SECTION 11

Fuel Delivery Systems

Contents

Fuel Delivery Systems

FUEL DELIVERY SYSTEM DIAGNOSTICS

CAUTION: USE CARE TO PREVENT COMBUSTION FROM FUEL SPILLAGE NO SMOKING, OPEN FLAMES OR ANY KIND OF ARCING

DRIVEABILITY SYMPTOM MENU
CRANKS NORMALLY BUT WON'T START
STARTS NORMALLY BUT WON'T RUN (STALLS)
CRANKS NORMALLY BUT SLOW TO START
MISSES UNDER LOAD
HESITATES OR STALLS ON ACCELERATION
BACKFIRE (INDUCTION OR EXHAUST)
LACK OF POWER
SURGES AT STEADY SPEED
GAS SMELL

Pre-checks

- Verify engine at operating temperature, transmission in NEUTRAL or PARK and brakes applied.
- Inspect all hoses, fuel lines and fuel tanks for deformities, kinks and leaks.
- Check fuel pump and fuel line connections for fuel leaks.
- Check fuel pressure regulator CFI/EFI area for fuel leaks.
- Check for adequate fuel supply in fuel tank.

NOTE: For additional information, refer to Group 24 in the Car or Truck Shop Manual.

Mechanical Fuel Pump Systems

FDM

FUEL PRESSURE AND VOLUME SPECIFICATIONS TABLE

ENGINE	PRESSURE (psi) ① ④	MIN. VOLUME FLOW ②	NO START ENGINE CONDITION ONLY: 10 SECOND CRANKING SPECS. FOR MIN. PRES. (psi) & VOL. (pt) ① ③	
2.0L	5.0-7.0	1 pt. in 25 sec.	5.0	0.25
5.8L	6.0-8.0	1 pt. in 20 sec.	6.0	0.3

TEST STEP	RESULT ▶	ACTION TO TAKE
FDM1 CHECK FUEL PRESSURE		
• Refer to footnotes 1 and 4. • Install fuel pressure gauge at the carburetor. • Reconnect fuel line. • Start and run engine at 1500 rpm for 30 seconds. • With engine at idle, read the fuel pressure gauge. **NOTE: If you are here for a no start, just crank the engine and read the fuel pressure gauge.** • Refer to specification table. • Is fuel pressure within specification?	Yes ▶ No ▶	GO to FDM2 . GO to FDM3 .

FOOTNOTES

① **Close off the fuel return line, if so equipped. Fuel return lines are found at the fuel pump fuel filter, carburetor or on the fuel flow sensor on vehicles equipped with tripminder.**

② **Inside diameter of the smallest passage in the test equipment flow circuit must not be smaller than 0.220 inch.**

③ **A steady 10 seconds of cranking time required with a fully charged battery.**

④ **Before taking a pressure reading, operate the engine and purge the fuel system into the fuel pump tester container for approximately five seconds.**

Mechanical Fuel Pump Systems

FDM

TEST STEP	RESULT ▶	ACTION TO TAKE
FDM2 CHECK FUEL VOLUME • Disconnect primary side of ignition coil. • Disconnect fuel line at the carburetor. • Slide a flexible fuel resistant hose onto the disconnected fuel line and hold it into a clear plastic fuel resistant container. • Refer to footnotes 2 and 3. • With a remote starter button, crank the engine. • Refer to Specification Table. • Is the volume to specification? • Save fuel in container for FDM6.	Yes ▶ No ▶	REPLACE fuel filter and, or SERVICE carburetor. RECONNECT ignition coil. Go to **FDM6** .
FDM3 CHECK AUXILIARY FUEL SUPPLY • Use an auxiliary fuel container and route the flexible fuel line under the fender or bumper to the inlet side of the fuel pump. • Repeat Test FDM1 and FDM2. • Refer to Specification Table. • Are fuel pressure and fuel volume within specifications?	Yes ▶ No ▶	RECONNECT the fuel line at the fuel pump. GO to **FDM4** . REPLACE fuel pump and fuel hose.
FDM4 CHECK FUEL LINE • Disconnect the fuel line at the tank. • Connect auxiliary fuel container to the fuel line. • Repeat Test FDM1 and FDM2. • Refer to the Specification Table. • Are fuel pressure and fuel volume within specifications?	Yes ▶ No ▶	GO to **FDM5** . BLOW OUT fuel line. SERVICE fuel line. REPLACE flexible hoses.

Mechanical Fuel Pump Systems

FDM

TEST STEP	RESULT ▶	ACTION TO TAKE
FDM5 CHECK FUEL TANK SENDER UNIT		
• Drain fuel tank, but not completely. • Disconnect fuel return line if applicable. • Disconnect fuel sender unit. • Disconnect evaporative system from fuel tank. • Lower the fuel tank and remove sender unit. • Inspect sender unit for being bent, blocked or rusted through. • Is fuel sender unit defective?	Yes ▶ No ▶	REPLACE the fuel sender unit. GO to **FDM6** .
FDM6 CHECK FUEL CONTAMINATION		
• Check remaining fuel in the tank for contamination. • Check the fuel sample from test FDM2 for contamination. • Is the fuel contaminated?	Yes ▶ No ▶	DUMP/FLUSH the fuel tank. BLOW OUT the fuel lines. REPLACE fuel filters. CLEAN out carburetor. Problem may be elsewhere. GO to Section 2.

Fuel System Diagnosis — Electric Fuel Pumps

VEHICLE APPLICATION

Ranger 2.3L EFI & 2.9L EFI.

F-Series 4.9L EFI & 5.0L EFI.

E-Series 4.9L EFI & 5.0L EFI.

Bronco 4.9L EFI & 5.0L EFI.

Bronco II 2.9L EFI.

DESCRIPTION

The electric fuel pump system used on the above Electronic Fuel Injection (EFI) engines consists of two fuel pumps: a low-pressure boost pump located in the fuel tank, and a high-pressure fuel pump mounted on the frame rail. There is an in-line reservoir to maintain fuel at the high-pressure pump inlet, during extreme vehicle maneuvers and steep vehicle attitudes with low tank fill levels.

The low-pressure pump provides pressurized fuel at the inlet of the high-pressure pump to prevent noise and hot fuel problems. The inlet of the low-pressure pump has a nylon filter on it to prevent dirt and other particulates from entering the fuel system. The filter allows the passage of water which may accumulate in the fuel tank. Some vehicles use an external resistor in the low-pressure pump electrical circuit to reduce the operating voltage to 11 volts.

The rail mounted high-pressure fuel pump is capable of supplying 60 liters (16 gallons) or 80 liters (21 gallons) in some applications of fuel per hour at a working pressure of 269 kPa (39 psi). The pump has an internal pressure relief valve to provide overpressure protection in the event the fuel system flow becomes restricted. The relief valve is set to 850 kPa (123 psi). The system fuel pressure is controlled by a pressure regulator mounted on the engine.

When the ignition switch is turned to the ON position, the Electronic Engine Control (EEC) power relay is energized, closing its contacts. Power is provided to both the fuel pump relay and a timing device in the EEC module. The fuel pump runs through the contacts of the fuel pump relay and the inertia switch. If the ignition switch is not turned to the START position, within approximately one second the timing device in the EEC module will open the ground circuit (57 bk) to the fuel pump relay. Opening the ground circuit de-energizes the fuel pump relay (opening its contacts), which de-energizes the fuel pumps. This circuitry pressurizes the fuel system.

When the ignition switch is turned to the START position, the EEC module operates the fuel pump relay to provide fuel while cranking.

After the engine starts, the ignition switch is returned to the ON position, and power to the fuel pump is again supplied through the fuel pump relay. The EEC module senses engine speed and shuts off the fuel pump by opening the ground circuit (57 bk) to the fuel pump relay when the engine stops or the engine speed drops below 120 rpm.

Fuel Injection System Schematic

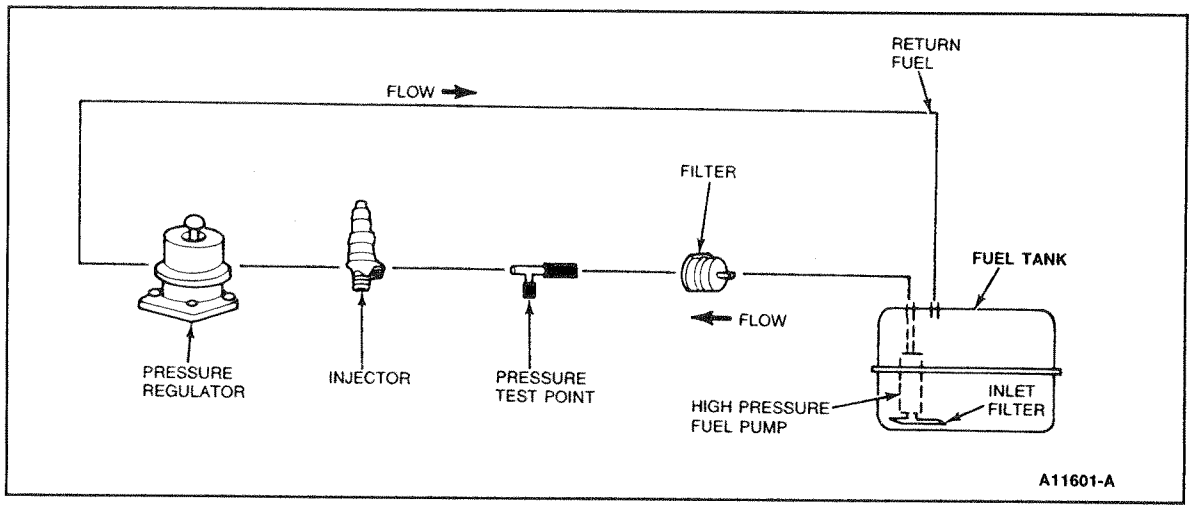


Figure 1A — Typical Car and Aerostar

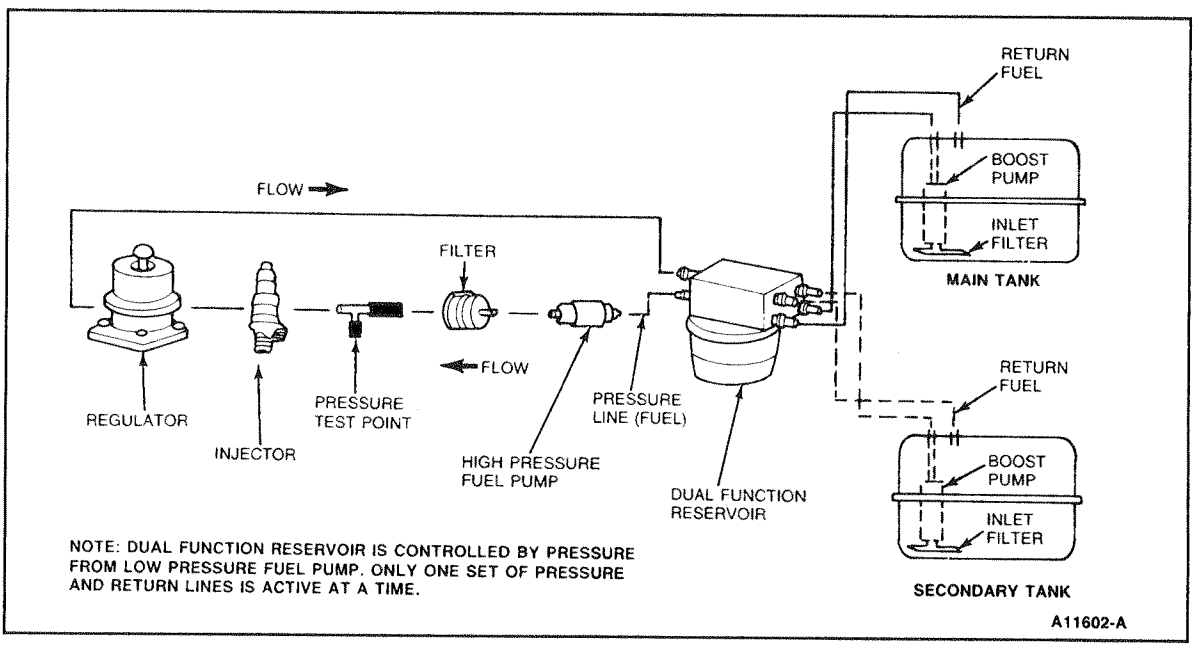


Figure 2 — Typical Truck

Fuel System Diagnosis — Dual Function Reservoir (Dual Tank)

VEHICLE APPLICATION

F-Series 4.9L EFI & 5.0L EFI w/dual fuel tanks.

E-Series 4.9L EFI & 5.0L EFI w/dual fuel tanks.

DESCRIPTION

The fuel tank selector valve on the above vehicles is located in the fuel filter/reservoir mounted on the frame rail. This valve differs from previous units by not being electrically activated. The valve is operated by fuel pressure from the in-tank fuel pumps.

When the tank selector switch is in the FRONT position, power from the fuel pump relay is directed to the front tank fuel pump. When the tank selector switch is moved to the REAR position power from the fuel pump relay is directed to the rear tank fuel pump. Pressurized fuel from the fuel pump moves a diaphragm in the dual function reservoir which is connected to a sliding valve. The sliding valve allows fuel to be drawn from and returned to the correct fuel tank. This design relies on proper operation of the tank mounted low-pressure fuel pumps.

Fuel System Diagnosis — Dual Function Reservoir

FR

The dual function reservoir is not serviceable. The reservoir requires approximately 2.0 psi of pressure from the in-tank pumps to operate properly.

The following procedure should be followed to check the dual function reservoir for proper function:

NOTE:

1. **For the following tests, it is recommended that appropriate sized quick connect fittings be used to connect to reservoir fittings. Damage to the port fittings may result if incorrect fittings are used.**
2. **Regulated air between 3 and 5 psi should be used for testing. Pressure greater than 5 psi will rupture the internal diaphragm.**
3. **All brackets and fuel lines removed during testing must be secured as originally found after testing is completed.**
4. **The reservoir will contain fuel, care should be taken to prevent spillage or combustion.**

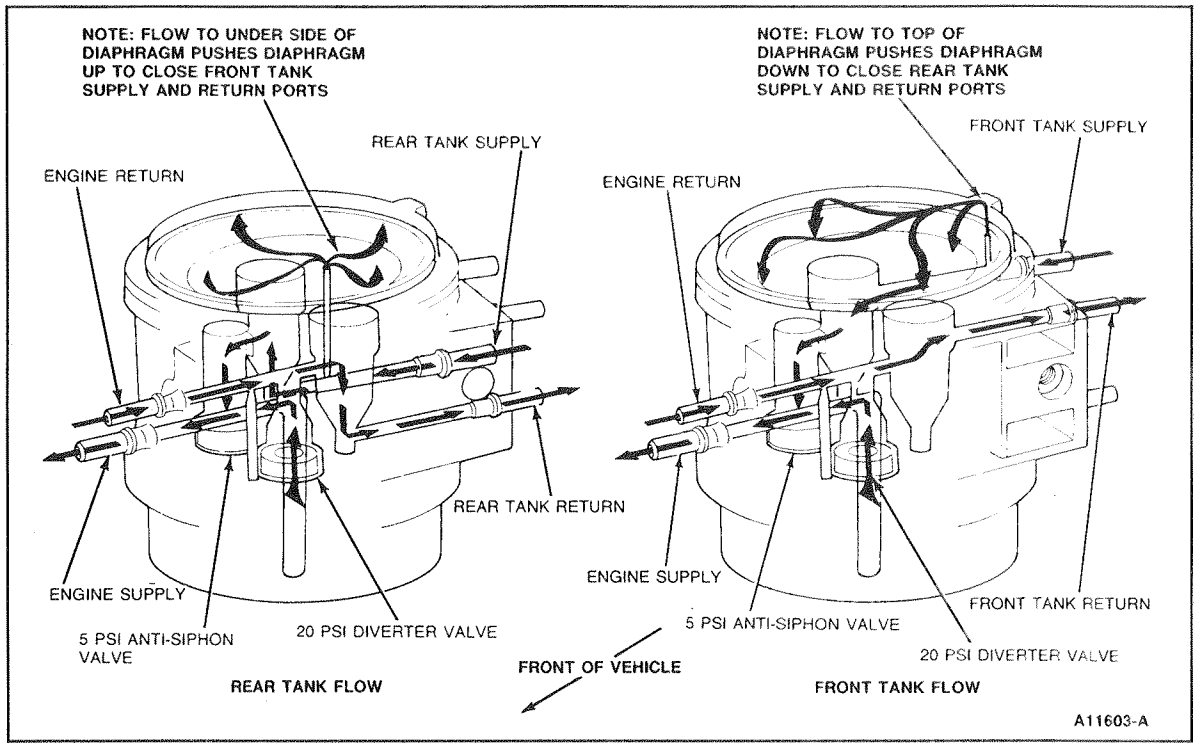
TEST STEP	RESULT ▶	ACTION TO TAKE
FR1 INITIAL CHECK		
• Remove lines from reservoir - note position and routing of lines, avoid fuel spillage. • Apply 3 to 5 psi air to return port (small diameter tube) on engine side of reservoir (only one set of 2 ports). • Is air out of only one port on other side of reservoir?	Yes ▶ No ▶	GO to FR3 . GO to FR2 .
FR2 RESET VALVE		
• Block pressure port (large diameter tube) on engine side of unit. • Apply 3 to 5 psi air to either of the pressure ports on the fuel tank side of the unit. • Remove air and apply to return tube on engine side of reservoir as in step FR1. • Is pressure out of only one return port on the other side of the unit?	Yes ▶ No ▶	GO to FR3 . REPLACE unit (valves stuck).
FR3 CHECK SWITCHING ACTION		
• Block engine pressure port of unit. • Apply 3 to 5 psi air to one pressure port and the corresponding return port on the fuel tank side of the unit. • Is air pressure out of return port on engine side of unit?	Yes ▶ No ▶	GO to FR4 . Change to opposite return port and RETEST per FR3 . If unit fails, REPLACE.

Fuel System Diagnosis — Dual Function Reservoir

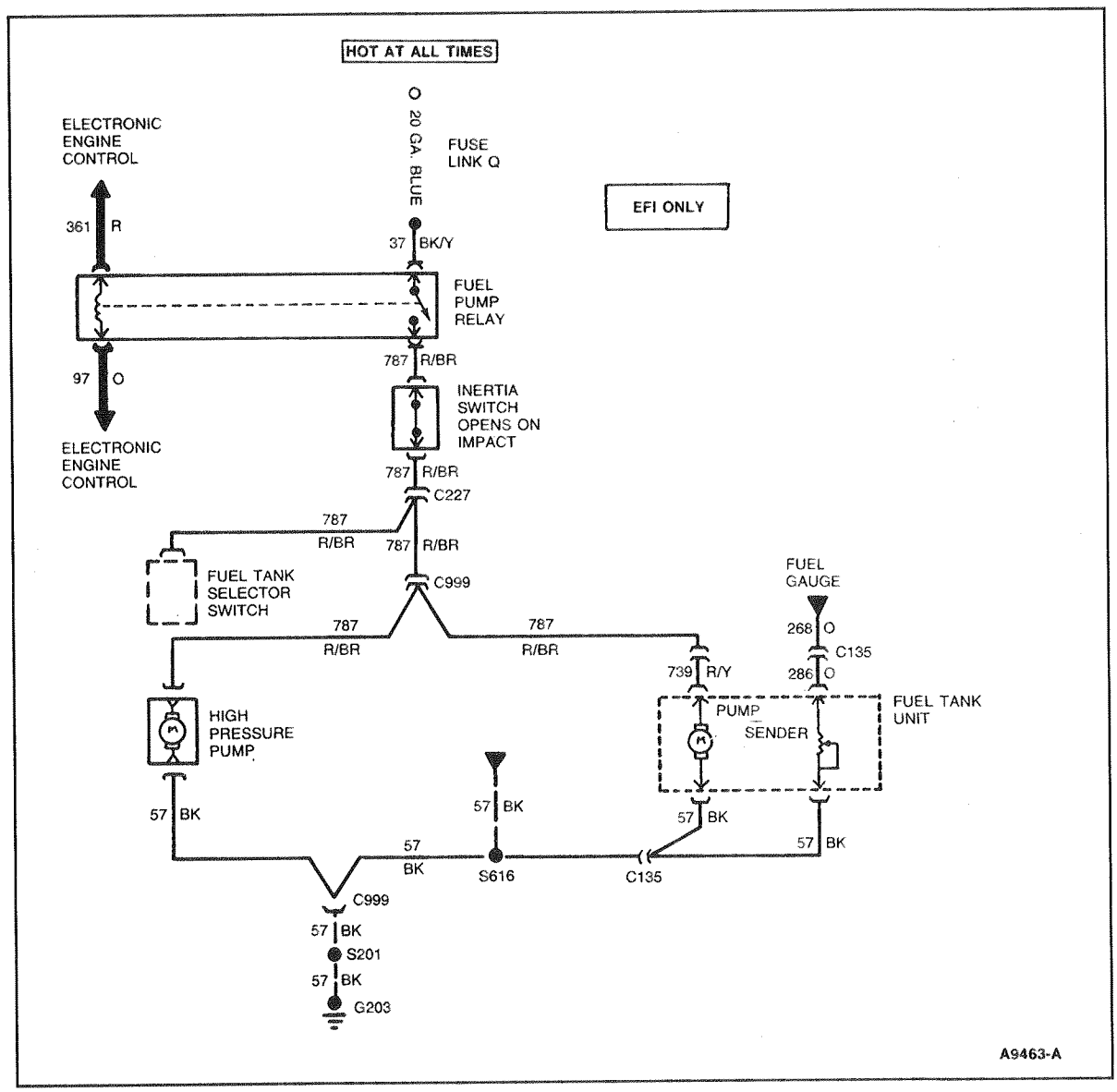
FR

TEST STEP	RESULT ▶	ACTION TO TAKE
FR4 VALVE SWITCHING		
• Remove air from pressure port tested previously and apply air to other set of ports on unit. • Is air pressure out of return port on engine side?	Yes ▶ No ▶	GO to **FR5** . CHECK connection to return port, if port correct then REPLACE unit (valves stuck).
FR5 CHECK LEAKAGE		
• Remove any blockages installed in the unit. • Apply pressure to the engine side pressure port and note which port is open on the fuel tank side of the unit. • Attach a pressure gauge (0 to 110 inches of water) to the closed pressure port. • Block the open port on the tank side of the unit. • Is pressure present on the gauge?	Yes ▶ No ▶	REPLACE unit (leakage between valves). GO to **FR6** .
FR6 LEAKAGE TEST		
• Remove pressure and gauge from selected port in step FR5. • Attach gauge to closed return port. • Apply pressure to return port on engine side and block open return port. • Is pressure on gauge?	Yes ▶ No ▶	REPLACE unit (leakage). Unit OK.

Dual Function Reservoir



Typical Electric Fuel Pump Schematic — Dual Pump



Fuel System Diagnosis — Electric Fuel Pumps

VEHICLE APPLICATION

Aerostar 2.3L EFI.

Aerostar 3.0L EFI.

All Passenger Cars EFI/CFI, Except Merkur

DESCRIPTION

The Electronic Fuel Injection (EFI) system uses an in-tank fuel pump which may be attached to the sender assembly. The fuel tank has an internal pump cavity (sump) where the fuel pump rests. This design provides satisfactory operation during extreme vehicle maneuvers and steep vehicle attitudes with low tank fill levels.

The fuel pump may be mounted on the fuel sender assembly or on a separate assembly inside the fuel tank. The assembly includes a check valve in the outlet of the fuel pump. The function of this valve is to maintain fuel pressure in the system after the vehicle is shut down. The pressure retention helps prevent starting problems. This pump is capable of supplying 60 liters (16 gallons) or 88 liters (21 gallons) of fuel per hour. The fuel pump has an internal pressure relief valve which limits the maximum fuel pressure. This only takes effect if there is a blockage causing system pressure to rise too high. The system pressure is controlled by a regulator mounted on the engine.

The pump is protected at its inlet by a nylon pickup element (filter). This nylon element filters dirt and other particulates while allowing the passage of water which may accumulate within the fuel tank sump.

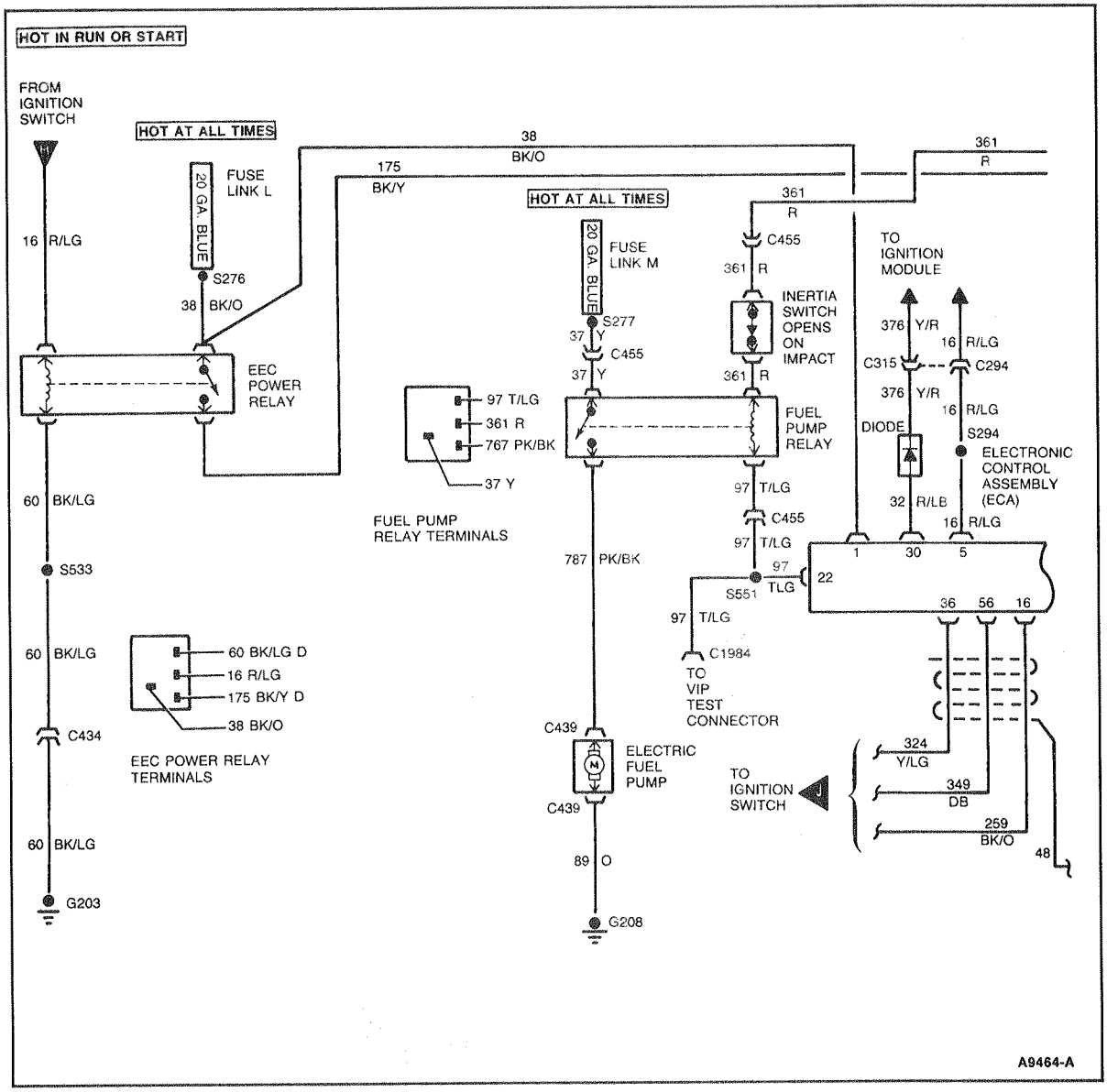
The electrical system has a fuel pump relay controlled by the Electronic Engine Control (EEC) module. The fuel pump relay provides power to the fuel pump. When the ignition switch is in the OFF position, the contacts of the EEC relay and the fuel pump relay are open.

When the ignition switch is turned to the ON position, the EEC relay is energized, closing its contacts. Power is provided to both the fuel pump relay and to a timing device in the EEC module. The fuel pump runs through the contacts of the fuel pump relay and the inertia switch. If the ignition switch is not turned to the START position within approximately one second, the timing device in the EEC module will open the ground (57 bk) to the fuel pump relay. Opening the ground de-energizes the fuel pump relay (opening its contacts), which in turn de-energizes the fuel pump. This circuitry pressurizes the fuel system.

When the ignition switch is turned to the START position, the EEC module operates the fuel pump relay to provide fuel while cranking.

After the engine starts and the ignition switch is returned to the ON position, power to the fuel pump is supplied through the fuel pump relay under control of the EEC processor. The EEC module senses engine speed and shuts off the fuel pump by opening the ground circuit (57 bk) to the fuel pump relay, when the engine stops or engine speed drops below 120 rpm.

Electric Fuel Pump Schematic — Single Pump



Electric Fuel Pump Diagnosis

DIAGNOSIS

NOTE: Almost any electric fuel pump malfunction that can occur will result in a reduction of fuel flow and/or pressure. A reduction of fuel flow and/or pressure will be detected by a reduction in engine performance. This diagnostic procedure will concentrate on determining if the electric fuel pump system is operating properly. Other diagnostic procedures will cover the analysis of other malfunctions that can cause losses or reductions of engine performance.

The following diagnostic procedures are to be performed to determine if the electric fuel pumps are operating correctly:

NOTE: If no pressure is detected in fuel lines during test procedure, fuel pump should not be powered in excess of three minutes to avoid possible overheating of pump.

A separate procedure is included to test low-pressure electric fuel pumps. It is only necessary to test low-pressure pumps if noise or very low flow is a problem with two-pump systems.

Electric Fuel Pump Diagnosis

FDE

FUEL PRESSURE SPECIFICATION TABLE

	1988 PASSENGER CAR ENGINES										
	VALUES ARE IN PSI AND kPa										
	1.9L EFI	1.9L CFI	2.3L OHC EFI	2.3L TC EFI	2.3L HSC EFI	2.5L CFI	3.0L EFI	3.8L FWD EFI	3.8L RWD EFI	5.0L SEFI	5.0L MA SEFI
ENGINE RUNNING	30 – 45 PSI 210 – 310 kPa	13 – 17 PSI 90 – 120 kPa	30 – 45 PSI 210 – 310 kPa	30 – 55 PSI 210 – 345 kPa	45 – 60 PSI 310 – 415 kPa	13 – 17 PSI 90 – 120 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa
KEY ON ENGINE OFF	35 – 45 PSI 240 – 310 kPa	13 – 17 PSI 90 – 120 kPa	35 – 45 PSI 240 – 310 kPa	35 – 45 PSI 240 – 310 kPa	50 – 60 PSI 345 – 415 kPa	13 – 16 PSI 90 – 120 kPa	35 – 45 PSI 240 – 310 kPa	35 – 45 PSI 240 – 310 kPa	35 – 45 PSI 240 – 310 kPa	35 – 45 PSI 240 – 310 kPa	35 – 45 PSI 240 – 310 kPa

	1988 LIGHT TRUCK ENGINES						
	VALUES ARE IN PSI AND kPa						
	2.3L EFI	2.9L EFI	3.0L EFI	4.9L EFI	5.0L EFI	5.8L EFI	7.5L EFI
ENGINE RUNNING	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	45 – 60 PSI 310 – 415 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa	30 – 45 PSI 210 – 310 kPa
KEY ON ENGINE OFF	35 – 45 PSI 210 – 310 kPa	35 – 45 PSI 210 – 310 kPa	35 – 45 PSI 210 – 310 kPa	50 – 60 PSI 345 – 415 kPa	35 – 45 PSI 210 – 310 kPa	35 – 45 PSI 210 – 310 kPa	35 – 45 PSI 210 – 310 kPa

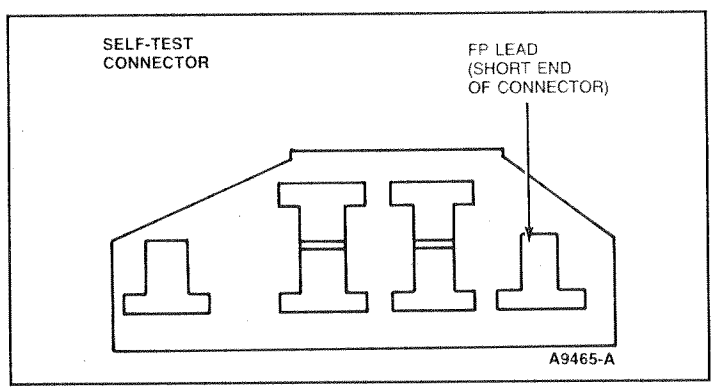


Figure 1

Electric Fuel Pump Diagnosis

FDE

TEST STEP	RESULT ▶	ACTION TO TAKE
FDE1 CHECK STATIC FUEL PRESSURE		
• Check for adequate fuel supply. • Key off. • Install fuel pressure gauge. • Install test lead to FP lead of VIP test connector (Fig. 1). • Turn key to RUN position. • Ground test lead to run fuel pump. • Refer to Fuel Pressure Specification Table and check to determine if pressure is within acceptable limits.	Yes ▶ No ▶	GO to FDE5 . GO to FDE2 .
FDE2 HYDRAULIC CIRCUIT CHECK		
• Pressure low but greater than 3 psi (indicates fuel pump is running but not enough pressure).	Yes ▶ No ▶	GO to FDE3 . GO to FDE4 .
FDE3 HYDRAULIC CIRCUIT CHECK		
• Plugged fuel line filter (replace filter and check again for proper pressure). • Kinked/restricted fuel lines (visual inspection). • Low voltage to fuel pump (should be within 0.5 volts of battery voltage at connector). • Disconnect return fuel line and note if fuel is being returned during this low pressure condition. If fuel is being returned, replace or adjust pressure regulator.	Yes ▶ No ▶	If service was required and made, GO to Step FDE1 . If no service was required, replace fuel pump and GO to Step FDE1 .
FDE4 ELECTRICAL CIRCUIT CHECK		
• Inertia switch open? (reset switch as required) • Wiring at fuel pump/tank connector loose or open? • Fuel pump ground connection at chassis loose or defective? • Improper fuel pump relay operation (should operate when FP (test) lead is grounded with ignition key in RUN position). • EEC relay not operating if Fuel Pump Relay doesn't operate?	Yes ▶ No ▶	SERVICE all electrical problems and RETURN to step FDE1 . If no electrical defects have been found, and pump still won't run, REPLACE pump and RETEST per step FDE1 .
FDE5 CHECK VALVE TEST		
• Remove ground from test lead and note pressure on gauge. Pressure should remain within 2 psi for 3 minutes after lead is ungrounded.	Yes ▶ No ▶	GO to FDE7 . GO to FDE6 .

Electric Fuel Pump Diagnosis

FDE

TEST STEP	RESULT ▶	ACTION TO TAKE
FDE6 CIRCUIT LEAK CHECK		
• Fuel lines or connectors leaking? • Disconnect fuel return line and plug engine side. Momentarily activate fuel pump by grounding test lead. Raise pressure to approximate operating pressure. Repeat Step FDE5. If pressure holds, replace regulator and repeat test FDE5.	Yes ▶ No ▶	If service was made, GO to step FDE1. If no problems were found, REPLACE fuel pump and GO to Step FDE1. If unit still fails Step FDE5, there may be a leaking fuel injector or rail. CORRECT these problems and GO to step FDE5.
FDE7 ENGINE ON TEST		
• If engine is EFI (fuel rail injectors), disconnect and plug the vacuum line connected to the pressure regulator. • Start engine and run at idle. Fuel pressure should be as indicated in chart for Key On, Engine Off.	Yes ▶ No ▶	GO to FDE9. GO to FDE8.
FDE8 IDLE ENGINE REPAIR		
• Fuel filter restricted (replace)? • Improper fuel regulator adjustment? • Fuel line restricted? • Improper voltage to fuel pump (battery voltage at pump connections)?	Yes ▶ No ▶	If defect has been found and serviced, GO to FDE1. If no defect is found, REPLACE fuel pump and GO to FDE1.
FDE9 HIGH SPEED TEST		
• With engine running at idle and vacuum line disconnected if necessary from step FDE7, note fuel rail pressure. • Rapidly accelerate engine and watch fuel pressure. Does pressure remain within 5 psi of starting pressure? **NOTE: Road testing vehicle while monitoring pressure may give a better test under load conditions.**	Yes ▶ No ▶	Fuel pump is OK. If problem persists, CONSULT other parts of the manual. DISCONNECT test connections and RECONNECT vacuum lead if removed for test. GO to FDE8.

Electric Fuel Pump Diagnosis

LP

NOTE:

1. **If you have multiple fuel tanks on vehicles, it will be necessary to perform this test on both fuel tanks to assure proper operation of both low pressure fuel pumps.**
2. **It has been observed that if the low pressure pump is running, it is almost certain that it is operating correctly. Therefore, flow testing of the fuel pump is only necessary if there is a good reason to suspect pump damage which would cause the pump to 'run but not pump'.**
3. **All tests should be performed with a fully charged vehicle battery. Fuel pump flow is very susceptible to vehicle voltage.**

TEST STEP	RESULT ▶	ACTION TO TAKE
LP1 INITIAL SET-UP AND TEST		
• Attach test lead to FP lead on VIP test connector (see figure 1 under "ELECTRIC FUEL PUMP DIAGNOSIS"), make sure lead is long enough to reach work area under vehicle. • Turn ignition key to RUN position. • Raise vehicle on hoise and bring test lead to a convenient point for grounding. • Ground test lead and listen at fuel tank for low-pressure pump operation (a stethescope or other device will help to hear pump). The electrical connection may be disconnected to the high-pressure pump to aid in hearing the pump run. • Is pump running?	Yes ▶ No ▶	GO to LP2 . GO to LP3 .
LP2 FLOW TEST		
• Remove ground from test lead. • Disconnect pressure line from pump at reservoir inlet fitting. • Obtain a calibrated container of at least one quart capacity. • Place fuel line removed from reservoir into container. • Ground test lead and run pump for 5 seconds. • Is fuel level at least 6 ounces (180 ml)?	Yes ▶ No ▶	Fuel pump OK. REINSTALL lines and REMOVE test connections. Momentarily restrict line to provide back pressure to prime pump. If no flow develops, CHECK for blocked lines and REPLACE pump if no problem found.

Electric Fuel Pump Diagnosis

LP

TEST STEP	RESULT ▶	ACTION TO TAKE
LP3 ELECTRICAL CHECK		
• If high-pressure pump is not running, check inertia switch, test connections, fuel pump relay, and any other wiring problems which could prevent the pumps from activating. Both pumps run from the same electrical circuit. • If high-pressure pump runs, check connections at top of fuel tank to pump for continuity and for voltage when circuit is energized. • Was electrical problem found?	Yes ▶	SERVICE problems found and REPEAT step **LP1** .
	No ▶	REPLACE pump.

CFI Fuel Pressure Regulator

PRC

Fuel Pressure Regulator Description

The pressure regulator is integral to the fuel charging main body and is located near the rear of the air horn. It is located so as to nullify the effects of supply line pressure drops. Its design is such that it is not sensitive to back pressure in the return line to the tank.

One function of the pressure regulator is to maintain fuel supply pressure upon engine and fuel pump shutdown. The regulator functions as a downstream check valve and traps the fuel between itself and the fuel pump. The maintenance of fuel pressure upon engine shutdown precludes fuel line vapor formation and allows for rapid restarts and for stable idle operation immediately thereafter.

TEST STEP	RESULT ▶	ACTION TO TAKE
PRC1 CHECK FUEL PRESSURE		
• Disconnect electrical connection to inertia switch. • Crank engine for five seconds to reduce fuel pressure in the fuel charging system. • Install fuel pressure gauge. • Reconnect electrical connection to inertia switch. • Start and run engine. • Stabilize fuel pressure. • Turn engine off. • Does fuel pressure drop?	Yes ▶ No ▶	GO to **PRC2**. GO to electric fuel pump diagnostics in this Section. Also REFER to Group 24 of the Car Shop Manual.
PRC2 CHECK VACUUM BLEED DOWN		
• Remove fuel inlet and outlet lines at fuel charging assembly. • Connect hand held vacuum pump to the fuel charging assembly fuel inlet side. • Apply 15-20 in-Hg vacuum. • Vacuum should not drop more than 10 in-Hg in 10 seconds. • Is vacuum drop greater than 10 in-Hg in 10 seconds?	Yes ▶ No ▶	GO to **PRC3**. Injector/O-Ring regulator seat/valve system OK. GO to Fuel Pump Diagnostics.

CFI Fuel Pressure Regulator

PRC

TEST STEP	RESULT ▶	ACTION TO TAKE
PRC3 CHECK VACUUM BLEED DOWN		
• Refer to Test Step PRC1. • Cap/plug the fuel outlet line. • Repeat Test Step PRC1. • Is vacuum drop greater than 10 in-Hg in 10 seconds?	Yes ▶ No ▶	GO to **PRC4**. SERVICE fuel pressure regulator. REFER to Group 24 of the Car Shop Manual.
PRC4 CHECK INJECTOR		
• With the injector in the fuel charging assembly: • Plug the injector tip outlet with finger. • Repeat Test Step PRC1. • Is vacuum drop greater than 10 in-Hg in 10 seconds?	Yes ▶ No ▶	REPLACE the injector O-Rings – 2. REPEAT Test Step **PRC4**. REPLACE injector. REFER to Group 24 of the Car Shop Manual.

EFI Fuel Pressure Regulator

PRE

Fuel Pressure Regulator Description

The fuel pressure regulator is attached to the fuel supply manifold assembly downstream of the fuel injectors. It regulates the fuel pressure supplied to the injectors. The regulator is a diaphragm-operated relief valve in which one side of the diaphragm senses fuel pressure and the other side is subjected to intake manifold pressure. The nominal fuel pressure is established by a spring preload applied to the diaphragm. Balancing one side of the diaphragm with manifold pressure maintains a constant fuel pressure drop across the injectors. Fuel, in excess of that used by the engine, is bypassed through the regulator and returns to the fuel tank.

TEST STEP	RESULT ▶	ACTION TO TAKE
PRE1 CHECK DIAPHRAGM INTEGRITY • Remove fuel tank filler cap. • Release the fuel pressure from the fuel charging system at schrader on the fuel rail. • Install fuel pressure gauge. • Start and run engine for 10 seconds. • Turn engine off and wait 10 seconds. • Start and run engine again for 10 seconds. • Turn engine off. • Remove the vacuum hose from the fuel pressure regulator. • Is fuel present at the vacuum port?	Yes ▶ No ▶	REPLACE the fuel pressure regulator. If engine oil is contaminated with fuel, change oil and filter. GO to **PRE2**. RECONNECT vacuum hose.
PRE2 CHECK REGULATOR VALVE PRESSURE • Start and run engine for 30 seconds. • Turn engine off. • Observe fuel pressure gauge. • Does fuel pressure drop more than 5 psi (34 kPa) after 60 seconds?	Yes ▶ No ▶	SERVICE leaks. REPEAT this Test Step if fuel pressure still drops, REPLACE regulator. GO to **PRE3**.
PRE3 CHECK VALVE SEAT LEAKAGE • Release the fuel pressure from the fuel charging system. (See PRE1). • Remove the fuel pressure regulator. • Inspect gasket and O-ring for cracks and cuts, or other defects. • Connect a hand held vacuum pump to the fuel return tube (7/32 in. diameter tube, centered on base plate). • Apply 20 in-Hg vacuum. • Does vacuum drop below 10 in.-Hg within 10 seconds?	Yes ▶ No ▶	REPLACE fuel pressure regulator. REINSTALL fuel pressure regulator. Problem may be elsewhere. GO to Section 2.