G - TESTS W/CODES - 1.6L & 2.0L
Article Text

1999 Suzuki Vitara
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Friday, January 18, 2002 08:09AM

ARTICLE BEGINNING

1999 ENGINE PERFORMANCE
Self-Diagnostics
SUZUKI

Vitara 1.6L & 2.0L

CIRCUIT TESTS

NOTE: See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article and appropriate wiring diagrams in WIRING DIAGRAMS article for PCM harness connector and wire terminal identification.

CIRCUIT TEST A-1: MALFUNCTION INDICATOR LIGHT (MIL) **INOPERATIVE**

NOTE: With ignition on, PCM energizes main relay. As PCM is supplied ignition power, MIL illuminates. After engine starts, MIL turns off if no malfunction is detected. If a malfunction is detected, MIL will remain illuminated until system is repaired.

1) Turn ignition on. Observe instrument cluster warning lights. If all warning lights illuminate except for MIL, go to next step. If no warning lights illuminate, check for blown fuses, faulty ignition switch, or poor connection at instrument cluster. Repair as necessary.
2) Attempt to start engine. If engine does not start, go to CIRCUIT TEST A-3: PCM POWER & GROUND CIRCUIT CHECK/ENGINE NO START. If engine starts, turn ignition off and disconnect PCM harness connectors. Go to next step.
3) Connect a fused jumper wire between ground and terminal No. 34 (Purple/Yellow wire) at 35-pin PCM harness connector. Turn ignition on. If MIL illuminates, replace PCM. If MIL does not illuminate, check for faulty MIL bulb or open in Purple/Yellow wire. Repair as necessary and retest system.

CIRCUIT TEST A-2: MALFUNCTION INDICATOR LIGHT (MIL) REMAINS **ILLUMINATED**

NOTE: With ignition on, PCM energizes main relay. As PCM is supplied ignition power, MIL illuminates. After engine starts, MIL turns off if no malfunction is detected. If a malfunction is detected, MIL will remain illuminated until system is repaired.

1) Connect scan tool to Data Link Connector (DLC). Start engine and attempt to retrieve DTCs. If any DTCs are displayed, see DIAGNOSTIC TESTS. If no DTCs are displayed, go to next step.

2) Turn ignition off. Disconnect PCM harness connectors. Turn ignition on. If MIL illuminates, repair short to ground in Purple/Yellow wire between MIL bulb and PCM harness connector. If MIL does not illuminate, replace PCM and retest system.

CIRCUIT TEST A-3: PCM POWER & GROUND CIRCUIT CHECK/ENGINE NO **START**

NOTE: For PCM connector and terminal identification, see PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article.

1) Observe main relay (located in underhood fuse box) while cycling ignition switch from ON to OFF position. If no sound is heard at relay, go to next step. If sound is heard at relay, go to step 4).

2) Check condition of Main fuse located in engine compartment relay/fuse box. If fuse is blown, check for a short circuit and repair as necessary. If fuse is okay, go to next step.

3) Turn ignition off. Remove main relay. Inspect and repair relay terminals if necessary. Using DVOM, check continuity between relay terminals "A" and "B". See Fig. 1. No continuity should be indicated. Measure resistance between terminals "C" and "D". Resistance should be 79-95 ohms. Use fused jumper wires to connect battery voltage and ground to terminals "C" and "D". There should now be continuity between terminals "A" and "B". If test results are not as specified, replace main relay. If relay is okay, go to next step.

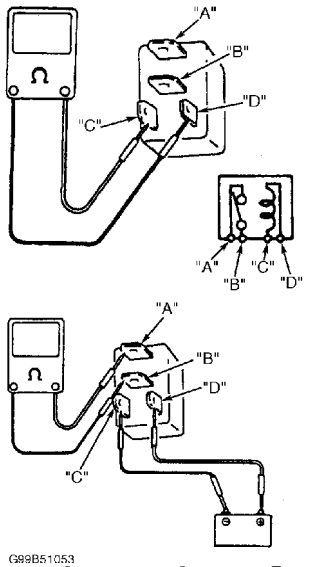

Fig. 1: Testing Main Relay (Vitara 4-Cylinder)
Courtesy of Suzuki of America Corp.

4) Turn ignition off. Disconnect PCM harness connectors. Reinstall main relay. Turn ignition on. Measure voltage between ground and terminal No. C51-3-20, also between ground and terminal No. E61-9 at PCM harness connector. If voltage is 10-14 volts, go to next step. If voltage is not as specified, repair open in Black/Red wire between MAIN fuse and main relay, in Blue wire between main relay and PCM, or Black/White wire between ignition switch and PCM. Retest system.

NOTE: For PCM connector and terminal identification, see PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article.

5) Connect a fused jumper wire between ground and PCM harness connector terminal No. E61-9. Turn ignition on. Using DVOM, measure voltage between ground and PCM harness connector terminals No. C51-3-4 and C51-3-15. If voltage is 10-14 volts, check for continuity to ground on PCM harness connector terminals No. C51-2-28 and C51-3-17 (Black/Blue wires). Also check for continuity to ground on harness connector terminal No. C51-3-6 (Black/Green wire). If ground circuits are okay, replace PCM and retest system. If voltage is not as specified, go to next step.

6) Retest main relay by cycling ignition switch from ON to OFF position. If sound is heard at relay, retest main relay. See step 3). If relay is okay, or if no sound is heard at relay, repair open circuit in Black/Red wire between MAIN fuse and main relay or in Blue/Black wire between main relay and PCM.

DIAGNOSTIC TESTS

NOTE: Before proceeding with diagnostic tests, perform PRELIMINARY DIAGNOSTIC PROCEDURE in SELF-DIAGNOSTICS - INTRODUCTION article.

DTC P0101: MASS AIRFLOW (MAF) CIRCUIT PERFORMANCE PROBLEM

NOTE: Ensure that MAF sensor is not blocked, and that there are no vacuum leaks before performing test.

Connect scan tool to Data Link Connector (DLC). Start engine and allow it to reach normal operating temperature. Select MAF SENSOR FLOW RATE parameter on scan tool. See MAF SENSOR STANDARD VALUES table under DTC P0103 for specified values. If scan tool display is not as specified, replace MAF sensor and retest system. If scan tool display is as specified, check for an intermittent problem or faulty PCM. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article.

DTC P0102: MASS AIRFLOW (MAF) CIRCUIT LOW INPUT

NOTE: For PCM connector and terminal identification, see PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article.

1) Connect scan tool to Data Link Connector (DLC). Start engine and allow it to reach normal operating temperature. Select MAF SENSOR FLOW RATE parameter on scan tool. See MAF SENSOR STANDARD VALUES table under DTC P0103 for specified values. If scan tool display is as specified, check for an intermittent problem or faulty PCM. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If scan tool display is not as specified, go to next step.

2) Turn ignition off. Disconnect MAF sensor harness connector. Turn ignition on. Using DVOM, measure voltage between ground and terminal No. 3 (Blue/Black wire) at MAF sensor harness connector. If voltage is 10-14 volts, go to next step. If voltage is not as specified, repair open in Blue/Black wire between MAF sensor and main relay.

3) Reconnect MAF sensor harness connector. With ignition switch on and engine off, measure voltage (backprobe) between PCM harness connector terminal C51-3-5 (Purple/Green wire) and terminal C51-3-10 (Purple/White wire). If voltage is 1.0-1.6 volts, check for poor PCM harness connections. Repair as necessary. If connections are okay, replace PCM and retest system. If voltage is not as specified, go to next step.

4) Check for an open in Purple/White wire between PCM and MAF sensor, or poor connection at MAF sensor. Repair as necessary. If wire is okay, replace MAF sensor and retest system.

DTC P0103: MASS AIRFLOW (MAF) CIRCUIT HIGH INPUT

NOTE: For PCM connector and terminal identification, see PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article.

1) Connect scan tool to Data Link Connector (DLC). Start engine and allow it to reach normal operating temperature. Select MAF SENSOR FLOW RATE parameter on scan tool. See MAF SENSOR STANDARD VALUES table for specified values. If scan tool display is not within specifications, go to next step. If scan tool displays specified values, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

2) With ignition switch on and engine off, measure voltage (backprobe) between PCM harness connector terminal C51-3-5 (Purple/Green wire) and terminal C51-3-10 (Purple/White wire). If voltage is 1.0-1.6 volts, go to next step. If voltage is not as specified, check for an open circuit in Purple/Green wire between MAF sensor and PCM, or a short circuit to power in Purple/White wire. Repair as necessary. If wires are okay, replace MAF sensor and retest system.

3) Start engine and measure voltage (backprobe) between PCM

harness connector terminal C51-3-5 (Purple/Green wire) and terminal C51-3-10 (Purple/White wire). If voltage increases to 5 volt range while engine speed is increased, replace PCM. If voltage is not as specified, replace MAF sensor and retest system.

MAF SENSOR STANDARD VALUES

Application	Lbs/min. (Grams/Sec.)
At Idle	
1.6L	**0.14-0.38 (1.1-2.9)**
2.0L	**0.20-0.53 (1.5-4.0)**
At 2500 RPM	
1.6L	**0.66-1.12 (5.0-9.0)**
2.0L	**0.66-1.32 (5.0-10.0)**

DTC P0111: INTAKE AIR TEMPERATURE (IAT) CIRCUIT

RANGE/PERFORMANCE PROBLEM

1) Turn ignition off. Disconnect IAT sensor harness connector. Check for poor connections and repair as necessary. If connections are okay, check operation of IAT sensor. See SYSTEM & COMPONENT TESTING article. Replace if necessary. If IAT sensor is okay, go to next step.

2) Disconnect PCM harness connectors. Check for poor connections and repair as necessary. If connections are okay, check Light Blue and Black/White wires for excessive resistance between IAT sensor and PCM. Repair as necessary. If circuits are okay, replace PCM and retest system.

DTC P0112: INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT LOW

INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select IAT sensor parameter on scan tool. If scan tool displays 302øF (150øC), go to next step. If scan tool displays near ambient temperature, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

2) Disconnect IAT sensor harness connector. If scan tool display drops to -40øF (-40øC), replace IAT sensor. If scan tool display is not as specified, check Light Blue wire for a short to ground. Repair as necessary. If wire is okay, replace PCM and retest system.

DTC P0113: INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT HIGH

INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select IAT sensor parameter on scan tool. If scan tool displays -40øF (-40øC), go to next step. If scan tool displays near ambient temperature, check for an intermittent problem. See **TROUBLE SHOOTING - NO CODES** article.

2) Disconnect IAT sensor harness connector. Turn ignition switch on and measure voltage at IAT sensor harness connector Light Blue wire. If voltage is between 4-6 volts, go to next step. If voltage is not as specified, inspect Light Blue wire for an open or short circuit between IAT sensor and PCM, or poor connection at PCM. If circuit is okay, replace PCM and retest system.

3) Connect a fused jumper wire between IAT sensor connector terminals. If scan tool displays 302øF (150øC), replace IAT sensor. If scan tool display is not as specified, check Blue/White wire for open circuit or poor PCM harness connections. Repair as necessary. If connections are okay, replace PCM and retest system.

DTC P0116: ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT RANGE/PERFORMANCE PROBLEM

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select ECT sensor parameter on scan tool. Make note of coolant temperature displayed on scan tool (ECT1). Start engine and warm up to operating temperature. Recheck coolant temperature displayed on scan tool (ECT2). If difference between ECT1 and ECT2 is 2øF (1øC) or less, go to next step. If difference is not as specified, inspect thermostat and replace if necessary.

2) Turn ignition off. Disconnect ECT sensor harness connector. Use a fused jumper to connect Orange/Black wire to Blue wire. Scan tool should display 327øF (164øC). Disconnect jumper wire from ECT sensor harness connector. Scan tool should now indicate a temperature of -40øF (-40øC). If readings are as specified, go to next step. If readings are not as specified, repair open or short circuit in Orange/Black or Blue wire. If circuits are okay, replace PCM and retest system.

3) Use DVOM to measure resistance of ECT sensor. See **ENGINE SENSORS & SWITCHES** in **SYSTEM & COMPONENT TESTING** article. If sensor resistance is not as specified, replace ECT sensor. If sensor resistance is as specified, check for an intermittent problem. See **TROUBLE SHOOTING - NO CODES** article.

DTC P0117: ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT LOW INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select ECT sensor parameter on scan tool. If scan tool displays 327øF (164øC), go to next step. If scan tool display is not as specified, check for an intermittent problem. See **TROUBLE SHOOTING**

- NO CODES article.

2) Disconnect ECT sensor harness connector. If scan tool display drops to -40øF (-40øC), replace ECT sensor. If scan tool display is not as specified, check Orange/Black wire for short to ground. If wire is okay, replace PCM and retest system.

DTC P0118: ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT HIGH INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select ECT sensor parameter on scan tool. If scan tool displays -40øF (-40øC), go to next step. If scan tool display is not as specified, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

2) Disconnect ECT sensor harness connector. Check for poor ECT sensor connection or bent terminals at ECT sensor. Repair as necessary. If connection and terminals are okay, test voltage at ECT sensor harness connector Orange/Black wire. If voltage is between 4-6 volts, go to next step. If voltage is not as specified, repair open or short circuit in Orange/Black wire, or poor connection at PCM.

3) Connect a fused jumper wire between ECT sensor connector Orange/Black Blue wires. If scan tool displays 327øF (164øC), replace ECT sensor. If scan tool display is not as specified, check Black wire for open circuit or poor PCM harness connections. Repair as necessary. If connections are okay, replace PCM and retest system.

DTC P0121: THROTTLE POSITION (TP) SENSOR SYSTEM PERFORMANCE

NOTE: If DTCs P0121, P0122 or P0123 are set together, diagnose DTCs P0122 or P0123 first. See DTC P0122: THROTTLE POSITION (TP) SENSOR CIRCUIT LOW INPUT or DTC P0123: THROTTLE POSITION (TP) SENSOR CIRCUIT HIGH INPUT.

1) If using scan tool, connect scan tool to Data Link Connector (DLC). Select TP sensor parameter on scan tool. Measure TP sensor output voltage. If using DVOM, measure voltage at PCM connector terminal C51-3-9. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article. With engine off, fully warmed up and throttle closed, voltage should be between .5-1.2 volts. With throttle fully opened, voltage should be between 3.4-4.7 volts. If voltage is as specified, replace PCM and retest system. If voltage is not as specified, go to next step.

2) Disconnect TP sensor harness connector. Inspect all terminals for corrosion or poor contact. If okay, test TP sensor resistance. See SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If TP sensor resistance is not as specified, replace TP sensor. If resistance is as specified, check for open circuit in Gray/Red, Red/Green or Gray/Yellow wires between TP sensor and PCM. Repair as necessary and retest system.

DTC P0122: THROTTLE POSITION (TP) SENSOR CIRCUIT LOW INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select TP sensor parameter on scan tool. Observe scan tool display while depressing accelerator pedal to full throttle position. If scan tool display remains at zero percent, go to next step. If scan tool display changes smoothly from zero to 100 percent, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

2) Turn ignition off. Disconnect TP sensor harness connector. Turn ignition on. Using DVOM, measure voltage between ground and Gray/Red wire at TP sensor harness connector. See WIRING DIAGRAMS article. If voltage is 4-6 volts, go to next step. If voltage is not as specified, Check for an open or short to ground in Gray/Red wire. Check for poor connection at PCM. Repair as necessary. If wire is okay, replace PCM and retest system.

3) Test TP sensor resistance. See ENGINE SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If TP sensor resistance is not as specified, replace TP sensor and retest system. If TP sensor resistance is okay, check for an open or short to ground in Red/Green wire. Check for poor connection at PCM. Repair as necessary. If wire is okay, replace PCM and retest system.

DTC P0123: THROTTLE POSITION (TP) SENSOR CIRCUIT HIGH INPUT

1) Connect scan tool to Data Link Connector (DLC). Turn ignition on. Select TP sensor parameter on scan tool. Observe scan tool display while depressing accelerator pedal to full throttle position. If scan tool display remains at 100 percent, go to next step. If scan tool display changes from zero to 100 percent, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

2) Turn ignition off. Disconnect TP sensor harness connector. Turn ignition on. Using DVOM, measure voltage between Gray/Yellow and Gray/Red wires at TP sensor harness connector. If voltage is 4-6 volts, go to next step. If voltage is not as specified, inspect Gray/Red wire between TP sensor and PCM for short to power. Also check Gray/Yellow wire for open circuit or poor connection at PCM. Repair as necessary. If wiring is okay, replace PCM and retest system.

3) Test TP sensor resistance. See ENGINE SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If TP sensor resistance is okay, check Red/Green wire between TP sensor and PCM for short to power. If wire is okay, replace PCM and retest system. If TP sensor resistance is not as specified, replace TP sensor.

DTC P0125: EXCESSIVE TIME TO ENTER CLOSED LOOP

1) Connect scan tool to Data Link Connector (DLC). Select

COOLANT TEMP parameter. Start engine and warm up to operating temperature. If temperature displayed on scan tool is less than 88øF (31øC), go to next step. If temperature is not as specified, go to step 4).

2) Turn ignition off. Use a fused jumper wire to connect ECT sensor harness connector terminal No. 1 (Orange/Black wire) to terminal No. 3 (Blue wire). Turn ignition on and note temperature displayed on scan tool. If temperature displayed is 327øF (164øC), go to next step. If temperature is not as specified, check Orange/Black and Blue wires for open or short circuit between ECT sensor and PCM. If wiring is okay, replace PCM and retest system.

3) Test ECT sensor resistance. See ENGINE SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If ECT sensor resistance is okay, go to next step. If resistance is not as specified, replace ECT sensor and retest system.

4) Inspect thermostat for proper operation. Replace thermostat if necessary. If thermostat is okay, replace PCM and retest system.

DTC P0131: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE LOW
DTC P0132: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE HIGH

1) Connect scan tool to Data Link Connector (DLC). Warm up engine and hold at 2000 rpm for one minute. Repeatedly rev engine up 5-6 times to richen air-fuel mixture, then allow engine to return to idle. Watch scan tool display to see if voltage continuously varies from above .6 volts to below .3 volts. If voltage is not as specified, go to next step. If voltage is as specified, go to step 4).

2) Turn ignition off. Disconnect HO2S No. 1 sensor harness connector. Using DVOM, measure voltage between terminals No. 1 and 2 of HO2S No. 1 harness connector while repeatedly revving engine. See Fig. 2. If voltage continuously varies from above .6 volts to below .3 volts, go to next step. If voltage is not as specified, replace HO2S No. 1 and retest system.

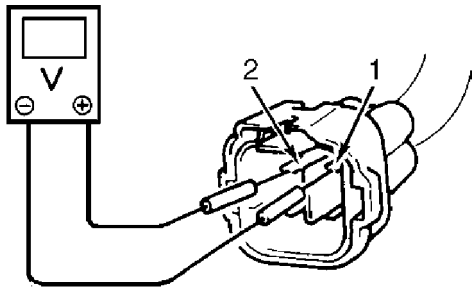

Fig. 2: Testing HO2S No. 1 & HO2S No. 2
Courtesy of Suzuki of America Corp.

3) Check Red wire or Gray/Yellow wire between HO2S No. 1 and PCM for an open or poor connection. Repair as necessary. If wires are okay, replace PCM and retest system.

4) Run engine at 2000 rpm for one minute, then return to idle. Note scan tool SHORT TERM FUEL TRIM value displayed. If value is between -20% to +20%, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. If displayed value is as specified, go to DTC P0171: FUEL TRIM SYSTEM LEAN OR DTC P0172: FUEL TRIM SYSTEM RICH.

DTC P0133: HEATED OXYGEN SENSOR (HO2S) NO. 1 SLOW RESPONSE

NOTE: Inspect HO2S for contamination, determine cause of contamination and repair before installing NEW HO2S.

Replace HO2S No. 1. If trouble code returns, replace PCM and retest system.

DTC P0134: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT ACTIVITY **INSUFFICIENT**

This code will set when HO2S voltage does not exceed .45 volts for a specified time. For diagnostic test procedures, see DTC P0131: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE LOW OR DTC P0132: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE HIGH.

DTC P0135: HEATED OXYGEN SENSOR (HO2S) NO. 1 HEATER CIRCUIT **MALFUNCTION**

1) Disconnect HO2S No. 1 harness connector. Using DVOM, measure resistance between terminals No. 3 and 4 of HO2S No. 1. See Fig. 3. On vehicles with warm-up three-way catalytic converters (WU-TWC), resistance should be between 4.5-5.7 ohms. On vehicles without WU-TWCs, resistance should be 11.7-14.3 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace HO2S No. 1 and retest system.

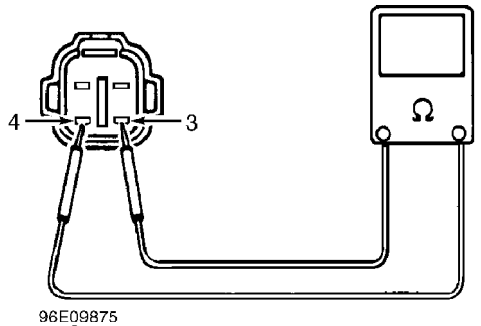

Fig. 3: Testing HO2S No. 1 & HO2S No. 2
Courtesy of Suzuki of America Corp.

2) Reconnect HO2S No. 1 harness connector. Turn ignition on. Measure voltage (backprobe) between ground and PCM harness connector terminal C51-2-4. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for terminal identification. If voltage is 10-14 volts, go to next step. If voltage is not as specified, check Black/White wire or Gray wire for an open, Gray wire for a short to ground, or poor HO2S No. 1 harness connection. Repair as necessary. If wires are okay, replace PCM and retest system.

3) Start engine and allow it to reach normal operating temperature. Measure voltage (backprobe) between ground and PCM harness connector terminal C51-2-4. If voltage is 0-1 volt, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. If voltage is not as specified, check for poor PCM harness connection. If connection is okay, replace PCM and retest system.

DTC P0136: HEATED OXYGEN SENSOR (HO2S) NO. 2 CIRCUIT MALFUNCTION

1) Connect scan tool to Data Link Connector (DLC). Drive vehicle for at least 2 minutes at 35 MPH or greater. While revving engine, observe HO2S No. 2 parameter on scan tool display. If scan tool displays continuously varying voltage above and below .3 volts, go to step 4). If voltage is not as specified, go to next step.

2) Turn ignition off. Disconnect HO2S No. 2 harness connector. Start engine. Using DVOM, measure voltage between terminals No. 1 and 2 of HO2S No. 2 while revving engine. See Fig. 2. If voltage is continuously varying above and below .3 volts, go to next step. If voltage is not as specified, replace HO2S No. 2 and retest system.

3) Check circuits between terminals No. 1 (Gray/Yellow wire) and No. 2 (Red/Green wire) of HO2S No. 2 and PCM for an open or short to ground. Repair as necessary. If circuits are okay, replace PCM and retest system.

4) Run engine at 2000 rpm for one minute, then return to idle. Note scan tool SHORT TERM FUEL TRIM value displayed. If value is between -20% to +20%, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. If displayed value is as specified, go to DTC P0171: FUEL TRIM SYSTEM LEAN OR DTC P0172: FUEL TRIM SYSTEM RICH.

DTC P0141: HEATED OXYGEN SENSOR (HO2S) NO. 2 HEATER CIRCUIT MALFUNCTION

1) Disconnect HO2S No. 2 harness connector. Using DVOM, measure resistance between terminals No. 3 and 4 of HO2S No. 2. See Fig. 3. If resistance is 11.7-14.3 ohms, go to next step. If resistance is not as specified, replace HO2S No. 2 and retest system.

2) Reconnect HO2S No. 2 harness connector. Turn ignition on. Measure voltage (backprobe) between ground and PCM harness connector terminal C51-[illegible]. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for

PCM terminal identification. If voltage is 10-14 volts, go to next step. If voltage is not as specified, check for open or short circuits between terminals No. 3 (Pink/Green wire) or 4 (Black/White wire) of HO2S No. 2 and PCM. Repair as necessary. If circuits are okay, replace PCM and retest system.

3) Drive vehicle at 30-40 mph for 2 minutes or more. Bring engine to idle and measure voltage (backprobe) between ground and PCM harness connector terminal E61-3 (Pink/Green wire). If voltage is 0-1 volt, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. If voltage is not as specified, check for poor PCM harness connection at E61-3. Repair as necessary. If connection is okay, replace PCM and retest system.

DTC P0171: FUEL TRIM SYSTEM LEAN DTC P0172: FUEL TRIM SYSTEM **RICH**

1) Check diagnostic system to determine if any other diagnostic tests codes (DTCs) are present. If other DTCs are present, go to appropriate test procedure first. See DIAGNOSTIC TESTS. If no other DTCs are indicated, go to next step.

2) Inspect intake and exhaust systems for leaks. If any leaks are detected, repair them and retest system. If intake and exhaust systems are okay, go to next step.

3) Check fuel pressure. See CIRCUIT TEST B-3: FUEL PRESSURE INSPECTION under CIRCUIT TESTS in BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is within specifications, go to next step. If fuel pressure is not as specified, repair as necessary and retest system.

4) Check fuel injectors. See CIRCUIT TEST B-1: FUEL INJECTOR CIRCUIT INSPECTION under CIRCUIT TESTS in BASIC DIAGNOSTIC PROCEDURES article. If problem is present, repair as necessary and retest system. If fuel injectors are okay, go to next step.

5) Check fuel lever sensor. See DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE. If problem is present, repair as necessary and retest system. If fuel level sensor is okay, go to next step.

6) Check MAF sensor circuit performance. See DTC P0101: MASS AIRFLOW (MAF) CIRCUIT PERFORMANCE PROBLEM. If problem is present, repair as necessary and retest system. If MAF sensor circuit is okay, go to next step.

7) Check ECT sensor circuit performance. See DTC P0125: EXCESSIVE TIME TO ENTER CLOSED LOOP. If problem is present, repair as necessary and retest system. If ECT sensor circuit is okay, go to next step.

8) Check HO2S No. 1 sensor circuit performance. See DTC P0131: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE LOW OR DTC P0132: HEATED OXYGEN SENSOR (HO2S) NO. 1 CIRCUIT VOLTAGE HIGH. If problem is present, repair as necessary. If HO2S No. 1 sensor circuit is okay, replace PCM and retest system.

DTC P0300: RANDOM MISFIRE DTC P0301, P0302, P0303 OR P0304:
CYLINDERS NO. 1-4 MISFIRE

1) Check ignition spark and spark plug at cylinder in question. Repair as necessary. If a strong Blue spark is present at ignition wire and spark plug is okay, go to next step.
2) Using a mechanic's stethoscope, check each fuel injector for a clicking sound while cranking engine. If sound is not heard from all 4 injectors, inspect and repair poor connections or open circuit between fuel injector(s) and PCM. If wiring and connections are okay, replace PCM and retest system. If sound is heard from all 4 injectors, go to next step.
3) Check fuel pressure. See CIRCUIT TEST B-3: FUEL PRESSURE INSPECTION under CIRCUIT TESTS in BASIC DIAGNOSTIC PROCEDURES article. If fuel pressure is within specifications, go to next step. If fuel pressure is not as specified, repair as necessary and retest system.
4) Check fuel injectors. See CIRCUIT TEST B-1: FUEL INJECTOR CIRCUIT INSPECTION under CIRCUIT TESTS in BASIC DIAGNOSTIC PROCEDURES article. If problem is present, repair as necessary and retest system. If fuel injectors are okay, go to next step.
5) Check ignition timing. See IGNITION TIMING in ON-VEHICLE ADJUSTMENTS article. Adjust ignition timing as necessary and retest system. If ignition timing is okay, go to next step.
6) Check EGR system for proper operation. See EXHAUST GAS RECIRCULATION (EGR) under EMISSION SYSTEMS & SUB-SYSTEMS in SYSTEM & COMPONENT TESTING article. Repair as necessary. If EGR operation is okay, go to next step.
7) Check fuel level sensor operation. See DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE. Repair as necessary. If fuel level sensor operation is okay, go to next step.
8) Inspect engine mechanical systems for proper operation. Check engine compression, valve lash adjustment and valve timing. See appropriate article in ENGINES in appropriate MITCHELL\R manual. Repair as necessary and retest system. If engine mechanical condition is okay, check PCM, ignition and fuel system wiring harnesses for intermittent open or short circuits. Repair as necessary.

DTC P0335: CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT
MALFUNCTION

1) Turn ignition off. Disconnect PCM harness connector C51-2. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. Using DVOM, check resistance between PCM harness connector C51-2 terminals No. 19 and 20. At 68øF, CKP sensor resistance should be 360-460 ohms on 1.6L engine and 484-656 ohms on 2.0L engine. Resistance between each terminal and ground should be at least 1 megohm. If all resistance values are as specified, go to step 2). If resistance values are not as specified, go to next step.

2) Disconnect CKP sensor connector. Using DVOM, measure resistance between CKP sensor terminals No. 1 and 2 on 1.6L engines, or terminals No. 2 (Orange/Blue wire) and No. 3 (White/Blue wire) on 2.0L engines. Also measure resistance to ground on each terminal. If resistance values were not as specified in step 1), replace CKP sensor and retest system. If resistance values were as specified, repair open circuit in Orange/Blue or White/Blue wires between CKP sensor and PCM.

3) Visually inspect CKP sensor for damage, foreign material obstructing sensor and proper installation. Check timing belt crankshaft pulley on 1.6L engines or CKP sensor plate on 2.0L engines for damage. Repair as necessary. Check for poor connections at PCM. Repair as necessary. If PCM connections are okay, replace PCM and retest system. If no problems were found, see INTERMITTENTS in TROUBLE SHOOTING - NO CODES article.

DTC P0340: CAMSHAFT POSITION (CMP) SENSOR CIRCUIT MALFUNCTION

1) Before testing CMP sensor circuit, ensure that starting system works properly. If engine does not crank over or cranks slowly, repair starting system first. If starting system is okay, go to next step.

2) Check diagnostic system for DTC P1500 (engine starter signal circuit). If DTC is present, go to DTC P1500: ENGINE STARTER SIGNAL CIRCUIT MALFUNCTION. If DTC P1500 is not present, go to next step.

3) Check for proper CMP sensor installation. If sensor is installed incorrectly, reinstall properly. Retest system. If problem is still present, go to next step.

4) Disconnect CMP sensor. Check for poor connection, corrosion or bent terminals at CMP sensor and harness. Repair if necessary. Turn ignition on. Using DVOM, test for voltage between CMP sensor harness connector terminals No. 1 (Blue/Black wire) and No. 3 (Purple/Red wire). If reading is between 10-14 volts, go to next step. If voltage is not as specified, repair open or short circuit in Blue/Black or Purple/Red wires, or poor connection at PCM.

5) Measure voltage between CMP sensor harness connector terminals No. 2 (Yellow/Blue wire) and No. 3 (Purple/Red wire). Voltage reading should be between 4-5 volts. If reading is not as specified, repair open or short circuit in Yellow/Blue wire between PCM and CMP sensor. If wiring is okay, replace PCM and retest system. If reading is as specified, test CMP sensor. On 1.6L engines, go to step 6). On 2.0L engines, go to step 7).

6) Remove CMP sensor. Clean off any metallic particles that may be attached to sensor. Leave CMP harness connector attached to sensor. Disconnect ignition coil assemblies and fuel injectors. Turn ignition on and measure voltage at PCM terminal C51-2-26 while passing a magnet about 0.03"(1 mm) from face of CMP sensor. If voltage reading goes from a low of 0-1 volt to a high of 4-6 volts, go to step 6)-TESTS W/CO

voltage readings are not as specified, replace CMP sensor and retest system.

7) Remove CMP sensor. Leave CMP harness connector attached to sensor. Disconnect ignition coil assemblies and fuel injectors. Turn ignition on and measure voltage between PCM terminal C51-2-26 and C51-3-26 while rotating CMP sensor coupling. If voltage reading goes from a low of 0-1 volt to a high of 4-6 volts, go to step 9). If voltage readings are not as specified, replace CMP sensor and retest system.

8) On 1.6L engine, use a mirror to inspect signal rotor for damage or foreign material attached to it. If problem is found, clean signal rotor or replace camshaft if damaged. If no problem is found, see INTERMITTENTS in TROUBLE SHOOTING - NO CODES article.

9) On 2.0L engine, remove signal rotor cover. Inspect signal rotor for damage or foreign material attached to it. If problem is found, clean signal rotor teeth or replace CMP sensor if damaged. If no problem is found, see INTERMITTENTS in TROUBLE SHOOTING - NO CODES article.

DTC P0400: EXHAUST GAS RECIRCULATION (EGR) FLOW MALFUNCTION

NOTE: Before performing diagnostic tests, clear diagnostic codes and road test vehicle. Drive between 35-40 mph for 7 minutes or more. Increase speed to 60-70 mph, then release gas pedal and allow engine to slow vehicle while coasting to a stop. Recheck for DTC P0400. If code has returned, continue with test procedure.

1) If DTC P0403 is present, go to DTC P0403: EXHAUST GAS RECIRCULATION (EGR) CIRCUIT MALFUNCTION. If DTC P0403 is not present, go to next step.

2) If scan tool is available, go to step 3). If scan tool is not available, go to step 4).

3) Test operation of EGR valve. See EXHAUST GAS RECIRCULATION (EGR) under EMISSION SYSTEMS & SUB-SYSTEMS in SYSTEM & COMPONENT TESTING article. If EGR valve operation is as specified, go to next step. If EGR valve operation is not as specified, go to step 5).

4) Inspect operation of manifold differential pressure sensor (MDP). See MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR under ENGINE SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If MDP sensor operation is not as specified, replace sensor and retest system. If MDP sensor operation is as specified, see INTERMITTENTS in TROUBLE SHOOTING - NO CODES article.

5) Disconnect EGR valve electrical connector. Turn ignition on. Using DVOM, check voltage at EGR harness connector terminals No. 2 and 5 (both Blue/Black wires). If 10-14 volts are present at both wires, go to next step. If voltage is not present at both wires, repair open or short circuit in Blue/Black wires between main relay and EGR valve.

6) Turn ignition off. Reconnect EGR valve electrical connector. Unplug PCM electrical connectors. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. Using DVOM, measure resistance between PCM harness connector terminal C51-3-4 (Blue/Black wire) and the following PCM harness connector terminals:

- **C51-2-13 (Light Green/Red wire).**
- **C51-2-14 (Light Green/Yellow wire).**
- **C51-2-15 (Light Green/White wire).**
- **C51-2-16 (Light Green wire).**

Resistance on each circuit should be between 20-24 ohms. If resistance values are as specified, go to next step. If resistance values are not as specified, repair open or short circuit in appropriate wire and retest system.

7) Check for plugged EGR passage. Repair as necessary. If passage is not plugged, problem is due to intermittent malfunction or faulty PCM. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If unable to duplicate intermittent problems, replace PCM and retest system.

DTC P0403: EXHAUST GAS RECIRCULATION (EGR) CIRCUIT MALFUNCTION

1) Turn ignition off and unplug EGR valve electrical connector. Using DVOM, measure resistance of EGR valve. See EXHAUST GAS RECIRCULATION (EGR) under EMISSION SYSTEMS & SUB-SYSTEMS in SYSTEM & COMPONENT TESTING article. If EGR valve resistance is as specified, go to next step. If EGR valve resistance is not as specified, replace EGR valve and retest system.

2) Turn ignition off. Reconnect EGR valve electrical connector. Unplug PCM electrical connectors. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. Using DVOM, measure resistance between PCM harness connector terminal C51-3-4 (Blue/Black wire) and the following PCM harness connector terminals:

- **C51-2-13 (Light Green/Red wire).**
- **C51-2-14 (Light Green/Yellow wire).**
- **C51-2-15 (Light Green/White wire).**
- **C51-2-16 (Light Green wire).**

Resistance on each circuit should be between 20-24 ohms. If resistance values are as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If resistance values are not as specified, repair open or short circuit in appropriate wire and retest system.

DTC P0420: THREE-WAY CATALYST (TWC) SYSTEM EFFICIENCY LOW

Inspect exhaust system for damage or leaks and repair as necessary. If no problems were found with exhaust system, check operation of Heated Oxygen Sensor (HO2S). See DTC P0136: HEATED OXYGEN SENSOR (HO2S) NO. 2 CIRCUIT MALFUNCTION. Repair as necessary. If HO2S is okay, replace TWC and retest system.

DTC P0440: EVAPORATIVE (EVAP) CONTROL SYSTEM MALFUNCTION DTC
P0455: EVAPORATIVE (EVAP) CONTROL SYSTEM LEAK DETECTED

NOTE: Ensure fuel filler cap is tightened securely and gasket is in good condition. Inspect vacuum hoses for kinks, loose connections and deterioration before testing EVAP system.

1) Check evaporative canister purge system for proper operation. See EVAP CANISTER PURGE SYSTEM in SYSTEM & COMPONENT TESTING article. If evaporative system operation is as specified, go to step 3). If operation is not as specified, go to next step.
2) Check evaporative canister purge valve and circuit operation. See EVAP CANISTER PURGE VALVE in SYSTEM & COMPONENT TESTING article. If canister purge valve operation is as specified, go to next step. If operation is not as specified, check for clogged vacuum passage. Clean or repair as necessary. If vacuum passage is okay, go to step 10).
3) Check evaporative canister air valve and circuit operation. See EVAP CANISTER AIR VALVE in SYSTEM & COMPONENT TESTING article. If evaporative canister air valve operation is as specified, go to next step. If operation is not as specified, go to step 11).
4) Check tank pressure control solenoid valve and circuit operation. See TANK PRESSURE CONTROL SOLENOID VALVE in SYSTEM & COMPONENT TESTING article. If tank pressure solenoid valve operation is as specified, go to next step. If operation is not as specified, go to step 12).
5) Check tank pressure control valve operation. See TANK PRESSURE CONTROL VALVE in SYSTEM & COMPONENT TESTING article. If tank pressure control valve operation is as specified, go to next step. If operation is not as specified, replace tank pressure control valve and retest system.
6) Check evaporative canister for damage or clogged passages. See EVAP CANISTER INSPECTION in SYSTEM & COMPONENT TESTING article. If evaporative canister operation is as specified, go to next step. If operation is not as specified, replace evaporative canister and retest system.
7) Inspect purge line, evaporative system components and fuel tank for leaks. See EVAP LEAKAGE INSPECTION in SYSTEM & COMPONENT TESTING article. If any leaks are found, repair or replace system or

components as necessary. If no leaks are found, go to next step.

8) Check fuel tank pressure sensor operation. See FUEL TANK PRESSURE SENSOR in SYSTEM & COMPONENT TESTING article. If fuel tank pressure sensor operation is not as specified, replace sensor and retest system. If operation is as specified, go to next step.

9) Check fuel level sensor operation. See DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE. If fuel level sensor operation is not as specified, repair as necessary. If operation is as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If no intermittent problems were found, replace PCM and retest system.

10) Check evaporative canister purge valve and circuit operation. See EVAP CANISTER PURGE VALVE in SYSTEM & COMPONENT TESTING article. If canister purge valve operation is as specified, check Blue/Black wire between purge valve, main relay and PCM for open or short circuit. Also check Green/Black wire between purge valve and PCM for open or short circuit. Repair as necessary. If wiring is okay and scan tool was used to check system, replace PCM and retest system. If canister purge valve operation is not as specified, replace canister purge valve.

11) Check evaporative canister air valve and circuit operation. See EVAP CANISTER AIR VALVE in SYSTEM & COMPONENT TESTING article. If canister air valve operation is as specified, check Blue/Black wire between air valve, main relay and PCM for open or short circuit. Also check Purple/Red wire between air valve and PCM for open or short circuit. Repair as necessary. If wiring is okay and scan tool was used to check system, replace PCM and retest system. If canister air valve operation is not as specified, replace canister air valve.

12) Check tank pressure control solenoid valve operation. See TANK PRESSURE CONTROL SOLENOID VALVE in SYSTEM & COMPONENT TESTING article. If tank pressure control solenoid valve operation is as specified, check Blue/Black wire between solenoid valve, main relay and PCM for open or short circuit. Also check Green/White wire between solenoid valve and PCM for open or short circuit. Repair as necessary. If wiring is okay and scan tool was used to check system, replace PCM and retest system. If tank pressure control solenoid valve operation is not as specified, replace canister purge valve.

DTC P0443: EVAPORATIVE (EVAP) CONTROL SYSTEM PURGE FLOW

INCORRECT

1) Check evaporative canister purge system. See EVAP CANISTER PURGE SYSTEM in SYSTEM & COMPONENT TESTING article. If canister purge system operation is not as specified, go to next step. If operation is as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If no intermittent problems were found, replace PCM and retest system.

2) Check evaporative canister purge valve resistance. See EVAP CANISTER PURGE VALVE in SYSTEM & COMPONENT TESTING article. If resistance is not as specified, replace purge valve and retest system. If resistance is as specified, check Green/Black wire between purge valve and PCM for open or short circuit. Also check Blue/Black wire between purge valve, main relay and PCM for open or short circuit. Repair as necessary. If wiring and connections are okay, replace PCM and retest system.

DTC P0450: EVAPORATIVE (EVAP) CONTROL SYSTEM PRESSURE SENSOR

MALFUNCTION

1) If scan tool is available, turn ignition off and connect scan tool to Data Link Connector (DLC). Select FUEL TANK PRESS parameter. If scan tool is not available, use DVOM to check voltage (backprobe) at PCM harness connector terminal E61-27. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. For either method of testing, remove fuel filler cap and turn ignition on. Scan tool display should read around 0 kPa (0 mm Hg), and DVOM should read between 2-3 volts. If readings are as specified, go to step 3). If readings are not as specified, go to next step.

2) Check fuel tank pressure sensor. See FUEL TANK PRESSURE SENSOR in SYSTEM & COMPONENT TESTING article. If fuel tank pressure sensor operation is not as specified, replace sensor and retest system. If operation is as specified, check for open or short circuits in Brown/Red, Gray/Red or Gray/Yellow wires between fuel tank pressure sensor and PCM. Repair as necessary. If wiring and connections are okay, replace PCM and retest system.

3) Check fuel tank pressure sensor. See FUEL TANK PRESSURE SENSOR in SYSTEM & COMPONENT TESTING article. If fuel tank pressure sensor operation is not as specified, replace sensor and retest system. If operation is as specified, go to next step.

4) Check fuel tank pressure control valve operation. See TANK PRESSURE CONTROL VALVE in SYSTEM & COMPONENT TESTING article. If valve operation is as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If no intermittent problems were found, replace PCM. If valve operation is not as specified, replace tank pressure control valve and retest system.

DTC P0451: EVAP CONTROL SYSTEM PRESSURE SENSOR

RANGE/PERFORMANCE

1) Remove tank pressure sensor from fuel tank. Check vent hole and pressure passage for clogging. Clean as necessary. If no problem is found, go to next step.

2) Check fuel tank pressure sensor performance. See FUEL TANK PRESSURE SENSOR in SYSTEM & COMPONENT TESTING article. Replace as

necessary. If tank pressure sensor is okay, check for open or short circuits in Brown/Red, Gray/Red or Gray/Yellow wires between fuel tank pressure sensor and PCM. Repair as necessary. If wiring and connections are okay, replace PCM and retest system.

DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE

NOTE: If DTCs P0461 and P0463 are set together, diagnose DTC P0463: FUEL LEVEL SENSOR CIRCUIT VOLTAGE HIGH first.

1) If using scan tool, connect to Data Link Connector (DLC) and check displayed fuel level. If scan tool is not available, use DVOM to backprobe PCM connector terminal E61-28. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. Note voltage at PCM terminal E61-28. Turn ignition off and add one gallon (3.8L) of fuel to tank. Go to next step.

2) Turn ignition on. If fuel level indicated on scan tool increases, or if DVOM voltage at PCM connector terminal E61-28 decreases, check for an intermittent problem. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. Repair as necessary and retest system. If fuel level displayed or PCM voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect fuel level sensor at fuel tank. Using DVOM, measure resistance between fuel level sensor harness connector terminals No. 2 (Blue/White wire) and No. 4 (Black/Yellow wire). Resistance should be between 2-130 ohms depending on level of fuel in tank. Add one gallon (3.8L) of fuel to tank and note resistance value. If reading changes by several ohms, go to next step. If reading does not change as specified, inspect and repair fuel sensor wiring or connector terminals. If wiring and terminals are okay, replace fuel level sensor and retest system.

4) Turn ignition on. Reconnect fuel level sensor. Disconnect PCM harness connectors. Turn ignition on. Watch fuel gauge while disconnecting fuel level sensor. Fuel gauge should go to "E"(empty). Use a fused jumper to ground Blue/White wire of fuel level sensor wiring harness. Fuel gauge should now read "F"(full). If fuel gauge operates as specified, replace PCM and retest system. If fuel gauge does not operate as specified, check for an open or short circuit on Blue/White wire between fuel level sensor, PCM or fuel gauge. If circuit is okay, replace fuel gauge.

DTC P0463: FUEL LEVEL SENSOR CIRCUIT VOLTAGE HIGH

NOTE: Turn ignition on and check fuel level. If fuel gauge reads "E"(empty), add fuel to tank before testing.

1) Using DVOM, measure voltage between PCM harness connector

terminal E61-28 and ground. If voltage is 7.1 volts or more, go to next step. If voltage is 7 volts or less, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. If voltage is between 9-14 volts, check Blue/White wire for a short to power. Repair as necessary. If wire is okay, replace fuel gauge and retest system.

2) Turn ignition off. Disconnect fuel level sensor harness connector. Use DVOM to check fuel level sensor resistance between Blue/White and Black/Yellow wires. When tank is empty, resistance should be between 90-130 ohms. When tank is half full, resistance should be around 32-33 ohms. When tank is completely full, resistance should be between 1-10 ohms. If resistance values are as specified, go to next step. If resistance values are not as specified, inspect fuel level sensor harness, connector and terminals for open or poor connections. If no problem is found, replace fuel level sensor and retest system.

3) Check Blue/White wire between fuel level sensor, fuel gauge and PCM for open circuit. Check Black/Yellow wire for open circuit between fuel level sensor and ground. See WIRING DIAGRAMS article. If no problem was found, replace PCM and retest system.

DTC P0500: VEHICLE SPEED SENSOR (VSS) MALFUNCTION

1) If speedometer functions and indicates actual vehicle speed, turn ignition off and check for open circuit between PCM harness connector terminal C51-2-25 and VSS harness connector terminal No. 1 (Blue/Yellow wire). Repair as necessary and retest system. If circuit is okay, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If speedometer does not function properly, go to next step.

2) Disconnect VSS harness connector from sensor. Turn ignition on and check for voltage between VSS harness connector terminals No. 2 (Black/Yellow wire) and No. 3 (Blue/Black wire). If voltage is between 10-14 volts, go to next step. If voltage is not as specified, check for open or short circuits in Blue/Black wire between VSS and main relay or Black/Yellow wire between VSS and ground. Repair as necessary and retest system.

3) With ignition on and engine off, check for voltage between VSS harness connector terminals No. 1 (Blue/Yellow wire) and No. 2 (Black/Yellow wire). If voltage reading is 4 volts or more, go to next step. If voltage is less than 4 volts, go to step 5).

4) Remove VSS from transmission/transfer case. Check VSS drive- and driven gears for damage or excessive wear. Repair or replace as needed. If no problems were found, check for bent or damaged connector or terminals at VSS. If connector and terminals are okay, replace VSS and retest system.

5) Turn ignition off. Remove combination meter and disconnect 16-pin connector. Turn ignition on. Check for voltage between VSS harness connector terminals No. 1 (Blue/Yellow wire) and No. 2

(Black/Yellow wire). If voltage reading is 4 volts or more, replace combination meter and retest system. If voltage is less than 4 volts, go to next step.

6) If vehicle is not equipped with cruise control, go to next step. Turn ignition off. Unplug cruise control module harness connector. Turn ignition on. Check for voltage between VSS harness connector terminals No. 1 (Blue/Yellow wire) and No. 2 (Black/Yellow wire). If voltage reading is 4 volts or more, replace cruise control module and retest system. If voltage is less than 4 volts, go to next step.

7) Check Blue/Yellow wire for open or short circuit between VSS, PCM, combination meter or cruise control module. Repair as necessary. If wiring and connections are okay, replace PCM and retest system.

DTC P0505: IDLE AIR CONTROL (IAC) SYSTEM MALFUNCTION

1) Ensure idle speed and IAC duty are within specifications. See IDLE SPEED in ON-VEHICLE ADJUSTMENTS article. If idle speed and IAC duty are within specifications, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article. Then if no problems were found, replace PCM and retest system. If idle speed does not stay within specification, go to next step.

2) Check idle air control valve operation. See IDLE AIR CONTROL (IAC) VALVE under IDLE CONTROL SYSTEM in SYSTEM & COMPONENT TESTING article. If idle air control valve operates as specified, go to step 5). If operation is not as specified, go to next step.

3) Turn ignition off. Disconnect PCM harness connectors. Using DVOM, check resistance between PCM harness connector terminals C51-2-3 (Light Green/Black wire) and C51-2-12 (Purple/Black wire). Also check resistance between PCM harness connector terminals C51-2-10 (Purple/Yellow wire) and C51-2-11 (Gray/Blue wire). Resistance on both circuits should be between 70-86 ohms. If resistance readings are as specified, go to next step. If resistance readings are not as specified, Check for open or short circuits on appropriate wire(s). If wiring and connectors are okay, replace IAC valve.

4) Reconnect PCM harness connectors. Disconnect IAC valve harness connector. Turn ignition on and check for voltage at IAC valve harness connector terminals No. 2 and 5 (Blue/Black wires). If voltage readings are between 10-14 volts, either IAC valve or PCM is defective. Replace as necessary. If voltage is not as specified, repair open circuit in Blue/Black wire between IAC valve and main relay.

5) If idle speed in step 2) was higher than specifications, check for intake leak at intake manifold, throttle body, PCV valve or EVAP canister purge control system. If idle speed was lower than specifications, check for intake leak between throttle body and MAF sensor. Also see ROUGH OR UNSTABLE IDLE under SYMPTOMS in TROUBLE

SHOOTING - NO CODES article.

DTC P0601: PCM MEMORY ERROR DTC P0603: KEEP ALIVE MEMORY ERROR

Turn ignition off. Connect scan tool to Data Link Connector (DLC). Turn ignition on. Clear DTC(s). Start engine and let idle for one minute. If DTC(s) reset, replace PCM and retest system. If DTC(s) do not reset, check for an intermittent problem. See TROUBLE SHOOTING - NO CODES article.

DTC P1408: MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR CIRCUIT MALFUNCTION

1) Remove PCM cover. Using DVOM, check voltage (backprobe) between PCM connector terminals C51-3-8 (Red/White wire) and C51-3-22 (Blue/Red wire). Turn ignition on. With engine off, voltage should be .2 volts or higher. With engine idling, voltage should be 4.6 volts or lower. If voltage readings are as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES. If voltage readings are not as specified, go to next step.

2) Disconnect manifold differential pressure (MDP) sensor wiring harness connector. Test operation of MDP sensor. See MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR under ENGINE SENSORS & SWITCHES in SYSTEM & COMPONENT TESTING article. If MDP sensor operation is as specified, check for open or short circuit in Red/White, Blue/Red or White/Red wires between MDP sensor and PCM. See WIRING DIAGRAMS article. If MDP sensor operation is not as specified, replace sensor and retest system.

DTC P1410: FUEL TANK PRESSURE CONTROL SYSTEM MALFUNCTION

1) If fuel gauge is working properly, go to next step. If fuel gauge is not reading properly, inspect fuel gauge and fuel level sensor operation. See step 3) of DTC P0461: FUEL LEVEL SENSOR CIRCUIT PERFORMANCE.

2) Remove PCM cover. If fuel gauge shows 3/4 tank or more, disconnect fuel level sensor connector. Using DVOM, check voltage (backprobe) between PCM connector terminal C51-2-6 and ground. For one second after ignition is turned on, voltage reading should be 10-14 volts. After one second, voltage should drop to 0-1 volt. If voltage readings are as specified, problem is intermittent. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If voltage readings are not as specified, go to next step.

3) Disconnect electrical connector from fuel tank pressure control solenoid located on top of fuel tank. Using DVOM, measure resistance between the 2 solenoid terminals. Resistance should be between 28-36 ohms. Measure resistance between each terminal and

ground. Resistance should be at least one megohm or higher. If resistance values are not as specified, replace pressure control solenoid valve. If values are as specified, repair open or short circuit in either Green/White wire between solenoid valve and PCM or in Blue/Black wire between solenoid valve, main relay and PCM. If wiring is okay, replace PCM and retest system.

DTC P1450: BAROMETRIC PRESSURE SENSOR CIRCUIT MALFUNCTION DTC
P1451 BAROMETRIC PRESSURE SENSOR PERFORMANCE PROBLEM

1) Turn ignition off. Connect scan tool to Data Link Connector (DLC). Turn ignition on. Clear DTC(s). Test drive vehicle and increase engine speed to 3000 RPM in 3rd gear (M/T) or "2" range (A/T). Release accelerator pedal and coast for 5 seconds or more. If necessary, perform test while coasting down a slope where engine can maintain 1600-3000 rpm and fuel-cut condition can be maintained for 5 seconds or more.
2) Bring vehicle to a stop and allow engine to idle. Repeat test drive in step 1) 2 times. Determine whether either DTC has reset. If DTC P1450 is present, replace PCM and retest system. If DTC 1451 has reset, go to next step.
3) Inspect manifold differential pressure (MDP) sensor operation. See steps 1) and 2) in DTC P1408: MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR CIRCUIT MALFUNCTION. If MDP sensor operation is not as specified, repair or replace MDP sensor or circuit as necessary. If MDP sensor operation is as specified, replace PCM and retest system.

DTC P1500: ENGINE STARTER SIGNAL CIRCUIT MALFUNCTION

Remove PCM cover. Using DVOM, measure voltage between ground and (backprobe) PCM harness connector terminal C51-3-18. If voltage is 6-12 volts while cranking and 0-1 volt after starting engine, check for poor PCM harness connections or intermittent problem. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES article. If connections are okay and no intermittent problems were found, replace PCM and retest system. If voltage is not a specified, repair open in Black/Yellow wire between starter and PCM.

DTC P1510: PCM BACKUP POWER SUPPLY MALFUNCTION

1) Turn ignition on. Using DVOM, measure voltage between ground and PCM harness connector terminal E61-2. See PIN VOLTAGE/CIRCUIT RESISTANCE CHARTS article for PCM connector and terminal identification. If voltage is 10-14 volts, check for poor PCM harness connections or intermittent problem. See INTERMITTENTS in TROUBLE SHOOTING - NO CODES. If connections are okay and no intermittent problems were found, replace PCM and retest system.

voltage is not as specified, go to next step. Retest system.

2) Check condition of fuses in passenger compartment and underhood fuse boxes. If fuse(s) are blown, check for short circuit and repair as necessary. If fuse(s) are okay, check for an open in White wire between PCM and fuse box. Check for open in White/Yellow wire between fuse box in passenger compartment and relay/fuse box in engine compartment. Repair as necessary.

END OF ARTICLE