

GE Transportation

# Engine Fuel System, PH37ACmi PowerHaul® Series Locomotive

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imagination at work

**GEK-114528A**  
**Engine Fuel System, PH37ACmi PowerHaul® Series Locomotive**

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**Revision History**

Rev	Date	By	Description
NEW	Sep-2009	BMS	Initial release of publication.
A	Sep-2012	GEM	<b>Workflow 77171496:</b> Update to figures and each section.

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## 1. GENERAL INFORMATION

### 1.1. INTRODUCTION

This publication defines the Fuel System for PowerHaul® Series locomotive components. The PowerHaul® Series locomotives comply with the UIC emissions regulations for railway locomotive.

### 1.2. RELATED PUBLICATIONS

When using related publications, ensure the highest letter revision of the publication is used for the most current information. For the latest publication revision, visit the GE Website or contact the local GE Representative.

Table 1. RELATED PUBLICATIONS

GEK NUMBER	PUBLICATION TITLE
GEK-114501	Scheduled Maintenance, PH37ACmi PowerHaul® Series Locomotive
GEK-114502	Component Overhaul Schedule, PH37ACmi PowerHaul® Series Locomotive
GEK-114524	P616LD Diesel Engine Maintenance
GEK-114527	Engine Air Intake System

### 1.3. SAFETY INFORMATION

Safety precautions that must be observed when working on locomotive maintenance appear throughout this publication. All local safety requirements should be reviewed before beginning maintenance work, and followed. GE recommends that the engine cranking system be de-energized for any major maintenance task.

**⚠ WARNING** Indicates the potential for equipment damage.

**⚠ CAUTION** Indicates the potential for equipment damage.

## 2. CONTROLS AND INDICATORS

Not Applicable

Revisions are indicated by margin bars.

### 3. FUNCTIONAL DESCRIPTION

#### 3.1. LOCOMOTIVE FUEL SYSTEM

The Common Rail Fuel System (Figure 1) used on the PH37ACmi locomotive consists of a low and high-pressure portion. The low-pressure system fuel transfer pump sucks fuel from the fuel tank through a fuel strainer then sends low pressure fuel through the thermostatic valve, fuel heater (If fuel temperature is below 77°F (25°C), fuel filters, water separator, and fuel pressure regulator. This fuel is then delivered to the high-pressure system. High-pressure positive-displacement fuel pumps increase the fuel pressure to maximum injection pressure. The high-pressure fuel is then delivered to the high-pressure accumulators in the pump before being sent to the series of jumpers that pass fuel to the injectors mounted on each cylinder.

### 4. SCHEDULED MAINTENANCE

**NOTE:** Refer to GEK-114501, *SCHEDULED MAINTENANCE POWERHAUL® SERIES LOCOMOTIVE*.

#### 4.1. FUEL FILTER ELEMENT

Filter elements are used on the P616LD engine to protect the fuel injection equipment. The filter canisters (Figure 2) are located across the platform in the Radiator Cab. The fuel filter assembly consists of two steel tanks (fuel filter canisters), each containing seven filter elements. A gradual drop in fuel flow and reduction in fuel pressure indicates that the fuel filter elements have become restricted (clogged) and should be replaced.

To replace the fuel filter elements:

1. Relieve the low pressure fuel system pressure as per the Diesel Engine Maintenance publication listed in section 1.2., *RELATED PUBLICATIONS*.
2. Open the canister vent valve handle located on the fuel canisters and open the fuel filter canister drain valve handle for 10 minutes (Figure 3 & Figure 4). Ensure that the fuel pressure is relieved.
3. Remove cotter pin and open the quick release on the clamp holding the fuel filter doors in place. Any diesel fuel that drips from the seal should be absorbed with shop rags.

**NOTE:** *The nut on the filter door clamp doesn't need to be loosened to remove the clamp.*

4. Remove and discard the filters and clean the canisters using clean rags.
5. Remove and discard the O-ring in the fuel filter doors.
6. Flush the filter tank with clean diesel fuel.
7. Blow the tank dry with compressed shop air.



*When using compressed air for cleaning purposes, flying debris and particles may present a hazard to personnel in the immediate area. Personnel should be provided with, and trained in the use of, personal protective equipment as specified by Federal, State and Local Safety Regulations, and facility procedures.*

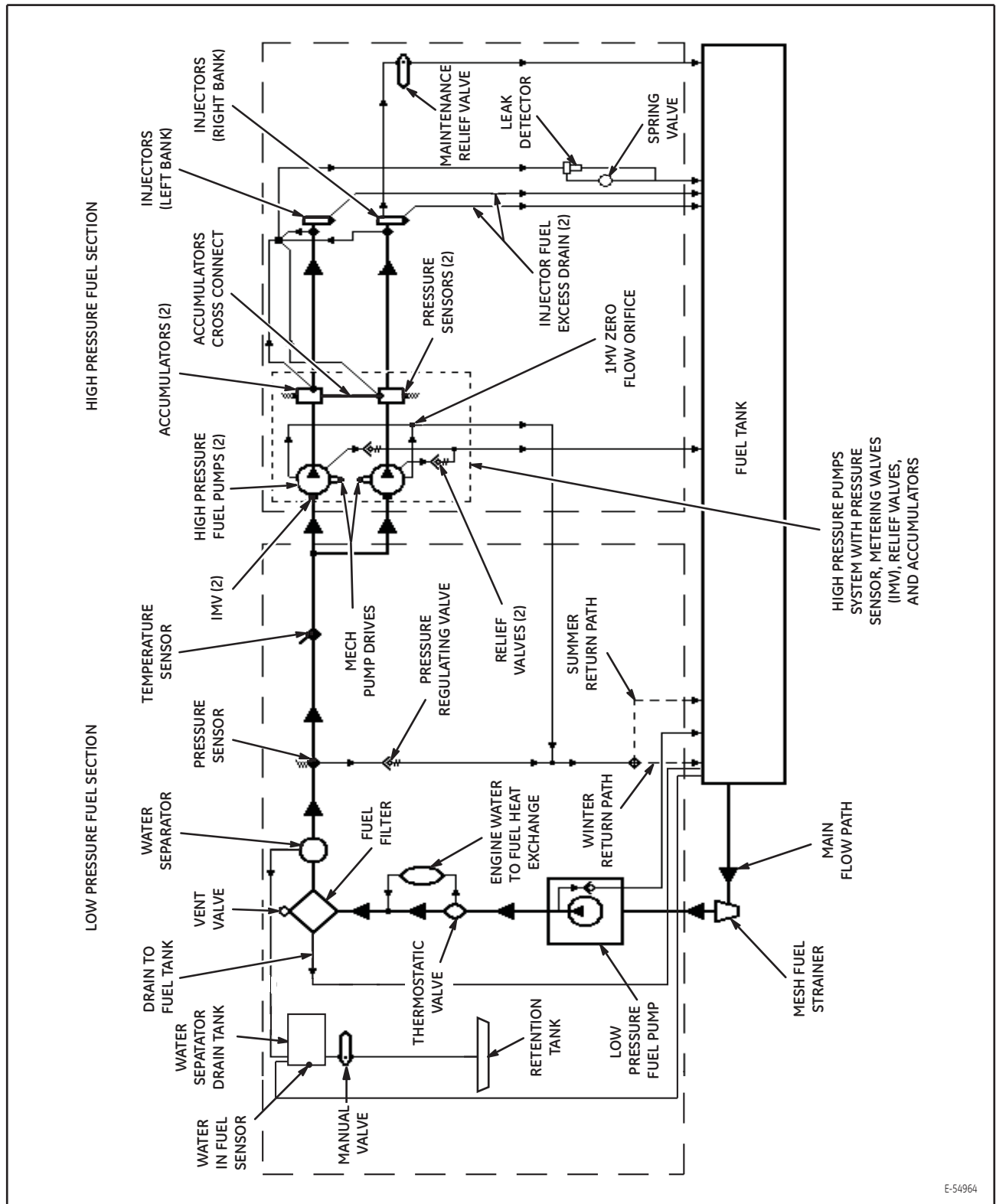


Figure 1. Diesel Engine Fuel System Block Diagram



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*Figure 2. Fuel Filters*

8. Lubricate the filter O-ring with clean diesel fuel and install the new GE approved filter elements. Use the part number in the latest revision of the parts catalog.
9. Apply Super O-lube to the new filter canister O-ring and install it into the door. Consult the latest revision of the parts catalog to determine the correct O-ring.
10. Install the doors on the filter canisters. Install the clamps by closing the quick release lever and installing the cotter pin. If the band clamp was loosened, tighten it accordingly to ensure a secure fit.
11. Prime the low pressure fuel system as per the Diesel Engine Maintenance publication listed in section 1.2., *RELATED PUBLICATIONS*.



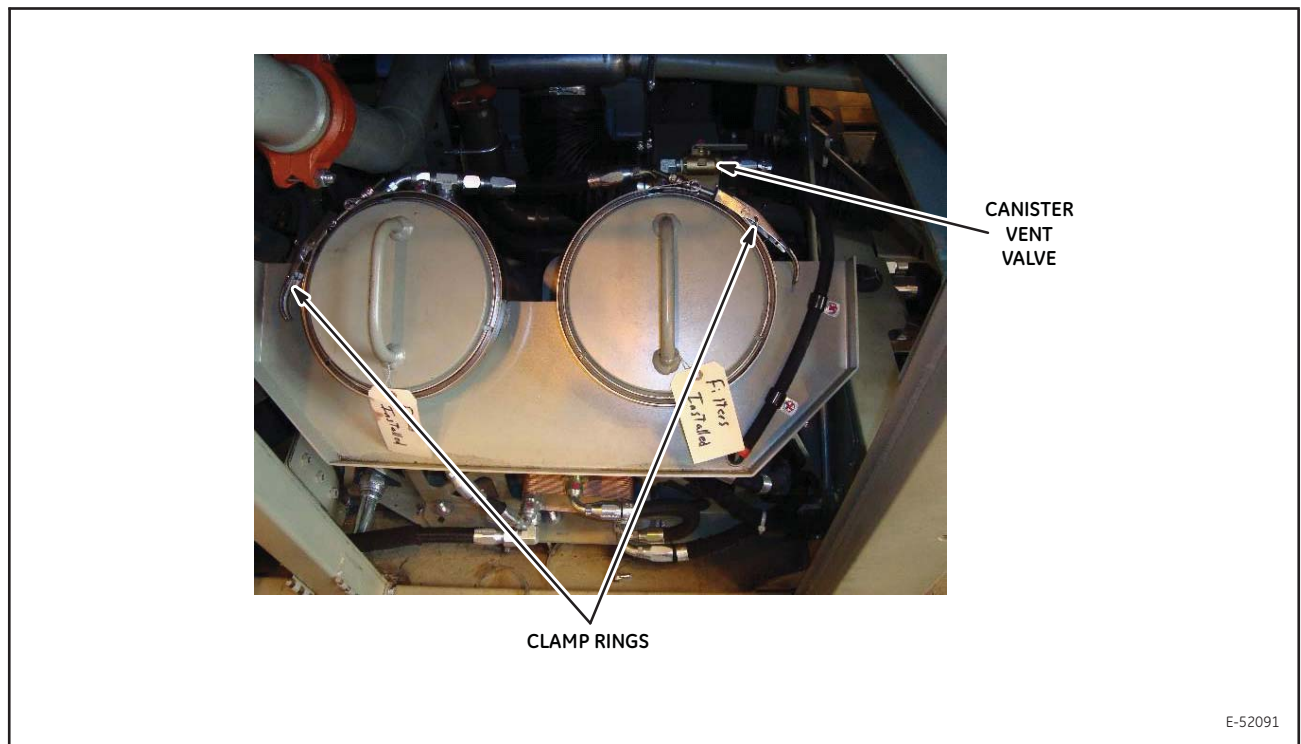


Figure 3. Fuel Canister Vent Valve and Clamp Rings

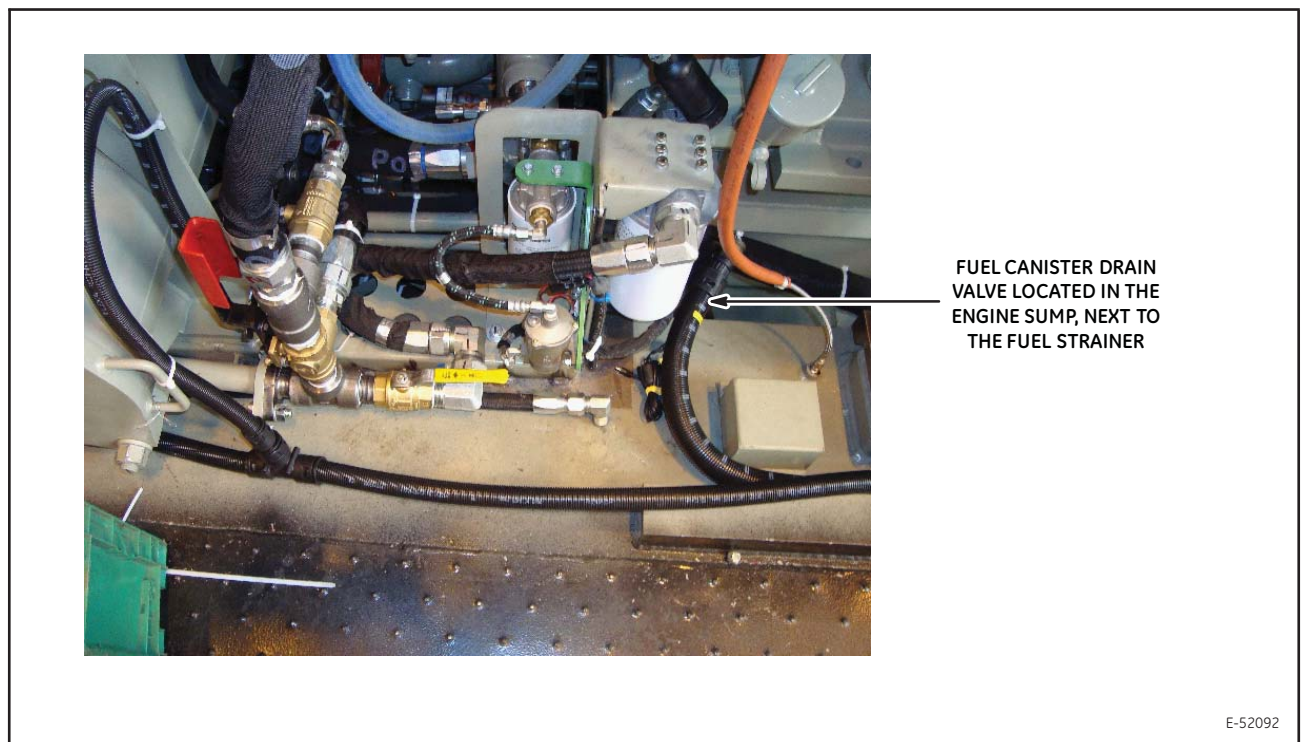


Figure 4. Fuel Canister Drain Valve

## 4.2. WATER SEPARATOR REMOVAL AND INSTALLATION

The water/fuel separator cartridge should be maintained annually. The O-rings must be replaced/renewed each time the cartridge is replaced/renewed.

**⚠ WARNING** *To prevent personal injury and potential equipment damage, make sure the engine cannot be started before beginning to remove, install, or adjust any engine components. Open the Maintenance Battery Switch (MBS) to prevent starting attempts. Also place the Fuel Pump circuit breaker (FBC) in the OFF position and apply a warning tag to the Engine Control (EC) switch.*

**⚠ CAUTION** *Do not allow the low pressure (LP) fuel lines to twist during installation. Use two wrenches where needed to prevent twisting. Failure to do so could result in fuel leaks.*

1. Disable the engine starting sequence by opening (turning off) the Maintenance Battery Switch (MBS) and placing the Fuel Pump circuit breaker (FBC) in the off position. Follow the local laws and procedures to properly secure the locomotive for maintenance. For switch locations, refer to the locomotive **OPERATING MANUAL**.
2. Open the canister vent valve handle located on the fuel canisters and open the fuel filter canister drain valve handle for 10 minutes (Figure 3 & Figure 4). Ensure that the fuel pressure is relieved.
3. Drain the fuel from water separator housing into engine sump by opening the manual drain valve which is at the bottom of the water separator drain tank (Figure 5).
4. When fuel is no longer draining, disconnect the - 8 hose connected to the water separator drain port with a 7/8 in. hand wrench. There could be fuel spill that is remaining in the hose (Figure 6).



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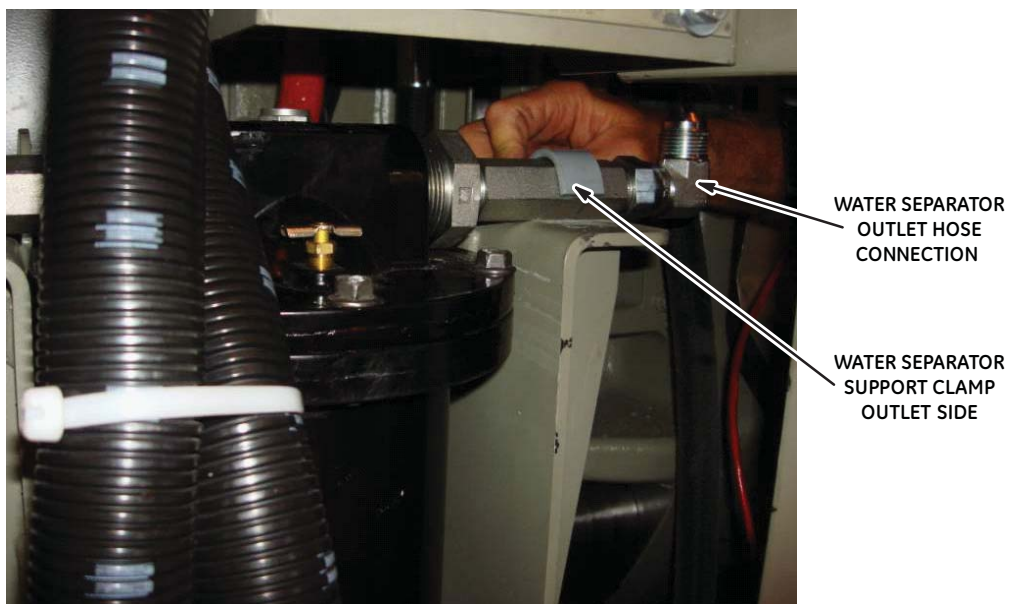
Figure 5. Water Separator Tank Manual Drain Valve

5. Disconnect the water separator inlet and outlet hose connections using 1 1/4 in. and 1 1/8 in. wrenches (Figure 7 & Figure 8).
6. Remove the separator support 3/8 in. clamp bolts on the inlet and outlet side of the separator using a 9/16 in. socket and ratchet (Figure 7 & Figure 8).
7. Remove the complete water separator assembly along with the inlet and outlet side pipe adapters for changing separator cartridge.
8. Remove the six 3/8 in. bolts on the separator housing using a 9/16 in. hand wrench and lift the housing head (Figure 9).



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*Figure 6. Hose Connection to Water Separator Drain Port*



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*Figure 7. Water Separator Support Clamp and Outlet Hose Connection*



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*Figure 8. Water Separator Inlet Hose Connection*



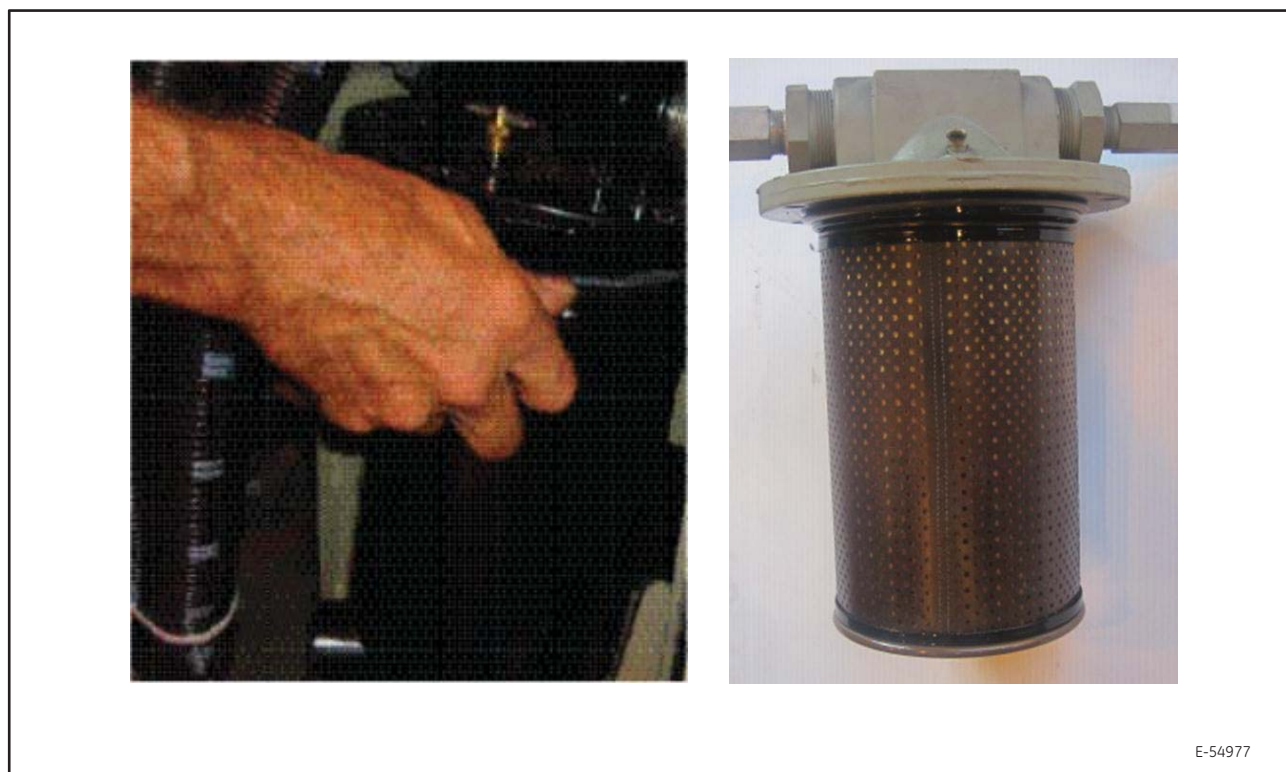


Figure 9. Remove Bolts on Separator

9. Remove the cartridge that is held in the head by about a 2 in. (51 mm) long stub (Figure 10).

**⚠ CAUTION** *Do not use sharp tools to remove the remove the element. Failure to do so could result in damage to the housing.*

10. Remove and discard the O-ring that seals the housing to the housing head (Figure 11).
11. Coat the new housing O-ring with Super O-lube and install it into the housing (Figure 11). O-rings are supplied with the new separator cartridge.
12. Insert new cartridge in the lower part of the housing and place the top housing head so that the stub fits into the cartridge and the bolt holes of the housing assembly are aligned (Figure 12). Do not touch the separator cartridge media.

**⚠ CAUTION** *Do not touch the separator cartridge media. Doing so could result in damage to the cartridge media.*

13. Insert the six 3/8 in. bolts and hand tighten all of them.
14. Torque the six bolts using a 9/16 in. socket and torque wrench to 14 Nm (10 lb.-ft.).
15. Place the separator assembly such that the pipe adapters on both sides are placed on the separator bracket.
16. Insert clamps on both sides of the pipe adapter and hand tighten them both. Torque the two 3/8 in. bolts to 34 Nm (25 lb.-ft.) using a 9/16 in. open end torque wrench.

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17. Reconnect and torque the -12 inlet and outlet hoses using a 1 1/4 in. open end torque wrench to 155 Nm (114 lb.-ft.) (Figure 5).
18. Reconnect and torque the -8 hose at the water separator drain port to 62 Nm (46 lb.-ft.) using a 7/8 in. open end torque wrench (Figure 7).
19. Prime the low pressure fuel system as per the Diesel Engine Maintenance publication listed in section 1.2., *RELATED PUBLICATIONS*



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*Figure 10. Remove Cartridge*



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Figure 11. Housing to Head O-Ring



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Figure 12. Install Cartridge

## 5. REMOVAL AND REPLACEMENT

### 5.1. ELECTRIC FUEL TRANSFER PUMP

The electric fuel transfer pump, located in the Radiator Cab, (Figure 3) is designed to provide pressurized fuel to the engine. The pump is self-priming.

Refer to **GEK-114524, P616LD DIESEL ENGINE MAINTENANCE** or the instructions on the removal and installation of the high-pressure fuel injection pump, and the fuel injectors. For removal and installation of the low pressure fuel pump see instructions below.

#### **CAUTION**

*Do not allow the low pressure (LP) fuel lines to twist during installation or removal. Use two wrenches where needed to prevent twisting. Failure to do so could result in fuel leaks.*

Low pressure fuel pump removal:

1. Disable the engine starting sequence by opening (turning off) the Maintenance Battery Switch (MBS) and placing the Fuel Pump circuit breaker (FBC) in the off position. Follow the local laws and procedures to properly secure the locomotive for maintenance. For switch locations, refer to the locomotive **OPERATING MANUAL**.
2. Remove the fiberglass air filters and filter housing as per the Engine Air Intake System publication listed in section 1.2., *RELATED PUBLICATIONS*.
3. Disconnect the 3 low pressure fuel lines from the low pressure fuel transfer pump using 32 mm and 35 mm hand wrenches.
4. Disconnect the two electrical connections by removing the two 10-24 nuts that hold fasten the wires to the pump.
5. Remove the 4 M12 mounting nuts using an 18 mm socket and ratchet.
6. Attach the appropriate lifting device to the lifting eyelet and remove the low pressure fuel transfer pump.

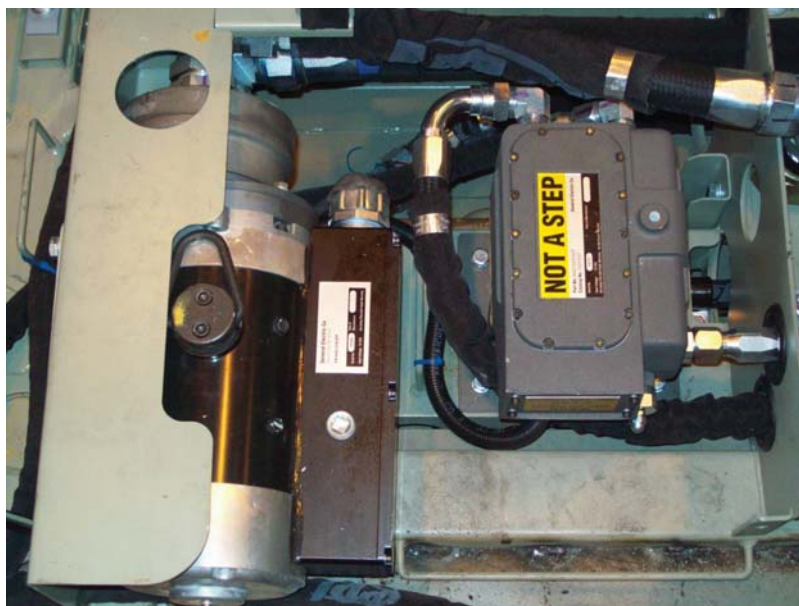
#### **WARNING**

*The low pressure fuel pump weighs approximately 39 kg. (85 lbs.). Ensure that the lifting device is of sufficient capacity*

Low pressure fuel pump installation (Figure 13):

1. Install the low pressure fuel pump and mounting bolts and torque the mounting bolts to 81 Nm (60 lb.-ft.) using a 18 mm socket and torque wrench.
2. Connect the low pressure fuel transfer pump electrical connections and torque the 10-24 nuts to 2.5 Nm (20 lbs.-in.).
3. Connect the low pressure fuel transfer pump fuel lines. Torque the two -12 lines to 115Nm (85 lb.-ft.) using a 32 mm open end torque wrench and the -16 line to 165 Nm (122 lb.-ft.) using a 35 mm open end torque wrench.
4. Install the fiberglass air filters and filter housing as per the Engine Air Intake System publication listed in section 1.2., *RELATED PUBLICATIONS*.
5. Prime the fuel system and check for leaks.





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*Figure 13. Fuel Transfer Pump on Right*

## 6. SUMMARY DATA

Not Applicable

