

INSTRUCTIONS

General Safety Guidelines to Follow When Working on Vehicles:

- Always wear approved eye protection
- Always operate the vehicle in a well-ventilated area. **Do not inhale exhaust gases—they are very poisonous!**
- Always keep yourself, tools, and test equipment away from all moving or hot engine parts.
- Always make sure the vehicle is in **Park** (automatic transmission) or **Neutral** (manual transmission) and that the **parking brake** is firmly set. Block the drive wheels.
- Never lay tools on vehicle battery. You may short the terminals together, causing harm to yourself, the tools, or the battery.
- Never smoke or have open flames near vehicle. Vapors from gasoline and charging batteries are highly flammable and explosive.
- Never leave vehicle unattended while running tests.
- Do not use Model KM2530 Fuel Pressure Gauge on **Diesel** or **Flex Fuel** engines!
- Always keep a fire extinguisher suitable for gasoline/electrical/chemical fires handy.
- Do not confuse Air Conditioning schrader valves with the fuel rail test port.
- Always turn ignition key OFF when connecting or disconnecting electrical components, unless otherwise instructed.
- Use shop rags to cover fuel line fittings when connecting or disconnecting fuel lines or gauges. Avoid contact with gasoline. Dispose of all rags properly.
- Clean up all fuel spills *immediately*.
- Keep away from engine cooling fan. On some vehicles, the fan may start up unexpectedly.
- You *must* follow vehicle service manual cautions when working around the air bag system. If the cautions are not followed, the air bag may deploy unexpectedly, resulting in personal injury. Note that the air bag can still deploy several minutes after the ignition key is turned OFF (or even if the battery is disconnected) because of a special energy reserve module.
- **Always** follow vehicle manufacturer's warnings, cautions, and service procedures.
- **Always** relieve fuel pressure before disconnecting fuel lines.

Vehicle Service Information

The following is a list of publishers who have manuals containing vehicle diagnostic information. Some manuals may be available at auto parts stores or your local public library. For others, you need to write for availability and pricing, specifying the make, model and year of your vehicle.

Vehicle Service Manuals:

Chilton Book Company
Chilton Way
Radnor, PA 19089

Haynes Publications
861 Lawrence Drive
Newbury Park, CA 91320

Cordura Publications
Mitchell Manuals, Inc.
P.O. Box 26260
San Diego, CA 92126

Motor's Auto Repair Manual
Hearst Company
250 W. 55th Street
New York, NY 10019

**Buick, Cadillac, Chevrolet, GEO,
GMC, Oldsmobile, & Pontiac**
Helm Incorporated
P.O. Box 07130
Detroit, MI 48207

Ford, Lincoln, & Mercury
Ford Publication Department
Helm Incorporated
P.O. Box 07150
Detroit, MI 48207

**Chrysler, Plymouth,
Dodge, Jeep, Eagle**
Dymont Distribution Service
Service Publications
12200 Alameda Drive
Strongsville, OH 44136

Saturn
Adistra Corporation
c/o Saturn Publications
101 Union St.
P.O. Box 1000
Plymouth, MI 48170

**Honda/Acura,
Isuzu, Suzuki, Kia,
Hyundai, Subaru**
Helm Incorporated
P.O. Box 07130
Detroit, MI 48207

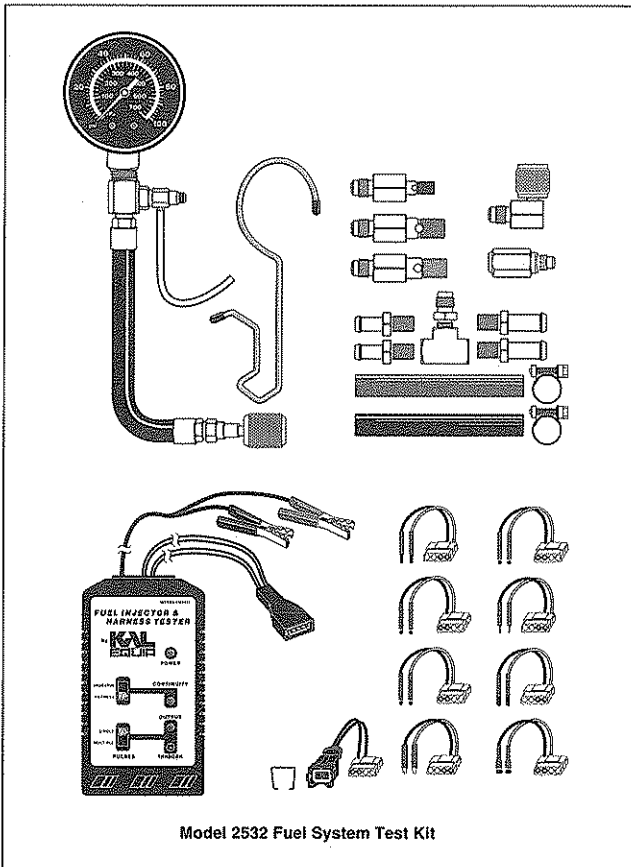
Fuel Injection Testing

In recent years, fuel injection has become standard equipment on most new vehicles. Although far more reliable and efficient than carburetors, fuel injection systems have their own unique problems. In many cases, fuel injection system problems can be linked to blocked or sticky fuel injectors. Testing fuel injectors was once a complicated and inaccurate procedure, but with the Kal Model KM2532 Fuel System Test Kit, you can quickly and easily locate any malfunctioning fuel system component without removing it from the vehicle.

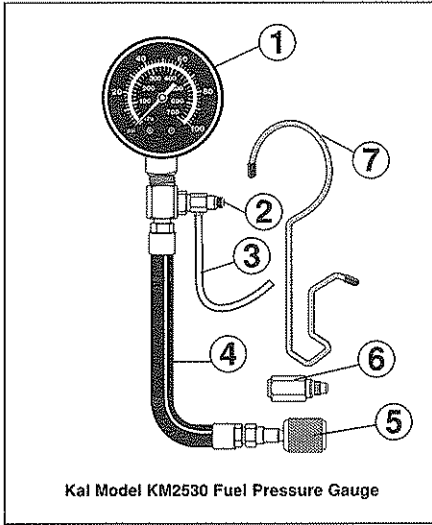
The Model KM2532 Fuel System Test Kit consists of a fuel pressure gauge, a hand-held Fuel Injector and Harness Tester used to check the

function of fuel injectors and their associated wiring harnesses, and adapters to connect the gauge and tester to most vehicles. The kit's fuel pressure gauge tests for faulty fuel delivery system components such as fuel filters, fuel pressure regulators, fuel lines, and fuel pumps. The Fuel Injector and Harness Tester tests for clogged or leaking fuel injectors by using a single, half-second pulse. Multiple 5-millisecond pulses are used to test for sticky or sluggish fuel injectors. By using the kit's fuel pressure gauge and comparing fuel pressure differences as each fuel injector is pulsed, faulty injectors can quickly be identified. In addition, the Model KM2532 Fuel System Test Kit is able to test fuel injection wiring harnesses for faulty wiring and connectors.

Model 2532 Fuel System Test Kit Features



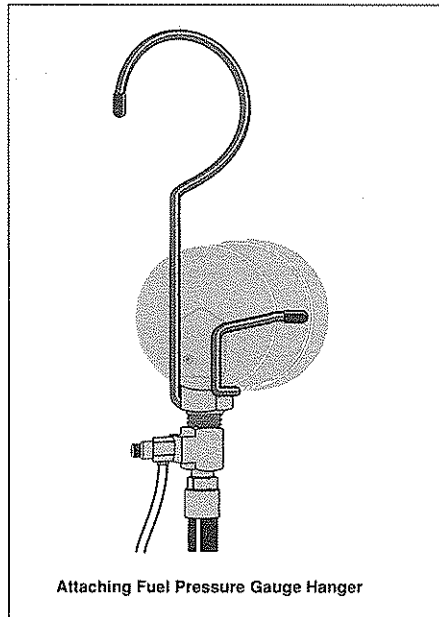
Fuel Pressure Gauge & Fuel Line Adapters:



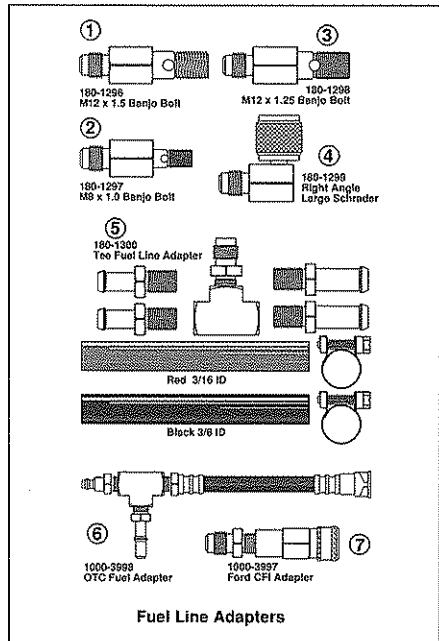
1. **Dial Face:** Measurement scale that shows amount of fuel pressure present in fuel system.
2. **Pressure Relief Button:** Used to relieve fuel pressure in the gauge hose before disconnecting the gauge from the fuel rail.
3. **Bleed-Off Hose:** A 6-ft. hose that bleeds off fuel pressure when the pressure relief button is pressed. Never use a bleed-off hose shorter than 6 ft.

IMPORTANT: Always make sure end of bleed-off hose is in an approved fuel container during testing and when bleeding off fuel pressure!

4. **Gauge Hose:** Hose that carries fuel to the gauge so that pressure can be measured.
5. **GM/Chrysler Test Port Adapter:** This adapter is used to connect the gauge hose to GM and Chrysler vehicles equipped with a schrader valve test port on the fuel rail.
6. **Ford Test Port Adapter:** This adapter is used to connect the gauge hose to Ford vehicles equipped with a schrader valve test port on the fuel rail.
7. **Fuel Pressure Gauge Hanger:** Used to hang the fuel pressure gauge in the engine compartment for easy viewing.

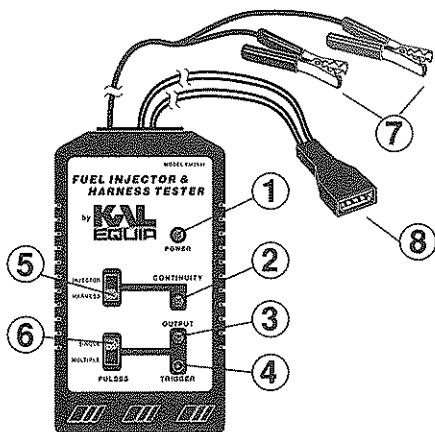


Fuel Line Adapters:



1. (Actron part # 180-1296): M12x1.5 Banjo Bolt
2. (Actron part # 180-1297): M8x1.0 Banjo Bolt
3. (Actron part # 180-1298): M12x1.25 Banjo Bolt
4. (Actron part # 180-1299): Right angle schrader valve adapter
5. (Actron part # 180-1300): Tee Fuel Line Adapter
6. (Actron part # 1000-3997): Ford CFI fuel line adapter (not included—see p. 6 to order)
7. (Actron part # 1000-3998): OTC fuel adapter — adapts KM2530 Fuel Pressure Gauge to OTC fuel pressure adapters (not included—see p. 6 to order).

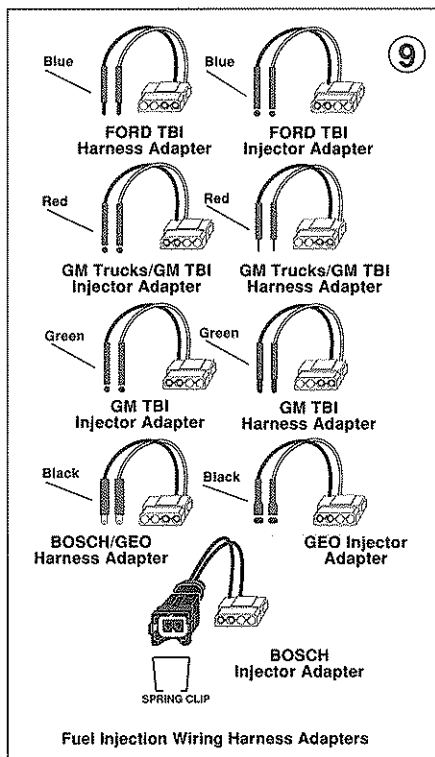
Fuel Injector and Harness Tester:



Model KM2532 Fuel Injector and Harness Tester

1. **Power LED**—As soon as the battery clips are attached to the vehicle battery, the Power LED will light. This verifies a good power connection.
2. **Continuity LED**—Indicates a good connection to the fuel injector or fuel injector wiring harness. This light must be lit before proceeding with any testing.
3. **Output LED**—Indicates the presence of a signal from the vehicle's on-board computer to the fuel injector OR a pulse from the Tester to the fuel injector.
4. **Trigger Button**—Activates fuel injector test pulses.

5. **Injector/Harness Switch**—Selects fuel injector or fuel injector wiring harness testing.
6. **Single Pulse/Multiple Pulses Switch**—Switches between one half-second and multiple 5-millisecond test pulses when the Trigger Button is pressed.
7. **Battery Clips**—Attach to vehicle battery to power the Fuel Injector and Harness Tester.
8. **Fuel Injector/ Wiring Harness Interface Cable**—Connects the Fuel Injector and Harness Tester to a vehicle fuel injector and fuel injection wiring harness for testing. **NOTE:** Requires the use of application-specific adapter (included) for fuel injector and wiring harness testing.
9. **Fuel Injector/Wiring Harness Adapters**—Used to connect Fuel Injector/Wiring Harness Interface Cable to vehicle. Since all vehicles are different, several color coded adapters are included. **Same color adapters are used for the same application—one adapter is used to connect the Interface Cable to the fuel injector, and the other connects the Interface Cable to the wiring harness.**



Pre-Testing Checks

1. Read Safety Guidelines.
2. Do a thorough visual and "hands-on" inspection of the engine and fuel system. Look for loose or cracked electrical wiring, battery cables, ignition wires, and fuel or vacuum lines.
3. Verify that the battery is fully charged and the fuel tank has an adequate supply of fuel.
4. Verify that the inertia switch on certain Ford/Lincoln/Mercury vehicles has not been tripped—the inertia switch is usually located in the trunk and may be labeled with a warning tag.
5. Verify that all fuel system fuses are good.
6. Verify that the fuel vapor recovery system and gas cap are in good condition.
7. Verify that manifold vacuum is within manufacturer's specification (typically 18-20 in. at idle).
8. Look for fuel leaks and wipe up any spilled fuel immediately.
9. Has the vehicle been serviced recently? Sometimes things get reconnected in the wrong place, or not at all.
10. Don't take shortcuts. Inspect wiring which may be difficult to see because of location beneath air cleaner housings, alternators and other components.
11. Inspect wiring harnesses for:
 - Contact with sharp edges (this happens often).
 - Contact with hot surfaces, such as exhaust manifolds.
 - Pinched, burned or chafed insulation.
 - Proper routing and connections.
12. Check electrical connectors for:
 - Corrosion on pins.
 - Bent or damaged pins.
 - Contacts not properly seated in housing.

NOTE: Problems with connectors are common in the engine control system. Inspect carefully. Note that some connectors use a special grease on the contact to prevent corrosion. Do not wipe off! Obtain extra grease, if needed, from your vehicle dealer. It is a special type for this purpose.
13. Check other vehicle systems:
 - Ignition—For safety reasons, most engine computers will not deliver fuel without an ignition spark.

- Engine computer—The engine computer has special drivers which energize the fuel injectors. These drivers are fragile and can break easily. If you suspect a computer driver problem, test by replacing the computer with a known good computer and retest.

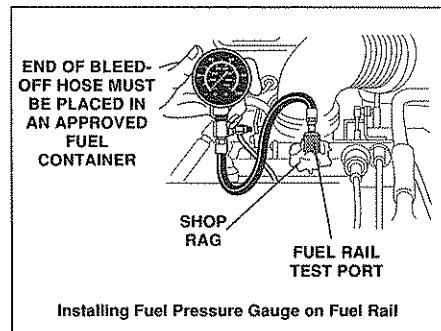
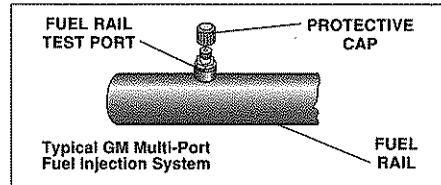
Testing with the Fuel System Test Kit

NOTE: Before beginning any testing, perform diagnostic procedures described in vehicle service manual to eliminate other possible causes of driveability problem. Compression and ignition problems may imitate fuel injection system problems.

Before proceeding with fuel pressure, fuel injector, and harness testing, read and understand all safety guidelines and perform all pre-testing checks.

Test 1: Fuel Pressure

1. Connect Kal KM2530 Fuel Pressure Gauge (included with kit) to fuel line. Most vehicles have a schrader valve located on the fuel rail for this purpose. On Ford vehicles, you must use the included Ford test port adapter. On vehicles without schrader valves, directions on opening the fuel line and attaching the fuel pressure gauge are included below.



IMPORTANT: Read and follow all **Pre-Testing Checks, Safety Precautions, and Fuel**

Pressure Testing Procedures contained in this manual and in vehicle service manual.

NOTE: Always use caution when working around fuel systems. The fuel in the fuel rail may be pressurized even if the engine is not running. Use a shop rag to surround the schrader valve or to cover the fuel line opening whenever connecting adapters to the fuel system. Clean all fuel spills immediately.

For vehicles without a schrader valve on the fuel rail:

- a) Depressurize fuel system by following procedure outlined in vehicle service manual. On most vehicles, this involves disconnecting or deactivating the electric fuel pump(s) and operating the engine until it stalls. **NOTE:** Some vehicles may have more than one fuel pump—deactivate all pumps! Failure to do so can result in personal injury, vehicle damage, spilled fuel, fire or other hazardous conditions.
- b) Using proper fuel pressure gauge adapter, open fuel line at point specified in vehicle service manual and connect adapter to fuel line (see application chart on the following page). **NOTE:** The information in this manual is not a substitute for the procedures outlined in the vehicle service manual. **ALWAYS** follow manufacturer's instructions when working on fuel systems.
- c) Attach fuel pressure gauge to adapter and tighten fitting until finger tight.

<u>Adapter Part Number</u>	<u>Part Description</u>
1000-3992	M12x1.5 banjo bolt fuel line adapter
1000-3993	M8x1.0 banjo bolt fuel line adapter
1000-3994	M12x1.25 banjo bolt fuel line adapter
1000-3995	Right angle schrader valve adapter
1000-3996	Chrysler TBI/"T" adapter
1000-3997	Ford CFI fuel line adapter
1000-3998	OTC fuel adapter (adapts KM2530 Fuel Pressure Gauge to OTC fuel pressure adapters)
KM2530	Fuel Pressure Gauge

Fuel Line Adapter Connection Location & Types

Make	Model	Access Location	Adapter Number
Acura	All with fuel injection	Fuel Filter	180-1298
Alfa-Romeo	All with fuel injection	Fuel Line to Fuel Rail	180-1300
AMC	1983-84 Alliance (Calif.)	Fuel Line to Fuel Rail	180-1300
	1983-84 Encore (Calif.)	Fuel Line to Fuel Rail	180-1300
Audi	All with fuel injection	Fuel Line to Fuel Rail	180-1300
BMW	All with L-Jetronic	Fuel Line to Fuel Rail	180-1300
Chrysler	1.5 Colt, Raider, Summit, Vista Wagon	Fuel Line to Fuel Rail	180-1298
	1981-83 Imperial	Fuel Line to TBI	180-1300
	1983-85 All except Imperial	Fuel Line to TBI	180-1300
	1986-90 All Cars & Light Trucks	Fuel Line to TBI	180-1300
	1987-91 3.0L Cars	Fuel Line to Fuel Rail	180-1300
	2.0L Colt, Raider, Vista Wagon	Fuel Line to Fuel Rail	180-1298
	3.0L Colt, Raider, Vista Wagon	Fuel Line to Fuel Rail	180-1298
	All 1991 with TBI	Fuel Line to TBI	180-1300
Daihatsu	All with fuel injection	Fuel Line to Fuel Rail	180-1298
Eagle	Medallion	Fuel Line to Fuel Rail	180-1300
	Premier/Monaco 2.5L	Fuel Line to Fuel Rail	180-1300
	Premier/Monaco 3.0L	Fuel Line to Fuel Rail	180-1300
Fiat	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Ford	1985-91 Small Cars	Fuel Line to CFI	1000-3997*
	1987-91 All Imports	Fuel Line to Fuel Rail	180-1300
GEO	1.6L	Fuel Line to Fuel Rail	180-1300
	Prism, Storm	Cold Start Injection Pipe Port	180-1297
GM	1988 Nova	Cold Start Injection Pipe Port	180-1298
	Sprint Turbo	Fuel Line to Fuel Rail	180-1300
Honda	All with fuel injection	Fuel Filter	180-1298
Hyundai	All with fuel injection	Fuel Filter	180-1298
Infiniti	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Isuzu	Amigo, Rodeo, Pickup, Trooper	Fuel Line to Fuel Rail	180-1300
	Impulse, Stylus	Fuel Line to Fuel Rail	180-1300
Jaguar	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Jeep	1985-90 1.4L, 1.7L, 2.5L	Fuel Line to TBI	180-1300
Kia	Sephia	Fuel Line to TBI	180-1300
Mazda	All with fuel injection	Fuel Line to Fuel Rail	180-1298
Mercedes Benz	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Mitsubishi	Van, Wagon	Fuel Line to Fuel Rail	180-1298
Nissan/Datsun	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Peugeot	2.2L	Fuel Line to Fuel Rail	180-1300
	V6	Fuel Line to Fuel Rail	180-1300
Porsche	All with Bosch L-Jetronic	Fuel Line to Fuel Rail	180-1300
Renault	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Saab	16 Valve Engine	Fuel Line to Fuel Rail	180-1296
Sterling	All with fuel injection	Fuel Filter	180-1298
Subaru	All with Bosch L-Jetronic	Fuel Line to Fuel Rail	180-1300
	All with TBI	Fuel Line to Fuel Rail	180-1300
Suzuki	All with fuel injection	Fuel Line to Fuel Rail	180-1300
		Fuel Line to TBI	180-1300
Toyota	All with fuel injection	Cold Start Injection Pipe Port	180-1297
Triumph	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Volkswagen	All with fuel injection	Fuel Line to Fuel Rail	180-1300
Volvo	All with fuel injection	Fuel Line to Fuel Rail	180-1300

*Not included with Fuel System Test Kit. Available directly from Actron. See p. 6.

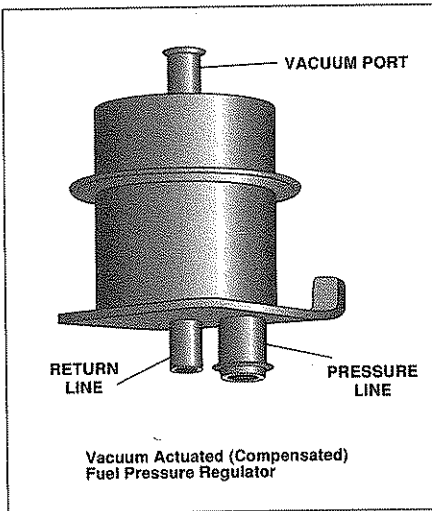
1. Place end of 6-ft. bleed-off hose in an approved container for fuel. Bleed-off hose must remain in container until testing is complete.
2. Turn all accessories OFF (i.e. radio, A/C, blower fan, headlights, windshield wipers, etc.)
3. Turn ignition key ON.

Perform the following checks:

- Pressurize fuel system by cycling ignition ON and OFF every ten seconds until fuel pressure is at manufacturer's specifications (check vehicle service manual for your particular application).
- Check fuel system for leaks. If leaks are found, turn ignition key OFF and clean up fuel *immediately!*
- If fuel pressure is not within manufacturer's specifications, cycle ignition key 2 or 3 more times. If fuel pressure is still not within specification, service vehicle according to vehicle service manual.
- For instructions on how to safely disconnect the Fuel Pressure Gauge from the fuel injection system, see p. 8.

4. Start engine and let idle.

- If test vehicle's fuel system uses a vacuum actuated (compensated) fuel pressure regulator, then fuel pressure should drop 3-10 psi, depending on manifold vacuum.



- If test vehicle's fuel system uses a fuel pressure regulator without a vacuum port, then fuel pressure should remain constant during both key-on-engine-off and idle.
- Read fuel pressure from dial face.
- If fuel pressure is not within manufacturer's specification, then service vehicle according to vehicle service manual.
- When repair is complete and idle fuel pressure is within manufacturer's specification, then proceed to **Step 6**.

5. Turn ignition key OFF.

6. Disconnect fuel pressure gauge as described in the following section.

Disconnecting Fuel Pressure Gauge

1. Verify that 6-ft. bleed-off hose is still in an approved container for fuel.
2. Fully DEPRESS and HOLD the pressure relief button until dial face pointer is resting on stop pin.

CAUTION: Pressurized fuel will spray out of bleed-off hose and into approved container.

3. Shake bleed-off hose to make sure that all fuel went into approved container.
4. Remove gauge hose from fuel rail test port or fuel line adapter fitting:
 - Wrap a shop rag around fuel rail test port or fuel line adapter fitting in case a small amount of fuel drips out while unscrewing test port adapters.
 - Unscrew fuel pressure gauge from fuel rail test port or fuel line adapter fitting.
 - Wrap a shop rag around end of fuel pressure gauge hose to catch any fuel dripping from hose.
 - Remove bleed-off hose from approved fuel container and hold gauge hose over container so any remaining fuel will drip into container.
5. After relieving fuel system pressure, disconnect fuel line adapter (if used) and reconnect fuel lines as described in vehicle service manual. Use correct fuel line fitting tools. Clean up any spilled fuel *immediately!*
6. Store shop rags in an approved container so they cannot cause personal injury or a hazardous situation.
7. Store fuel pressure gauge in a well-ventilated area where it cannot cause personal injury or a hazardous situation.

General Fuel Pressure Diagnostics

Checking fuel pressure is an essential part of fuel injection system troubleshooting. High fuel pressure will make an engine run rich, while low fuel pressure will make an engine run lean or not at all. In some cases, low fuel pressure can cause additional damage such as burned pistons, valves, spark plugs, or blown head gaskets.

Fuel pressure readings which are higher than manufacturer's specifications are generally caused by a problem in the fuel return line components. Conversely, fuel pressure readings which are lower than manufacturer's specifications are generally caused by a problem in the fuel pressure line components.

If fuel pressure readings are not within manufacturer's specifications, refer to a vehicle service manual for step-by-step diagnostic procedures which will pinpoint the faulty component for each specific vehicle.

Possible causes of high fuel pressure readings may include:

- Faulty fuel pressure regulator.
- Restriction in fuel return line.
- Faulty fuel line couplings at fuel tank or fuel pickup.
- Sticking or "sluggish" fuel injectors.

Possible causes of low fuel pressure readings may include:

- Clogged or restricted fuel filter.
- Restriction in pressure line.
- Faulty fuel pump(s).
- Faulty fuel pump relay.
- Blown fuel pump fuse.
- Faulty fuel pump wiring.
- Clogged or restricted fuel pump filter.
- Faulty fuel pressure regulator.
- Leaking fuel injectors.
- Faulty fuel line couplings at fuel tank or fuel pickup.

Test 2: Fuel Injectors

1. Connect the Fuel Injector Tester to vehicle battery.

- a) Connect battery clips to the vehicle battery: RED to the positive (+) terminal and BLACK to a good vehicle ground (-). Be sure the Power LED is lit before continuing.

2. Connect fuel pressure gauge to fuel rail schrader valve or fuel line adapter. See Test 1: Fuel Pressure (p. 5) for information on connecting fuel pressure gauge to test vehicles.

3. Test for fuel system leaks:

- a) Pressurize fuel system by cycling ignition ON and OFF every ten seconds until fuel pressure is at manufacturer's specifications (check vehicle service manual for your particular application).

NOTE: Check fuel pressure gauge connection point for leaks. If leak occurs, clean all fuel immediately and check all fittings for tightness.

- b) Observe pressure gauge for 10-15 seconds, looking for pressure drop.
- c) If the pressure does not drop, continue with fuel injector testing Step 4. If fuel pressure does drop, continue looking for leaks by blocking off the return line between the fuel pressure regulator and the gas tank. Retest as described above.
- d) If the pressure drops again, there may be one or more leaky injectors. Later tests will identify malfunctioning injectors.

4. Test fuel injectors:

IMPORTANT: Do not pulse fuel more than once per cylinder. Start and run the engine briefly after pulsing fuel once into all cylinders. This clears excess fuel from the intake ports. Failure to do so could cause hard starting, severe engine flooding, catalytic converter damage, or fire.

- a) Carefully disconnect wiring harness from fuel injector being tested. **NOTE:** Do not jerk or pull on wires—some harnesses are attached with clips. It is a good idea to test injectors in sequence, beginning with cylinder #1.
- b) Set **Injector/Harness** switch to Injector.
- c) Attach appropriate injector adapter to Fuel Injector/Wiring Harness Interface cable.
- d) Connect Fuel Injector and Harness Tester to fuel injector. For most injectors (except

Bosch type) it does not matter which wire is connected to which terminal on the injector. Make sure the injector adapter wires are securely fastened to the fuel injector terminals and that there is no exposed metal between them. For Bosch type injectors, the injector adapter is keyed so it can only be attached one way.

- e) Verify that the Continuity LED is lit. If Continuity LED does not light, check all electrical connections. If all electrical connections are secure and LED remains OFF, injector is faulty and should be replaced.
- f) Set **Pulse** switch.
 - **Single** will test for clogged injectors.
 - **Multiple** will test for sticky or sluggish injectors.

- g) Re-pressurize fuel system as described in Step 3. Be sure that fuel pressure is stable before continuing. Record this initial fuel pressure for reference.

NOTE: Fuel system must be re-pressurized to manufacturer's specifications before testing **each** fuel injector.

- h) Press **Trigger** button to energize fuel injector. Output LED will flash briefly as injector is energized by the Tester.

IMPORTANT: Do not pulse fuel more than once per cylinder. Start and run the engine briefly after pulsing fuel once into all cylinders. This clears excess fuel from the intake ports. Failure to do so could cause hard starting, severe engine flooding, catalytic converter damage, or fire.

- i) Record fuel pressure drop 2-3 seconds after pulse.

NOTE: Make sure that each injector's pressure drop is recorded the same amount of time after the pulse. If this time interval varies, the test results will be inaccurate due to normal fuel system leakdown.

- j) Repeat steps a-i on the next injector until all injectors have been tested.
- k) After testing all injectors with Pulse switch in one position (Single or Multiple), repeat steps a-j with the Pulse switch in the position other than the one just tested.

5. Fuel Injector test results:

- a) Using the pressure values for each cylinder you recorded in step 4-i, compare pressure differences between the injectors. **NOTE:** Injectors showing significant (more than 2.0 psi) pressure change should be retested to be certain that there were no variations in the test procedure.
 - When testing with a **Single Pulse:** Clogged injectors will show *less* pressure drop than healthy injectors. Leaking injectors will show *more* pressure drop than healthy injectors.
 - When testing with **Multiple Pulses:** Sticky or sluggish injectors will show less pressure drop than healthy injectors.
- b) Flush or clean any injector which continues to show a variation of more than 2.0 psi when compared to the other injectors. **NOTE:** Be sure to compare readings taken during Single and Multiple pulse testing separately. Pressure values for single pulses can be much different than values for multiple pulses.
- c) Retest and replace any injector which does not improve after being flushed and cleaned.

6. After testing:

- a) Disconnect all tester leads from fuel injectors and harnesses.

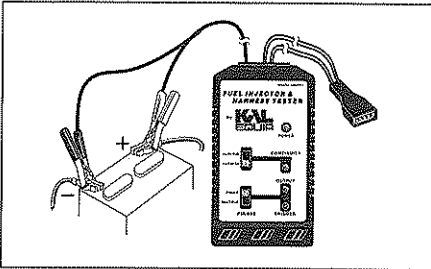
NOTE: Always grasp adapter ends near terminals when removing from injectors and harnesses to prevent damage. Do not tug or jerk adapter wires from terminals.
- b) Remove tester battery clips from battery.
- c) Remove fuel pressure gauge as described on p. 8.
- d) If the excess fuel in the intake ports has been purged by starting the vehicle after each injector test, reconnect injector wiring harness to injector.

IMPORTANT SAFETY NOTE: If excess fuel has NOT been purged following each injector test, vehicle damage may result when engine is started. To clear excess fuel, disconnect ALL fuel injectors and crank engine. Engine may start and run roughly, then die. This is normal. Reconnect all injectors.

Test 3: Fuel Injection Wiring Harness

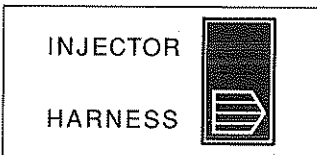
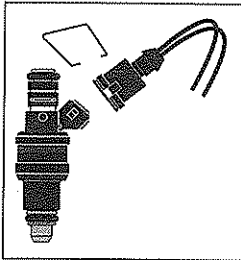
1. Connect the Fuel Injector and Harness Tester to the vehicle battery.

- a) Connect battery clips to the vehicle battery: RED to the positive (+) terminal and BLACK to a good vehicle ground (-). Be sure the Power LED is lit.



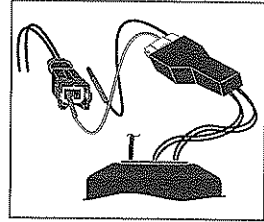
2. Test fuel injector harness (repeat steps a-e for each injector harness):

- a) Carefully disconnect wiring harness from fuel injector being tested. Do not jerk or pull on wires—some harnesses are attached with clips. It is a good idea to test injector wiring harnesses in sequence, beginning with cylinder #1.
- b) Set Injector/Harness switch to Harness.



- c) Connect appropriate harness adapter to the interface cable.

- d) Connect Fuel Injector/Wiring Harness Interface Cable to wiring harness of fuel injector being tested using the appropriate adapter.



For all harness adapters, it does not matter which wire is connected to either terminal of the wiring harness. The tester is designed in such a way that hook-up orientation does not matter.

NOTE: The continuity LED may be bright, dim, or off. The status of the continuity LED becomes important in later testing.

- e) Turn vehicle ignition switch to ON, but do not start vehicle.

NOTE: On most vehicles, the Continuity LED will now be on. If the Continuity LED remains off, further testing will determine if a problem exists.

- f) Start the engine—If engine will not start, then have an assistant crank the engine so you can observe the LEDs. **NOTE:** Vehicle may start and run even with one or more injectors disconnected. This does not affect the harness test. Observe all safety precautions!

Verify that the Continuity LED is lit, and the Output LED is flashing. **NOTE:** Output LED may flash so quickly that it appears to remain on. This is normal.



If the Continuity LED does not light, and the Output LED is not flashing, then check all electrical connections. If all electrical connections are good, then proceed to Step g.

- g) Wiring Harness Test Results:

- If the Continuity LED lit up and the Output LED flashed, the wiring harness for that fuel injector is good.
- If the Continuity LED failed to light, then there is a problem with the fixed voltage wire in the injector wiring harness. Use a digital multimeter to check for an open or short circuit.

- If the Output LED does not flash, then:
 - Check fuel injector wiring harness for an open or short circuit in the wire that turns the fuel injector ON and OFF.
 - The driver in the engine computer may be faulty. Substitute good computer and retest.
 - Check ignition system. For safety reasons, most fuel injection systems will not deliver fuel without the presence of ignition reference pulses from the ignition module. NOTE: This only applies to a "No Start" condition.
- h) Repeat steps a-g for each injector.

3. Disconnect Tester from wiring harness and reconnect all wires. Start and run engine to be sure that all injectors are firing normally.

Replacement Parts & Order Information

Most components listed in this manual are available directly from Actron. Please have part number(s) handy when placing your order to insure that you receive the exact components you need.

For information on replacement parts, additional testing equipment, and optional fuel system test adapters, call:

**1-800-ACTRON-7
OR
(216) 651-9200**

Actron is also available my mail at:

**Actron Manufacturing Co.
9999 Walford Ave.
Cleveland, OH 44102**

Internet – <http://www.actron.com>

E-Mail – sunpro@actron.com

Care and Maintenance

- Apply a lightweight household oil to the rubber "O" rings inside the fuel pressure gauge fittings and all fuel line adapter fittings before each use.
- Keep all Fuel Injector and Harness Tester electrical connections clean and free of corrosion.
- If Fuel Injector and Harness Tester face becomes dirty, wipe clean with a damp rag. **DO NOT use alcohol or other strong solvents as they may remove face printing.**
- Use care to prevent Fuel Injector and Harness Tester wiring insulation from becoming chafed or broken. Do not use Tester if insulation or wiring is damaged.

FULL THREE (3) YEAR WARRANTY

Actron Manufacturing Company, 9999 Walford Avenue, Cleveland, Ohio 44102, warrants to the user that this unit will be free from defects in materials and workmanship for a period of three (3) years from the date of original purchase. Any unit that fails within this period will be repaired without charge when returned to the Factory. Actron requests that a copy of the original, dated sales receipt be returned with the unit to determine if the warranty period is still in effect. This warranty does not apply to damages caused by accident, alterations, or improper or unreasonable use. Expendable items, such as batteries, fuses, lamp bulbs, flash tubes also are excluded from the scope of this warranty. ACTRON MANUFACTURING COMPANY DISCLAIMS ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY WRITTEN WARRANTY ON THE UNIT. Some states do not allow the disclaimer of liability for incidental or consequential damages, so the above disclaimer may not apply to you. This warranty gives specific legal rights, and you may also have rights which vary from state to state.

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