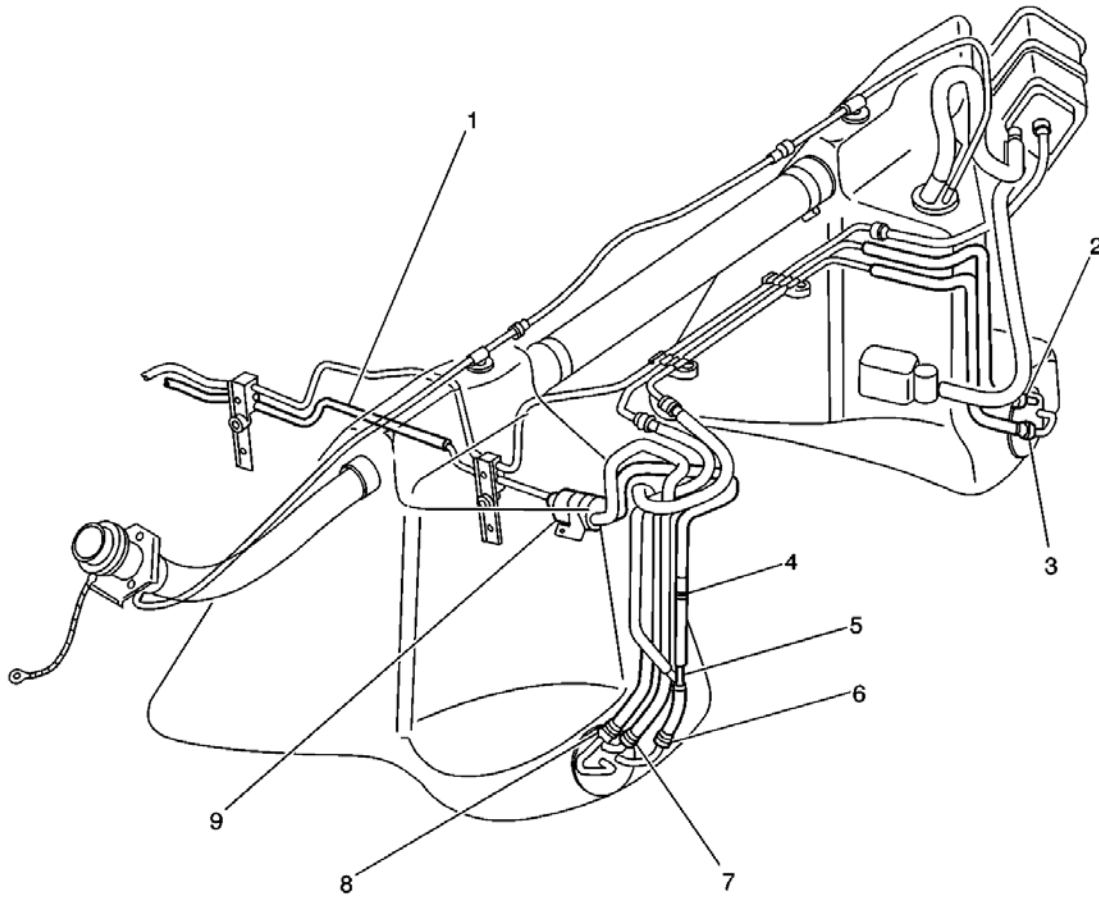


Fuel System Diagnosis



- (1) Fuel Feed Pipe
- (2) Auxiliary Fuel Feed Rear Pipe (left tank to jet pump)
- (3) Auxiliary Fuel Return Rear Pipe (jet pump to left tank)
- (4) Fuel Feed Pipe Check Valve
- (5) Fuel Feed Pipe Tee with Orifice
- (6) Fuel Feed Rear Pipe (to fuel filter/fuel pressure regulator and siphon jet pump)
- (7) Fuel Return Rear Pipe
- (8) Auxiliary Fuel Return Rear Pipe (jet pump to left tank)
- (9) Fuel Filter/Fuel Pressure Regulator

System Description

When you turn ON the ignition switch, the Powertrain Control Module (PCM) turns ON the in-tank fuel pump. The in-tank fuel pump remains ON as long as the engine is cranking or running and the PCM receives reference pulses. If there are no reference pulses, the PCM turns the in-tank fuel pump OFF 2 seconds after the ignition switch is turned ON or 2 seconds after the engine stops running.

The electric fuel pump attaches to the fuel sender assembly inside the left fuel tank. The in-tank fuel pump

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supplies fuel through an in-pipe fuel filter/fuel pressure regulator assembly to the fuel rail. The fuel pump also supplies fuel to the right fuel tank siphon jet pump in order to transfer fuel from the right fuel tank to the left fuel tank. The fuel pump provides fuel at a pressure above the pressure needed by the fuel injectors. The fuel pressure regulator, part of the fuel filter, keeps the fuel available to the fuel injectors at a regulated pressure. Unused fuel returns to the left fuel tank by a separate fuel return pipe.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. The left fuel sender voltage will be low if the left fuel tank is empty.
3. When the ignition switch is ON and the fuel pump is running, the fuel pressure indicated by the fuel pressure gauge should read 380-420 kPa (55-61 psi). The spring pressure inside the fuel pressure regulator controls this pressure.
4. A fuel system that can not maintain a constant fuel pressure has a leak in one or more of the following areas:
 - The fuel feed pipe check valve (check valve stuck open)
 - The fuel feed rear pipe
 - The valve or valve seat within the fuel pressure regulator
 - The fuel injectors
5. Fuel pressure that drops-off during acceleration, cruise, or hard cornering may cause a lean condition. A lean condition can cause a loss of power, surging, or misfire. You can diagnose a lean condition using a scan tool. If an extremely lean condition occurs, the front heated oxygen sensors will stop toggling. The heated oxygen sensor output voltages will drop below 300 mV. The fuel injector pulse width will increase.

Important: Make sure the fuel system is not operating in the Fuel Cut-Off Mode. This can cause false indications by the scan tool.

11. A rich condition may result from the fuel pressure being above 420 kPa (61 psi). A rich condition may cause DTC P0132, DTC P0152, DTC P0172 or DTC P0175 to set. Driveability conditions associated with rich conditions can include hard starting followed by black smoke and a strong sulfur smell in the exhaust.
12. This test determines if the high fuel pressure is due to a restricted fuel return pipe or if the high fuel pressure is due to a faulty fuel pressure regulator.
14. A lean condition may result from the fuel pressure being below 380 kPa (55 psi). A lean condition may cause DTC P0131, DTC P0151, DTC P0171 or DTC P0174 to set. Driveability conditions associated with lean conditions can include hard starting when the engine is cold, hesitation, poor driveability, lack of power, surging, and misfiring.
15. Restricting the fuel return pipe with the [J 37287](#) fuel pipe shut-off adapter causes the fuel pressure to rise above the regulated fuel pressure. Using a scan tool to pressurize the system, the fuel pressure should rise above 420 kPa (61 psi) as the valve on the fuel pipe shut-off adapter connected to the fuel return pipe becomes partially closed.
17. The fuel pump runs for 2 seconds each time you command the pump ON with the scan tool. Enable the fuel pump several times in order to achieve the time specified in the diagnostic table. This test checks the supply of fuel to the right fuel tank siphon jet pump.
18. The fuel pump runs for 2 seconds each time you command the pump ON with the scan tool. Enable the fuel pump several times in order to achieve the time specified in the diagnostic table. This test checks for a restriction in the fuel sender fuel feed pipe (jet pump to left tank).
19. The fuel pump runs for 2 seconds each time you command the pump ON with the scan tool. Enable the fuel

pump several times in order to achieve the time specified in the diagnostic table. This test checks the siphon jet pump output. If the siphon jet pump becomes plugged, is cracked, or if the tube is kinked, the jet pump will not transfer fuel from the right tank to the left tank.

23. Inspect the spark plug associated with a particular fuel injector for fouling or saturation in order to determine if that particular fuel injector is leaking. If inspecting the spark plug associated with a particular fuel injector for fouling or saturation does not determine that a particular fuel injector is leaking, use the following procedure:
1. Remove the fuel rail, but leave the fuel pipe connected to the fuel rail. Refer to [Fuel Injection Fuel Rail Assembly Replacement](#) .
 2. Lift the fuel rail just enough to leave the fuel injector nozzles in the fuel injector ports.
 3. Pressurize the fuel system by using the scan tool fuel pump enable.
 4. Visually and physically inspect the fuel injector nozzles for leaks.

Fuel System Diagnosis

Step	Action	Values	Yes	No
1	Did you perform the Powertrain On-Board Diagnostic (OBD) System Check?	--	Go to Step 2	Go to Powertrain On Board Diagnostic (OBD) System Check
2	Monitor the left fuel sender voltage using a scan tool. Is the left fuel sender voltage less than the specified value?	0.8V	Go to Step 17	Go to Step 3
3	<ol style="list-style-type: none"> 1. Turn the ignition OFF. 2. Turn the air conditioning system OFF. 3. Install the J 34730-1A fuel pressure gauge to the fuel rail pressure test connection. 4. Place the bleed hose of the fuel pressure gauge into an approved gasoline container. 5. Turn the ignition ON. 6. Bleed the air out of the fuel pressure gauge. 7. Turn the ignition OFF for 10 seconds. 8. Turn the ignition ON. <p>Important: The fuel pump will run for approximately 2 seconds. Cycle the ignition as necessary in order to achieve the highest possible fuel pressure.</p> <ol style="list-style-type: none"> 9. Observe the fuel pressure with the fuel pump running. Is the fuel pressure within the specified limits?	380-420 kPa (55-61 psi)	Go to Step 4	Go to Step 11
4	<p>Important: The fuel pressure may vary slightly when the fuel pump stops running. After the fuel pump stops running the fuel pressure should stabilize and remain constant.</p> After the fuel pump stops running, does the fuel pressure remain constant?	--	Go to Step 5	Go to Step 8
5	Do you suspect the fuel pressure of dropping-off during acceleration, cruise, or hard cornering?	--	Go to Step 6	Go to Symptoms
	Visually and physically inspect the following items for a restriction:			

6	<ul style="list-style-type: none"> • The fuel filter/fuel pressure regulator (9) • The fuel feed pipe (1) <p>Did you find a restriction?</p>	--	Go to Step 25	Go to Step 7
7	<ol style="list-style-type: none"> 1. Remove the left fuel sender assembly. Refer to Fuel Sender Assembly Replacement . 2. Visually and physically inspect the following items: <ul style="list-style-type: none"> • The fuel pump strainer for a restriction • The fuel pump fuel feed pipe for leaks • The fuel pump--Verify the fuel pump is the correct fuel pump for this vehicle. <p>Did you find a problem in any of these areas?</p>	--	Go to Step 25	Go to Step 21
8	<p>Important: This step requires the aid of an assistant.</p> <ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the Fuel Pressure Relief . 2. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information. 3. Disconnect the fuel return pipe (7) from the fuel sender. 4. Install the J 37287 fuel pipe shut-off adapter between the fuel return pipe (7) and the fuel sender. 5. Open the valve on the fuel pipe shut-off adapter that is connected to the fuel return pipe (7). 6. Pressurize the fuel system using a scan tool. 7. Close the valve in the fuel pipe shut-off adapter that is connected to the fuel return pipe (7). <p>Does the fuel pressure remain constant?</p>	--	Go to Step 22	Go to Step 10
9	<p>Important: This step requires the aid of an assistant.</p> <ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the Fuel Pressure Relief . 2. Remove the fuel pipe shut-off adapter that is connected to the fuel feed pipe at the fuel rail. 3. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information. 4. Disconnect the fuel feed rear pipe (6) from the fuel sender. 5. Install the J 37287 fuel pipe shut-off adapter between the fuel feed rear pipe (6) and the fuel sender. 6. Open the valve on the fuel pipe shut-off adapter. 7. Pressurize the fuel system using a scan tool. 8. Close the valve in the fuel pipe shut-off adapter that is connected to the fuel feed rear pipe (6). <p>Does the fuel pressure remain constant?</p>	--	Go to Step 21	Go to Step 28
	<ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the Fuel Pressure Relief . 2. Remove the fuel pipe shut-off adapter that is connected to the fuel return pipe (7). 			

10	<ol style="list-style-type: none"> 3. Reconnect the fuel return pipe (7) to the fuel sender. 4. Lower the vehicle. 5. Disconnect the fuel feed pipe (1) from the fuel rail. 6. Install the J 37287 fuel pipe shut-off adapter between the fuel feed pipe and the fuel rail. 7. Open the valve on the fuel pipe shut-off adapter. 8. Pressurize the fuel system using a scan tool. 9. Close the valve in the fuel pipe shut-off adapter. <p>Does the fuel pressure remain constant?</p>	--	Go to Step 9	Go to Step 23
11	Is the fuel pressure above the specified limit?	420 kPa (61 psi)	Go to Step 12	Go to Step 14
12	<p>Important: This step requires the aid of an assistant.</p> <ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the Fuel Pressure Relief. 2. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information. 3. Disconnect the fuel return pipe (7) from the fuel sender. 4. Insert the fuel return pipe (7) into an approved gasoline container. 5. Pressurize the fuel system using a scan tool. 6. Observe the fuel pressure with the fuel pump running. <p>Is the fuel pressure within the specified limits?</p>	380-420 kPa (55-61 psi)	Go to Step 24	Go to step 13
13	<p>Visually and physically inspect the fuel sender fuel return pipe for a restriction.</p> <p>Did you find a restriction?</p>	--	Go to Step 25	Go to Step 22
14	Is the fuel pressure above the specified value?	0 kPa (0 psi)	Go to Step 15	Go to Step 16
15	<ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the Fuel Pressure Relief. 2. Raise the vehicle. Refer to Lifting and Jacking the Vehicle in General Information. 3. Disconnect the fuel return pipe (7) from the fuel sender. 4. Install the J 37287 fuel pipe shut-off adapter between the fuel return pipe (7) and the fuel sender. 5. Open the valve on the fuel pipe shut-off adapter. 6. Pressurize the fuel system using a scan tool. 7. Slowly close the valve in the fuel pipe shut-off adapter that is connected to the fuel return pipe. <p>Does the fuel pressure rise above the specified value?</p>	420 kPa (61 psi)	Go to Step 22	Go to Step 7
16	<p>Turn ON the fuel pump using a scan tool.</p> <p>Does the fuel pump run?</p>	--	Go to Step 20	Go to Fuel Pump Electrical Circuit Diagnosis
	1. Add fuel if the left fuel tank is empty.			

17	<ol style="list-style-type: none"> 2. Disconnect the auxiliary fuel feed rear pipe at the right fuel sender. 3. Insert the auxiliary fuel feed rear pipe into an approved gasoline container. 4. Command the fuel pump ON for the specified amount of time using a scan tool. 5. Measure the volume of fuel. <p>Is the volume of fuel greater than the specified value?</p>	<p>10 sec 300 ml (0.633 pt)</p>	<p>Go to Step 18</p>	<p>Go to Step 29</p>
18	<ol style="list-style-type: none"> 1. Reconnect the auxiliary fuel feed rear pipe to the right fuel sender. 2. Disconnect the auxiliary fuel return rear pipe (8) from the left fuel sender. 3. Insert the auxiliary fuel return rear pipe (8) into an approved gasoline container. 4. Command the fuel pump ON for the specified amount of time using a scan tool. 5. Measure the volume of fuel. <p>Is the volume of fuel greater than the specified value?</p>	<p>8 sec 332.6 ml (0.703 pt)</p>	<p>Go to Step 3</p>	<p>Go to Step 19</p>
19	<ol style="list-style-type: none"> 1. Reconnect the auxiliary fuel return rear pipe (8) to the left fuel sender. 2. Disconnect the auxiliary fuel return rear pipe (3) from the right fuel sender. 3. Connect a length of flexible fuel hose to the auxiliary fuel return rear pipe (38) nipple on the right fuel sender. 4. Insert the open end of the fuel hose into an approved gasoline container. 5. Elevate the fuel hose and the gasoline container above the fuel tank level. 6. Command the fuel pump ON for the specified amount of time using a scan tool. 7. Measure the volume of fuel. <p>Is the volume of fuel greater than the specified value?</p>	<p>8 sec 332.6 ml (0.703 pt)</p>	<p>Go to Step 3</p>	<p>Go to Step 26</p>
20	<p>Visually and physically inspect the following items:</p> <ul style="list-style-type: none"> • The fuel filter/fuel pressure regulator (9) for obstructions • The fuel feed pipe (1) for a restriction • The fuel pump strainer for obstructions • The fuel pump fuel feed pipe for leaks <p>Did you find a problem in any of these areas?</p>	<p>--</p>	<p>Go to Step 25</p>	<p>Go to Step 21</p>
21	<p>Replace the fuel tank pump module. Refer to Fuel Tank Fuel Pump Module Replacement .</p> <p>Is the action complete?</p>	<p>--</p>	<p>System OK</p>	<p>--</p>
22	<p>Replace the fuel pressure regulator. Refer to Fuel Pressure Regulator Replacement .</p> <p>Is the action complete?</p>	<p>--</p>	<p>System OK</p>	<p>--</p>
23	<p>Locate and replace any leaking fuel injectors. Refer to Fuel Injector Replacement .</p>	<p>--</p>	<p>System</p>	

	Is the action complete?		OK	--
24	Locate and correct the restriction in the fuel return pipe (7). Is the action complete?	--	System OK	--
25	Repair the problem as necessary. Is the action complete?	--	System OK	--
26	Replace the right tank fuel sender. Refer to Fuel Sender Assembly Replacement . Is the action complete?	--	System OK	--
27	Locate and correct the restriction in the auxillary fuel return rear pipe (3,8). Is the action complete?	--	System OK	--
28	Replace the fuel feed rear pipe (6) with the check valve (4). Refer to Fuel Hose/Pipes Assembly Replacement . Is the action complete?	--	System OK	--
29	Locate and correct the restriction in the following: <ul style="list-style-type: none"> • The orifice located in the tee (5) in the fuel feed rear pipe (6) • The fuel feed rear pipe (6) and the auxillary fuel feed rear pipe (2) from the tee (5) to the right fuel sender. Is the action complete?	--	System OK	--