GENERAL MOTORS V8 DIESEL FUEL INJECTION

DESCRIPTION

A mechanical high pressure rotary pump, gear driven by the camshaft at camshaft speed, injects a precisely metered amount of fuel to each cylinder at the proper time. The pump is mounted on top of the engine and provides necessary timing advance under all operating conditions.

Eight high pressure fuel pipes carry fuel from pump to an injection nozzle in each cylinder. All eight pipes are exactly the same length to ensure that there is no variance in timing. Engine RPM is controlled by a rotary fuel metering valve. As the accelerator pedal is pushed down, a throttle cable opens the metering valve and allows increased fuel delivery. A built-in low pressure transfer pump delivers fuel to the main injection pump.

A fuel filter is located between the mechanical fuel pump (mounted on the side of the engine block) and the injection pump. Any excess fuel is returned to the tank by a fuel return system.

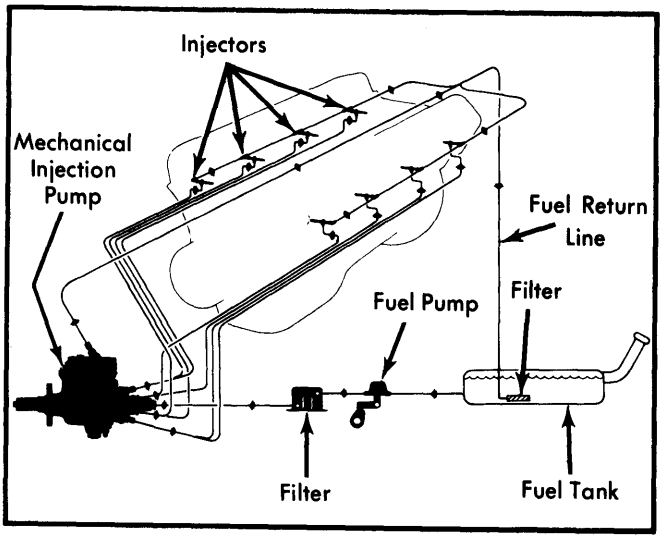

Fig. 1 Diesel Injection System Fuel Circuit

OPERATION

DIESEL INJECTION PUMP

The Roosa-Master Diesel Injection pump is mounted to the top of the engine beneath the air crossover. This pump is cam driven and delivers fuel to the injectors at 1800-2000 psi. Being driven at camshaft speed, the rotary pump can precisely govern time and amount of fuel injection. Eight equal-length pipes, running from pump to injectors at each cylinder, ensure that injection timing does not vary from cylinder to cylinder.

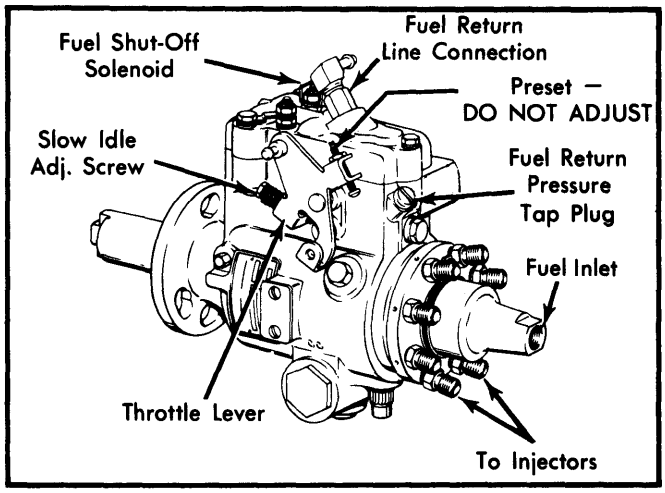

Fig. 2 Main Diesel Injection Pump

INJECTION NOZZLES

One injection nozzle is located in each combustion chamber. It has a single fuel inlet fitting and a return line for removal of excess fuel. Nozzle is retained in head by a bolt and clamp and is not threaded as glow plugs are. Injection nozzles are spring loaded and calibrated to open at a specified fuel pressure. The engine end of nozzle has a replaceable compression seal and carbon stop seal.

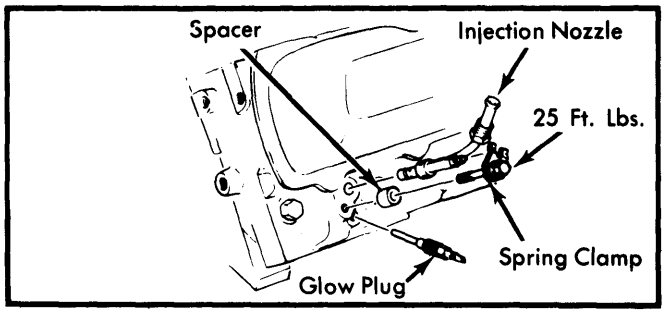

Fig. 3 Glow Plug & Injection Nozzle Location in Diesel Engine Cylinder Head

NOTE — *Never try to interchange pickup and passenger car injectors.*

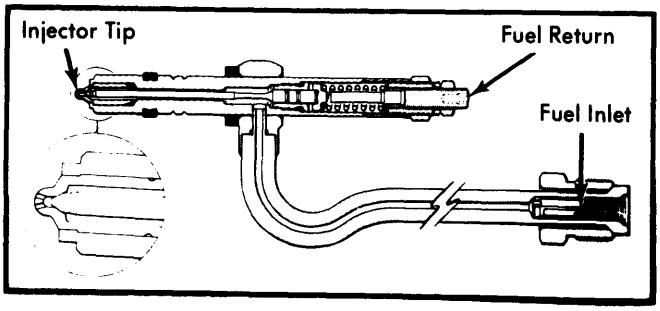

Fig. 4 Cutaway View of Injection Nozzle

GENERAL MOTORS V8 DIESEL FUEL INJECTION (Cont.)

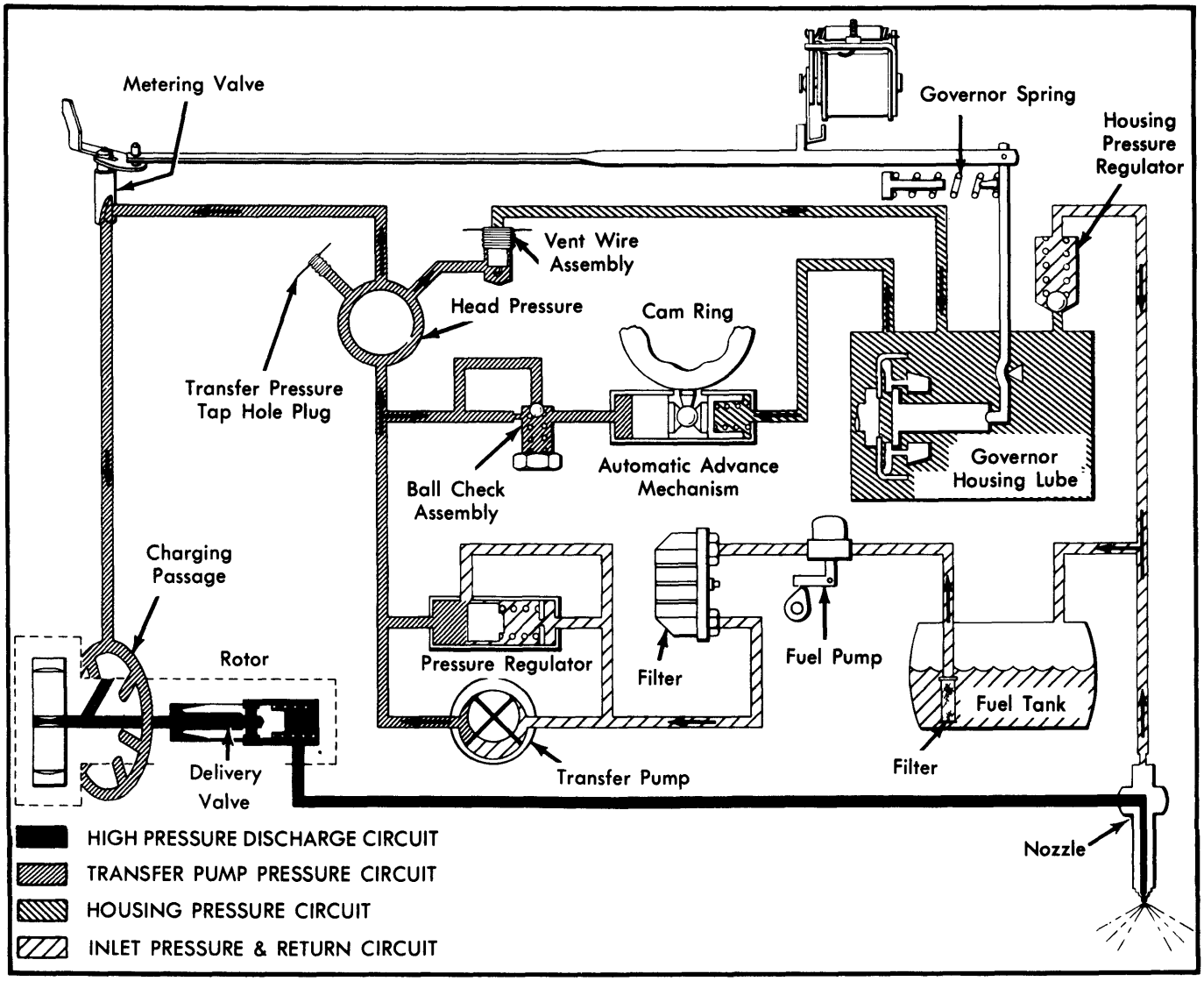

Fig. 5 Diesel Injection Pump Fuel Circuit Diagram

EMISSION CONTROL SYSTEMS

The only emission control system required on the diesel injected engine is a flow control valve. This valve is located just behind the air intake and connects to a "T" adaptor. Branches run from the adaptor to each valve cover. In this way, the flow control valve acts as a PCV system.

TESTING

INJECTION PUMP HOUSING FUEL PRESSURE

1) Remove air crossover assembly. Install screened covers over openings in intake manifold.

2) Remove pressure tap plug from injector pump. See *Fig. 2*.

3) Place seal from pressure tap plug onto pressure tap adapter (J-28526 or equivalent). Screw adapter into pump housing in place of plug.

4) Connect a low pressure gauge to adapter. Install magnetic pickup tachometer.

5) Start engine. Run engine at 1000 RPM with transmission in PARK. Observe gauge.

6) Pressure should be 8-12 psi with no more than 2 psi fluctuation.

7) If pressure is incorrect, replace fuel return line connector assembly.

8) Recheck pressure. If pressure is still not correct, remove injection pump for repair. Pump is not serviceable and must be exchanged for another unit. See *Injection Pump Removal*.

9) Remove tachometer, pressure gauge and adapter. Install a NEW pressure tap plug seal on plug. Install tap plug into pump.

10) Remove screened covers from manifold. Install air crossover assembly.

GENERAL MOTORS V8 DIESEL FUEL INJECTION (Cont.)

REMOVAL & INSTALLATION

INJECTION PUMP FUEL LINES

Removal – 1) Remove air crossover assembly and install screened covers (Tool J-26996-2) over manifold openings.

2) Remove injection pump line clamps. It is not necessary to use a back-up wrench when removing lines from pump.

3) Remove injection pump lines and cap open lines.

4) Disconnect lines at nozzle inlet fittings and cap open fittings on nozzle.

5) It is not necessary to remove pump to replace a line(s).

Installation – 1) Install new injection pump line(s) loosely. Position line properly.

2) Torque line fittings as follows:

Line-to-Pump	25 ft. lbs.
Line-to-Nozzle	25 ft. lbs.

3) Install line clamps. Start engine and check for fuel leaks.

NOTE – *If several lines are to be replaced, start by connecting lower lines first.*

4) Remove screened covers from intake manifold and install air crossover and air filter assembly.

INJECTION PUMP

Removal – 1) Remove air crossover assembly and place screened covers (Tool J-26996-2) over intake manifold openings.

2) Disconnect throttle rod and return spring.

3) Remove bellcrank. Remove throttle and T.V. cables from intake manifold brackets. Position cables away from engine.

4) Remove lines to fuel filter and remove filter.

5) Disconnect fuel line at fuel pump and remove fuel line to injector pump.

6) Disconnect fuel return line at injection pump. Slide clamp off fuel return lines at nozzles. Remove fuel return lines from each side of engine.

7) Using TWO wrenches, disconnect injection pump lines at nozzles.

8) Use special wrench J-26987 (or equivalent) to remove 3 nuts securing injection pump. Remove pump and cap all open lines and nozzles.

Installation – 1) Remove caps over fittings.

2) Line up the offset tang on pump driveshaft with pump driven gear and install pump.

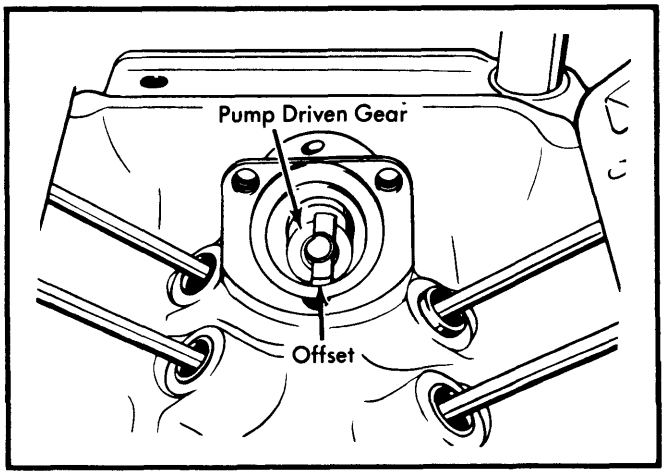

Fig. 6 View of Offset on Pump Driven Gear (Shown with Intake Removed)

3) Install 3 nuts and lockwashers securing pump but DO NOT tighten yet.

4) Connect pump lines at nozzles and tighten to 25 ft. lbs. with TWO wrenches.

5) Connect fuel return lines to nozzles and pump.

6) Align mark on injection pump with line on adapter. Tighten retaining nuts to 19 ft. lbs.

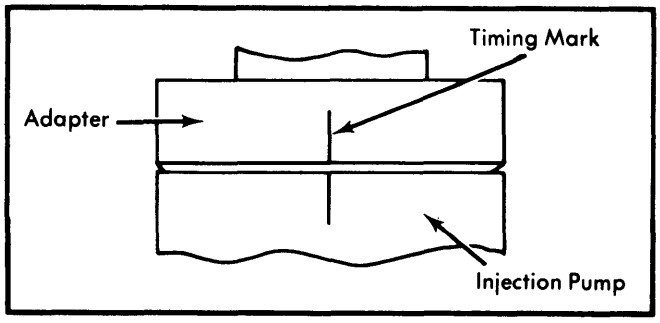

Fig. 7 Aligning Timing Marks on Pump & Adapter

NOTE – *Use a ¾" wrench on boss at front of injection pump to help in rotating pump while aligning marks.*

7) Adjust throttle rod. See *Linkage Adjustment in this article.*

8) Install fuel line from fuel pump to fuel filter.

9) Install bellcrank and clip. Install throttle and T.V. cables to intake manifold. Attach cables to bellcrank.

10) Connect throttle rod and return spring.

GENERAL MOTORS V8 DIESEL FUEL INJECTION (Cont.)

11) Start engine and check for fuel leaks.

12) Remove screened covers and install air crossover and filter assembly.

INJECTION PUMP ADAPTER, SEAL & NEW ADAPTER TIMING MARK

Removal – 1) Remove air cleaner, air crossover, injection pump and lines.

2) Remove injection pump adapter. Remove seal from pump adapter.

Installation – 1) File timing mark off of injection pump ADAPTER.

CAUTION – *DO NOT file timing mark off of injection pump.*

2) Rotate engine to place No. 1 piston at TDC. Align mark on balancer with ZERO mark on indicator. *See Fig. 6* for position of driven gear.

NOTE – *Index is offset to the right with No. 1 at TDC.*

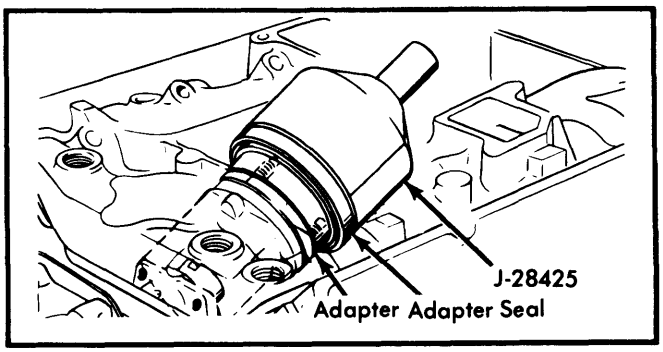

Fig. 8 Installation of New Adapter Seal

3) Apply chassis lube to seal area on adapter, taper edge and seal area in intake manifold. Install adapter and leave loose.

4) Thoroughly lube seal, inside and out, with chassis lube. Install seal on seal installation tool (J-28425).

5) Push seal onto pump adapter using installation tool. *See Fig 8.*

6) Remove tool. Observe seal for proper positioning. Torque adapter bolts to 25 ft. lbs.

7) Install timing tool (J-26896) into injection pump adapter. Torque tool in direction of No. 1 cylinder to 50 ft. lbs.

8) While holding torque, mark injection pump, lines and air crossover assembly. *See Fig. 9.*

9) Remove tool. Install injection pump, lines and air crossover assembly.

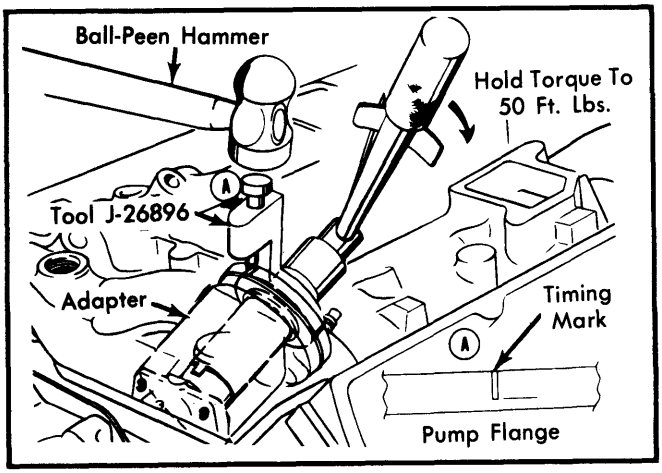

Fig. 9 Holding Torque on Adapter While Marking Timing Marks

INJECTION NOZZLES

Removal – 1) Remove fuel lines from injection pump-to-nozzle on bank of engine where nozzle is to be serviced. DO NOT bend lines out of way to remove nozzle.

2) Cap open fittings and nozzles. Remove fuel return line clamps from all nozzles on side of engine where nozzle is to be removed. Remove appropriate fuel return line(s).

3) Remove nozzle spring clamp and spacer. Remove nozzle using removal tool (J-26952). Cap nozzle inlet line and nozzle tip.

NOTE – *Tip of nozzle must be protected from any damage or dirt.*

Installation – 1) If old nozzle is to be reinstalled after removal, remove old carbon stop seal and compression seal. Install NEW carbon stop and compression seals. *See Fig. 10.*

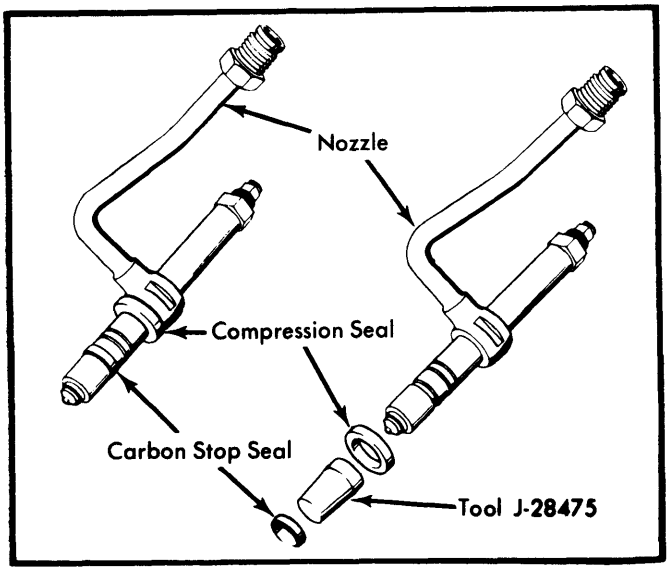

Fig. 10 Injection Nozzle Showing Seals

GENERAL MOTORS V8 DIESEL FUEL INJECTION (Cont.)

2) Remove caps from open fittings and lines. Install nozzle, spring clamp and spacer. Torque bolt to 25 ft. lbs.

3) Reinstall fuel return lines and clamps.

4) Install fuel delivery lines from pump-to-nozzles.

5) Start engine and check for leaks.

GLOW PLUGS

Removal – 1) Glow plugs are mounted near each injector nozzle in the cylinder heads. They are threaded and have an electrical wire plugged into the top end.

2) Remove electrical wire from glow plug.

3) Using suitable deep-well socket, remove glow plug.

Installation – 1) Install glow plug and torque to 12 ft. lbs.

2) Connect wire to glow plug.

PRE-CHAMBER

NOTE – *Cylinder head must be removed to remove pre-chamber. There is one pre-chamber for each combustion chamber in cylinder head. Pre-chamber is opposite glow plug and can be tapped out with small blunt drift.*

CAUTION – *When removing pre-chamber, be sure to remove injection nozzle and glow plug from head first. If not, glow plug and/or nozzle could be bent and need replacement.*

ADJUSTMENT

HOT (SLOW) IDLE RPM

See *appropriate article in TUNE-UP Section.*

COLD (FAST) IDLE RPM

See *appropriate article in TUNE-UP Section.*

INJECTION TIMING

Engine is properly timed when marks on top of injection pump adapter and pump flange are aligned. See *Fig. 7.* If marks are not aligned, adjustment is necessary. Engine must be OFF for adjustment.

1) Loosen 3 pump retaining nuts with suitable wrench (J-26987).

2) Align mark on pump with mark on adapter and tighten nuts. Torque to 19 ft. lbs.

NOTE – *Use ¾" wrench on boss at front of pump to turn pump while aligning marks.*

THROTTLE ROD

1) Transmission vacuum regulator valve must be installed. Loosen lock nut on throttle rod and shorten rod several turns.

2) Rotate bell crank to full throttle stop, now lengthen throttle rod until injection pump lever contacts injection pump full throttle stop. Release bell crank and tighten lock nut.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Fuel Pump-to-Block Bolt/Nut	25
Injection Pump Attaching Nuts	19
Injection Line Nut-to-Pump	25
Injection Pump Adapter Bolts	25
Injection Line Nut-to-Nozzle	25
Inj. Pump Fuel Filter Inlet	20
Inj. Pump Fuel Filter Outlet	18
Injection Pump Fuel Inlet Line	20
Nozzle Clamp	25
Glow Plug	12