


Light Vehicle Diesel Engines
First Edition

Light Vehicle Diesel Engines



Chapter 12
Fuel Supply and
Low Pressure Fuel
Systems

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ALWAYS LEARNING
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LEARNING OBJECTIVES (1 of 1)

12.1 Prepare for the Light Vehicle Diesel Engine (A9) ASE certification fuel system diagnosis and repair area ("F").

12.2 Describe the function of the low-pressure fuel systems.

12.3 Identify the components in the low-pressure fuel system.

12.4 Discuss the need for service and repair of the low pressure fuel system.

12.5 Explain the need for controlling the temperature of the fuel.

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LOW-PRESSURE FUEL SYSTEM COMPONENTS (1 of 2)

- **Low-Pressure Fuel System Include**
 - Fuel tank(s)
 - Fuel-level sending unit/Tank pick-up
 - Transfer pump
 - Low-pressure lines
 - Fuel filters/Water separators/Temperature regulators
- **Diesel Fuel Tank Filler Opening Page 135**
- **Fuel Tank Page 135**
- **Fuel-level Sending Unit/Tank Pick-up Page 136**
- **Transfer Pump: Page 136**

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LOW-PRESSURE FUEL SYSTEM COMPONENTS (2 of 2)

- **Low-Pressure Lines**
 - Presence of air in low-pressure fuel system:
 - **Hard starting**
 - **Low power**
 - **Rough idle conditions**
- **Fuel Filter Assemblies**
 - Filter elements, water separators
 - Temperature regulators
 - Condition diesel fuel for proper operation

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LOW-PRESSURE FUEL SYSTEM SERVICE

- **Scheduled Maintenance Pages 139-140**
 - Some filters contain integral pin
 - Unseats check ball when properly installed
 - Prevents fuel from flowing if NOT installed Properly installed
- **Fuel Pressure Testing**
 - Pressure measured after fuel filter(s)
 - Before it enters high pressure pump
- **Fuel Volume Testing**
- **Fuel Filter Restriction**
- **Return Volume**
 - **Dispose of diesel fuel according to federal, state, local laws.**

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What Are the Pump Nozzle Sizes?



FREQUENTLY ASKED QUESTION

Unleaded gasoline nozzles are smaller than those used for diesel fuel to help prevent fueling errors. However, it is still possible to fuel a diesel vehicle with gasoline. SEE CHART 12–1 for sizes and colors used for fuel pump nozzles.

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CHART 12-1 Fuel pump nozzle size standardized except for use by over-the road truck stops where high fuel volumes and speedy refills require larger nozzles compared to passenger vehicle station nozzles.

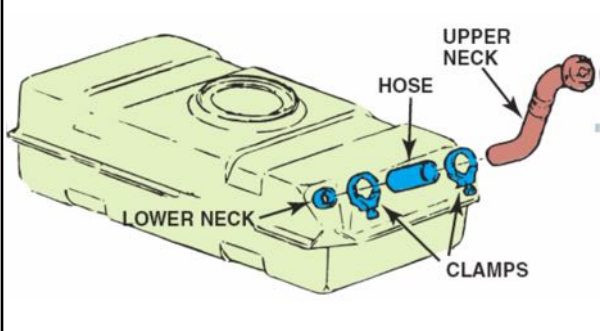
FUEL	NOZZLE DAIMETER	PUMP HANDLE COLOR (VARIES-NO ESTABLISHED STANDARD)
Gasoline	13/16 inch (21 mm)	Black, red, white, green or blue
E10	13/16 inch (21 mm)	Black, red, white, green or blue
E85	13/16 inch (21 mm)	Yellow or black
Diesel Fuel	15/16 inch (24 mm)	Yellow, green, black
BioDiesel	15/16 inch (24 mm)	Green
Truckstop Diesel	1 1/4 or 1 1/2 inch (32 or 38 mm)	Varies

CHART 12-1

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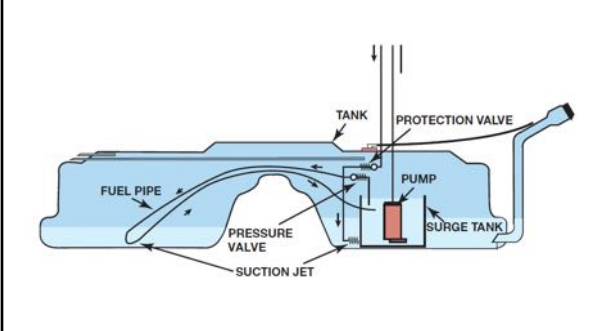
FIGURE 12-1 fuel tank is used to store the fuel and to allow fuel to recirculate from the return system, and cool after absorbing heat from the high-pressure pump and the injectors.



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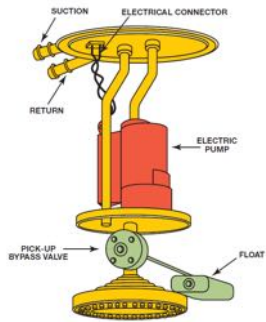
FIGURE 12-2 jet pump siphons fuel from the opposite side of the saddle tank to ensure the supply pump delivers fuel to the engine from both sides of the tank equally



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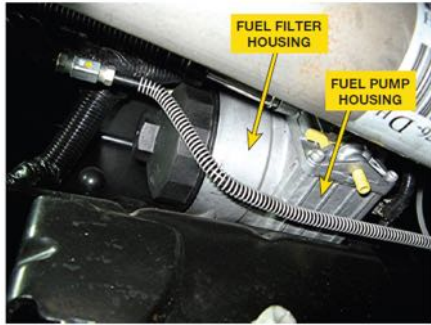
FIGURE 12-3 fuel pump module contains the low-pressure pump and regulator, the fuel-level sending unit, and tank pick-up.



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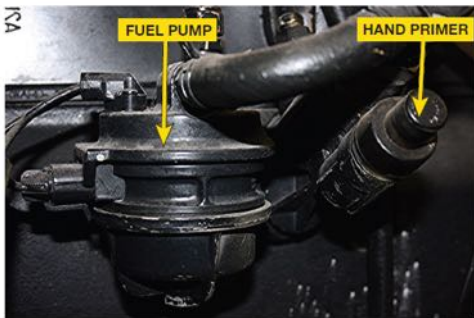
FIGURE 12-4 lift pump pushes fuel through filtration system to high-pressure pump at correct pressure and with adequate volume.



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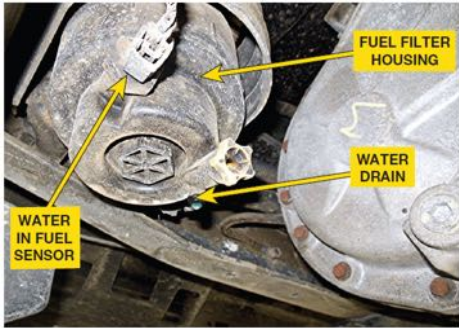
FIGURE 12-5 low-pressure pump can be an in-tank or out-of-tank variety, depending on the system design.



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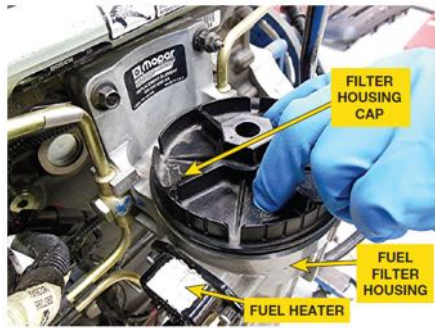
FIGURE 12-6 Many manufacturers recommend that water be drained once a month to ensure there is no damage to the high-pressure fuel system.



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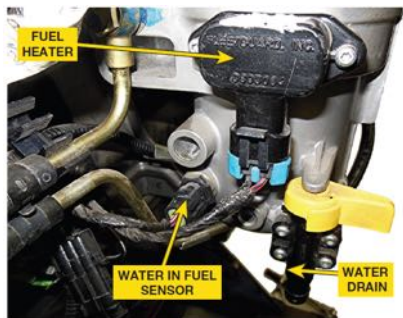
FIGURE 12-7 second filter in a dual filter system is located on engine assembly. Both filters are replaced at same time following recommended service procedures.



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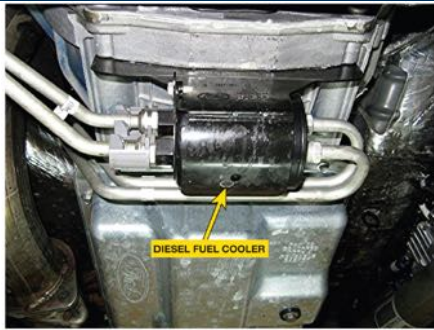
FIGURE 12-8 fuel heater keeps the fuel from gelling in cold weather.



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FIGURE 12-9 fuel cooler is used to control density of fuel so that high temperatures do not have a negative effect on engine performance.



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FIGURE 12-10 water-in-fuel sensor uses electrical conductivity to sense the water in the fuel. If the conductivity is above a specific level, the warning lamp on the dash is illuminated.



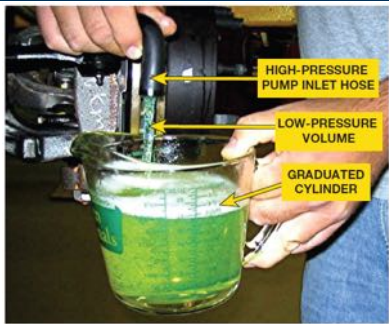
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FIGURE 12-11 low-pressure fuel system can be tested with a traditional fuel pressure gauge and the required adapters.



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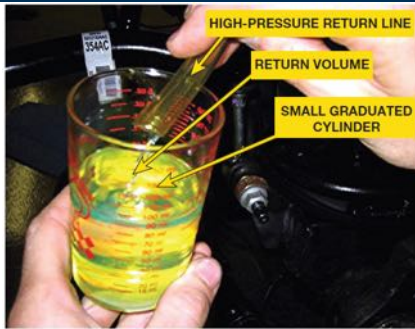
FIGURE 12-12 low-pressure pump is being tested for adequate volume.



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FIGURE 12-13 return volume from the injectors and the high-pressure pump is being measured.



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Summary (1 of 2)

- The low-pressure fuel system is used to store and supply clean fuel in adequate volume and at the correct pressure to the high-pressure fuel system.
- The system contains filters to remove foreign material from the fuel before it enters the high-pressure system. It contains heaters to ensure the fuel flows properly during cold temperatures, and a cooler to ensure the fuel is at the proper density. This does not affect engine performance.

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Summary (2 of 2)

- The maintenance of the low-pressure fuel system is critical to the operation and the longevity of the high-pressure fuel system.
- An excess of fuel being returned to the tank via the low pressure return can indicate a failure in the high-pressure system.

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