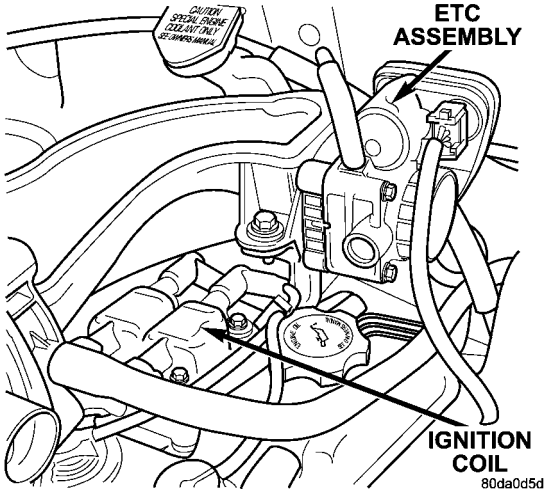

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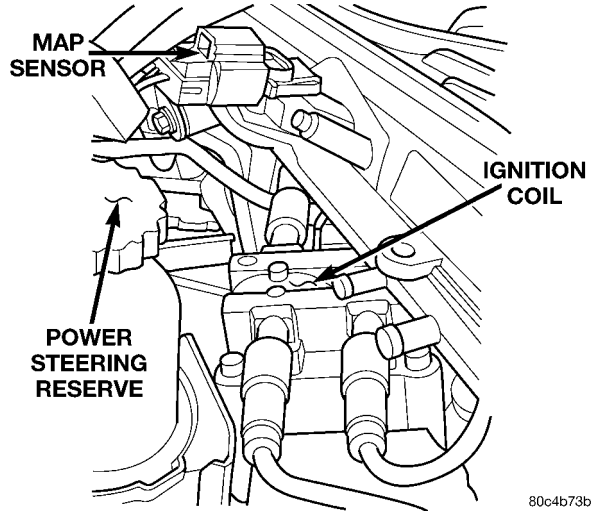

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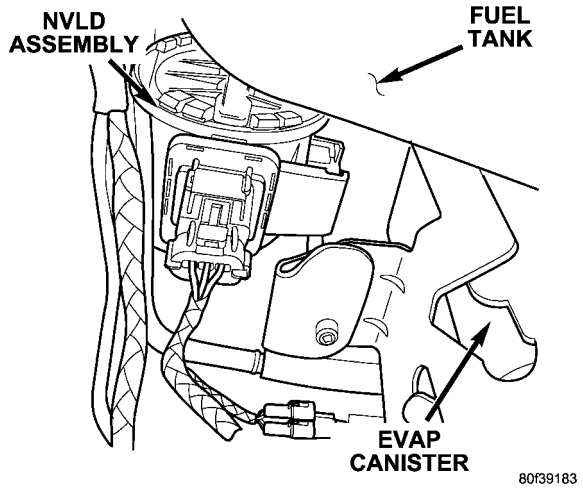

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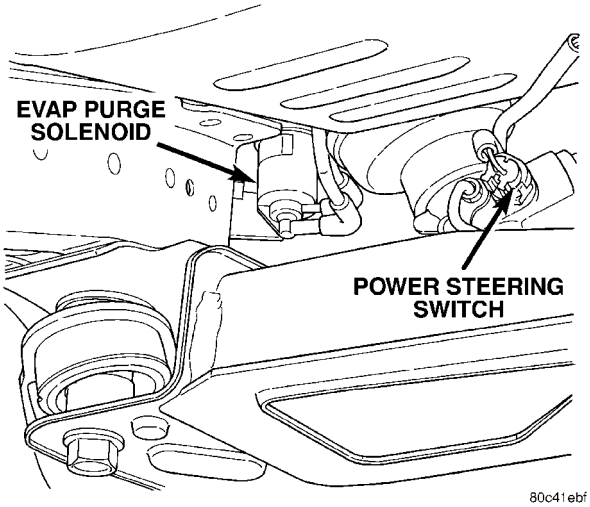

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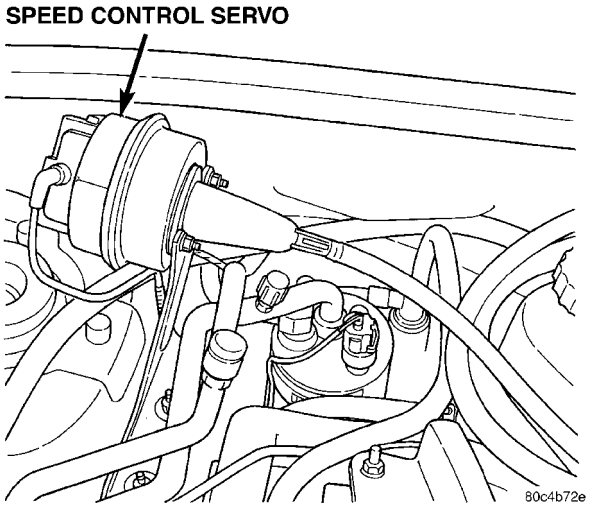

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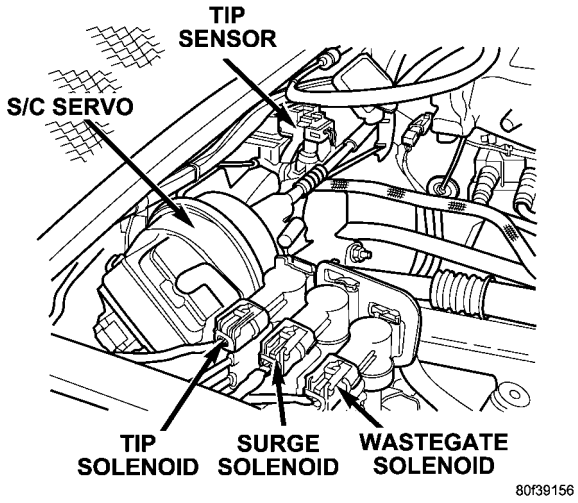
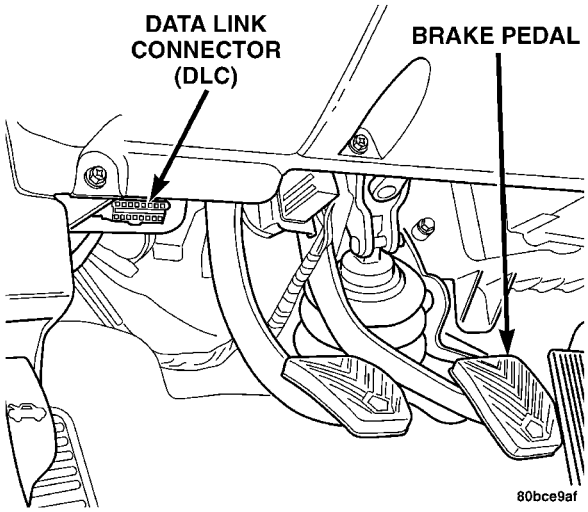
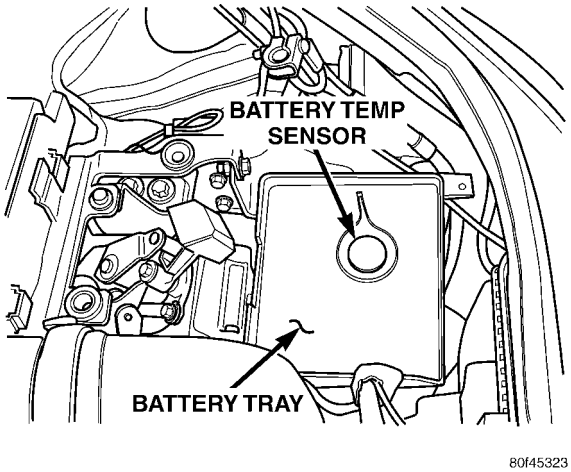


8.3 DATA LINK CONNECTOR



8.4 SENSORS

2.0L/2.4L



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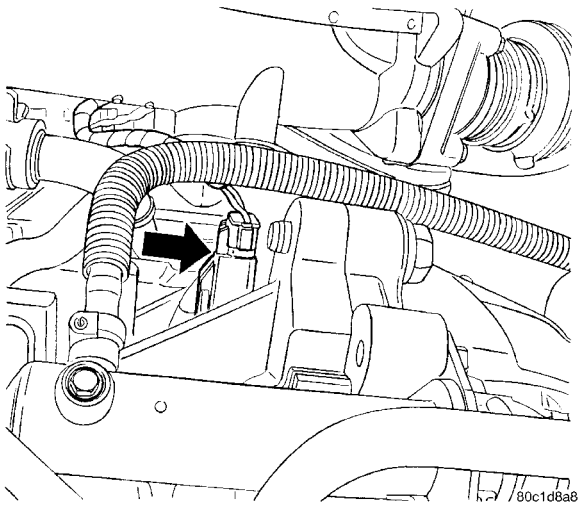

8.4 SENSORS (Continued)

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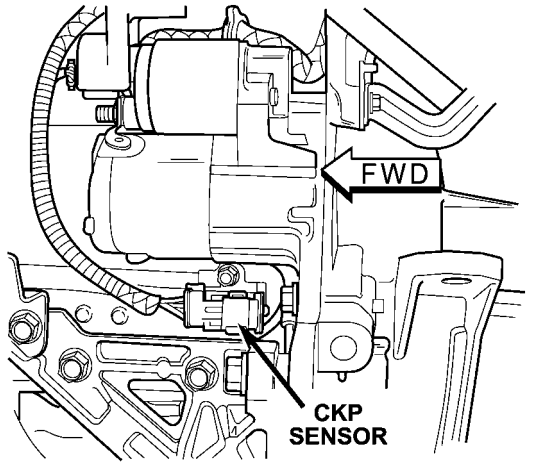

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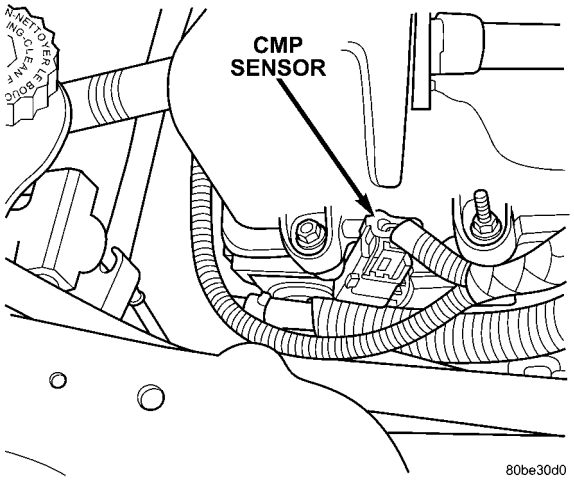

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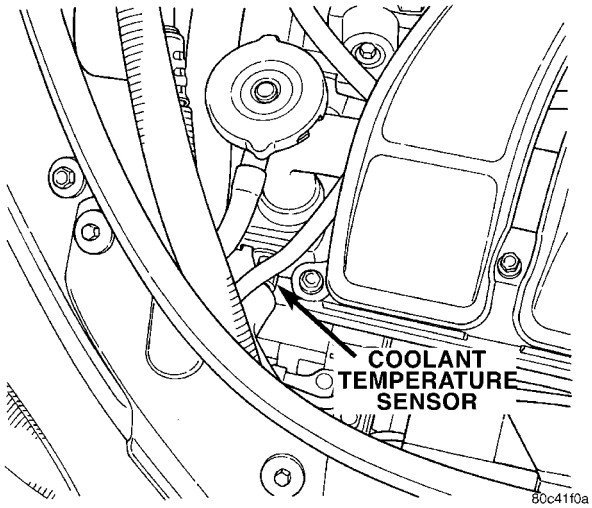
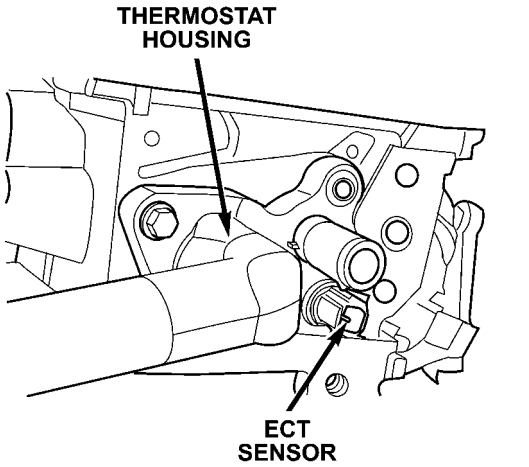
2.0L/2.4L



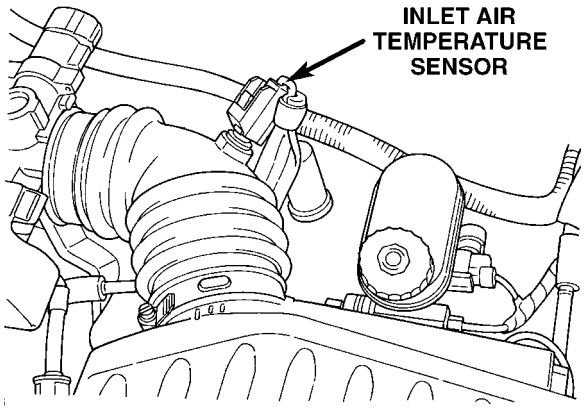
80c41f0a

1.6L



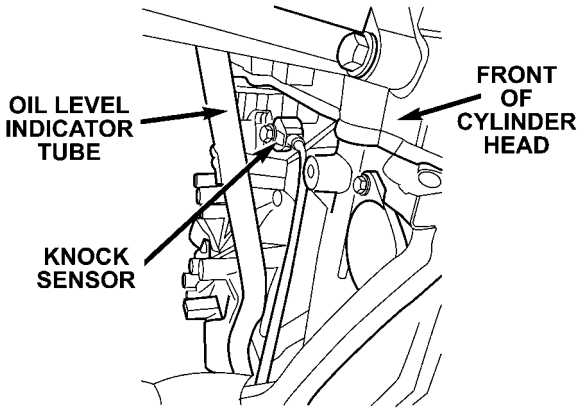
80be1dd3

2.0L/2.4L



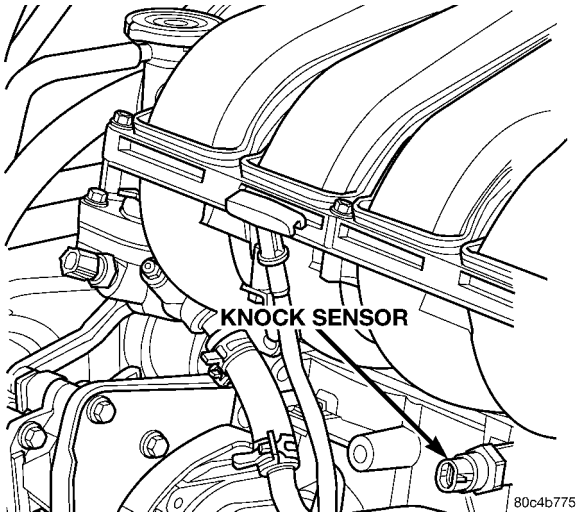
80f4a379

1.6L

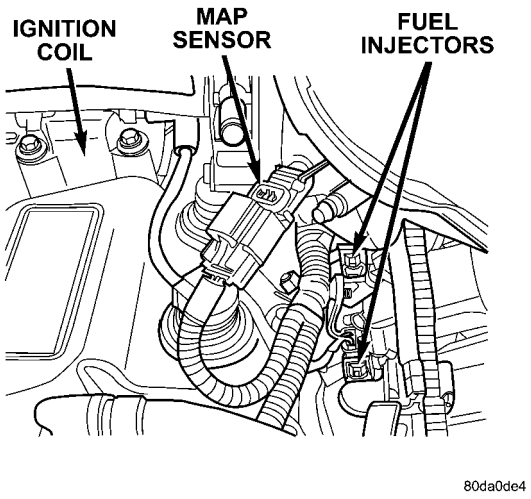


80be20be

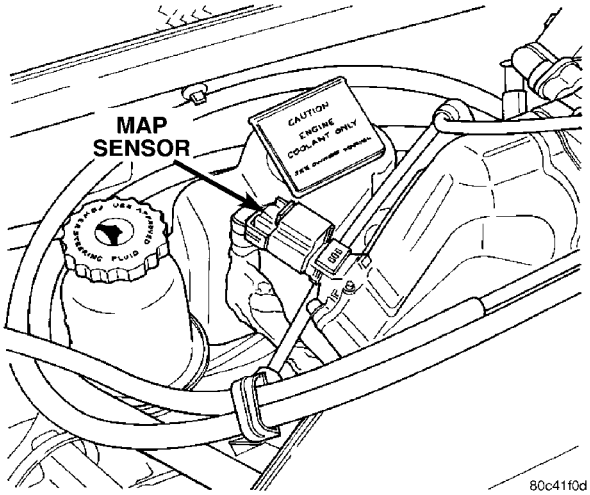
2.4L



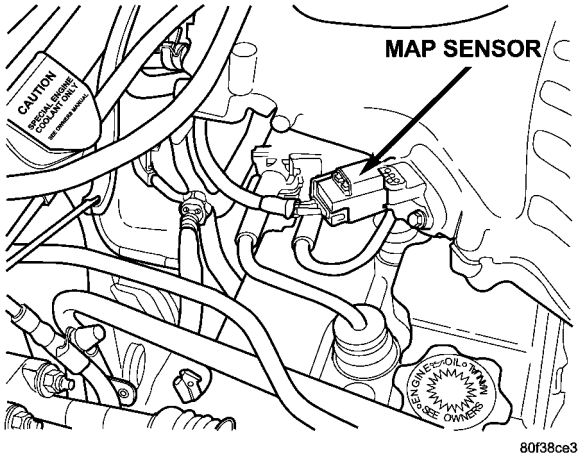
1.6L



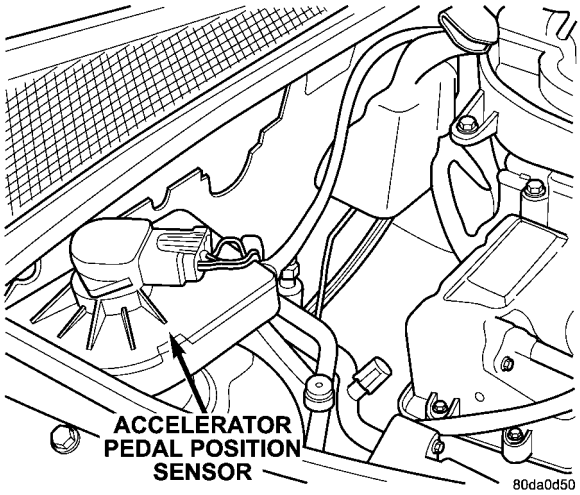
2.0L/2.4L

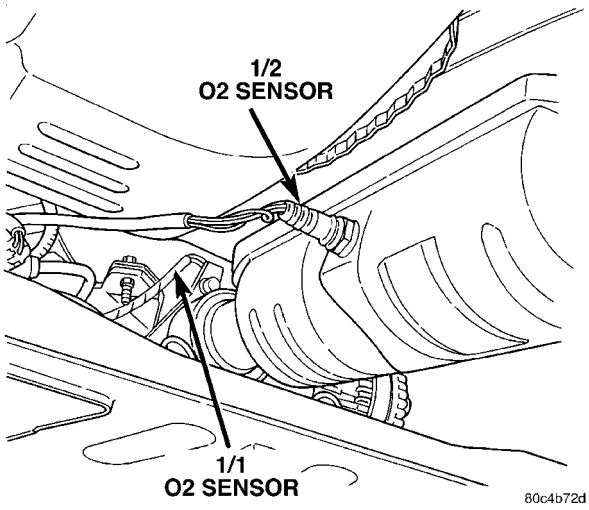


2.4L TURBO ONLY



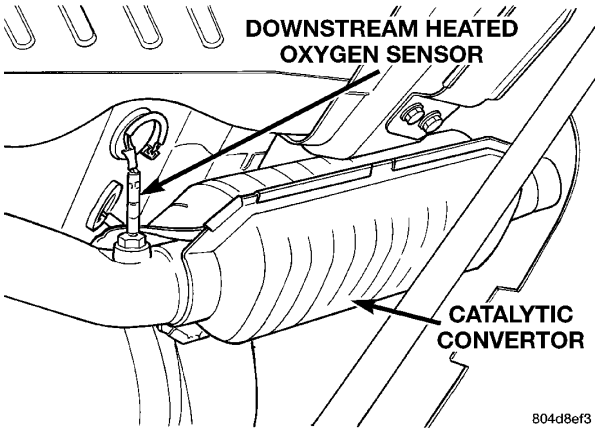
1.6L



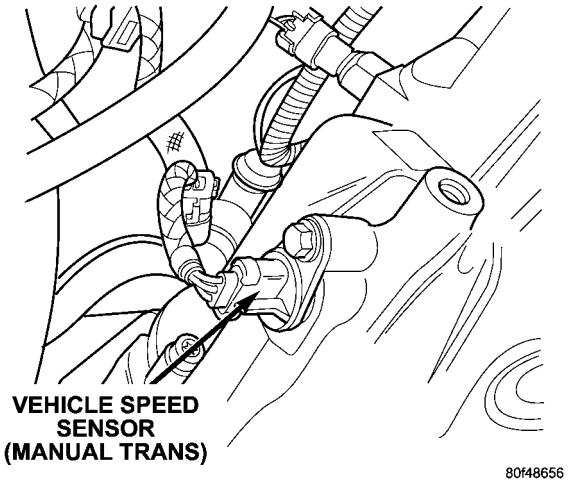


8.4 SENSORS (Continued)

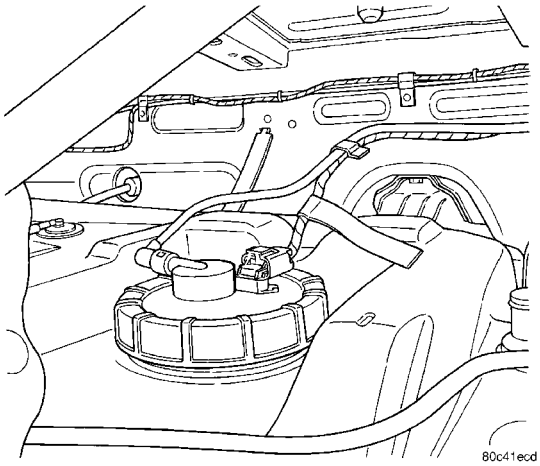
1.6L



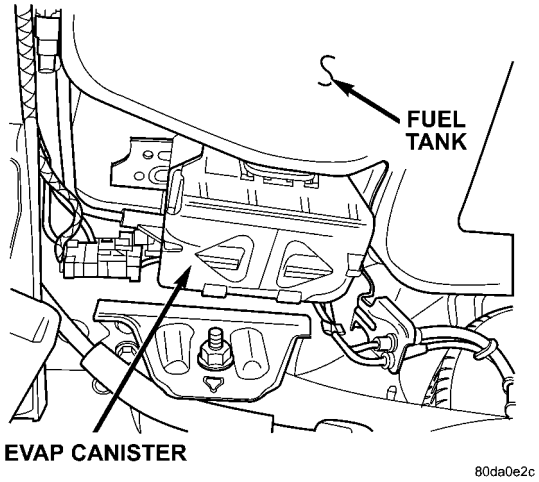
MANUAL TRANS



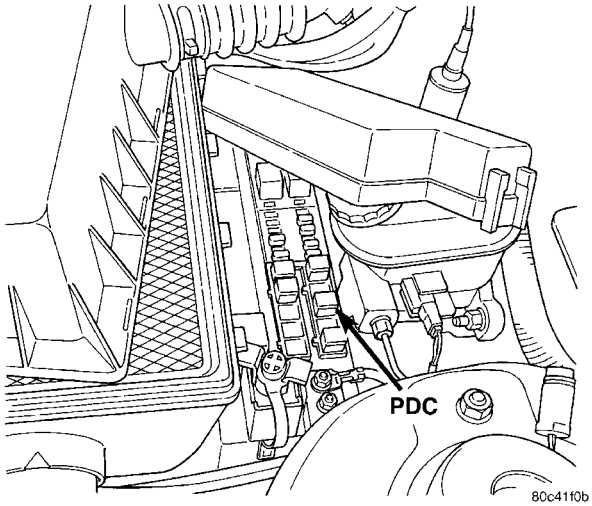
8.5 FUEL SYSTEM



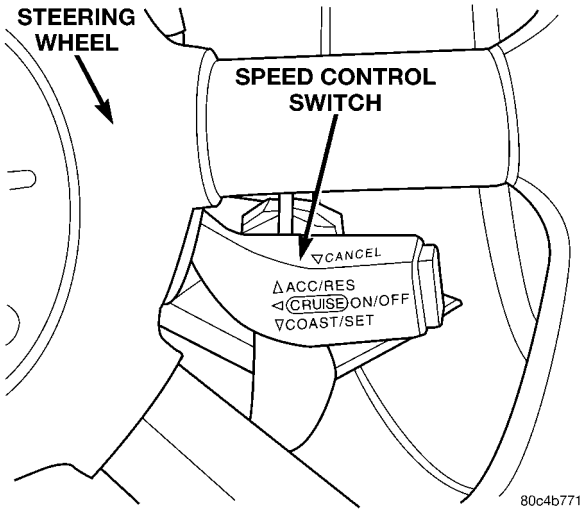
1.6L W/O LDP

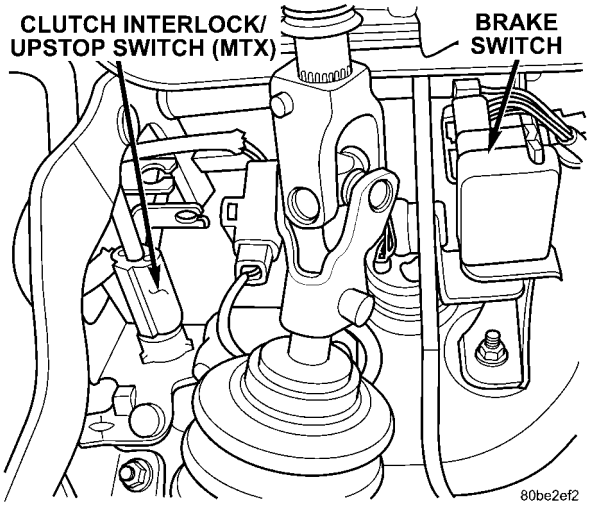


8.6 RELAYS



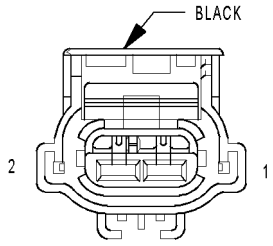
8.7 SWITCHES


STEERING WHEEL
SPEED CONTROL SWITCH
▽CANCEL
△ACC/RES
◁CRUISE▷ON/OFF
▽COAST/SET
80c4b771


CLUTCH INTERLOCK/ UPSTOP SWITCH (MTX)
BRAKE SWITCH
80be2ef2

NOTES

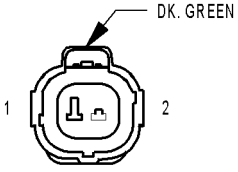
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH (GAS)

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

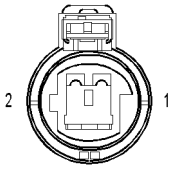
CAV	CIRCUIT	FUNCTION
1	C3 20DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z1 20BK	GROUND



A/C LOW PRESSURE SWITCH

A/C LOW PRESSURE SWITCH - DK. GREEN 2 WAY

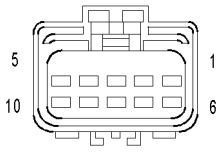
CAV	CIRCUIT	FUNCTION
1	C21 20DB/OR	A/C LOW PRESSURE SIGNAL
2	C20 20BR	A/C REQUEST SIGNAL



A/C PRESSURE TRANSDUCER

A/C PRESSURE TRANSDUCER - 2 WAY

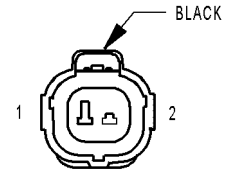
CAV	CIRCUIT	FUNCTION
1	C22 18BR/WT (1.6L)	A/C HIGH PRESSURE SIGNAL
1	C22 20BR/WT (EXCEPT 1.6L)	A/C HIGH PRESSURE SIGNAL
2	C21 20DB/OR (1.6L)	A/C LOW PRESSURE SIGNAL
2	C21 20DB/WT (EXCEPT 1.6L)	A/C LOW PRESSURE SIGNAL



ACCELERATOR PEDAL POSITION SENSOR (1.6L/DIESEL)

ACCELERATOR PEDAL POSITION SENSOR (1.6L/DIESEL) - 10 WAY

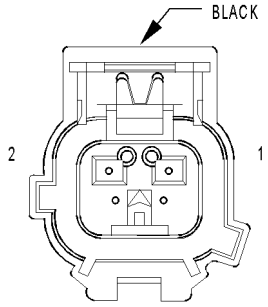
CAV	CIRCUIT	FUNCTION
1	-	-
2	K167 20BR/YL	ACCELERATOR PEDAL POSITION SENSOR NO. 1 GROUND
3	F858 20LG/PK	ACCELERATOR PEDAL POSITION SENSOR NO. 1 5 VOLT SUPPLY
4	K80 20BK/LG	ACCELERATOR PEDAL POSITION SENSOR NO. 1 SIGNAL
5	F859 20DG/PK (1.6L)	ACCELERATOR PEDAL POSITION SENSOR NO. 2 5 VOLT SUPPLY
5	F859 20DG/PK (DIESEL)	SENSOR REFERENCE VOLTAGE A
6	-	-
7	-	-
8	K981 20BR/DG	ACCELERATOR PEDAL POSITION SENSOR NO. 2 GROUND
9	-	-
10	K81 20DB/DG	ACCELERATOR PEDAL POSITION SENSOR NO. 2 SIGNAL



AMBIENT TEMPERATURE SENSOR (EXCEPT 2.4L BASE)

AMBIENT TEMPERATURE SENSOR (EXCEPT 2.4L BASE) - BLACK 2 WAY

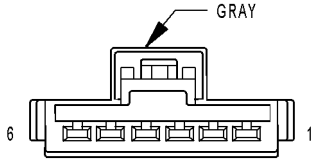
CAV	CIRCUIT	FUNCTION
1	G31 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	G32 20BK/LB	SENSOR GROUND



AMBIENT TEMPERATURE SENSOR (NGC)

AMBIENT TEMPERATURE SENSOR (NGC) - BLACK 2 WAY

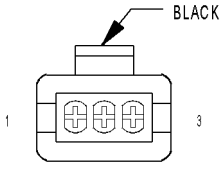
CAV	CIRCUIT	FUNCTION
1	K145 20BR/OR	AAT SIGNAL
2	K167 20BR/YL	SENSOR GROUND 2



BRAKE LAMP SWITCH (GAS)

BRAKE LAMP SWITCH (GAS) - GRAY 6 WAY

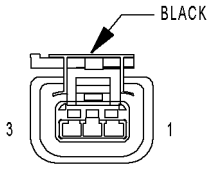
CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L50 18WT/TN (ABS)	BRAKE LAMP SWITCH OUTPUT
3	V40 20DB/RD (EXCEPT 1.6L)	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	V32 20YL/RD (EXCEPT 1.6L)	S/C SUPPLY
5	Z1 20BK	GROUND
6	K29 20WT/PK (1.6L)	BRAKE LAMP SWITCH SIGNAL
6	K29 20WT/PK (1.6L)	BRAKE LAMP SWITCH SIGNAL
6	K29 20WT/PK (2.4L)	BRAKE SWITCH SIGNAL
6	K29 20WT/PK (2.4L)	BRAKE SWITCH SIGNAL



CAMSHAFT POSITION SENSOR (DIESEL)

CAMSHAFT POSITION SENSOR (DIESEL) - BLACK 3 WAY

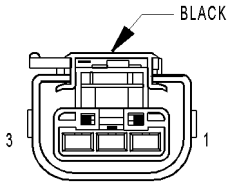
CAV	CIRCUIT	FUNCTION
1	K944 20BR/LG	CAMSHAFT POSITION SENSOR GROUND
2	K44 20YL/GY	CAMSHAFT POSITION SENSOR SIGNAL
3	A142 20RD/LG	AUTOMATIC SHUT DOWN RELAY OUTPUT



CAMSHAFT POSITION SENSOR (GAS)

CAMSHAFT POSITION SENSOR (GAS) - BLACK 3 WAY

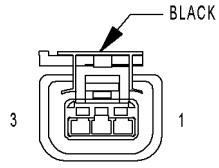
CAV	CIRCUIT	FUNCTION
1	F854 20GY/PK (1.6L)	CAMSHAFT POSITION SENSOR 5 VOLT SUPPLY
1	K7 20OR (EXCEPT 1.6L)	5 VOLT SUPPLY
2	K44 20TN/YL (1.6L)	CAMSHAFT POSITION SENSOR SIGNAL
2	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1
3	K944 20BR/GY (1.6L)	CAMSHAFT POSITION SENSOR GROUND
3	K44 20TN/YL (EXCEPT 1.6L)	CMP SIGNAL



CLUTCH PEDAL POSITION SWITCH (UP)

CLUTCH PEDAL POSITION SWITCH (UP) - BLACK 3 WAY

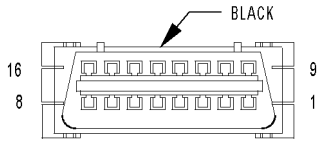
CAV	CIRCUIT	FUNCTION
1	K119 20LG/BK (1.6L/ DIESEL)	CLUTCH UPSTOP SWITCH SIGNAL
2	Z12 20BK/TN	GROUND
3	T141 20YL/RD	CLUTCH INTERLOCK SWITCH SIGNAL



CRANKSHAFT POSITION SENSOR (GAS)

CRANKSHAFT POSITION SENSOR (GAS) - BLACK 3 WAY

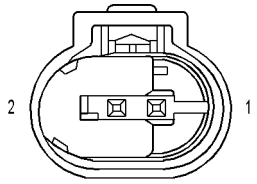
CAV	CIRCUIT	FUNCTION
1	K924 20BR/WT (1.6L)	CRANKSHAFT POSITION SENSOR GROUND
1	K7 20OR (EXCEPT 1.6L)	5 VOLT SUPPLY
2	K24 20GY/BK (1.6L)	CRANKSHAFT POSITION SENSOR SIGNAL
2	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1
3	K7 20OR (1.6L)	CRANKSHAFT POSITION SENSOR 5 VOLT SUPPLY
3	K24 20GY/BK (EXCEPT 1.6L)	CKP SIGNAL



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

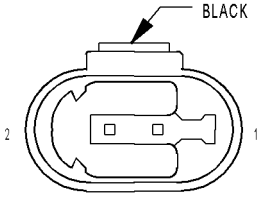
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	D223 20WT/VT	NOT USED
4	Z12 20BK/TN	GROUND
5	Z12 20BK/TN	GROUND
6	-	-
7	D21 20PK (DIESEL)	SCI TRANSMIT (ECM)
7	D21 20PK (GAS)	SCI TRANSMIT (PCM)
8	-	-
9	D24 20WT/DG	FLASH PROGRAM ENABLE
10	-	-
11	-	-
12	D20 20LG (GAS)	SCI RECEIVE
13	-	-
14	-	-
15	D15 20WT/DG (EATX)	SCI TRANSMIT (TCM)
16	A14 18RD/WT	FUSED B(+)



EGR SOLENOID (DIESEL)

EGR SOLENOID (DIESEL) - 2 WAY

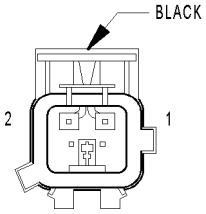
CAV	CIRCUIT	FUNCTION
1	K35 20GY/YL	EGR SOLENOID CONTROL
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



ENGINE COOLANT TEMPERATURE SENSOR (DIESEL)

ENGINE COOLANT TEMPERATURE SENSOR (DIESEL) - BLACK 2 WAY

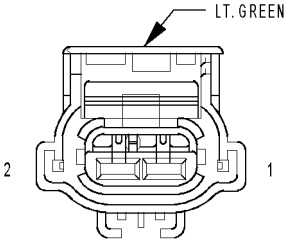
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K2 20LG/RD	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



ENGINE COOLANT TEMPERATURE SENSOR (GAS)

ENGINE COOLANT TEMPERATURE SENSOR (GAS) - BLACK 2 WAY

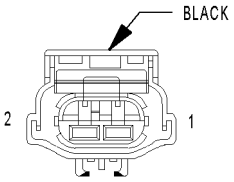
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB (1.6L)	ENGINE COOLANT TEMPERATURE SENSOR GROUND
1	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1
2	K2 20TN/BK (1.6L)	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K2 20TN/BK (EXCEPT 1.6L)	ECT SIGNAL



ENGINE OIL PRESSURE SWITCH

ENGINE OIL PRESSURE SWITCH - LT. GREEN 2 WAY

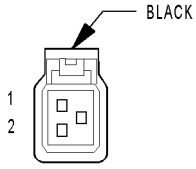
CAV	CIRCUIT	FUNCTION
1	G6 20GY (1.6L)	ENGINE OIL PRESSURE SWITCH SIGNAL
1	G6 20VT/LG (DIESEL)	ENGINE OIL PRESSURE SWITCH SIGNAL
1	G6 20GY (EXCEPT 1.6L/ DIESEL)	OIL PRESSURE SIGNAL
2	-	-



EVAP/PURGE SOLENOID (GAS)

EVAP/PURGE SOLENOID (GAS) - BLACK 2 WAY

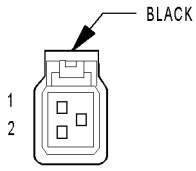
CAV	CIRCUIT	FUNCTION
1	F12 20DB/WT (1.6L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
1	K108 20WT/TN (EXCEPT 1.6L)	EVAP PURGE RETURN
2	K52 20PK/BK	EVAP PURGE CONTROL



FUEL INJECTOR NO. 1 (GAS)

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

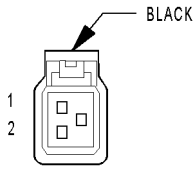
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB (1.6L)	FUEL INJECTOR NO. 1 DRIVER
1	K11 18WT/DB (EXCEPT 1.6L)	INJECTOR CONTROL NO. 1
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 2 (GAS)

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

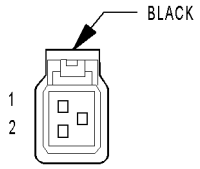
CAV	CIRCUIT	FUNCTION
1	K12 18TN (1.6L)	FUEL INJECTOR NO. 2 DRIVER
1	K12 18TN (EXCEPT 1.6L)	INJECTOR CONTROL NO. 2
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 3 (GAS)

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

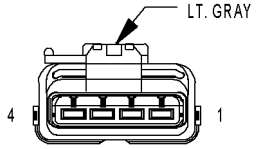
CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT (1.6L)	FUEL INJECTOR NO. 3 DRIVER
1	K13 18YL/WT (EXCEPT 1.6L)	INJECTOR CONTROL NO. 3
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 4 (GAS)

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

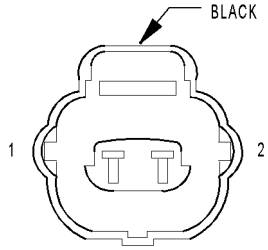
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR (1.6L)	FUEL INJECTOR NO. 4 DRIVER
1	K14 18LB/BR (EXCEPT 1.6L)	INJECTOR CONTROL NO. 4
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL PUMP MODULE

FUEL PUMP MODULE - LT. GRAY 4 WAY

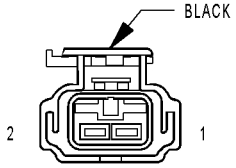
CAV	CIRCUIT	FUNCTION
1	Z1 16BK	GROUND
2	Z2 20BK/LG	GROUND
3	G4 20DB	FUEL LEVEL SENSOR SIGNAL
4	A141 16DG/WT	FUEL PUMP RELAY OUTPUT



GENERATOR (2.4L TURBO)

GENERATOR (2.4L TURBO) - BLACK 2 WAY

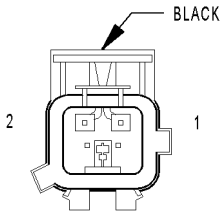
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K20 20DG	GEN FIELD CONTROL



GENERATOR (GAS EXCEPT 2.4L TURBO)

GENERATOR (GAS EXCEPT 2.4L TURBO) - BLACK 2 WAY

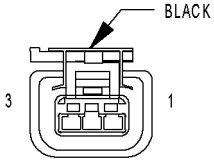
CAV	CIRCUIT	FUNCTION
1	K20 18DG (1.6L)	GENERATOR FIELD CONTROL
1	Z1 20BK (2.4L)	GROUND
2	A142 18DG/OR (1.6L)	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K20 20DG (2.4L)	GEN FIELD CONTROL



IDLE AIR CONTROL MOTOR (2.4L)

IDLE AIR CONTROL MOTOR (2.4L) - BLACK 2 WAY

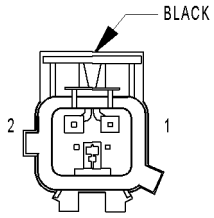
CAV	CIRCUIT	FUNCTION
1	K610 18VT/GY	IAC MOTOR CONTROL
2	K961 18BR/VT	IAC RETURN



IGNITION COIL (GAS)

IGNITION COIL (GAS) - BLACK 3 WAY

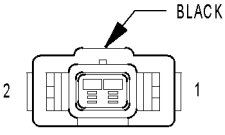
CAV	CIRCUIT	FUNCTION
1	K17 18DB/TN (1.6L)	IGNITION COIL NO. 2 DRIVER
1	K17 18DB/TN (2.4L EXCEPT TURBO)	COIL CONTROL NO. 2
1	K17 18DB/TN (2.4L TURBO)	COIL CONTROL NO. 2
2	A142 18DG/OR (1.6L/2.4L TURBO)	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	A142 16DG/OR (2.4L EXCEPT TURBO)	AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K19 18BK/GY (1.6L)	IGNITION COIL NO. 1 DRIVER
3	K19 18BK/GY (2.4L EXCEPT TURBO)	COIL CONTROL NO. 1
3	K19 18BK/GY (2.4L TURBO)	COIL CONTROL NO. 1



INLET AIR TEMPERATURE SENSOR (GAS)

INLET AIR TEMPERATURE SENSOR (GAS) - BLACK 2 WAY

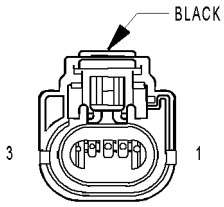
CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD (1.6L)	INLET AIR TEMPERATURE SENSOR SIGNAL
1	K21 20BK/RD (EXCEPT 1.6L)	IAT SIGNAL
2	K921 20RD (1.6L)	INLET AIR TEMPERATURE SENSOR GROUND
2	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1



KNOCK SENSOR (GAS)

KNOCK SENSOR (GAS) - BLACK 2 WAY

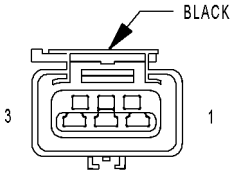
CAV	CIRCUIT	FUNCTION
1	K42 20DB/LG (1.6L)	KNOCK SENSOR SIGNAL
1	K42 20DB/LG (EXCEPT 1.6L)	KS SIGNAL
2	K45 20BK/VT (1.6L)	KNOCK SENSOR GROUND
2	K45 20BK/VT (EXCEPT 1.6L)	KS RETURN



MANIFOLD ABSOLUTE PRESSURE SENSOR (GAS)

MANIFOLD ABSOLUTE PRESSURE SENSOR (GAS) - BLACK 3 WAY

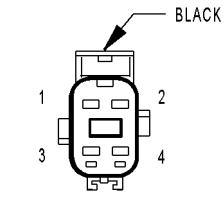
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD (1.6L)	MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL
1	K1 20DG/RD (EXCEPT 1.6L)	MAP SIGNAL
2	K901 20DB/VT (1.6L)	MANIFOLD ABSOLUTE PRESSURE SENSOR GROUND
2	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1
3	K7 20OR	5 VOLT SUPPLY
3	K6 18VT/WT (1.6L)	MANIFOLD ABSOLUTE PRESSURE SENSOR 5V SUPPLY



NATURAL VACUUM LEAK DETECTION ASSEMBLY (EXCEPT EXPORT)

NATURAL VACUUM LEAK DETECTION ASSEMBLY (EXCEPT EXPORT) - BLACK 3 WAY

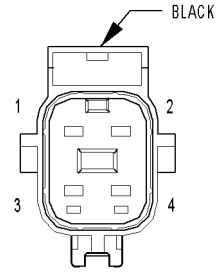
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K107 20OR/YL	NVLD SWITCH SIGNAL
3	K106 20WT/DG	NVLD SOLENOID CONTROL



OXYGEN SENSOR 1/1 UPSTREAM (GAS)

OXYGEN SENSOR 1/1 UPSTREAM (GAS) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR (1.6L)	AUTOMATIC SHUT DOWN RELAY OUTPUT
1	Z1 18BK (EXCEPT 1.6L)	GROUND
2	K79 18OR/RD (1.6L)	OXYGEN SENSOR 1/1 CONTROL
2	K99 18BR/OR (EXCEPT 1.6L)	O2 1/1 HEATER CONTROL
3	K902 20BR/DG (1.6L)	OXYGEN SENSOR 1/1 GROUND
3	K904 20DB/DG (EXCEPT 1.6L)	O2 RETURN
4	K41 20BK/DG (1.6L)	OXYGEN SENSOR 1/1 SIGNAL
4	K41 20BK/DG (EXCEPT 1.6L)	O2 1/1 SIGNAL

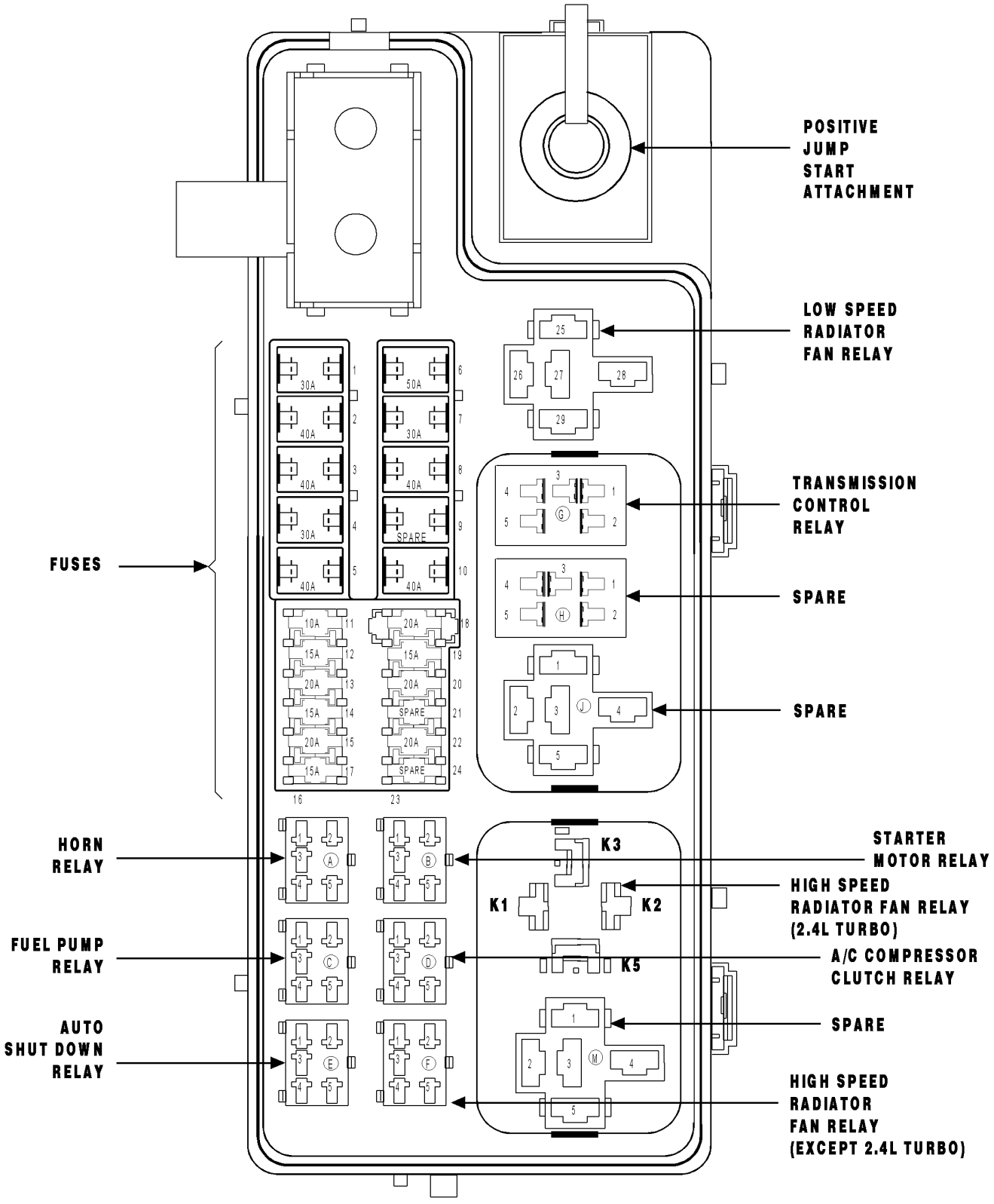


OXYGEN SENSOR 1/2 DOWNSTREAM (GAS)

OXYGEN SENSOR 1/2 DOWNSTREAM (GAS) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	K199 18BR/VT (1.6L)	OXYGEN SENSOR 1/2 CONTROL
1	Z1 18BK (EXCEPT 1.6L)	GROUND
2	A142 18DG/OR (1.6L)	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K199 18BR/VT (EXCEPT 1.6L)	O2 1/2 HEATER CONTROL
3	K904 20DB/DG (1.6L)	OXYGEN SENSOR 1/2 GROUND
3	K904 20DB/DG (EXCEPT 1.6L)	O2 RETURN
4	K141 20TN/WT (1.6L)	OXYGEN SENSOR 1/2 SIGNAL
4	K141 20TN/WT (EXCEPT 1.6L)	O2 1/2 SIGNAL

POWER DISTRIBUTION CENTER
GAS



A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
D1	C3 20DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
D2	C28 20DB/OR (1.6L/ DIESEL)	A/C COMPRESSOR CLUTCH RELAY CONTROL
D2	C28 20DB/OR (2.0L/2.4L)	A/C CLUTCH RELAY CONTROL
D3	-	-
D4	A142 18DG/OR (DIESEL)	AUTOMATIC SHUT DOWN RELAY OUTPUT
D4	F18 20LG/BK (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D5	A17 20RD/BK	FUSED B(+)

AUTO SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
E1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
E2	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
E3	-	-
E4	A14 18RD/WT	FUSED B(+)
E5	A14 18RD/WT	FUSED B(+)

FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
C1	A141 16DG/WT	FUEL PUMP RELAY OUTPUT
C2	K31 20BR	FUEL PUMP RELAY CONTROL
C3	-	-
C4	A142 18DG/OR (DIESEL)	AUTOMATIC SHUT DOWN RELAY OUTPUT
C4	F12 20DB/WT (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C5	A140 16DG/WT (DIESEL)	FUSED B(+)
C5	A14 18RD/WT (GAS)	FUSED B(+)

HIGH SPEED RADIATOR FAN RELAY (2.4L TURBO)

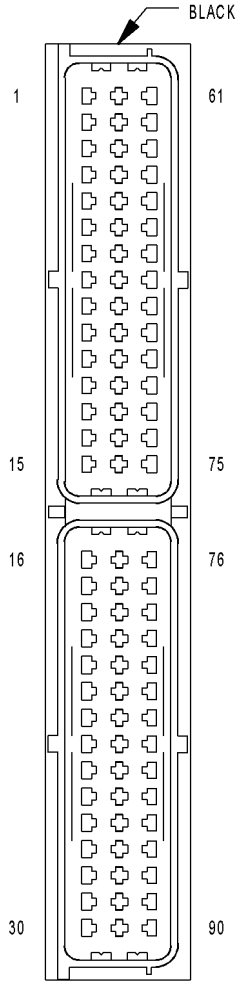
CAV	CIRCUIT	FUNCTION
K1	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
K2	C27 20DB/PK	HIGH SPEED RAD FAN RELAY CONTROL
K3	A110 10VT/RD	FUSED B(+)
K4	-	-
K5	C25 10YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT

HIGH SPEED RADIATOR FAN RELAY (EXCEPT 2.4L TURBO)

CAV	CIRCUIT	FUNCTION
F1	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT
F2	C27 20DB/PK (1.6L/ DIESEL)	HIGH SPEED RADIATOR FAN RELAY CONTROL
F2	C27 20DB/PK (2.4L)	HIGH SPEED RAD FAN RELAY CONTROL
F3	-	-
F4	A142 18DG/OR (DIESEL)	AUTOMATIC SHUT DOWN RELAY OUTPUT
F4	F18 20LG/BK (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
F5	A16 12GY	FUSED B(+)

LOW SPEED RADIATOR FAN RELAY

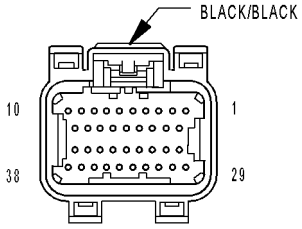
CAV	CIRCUIT	FUNCTION
25	A142 18DG/OR (DIESEL)	AUTOMATIC SHUT DOWN RELAY OUTPUT
25	F18 20LG/BK (GAS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
26	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
27	-	-
28	A16 12GY	FUSED B(+)
29	C24 20YL/RD (1.6L/ DIESEL)	LOW SPEED RADIATOR FAN RELAY CONTROL
29	C24 20YL/RD (2.4L EX-CEPT TURBO)	LOW SPEED RAD FAN RELAY CONTROL
29	C24 20DB/WT (2.4L TURBO)	LOW SPEED RAD FAN RELAY CONTROL



POWERTRAIN CONTROL MODULE (1.6L)

POWERTRAIN CONTROL MODULE (1.6L) - BLACK 90 WAY

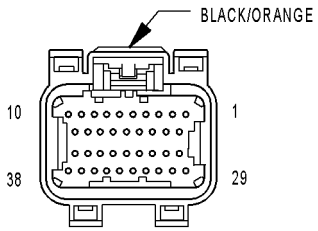
CAV	CIRCUIT	FUNCTION
1	A14 18GY/WT	FUSED B(+)
2	-	-
3	-	-
4	-	-
5	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
6	D25 20VT/YL	PCI BUS
7	K81 20DB/DG	ACCELERATOR PEDAL POSITION SENSOR NO. 2 SIGNAL
8	C22 18BR/WT	A/C HIGH PRESSURE SIGNAL
9	K921 20RD	INLET AIR TEMPERATURE SENSOR GROUND
10	N907 20BR/OR	VEHICLE SPEED SENSOR GROUND
11	K901 20DB/VT	MANIFOLD ABSOLUTE PRESSURE SENSOR GROUND
12	F858 20DG/LG	ACCELERATOR PEDAL POSITION SENSOR NO. 1 5 VOLT SUPPLY
13	F859 20DG/PK	ACCELERATOR PEDAL POSITION SENSOR NO. 2 5 VOLT SUPPLY
14	F855 18OR/PK	THROTTLE POSITION SENSOR 5 VOLT SUPPLY
15	-	-
16	K1 20DG/RD	MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL
17	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
18	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
19	K167 20BR/YL	ACCELERATOR PEDAL POSITION SENSOR NO. 1 GROUND
20	K42 20DB/LG	KNOCK SENSOR SIGNAL
21	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
22	K981 20BR/DG	ACCELERATOR PEDAL POSITION SENSOR NO. 2 GROUND
23	K922 20DB/OR	THROTTLE POSITION SENSOR GROUND
24	K902 20BR/DG	OXYGEN SENSOR 1/1 GROUND
25	K924 20BR/WT	CRANKSHAFT POSITION SENSOR GROUND
26	K45 20BK/VT	KNOCK SENSOR GROUND
27	-	-
28	Z12 18BK/TN	GROUND
29	Z12 18BK/TN	GROUND
30	K17 18DB/TN	IGNITION COIL NO. 2 DRIVER
31	V50 20VT/OR	ELECTRONIC THROTTLE CONTROL POSITIVE MOTOR CONTROL
32	V51 20WT	ELECTRONIC THROTTLE CONTROL NEGATIVE MOTOR CONTROL
33	K4 20BK/LB	ENGINE COOLANT TEMPERATURE SENSOR GROUND
34	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
35	K90 20TN	STARTER MOTOR RELAY CONTROL
36	C24 20YL/RD	LOW SPEED RADIATOR FAN RELAY CONTROL
37	-	-
38	-	-
39	K10 20DB/OR	STEERING PRESSURE SWITCH SIGNAL
40	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
41	D20 20LG	SCI RECEIVE
42	K944 20BR/GY	CAMSHAFT POSITION SENSOR GROUND
43	F854 20GY/PK	CAMSHAFT POSITION SENSOR 5 VOLT SUPPLY
44	K7 20OR	CRANKSHAFT POSITION SENSOR 5 VOLT SUPPLY
45	F857 20OR/PK	VEHICLE SPEED SENSOR 5V SUPPLY
46	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL NO. 1
47	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
48	-	-
49	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
50	G6 20GY	ENGINE OIL PRESSURE SWITCH SIGNAL
51	-	-
52	-	-
53	K904 20DB/DG	OXYGEN SENSOR 1/2 GROUND
54	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
55	K52 20PK/BK	EVAP/PURGE SOLENOID CONTROL
56	-	-
57	-	-
58	-	-
59	Z12 18BK/TN	GROUND
60	K19 18BK/GY	IGNITION COIL NO. 1 DRIVER
61	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
62	-	-
63	-	-
64	-	-
65	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
66	K31 20BR	FUEL PUMP RELAY CONTROL
67	-	-
68	L50 20WT/TN	BRAKE LAMP SWITCH OUTPUT
69	K119 20LG/BK	CLUTCH UPSTOP SWITCH SIGNAL
70	T141 20YL/RD	CLUTCH INTERLOCK SWITCH SIGNAL
71	K29 20WT/PK	BRAKE LAMP SWITCH SIGNAL
72	K21 20BK/RD	INLET AIR TEMPERATURE SENSOR SIGNAL
73	D21 20PK	SCI TRANSMIT
74	K80 20BK/LG	ACCELERATOR PEDAL POSITION SENSOR NO. 1 SIGNAL
75	K6 18VT/WT	MANIFOLD ABSOLUTE PRESSURE SENSOR 5V SUPPLY
76	-	-
77	K122 20DB/GY	THROTTLE POSITION SENSOR SIGNAL NO. 2
78	-	-
79	G7 20WT/OR	VEHICLE SPEED SENSOR SIGNAL
80	-	-
81	K79 18OR/RD	OXYGEN SENSOR 1/1 CONTROL
82	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
83	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
84	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
85	K199 18BR/VT	OXYGEN SENSOR 1/2 CONTROL
86	-	-
87	-	-
88	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
89	K20 18DG	GENERATOR FIELD CONTROL
90	Z12 18BK/TN	GROUND



POWERTRAIN CONTROL MODULE C1 (NGC)

POWERTRAIN CONTROL MODULE C1 (NGC) - BLACK/BLACK 38 WAY

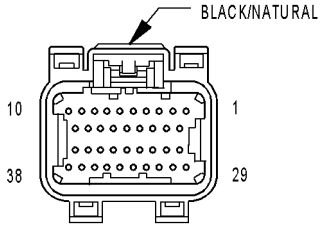
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	Z12 16BK/TN	GROUND
10	-	-
11	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F11 20RD/WT (EATX)	FUSED IGNITION SWITCH OUTPUT (UNLOCK-RUN-START)
13	G7 20WT/OR (MTX)	VEHICLE SPEED SIGNAL
14	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
15	K55 18LB (2.4L TURBO)	TIP SOL CONTROL
16	-	-
17	K150 18DB/YL (2.4L TURBO)	SURGE SOL CONTROL
18	Z12 16BK/TN	GROUND
19	-	-
20	G6 20GY	OIL PRESSURE SIGNAL
21	-	-
22	K145 20BR/OR	AAT SIGNAL
23	K153 20DB/LG (2.4L TURBO)	TIP SIGNAL
24	-	-
25	D20 20LG	SCI RECEIVE
26	D6 20PK/LB (EATX)	SCI RECEIVE (TCM)
27	K6 20VT/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
37	D15 20WT/DG (EATX)	SCI TRANSMIT (TCM)
38	D25 18VT/YL	PCI BUS



POWERTRAIN CONTROL MODULE C2 (NGC)

POWERTRAIN CONTROL MODULE C2 (NGC) - BLACK/ORANGE 38 WAY

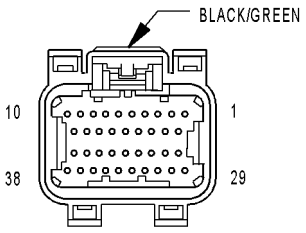
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	K17 18DB/TN	COIL CONTROL NO. 2
10	K19 18BK/GY	COIL CONTROL NO. 1
11	K14 18LB/BR	INJECTOR CONTROL NO. 4
12	K13 18YL/WT	INJECTOR CONTROL NO. 3
13	K12 18TN	INJECTOR CONTROL NO. 2
14	K11 18WT/DB	INJECTOR CONTROL NO. 1
15	-	-
16	-	-
17	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 20TN/BK	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 18BK/LB	SENSOR GROUND 1
28	K961 18BR/VT	IAC RETURN
29	K7 20OR	5 VOLT SUPPLY
30	K21 20BK/RD	IAT SIGNAL
31	K41 20BK/DG	O2 1/1 SIGNAL
32	K904 18DB/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 18VT/GY	IAC MOTOR CONTROL



POWERTRAIN CONTROL MODULE C3 (NGC)

POWERTRAIN CONTROL MODULE C3 (NGC) - BLACK/NATURAL 38 WAY

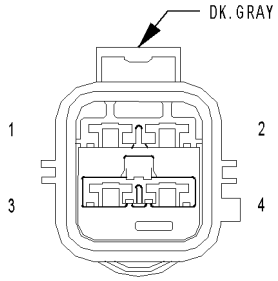
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
4	C27 20DB/PK	HIGH SPEED RAD FAN RELAY CONTROL
5	V35 20LG/RD (SPEED CONTROL)	S/C VENT CONTROL
6	C24 20YL/RD	LOW SPEED RAD FAN RELAY CONTROL
6	C24 20DB/WT (2.4L TURBO)	LOW SPEED RAD FAN RELAY CONTROL
7	V32 20YL/RD	S/C SUPPLY
8	K106 18WT/DG	NVLD SOLENOID CONTROL
9	-	-
10	-	-
11	C28 20DB/OR	A/C CLUTCH RELAY CONTROL
12	V36 20TN/RD (SPEED CONTROL)	S/C VACUUM CONTROL
13	-	-
14	-	-
15	-	-
16	-	-
17	K167 20BR/YL	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	C22 20DB/WT	A/C HIGH PRESSURE SIGNAL
25	-	-
26	T44 18YL/LB (EXCEPT TURBO)	AUTOSTICK DOWNSHIFT SWITCH SIGNAL
26	T44 18YL (TURBO)	AUTOSTICK DOWNSHIFT SWITCH SIGNAL
27	T5 20LG/LB (EXCEPT TURBO)	AUTOSTICK UPSHIFT SWITCH SIGNAL
27	T5 20LG (TURBO)	AUTOSTICK UPSHIFT SWITCH SIGNAL
28	A142 18DGOR	AUTOMATIC SHUTDOWN RELAY OUTPUT
29	K108 20WT/TN	EVAP PURGE RETURN
30	K10 20DB/OR	PSP SWITCH SIGNAL
31	-	-
32	-	-
33	-	-
34	V37 20RD/LG	S/C SWITCH SIGNAL
35	K107 18OR	NVLD SWITCH SIGNAL
36	-	-
37	K31 20BR	FUEL PUMP RELAY CONTROL
38	K90 20TN	STARTER MOTOR RELAY CONTROL



POWERTRAIN CONTROL MODULE C4 (NGC)

POWERTRAIN CONTROL MODULE C4 (NGC) - BLACK/GREEN 38 WAY

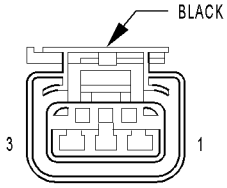
CAV	CIRCUIT	FUNCTION
1	T60 18BR	OD SOLENOID CONTROL
2	T59 18PK (2.4L EXCEPT TURBO)	UD SOLENOID CONTROL
2	T59 18PK/BK (2.4L TURBO)	UD SOLENOID CONTROL
3	-	-
4	-	-
5	-	-
6	T19 18WT	2-4 SOLENOID CONTROL
7	-	-
8	-	-
9	-	-
10	T20 18LB	L/R SOLENOID CONTROL
11	-	-
12	Z14 16BK/YL	GROUND
13	-	-
14	Z13 16BK/RD	GROUND
15	T1 20LG/BK	TRS T1 SENSE
16	T3 20VT	TRS T3 SENSE
17	-	-
18	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
19	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
20	-	-
21	-	-
22	T9 18OR/BK	OD PRESSURE SWITCH SENSE
23	-	-
24	-	-
25	-	-
26	-	-
27	T41 20BK/WT	TRS T41 SENSE
28	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
29	T50 18DG	L/R PRESSURE SWITCH SENSE
30	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
31	-	-
32	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
33	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
34	T13 20DB/BK	SPEED SENSOR GROUND
35	T54 20VT/PK	TRANSMISSION TEMPERATURE SENSOR SIGNAL
36	-	-
37	T42 20VT/WT	TRS T42 SENSE
38	-	-



RADIATOR FAN MOTOR (2.4L TURBO)

RADIATOR FAN MOTOR (2.4L TURBO) - DK. GRAY 4 WAY

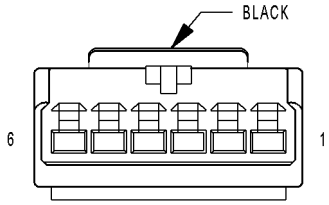
CAV	CIRCUIT	FUNCTION
1	C25 10YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT
2	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
3	Z1 10BK	GROUND
4	-	-



RADIATOR FAN MOTOR (EXCEPT 2.4L TURBO)

RADIATOR FAN MOTOR (EXCEPT 2.4L TURBO) - BLACK 3 WAY

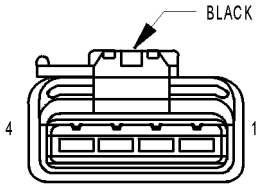
CAV	CIRCUIT	FUNCTION
1	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
2	Z1 12BK	GROUND
3	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

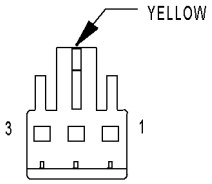
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	G5 20DB/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z2 20BK/LG	GROUND
6	M1 18PK	FUSED B(+)



SPEED CONTROL SERVO (2.4L)

SPEED CONTROL SERVO (2.4L) - BLACK 4 WAY

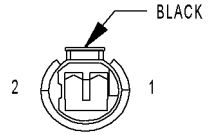
CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	S/C VACUUM CONTROL
2	V35 20LG/RD	S/C VENT CONTROL
3	V40 20DB/RD	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	Z1 20BK	GROUND



SPEED CONTROL SWITCH

SPEED CONTROL SWITCH - YELLOW 3 WAY

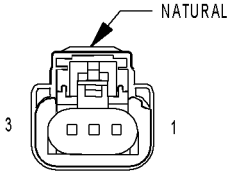
CAV	CIRCUIT	FUNCTION
1	V131 20BK/LG	SPEED CONTROL SWITCH SIGNAL
2	-	-
3	Z123 20RD/TN	GROUND



SURGE SOLENOID (2.4L TURBO)

SURGE SOLENOID (2.4L TURBO) - BLACK 2 WAY

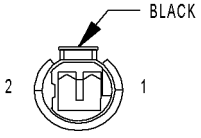
CAV	CIRCUIT	FUNCTION
1	K150 18DB/YL	SURGE SOL CONTROL
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



THROTTLE INLET PRESSURE SENSOR (2.4L TURBO)

THROTTLE INLET PRESSURE SENSOR (2.4L TURBO) - NATURAL 3 WAY

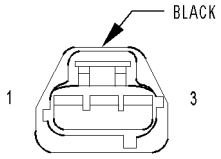
CAV	CIRCUIT	FUNCTION
1	K153 20DB/LG	TIP SIGNAL
2	K167 20BR/YL	SENSOR GROUND 2
3	K6 20VT/WT	5 VOLT SUPPLY



THROTTLE INLET PRESSURE SOLENOID (2.4L TURBO)

THROTTLE INLET PRESSURE SOLENOID (2.4L TURBO) - BLACK 2 WAY

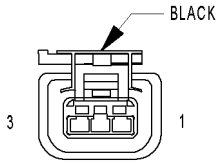
CAV	CIRCUIT	FUNCTION
1	K55 18LB	TIP SOL CONTROL
2	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)



THROTTLE POSITION SENSOR (2.4L)

THROTTLE POSITION SENSOR (2.4L) - BLACK 3 WAY

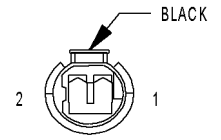
CAV	CIRCUIT	FUNCTION
1	K7 20OR	5 VOLT SUPPLY
2	K22 20OR/DB	TP SIGNAL
3	K4 20BK/LB	SENSOR GROUND 1



VEHICLE SPEED SENSOR (GAS MTX)

VEHICLE SPEED SENSOR (GAS MTX) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	F857 20OR/PK (1.6L)	VEHICLE SPEED SENSOR 5V SUPPLY
1	K7 20OR (EXCEPT 1.6L)	5 VOLT SUPPLY
2	N907 20BR/OR (1.6L)	VEHICLE SPEED SENSOR GROUND
2	K4 20BK/LB (EXCEPT 1.6L)	SENSOR GROUND 1
3	G7 20WT/OR (1.6L)	VEHICLE SPEED SENSOR SIGNAL
3	G7 20WT/OR (EXCEPT 1.6L)	VEHICLE SPEED SIGNAL



WASTEGATE SOLENOID (2.4L TURBO)

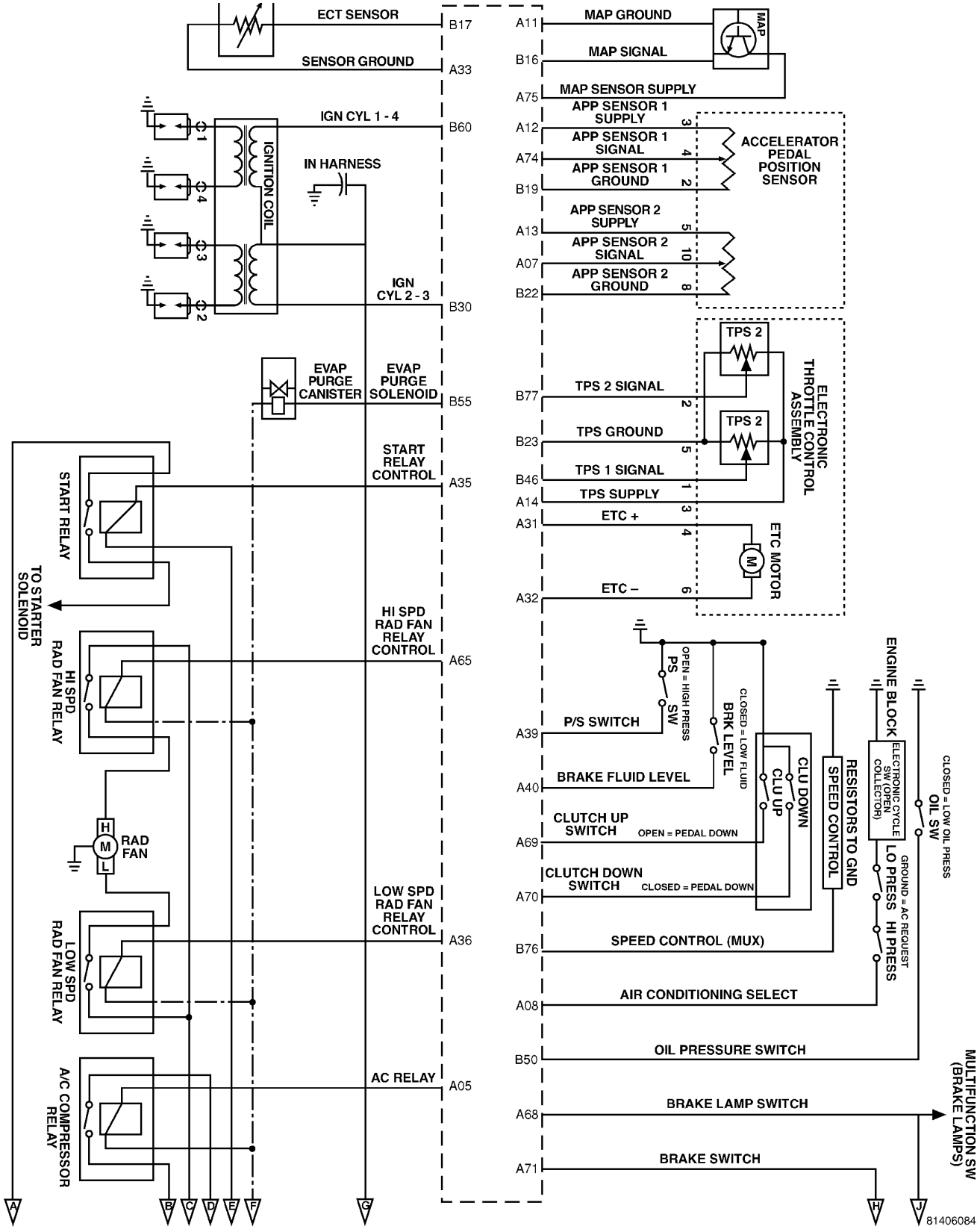
WASTEGATE SOLENOID (2.4L TURBO) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K137 18DB/GY	WASTEGATE SOL CONTROL
2	Z1 18BK	GROUND

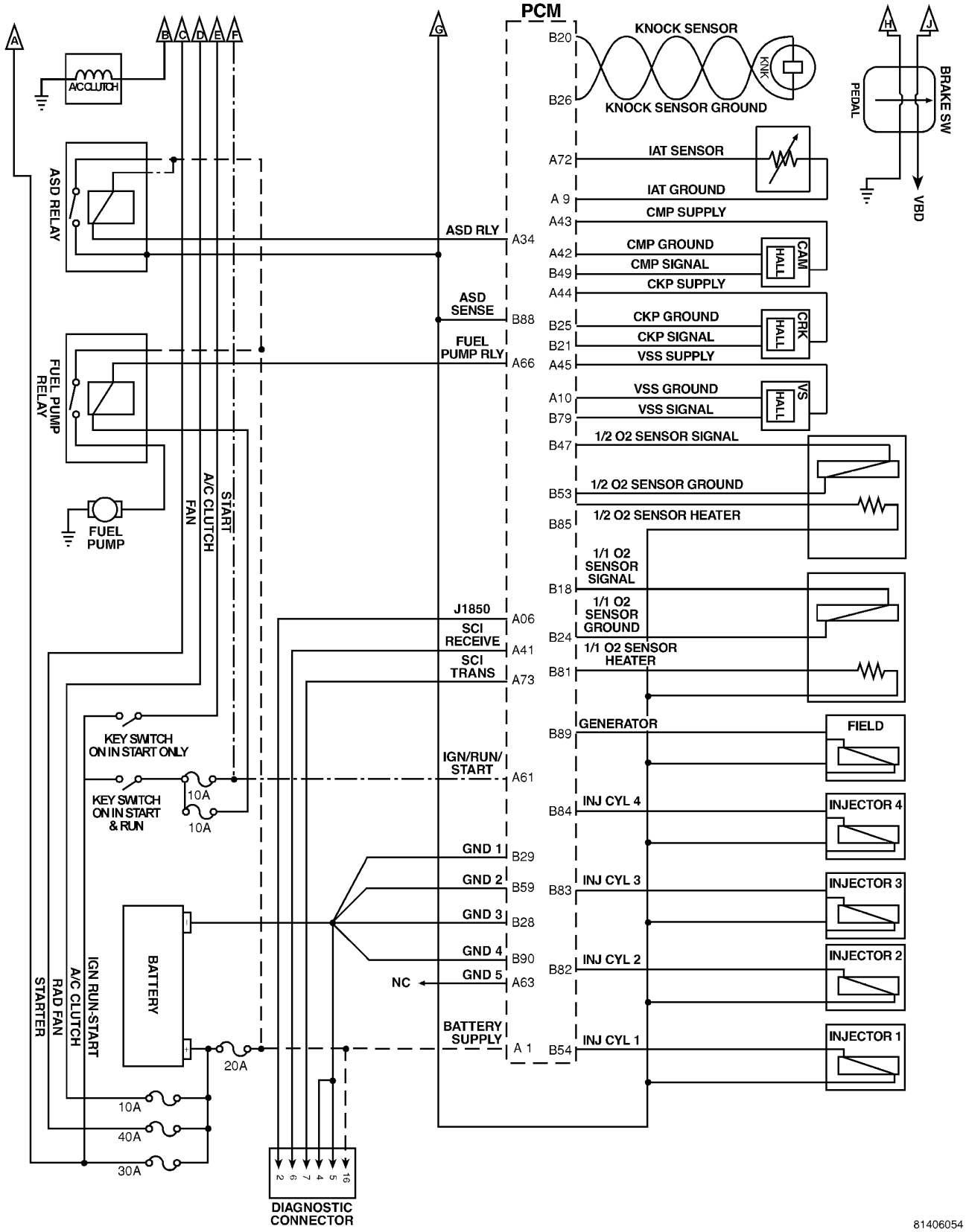
NOTES

10.0 SCHEMATIC DIAGRAMS

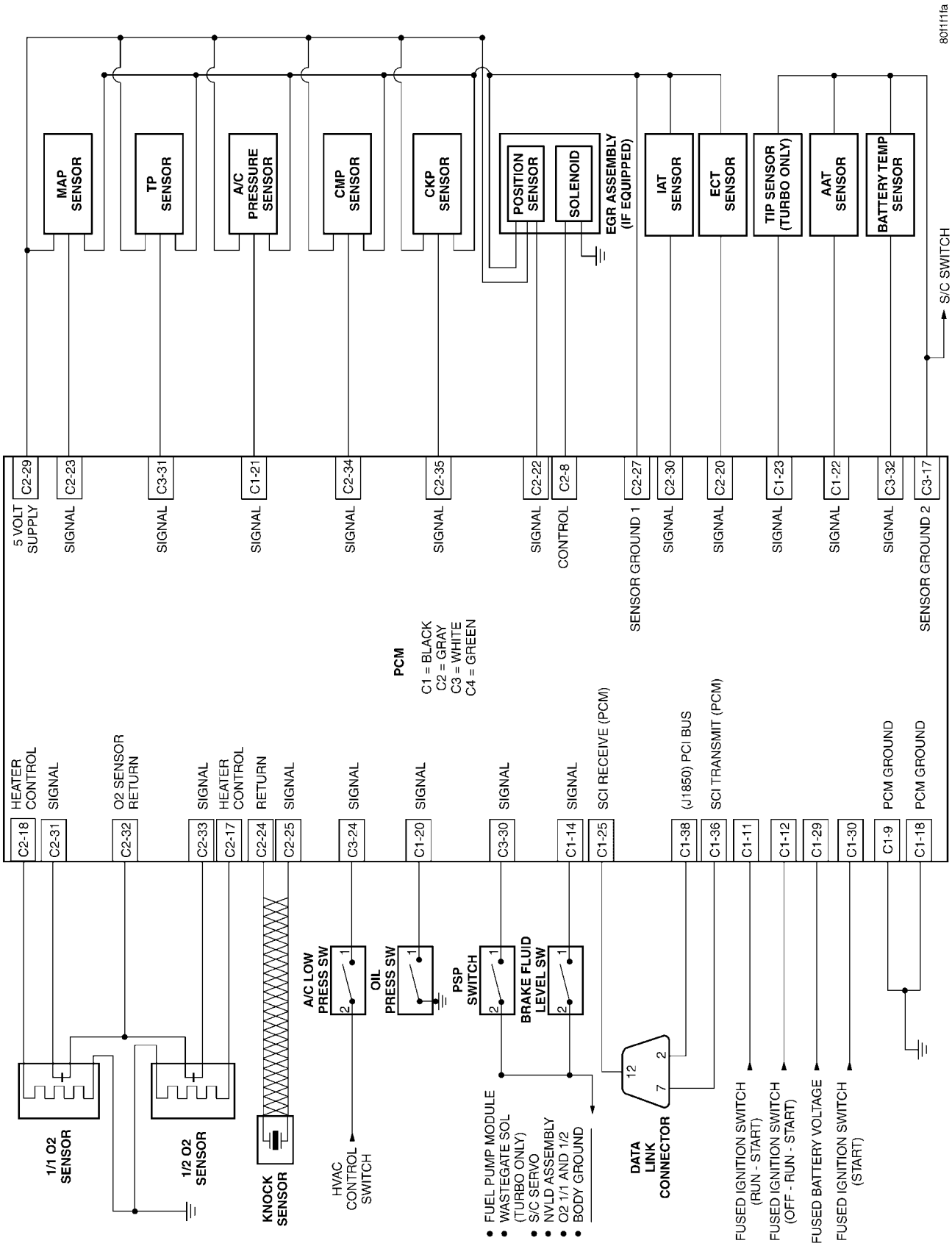
10.1 PT 1.6L ENGINE



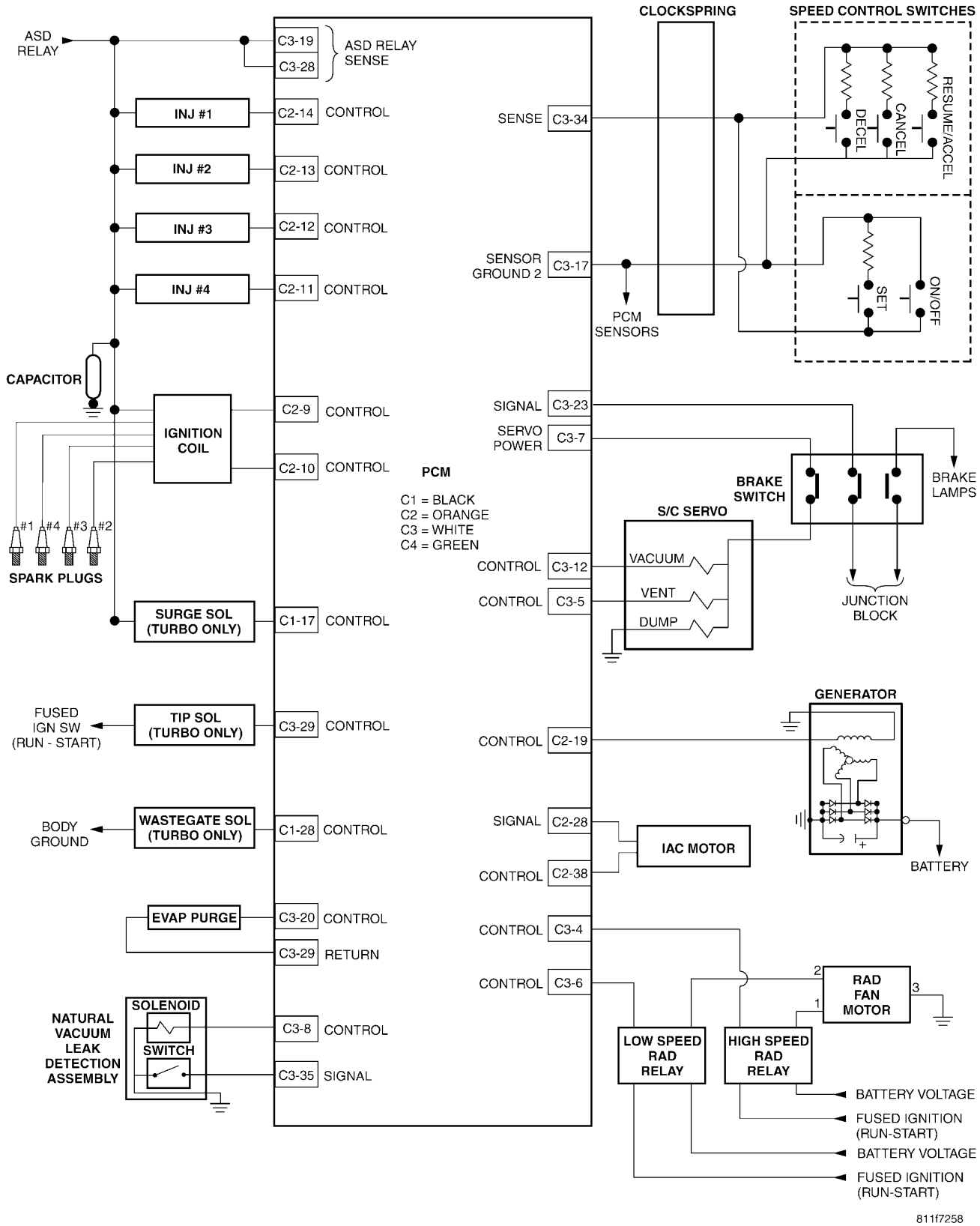
10.1 PT 1.6L ENGINE (Continued)

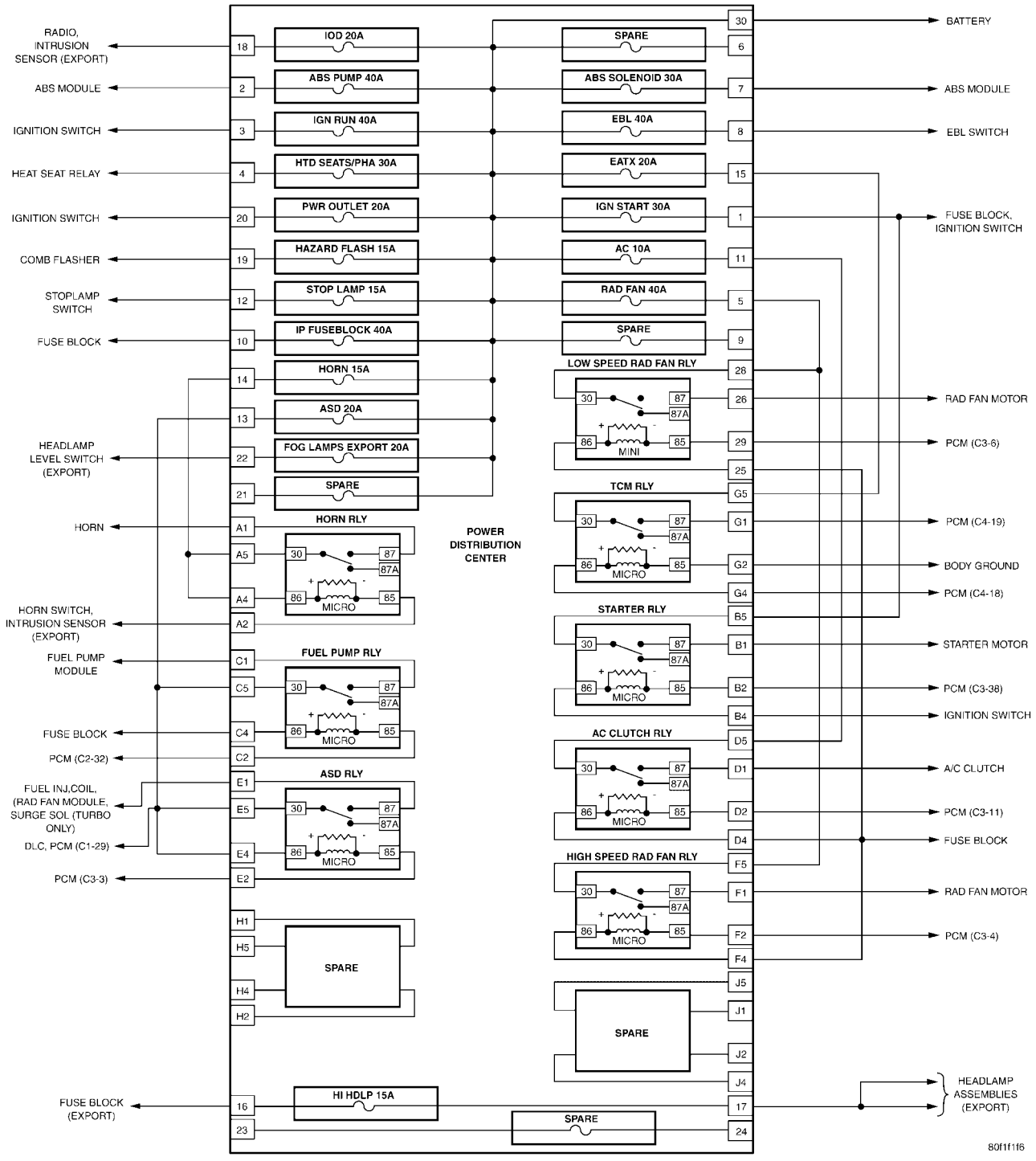


10.2 PT 2.0L AND 2.4L ENGINES



10.2 PT 2.0L AND 2.4L ENGINES (Continued)



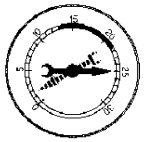

RADIO, INTRUSION SENSOR (EXPORT)
ABS MODULE
IGNITION SWITCH
HEAT SEAT RELAY
IGNITION SWITCH
COMB FLASHER
STOPLAMP SWITCH
FUSE BLOCK
HEADLAMP LEVEL SWITCH (EXPORT)
HORN
HORN SWITCH, INTRUSION SENSOR (EXPORT)
FUEL PUMP MODULE
FUSE BLOCK
PCM (C2-32)
FUEL INJ,COIL, (RAD FAN MODULE, SURGE SOL (TURBO ONLY)
DLC, PCM (C1-29)
PCM (C3-3)
FUSE BLOCK (EXPORT)
18
2
3
4
20
19
12
10
14
13
22
21
A1
A5
A4
A2
C1
C5
C4
C2
E1
E5
E4
E2
H1
H5
H4
H2
16
23
IOD 20A
ABS PUMP 40A
IGN RUN 40A
HTD SEATS/PHA 30A
PWR OUTLET 20A
HAZARD FLASH 15A
STOP LAMP 15A
IP FUSEBLOCK 40A
HORN 15A
ASD 20A
FOG LAMPS EXPORT 20A
SPARE
HORN RLY
FUEL PUMP RLY
ASD RLY
SPARE
HI HDLP 15A
SPARE
POWER DISTRIBUTION CENTER
SPARE
ABS SOLENOID 30A
EBL 40A
EATX 20A
IGN START 30A
AC 10A
RAD FAN 40A
SPARE
LOW SPEED RAD FAN RLY
TCM RLY
STARTER RLY
AC CLUTCH RLY
HIGH SPEED RAD FAN RLY
SPARE
SPARE
MICRO
MINI
30
6
7
8
15
1
11
5
9
28
26
29
25
G5
G1
G2
G4
B5
B1
B2
B4
D5
D1
D2
D4
F5
F1
F2
F4
J5
J1
J2
J4
17
24
BATTERY
ABS MODULE
EBL SWITCH
FUSE BLOCK, IGNITION SWITCH
RAD FAN MOTOR
PCM (C3-6)
PCM (C4-19)
BODY GROUND
PCM (C4-18)
STARTER MOTOR
PCM (C3-38)
IGNITION SWITCH
A/C CLUTCH
PCM (C3-11)
FUSE BLOCK
RAD FAN MOTOR
PCM (C3-4)
HEADLAMP ASSEMBLIES (EXPORT)
80f1f116

NOTES

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

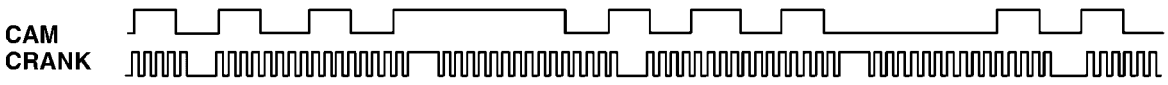
WORN VALVE GUIDES (STEADIES AS ENGINE SPEED INCREASES)

WORN VALVE SPRINGS (MORE PRONOUNCED AS ENGINE SPEED INCREASES)

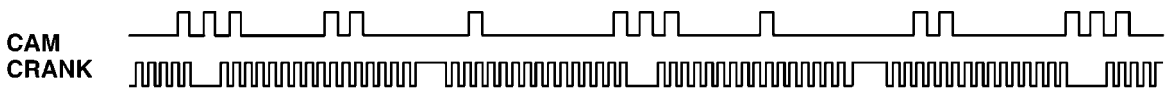
0920606

NGC TYPICAL SCOPE PATTERNS
CAMSHAFT AND CRANKSHAFT SENSOR

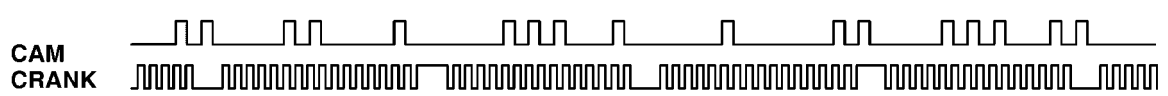
4 CYL ENGINES



6 CYL ENGINES

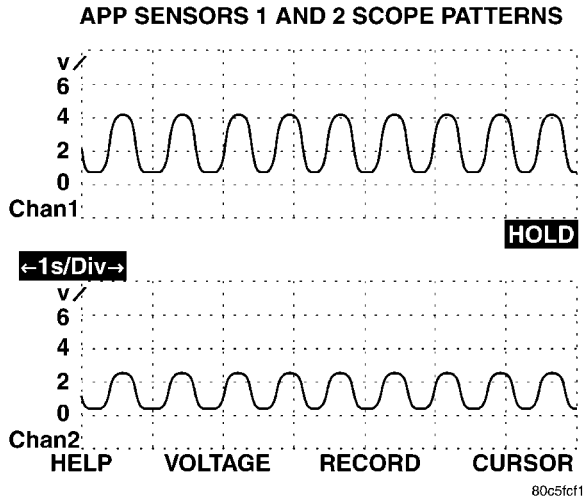


8 CYL ENGINES

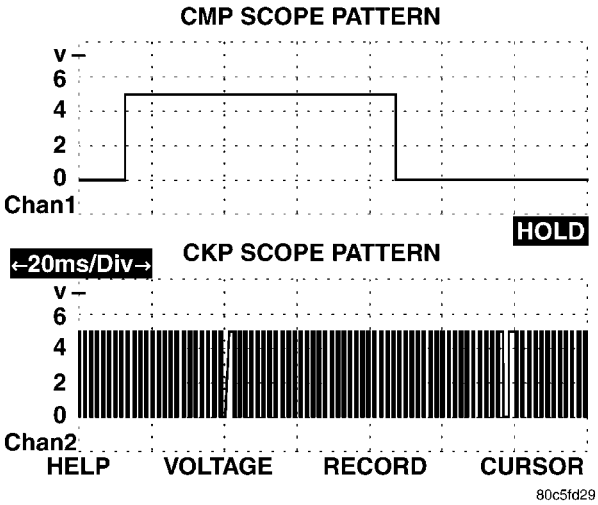


80dd1b34

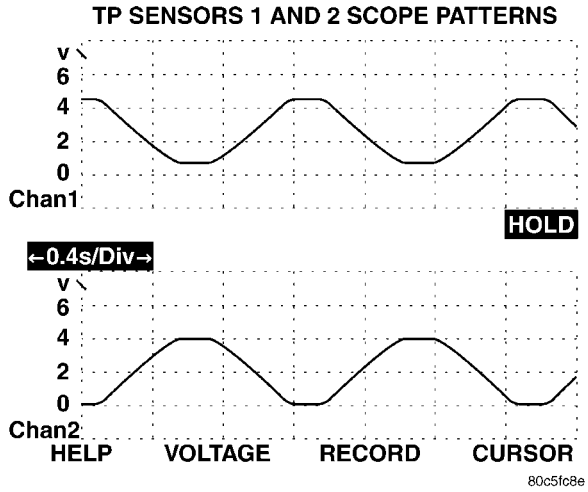
1.6L

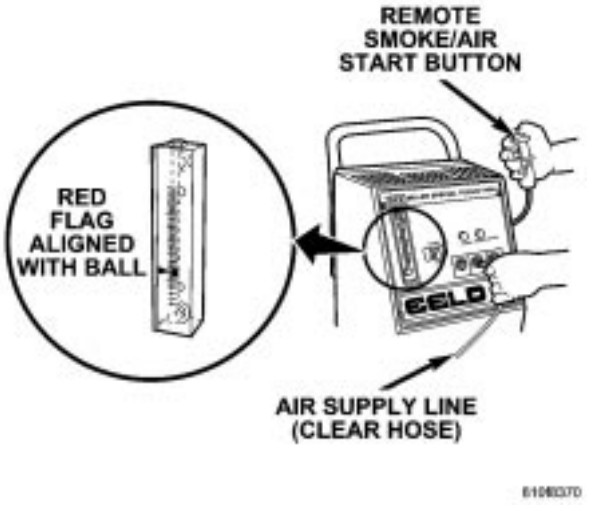

APP SENSORS 1 AND 2 SCOPE PATTERNS
V
6
4
2
0
Chan1
HOLD
←1s/Div→
V
6
4
2
0
Chan2
HELP
VOLTAGE
RECORD
CURSOR
80c5fcf1

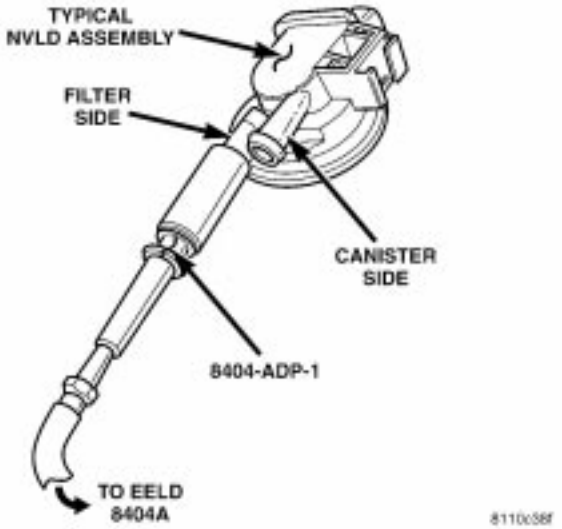
1.6L

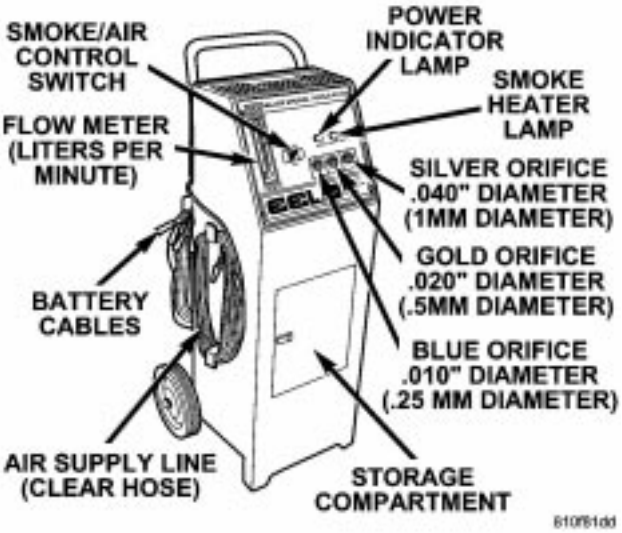

CMP SCOPE PATTERN
V
6
4
2
0
Chan1
HOLD
CKP SCOPE PATTERN
←20ms/Div→
V
6
4
2
0
Chan2
HELP
VOLTAGE
RECORD
CURSOR
80c5fd29

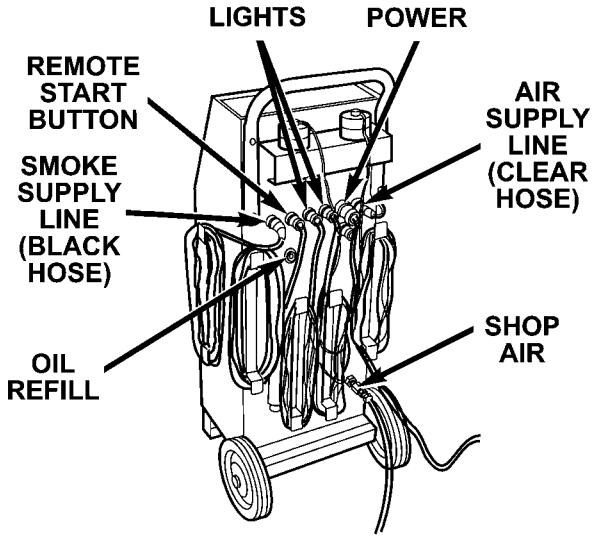
1.6L


TP SENSORS 1 AND 2 SCOPE PATTERNS
V
6
4
2
0
Chan1
HOLD
←0.4s/Div→
V
6
4
2
0
Chan2
HELP
VOLTAGE
RECORD
CURSOR
80c5fc8e

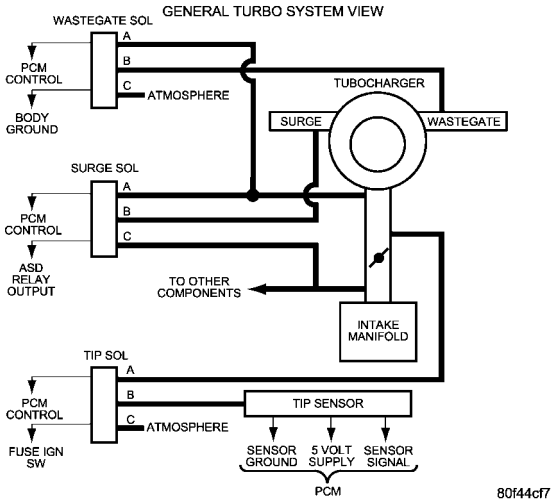

REMOTE SMOKE/AIR START BUTTON
RED FLAG ALIGNED WITH BALL
AIR SUPPLY LINE (CLEAR HOSE)


TYPICAL NVLD ASSEMBLY
FILTER SIDE
CANISTER SIDE
8404-ADP-1
TO EELD 8404A


SMOKE/AIR CONTROL SWITCH
POWER INDICATOR LAMP
SMOKE HEATER LAMP
FLOW METER (LITERS PER MINUTE)
SILVER ORIFICE .040" DIAMETER (1MM DIAMETER)
GOLD ORIFICE .020" DIAMETER (.5MM DIAMETER)
BATTERY CABLES
BLUE ORIFICE .010" DIAMETER (.25 MM DIAMETER)
AIR SUPPLY LINE (CLEAR HOSE)
STORAGE COMPARTMENT



80c38d69



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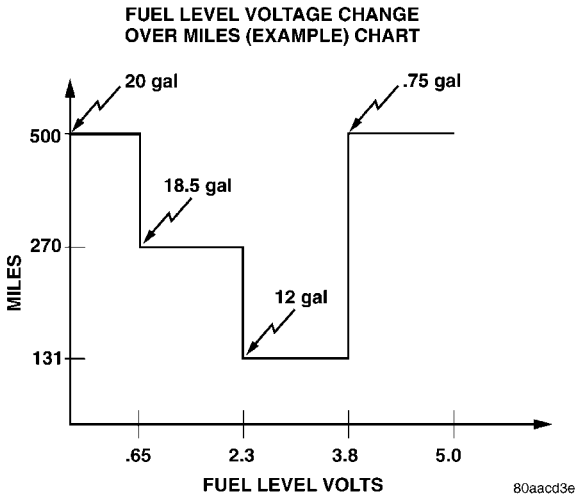

80aacd3e

NOTES