

Master Fuel Pressure Test Kit

User's Manual

MODEL 2535



SAFETY GUIDELINES TO FOLLOW WHEN WORKING ON VEHICLES

DO NOT

- **DO NOT** smoke when working on fuel systems.
- **DO NOT** use the Fuel Pressure Test Kit on diesel or flex fuel engines.
- **DO NOT** connect or disconnect fuel system fittings with the ignition on.
- **DO NOT** lay tools on the vehicle battery. A short may occur, causing damage or personal injury.
- **DO NOT** leave the vehicle unattended with the engine running or while performing tests.
- **DO NOT** allow unauthorized personnel in the test area.
- **DO NOT** allow test hoses or test instrument harnesses to lie near engine cooling fan, exhaust manifolds, etc.
- **DO NOT** work on fuel systems where a flame or spark could be present. This includes furnaces, space heaters, exposed spark plug wires, etc.
- **DO NOT** allow fuel to spill on hot engine parts. If a leak or spill develops, turn off ignition, disable fuel pump, and clean up spill immediately.

DO

- Wear approved eye protection.
- Refer to the manufacturers' vehicle service or repair manuals for specific information regarding pressure testing values, procedures, and test port locations.
- Follow all manufacturers' cautions, warnings, and instructions.
- Keep clothing, tools and yourself away from hot or moving engine parts.
- Clean fuel system connections before loosening. Dirt in the system could result in damage.
- Wrap a cloth around fittings when loosening to prevent spray or spilling of fuel.
- Provide proper ventilation of gasoline and exhaust fumes.
- Use hose clamps on all hose adapters.
- Make sure quick-disconnect couplers snap together fully and there is no fuel leakage.
- Make sure the battery is fully charged, and the vehicle has an adequate supply of fuel.
- Use two wrenches to loosen or tighten fuel system connections to prevent damage or twisting of fuel lines.
- Check the general condition of the engine and fuel system. Check the fuel lines, ignition wires, battery cables, electrical wiring, and fuses. Check the fuel tank filler cap and the venting system.
- Carefully relieve residual fuel pressure per manufacturer's recommended procedure.
- Have a dry chemical fire extinguisher on hand, and know how to use it.

FUEL INJECTION SYSTEMS - GENERAL INFORMATION

Automotive fuel systems and access points are so varied that it is not possible to list all of the test adapter applications. Always consult a reliable shop manual, or consult the car manufacturer for the recommended test procedure and connections.

There are two basic types of automotive fuel injection systems:

1. Port Fuel Injection (PFI) - Separate fuel injectors supply fuel to each cylinder.
2. Throttle Body Injection (TBI) – Fuel is injected from a point on the intake manifold above the throttle plate.
 - Both systems have a supply side, which provides fuel for the injectors, and a return side, which sends excess fuel back to the fuel tank.

There are three basic ways to check fuel system pressure:

1. Many domestic cars with PFI systems are equipped with a test port. Connect the proper test adapter to the Test Gauge, couple the adapter to the test port, and perform the test.
2. On some systems an end-of-hose connection is necessary. Some PFI systems have a flexible hose connection. For this type of system, connect a single barb fitting with a hose clamp to perform the test. Other systems have a fuel bolt or banjo type fitting as an access point.
3. The third method of fuel pressure testing is in-line connecting. This method requires separating the fuel line and installing the Test Gauge and adapters in series.
 - Most manufacturers require that you relieve the fuel pressure before connecting to or disconnecting from the fuel system. To relieve the fuel pressure, it may be necessary to disconnect or disable the fuel pump. Some models may have two fuel pumps, and both must be disabled. After the fuel pump(s) are disabled, run the engine until it stalls, then try to restart it for three to five seconds. When the fuel system has been drained of fuel it is ready for testing. Connect the proper test adapters and the Test Gauge, reconnect the fuel pump and perform the tests. When the tests are finished, repeat the procedure to relieve the fuel pressure before removing the Test Gauge.

CHECKS TO MAKE BEFORE TESTING FUEL SYSTEM

The following items should be checked. Any faults that are found must be corrected before a proper fuel system test can be performed.

Check for loose or disconnected vacuum lines. Look for coolant or excessive oil leaks. Listen for any audible air leaks, unusual noises, engine rattles or knocks. Check valve timing and adjustment.

Electrical System

1. If engine won't start, check for ignition spark. If no spark is present, service ignition system. The ignition fires the fuel injector on most systems so that if a spark plug is not firing, that cylinder's injector will not be firing.
2. Observe Check Engine lamps or other computer fault indicators.
3. Look for broken, disconnected, or arcing ignition wires.
4. Look for disconnected distributor, or arcing cap or rotor.
5. Check for loose or corroded component grounds.
6. Look for disconnected electrical components.
7. Check battery condition. A weak battery will affect proper fuel pump delivery or injector triggering. Battery voltage should be more than 12 volts.
8. Check basic operation of the charging system.
9. Look for loose or corroded battery cables.

Fuel System

1. Make sure fuel tank has sufficient fuel (do not rely on the fuel gauge).
2. Look for broken, loose, or corroded metal, rubber or plastic fuel lines.
3. Check for water or other contaminants in fuel.
4. Check condition of fuel system related fuses or solenoids.
5. Check condition of fuel tank venting systems.
6. Check condition of fuel tank filler cap.
7. On vehicles equipped with inertia switch, check and make sure switch has not been tripped.

TYPICAL PROCEDURE TO RELIEVE FUEL SYSTEM PRESSURE

1. Do not smoke.
2. Wear approved safety glasses.
3. Have a Class B dry chemical fire extinguisher nearby.
4. With ignition off, release fuel tank filler cap.
5. Disable the fuel pump. Follow the manufacturer's recommended procedure.
 - a. Some vehicles may have two fuel pumps. Both pumps must be disabled.
 - b. A common method of disabling the fuel pump is to remove the fuel pump fuse.
 - c. On some vehicles, removing the fuse also disables the fuel injectors or ignition system, so another method of disabling the pump must be used.
 - d. On some vehicles, the fuel pump can be disabled by disconnecting the fuel pump wiring harness.
 - e. On Ford vehicles, equipped with an inertia switch, check that the switch has not been tripped. The inertia switch is usually located in the trunk.
6. Turn on the ignition and start the engine. If engine will not start, check ignition system for spark. If no spark is present, refer to the vehicle service manual for No Start Diagnostics.
7. Run the engine until it stalls.
8. Try to restart the engine for 3 to 5 seconds. For some Ford/Mercury/Lincoln vehicles with inertia-switch pressure relief, engage the starter for 15 seconds to relieve fuel pressure.
9. Turn ignition off.

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TYPICAL PORT FUEL INJECTION SYSTEM PRESSURE TEST

For TBI & Bosch C.I.S., see additional instructions

1. Refer to **Figure 1**, Typical Multi-Port Fuel Injection System With Test Port. With engine off, locate fuel pressure test port (Schrader valve) and attach the Test Gauge. If no Test Port is provided, residual pressure must be released before fuel system fittings are loosened. Connect the Test Gauge to the access point using the correct adapter. Always wrap a shop towel around the fitting before loosening.
2. If the adapter you need is a banjo bolt adapter, ours are designed for use with standard depth banjos. If a car manufacturer uses a non-standard banjo, more than one washer maybe needed on either or both sides of the banjo. Our M12 x 1.25 banjo bolt adapter may need one or more thick or thin washers depending on the application.
3. Connect the Test Gauge into the system, and watch the Gauge. Reactivate the fuel pump and start the engine.
4. Fuel pressure should rise to slightly above operating pressure and then stabilize at operating pressure, per the manufacturer's' specifications.
5. Check for leaks and repair as required.
6. If engine will not start, check ignition system for spark. If no ignition spark is present, refer to vehicle service manual for No Start Diagnostics.

CAUTION: Pressure could exceed 75 psi and may blow apart any loose fittings or defective lines or hoses. Observe the condition of fuel system components before performing this test.

9. If pressures are acceptable, some manufacturers also require a flow test. If so, open the fuel system into a graduated plastic container and measure the flow rate. Consult a service manual for the acceptable flow rate. Close the fuel system.
10. Turn ignition off and observe the residual pressure. Some manufacturers specify a minimum holding time.
11. In conjunction with an injector pulse tester, turn the ignition on, observe fuel pressure, pulse one injector, turn ignition off. Move injector pulse tester to next injector and repeat test sequence. Continue test procedure on remaining injectors.

CAUTION: Do not repeat this test more than the manufacturer recommends. The engine may become flooded, or the oil can become contaminated.

12. Deactivate the fuel pump and relieve the system pressure. With the ignition off, put the Test Gauge bleed-off tube in a disposal container and press the bleed valve on the hose.

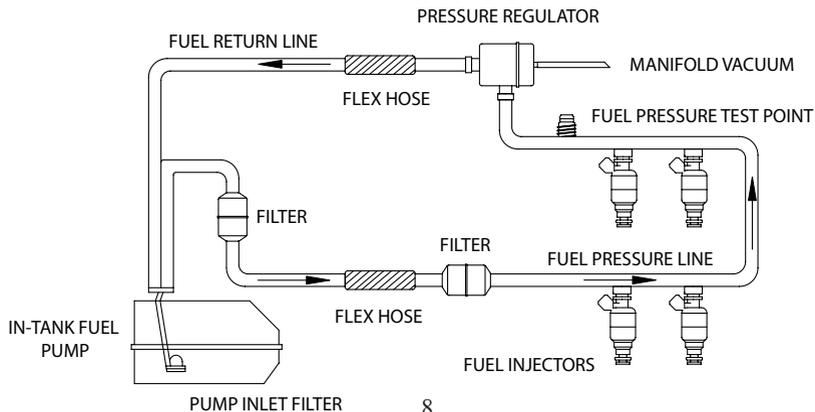
7. If the system has an adjustable fuel pressure regulator, it should maintain system pressure while the engine is running. If a compensating fuel pressure regulator is used, fuel pressure may vary, depending on manifold vacuum.
8. Locate a flexible hose on the fuel return side and gently squeeze off return flow briefly. Never squeeze a steel braided or plastic hose. Pressure should increase rapidly.

CAUTION: Some fuel pump designs can be damaged by this test. This test should not be performed unless recommended by the manufacturer.

13. Remove the Test Gauge and reconnect all the fuel lines.
14. Start the engine and check for leaks.
15. Remove residual fuel from all Test Gauge hoses. If fuel remains in the Test Gauge hose, install any adapter in the test hose quick connect. Put the Test Gauge hose and bleed-off tube in a disposal container. Press the bleed valve on the Test Gauge. The fuel will drain into the container.

FIGURE 1

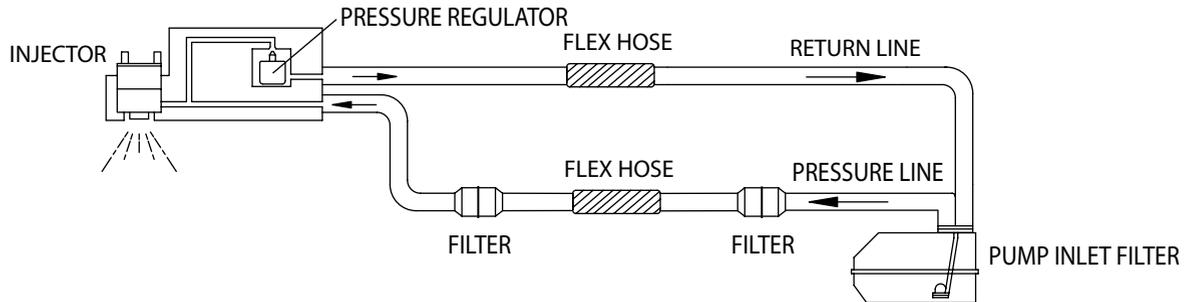
TYPICAL MULTI-PORT FUEL INJECTION SYSTEM WITH TEST PORT



ADDITIONAL INSTRUCTIONS FOR TESTING TBI SYSTEMS

1. Deactivate the fuel pump(s) and relieve fuel system pressure.
2. Remove the air cleaner assembly.
3. On GM vehicles, temporarily plug the Tharmac vacuum port on the throttle body.
4. Refer to **Figure 2**, Typical TBI Fuel Injection System. Using the adapters supplied, install the Test Gauge in-line somewhere between the fuel filter and the throttle body. If longer pieces of 3/8" hose are needed, cut from 3/8" fuel line hose. Use hose clamps on the hose.
5. If steel tubing is disconnected, use two wrenches to prevent damage.
6. On some vehicles it may be easier to put the car on a lift and test from underneath.
7. On some cars with TBI systems, it may be difficult to install adapters. The adapters furnished with this kit will allow many combinations to be made.
8. Reactivate the fuel pump, start the engine, and check for leaks.
9. When fuel pressure has stabilized, observe Test Gauge. Consult a service manual for the exact pressure reading required.
10. Turn ignition off. Deactivate the fuel pump and relieve fuel system pressure. Put Test Gauge bleed-off tube in a disposal container and press bleed valve button.
11. Remove Test Gauge and reconnect all fuel lines.
12. Start engine and check for leaks.
13. Remove residual fuel from all Test Gauge hoses. If fuel remains in the Test Gauge hose, install any adapter in the test hose quick connect. Put the Test Gauge hose and bleed-off tube in a disposal container. Press the bleed valve on the Test Gauge. The fuel will drain into the container.
14. On GM vehicles, remove the plug from the Tharmac vacuum port.
15. Replace air cleaner.

FIGURE 2
TYPICAL TBI FUEL INJECTION SYSTEM



POSITION AND NUMBER OF FILTERS MAY VARY.

ADDITIONAL INSTRUCTIONS FOR TESTING BOSCH C.I.S. SYSTEMS

The following C.I.S. tests can be made with this Test Kit:

- Cold Control Pressure – engine cold, test valve open
- Warm Control Pressure – engine warm, test valve open
- System Pressure – engine cold or warm, test valve closed
- Rest Pressure – engine warm, test valve open
- Fuel Delivery Rate

CAUTION: Adapters with o-rings should be handtightened only.

In some cases, to get the right combination of threads, multiple test adapters may have to be used.

For C.I.S. test pressures specifications, consult the vehicle service manual.

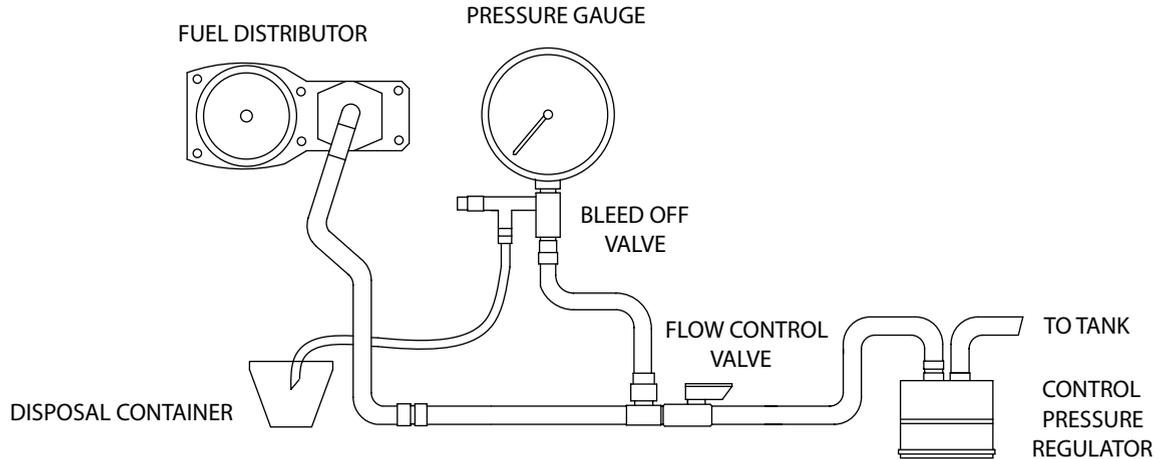
Preparation:

1. Relieve fuel system pressure.
2. Clean any dirt off the top of the fuel distributor.
3. Refer to **Figure 3**, Typical C.I.S. Fuel Injection System Test Gauge Connections. Hook up the Test Gauge between the fuel distributor and the control pressure regulator. The Test Hose without the flow control valve should be connected to the fuel distributor. The hose with the valve should be connected to the hose that was removed from the fuel distributor, or connected directly to the control pressure regulator.

To Test Cold Control Pressure:

1. The engine should be cold after standing several hours or overnight.
2. Disconnect electrical connector at warm-up regulator and auxiliary air valve.
3. Connect Test Gauge and open valve on Test Hose.
4. Remove the air from the system. Put the Test Gauge bleed-off tube in a disposal container. Activate the fuel pump, but do not start the engine. With the fuel pump operating, bleed until air is removed from system.
5. Start the engine and note pressure reading immediately after starting. Compare to manufacturer's specifications.
6. If the Cold Control Pressure is not correct, the warm-up regulator may be at fault.

FIGURE 3 TYPICAL C.I.S. FUEL INJECTION SYSTEM TEST GAUGE CONNECTIONS



Tests Continued on Next Page

To Test Warm Control Pressure:

1. Reconnect wiring to warm-up regulator and auxiliary air valve.
2. Open valve on Test Hose.
3. Start engine and run for specified time.
4. Compare Warm Control pressure readings with manufacturer's specifications.

To Test System Pressure:

1. Test can be performed with engine cold or warm.
2. Reconnect wiring to warm-up regulator and auxiliary air valve.
3. Close valve on Test Hose (closed valve eliminates control pressure.)
4. Start engine and run for specified time.
5. Compare System Pressure reading with manufacturer's specifications.

To Test Rest Pressure:

1. Open valve on Test Hose.
2. With engine at normal operating temperature, energize fuel pump or start engine.
3. Turn engine off or disable pump when pressure reading stabilizes.
4. Compare pressure readings taken at specified time intervals with manufacturer's specifications.

5. If the Rest Pressure drops too quickly, check for leaks at o-ring and fuel line connections.
6. If no external leaks are found, consult the service manual for causes of low fuel pressure.

To Test Fuel Delivery Rate:

1. If pressure testing finds no problems in the fuel injection system, the fuel pump should be checked.
2. Consult manufacturer's specifications for the correct fuel volume and time period to test.
3. Hook up the Test Gauge for a pressure test and put the bleed-off tube into a graduated container.
4. Start the engine or activate the fuel pump.
5. Collect fuel in the container for the specified period of time. Compare the volume of fuel collected with the manufacturer's specifications.
6. Turn off the engine or disconnect the fuel pump.

To Complete Testing:

1. Deactivate fuel pump and relieve fuel system pressure. With ignition off, put Test Gauge bleed-off tube in a disposal container and press bleed valve on the Test Gauge. The fuel will drain into the container.
2. Remove Test Gauge. Reconnect all fuel lines and any vacuum lines or wiring connectors that were disconnected.
3. Start engine and check for fuel system leaks.

ENGLISH / METRIC PRESSURE EQUIVALENTS

psi	bar	kPa	kg/cm ²
0.5	0.034	3.45	0.0352
1	0.069	6.89	0.0703
1.25	0.086	8.62	0.0879
1.5	0.103	10.34	0.1054
1.75	0.12	12.07	0.123
2	0.138	13.79	0.1406
5	0.345	34.47	0.3515
10	0.689	68.95	0.703
15	1.034	103.42	1.0545
20	1.379	137.89	1.406
25	1.724	172.36	1.75
30	2.068	206.84	2.109
35	2.413	241.31	2.4605
40	2.758	275.79	2.812
50	3.447	344.74	3.515
60	4.137	413.68	4.218
70	4.826	482.63	4.921
75	5.167	517.1	5.2725
80	5.516	551.58	5.624
90	6.205	620.52	6.327
100	6.895	689.47	7.03

PRESSURE CONVERSION FACTORS

To Convert	To	Multiply By
psi	kPa	6.8946
psi	bar	0.0689
psi	kg/cm ²	0.0703
psi	in. H ₂ O	27.68
psi	in. mercury	0.4911
psi	cm. mercury	0.1934
kPa	psi	0.145
kPa	bar	0.01
kPa	kg/cm ²	0.0102
bar	psi	14.504
bar	kPa	100
bar	kg/cm ²	1.02
kg/cm ²	psi	14.22
kg/cm ²	kPa	98.074
kg/cm ²	bar	0.9807

BASIC TESTER



1000 - 5057

3 1/2", 0-100 PSI Test Gauge and Hose assembly with blow-down valve. Provides a convenient method of purging air and relieving pressure after testing. Can also be used for observing volume of fuel.



0032 - 0129

CIS / TBI Test Hose – use when testing CIS or TBI systems where in line connections are needed. Includes shut-off valve for both control & primary system pressure checks. The gauge hose should be used with CIS testing, to purge all air from the test gauge when running tests.

SCHRADER VALVE TEST PORT ADAPTERS



0180 - 1462 -----Small Schrader Valve
90 Degree Adapter

0032 – 0128



Small Schrader Type Test Hose with .308" X 32 Thread
Common applications – Ford EFI.



1000-5057
3 1/2" Gauge / Boot / Hose /
Valve / Tubing



0180 - 1463 ----- Standard Schrader Valve 90 Degree Adapter

0032 - 0127



Large Schrader Type Test Hose with 7/16" X 20 Thread.
Common applications include Chrysler, Jeep, and GM with
test ports.

IN LINE TESTING - TBI



1000 - 5057

3 1/2" Gauge / Boot / Hose /
Valve / Tubing



0032 - 0130

Connecting Hose



0180 -1453----- Bent Tube with 5/8"
Flare Nut to M16 with
O-ring



0180 - 1441 ----- Bent Tube with 5/8"
Flare Nuts



0180 - 1459 ----- M12 X 1.25 Banjo
Bolt



0180 - 1444 ----- 5/8"-18 to M16 Union



0180 - 1443 ----- Female M14 to 3/8" Tube



0180 - 1442 ----- Female M16 to 3/8" Tube



0180 - 1455 ----- M14 with O-Ring to 3/8"
Tube



0180 - 1454 ----- M16 with O-Ring to 3/8"
Tube



1000 - 5061 ----- Straight Flared
Tube with 5/8" Flare Nut



0400 - 2972 ----- 3/8" ID X 3" Hose



1000 - 5062 ----- Hose Clamp Kit

IN LINE TESTING - C.I.S., C.I.S.-E, & K-JETRONIC



1000 - 5057
3 1/2" Gauge / Boot / Hose /
Valve / Tubing



0032 - 0129
Connecting Hose &
Valve Assembly

-  **0180 - 1457** ----- M8 Banjo Bolt with Washer
-  **0180 - 1458** ----- M10 Banjo Bolt with Washer
-  **0180 - 1460** ----- M12 X 1.5 Banjo Bolt
-  **0180 - 1451** ----- M10 Male to M12 Male
-  **0180 - 1445** ----- M8 Female to M12 Male
-  **0180 - 1446** ----- M10 Female to M12 Male
-  **0180 - 1450** ----- M8 Male to M12 Male
-  **0180 - 1452** ----- Long M8 Male to M12 Male
-  **0180 - 1461** ----- Long M8 Female to M12 Male

IN-LINE TESTING - SPECIAL ADAPTERS



1000 - 5057

3 1/2" Gauge / Boot / Hose /
Valve / Tubing



0180 - 1449 ----- Manifold with Quick
Connect



0180 - 1448 ----- GEO / Isuzu
Adapter



0400 - 2970 ----- 1/4" ID X 2" Hose



0400 - 2971 ----- 5/16" ID X 3" Hose



1000 - 5060-- Ford CFI Hair Pin
Hose Adapter



1000 - 5059 -- Ford EFI Spring
Lock Hose
Adapter



1000 - 5058 -- Volvo Adapter



1000 - 5063 -- 3/8" Hair Pin Hose
Assembly



1000 - 5064-- 5/16" Hair Pin
Hose Assembly

END-OF-LINE TESTING - BANJO, FUEL BOLT ADAPTERS



1000 - 5057
3 $\frac{1}{2}$ " Gauge / Boot / Hose /
Valve / Tubing



0180 - 1456 -----M6 Banjo Bolt with
O-ring



0180 - 1457 -----M8 Banjo Bolt with
Washer



0180 - 1458 -----M10 Banjo Bolt with
Washer



0180 - 1459 ----- M12 X 1.25 Banjo
Bolt



0180 - 1460 ---- M12 X 1.5 Banjo
Bolt



0180 - 1447 --- M14 X 1.5 Banjo
Bolt



0180 - 1464 ---- Single End Hose
Adapter



0180 - 1440---- Quick Connect Plug to
1/4" Hose

