

Title	Pressure testing the 280Z fuel system.	Date	18-NOV-2015
Subject	Datsun 280Z 1975 – 1978 Fuel Injection System	Rev.	C- 20170612

Pressure testing the 280Z fuel system.

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1 – LIST OF ABBREVIATIONS

- 1.1 FPR Fuel Pressure Regulator.
- 1.2 CSV Cold Start Valve.
- 1.3 AFM Air Flow Meter.
- 1.4 BarG Bar Gauge (Pressure above atmosphere)
- 1.5 PsiG Pounds per square inch Gauge (Pressure above atmosphere)
- 1.6 NLA No Longer Available
- 1.7 EV1 Two pin electrical connector commonly used on injectors and sensors.
- 1.8 NBR Nitrilbutadienrubber

Pressure conversion table	Barg	Psig
	1,0	14,5
	1,5	21,8
	2,0	29,0
	2,5	36,3
	3,0	43,5
	3,5	50,8
	4,0	58,0

Notes for recording pressure: Pressure drop and Time.

Example: When noting the pressure in test 5.1.

5.1: PRESSURE DROP = _____ x _____ Time

- Start the test and read the pressure, Eg. 2.5Barg.
- Wait 30 seconds and note pressure, Eg. 2.1Barg.
- The result would be 0.4Barg x 60 seconds.

This result shows a pressure leak in test 5.1 of 0.4Barg in 60 seconds and indicates a leaking fuel system. The test that follow will locate which items are causing the fuel drop.

The time you choose may depend on the leak. If pressure drops to 0Barg in 40 seconds, you can use 40 seconds for the time interval.

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2 – FUEL SUPPLY

This instruction covers fuels pressure testing. It is not intended for troubleshooting flow problems.

Fuel is supplied by an electric fuel pump located forward of the tank near the right rear wheel. The fuel pump operates at constant speed. The fuel pump is fitted with a small inlet strainer to protect the pump. A blocked strainer will reduce or even stop flow.

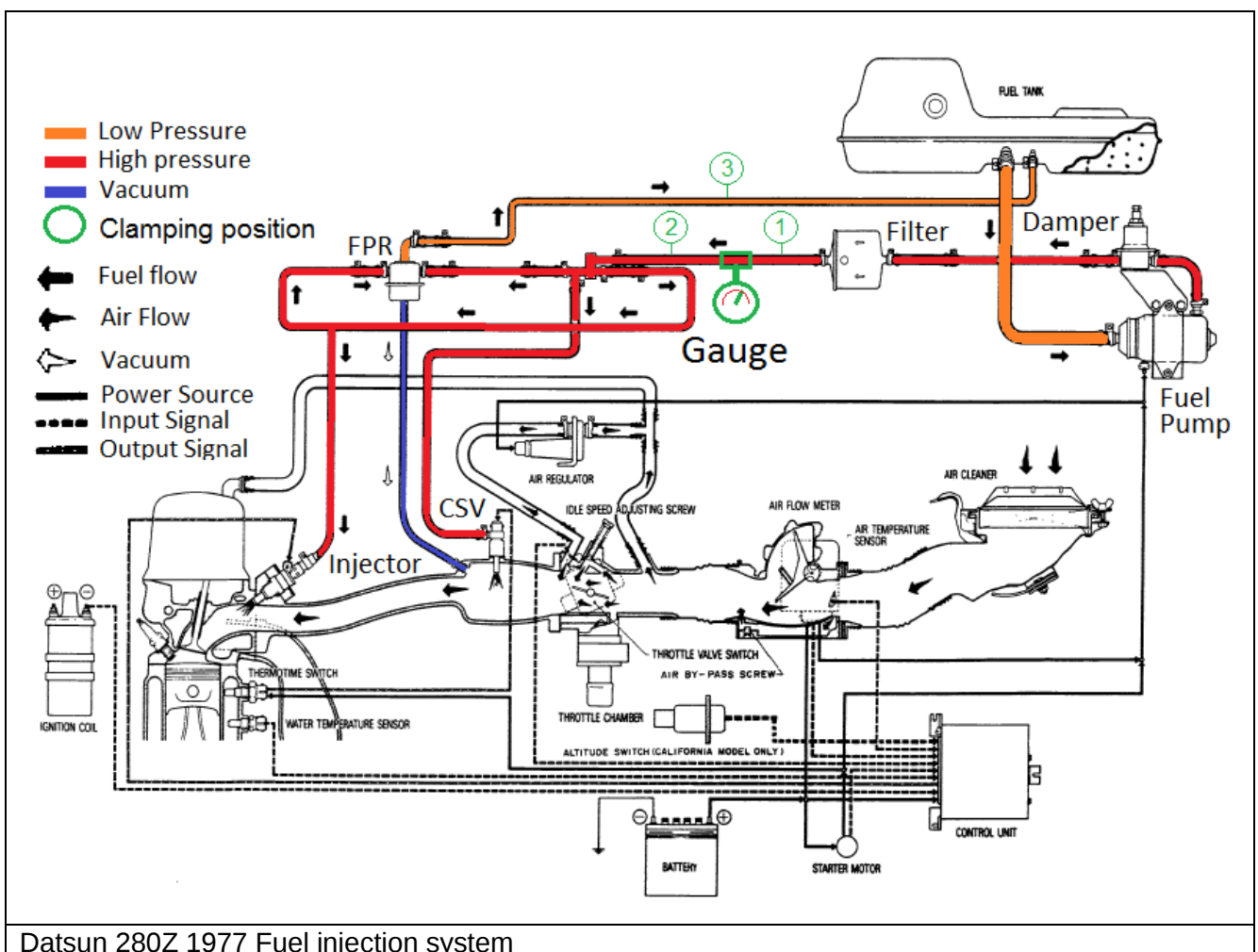
A pulsation damper is located on the side of the pump and reduces pulses caused by the pump. Pulsations can cause pump noise and reduce injector life.

The fuel is then filtered by a inline fine fuel filter located in the front right side of the engine bay. Again this filter has no bypass and if blocked will reduce flow or stop flow completely.

The fuel flows through the fuel rail to the six injectors, CSV and FPR.

The injectors open simultaneously for a determined time calculated by the ECU.

Surplus fuel is returned to the tank via the FPR. The FPR also maintains a constant fuel pressure of approximately 2.5BarG across the injector tips. This is achieved by a vacuum operated diaphragm valve in the FPR. It also means the fuel pressure in the fuel rail will vary in line with the inlet manifold vacuum.



Datsun 280Z 1977 Fuel injection system

FIG:1

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3 – PARTS REQUIRED

Nr.	Description	Qty
3.1	Fuel gauge with a minimum range of 0 to 4.0BarG (0 to 60PsiG) with 1/4" BSP female connection. (Expect a maximum pressures of 4.0BarG (60PsiG) when doing some tests.)	1
3.2	T-piece 1/4" BSP Female tee off and 8mm (5/16") Barbs	1
3.3	Union: 1/4" BSP female fitting.	1
3.4	Hose clamps 12-13mm	2
3.5	Fuel hose (NBR or Viton) minimum 100psi working pressure	50cm

Parts are a suggestion. This is just one suggested combination. Other combinations are possible.



FIG 3.1: Parts required for testing fuel pressure.

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4 – TOOLS REQUIRED

- 4.1 2 pairs of vice grips or a clamp to clamp hoses shut.
- 4.2 Metal plates to protect the hose from being damaged by the vice grips.



Note: The old hoses are generally not very flexible and can be damaged when you clamp them shut. It is recommended to replace the hose before testing.

A new hose will then clamp shut and hold pressure better than the old hose.

The CSV has two short sections of hose and a section of pipe. You may need to temporarily replace these three components with a section of hose to do the leak test in chapter 9.

Approximately 1 meter of fuel hose suitable for high pressure will be enough to replace all hoses in the test.

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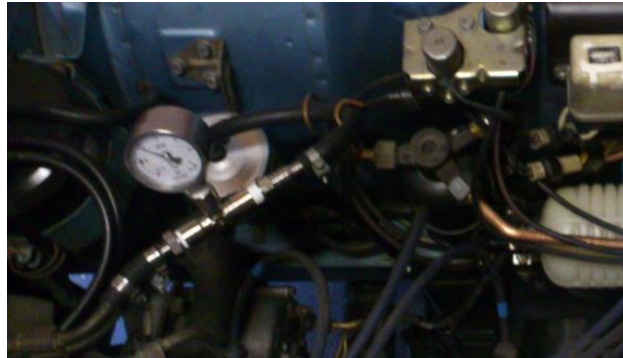
5 – PREPARING FOR PRESSURE TESTING.

5.1 Remove the fuel hose between the inline filter and the fuel rail.

Be careful of spraying out under pressure when you remove the hose.

5.2 Replace the hose with two new hoses and the pressure gauge.

Make sure you leave enough hose before and after the gauge so you can clamp the hose shut with the vise grips.



5.3 The fuel pump is activated by two circuits. One circuit works when cranking the engine and the other takes over when the engine is running.

The circuit used when cranking is ideal for activating the fuel pump during these tests.

To use this circuit disconnect the spade terminal from the starter motor. This will stop the engine from turning over when you turn the key to the start position, but the pump will still activate and run.



5.4 Run pump to prime system. The system should build up pressure to approximately 2.5BarG (36PsiG).

Note the pressure drop versus time (seconds) for reference during the tests.

If you see no pressure drop in test 5.1 → System is leak free.

5.1: PRESSURE DROP = _____ x _____ Time

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6 – TEST 1: FUEL PUMP CHECK VALVE TEST

6.1 Run the pump to build up pressure and clamp the hose shut after the gauge in **Position 2, FIG1.**

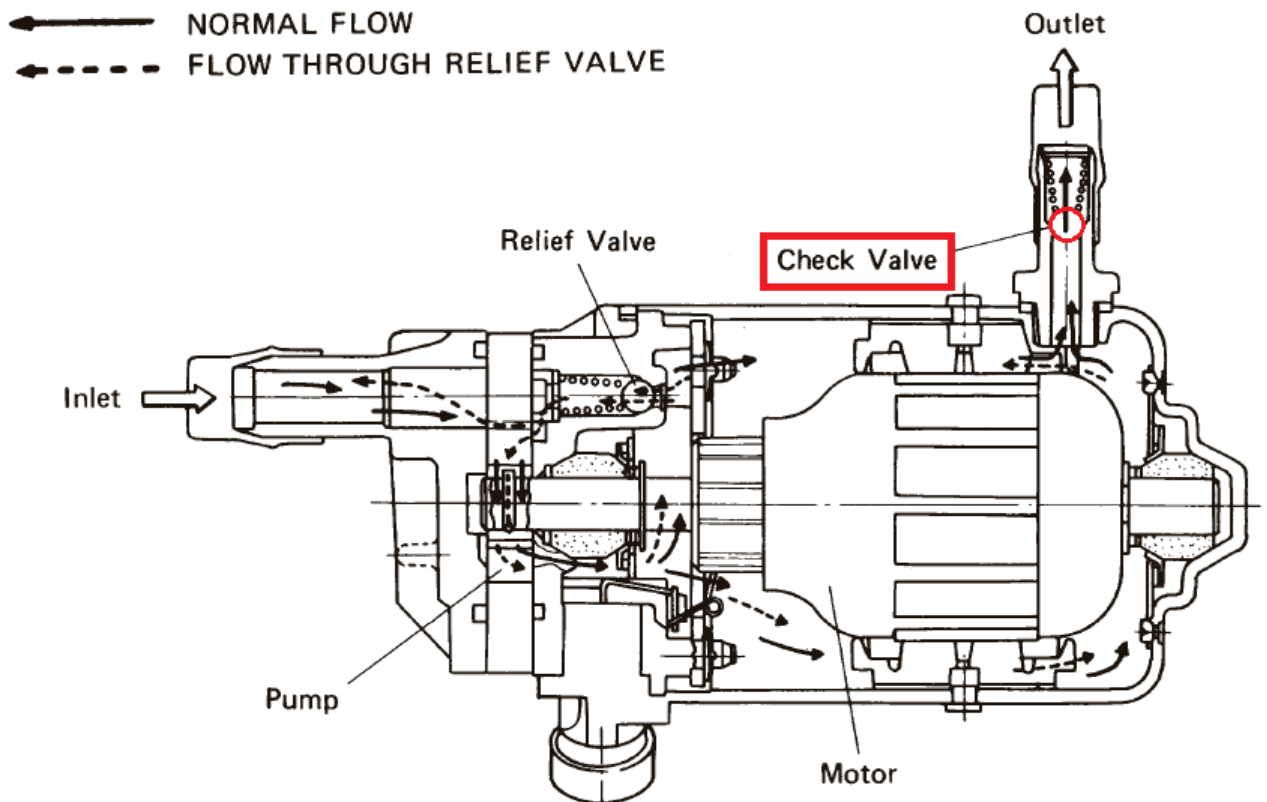
Note the pressure and check it again after the set time period has past.

A: Not pressure drop → Pump check valve is in good condition

B: Pressure is dropping → Pump check valve is leaking fuel back through the pump to the tank.

6.1: PRESSURE DROP = _____ x _____ Time

- A leaking check valve can result in longer cranking time to start the engine. The pump will need to build up pressure before the CSV and injectors will work properly.
- The check valve is NLA, but they sometimes turn up on e-Bay etc. You can also use an alternative in chapter 12, page 12.



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7 – TEST 2: FUEL PRESSURE REGULATOR TEST

This test will isolate the fuel pump check valve from the test, but not the injectors. Therefore two pressure readings will be required to determine the FPR leakage.

7.1 Run the pump to build up pressure and clamp the hose shut between the filter and the pressure gauge. **Position 1, FIG1.**

Note the pressure.

7.1: PRESSURE DROP = _____ x _____ Time

7.2 Run the pump again to build up pressure and this time clamp the hose between the filter and the pressure gauge, **Position 1, FIG1** and the return line shut. **Position 3, FIG1.**

The return line goes from the FPR back to the tank. The easiest place to clamp it shut is the hose close to the fuel filter.

Note the pressure.

7.2: PRESSURE DROP = _____ x _____ Time

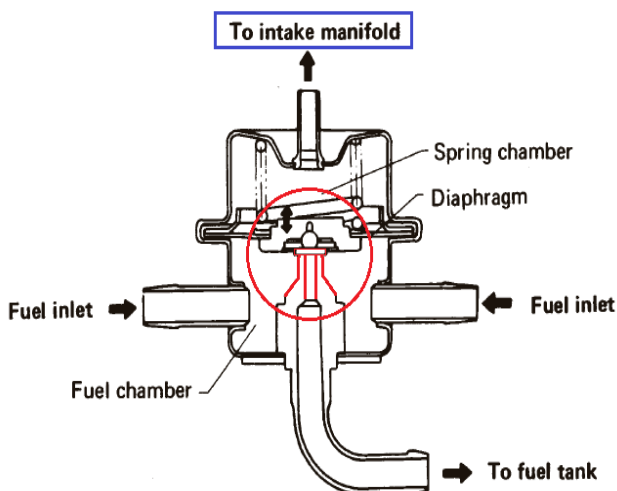
A: Pressure reading 7.2 is less than 7.1

→ FPR is leaking back to tank.

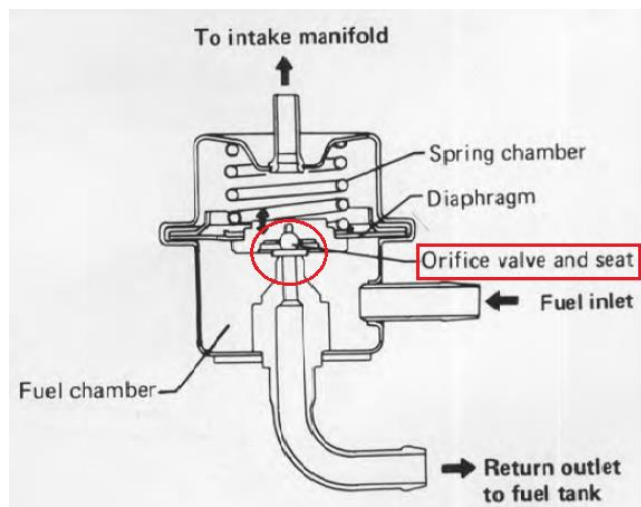
B: Pressure reading 7.2 is the same as 7.1

→ FPR is in good condition.

If pressure readings 7.1 and 7.2 are the same, both maintaining pressure or losing pressure at the same rate → FPR is not leaking. The leakage is caused by one or more injectors or the CSV.



FPR up to Aug 77



FPR From Aug 77

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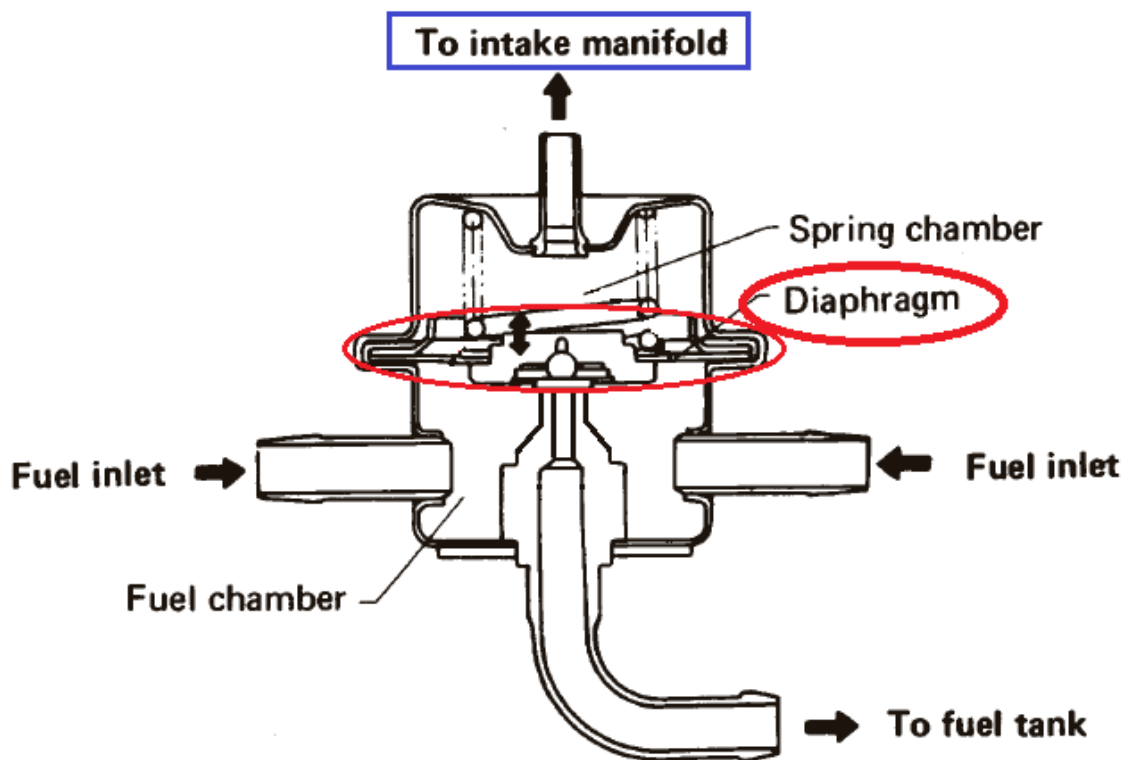
8 – TEST 3: FUEL PRESSURE REGULATOR DIAPHRAGM TEST

8.1 Run the pump to build up pressure.

Remove the vacuum line from the FPR and check for fuel leaking out of the intake manifold fitting on the FPR.

Results:

1. Fuel is visibly leaking. → FPR diaphragm is damaged and the FPR needs replacing.
2. No Fuel is visibly leaking. → FPR diaphragm is good.



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9 – TEST 4: COLD START VALVE TEST

9.1- Cold start valve. The hose going to the CSV is too short to clamp.

To test the valve remove the EV1 connector. Remove the two mounting screws and gently pry it loose from the manifold. The nozzle is long and you may need to remove the hose to extract the CSV. If you remove the hose, you may need to run the leak test longer for any air in the line.

Run the pump to build up pressure. Clamp the hose before the pressure gauge and the return line hose shut. **Position 1, FIG1 & Position 3, FIG1.**

Visually check for leaks at the injector tip.

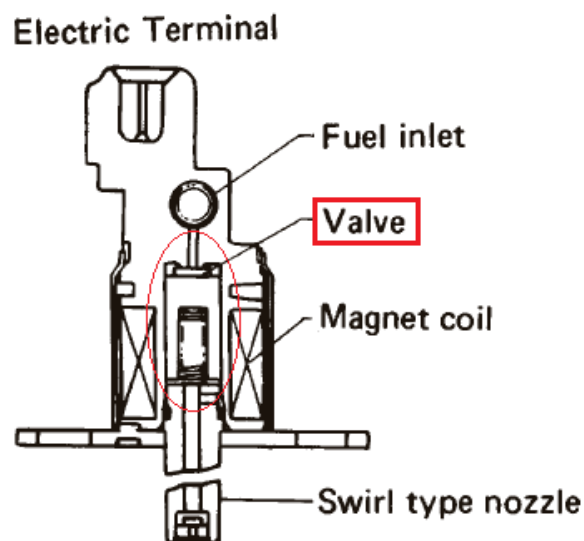
Results:

- | | |
|--|---|
| 1. No visible leaks and no pressure drop | → Cold start valve is in good condition. |
| 2. No visible leaks and pressure is dropping | → Cold start valve is in good condition, but one or more injectors are leaking. |
| 3. Visible leaks and pressure is dropping | → Cold start valve needs replacing. |

Note: Result 3 can also have leaking injectors. You can determine a leaking injector by doing the test again and clamping the hose to the CSV shut.

You may need to replace the two short hoses and pipe between the CSV and fuel rail to be able to clamp the hose.

If there is still a leakage then one or more injectors are leaking.



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10 – TEST 5: FUEL PUMP MAXIMUM PRESSURE TEST

10- Clamp the hose after the pressure gauge shut. Position 2.

Run the pump until it reaches maximum pressure.

Maximum pressure for the original 280Z/280ZX fuel pump should be about 3.8 – 4.0BarG (55 – 58PsiG).

Note: Some aftermarket pumps can deliver much more pressure. Take caution not to overpressure the system and rupture hoses etc.



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11 – TEST 6: FUEL PUMP MAXIMUM FLOW TEST

11- Remove the hose after the filter and run the pump for one minute into a 4Ltr. container.

Pump should deliver approximately 2 – 2.5Ltrs/minute.



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12 – ALTERNATIVE TO FUEL PUMP CHECK VALVE

Do not use a simple 8mm barb with M10x1.0 fitting. It does not have a check valve function.

Bosch Fuel pump check valve 1 587 010 536



Inlet connection : M10x1.0

Outlet connection : Banjo fitting M12x1.5

Bosch 044 Fuel Pump 8mm Barb Hose Banjo Adapter Fitting + Cap



Banjo connection : 12mm

Cap nut : M12x1.5

Outlet connection : 8mm barb.