

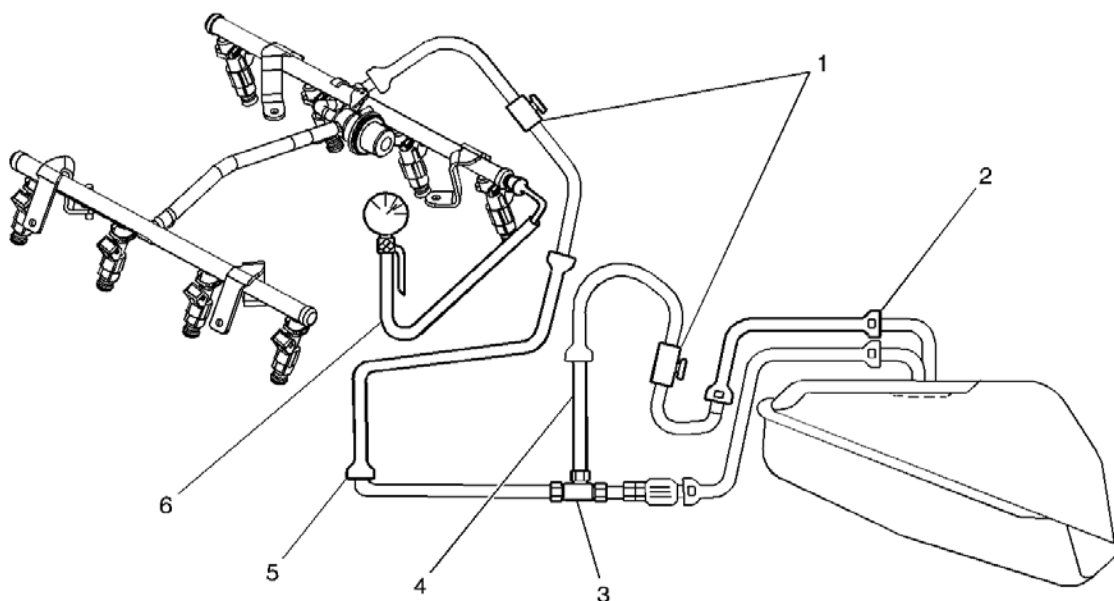
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Document ID# 305476
1999 Chevrolet/Geo Camaro

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Fuel System Diagnosis



- (1) J 37287 Fuel Line Shut-off Adapters
- (2) Rear Fuel Return Pipe
- (3) T-connector
- (4) Fuel Return Pipe
- (5) Fuel Feed Pipe
- (6) J 34730-1A Fuel Pressure Gauge

Circuit 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 fuel tank . The in-tank fuel pump supplies fuel through an in-pipe fuel filter to the fuel rail assembly. The fuel pump provides fuel at a

pressure above the pressure needed by the fuel injectors. The fuel pressure regulator keeps the fuel available to the fuel injectors at a regulated pressure. The fuel pressure regulator attaches to the fuel sender assembly return pipe. Unused fuel returns to the fuel tank by a separate fuel return pipe. The fuel return pipe attaches to a T-connector in the fuel feed pipe on the outlet side of the fuel filter.

Test Description

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

2. When the ignition switch is ON and the fuel pump is running, the fuel pressure indicated by the fuel pressure gauge should read 380-410 kPa (55-60 psi). The spring pressure inside the fuel pressure regulator controls the fuel pressure.
3. A fuel system that drops more than 34 kPa (5 psi) in 10 minutes has a leak in one or more of the following areas:
 - The fuel pipes.
 - The fuel pump check valve.
 - The fuel pump flex pipe.
 - The valve or valve seat within the fuel pressure regulator.
 - The fuel injector(s).
4. A fuel system that drops more than 14 kPa (2 psi) in 10 minutes after being relieved to 69 kPa (10 psi) indicates a leaking fuel pump check valve.
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 heated oxygen sensors (s) will stop toggling. The heated oxygen sensor output voltage(s) 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.

10. A rich condition may result from the fuel pressure being above 410 kPa (60 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.
11. 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.
12. 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.
13. **Notice**

Do not allow the fuel pressure to exceed 500 kPa (72 psi). Fuel pressure in excess of 500 kPa (72 psi) may damage the fuel pressure regulator.

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 fuel system, the fuel pressure should rise above 410 kPa (60 psi) as the valve on the fuel pipe shut-off adapter connected to the fuel return pipe becomes partially closed.

18. Check 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 checking 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:
 - A. Remove the fuel rail, but leave the fuel pipe connected to the fuel rail. Refer to [Fuel Rail Assembly Replacement](#) .
 - B. Lift the fuel rail just enough to leave the fuel injector nozzles in the fuel injector ports.

Caution

In order to reduce the risk of fire and personal injury that may result from fuel spraying on the engine, verify that the fuel rail is positioned over the fuel injector ports. Also verify that the fuel injector retaining clips are intact.

- C. Pressurize the fuel system by using the scan tool fuel pump enable.
- D. Visually and physically inspect the fuel injector nozzles for leaks.

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	<ol style="list-style-type: none"> 1. Turn the ignition OFF. 2. Turn the air conditioning system OFF. <p>Caution</p> <p>Wrap a shop towel around the fuel pressure connection in order to reduce the risk of fire and personal injury. The towel will absorb any fuel leakage that occurs during the connection of the fuel pressure gage. Place the towel in an approved container when the connection of the fuel pressure gage is complete.</p> <ol style="list-style-type: none"> 3. Install the J 34730-1A fuel pressure gauge (6). 4. Place the bleed hose of the fuel pressure gauge into an approved gasoline container. 	380-410 kPa		

	<p>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> <p>Important:</p> <p>The fuel pump will run for approximately 2 seconds. Cycle the ignition as necessary in order to achieve the highest possible fuel pressure.</p> <p>9. Observe the fuel pressure with the fuel pump running.</p> <p>Is the fuel pressure within the specified limits?</p>	(55-60 psi)	Go to Step 3	Go to Step 10
3	<p>Important:</p> <p>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> <p>Does the fuel pressure drop more than the specified value in 10 minutes?</p>	34 kPa (5 psi)	Go to Step 8	Go to Step 4
4	<p>Relieve the fuel pressure to the first specified value.</p> <p>Does the fuel pressure drop more than the second specified value in 10 minutes?</p>	69 kPa (10 psi) 14 kPa (2 psi)	Go to Step 17	Go to Step 5
5	<p>Do you suspect the fuel pressure of dropping-off during acceleration, cruise, or hard cornering?</p>	--	Go to Step 6	Go to Symptoms
6	<p>Visually and physically inspect the following items for a restriction:</p> <ul style="list-style-type: none"> • The fuel filter. • The fuel feed pipe (5). <p>Did you find a restriction?</p>	--	Go to Step 21	Go to Step 7
7	<p>1. Remove the fuel sender assembly. Refer to Fuel Sender Assembly Replacement .</p> <p>2. Visually and physically inspect the following items:</p> <ul style="list-style-type: none"> ○ The fuel pump strainer for a restriction ○ The fuel pump flex pipe for leaks ○ The fuel pressure regulator for leaks ○ The fuel pressure regulator fuel return pipe for leaks ○ 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 21	Go to Step 17

8	<ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the <i>Fuel Pressure Relief Procedure</i> . 2. Disconnect the fuel feed pipe (5) from the fuel rail. 3. Install the J 37287 fuel pipe shut-off adapter (1) between the fuel feed pipe and the fuel rail. 4. Open the valve on the fuel feed pipe shut-off adapter. 5. Pressurize the fuel system using a scan tool. 6. Place the bleed hose of the fuel pressure gauge (6) into an approved gasoline container. 7. Bleed the air out of the fuel pressure gauge. 8. Wait for the fuel pressure to build. 9. Close the valve in the fuel feed pipe shut-off adapter. <p>Does the fuel pressure remain constant?</p>	--	Go to Step 9	Go to Step 18
9	<p>Important:</p> <p>This step requires the aid of an assistant.</p> <ol style="list-style-type: none"> 1. Open the valve in the fuel feed pipe shut-off adapter (1). 2. Relieve the fuel pressure. Refer to the <i>Fuel Pressure Relief Procedure</i> . 3. Raise the vehicle. 4. Disconnect the steel fuel return pipe (4) at the nylon rear return pipe (2). 5. Drain any remaining fuel from the pipes into an approved gasoline container. 6. Install the J 37287 fuel pipe shut-off adapter (1) between the steel fuel return pipe and the rear nylon return pipe. 7. Pressurize the fuel system using a scan tool. 8. Wait for the fuel pressure to build. 9. Close the valve in the fuel pipe shut-off adapter that is connected to the fuel return pipe (4). <p>Does the fuel pressure remain constant?</p>	--	Go to Step 16	Go to Step 17
10	Is the fuel pressure above the specified limit?	410 kPa (60 psi)	Go to Step 11	Go to Step 12
11	<ol style="list-style-type: none"> 1. Relieve the fuel pressure. Refer to the <i>Fuel Pressure Relief Procedure</i> . 2. Disconnect the steel fuel return pipe (4) at the nylon rear return pipe (2). 3. Drain any remaining fuel from the fuel pipes into an approved gasoline container. 4. Attach a length of flexible fuel hose to the steel fuel return pipe attached to the T-connector (3). 5. Place the open end of the flexible fuel hose into an 	--		

	<p>approved gasoline container.</p> <p>6. Turn ON the fuel pump using a scan tool.</p> <p>7. Observe the fuel flow with the fuel pump running.</p>			
	Is there fuel flow?		Go to Step 20	Go to step 19
12	Is the fuel pressure above the specified value?	0 kPa (0 psi)	Go to Step 13	Go to Step 14
13	<p>Important:</p> <p>This step requires the aid of an assistant.</p> <ol style="list-style-type: none"> Relieve the fuel pressure. Refer to the <i>Fuel Pressure Relief Procedure</i> . Raise the vehicle. Disconnect the steel fuel return pipe (4) from the nylon rear return pipe (2). Drain any remaining fuel from the fuel pipes into an approved gasoline container. Install the J 37287 fuel pipe shut-off adapter (1) between the steel fuel return pipe and the nylon rear fuel return pipe. Open the valve on the fuel pipe shut-off adapter. Pressurize the fuel system using a scan tool. Place the bleed hose of the fuel pressure gauge (6) into an approved gasoline container. Bleed the air out of the fuel pressure gauge. <p>Notice</p> <p>Do not allow the fuel pressure to exceed 500 kPa (72 psi). Fuel pressure in excess of 500 kPa (72 psi) may damage the fuel pressure regulator.</p> <ol style="list-style-type: none"> Slowly close the valve in the fuel pipe shut-off adapter that is connected to the fuel return pipe. 	410 kPa (60 psi)		
	Does the fuel pressure rise above the specified value?		Go to Step 16	Go to Step 7
14	<p>Turn ON the fuel pump using a scan tool.</p> <p>Does the fuel pump run?</p>	--	Go to Step 15	Go to Fuel Pump Electrical Circuit Diagnosis
15	<p>Visually and physically inspect the following items:</p> <ul style="list-style-type: none"> The fuel filter for obstructions. The fuel feed pipe (5) for a restriction. The fuel pump strainer for obstructions. The fuel pump flex pipe for leaks. 	--	Go to	

	Did you find a problem in any of these areas?		Step 21	Go to Step 17
16	Replace the fuel pressure regulator. Refer to Fuel Pressure Regulator Replacement . Is the action complete?	--	System OK	--
17	Replace the fuel pump. Refer to Fuel Tank Pump Module Replacement . Is the action complete?	--	System OK	--
18	Locate and replace any leaking fuel injector(s). Is the action complete?	--	System OK	--
19	Locate and correct the restriction in the steel fuel return pipe (4) or the T-connector (3). Is the action complete?	--	System OK	--
20	Visually and physically inspect the nylon rear fuel return pipe (2) for a restriction. Did you find a restriction?	--	Go to Step 21	Go to Step 16
21	Repair the problem as necessary. Is the action complete?	--	System OK	--

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