

Fuel System Testing Part 1

Rev 1

In Part 1, instructions are given for checking fuel pressure and volume.

In Part 2, how to check the electrical aspects of the fuel pump, fuel pump relay and fuel injector waveforms will be shown.

Checking Fuel Pressure and Volume

This procedure is based upon the Workshop manual, but with one added test for peak pressure. I hope to fill in the details where the manual is not clear.

Special Tools and Materials

Fuel pressure gauge

Connecting hose PN 000-721-950-70

Fuse-protected shop made jump lead

Closing cap PN 997-110-218-00

Other tools are identified as they are used in the procedure.

Procedure Overview

Five tests will be performed in the order listed:

1. Static pressure
2. Peak pressure
3. Static flow
4. Idle pressure
5. Residual pressure

The first 3 tests are static, meaning the engine is not running. The idle pressure test is the only test done with the engine running. The residual test is a static test.

Procedure

0. Place a fire extinguisher near the car for immediate access if needed.
1. Remove the rear blower assembly or the RS heater bypass tube if installed.
2. Remove the brass closing cap from the Schrader valve on the fuel rail and discard. Place a shop rag under the valve to catch any gas that may leak out.
3. Connect the fuel pressure gauge finger tight then use pliers to snug up.
4. Secure the gauge dial in a visible location.
5. Remove the DME relay (R53) and jumper the fuel pump connecting pin 3 (30) and 7 (87b) on the Central Electric System (fuse panel). The pump can be heard running.
6. Check for fuel leaks in the engine compartment.
7. Record the fuel static pressure reading. Expected: 55 +/- 3 psi
8. Pinch the fuel return line momentarily using a line clamp and record the fuel peak pressure reading. Expected: 75-100 psi
- 8.5 Disconnect the fuel pump jumper.
9. Bleed the fuel pressure gauge and then clamp off the clear bleed hose to prevent leaking.
10. Place a shop rag under the fuel return line connection.
11. Remove the fuel return line connection using 19mm and 22mm open-ring wrenches.
12. Connect the special tool connecting hose to the fuel return line connection on the fuel rail. Tighten using the 19/22mm open-ring wrenches.
13. Remove the metal disk which plugs an access hole to the rear of the heater tube.
14. Route the connecting hose through the access hole to a 1liter fuel catch container. Secure the container from moving.
15. Jumper the fuel pump and start a stopwatch.

16. Stop the test by removing the fuel pump jumper lead when the 1 liter bottle is full or 30 seconds transpires (whichever occurs first). Record the volume of fuel collected and the time taken. Expected: 850 c.c/30 seconds minimum.
17. Bleed off the fuel pressure gauge and then clamp off the clear bleed hose to prevent leaking.
18. Dispose of the gas collected in the catch container.
19. Remove and drain the collection hose.
20. Reconnect the fuel return line and torque to 35 Nm.
21. Replace the metal plug into the access hole.
22. Replace the DME relay.
23. Start the engine and check for leaks.
24. Record the idle fuel pressure reading. Expected: 48 +/- 3 psi.
25. Shut off the engine and start a timer for 20 minutes.
26. Read and record the residual fuel pressure reading. Expected: 43.5 psi minimum.
27. Bleed off the fuel pressure gauge and then clamp off the clear bleed hose to prevent leaking.
28. Place a shop rag under the Schrader valve and remove the fuel pressure gauge.
29. Replace the closing cap with a new cap. Tighten finger tight then just snug up a bit with the 13mm wrench.
30. Refit the rear blower assembly or RS heater bypass tube if installed.

My Results

Date of test: 3-26-2016

Time: 12pm

Temp: 77 degrees F.

Car: 1997 Porsche Carrera

Mileage: 120K miles

Fuel Pump Service Life: 120K miles

Fuel Pressure Regulator Service Life: 120K miles

Fuel Filter Service Life: 25K miles

Static pressure

Expected: 55 +/- 3 psi

Actual: 56 psi

Peak pressure

Expected: 75-100 psi

Actual: 100 psi

Static flow

Expected: 850 c.c./30 seconds

Actual: 1 liter/16.95 seconds

Idle pressure

Expected: 48 +/- 3 psi

Actual: 50 psi

Residual pressure

Expected: >43.5 psi

Actual: 52 psi

Discussion

All results meet or exceed the test specifications provided in the workshop manual. System is operating normally, no faults found.

Although the fuel filter is nearing the end of the scheduled service life (30K miles), it did not appear to impede fuel delivery.

The slight rise in residual pressure is probably due to heat from the engine.

Below is a diagnostic guide based upon Appendix B of the MityVac FST Pro User Manual tailored for the tests performed in this procedure. The main difference is that the MityVac FST Pro includes an Idle Flow test and no Residual Pressure test.

Diagnostic Guide

Idle Pressure	Peak Pressure	Peak Flow	Residual Pressure	Potential Causes
Normal	Normal	Normal	Normal	System operating OK
Normal - Low	Normal	Low	Normal	Blocked fuel filter, inlet strainer, or pinched supply line
Low	Normal	Normal	Low	Under-restricting pressure regulator
High	Normal	Normal	High	Over-restricting pressure regulator
Low	Low	Low	Normal	Failing fuel pump, low supply voltage/current