

Fuel Injection **Manual**

PN-42439

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To the best of our knowledge, the information in this book is correct. As the information has to be general to cover all makes and models world-wide, there may be a limited number of cars or models that may vary from the general instructions. If in doubt, consult factory, Bosch, Mitchell, or other manuals for more specific information.

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Pretest System Checks

The following basic checks should be performed and any detected faults corrected before a fuel system test is performed.

Fuel System

- Look for broken or loose fuel lines (metal or rubber)
- Make sure fuel tank has sufficient fuel (do not rely on fuel gauge).
- Check for water or other contaminants in fuel.
- Check condition of fuel system related fuses.
- Check condition of fuel tank venting systems.
- Check condition of fuel tank filler cap.

Electrical System

- If engine won't start, check for ignition spark using a test plug. If no spark, repair ignition system. The ignition fires the injector on most fuel injection systems so that if there is no spark plug firing, there will be no injector firing.
- Observe check engine lamps or other computer fault indicators.
- Look for ignition wires broken, disconnected or arcing.
- Look for distributor cap or rotor disconnected or arcing.
- Check for component grounds loose or corroded.
- Look for disconnected electrical components.

Battery & Charging System

- A. Check battery condition. A weak battery will not ensure proper pump delivery or injector triggering. Should be over 12 volts.
- B. Check basic operation of charging system.
- C. Look for loose or corroded battery cables.

Miscellaneous

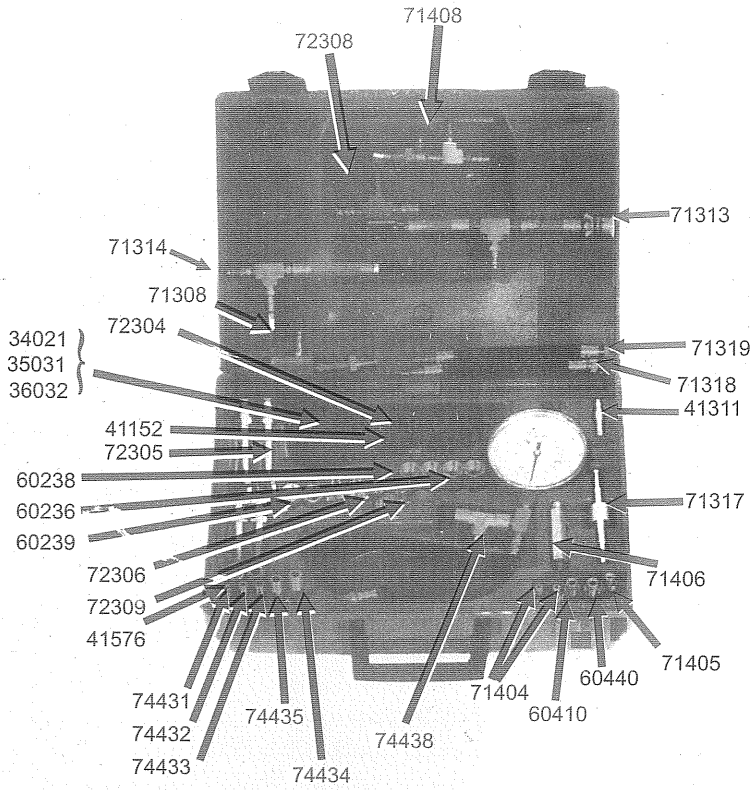
- A. Check vacuum lines for loose or disconnected lines.
- B. Look for water leaks.
- C. Look for excessive oil leaks.
- D. Listen for any audible air leaks, unusual noises, fuel pump buzz (a noisy pump may not be an indication of poor operating condition), engine rattles or knocks.
- E. Check valve timing and adjustment.

PARTS & ASSEMBLIES FOR FUEL INJECTION

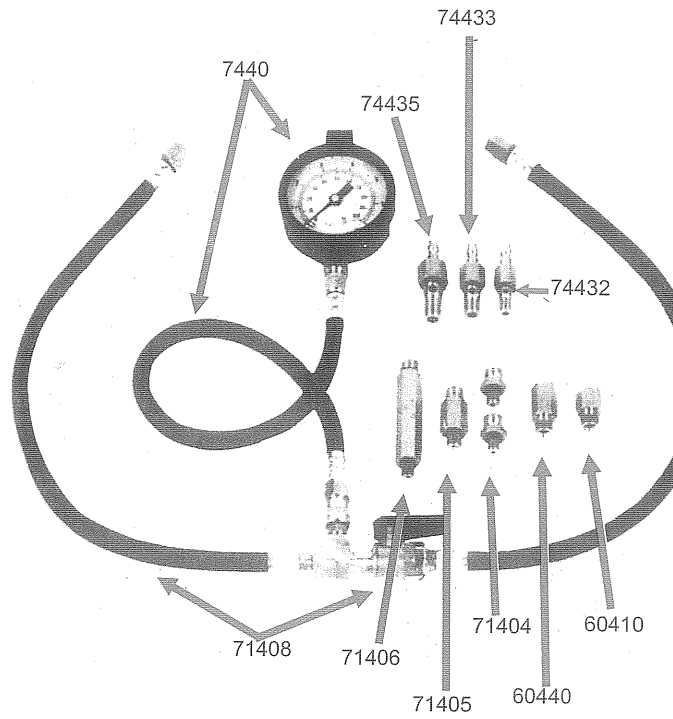
NO.	DESCRIPTION
34021	2" Cut Hose—1/4" I.D.
35031	3" Cut Hose—5/16" I.D.
**36032	3" Cut Hose—3/8" I.D.
41311	Quick Coupler Plug with 1/4" Hose Barb
**41576	Bent Tubing with 3/8 inverted flare nut
**60236	Adapter—Female M16x1.5 one end and 3/8 tube fitting other end
**60238	Adapter—Female M14x1.5 one end and 3/8 tube fitting other end
**60239	Adapter—Union—5/8—18 and M16x1.5
*60410	Adapter—M8x1.0 Female and M12x1.5 Male
*60440	Adapter—M10x1.0 Female and M12x1.5 Male
71305	Volvo adapter, 14 mm LH-Jetronic
71308	Adapter for Geo Storm and Isuzu (Isuzu I-Tec Systems)
71313	Adapter—Ford EFI
71314	Adapter—Ford CFI
71317	Manifold with quick coupler plug
71318	Adapter for Standard Schrader Valve
71319	Adapter for small Schrader Valve (Ford)
*71404	Adapter M8x1.0 Male—M12x1.5 Male with O' ring
*71405	Adapter M10x1.0 Male—M12x1.5 Male with O' ring
*71406	Adapter M8x1.0 Male—M12x1.5 Male with O' ring
*71408	Connecting Hose and Valve Assembly for Bosch CIS
**72304	Straight tubing with 3/8 inverted flare nut
**72305	Bent tubing with 3/8 invert flare nut & M16x1.5 nut & O' ring
**72306	Adapter—Male 16x1.5 and 3/8 tube fitting, plus O' ring
**72308	Connecting Hose Assembly for GM TBI
*72309	Adapter—Male M14x1.5 and 3/8 tube fitting, plus O' ring
74431	Adapter—Banjo Bolt M6x1.0 with O' ring
*74432	Adapter—Banjo Bolt M8x1.0 with nylotron washer
*74433	Adapter—Banjo Bolt M10x1.0 with nylotron washer
*74434	Adapter—Banjo Bolt M12x1.25 with nylotron washer
*74435	Adapter—Banjo Bolt M12x1.5 with nylotron washer
74438	Gauge (3 1/2") 4 ft. Hose, Valve; 6 ft. Tubing assembly (100 PSI)
74440	Gauge (2 1/2"), and 16" hose assembly only, no valve, no tubing (100 PSI)
74446	Relief valve, & Tubing assembly
<i>(The following parts are not illustrated)</i>	
12203	Connecting Adapter for Quick Coupler & Hose
20602	Gauge—60 lbs. (2 1/2")
41152	Hose Clamp
41304	Quick Coupler with 1/8 FNPT
41312	Quick Coupler Plug 1/8 MNPT
42440	Instruction Book
52005	Blow Molded Plastic Box
74437	Repair Parts Kit
74439	Gauge—100 lbs. (2 1/2") 16" hose, valve, 6' tubing assembly
74441	Gauge—60 lbs. (2 1/2") 16" hose, valve, 6' tubing assembly
74442	Gauge—60 lbs. (2 1/2") with 16" hose, no valve, no tubing
74443	Upgrade Kit for GM-TBI—All Adapters & Connecting Hoses
74444	Upgrade Kit For Bosch CIS—All Adapters & Connecting Hoses
74445	Upgrade Kit for All Systems except GM TBI and Bosch CIS

*For Bosch CIS System **For GM TBI System

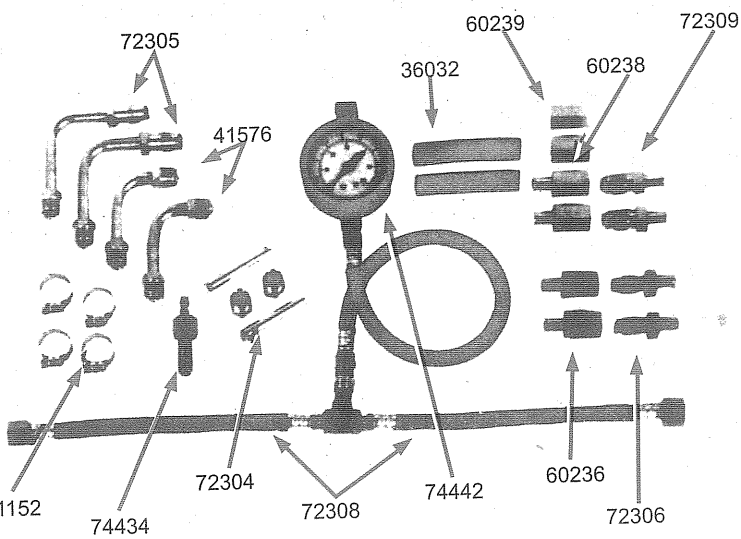
DELUXE FUEL INJECTION SET



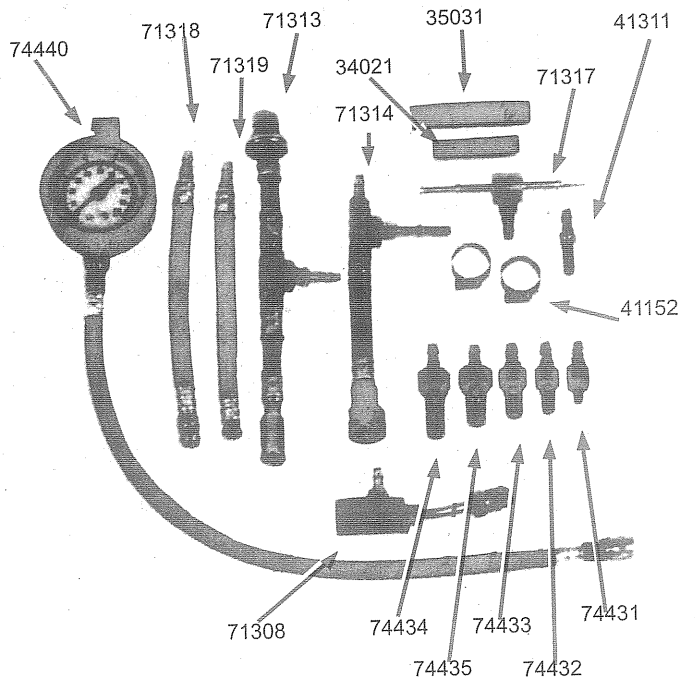
BOSCH CIS TESTER



GM TBI TESTER



TESTER FOR ALL OTHER SYSTEMS



TYPICAL FUEL INJECTION PRESSURE TEST (For Bosch CIS & GM TBI, see additional instructions)

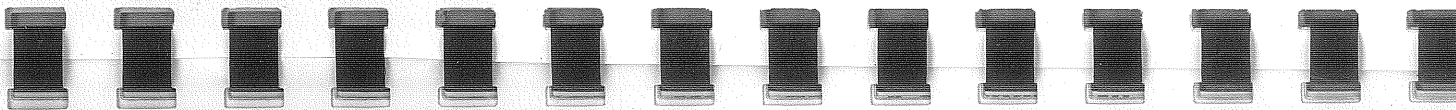
All pressure tests should be made at idle on the high pressure side of the system.

1. With engine off, locate fuel pressure port (Schrader Valve) and attach fuel pressure gauge. If no Schrader Valve is provided and system must be opened, residual pressure must be released before fittings are loosened to keep gasoline from spraying all over, possibly causing eye injury or a fire. See our "Fuel Pressure Release" chart on pages 10-11 and follow instructions. Connect tester using the correct adapter and access point. Always wrap a shop towel around fitting before loosening.
2. If the adapter you use is a banjo bolt adapter, ours is designed to use with standard banjos. If a car manufacturer uses a non-standard banjo, more than one washer may be 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. With gauge connected or teed into system using proper adapters, reactivate fuel pump, start the engine and check for leaks. If no leaks are detected, observe gauge. Pressure should rise to slightly above operating pressure and then stabilize at operating pressure (as per manufacturer's specifications). See our "Adapter Application and Specification" chart on page 12.
4. Start engine. If an adjustable fuel pressure regulator is used, pressure should be maintained during running. If a compensating fuel pressure regulator is used, pressure should drop approximately 8-9 PSI, depending on manifold vacuum.

Observe rapid increase in dead-end pressure.

CAUTION: Pressure could exceed 75 PSI and may blow any loose fittings or defective lines. Observe condition of system before this test.

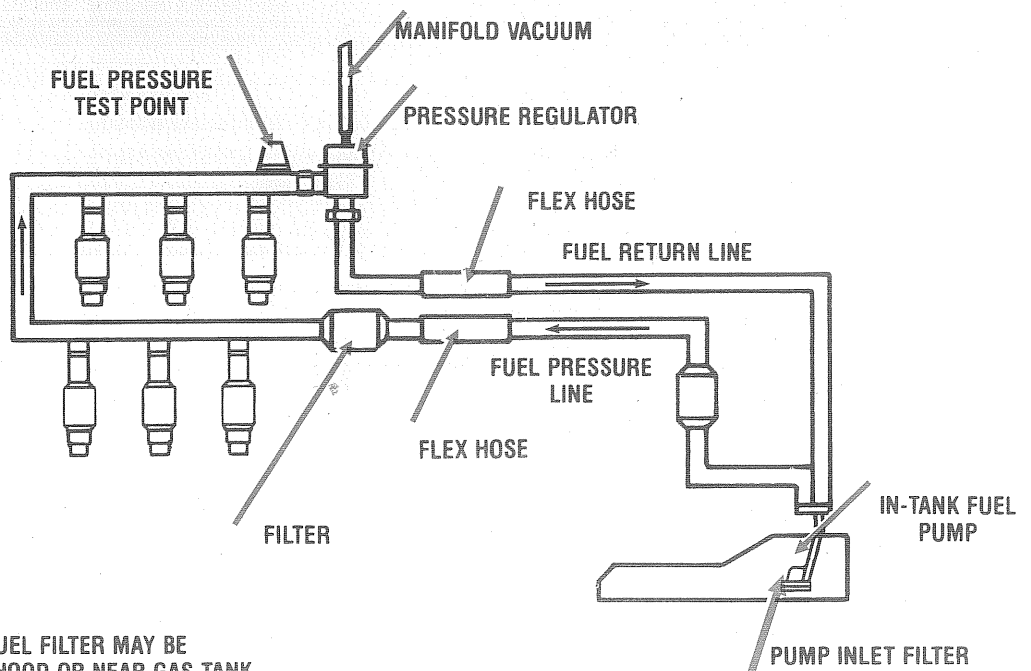
6. If pressures are acceptable, some manufacturers also require a flow test. If so, at this point open the fuel system into a graduated plastic container and observe flow rate (example: one pint/15 seconds). Close system.
7. Turn key off and observe residual pressure. Some manufacturers prescribe a minimum holding time.
8. In conjunction with an injector pulse tester, turn key on, observe pressure, pulse one injector, observe pressure drop, turn key off, move tester to next injector, turn key on, observe pressure, pulse injector, observe drop, turn key off, continue with remaining injectors.
CAUTION: Do not repeat this test more than manufacturer's recommendations. Flooding of engine may occur.
9. Deactivate fuel pump and relieve fuel system if necessary. With key off, put bleed-off tubing in a fuel can and press bleed-off valve. If your tester has no bleed-off valve assembly, wrap rags around connections and release slowly. A bleed-off assembly can be purchased from your tool man.
10. Remove tester and reconnect all lines.
11. Start engine and check for leaks.



5. Locate a flexible hose on the return side and gently squeeze off return flow briefly. Never squeeze a steel braided hose. **CAUTION:** Some pump designs can be damaged by this test and test should not be performed unless recommended by manufacturer.

12. Remove fuel from all hoses. If fuel remains in gauge hose assembly, connect the smallest banjo bolt adapter into the quick coupler over a fuel container. Hold gauge above hose and fuel will flow into the fuel can.

TYPICAL MULTI-PORT FUEL INJECTION SYSTEM WITH SCHRADER VALVE



PROCEDURE TO RELIEVE FUEL SYSTEM PRESSURE

1. Do not smoke.
2. Wear a pair of safety glasses.
3. Keep a dry chemical (Class B) fire extinguisher near you.
4. Release gas cap with ignition off.
5. Disable fuel pump as per our Fuel Pressure Chart below.
6. On some vehicles, a satisfactory method of disabling the fuel pump(s) is to remove the fuel pump fuse(s). But on other vehicles, removing the fuse(s) disables the fuel injectors or ignition system, so another disabling method must be used. Refer to our chart below.
7. Some vehicles not specifically mentioned in our "Fuel Pressure Release" chart may have two fuel pumps. Make sure both are disabled.
8. Turn the ignition key on and start the engine.
9. Run the engine until it stalls.
10. Try to restart the engine for 3–5 seconds. For cars with inertia switch pressure relief, engage starter 15 seconds to relieve fuel pressure.
11. Turn ignition key off.



FUEL PRESSURE RELEASE

Unplug or disconnect at fuel pump(s)

Acura	Geo	Nissan/Datsun	Subaru
Alfa Romeo	Honda	Peugeot	Suzuki
AMC	Hyundai	Porsche*	Toyota
Chrysler	Isuzu	Renault	Triumph
Daihatsu	Jaguar	Saab	Volkswagen*
Eagle	Jeep	Sterling	Volvo*
Fiat	Mitsubishi		

*some models may have two fuel pumps, in tank and outside. Unplug both.

Disable in other ways:

Audi

Coupe & V8 Quattro: unplug fuel pump connector. *All others:* remove fuel pump relay.

BMW

Through 1990: Disconnect negative terminal of fuel pump.
1991: Unplug fuel pump connector.

Ford

Cars, vans, and utility vehicles *except Explorer:* Disconnect inertia switch.

Explorer: Unplug fuel pump connector.

Some Ford products have two fuel pumps. It is important that both fuel pumps are disabled.

GM

All except below: unplug fuel pump connector.

(a) *1975–80 Cadillac:* Disconnect one fuel pump in gas tank and second one on chassis, left front of tank.

(b) *1986–89 Corvette:* Remove fuel pump fuse if one fuel pump. If two fuel pumps, remove the correct 10 amp. fuse in both the main and auxiliary fuse blocks.

Mazda

MPV, MX-6, 626, RX7, 323, 929, & Navajo: Unplug fuel pump connector.

B2600, MX5, & Miata: Disconnect circuit opening relay connector.

Mercedes-Benz

Disconnect negative terminal of fuel pump connector.

ADAPTER APPLICATION & SPECIFICATION CHART

To the best of our knowledge, the following data is accurate, but if in doubt, consult the shop manual for the car. Some models may take another adapter and the connection may be different. In very limited cases, there may not be an adapter for a particular model or year.

Maker	Model	F.I. System	Adapter	Adapter Access	Operating Pressure PSI	
AMC	Alliance & Encore 1983-4 Calif.	Bosch L-Jetronic AFC	71317	A	36	
	All Other Cars	AMC TBI & Renix	71317	B	14-15	
ACURA	All	MPFI	74431 or 74434	H	35-41	
ALFA-ROMEO	All	Bosch L-Jetronic AFC	71317	A	36	
AUDI	1975-78 All	Bosch CIS	see note J	J	35-41	
	1979-all but Calif. 5000	Bosch CIS	see note J	J	35-41	
	1980-4000 4 cyl. & Fed, 5000	Bosch CIS	see note J	J	35-41	
	All other years and models	Bosch CIS	see note J	J	49-55	
BMW	320i	Bosch K-Jetronic	see note J	J	39-45	
	All with Bosch L-Jetronic	Bosch L-Jetronic	71317	A	30	
CHRYSLER	1981-83 Imperial	TBI	71317	B	34	
	1983-85 Other than Imperial with TBI	TBI	71317	B	36	
	1986-90. All cars & light Dodge trucks with TBI	TBI	71317	B	15	
	1991. All except early convertibles	TBI	71317	B	39	
	1991. Early convertibles	TBI	71317	B	15	
	1984-91 2.2L, 2.5L, 4 cyl. turbo	Multi-Port	71318	C	55	
	1985-91 Horizon, Omni, Laser, Lancer, LeBaron—4 cyl. w/o turbo	Multi-Port	71318	C	40	
	1987-91. Other cars, 3.0L	Mitsubishi MPFI	71317	A	48	
	1987-91. Other cars, 3.3 & 3.8L	Chrysler MPFI	71318	C	45-53	
	1.5L Colt & Summit*	MPFI Import	74434	A	40	
	1.6L Colt & Summit, non Turbo	MPFI Import	*71306	E	40	
	1.6L Colt & Summit, Turbo	ECl Import	*71321	E	40	
	DAEWOO	1.5L Colt, Vista, Wagon & Raider	Mitsubishi MPFI Import	74434	A	35-38
		1.8L Colt, Vista, Wagon & Raider	Mitsubishi MPFI Import	*71306	E	35-38
2.0L Colt, Vista, Wagon & Raider		Mitsubishi MPFI Import	74434	A	35-38	
2.6L Colt, Vista, Wagon & Raider		Mitsubishi MPFI Import	*71320	E	35-38	
3.0L Colt, Vista, Wagon & Raider		Mitsubishi MPFI Import	74434	A	35-38	
Conquest		ECl Import	*71321	E	35-38	
Stealth		Mitsubishi MPFI Import	*71321	E	38	
*not in kit—order special						
DAIHATSU		All	EFI	74434 or 71317	A	33-40
DODGE		Medallion	Bosch L-Jetronic AFC	71317	A	30
	Monaco & Premier 2.5L	TBI	71317	A	14-15	
	Monaco & Premier 3.0L	MPFI	71317	A	35-38	
	Talon 1.8L & 2.0L	Mitsubishi MPFI	*71321	E	38	
	Talon 2.0L Turbo	Mitsubishi MPFI	*71321	E	27	
	*not in kit—order special					
FIAT	All	Bosch L-Jetronic AFC	71317	A	30	
	FORD	1980-91 Large Cars—High Press.	CFI (EFI)	71313 or 71319	F	35-41
		1985-91 Small Cars—Low Press.	CFI	71314	G	14.5
		1983-91—All MPFI	MPFI	71319	D	35-41
		1987-91—All Imports	Bosch L-Jetronic	71317	A	30
GM	1984-92—All MPFI except below	GM Multi-Port	71318	C	36-42	
	1988 Nova	Bosch L-Jetronic AFC	74434	I	38-44	
	Sprint Turbo	Bosch L-Jetronic AFC	71317	A	25-33	
	Spectrum	Isuzu I-Tec	71308	A	35.6	
	1982-84—two injectors in some Chevrolet & Pontiac	GM-TBI	see note K	K	20	
	1990-92—Lumina Single Injector	GM-TBI	see note K	K	26-32	
1982-92—All other cars single injection	GM-TBI	see note K	K	9-13		
HONDA	1.0L Metro	Suzuki TBI	74431	H	25	
	1.6L	Bosch L-Jetronic AFC	71317	A	40	
	Prizm, Storm	Isuzu I-TEC	74432 or 71308	I	40	
	Tracker	Suzuki TBI	74431	H	38	

ADAPTER APPLICATION & SPECIFICATION CHART

Maker	Model	F.I. System	Adapter	Adapter Access	Operating Pressure PSI	
HONDA & HYUNDAI	All	MPFI	74431 or 74434	H	35-41	
	SUZUKI	1.6L and 2.6L	Isuzu I-TEC	71308	A	40-42
		2.0L	Isuzu I-TEC	71308	A	33-35
		2.3L	Isuzu I-TEC	71308	A	26-28
		2.8L & 3.1L	GM-TBI	see note K	K	12-15
JEEP	1985-90 1.4, 1.7 & 2.5L	TBI	71317	B	14-15	
	1987-90 4.0 & 4.2L	MPFI	71318	C	31-39	
	1991-92 All—2.5L, 4.0 & 4.2L	MPFI	71318	C	53	
JAGUAR	All	All Systems	71317	A	28-30	
MAZDA	B2600	Bosch L-Jetronic AFC	74434 or 71317	A	28-37	
	MPV, Miata, Protege & 323	Bosch L-Jetronic AFC	74434 or 71317	A	38-46	
	MX-6, RX-7, 626	Bosch L-Jetronic AFC	74434 or 71317	A	27-33	
	929	Bosch L-Jetronic AFC	74434 or 71317	A	31-38	
	Navajo	Ford MPFI	71313 or 71319	D	35-41	
	Mercedes Benz	All	Bosch CIS	see note J	J	44-59
MITSUBISHI	Starion	Mitsubishi ECI	*71320	A	35-38	
	Mirage Turbo 1.6L & Montero	Mitsubishi ECI	*71306	A	35-38	
	Van & Wagon	Mitsubishi ECI	74434	A	35-38	
	Mirage Turbo 1.5L & all others	Mitsubishi ECI	*71321	A	35-38	
	* Not in kit—order special					
NISSAN/DATSUN	All TBI	Nissan TBI	71317	A	35	
	200SX, 1.8L, 2.0L, 3.0L	Bosch L-Jetronic AFC	71317	A	30	
	All others	Bosch L-Jetronic AFC	71317	A	36	
PEUGEOT	2.0L	Bosch CIS	see note J	J	49-55	
	2.2L	Bosch L-Jetronic AFC	71317	A	49-55	
	V6	Bosch LH-Jetronic	71317	A	35-41	
		AFC				
PORSCHÉ	All with Bosch L-Jetronic	Bosch L-Jetronic	71317	A	35-41	
	1975-79 plus 1975-77 Turbo	Bosch CIS	see note J	J	39-45	
	1980-83 & 1978-9 Turbo plus 924	Bosch CIS	see note J	J	49-55	
	928	Bosch CIS	see note J	J	41-46	
RENAULT	All	Bosch L-Jetronic AFC	71317	A	35-41	
SAAB	16 valve engine	Bosch L-Jetronic AFC	74435	A	35-41	
	8 valve engine	Bosch CIS	see note J	J	49-55	
STERLING	All	MPFI	74431 or 74434	H	35-41	
SUBARU	All with TBI	Subaru Single Point	71317	A	20-24	
	All with Bosch L-Jetronic	Bosch L-Jetronic AFC	71317	A	35-41	
SUZUKI	16 valve engine	Suzuki MPFI	74431	H	25	
	All others	Suzuki TBI	74431	H	38	
TOYOTA	All	Bosch L-Jetronic AFC	74432	I	35-41	
TRIUMPH	All	Lucas Bosch AFC	71317	A	35-41	
VW	All with Bosch CIS	Bosch CIS	see note J	J	49-55	
	All with Bosch L-Jetronic	Bosch L-Jetronic AFC	71317	A	35-41	
VOLVO	1982-88 Bosch LH-Jetronic AFC	Bosch LH-Jetronic AFC	71317 or 71305	A	35-36	
	1989 and up Bosch LH-Jetronic AFC	Bosch LH-Jetronic AFC	71317 or 71305	A	36-42	
	All with Bosch CIS-4 cyl.	Bosch CIS	see note J	J	51-57	
	All with Bosch CIS-6 cyl.	Bosch CIS	see note J	J	54-59	
	* Not in kit, order special					

- A — Fuel Line to (Fuel) Rail
- B — Fuel Line to TBI
- C — Fuel Rail—Standard Schrader Flex Adapter
- D — Fuel Rail—Small Schrader Flex Adapter (Ford)
- E — Fuel Rail
- F — CFI (TBI) assembly

- G — Fuel Line to CFI
- H — Fuel Filter
- I — Cold Start Injector Pipe Port
- J — See CIS diagram & instructions, pp. 18-19
- K — See GM TBI diagram & instructions, pp. 16-17

ADDITIONAL INSTRUCTIONS FOR TESTING GM TBI

1. Relieve fuel system pressure (see pp. 10–11).
2. Remove the air cleaner assembly.
3. Temporarily plug the Therman vacuum port on the throttle body.
4. Refer to our GM TBI Adapter Chart below, and using the adapters we supply, install the tester in line between the fuel filter and throttle body. If longer pieces of $\frac{3}{8}$ " hose are needed, cut from $\frac{3}{8}$ " fuel line. Use hose clamps on hose.
5. If steel tubing is removed, use two wrenches to prevent damage.
6. On some cars, it is easier to put the car on a lift and test from underneath.
7. On some cars with GM TBI systems, it is hard to install adapters. With the adapters and tubing furnished, many combinations can be made to help you.
8. Reactivate fuel pump, start the engine and check for leaks.
9. When fuel pressure has stabilized after a minute or so, gauge should read 9–13 PSI (62–90 kPa), (.6–.9 bar) and (.63–.91 Kg/cm²).
10. Deactivate fuel pump, and relieve fuel system pressure. With key off, put bleed-off tubing in a fuel can and press bleed-off valve. If your tester has no bleed-off valve assembly, wrap rags around connections and release slowly. A bleed-off assembly can be purchased from your tool man.
11. Remove tester and reconnect all lines.
12. Start engine and check for leaks.
13. Remove fuel from all hoses. If fuel remains in gauge hose assembly, connect the smallest banjo bolt adapter into the quick coupler over a fuel container. Hold gauge above hose and fuel will flow into the fuel can.
14. Remove the plug from the Therman and replace air cleaner.

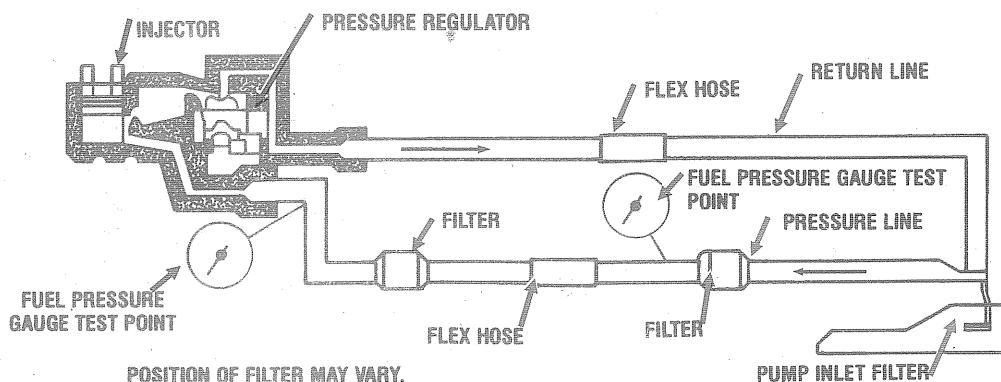
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GM TBI ADAPTER APPLICATIONS CHART K

Adapter #	Description	Applications
72308	GM TBI Hose assembly	All except with 74434
60236 & 72306	M16 × 1.5– $\frac{3}{8}$ " Tube Fitting (silver colored with notch)	4.3L V-6
60238 & 72309	M14 × 1.5– $\frac{3}{8}$ " Tube Fitting (brass colored with notch)	2.8L "X" bodies & 3.8L "A" bodies
60239	M16 × 1.5– $\frac{5}{8}$ × 18 Union	1.8L & 2.0L "J" bodies
72304	Straight tubing	1.8L engines
72305	Right angle tubing M16 × 1.5– $\frac{3}{8}$ Inverted Flare	J2000/6000 Pontiac
74434	M12 × 1.25 Banjo bolt adapter	Vehicles w/Banjo

See pages 4–7 for illustration of adapters

TYPICAL TBI FUEL INJECTION SYSTEM



ADDITIONAL INSTRUCTIONS FOR TESTING BOSCH CIS

Four pressure tests can be made with this tester:

- A. Cold Control Pressure—engine cold, valve open
- B. Warm Control Pressure—engine warm, valve open
- C. Primary Pressure—engine cold or warm, valve closed (closed valve eliminates control pressure)
- D. Rest Pressure—engine warm, valve open

The CIS pressures shown in this book are for the warm control pressures. For pressures for tests A & C, consult the vehicle service manual, a Mitchell Fuel Injection manual, or Robert Bosch Service Guide booklet for Fuel Injection.

To make tests:

1. For test "A" (above), the engine should be cold, standing several hours or overnight.
2. Relieve fuel system pressure (see pp. 10–11).
3. Make sure fuel filter is not clogged. Replace if doubtful.
4. Clean dirt off the fuel distributor top.
5. Referring to the typical CIS hookup diagram, hook up the tester between the fuel distributor and the control pressure regulator. The hose without the flow control valve should be connected to the center of the fuel distributor. The hose with the valve should be connected to the hose removed from the fuel distributor or connected directly to the control pressure regulator.
 - (a) CAUTION: hand tighten any adapters with O' rings to avoid damage to O' rings.
 - (b) In a few cases, to get the right combination of threads to connect, the adapters may have to be piggy-backed.

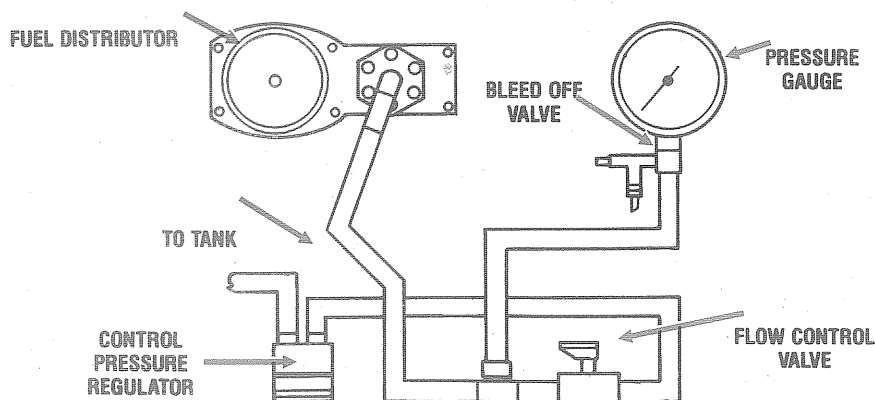
6. Reactivate fuel pump, start the engine and check for leaks.
7. When the tester is connected, remove the air from the system.
 - (a) If your tester has a release valve under the gauge, wrap a rag over the valve and depress button until the air is released. Do not do this over a hot engine or manifold.
 - (b) If your tester has a bleed-off valve, put the end of the bleed-off tubing in a fuel container and with fuel pump operating, bleed until air is removed.
 - (c) If your tester has none of the above, position the gauge downward as far as the hoses will allow with the gauge below the hoses and control valve. Operate fuel pump with engine off. Open and close the control valve at least 5 times with the valve in the off and on position at least 12 seconds.
8. When pressure stabilizes, read the gauge. If the Cold Control Pressure is not correct, the warm-up regulator may be at fault.
9. If pressure is okay, run other pressure checks.
 - (a) Warm Control Pressure and Rest Pressure must be measured with engine warm.
 - (b) Primary Pressure can be measured with engine cold or warm.
10. (a) If pressures are not within the normal range on the control Pressure Warm test, try adjusting the fuel pressure regulator. If it cannot be adjusted to normal pressures, replace it unless the problem is as below (b).
 - (b) If the pressure is low with engine running and at idle, check to see if the voltage is at least 11.5V at the warm-up regulator plug contacts. If full voltage is available at the plug, then the warm-up regulator may need replacing.

11. If the pressure is too low, test the fuel pump volume. Also, there may be a blockage in the supply line or leakage in the return line. If the system has none of these, the fuel system pressure needs adjustment. Consult the factory manual or fuel injection manual for the procedure.
12. If Rest Pressure drops too quickly, check for leaks at O' rings and fuel line connections. If no external leaks, check for a leaking cold start valve or fuel injectors. If still no leaks there, leakage may be at the fuel pump check valve or at the O' ring on the relief valve in the fuel distributor. Repair or replace.
13. If no problems can be found in the fuel injection system through pressure testing, fuel pump should be checked. For this, your tester should have a bleed-off valve and tubing. If you do not have one, it can be purchased from your tool supplier. With gauge hooked up to pressure test, put bleed-off tube into a fuel

container of at least 2 quarts or 2 liters. Fuel flow in 30 seconds should be 1.5–2.0 pints or $\frac{3}{4}$ –1 liter. Turbo cars may have a volume of 20–25% more than non-turbo.

14. Deactivate fuel pump and relieve fuel system pressure. With key off, put bleed-off tubing in a fuel can and press bleed-off valve. If your tester has no bleed-off valve assembly, wrap rags around connections and release slowly. A bleed-off assembly can be purchased from your tool man.
15. Remove tester and reconnect all lines.
16. Start engine and check for leaks.
17. Remove fuel from all hoses. If fuel remains in gauge hose assembly, connect the smallest banjo bolt adapter into the quick coupler over a fuel container. Hold gauge above hose and fuel will flow into the fuel can.

TYPICAL C.I.S. PRESSURE TESTING FUEL INJECTION HOOKUP



FUEL PRESSURE DIAGNOSIS

Fuel Pressure problems generally fall into two categories: higher than normal and lower than normal operating pressures. The fuel supply system is a closed loop system. Fuel is pumped from the tank to the pressure regulator and injectors, and excess fuel is returned to the tank. The fuel pressure regulator is the dividing point between the supply side and the return side. A higher than normal pressure is generally caused by a malfunction in the return side, and lower than normal pressure is generally caused by a problem in the supply side.

Higher than normal pressures can usually be attributed to faults such as:

- defective fuel pressure regulator
- restriction (bend or kink) in return line
- flexible coupling at tank
- excessive tank pressure caused by a poor vent system

Lower than normal pressures can usually be attributed to faults such as:

- clogged fuel filter
- restriction (bend or kink) in supply line
- defective fuel pump
- defective pressure regulator
- flexible coupling at tank
- clogged fuel filter sock in tank
- low pressure in tank (vacuum) caused by improper venting

Restrictions are usually coupled with a low flow rate, whereas a defective pump or pressure regulator could maintain proper flow rate but not pressure. If any of these conditions exist, component isolation is generally the fastest route of diagnosis (Example: whenever possible, disconnect lines before and after component or line. Check pressure and flow before and after component or line).

TRUBLE SHOOTING MULTI-PORT & TBI SYSTEMS

Low Fuel Pressure

Check fuel filter and replace if needed.

If filter questionable, check pressure between fuel supply and filter. If pressure normal, replace filter.

Check fuel lines for kink or restriction

Check fuel pump

If filter replaced and pressure still low

Gently squeeze rubber return line hose. If pressure increases, adjust or replace fuel regulator.

No pressure increase plugged in-tank fuel filter sock or in tank fuel pump.

For troubleshooting C.I.S., see page 10

High Fuel Pressure

Remove return hose at rear of vehicle or other safe place.

Attach a long enough substitute fuel line hose to reach a 2 gallon or larger fuel can.

Start engine. If pressure drops to normal, return line is plugged or restricted.

If no change, the fuel pressure regulator is bad.

PRESSURE CONVERSION CHART

Convert	To	Multiply By
	kPa	6.8946
	bar	.0689
	kg/cm ²	.0703
	PSI	.145
	bar	.01
	kg/cm ²	.0102
	PSI	14.504
	kPa	100
	kg/cm ²	1.02
cm ²	PSI	14.22
cm ²	kPa	98.074
cm ²	bar	.9807

METRIC CONVERSION CHART

P.S.I.	Bar	k/Pa	kg/cm ²
0.5	0.034	3.44	0.0352
1	0.069	6.89	0.0703
1.25	0.086	8.62	0.0879
2	0.138	13.79	0.1406
5	0.345	34.48	0.3515
10	0.699	69.85	0.7030
15	1.034	103.43	1.0545
20	1.379	137.90	1.4060
25	1.724	172.38	1.7500
30	2.069	106.85	2.1090
35	2.143	241.33	2.4605
40	2.758	275.80	2.8120
50	3.448	344.75	3.5150
60	4.137	413.70	4.2180
70	4.827	482.65	4.9210
80	5.516	551.60	5.6240
90	6.206	620.55	6.3270
100	6.895	689.50	7.0300