2008 ENGINE

Engine Controls & Fuel - 4.2L - Ascender, Envoy & Trailblazer

SYMPTOMS - ENGINE CONTROLS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

SYMPTOMS DESCRIPTION

Symptoms covers conditions that are not covered by DTCs. Certain conditions can cause multiple symptoms. These conditions are listed together under Symptoms Testing. Conditions that may only cause specific symptoms are listed separately under Additional Symptoms Testing. Perform the Symptoms Testing before using the Additional Symptoms Testing.

SYMPTOMS DEFINITION

Backfire

The fuel ignites in the intake manifold or in the exhaust system, making a loud popping noise.

Cuts Out, Misses

A steady pulsation or jerking that follows engine speed, which is usually more pronounced as the engine load increases. This condition is not normally felt above 1500 RPM or 48 km/h (30 mph). The exhaust has a steady spitting sound at idle or at low speed.

Detonation/Spark Knock

A mild to severe ping which usually occurs worse while under acceleration. The engine makes sharp metallic knocks that change with throttle opening.

Dieseling, Run-On

The engine continues to run after the key is turned OFF, but runs very rough.

Hard Start

The engine cranks OK, but does not start for a long time. The vehicle does eventually run, or may start but immediately stall.

Hesitation, Sag, Stumble

A momentary lack of response as the accelerator is pushed down. This condition can occur at any vehicle speed. This condition is usually more pronounced when first trying to make the vehicle move, as from a stop. This condition may cause the engine to stall in severe conditions.

Lack of Power, Sluggishness, or Sponginess

The engine delivers less than expected power. Little or no increase in vehicle speed when the accelerator pedal is pushed down part way.

Poor Fuel Economy

Fuel economy, as measured by an actual road test, is noticeably lower than expected. Also, the fuel economy is noticeably lower than it was on this vehicle at one time, as previously shown by an actual road test.

Rough, Unstable, or Incorrect Idle and Stalling

The engine runs unevenly at idle. If severe, the engine or the vehicle may shake. Engine idle speed may vary. Either condition may be severe enough to stall the engine.

Surges/Chuggles

An engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and slows down with no change in the accelerator pedal position.

SYMPTOMS VERIFICATION

Before using the Symptom tables, perform the following inspections:

- Ensure that the engine control module (ECM) and malfunction indicator lamp (MIL) are operating correctly.
- Ensure that there are no diagnostic trouble codes (DTCs) that are stored.
- Ensure that the scan tool data is within a normal operating range. Refer to **Control Module References** for scan tool information.
- Verify the customer concern.
- Perform the Visual/Physical Inspection in this section. The visual/physical inspection is extremely important, and can lead to correcting a condition without additional testing. It may also help reveal the cause of an intermittent condition.

Identifying Intermittent Conditions

Many intermittent conditions occur with harness or connector movement due to engine torque, rough pavement, vibration or physical movements of a component. Refer to the following for a list of issues that may cause an intermittent condition:

- Moisture and water intrusion in connectors, terminals, and components

- Incomplete connector mating
- Poor terminal contact
- High circuit or component resistance-High resistance can include any resistance, regardless of the amount, which can interrupt the operation of the component.
- Harness that is too short or tight
- Wire insulation that is chaffed or cut
- High or low ambient temperature
- High or low engine coolant temperatures
- High underhood temperatures
- Heat build up in component or circuit due to circuit resistance, poor terminal contact, or high electrical load
- High or low system voltage
- High vehicle load conditions
- Rough road surfaces
- Electro-magnetic interference (EMI)/circuit interference from relays, solenoids or other electrical surge
- Incorrect installation of aftermarket, add on accessories

Visual/Physical Check

- Ensure that the control module grounds are clean, tight, and correctly located.
- Ensure that the vacuum hoses are not split, kinked, and properly connected, as shown on the Vehicle Emission Control Information label. Refer to **Emission Hose Routing Diagram** .
- Ensure that the air filter is clean and free from restrictions.
- Ensure that there is no water intrusion in connectors terminals and components.
- Inspect the air intake ducts for the following conditions:
    - Collapsed
    - Damaged areas
    - Looseness
    - Incorrect installation
    - Leaking
- Inspect for air leaks at the throttle body mounting area, the mass air flow (MAF) sensor and intake manifold sealing surfaces.
- Inspect the wiring harness for the following conditions:
    - Poor connections
    - Pinches
    - Cuts
- Inspect for loose, damaged, unseated, or missing sensors/components.
- Inspect the terminals for corrosion and correct contact.

SYMPTOMS TESTING

Backfire, Cuts Out/Misses, Detonation/Spark Knock, Dieseling/Run-On, Hard Start, Hesitation/Sag/Stumble, Lack of Power/Sluggishness/Sponginess, Poor Fuel Economy, Rough, Unstable, or Incorrect Idle and Stalling, or Surges/Chuggles

- Test the fuel system for the following:
  - The fuel system for correct operation volume and pressure-Refer **Fuel System Diagnosis**.
  - The fuel injectors for proper operation-Refer to **Fuel Injector Diagnosis (w/CH47976)** or **Fuel Injector Diagnosis (w/J39021 or w/Tech 2)**.
  - The fuel quality condition-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis**.
- Test ignition system for the following:
  - Proper ignition system operation-Refer to **Electronic Ignition (EI) System Diagnosis**.
  - Spark plugs-Refer to **Spark Plug Inspection** .
  - Spark plugs for correct application-Refer to **Ignition System Specifications** .
- Inspect for the following conditions
  - The proper operation of the transmission torque converter clutch (TCC). The scan tool should indicate an engine speed drop when the TCC is commanded ON.
  - The proper operation of the A/C compressor
  - Items that can cause an engine to run lean or rich. Refer to **DTC P0171 or P0172** .
  - The crankshaft position (CKP) sensor for proper operation
  - The proper operation of the knock sensor (KS) system
  - Inspect the exhaust system. Refer to **Symptoms - Engine Exhaust** .
  - Electromagnetic interference (EMI) on the reference circuit can cause a misfire condition. You can usually detect EMI with a scan tool by monitoring the engine speed parameter. A sudden increase in the engine speed parameter with little change in actual engine speed indicates that EMI is present. Inspect the high voltage components near the ignition control circuit if a condition exists.
  - The crankcase ventilation valve for proper operation
  - The proper operation of the evaporative emission (EVAP) canister purge solenoid
  - The proper operation of the engine cooling system-Refer to **Symptoms - Engine Cooling** .
- Inspect the engine for the following mechanical failures:

  Refer to **Symptoms - Engine Mechanical** .

  - Excessive oil in the combustion chamber or leaking valve seals
  - Oil consumption
  - Incorrect cylinder compression
  - Sticking or leaking valves
  - Worn camshaft lobes
  - Incorrect valve timing

  - Worn rocker arms
  - Broken valve springs
  - Excessive carbon buildup in the combustion chambers-Clean the chambers with top engine cleaner. Follow the instructions on the can.
  - Incorrect engine parts
- If the above conditions do not address the symptom, refer to the additional symptoms tests.

ADDITIONAL SYMPTOMS TESTS

Hard Start

- Verify that the engine coolant temperature (ECT) has not shifted in value. Refer to **Temperature Versus Resistance** .
- Verify the engine electrical system for correct operation. Refer to **Symptoms - Engine Electrical** .
- Verify that the driver is using the correct starting procedure as described in the owners manual.
- Verify that there is adequate fuel.
- Inspect for excessive crankshaft endplay that will cause the CKP sensor reluctor wheel to move out of alignment with the CKP sensor. Refer to **Crankshaft and Bearing Cleaning and Inspection** .

Hesitation, Sag, Stumble

- Inspect the mass air flow (MAF) sensor for obstruction, contamination, and damage. Refer to **Mass Airflow Sensor/Intake Air Temperature Sensor Replacement** .
- Test the generator. Refer to **Symptoms - Engine Electrical** . Repair the charging system if the generator output voltage is less than 9 volts or more than 16 volts.
- Inspect for excessive crankshaft endplay that will cause the CKP sensor reluctor wheel to move out of alignment with the CKP sensor. Refer to **Crankshaft and Bearing Cleaning and Inspection** .

Poor Fuel Economy

- Heavy loads being carried or towed
- Acceleration rate too much or too often
- Inspect the brake system for brake drag.
- Inspect for incorrect operation of the speedometer.
- Verify that the ECT has not shifted in value. Refer to **Temperature Versus Resistance** .
- Inspect the MAF sensor for obstruction, contamination, and damage. Refer to **Temperature Versus Resistance** .
- Inspect for foreign material accumulation in the throttle bore, and for carbon deposits on the throttle plate and shaft. Also inspect for throttle body tampering.

Detonation/Spark Knock

- Test for an engine overheating condition. Refer to **Symptoms - Engine Cooling** .
- Verify that the ECT has not shifted in value. Refer to **Temperature Versus Resistance** .
- If there are no engine mechanical faults, fill the fuel tank with a known high quality fuel that meets the vehicle minimum octane requirements.

Lack of Power, Hesitation, or Cut Out

- Inspect the engine electrical system for correct operation. Refer to **Symptoms - Engine Electrical** .
- Verify that each injector harness is connected to the correct injector.
- Inspect the MAF sensor for obstruction, contamination, and damage. Refer to **Mass Airflow Sensor/Intake Air Temperature Sensor Replacement** .

Rough, Unstable, or Incorrect Idle and Stalling

- Inspect the MAF sensor for obstruction, contamination, and damage. Refer to **Mass Airflow Sensor/Intake Air Temperature Sensor Replacement** .
- Inspect the engine mounts. Refer to **Engine Mount Inspection** .
- Inspect the intake and exhaust manifolds for casting flash.

Surges/Chuggles

- Inspect the MAF sensor for obstruction, contamination, and damage. Refer to **Mass Airflow Sensor/Intake Air Temperature Sensor Replacement** .
- Test the heated oxygen sensors (HO2S). The HO2S should respond quickly to a change in throttle position. If the HO2S do not respond to different throttle positions, inspect for contamination from fuel, silicon, or the incorrect use of RTV sealant. The sensors may have a white powdery coating and result in a high, but false, signal voltage, which gives a rich exhaust indication. The ECM reduces the amount of fuel delivered to the engine, causing a driveability condition.
- Verify that each injector harness is connected to the correct injector.

POOR FUEL FILL QUALITY

Problem	Causes
DEFINITION: During the fueling process a continual, occasional or no fuel nozzle shut-off condition has occurred.	
Difficult to fill	• Fuel fill limiter vent valve stuck closed • Evaporative emission (EVAP) canister restricted • EVAP vent valve stuck closed • Restricted vapor lines • High fuel temperature • Fuel filler hose is pinched or kinked • Ignition switch ON, vent valve closed

Over fill	• Pressure relief valve is stuck open or leaking • Fill limiter vent valve stuck open or leaking
Pre-mature shut-off of the fuel dispensing nozzle occurs immediately after engaging dispensing nozzle, tank empty	• Faulty dispensing nozzle • Restricted vapor lines or fuel fill pipe • High fuel temperature • Inlet check valve at tank stuck closed, fill pipe full of fuel • Fuel tank full, gage not accurate
Pre-mature shut-off of the fuel dispensing nozzle, more than 1/8 of tank capacity dispensed	• Kinked, pinched or plugged lines in fuel tank vent system • EVAP vent valve stuck closed or restricted • EVAP canister restricted • Fuel limiting vent valve stuck closed or obstruction at top of fuel tank • Fill pipe design concern exists, check with technical assistance
Fuel Spitback	• Restricted EVAP canister • High fuel temperature • Ignition switch ON, EVAP vent valve closed

MALFUNCTION INDICATOR LAMP (MIL) DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

Ignition voltage is supplied to the malfunction indicator lamp (MIL). The engine control module (ECM) turns the MIL ON by grounding the MIL control circuit.

REFERENCE INFORMATION

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics**

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

Ignition ON, the MIL should turn ON and OFF when commanded with a scan tool.

CIRCUIT/SYSTEM TESTING

1. Ignition ON, verify that the instrument panel cluster (IPC) warning indicators are illuminated.
    - If the IPC warning indicators are not illuminated, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ignition circuit fuse is open, replace the IPC.
2. Ignition OFF, disconnect connector X1 at the ECM.
3. Ignition ON, verify that the MIL is not illuminated.
    - If the MIL is illuminated inspect the MIL control circuit for a short to ground. If the circuit tests normal, replace the IPC.
4. Ignition ON, verify that the MIL illuminates with a 3A fused jumper between the MIL control circuit X1-40 and ground.
    - If the MIL does not illuminate test the MIL control circuit for a short to voltage or an open/high resistance. If the circuit tests normal replace the ECM.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Instrument Cluster Replacement**
- **Control Module References** for replacement. setup, and programming

ENGINE CRANKS BUT DOES NOT RUN

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

This Engine Cranks but Does Not Run diagnostic is an organized approach to identify a condition which causes the engine to crank but not start. This diagnostic directs the technician to the appropriate system diagnosis.

DIAGNOSTIC AIDS

Inspect for any of the following conditions:

- Insufficient fuel can cause a no start condition. Thoroughly inspect the fuel delivery system for sufficient fuel volume to the fuel injectors. Inspect the fuel supply components for partial blockage or restrictions.
- Fuel injectors with partially blocked and restricted nozzles, or a malfunctioning solenoid, can cause a no start condition. Refer to **Fuel Injector Diagnosis (w/CH47976)** or **Fuel Injector Diagnosis (w/J39021 or w/Tech 2)**.
- There may be fuel spray at the fuel injectors and the indicated fuel pressure may be correct, yet there may not be enough fuel to start the engine. If the fuel injectors and the injector circuit are OK, and fuel spray is detected, the fuel injector ON time may be inadequate. If the engine control module (ECM) receives incorrect inputs from the various information sensors, the fuel delivered by the fuel injectors may be inadequate to start the engine. Check all the engine data parameters with a scan tool and compare the values indicated with the expected values or the values from a known good vehicle.
- Check the crankshaft position (CKP) sensor engine reference signal with a scan tool. Observe the Engine Speed parameter while cranking the engine. The scan tool should indicate a steady 200-300 RPM while cranking. If erratic values, such as sudden spikes in the engine speed are displayed, the engine reference signal is not stable enough for the engine to start and run properly.
- Inspect the engine for good secure electrical grounds.
- If the engine almost starts and then stalls, check for an open in the ground circuits of the CKP sensor and the camshaft position (CMP) sensor.
- Water or foreign material in the fuel can cause a no start or engine will not stay running condition. During freezing weather water can freeze inside the fuel system. The engine may start after 30 minutes in a heated repair shop. The malfunction may not recur until parked overnight in freezing temperatures. Extreme weather conditions can cause contaminated fuel to prevent the vehicle from starting.
- A vehicle that starts and runs after being brought to the repair shop for a no start condition, may have an ignition system that is susceptible to moisture. Spray water on the ignition system components and the wiring in order to check for an engine starting or will not stay running concern.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **CH-48027** Digital Pressure Gage. See **Special Tools** .
- **J 26792** Spark Tester. See **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

IMPORTANT: This diagnostic assumes the following:

- **The battery is completely charged. Refer to Battery Inspection/Test .**
- **The engine cranking speed is acceptable. Refer to Engine Cranks Slowly .**
- **There is adequate fuel in the fuel tank.**

1. Crank the engine for 15 seconds. Observe the DTC information with a scan tool. The following DTCs should not be set:

   DTC P0201-P0204, P0335, P0336, P0351, P0353, P0601, P0602, P0603, P0604, P0606, P0607, P060E, P062F, P0685, P0689, P0690, P1516, P1682, P2610

   - If a DTC is set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. Ignition ON, observe the Theft Deterrent parameter with a scan tool. The parameter should display Disabled.
   - If Enabled is displayed, refer to **Symptoms - Engine Controls**.
3. Ignition OFF, disconnect the fuel pump relay.
4. Connect a **J 26792** to the boot of an ignition coil of a cylinder and ground. See **Special Tools** .

IMPORTANT: An erratic or weak spark is considered a no spark condition.

5. While cranking the engine, verify that the spark tester sparks.
   - If there is no spark, refer to **Electronic Ignition (EI) System Diagnosis**.
6. Ignition OFF, install the fuel pump relay.
7. Ignition ON, command the fuel pump ON with a scan tool. You should hear the fuel pump turn ON.
   - If the fuel pump does not turn ON, refer to **Fuel Pump Electrical Circuit Diagnosis**.
8. Ignition OFF, install the **CH-48027** . See **Special Tools** . Refer to **Fuel Pressure Gage Installation and Removal** .

IMPORTANT:
- **The fuel pump may need to be commanded ON a few times, in order to obtain the highest possible fuel pressure.**
- **Do NOT start the engine for this test.**

9. Ignition ON, command the fuel pump ON with a scan tool. The fuel pressure should be between 345-414 kPa (50-60 psi).
   - If the fuel pressure is not within the specified range, refer to **Fuel System Diagnosis**.
10. Verify that the following conditions do not exist:
    - Collapsed air intake duct to the throttle body
    - Restricted air filter element
    - Spark plugs for being gas or coolant fouled
    - A skewed manifold absolute pressure (MAP) sensor-Refer to **DTC P0106** .
    - A skewed engine coolant temperature (ECT) sensor-Refer to **Temperature Versus Resistance** .
    - Exhaust system restricted-Refer to **Restricted Exhaust** .
    - Fuel contamination-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis**.
    - Engine mechanical condition, for example, worn timing belt or low compression-Refer to **Engine Compression Test** or **Symptoms - Engine Mechanical** .
    - If you find any of the above conditions, repair as necessary.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

FUEL PUMP ELECTRICAL CIRCUIT DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Battery Voltage-Relay Switch Side	1	2	-	-
Fuel Pump Supply Voltage	1	2	3	-
Fuel Pump Relay Control	P0230	P0230	P0230	-
Fuel Pump Relay Ground	-	P0230	P0230	-
Fuel Pump Ground	-	2	-	-

1 Open fuel pump fuse, cranks no start
2 Cranks no start
3 Fuel pump operates continuously, then discharged battery

CIRCUIT/SYSTEM DESCRIPTION

The control module enables the fuel pump relay when the ignition switch is turned ON. The control module will disable the fuel pump relay within 2 seconds unless the control module detects ignition reference pulses. The control module continues to enable the fuel pump relay as long as ignition reference pulses are detected. The control module disables the fuel pump relay within 2 seconds if ignition reference pulses cease to be detected and the ignition remains ON.

DIAGNOSTIC AIDS

The following conditions may cause the fuel pump fuse to open:

- The fuse is faulty.
- There is an intermittent short to ground in the supply voltage circuit of the fuel pump.
- The fuel pump has an intermittent internal condition.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Electrical Center Identification Views**

Electrical Information Reference

- **Circuit Testing**

- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 43244 Relay Puller Pliers

CIRCUIT/SYSTEM VERIFICATION

IMPORTANT: An open or a short to voltage in the control circuit will cause both the Ckt. Open Test Status and the Ckt. Short Volts Test Status parameters to display Fault.

Ignition ON, command the fuel pump relay ON and OFF with a scan tool while observing the following control circuit status parameters:

- Fuel pump relay Ckt. Short Gnd Test Status
- Fuel pump relay Ckt. Open Test Status
- Fuel pump relay Ckt. Short Volts Test Status

Each parameter should toggle between OK and Not Run or Not Run and OK.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the fuel pump relay.
2. Ignition ON, verify that a test lamp illuminates between the ground circuit terminal and B+.
    - If the test lamp does not illuminate, test the ground circuit for a short to voltage or an open/high resistance.
3. Verify that a test lamp does not illuminate between the ground circuit terminal and the control circuit terminal.
    - If the test lamp illuminates, test the control circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Remove the test lamp.
5. Command the fuel pump relay ON with a scan tool. Verify the scan tool fuel pump relay Ckt. Short Grnd Test Status parameter is OK.
    - If not the specified value, test the fuel pump relay control circuit for a short to ground. If the circuit tests normal, replace the ECM.
6. Install a 3A fused jumper wire between the fuel pump relay control circuit terminal and the ground circuit

terminal. Command the fuel pump ON with a scan tool. Verify the scan tool fuel pump relay Ckt. Short Grnd Test Status parameter is Fault.
    - If not the specified value, test the fuel pump relay control circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
7. Inspect the fuel pump fuse.
    - If the fuel pump fuse is open, test for the following conditions:
        - A short to ground in the relay switch B+ circuit
        - A short to ground in the supply voltage circuit of the fuel pump
    - If the above circuits test normal, replace the fuel sender.
8. Verify that a test light illuminates between the B+ circuit and ground.
    - If the test lamp does not illuminate, test the B+ circuit for an open/high resistance.
9. Connect a 15A fused jumper wire between the B+ circuit and the supply voltage circuit of the fuel pump. Verify the fuel pump is activated.
    - If the fuel pump does not activate, test for the following conditions:
        - An open/high resistance in the supply voltage circuit of the fuel pump
        - An open/high resistance in the ground circuit of the fuel pump
    - If the above circuits test normal, replace the fuel sender.
10. If all circuits test normal, test or replace the fuel pump relay.

COMPONENT TESTING

1. Measure for 70-110 ohms of resistance between terminals 85 and 86 of the fuel pump relay.
    - If the resistance is not within the specified range, replace the fuel pump relay.
2. Measure for infinite resistance between the following terminals of the fuel pump relay:
    - 30 and 86
    - 30 and 87
    - 30 and 85
    - 85 and 87
    - If continuity is detected, replace the fuel pump relay.
3. Connect a 15A fused jumper wire from the positive terminal of the battery to relay terminal 85. Connect a jumper wire from the negative terminal of the battery to relay terminal 86. Measure for less than 2 ohms between terminals 30 and 87 of the relay.
    - If the resistance measures more than 2 ohms, replace the fuel pump relay.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Sender Assembly Replacement**
- **Relay Replacement (Attached to Wire Harness)** or **Relay Replacement (Within an Electrical Center)**

- **Control Module References** for ECM replacement, setup, and programming

FUEL SYSTEM DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

The control module enables the fuel pump relay when the ignition switch is turned ON. The control module will disable the fuel pump relay within 2 seconds unless the control module detects ignition reference pulses. The control module continues to enable the fuel pump relay as long as ignition reference pulses are detected. The control module disables the fuel pump relay within 2 seconds if ignition reference pulses cease to be detected and the ignition remains ON.

The fuel system is a returnless on-demand design. The fuel pressure regulator is a part of the fuel sender assembly, eliminating the need for a return pipe from the engine. A returnless fuel system reduces the internal temperature of the fuel tank by not returning hot fuel from the engine to the fuel tank. Reducing the internal temperature of the fuel tank results in lower evaporative emissions.

The fuel tank stores the fuel supply. An electric turbine style fuel pump attaches to the fuel sender assembly inside the fuel tank. The fuel pump supplies high pressure fuel through the fuel feed pipe to the fuel injection system. The fuel pump provides fuel at a higher rate of flow than is needed by the fuel injection system. The fuel pump also supplies fuel to a venturi pump located on the bottom of the fuel sender assembly. The function of the venturi pump is to fill the fuel sender assembly reservoir. The fuel pressure regulator, a part of the fuel sender assembly, maintains the correct fuel pressure to the fuel injection system. The fuel sender assembly contains a reverse flow check valve. The check valve and the fuel pressure regulator maintain fuel pressure in the fuel feed pipe and the fuel rail in order to prevent long cranking times.

REFERENCE INFORMATION

Description and Operation

Fuel System Description

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **CH-48027** Digital Pressure Gage. See **Special Tools** .
- **J 37287** Fuel Line Shut-off Adapter. See **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

IMPORTANT:

- **Inspect the fuel system for damage or external leaks before proceeding.**
- **Verify that adequate fuel is in the fuel tank before proceeding.**
- **The fuel pump relay may need to be commanded ON a few times in order to obtain the highest possible fuel pressure.**
- **Before proceeding with this test review the User Manual CH 48027-5 for Safety Information and Instructions.**

1. Ignition ON, engine OFF, command the fuel pump relay ON with a scan tool. You should hear the fuel pump turn ON and OFF.
   - If the fuel pump does not operate, refer to **Fuel Pump Electrical Circuit Diagnosis**.
2. Ignition OFF, all accessories OFF, install a **CH-48027** . See **Special Tools** . Refer to **Fuel Pressure Gage Installation and Removal** .
3. Ignition ON, engine OFF, command the fuel pump relay ON with a scan tool. Verify the fuel pressure is between 345-395 kPa (50-57 psi) and does not decrease more than 34 kPa (5 psi) in 1 minute.

CIRCUIT/SYSTEM TESTING

IMPORTANT:

- **The fuel pump relay may need to be commanded ON a few times in order to obtain the highest possible fuel pressure.**
- **DO NOT start the engine.**

1. Ignition ON, engine OFF, command the fuel pump relay ON with a scan tool and observe the fuel pressure gage while the fuel pump is operating. Verify the fuel pressure is between 345-395 kPa (50-57 psi).
   - If the fuel pressure is greater than the specified range, replace the fuel sender.
   - If the fuel pressure is less than the specified range, test, inspect, and repair the items listed below. If all items test normal, replace the fuel sender.
     - Restricted fuel feed pipe
     - Inspect the harness connectors and the ground circuits of the fuel pump for poor connections.
2. Verify that the fuel pressure does not decrease more than 34 kPa (5 psi) in 1 minute.
   - If the fuel pressure decreases more than the specified value, perform the following procedure:

1. Ignition OFF, relieve the fuel pressure. Refer to **Fuel Pressure Relief (With CH 48027)** or **Fuel Pressure Relief (Without CH 48027)** .
2. Install the **J 37287** between the fuel feed pipe and the fuel rail. See **Special Tools** .
3. Open the valve on the **J 37287** . See **Special Tools** .
4. Ignition ON, command the fuel pump relay ON with a scan tool and bleed the air from the **CH-48027** . See **Special Tools** .
5. Command the fuel pump relay ON and then OFF with a scan tool.
6. Close the valve on the **J 37287** . See **Special Tools** .
7. Monitor the fuel pressure for 1 minute.
   - If the fuel pressure decreases more than 34 kPa (5 psi) within the specified time, locate and replace the leaking fuel injector(s).
   - If the fuel pressure does not decrease more than 34 kPa (5 psi) within the specified time, replace the fuel sender.

3. Relieve the fuel pressure to 69 kPa (10 psi). Verify that the fuel pressure does not decrease more than 14 kPa (2 psi) in 5 minutes.
   - If the fuel pressure decreases more than the specified value, replace the fuel sender.
4. Operate the vehicle within the conditions of the customer's concern while monitoring the fuel pressure with the **CH-48027** . See **Special Tools** . The fuel pressure should not drop off during acceleration, cruise or hard cornering.
   - If the fuel pressure drops off, test, inspect, and repair the items listed below. If all items test normal, replace the fuel sender.
     - Restricted fuel feed pipe
     - Inspect the harness connectors and the ground circuits of the fuel pump for poor connections
5. If the fuel system tests normal, refer to **Symptoms - Engine Controls**.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Hose/Pipes Replacement - Chassis**
- **Fuel Injector Replacement**
- **Fuel Sender Assembly Replacement**

FUEL INJECTOR DIAGNOSIS (W/CH47976)

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

The control module enables the appropriate fuel injector pulse for each cylinder. The ignition voltage is supplied directly to the fuel injectors. The control module controls each fuel injector by grounding the control circuit via a solid state device called a driver. A fuel injector coil winding resistance that is too high or too low will affect the engine driveability. A fuel injector control circuit DTC may not set, but a misfire may be apparent. The fuel injector coil windings are affected by temperature. The resistance of the fuel injector coil windings will increase as the temperature of the fuel injector increases.

The **CH-47976** Active Fuel Injector Tester (AFIT) is used to test the fuel pump, fuel system leak down, and the fuel injectors. See **Special Tools** . Following the User Guide, CH 47976-11, and the on screen prompts or selections, will indicate the steps required to perform each of the available tests. The tester will perform all of the tests automatically and display results of the test. The results can also be down loaded for storage and printing.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Special Tools

CH-47976 Active Fuel Injector Tester (AFIT). See **Special Tools** .

COMPONENT TESTING

Fuel Injector Coil Test

Verify the resistance of each fuel injector with one of the following methods:

- If the engine coolant temperature (ECT) sensor is between 10-32°C (50-90°F), the resistance of each fuel injector should be 11-14 ohms.
    - If the injectors measure OK, perform the **AFIT Test Procedure**.

  - If not within the specified range, replace the fuel injector.
- If the ECT sensor is not between 10-32°C (50-90°F), measure and record the resistance of each fuel injector with a DMM. Subtract the lowest resistance value from the highest resistance value. The difference between the lowest value and the highest value should be equal to or less than 3 ohms.
  - If the difference is equal to or less than 3 ohms, refer to the **AFIT Test Procedure**.
  - If the difference is more than 3 ohms, add all of the fuel injector resistance values to obtain a total resistance value. Divide the total resistance value by the number of fuel injectors to obtain an average resistance value. Subtract the lowest individual fuel injector resistance value from the average resistance value. Compute the difference between the highest individual fuel injector resistance value and the average resistance value. Replace the fuel injector that displays the greatest difference above or below the average.

IMPORTANT:

- **DO NOT perform this test if the engine coolant temperature (ECT) is above 94°C (201°F). Irregular fuel pressure readings may result due to hot soak fuel boiling.**
- **Verify that adequate fuel is in the fuel tank before proceeding with this diagnostic.**

AFIT Test Procedure

1. Turn OFF all accessories.
2. Turn OFF the ignition.
3. Install the AFIT. Refer to the AFIT User Guide.
4. Turn ON the AFIT and select the vehicle.
5. Turn ON the ignition and perform the Injector Test.
   - If the AFIT aborts testing due to fuel pressure or fuel leak down, refer to **Fuel System Diagnosis**.
6. View the test results.
   - If any injector exceeds the recommended tolerance, replace the fuel injector(s).

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Fuel Injector Replacement

FUEL INJECTOR DIAGNOSIS (W/J39021 OR W/TECH 2)

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

The control module enables the appropriate fuel injector pulse for each cylinder. The ignition voltage is supplied directly to the fuel injectors. The control module controls each fuel injector by grounding the control circuit via a solid state device called a driver. A fuel injector coil winding resistance that is too high or too low will affect the engine driveability. A fuel injector control circuit DTC may not set, but a misfire may be apparent. The fuel injector coil windings are affected by temperature. The resistance of the fuel injector coil windings will increase as the temperature of the fuel injector increases.

When performing the fuel injector balance test, the scan tool is first used to energize the fuel pump relay. The fuel injector tester or the scan tool is then used to pulse each injector for a precise amount of time, allowing a measured amount of the fuel to be injected. This causes a drop in the system fuel pressure that can be recorded and used to compare each injector.

DIAGNOSTIC AIDS

- Monitoring the misfire current counters, or misfire graph, may help to isolate the fuel injector that is causing the condition.
- Operating the vehicle over a wide temperature range may help isolate the fuel injector that is causing the condition.
- Perform the fuel injector coil test within the conditions of the customer's concern. A fuel injector condition may only be apparent at a certain temperature, or under certain conditions.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

- **CH-48027** Digital Pressure Gage. See **Special Tools** .
- **J 35616** Connector Test Adapter Kit. See **Special Tools** .
- **J 39021** Fuel Injector Coil and Balance Tester. See **Special Tools** .

COMPONENT TESTING

Fuel Injector Coil Test

Verify the resistance of each fuel injector with one of the following methods:

- If the engine coolant temperature (ECT) sensor is between 10-32°C (50-90°F), the resistance of each fuel injector should be 11-14 ohms.
  - If the injectors measure OK, perform the Fuel Injector Balance Test - Fuel Pressure Test.
  - If not within the specified range, replace the fuel injector.
- If the ECT sensor is not between 10-32°C (50-90°F), measure and record the resistance of each fuel injector with a DMM. Subtract the lowest resistance value from the highest resistance value. The difference between the lowest value and the highest value should be equal to or less than 3 ohms.
  - If the difference is equal to or less than 3 ohms, refer to the **Fuel Injector Balance Test - Fuel Pressure Test** for further diagnosis of the fuel injectors.
  - If the difference is more than 3 ohms, add all of the fuel injector resistance values to obtain a total resistance value. Divide the total resistance value by the number of fuel injectors to obtain an average resistance value. Subtract the lowest individual fuel injector resistance value from the average resistance value. Compute the difference between the highest individual fuel injector resistance value and the average resistance value. Replace the fuel injector that displays the greatest difference above or below the average.

IMPORTANT:

- **DO NOT perform this test if the engine coolant temperature (ECT) is above 94°C (201°F). Irregular fuel pressure readings may result due to hot soak fuel boiling.**
- **Verify that adequate fuel is in the fuel tank before proceeding with this diagnostic.**
- **Before proceeding with this test review the User Manual CH 48027-5 for Safety Information and Instructions.**

Fuel Injector Balance Test - Fuel Pressure Test

1. Install a fuel pressure gage. Refer to **Fuel Pressure Gage Installation and Removal** .
2. Turn ON the ignition, with the engine OFF.

IMPORTANT:

- **The fuel pump relay may need to be commanded ON a few times in order to obtain the highest possible fuel pressure.**

- **DO NOT start the engine.**

3. Command the fuel pump relay ON with a scan tool.
4. Observe the fuel pressure gage with the fuel pump commanded ON. The fuel pressure should be 345-395 kPa (50-57 psi).
    - If the fuel pressure is not 345-395 kPa (50-57 psi), refer to **Fuel System Diagnosis**.
5. Monitor the fuel pressure gage for one minute. The fuel pressure should not decrease more than 34 kPa (5 psi).
    - If the fuel pressure decreases more than 34 kPa (5 psi), refer to **Fuel System Diagnosis**.
6. Perform the Fuel Injector Balance Test with Special Tool or the Fuel Injector Balance Test with Tech 2.

Fuel Injector Balance Test with Special Tool

1. Set the amperage supply selector switch on the fuel injector tester to the Balance Test 0.5-2.5 amp position.
2. Disconnect the multi-way harness connector C104 of the fuel injectors.
3. Connect the **J 39021** using the **J 35616** to the ignition circuit terminal A and the control circuit of the appropriate fuel injector listed below:. See **Special Tools** .
    - Injector 1 terminal F
    - Injector 2 terminal G
    - Injector 3 terminal H
    - Injector 4 terminal B
    - Injector 5 terminal C
    - Injector 6 terminal D
4. Command the fuel pump relay ON and then OFF three times with a scan tool. On the last command, as the fuel pressure begins to slowly degrade and stabilize, select a fuel pressure within 34 kPa (5 psi) of the maximum pump pressure. Record this fuel pressure. This is the starting pressure at which you will pulse each injector.
5. Command the fuel pump relay ON one more time and energize the fuel injector by depressing the Push to Start Test button on the **J 39021** at the previously selected pressure. See **Special Tools** .
6. After the injector stops pulsing, select Min from the Display Mode and record the Min pressure.

IMPORTANT: New test results will not be recorded if the Min/Max results are not cleared after each injector is tested.

7. Clear the Min/Max results.
8. Select Normal from the Display Mode.
9. Repeat steps 3 and 5 through 8 for each fuel injector.
10. Perform the Pressure Drop Calculation.

Fuel Injector Balance Test with Tech 2

1. Command the fuel pump relay ON and then OFF three times with a scan tool. On the last command, as the fuel pressure begins to slowly degrade and stabilize, select a fuel pressure within 34 kPa (5 psi) of the maximum pump pressure. Record this fuel pressure. This is the starting pressure at which you will pulse each injector.
2. With a scan tool, select the Fuel Injector Balance Test function within the Special Functions menu.
3. Select an injector to be tested.
4. Press Enter to prime the fuel system.
5. Energize the fuel injector by depressing the Pulse Injector button on the scan tool at the previously selected pressure.
6. After the injector stops pulsing, select Min from the Display Mode on the **CH-48027** and record the Min pressure. See **Special Tools** .

IMPORTANT: New test results will not be recorded if the Min/Max results are not cleared after each injector is tested.

7. Clear the Min/Max results on the **CH-48027** . See **Special Tools** .
8. Select Normal from the Display Mode on the **CH-48027** . See **Special Tools** .
9. Press Enter on the scan tool to bring you back to the Select Injector screen.
10. Repeat steps 3 through 9 for each fuel injector.
11. Perform the Pressure Drop Calculation.

Pressure Drop Calculation

1. Subtract the minimum pressure from the starting pressure for one fuel injector. The result is the pressure drop value.
2. Obtain a pressure drop value for each fuel injector.
3. Add all of the individual pressure drop values except for the injector suspected of being faulty. This is the total pressure drop.
4. Divide the total pressure drop by the number of fuel injectors that were added together. This is the average pressure drop. The difference between any individual pressure drop and the average pressure drop should not be more than 20 kPa (3 psi).
    - If the difference between any individual pressure drop and the average pressure drop is more than 20 kPa (3 psi), replace the fuel injector(s).

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Fuel Injector Replacement

FUEL INJECTOR CIRCUIT DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition 1 Voltage - Fuse to Splice	[1]	[2]	-	-
Ignition 1 Voltage - Splice to Injector	[1]	P0201, P0202, P0203, P0204, P0205, P0206	-	-
Fuel Injector 1 Control	P0201	P0201	P0201	-
Fuel Injector 2 Control	P0202	P0202	P0202	-
Fuel Injector 3 Control	P0203	P0203	P0203	-
Fuel Injector 4 Control	P0204	P0204	P0204	-
Fuel Injector 5 Control	P0205	P0205	P0205	-
Fuel Injector 6 Control	P0206	P0206	P0206	-

[1] Open fuse, Cranks no start
[2] Cranks no start

CIRCUIT/SYSTEM DESCRIPTION

The control module enables the appropriate fuel injector pulse for each cylinder. Ignition voltage is supplied to the fuel injectors. The control module controls each fuel injector by grounding the control circuit via a solid state device called a driver.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

- **Component Connector End Views**
- **Inline Harness Connector End Views**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**

- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 35616-200 Test Light Probe Kit

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the C104 fuel injector multi-way connector.
2. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal A engine control module (ECM) harness side and ground.
    - If the test lamp does not illuminate, test the ignition circuit for a short to ground, or an open/high resistance. If the circuit tests normal and the ignition circuit fuse is open, test or replace the fuel injector.
3. Ignition OFF, connect a **J 35616-200** between the ignition circuit terminal A and the control circuit ECM harness side, of the appropriate injector listed below:
    - Injector 1 terminal F
    - Injector 2 terminal G
    - Injector 3 terminal H
    - Injector 4 terminal B
    - Injector 5 terminal C
    - Injector 6 terminal D
4. Engine cranking, the test lamp should flash for each injector.
    - If the test lamp is always ON, test the appropriate control circuit for a short to ground. If the circuit tests normal, replace the ECM.
    - If the test lamp is always OFF, test the appropriate control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
5. Ignition OFF, measure for 10-15 ohms on the engine harness side of C104 between the ignition circuit terminal A and the control circuit of the appropriate injector listed below:
    - Injector 1 terminal F
    - Injector 2 terminal G
    - Injector 3 terminal H
    - Injector 4 terminal B
    - Injector 5 terminal C
    - Injector 6 terminal D
    - If the resistance is not within the specified range, test for a short to ground or an open/high resistance between C104 and the appropriate fuel injector harness connector. If the circuits test

normal, test or replace the affected fuel injector.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Injector Replacement**
- **Control Module References** for ECM replacement, setup, and programming

FUEL TANK LEAK TEST

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

TEST DESCRIPTION

The fuel tank leak test is used to locate any fuel or fuel vapor escaping the fuel tank area. Fuel vapors escaping above the fuel level will be detected, if more than the calibrated amount, when the evaporative emission (EVAP) diagnostics complete one test cycle. The malfunction indicator lamp (MIL) will illuminate after the EVAP diagnostics have failed 2 test cycles.

DIAGNOSTIC AIDS

- Operate the vehicle under the condition of the customer concern. Under high temperature conditions fuel vapors may increase to the point of EVAP canister vapor saturation. Fuel vapors would then be released into the atmosphere. Once the engine is running and the EVAP purge is enabled, all fuel vapor release would be eliminated.
- Movement of the EVAP pipes or the fuel pipes may help find an intermittent condition.
- If the fuel level is low, a liquid fuel leak may not be evident.

REFERENCE INFORMATION

Special Tools

- **GE-41415-50** Interrupted Thread Cap Adapter
- **J 41413-200** Evaporative Emissions System Tester (EEST). See **Special Tools** .

SYSTEM VERIFICATION

CAUTION: Gasoline or gasoline vapors are highly flammable. A fire could occur if an ignition source is present. Never drain or store gasoline or diesel fuel in an open container, due to the possibility of fire or explosion. Have a dry

chemical (Class B) fire extinguisher nearby.

- Inspect the fuel tank and the fuel pipes for damage or external leaks.
- Turn ON the ignition, with the engine OFF. Command the fuel pump relay ON with a scan tool. Inspect for fuel leaking from the fuel pipes.

SYSTEM TESTING

IMPORTANT: If the floating indicator registers any flow after stabilizing, a leak is evident.

1. Turn OFF the ignition. Install the **J 41413-200** and the **GE-41415-50** . Test for a fuel leak while the system is under pressure referring to the J 41413-210 Operation Manual.

IMPORTANT: It may be necessary to partially lower the fuel tank.

2. Using the **J 41413-200** and the J 41413-210 Operation Manual, introduce smoke into the evaporative emission (EVAP) system. See **Special Tools** . Inspect for leaks in any of the following locations:
   - The fuel tank, the fill limiter vent valve, the pressure relief valve, and the grade vent valve
   - The fuel sender, the fuel sender seal, the fuel pipe, and the EVAP pipes
   - The fuel tank pressure (FTP) sensor seal
   - The fuel fill pipe and hose

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Evaporative Emission Hoses/Pipes Replacement - Canister/Fuel Tank**
- **Fuel Hose/Pipes Replacement - Chassis**
- **Fuel Sender Assembly Replacement**
- **Fuel Tank Replacement**

ALCOHOL/CONTAMINANTS-IN-FUEL DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

TEST DESCRIPTION

Water contamination in the fuel system may cause driveability conditions such as hesitation, stalling, no start,

or misfires in one or more cylinders. Water may collect near a single fuel injector at the lowest point in the fuel injection system and cause a misfire in that cylinder. If the fuel system is contaminated with water, inspect the fuel system components for rust or deterioration.

Ethanol concentrations of greater than 10 percent can cause driveability conditions and fuel system deterioration. Fuel with more than 10 percent ethanol could result in driveability conditions such as hesitation, lack of power, stalling, or no start. Excessive concentrations of ethanol used in vehicles not designed for it may cause fuel system corrosion, deterioration of rubber components, and fuel filter restriction.

REFERENCE INFORMATION

Special Tools

J 44175 Fuel Composition Tester. See **Special Tools** .

SYSTEM VERIFICATION

The fuel sample should be drawn from the bottom of the tank so that any water present in the tank will be detected. The sample should be bright and clear.

- If the sample appears cloudy, or contaminated with water, as indicated by a water layer at the bottom of the sample, perform the Particulate Contaminants in Fuel Testing Procedure.
- If alcohol contamination is suspected, perform the Alcohol in Fuel Testing procedure.

ALCOHOL IN FUEL TESTING WITH SPECIAL TOOL

1. Test the fuel composition using **J 44175** and Instruction Manual. See **Special Tools** .
2. If water appears in the fuel sample, clean the fuel system.
3. Subtract 50 from the reading on the DMM in order to obtain the percentage of alcohol in the fuel sample.
4. If the fuel sample contains more than 15 percent ethanol, add fresh, regular gasoline to the vehicle fuel tank.
5. Test the fuel composition.
6. If testing shows the ethanol percentage is still more than 15 percent, replace the fuel in the vehicle.

ALCOHOL IN FUEL TESTING WITHOUT SPECIAL TOOL

1. Using a 100 ml (3.38 oz) specified cylinder with 1 ml (0.034 oz) graduation marks, fill the cylinder with fuel to the 90 ml (3.04 oz) mark.
2. Add 10 ml (0.34 oz) of water in order to bring the total fluid volume to 100 ml (3.38 oz) and install a stopper.
3. Shake the cylinder vigorously for 10-15 seconds.
4. Carefully loosen the stopper in order to release the pressure.
5. Re-install the stopper and shake the cylinder vigorously again for 10-15 seconds.
6. Put the cylinder on a level surface for approximately 5 minutes in order to allow adequate liquid

separation. If alcohol is present in the fuel, the volume of the lower layer, which would now contain both alcohol and water, will be more than 10 ml (0.34 oz). For example, if the volume of the lower layer is increased to 15 ml (0.51 oz), this indicates at least 5 percent alcohol in the fuel. The actual amount of alcohol may be somewhat more because this procedure does not extract all of the alcohol from the fuel.

PARTICULATE CONTAMINANTS IN FUEL TESTING PROCEDURE

1. Using an approved fuel container, draw approximately 0.5 liter (0.53 qt) of fuel.
2. Place the container on a level surface for approximately 5 minutes in order to allow settling of the particulate contamination. Particulate contamination will show up in various shapes and colors. Sand will typically be identified by a white or light brown crystals. Rubber will appear as black and irregular particles.
3. Observe the fuel sample. If any physical contaminants or water are present, clean the fuel system.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Fuel System Cleaning

ELECTRONIC IGNITION (EI) SYSTEM DIAGNOSIS

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

The ignition system uses individual ignition coil/module assemblies for each cylinder. The engine control module (ECM) controls the individual coils by transmitting timing pulses on the ignition control (IC) circuit of each ignition coil/module to enable a spark event. Each ignition coil/module has the following circuits:

- Ignition voltage circuit
- Ground circuit
- IC circuit
- Low reference circuit

DIAGNOSTIC AIDS

- Depending on location in the spliced ignition voltage circuit, a slight resistance can cause a misfire or a crank/no start concern. A voltage drop test will pinpoint this condition.
- A slight to moderate resistance on any IC circuit can cause a misfire before DTC P0351-P0356 sets.

- Extended engine cranking time, may foul the spark plugs with excessive fuel.

REFERENCE INFORMATION

Schematic Reference

Engine Controls Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Special Tools

J 26792 HEI Spark Tester. See **Special Tools** .

CIRCUIT/SYSTEM VERIFICATION

1. Verify that the engine is in good mechanical condition before continuing with this diagnostic.
2. Verify the following conditions:
   - The ignition coil/modules are correctly connected
   - The proper firing order
   - The proper spark plug type
   - The proper spark plug gap and torque-Refer to **Ignition System Specifications** and **Spark Plug Inspection** .

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector at the affected ignition coil/modules.
2. Ignition OFF for 90 seconds, test for less than 5 ohms between the ground circuit terminal C and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 5 ohms between the low reference circuit terminal D and ground.

- If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.

IMPORTANT: If the ignition fuse is open, it will be necessary to test the spliced ignition circuits and the components for a short to ground.

4. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal A and ground.
   - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance.
5. Exchange the affected ignition coil/module with the ignition coil/module of a good cylinder.
6. Start the engine, and observe the scan tool Misfire Current Cylinder parameters.
   - If the misfire transfers with the suspect ignition coil/module, replace as needed.
7. If the circuits test normal, test or replace the spark plug/s.

COMPONENT TESTING

Use the **J 26792** to verify the output of each ignition coil/module. See **Special Tools** .

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition Coil Replacement**
- **Spark Plug Replacement**

EVAPORATIVE EMISSION SYSTEM DIAGNOSIS

OPERATING INSTRUCTIONS FOR THE EVAPORATIVE EMISSION SYSTEM TESTER (EEST)

Vehicle Setup

IMPORTANT: A large difference between the vehicle temperature and shop temperature will seriously affect the accuracy of the tests. Always allow enough time, at least 15 minutes, for the vehicle temperature to adjust to the shop temperature. Refer to Temperature Variation Instructions for more information about vehicle versus shop temperatures.

1. Engine OFF, open the hood. Position a large fan to blow air under the vehicle onto the fuel tank area.
2. Connect the red battery clip from the tester to the positive battery terminal.

IMPORTANT: The vehicle battery must be fully charged for optimum tester performance.

3. Connect the black battery clip from the tester to chassis ground.

FLOWMETER TEST - LEAK DETECTION

1. Open the Nitrogen tank valve and turn the NITROGEN/SMOKE valve on the front control panel to NITROGEN.
2. Connect the hose to the correct test orifice on the bottom front of the tester. For orifice size, refer to the GM Service manual for the vehicle being tested. The vehicle specific information can be found in service procedures for DTCs that relate to evaporative emission (EVAP) system leaks.
3. Press and release the remote switch to activate the tester.
4. Position the sliding red flag on the flowmeter to align with the floating indicator. When the red flag is set, press and release the remote switch to deactivate the tester.
5. Remove the hose from the test orifice and install the hose onto the vehicle. For proper connection location, and the special tool numbers for any adapters that may be required, refer to the service manual for the vehicle being tested. The vehicle specific information can be found in service procedures for DTCs that relate to evaporative emission EVAP system leaks.
6. Seal the EVAP system per instructions in the service manual. Most systems can be sealed using a scan tool output control for the EVAP canister vent solenoid valve. Other systems require that the system be plugged. Refer to the service manual for vehicle being tested for specific instructions.

IMPORTANT:

- **Larger volume fuel tanks, and/or those with lower fuel levels, may require several minutes to fill with nitrogen.**
- **Static buildup may cause the float indicator to stick. It may be necessary to tap on the flowmeter to free up the float.**

7. Press and release the remote switch to activate the nitrogen flow and fill the system.
8. Compare the stable floating indicator position to the red flag.
   - ABOVE the red flag, the result is UNACCEPTABLE, FAIL-Go to **Smoke Procedure**
   - BELOW the red flag, the result is ACCEPTABLE, PASS-Test complete
9. Press and release the remote switch to deactivate the tester.

SMOKE PROCEDURE - LOCATE THE LEAK

IMPORTANT: It is not recommended to use the tester in an outside repair bay area because wind and sunlight may affect temperature and your ability to see the smoke.

1. Turn OFF any fans that may cause air movement around or near the vehicle.

IMPORTANT: Completely unwind the nitrogen/smoke hose from the bracket to optimize the tester's performance.

2. Connect the nitrogen/smoke hose to the vehicle as directed in the service manual. Some vehicles require

that the nitrogen/smoke hose be connected at the front of the EVAP system at the EVAP service port. An adapter may be necessary. Other vehicles require the connection be made at the rear of the system using an adapter at the fuel fill cap. Consult the service manual for vehicle specific instructions regarding connection location and adapters.

3. Open the nitrogen tank valve and turn the NITROGEN/SMOKE valve on the control panel to SMOKE.

IMPORTANT: The remote switch operates in a push ON, push OFF fashion.

4. Press and release the remote switch to activate the tester and inject smoke into the EVAP system.
5. Verify smoke has filled the EVAP system by opening the system opposite the end where smoke is injected. When injecting smoke at the service port, remove the fuel fill cap, or temporarily leave the EVAP canister vent valve open, until smoke is observed. Then close the system and continue testing. If using a special tool fuel fill cap adapter at the filler neck, use the **J 41413-VLV** EVAP Service Port Vent Fitting tool at the service port until smoke is observed, then remove the **J 41413-VLV** tool and continue with the test. See **Special Tools** .

IMPORTANT: Inject smoke in less than 2-minute cycles for optimum tester performance.

6. Press and release the remote switch to deactivate the tester.

IMPORTANT: For optimum visual smoke performance, deactivate the smoke flow and allow the system pressure to drop. Allowing the smoke to exit small holes at a low flow rate greatly enhances visibility.

7. Introduce smoke into the system for an additional 60 seconds. Continue introducing smoke at 15-second intervals, as necessary.
8. Using the a high-intensity white light, inspect the entire EVAP system path, and look for the source of the leak indicated by the exiting smoke. Introduce smoke at 15-second intervals, as needed, until leak source is identified.

TEMPERATURE VARIATION INSTRUCTIONS

The Concern

Ideal circumstances for conducting the EVAP Flowmeter Test require equal temperatures between the nitrogen gas and the vehicle EVAP system. Significant differences in temperature between them can result in a flow or pressure change during testing, causing misleading results. Typically, the Evaporative Emissions System Tester is stored indoors, approximately 21°C (70°F). Vehicles brought in for diagnosis may have an EVAP system at significantly different temperatures -40 to +43°C (-40 to +110°F).

For Example

IMPORTANT: With no temperature difference between the nitrogen gas and EVAP system, the resulting vehicle EVAP system pressure will remain stable at 13 inches H2O once pressurized, providing no leaks are present.

When the EVAP Flowmeter Tests are performed with significant differences in temperature between the nitrogen gas and the vehicle EVAP system, the following results can occur:

- An increase in flow during the flowmeter test can be caused by a vehicle's warm EVAP system cooling down.
- A decrease in flow during the flowmeter test can be caused by a vehicle's cool EVAP system warming up.

The Solution

When working on a vehicle with significant temperature differences between the vehicle EVAP system and the nitrogen gas, allow the vehicle EVAP system temperature to stabilize as close as possible to the temperature of the nitrogen gas before conducting the Flowmeter Test.

INSPECTION/MAINTENANCE (I/M) SYSTEM CHECK

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

Several states require that a vehicle pass on-board diagnostic (OBD) system tests and the inspection/maintenance (I/M) emission inspection in order to renew license plates. This is accomplished by viewing the I/M System Status display on a scan tool. Using a scan tool, the technician can observe the I/M System Status in order to verify that the vehicle meets the criteria that comply with the local area requirements.

CONDITIONS FOR UPDATING THE I/M SYSTEM STATUS

Each system monitor requires at least one, and sometimes several diagnostic tests. The result of each test is reported by a diagnostic trouble code (DTC). A system monitor is complete when either all of the DTCs composing the monitor have Run and Passed, or when any one of the DTCs comprising the monitor has illuminated the malfunction indicator lamp (MIL). Once the system monitor is complete, the I/M System Status display will indicate YES in the Completed column.

For example, when the HO2S Heater Status indicates YES, either all of the oxygen sensor heater tests have passed or one of the tests has illuminated the MIL. If the vehicle has four heated oxygen sensors, either all four heater circuit tests have passed or one of the heater circuit tests has illuminated the MIL. The I/M System Status will indicate NO under the Completed column when any of the required tests for that system have not run. The following is a list of conditions that would set the I/M System Status indicator to NO:

- The vehicle is new from the factory and has not yet been driven through the necessary drive conditions to complete the tests.
- The battery has been disconnected or discharged below operating voltage.
- The control module power or ground has been interrupted.

- The control module has been reprogrammed.
- The control module DTCs have been cleared.

MONITORED EMISSION CONTROL SYSTEMS

The OBD II System monitors all emission control systems that are on-board. The OBD II regulations require monitoring of the following:

- The air conditioning system
- The catalytic converter efficiency
- Comprehensive component monitoring-Emission related inputs and outputs
- The evaporative emission (EVAP) system
- The fuel delivery system
- Heated catalyst monitoring
- Misfire monitoring
- The oxygen sensor system (O2S or HO2S)
- The oxygen sensor heater system (HO2S heater)
- The secondary air injection (AIR) system

For the specific DTCs required for each system, refer to **Inspection/Maintenance (I/M) System DTC Table**. Systems such as fuel delivery, misfire, and comprehensive components may not be listed in a system status list. These tests run continuously and do not require an I/M System Status indicator.

CIRCUIT/SYSTEM VERIFICATION

Review the I/M System Status indicators. All I/M System Status indicators should report YES.

CIRCUIT/SYSTEM TESTING

IMPORTANT: Many DTC related repairs will instruct the technician to clear the DTC information. Clearing the DTC will reset the I/M System Status indicators to NO. Performing the I/M Complete System Set Procedure will set each of the I/M System Status indicators to YES.

1. Observe the Engine DTC information with a scan tool.
    - If a DTC is set that would prevent the I/M System Status tests from completing, diagnose that DTC before continuing. Refer to **Inspection/Maintenance (I/M) System DTC Table**.
2. Review applicable service bulletins for software updates that would prevent the I/M System Status tests from completing.
    - If a control module re-program or other repair is required, perform the **Inspection/Maintenance (I/M) Complete System Set Procedure**.
3. Observe the I/M System Status indicators.

- If any I/M System Status indicators report NO, perform the **Inspection/Maintenance (I/M) Complete System Set Procedure**.

INSPECTION/MAINTENANCE (I/M) COMPLETE SYSTEM SET PROCEDURE

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

CIRCUIT/SYSTEM DESCRIPTION

The purpose of the Inspection/Maintenance (I/M) complete system set procedure is to satisfy the enable criteria necessary to execute all of the I/M readiness diagnostics and complete the trips for those particular diagnostics. When all I/M monitored diagnostic tests are completed, the I/M System Status indicators are set to YES. Perform the I/M Complete System Set Procedure if any I/M System Status indicators are set to NO.

I/M DATA LIST

To determine if the I/M readiness diagnostic tests can be run this ignition cycle, use a scan tool to observe the I/M monitor enabled parameters in the I/M Data List.

CONDITIONS FOR MEETING A COLD START

- The ignition voltage between 11-18 volts.
- The barometric pressure (BARO) is more than 75 kPa.
- The start-up engine coolant temperature (ECT) is between 4-30°C (39-86°F).
- The start-up intake air temperature (IAT) is between 4-30°C (39-86°F).
- The difference between the IAT and the ECT is less than 6°C (10.8°F)
- The ambient air temperature is between 4-30°C (39-86°F).
- The fuel level is between 15-85 percent.
- Vehicle has NOT been refueled since the last cold start ignition cycle.

CIRCUIT/SYSTEM VERIFICATION

Review the I/M System Status indicators. All I/M System Status indicators should report YES.

INSPECTION/MAINTENANCE (I/M) SYSTEM SET PROCEDURE

IMPORTANT: Whenever the ignition is turned ON, ignition positive voltage is supplied to the heated oxygen sensor (HO2S) heaters. After verifying the enable criteria, turn OFF the ignition for approximately 5 minutes to allow the sensors to cool before continuing with the test. Once the engine is

started, do NOT turn the engine OFF for the remaining portion of the set procedure.

1. Ensure that the vehicle meets the conditions for a cold start listed above.
    - If the evaporative emission (EVAP) I/M System Status indicator displays NO, perform the EVAP Service bay test if applicable.
    - If the EVAP Service Bay Test is NOT available, it may take up to 6 drive cycles, with up to 17 hours between drive cycles, for the EVAP I/M System Status indicator to transition to YES.
    - If the O2S Heater System Status indicator displays NO, ensure that the ignition has been turned OFF for at least 10 hours.
2. Turn OFF all accessories; HVAC system, other electrical loads, including aftermarket/add-on equipment, etc.
3. Set the vehicle parking brake and ensure the vehicle is in park for automatic transmission or neutral for manual transmission.
4. Turn the ignition ON with the engine OFF for 1 minute.
5. Start and idle the engine for 2 minutes and until 65°C (149°F) is achieved.
6. Run the engine for 8 minutes within the following conditions:
    - MAF parameter between 4-30 g/s
    - Engine speed steady between 1,000-3,000 RPM
7. Apply and hold brake pedal, and shift to Drive for automatic, or apply clutch pedal for manual and operate the vehicle within the following conditions for 2 minutes:
    - Mass air flow (MAF) signal between 4-30 g/s
    - RPM steady between 1,200-1,500 RPM

IMPORTANT: Do NOT touch the accelerator pedal during the idle period. A change in throttle position (TP) Sensor angle or an increase in engine speed may invalidate this portion of the test.

8. Release the accelerator pedal and allow the engine to idle for 2 minutes.

CAUTION: Refer to Road Test Caution .

9. Release the parking brake and drive vehicle for at least 5.5 miles between 45-112 km/h (28-70 mph) with the vehicle reaching at least 80 km/h (50 mph).
10. Safely stop the vehicle. With the brake pedal applied, allow the engine to idle for 2 minutes.
11. Apply the parking brake and shift to Park for automatic, or Neutral and release clutch pedal for manual.

IMPORTANT: Do NOT disturb the vehicle or turn ON the ignition until told to do so. Disturbing the vehicle may invalidate this portion of the test.

12. Turn OFF the ignition and exit the vehicle. Do NOT disturb the vehicle for 45 minutes.
13. Observe the I/M System Status with a scan tool. All of the I/M System Status indicators should display YES.
    - If the EVAP I/M System Status indicator displays NO turn OFF the ignition for 17 hours, ensure that the vehicle meets the conditions for a cold start, and repeat steps 9-13 six more times, or until the EVAP I/M System Status indicator transitions to YES. If the indicator continues to display NO, refer to the **Inspection/Maintenance (I/M) System DTC Table** to identify the DTCs that did not run.

- If any of the I/M System Status indicators display NO, refer to the **Inspection/Maintenance (I/M) System DTC Table** for the indicator which did not display YES. The I/M System DTC Table identifies the DTCs associated with each I/M System Status Indicator.

INSPECTION/MAINTENANCE (I/M) SYSTEM DTC TABLE

System	DTCs Required to Set System Status to YES
If an I/M System Status indicator did NOT update to YES during the **Inspection/Maintenance (I/M) System Check**, review each indicator and reference this table to determine each DTC associated with the I/M System Status Indicator. Each DTC listed below has specific conditions that must be met for the diagnostic to run. Included in these conditions are additional DTCs which, if set, will inhibit these DTCs from running. Reviewing and operating the vehicle within the Conditions for Running for each DTC listed below will allow the I/M System Status Indicators to transition to YES.	
Catalyst	**DTC P0420**
EVAP	**DTC P0442** **DTC P0443 or P0449** **DTC P0446** **DTC P0451, P0452, P0453, or P0454** **DTC P0455** **DTC P0496**
Oxygen Sensor	**DTC P0131, P0132, P0137, or P0138** **DTC P0133, P0134, P013A, P013B, P013E, P013F, P0140, P1133, P2270, P2271, or P2A00**
Oxygen Sensor Heater	**DTC P0030, P0036, P0053, P0054, P0135, or P0141**
Secondary AIR Injection	**DTC P0411** **DTC P0412 or P0418** **DTC P2430, P2431, P2432, or P2433** **DTC P2440** **DTC P2444**

SERVICE BAY TEST

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DESCRIPTION

The purpose of the evaporative emission (EVAP) Service Bay Test is to aid in resetting the EVAP inspection/maintenance (I/M) system status. For this vehicle that is equipped with the engine off natural vacuum (EONV) diagnostic, the Service Bay Test uses the scan tool to initiate the engine control module (ECM) regular sequence of EVAP system DTC tests, but with different enable criteria. By using the Service Bay Test the I/M indicator can be set without the need for multiple cold soaks.

The scan tool displays for the Service Bay Test are based on the events that occur within the following three categories:

- The engine running portion of the tests-The vehicle must remain at rest, in Park, or in Neutral, during this portion of the test. This test inspects for large leaks, a leaking purge valve and/or vent system restrictions. The scan tool will display test progress or the reason for an abort or failure.
- Drive cycle-The scan tool will display time and distance needed to warm the fuel.
- Ignition OFF-During this portion of the test, the engine controller will remain active for up to 45 minutes when the ignition is turned OFF to allow control of the EVAP vent valve and run the EONV test. The engine controller inspects for small leaks during this period by monitoring fuel tank pressure or vacuum. If the system is sealed, there will be a pressure or vacuum change. Pressure or vacuum changes that are less than the calibrated values indicate a leak.

When the EVAP diagnostics are initiated by the Service Bay Test, the scan tool will indicate if the enable conditions listed below are not met, or will display a specific reason if the test aborts. When complete, the display will indicate that the tests passed or failed.

CONDITIONS FOR RUNNING THE TEST

The following conditions must be met in order to enable the Service Bay Test:

- The battery voltage is between 11-18 volts.
- The engine coolant temperature (ECT) is less than 70°C (158°F) at start-up.
- The EVAP I/M system status indicator is set to NO.
- The fuel level is 15-85 percent capacity and cannot be refueled during the tests.
- There are no DTCs displayed.
- The vehicle must be driven for the time and distance specified on the scan tool.
- The ambient air temperature is between 0-40°C (32-104°F).
- The ignition must remain OFF during the engine OFF portion of the test, and the vehicle must remain at rest.

TEST PROCEDURE

IMPORTANT: If the Service Bay Test aborts or fails a DTC will NOT be set.

1. Install a scan tool.
2. Select the Service Bay Test with the scan tool.

CAUTION: Refer to Road Test Caution .

3. Follow the instructions on the scan tool.
   - If the test aborts, correct the condition for running the test and then retest.
   - If the test fails, repair the vehicle for the condition indicated by the failure message on the scan tool.
4. Verify that the EVAP I/M system status is set to YES.