SENR9779-03
January 2007

Disassembly and Assembly

1103 and 1104 Industrial Engines

DC (Engine)
DD (Engine)
DJ (Engine)
DK (Engine)
RE (Engine)
RG (Engine)
RJ (Engine)
RR (Engine)
RS (Engine)
DF (Engine)
DG (Engine)

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Disassembly and Assembly Section

i02219291

Fuel Priming Pump - Remove and Install

Removal procedure

There are two types of fuel priming pump. Type 1 is mounted above the starter motor. Type 1 is combined with the fuel filter. Type 2 is mounted below the starter motor. Type 2 is not combined with the fuel filter. Type 2 is used on 4 cylinder engines only.

Removal Procedure for Type 1

Start By:

a. Remove the assembly of the filter case and the fuel filter element. Refer to this Disassembly and Assembly Manual, “Fuel Filter Base - Remove and Install”.

Note: There is an option for the three cylinder engine. The fuel priming pump and the fuel filter can be installed onto the application rather than onto the engine. If this is the case, refer to the appropriate installation manual that is supplied by the OEM for further information.

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

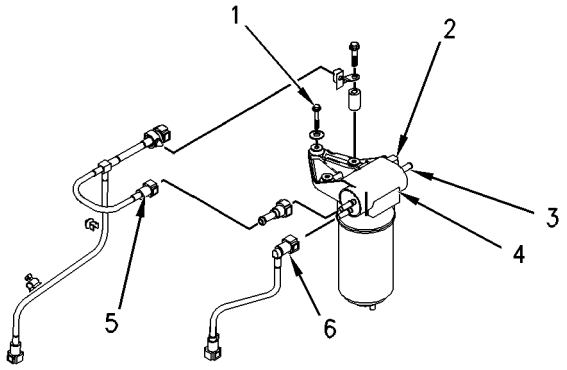

Illustration 1 g00952432

Typical example

1. Disconnect the tube assembly (5). Disconnect the tube assembly (6). Install dust covers onto the connectors for the fuel priming pump.

2. Disconnect the fuel return line from the connector (3). Install a dust cover to the connector (3).

3. Disconnect the harness assembly from the connector (2).

4. Support the fuel priming pump. Remove the three setscrews (1) and discard the rubber washers. Remove the fuel priming pump (4).

Removal Procedure for Type 2

Note: Put identification marks on the two fuel hose assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies . This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

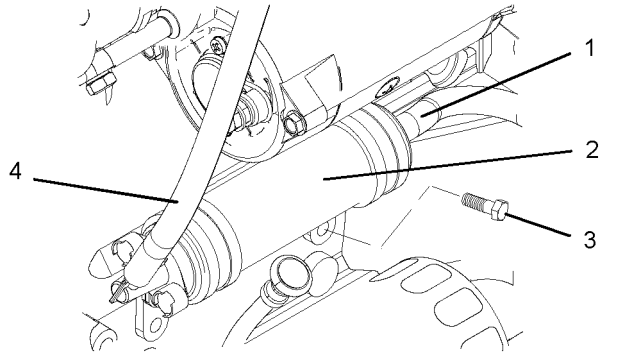

Illustration 2 g01121719

1. Disconnect the fuel hose assembly (1). Disconnect the fuel hose assembly (4). Install dust covers onto the connectors for the fuel priming pump.

2. Disconnect the harness assembly from the electrical connector on the fuel priming pump(2).

3. Support the fuel priming pump. Remove the two setscrews (3). Remove the fuel priming pump (2).

Installation Procedure

There are two types of fuel priming pump. Type 1 is mounted above the starter motor. Type 1 is combined with the fuel filter. Type 2 is mounted below the starter motor. Type 2 is not combined with the fuel filter. Type 2 is used on 4 cylinder engines only.

Installation Procedure for Type 1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

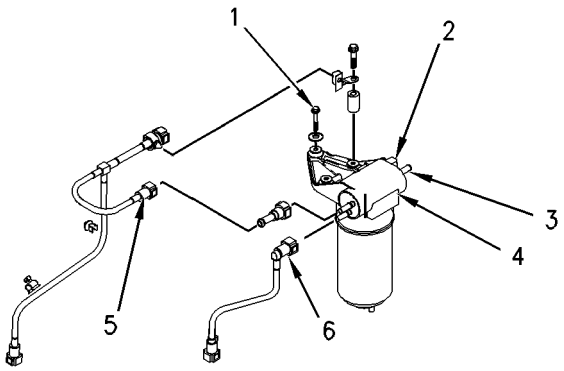

Illustration 3 g00952432
Typical example

1. Clean the external surfaces of the fuel priming pump (4). Position the fuel priming pump (4) and install the three setscrews (1) and new rubber washers.

2. Remove the dust covers from the fuel priming pump (4). Remove the plugs from the tube assemblies. Connect the tube assembly (5). Connect the tube assembly (6).

3. Connect the fuel return line to the connector (3).

4. Connect the harness assembly to the connector (2).

5. Remove the air from the fuel system. Refer to the Operations and Maintenance Manual, “Fuel System - Prime”.

Installation Procedure for Type 2

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

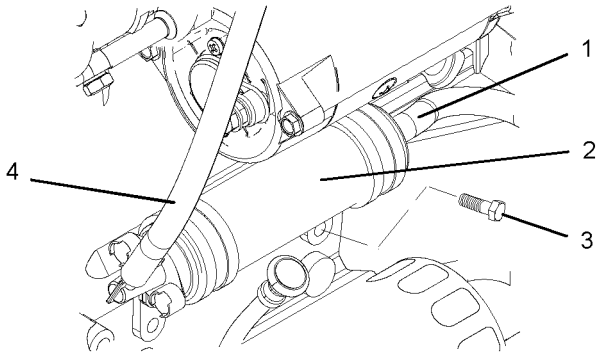

Illustration 4 g01121719

1. Clean the external surfaces of the fuel priming pump (2). Position the fuel priming pump (2) and install the two setscrews (3).

2. Remove the dust covers from the fuel priming pump. Remove the plugs from the fuel hose assemblies. Connect the fuel hose assembly (1). Connect the fuel hose assembly (4).

3. Connect the harness assembly to the electrical connector on the fuel priming pump (2).

4. Remove the air from the fuel system. Refer to the Operations and Maintenance Manual, “Fuel System - Prime”.

i02224029

Fuel Filter Base - Remove and Install

Removal Procedure

There are two types of fuel filter. The element filter has a fuel filter element in a filter case. The element filter is combined with the fuel priming pump. The spin-on filter is self-contained. The spin-on filter is not combined with the fuel priming pump. The spin-on filter is used on 4 cylinder engines only.

Removal Procedure for the Element Filter

Note: There is an option for the three cylinder engine. The fuel filter and the fuel priming pump can be installed onto the application rather than onto the engine. If this is the case, refer to the appropriate OEM information as well to this text.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Note: The removal procedure is identical for the four cylinder and the three cylinder engines. The illustrations show the four cylinder engine.

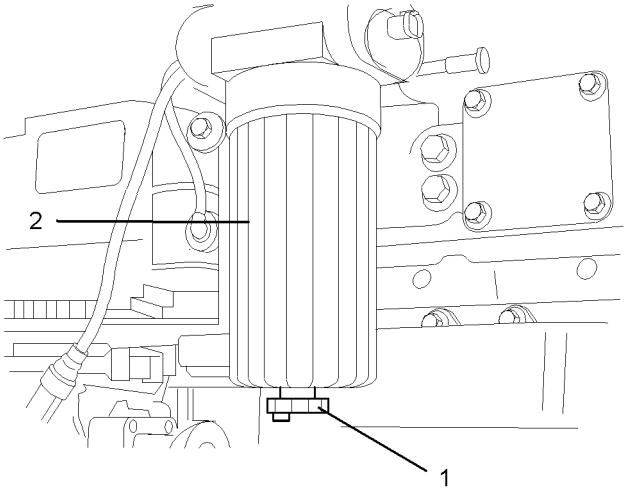

Illustration 5 g01010637
Typical example

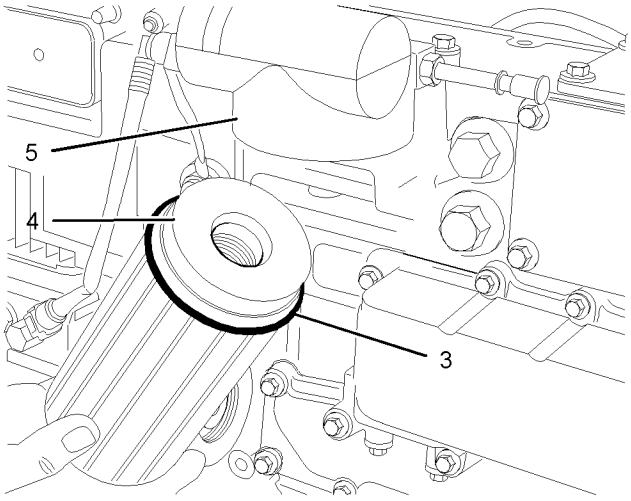

Illustration 6 g01010595
Typical example

1. Place a suitable container below the filter in order to collect the spilled fuel. Thoroughly clean the outside surfaces of the fuel filter. Open the drain (1) in order to drain the fuel from the filter.

2. Use a suitable strap wrench to loosen the filter case (2). Remove the filter case (2) from the filter head (5).

3. Push down against the spring pressure that is applied to the filter element (4). Rotate the filter element (4) counterclockwise in order to release the filter element from the filter case (2).

4. Discard the filter element (4) and the O-ring (3).

Removal Procedure for the Spin-on Filter

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

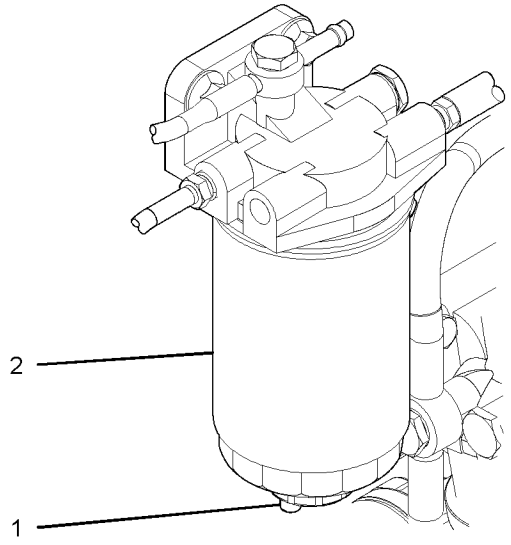

Illustration 7 g01121724

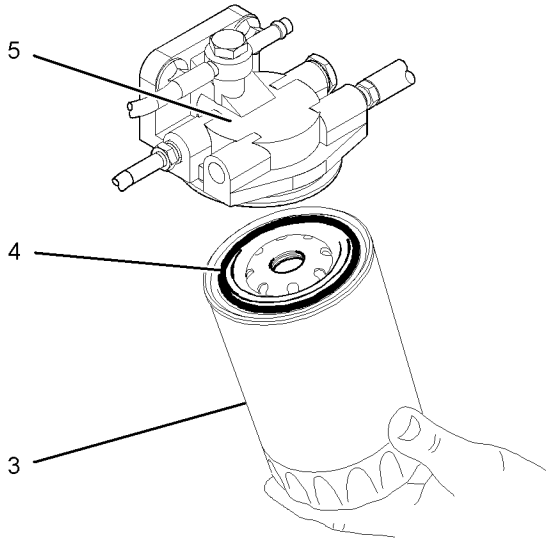

Illustration 8 g01121763

1. Turn the valves for the fuel lines (if equipped) to the OFF position before performing this maintenance. Place a tray under the fuel filter in order to catch any fuel that might spill. Clean up any spilled fuel immediately.

2. Clean the outside of the fuel filter assembly. Open the fuel drain (1) and drain the fuel into a suitable container.

3. Use a suitable tool in order to remove the spin-on filter (2) from the filter head (5).

4. Discard the filter element (3) and the O-ring (4).

Installation Procedure

There are two types of fuel filter. The element filter has a fuel filter element in a filter case. The element filter is combined with the fuel priming pump. The spin-on filter is self-contained. The spin-on filter is not combined with the fuel priming pump.

Installation Procedure for the Element Filter

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

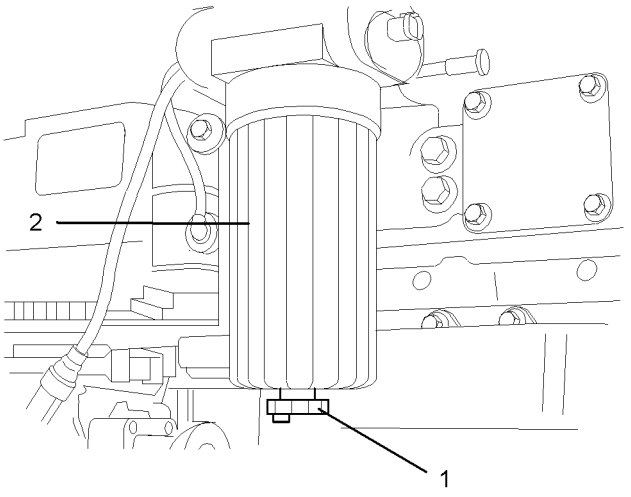

Illustration 9 g01010637

Typical example

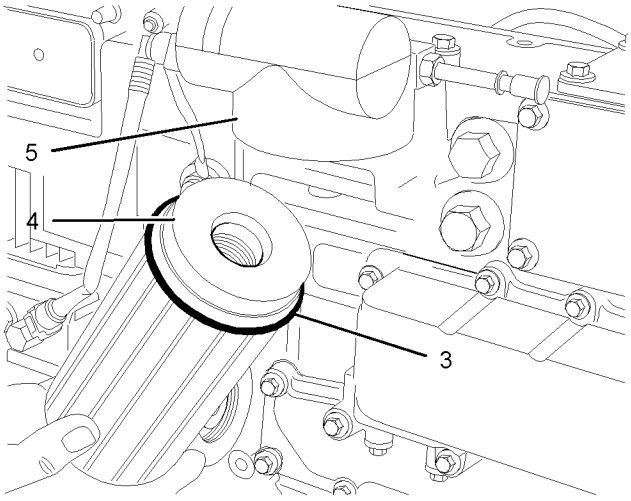

Illustration 10 g01010595

Typical example

1. Thoroughly clean the inside of the filter case (2) and thoroughly clean the lower face of the filter head (5).

2. Inspect the thread of a new filter element (4) in order to ensure that the thread is not damaged. Inspect the thread of the adapter in the filter head (5) in order to ensure that the thread is not damaged.

3. Inspect the condition of the spring and ensure that the spring is correctly located within the filter case (2).

4. Install the new filter element (4) into the filter case (2). Push the filter element against the spring pressure and rotate the filter element in a clockwise direction in order to secure the filter element within the filter case (2).

5. Lightly lubricate a new O-ring (3) with clean fuel oil. Install the new O-ring (3) into the recess within the filter case (2).

6. Close the drain (1).

7. Remove the air from the fuel system. Refer to the Operations and Maintenance Manual, “Fuel System - Prime”. Remove the suitable container and dispose of the fuel that has drained as waste.

Installation Procedure for the Spin-on Filter

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

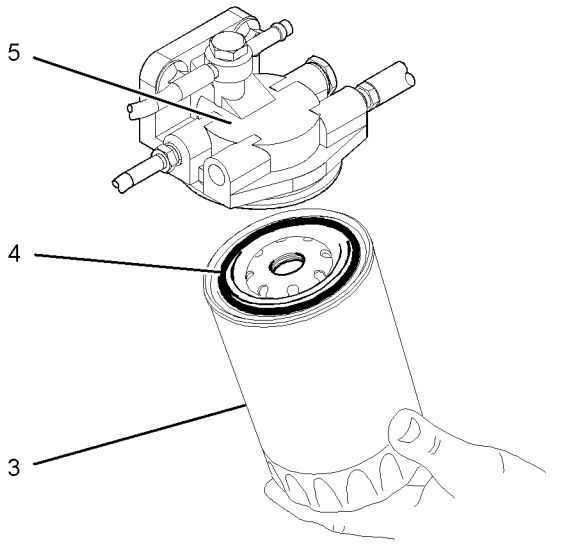

Illustration 11 g01121763

1. Thoroughly clean the lower face of the filter head (5).

2. Inspect the thread of a new filter element (3) in order to ensure that the thread is not damaged. Inspect the thread of the adapter in the filter head (5) in order to ensure that the thread is not damaged.

3. Lubricate the sealing ring (4) with clean fuel oil.

4. Install the spin-on filter (3) onto the filter head (5).

5. Tighten the spin-on filter by hand until the sealing ring contacts the filter head. Rotate the spin-on filter through 90 degrees.

6. Close the drain (1).

7. Prime the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime”.

i02221357

Fuel Injection Lines - Remove

Removal Procedure

Start By:

a. If equipped, remove the cover for the fuel injectors. Refer to this Disassembly and Assembly Manual, “Fuel Injector Cover - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Note: The removal procedure is identical for four cylinder and three cylinder engines. The illustration shows the four cylinder engine.

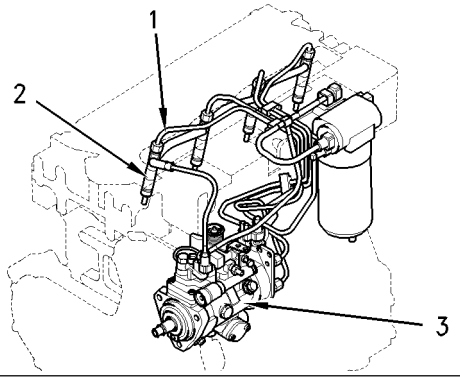

Illustration 12 g00955826
Typical example

1. Disconnect the fuel injection lines (1) at the fuel injectors (2).

2. Disconnect the fuel injection lines (1) at the fuel injection pump (3).

3. If it is necessary remove the clamps for the fuel injection lines or loosen the clamps for the fuel injection lines. Remove the fuel injection lines (1).

4. Install dust caps onto the ports of the fuel injectors and onto the ports of the fuel injection pump. Install dust caps onto both ends of the fuel injection lines.

i02221359

Fuel Injection Lines - Install

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Note: The installation procedure is identical for the four cylinder and the three cylinder engines. The illustration shows the four cylinder engine.

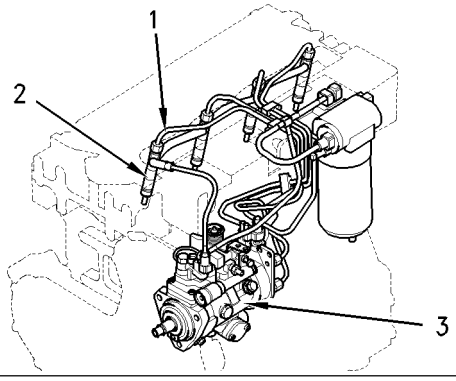

Illustration 13 g00955826

Typical example

1. Inspect the fuel injection lines (1) for wear and for damage. Replace any fuel injection line (1) that is worn or any fuel injection line that is damaged.

2. Loosely install the clamps for the fuel injection lines (1).

3. Remove the dust caps from the fuel injection pump (3) and from the fuel injectors (2). Remove the dust caps from the fuel injection lines (1).

4. Loosely connect the nuts at both ends of the fuel injection lines (1).

5. Ensure that each fuel injection line (1) does not contact any other fuel injection line or any other engine component. Tighten the fasteners for the clamps for the fuel injection lines (1). Check that the fuel injection lines (1) are still clear of other components.

6. Tighten the fuel injection lines (1) at the fuel injectors (2) to a torque of 30 N·m (22 lb ft).

7. Tighten the fuel injection lines (1) at the fuel injection pump (3) to 30 N·m (22 lb ft).

8. Remove the air from the fuel system. Refer to the Operations and Maintenance Manual, “Fuel System - Prime”.

End By:

a. If equipped, install the cover for the fuel injectors. Refer to this Disassembly and Assembly Manual, “Fuel Injector Cover - Remove and Install”.

i02221380

Fuel Injector Cover - Remove and Install (If Equipped)

Removal Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The removal procedure is identical for the four cylinder and the three cylinder engines. The illustration shows the four cylinder engine.

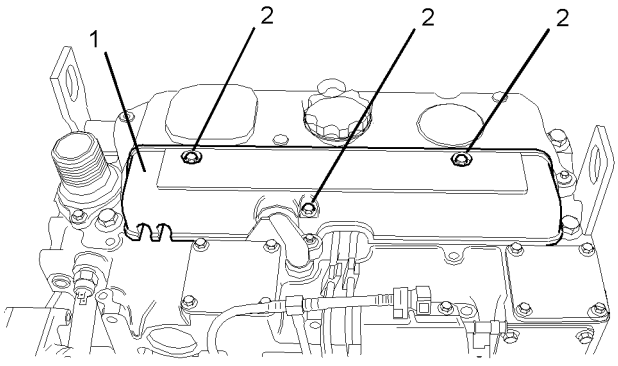

Illustration 14 g01011111

Typical example

1. Thoroughly clean all of the outer surfaces of the cover (1) for the fuel injectors.

2. Remove the setscrews (2) from the cover (1).

3. Remove the cover (1).

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The installation procedure is identical for the four cylinder and the three cylinder engines. The illustration shows the four cylinder engine.

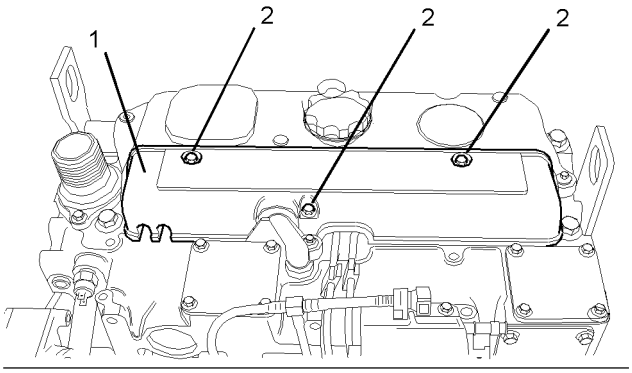

Illustration 15 g01011111
Typical example

1. Thoroughly clean all of the inner surfaces of the cover (1) for the fuel injectors.
2. Install the cover (1).
3. Install the setscrews (2) for the cover (1). Tighten the setscrews (2) to a torque of 9 N·m (7 lb ft).

i02216956

Fuel Injection Pump - Remove (Delphi DP210)

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Remove”.

b. Remove the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Remove the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

Note: The removal procedure is identical for the four cylinder and the three cylinder engines. The illustrations show the four cylinder engine.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Finding Top Center Position for No. 1 Piston”.

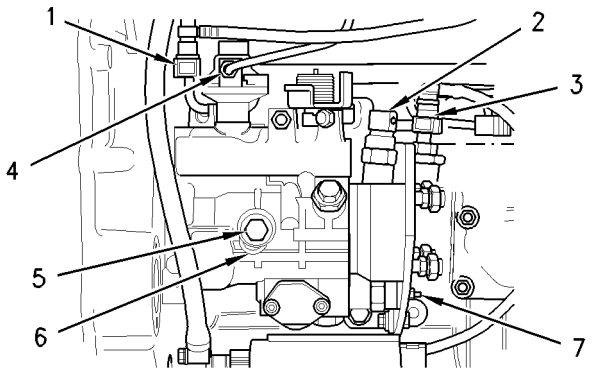

Illustration 16 g00956204
Typical example

2. Loosen the locking screw (5). Rotate the spacer (6) in order to allow the locking screw (5) to tighten against the shaft of the fuel injection pump. Rotate the fuel injection pump gear in a counterclockwise direction in order to remove the backlash. Tighten the locking screw (5) to a torque of 17 N·m (13 lb ft).

Note: The locking screw (5) must be tightened in order to prevent the shaft of the fuel injection pump from rotating. The shaft of the fuel injection pump must not be rotated after the fuel injection pump has been removed from the engine.

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies with suitable plastic plugs. Also install dust caps on all of the connectors on the fuel injection pump. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

3. Disconnect the fuel return line (1). Disconnect the tube assembly (4) from the fuel injection pump.

4. Disconnect the fuel line (3).

5. Disconnect the harness assembly (2) from the timing advance solenoid (7).

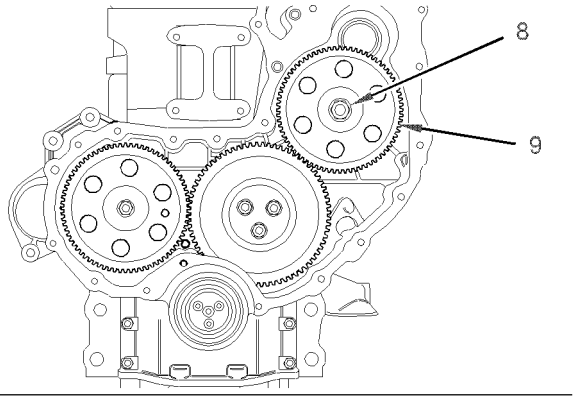

Illustration 17 g01011369
Typical example

6. Remove the nut (8) and the washer from the shaft of the fuel injection pump.

7. Use a suitable puller in order to remove the fuel injection pump gear (9).

Note: Do not pry the fuel injection pump gear (9) from the shaft of the fuel injection pump.

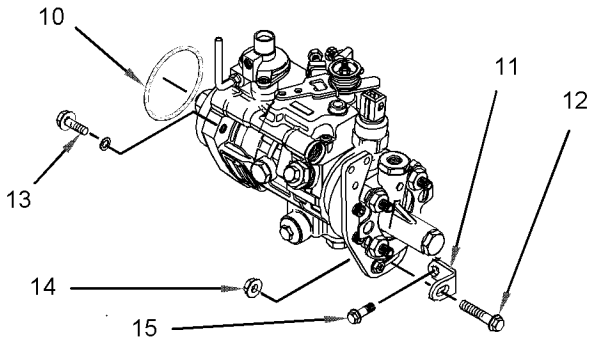

Illustration 18 g01062058
Typical example

Note: The two steps that follow are only required if the bracket (11) is installed on the fuel injection pump.

8. Remove the nut (14). Remove the bolt (12).

9. If necessary, remove the setscrew (15) and the bracket (11) from the cylinder block.

10. Remove the setscrews (13) in order to remove the fuel injection pump.

11. Remove the fuel injection pump from the front housing. Remove the O-ring (10) and discard the O-ring from the fuel injection pump.

i02075326

Fuel Injection Pump - Remove (Delphi STP)

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Remove”.

b. Remove the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Remove the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Finding Top Center Position for No. 1 Piston”.

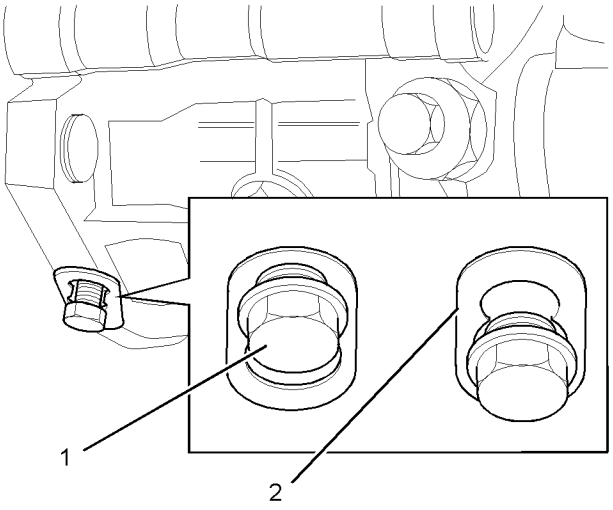

Illustration 19 g01061708

2. Loosen the locking screw (1). Rotate the spacer (2) in order to allow the locking screw (1) to tighten against the shaft of the fuel injection pump. Rotate the fuel injection pump gear in a counterclockwise direction in order to remove the backlash. Tighten the locking screw (1) to a torque of 13 N·m (9.6 lb ft).

Note: The locking screw (1) must be tightened in order to prevent the shaft of the fuel injection pump from rotating. The shaft of the fuel injection pump must not be rotated after the fuel injection pump has been removed from the engine.

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies with suitable plastic plugs. Also install dust caps on all of the connectors on the fuel injection pump. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

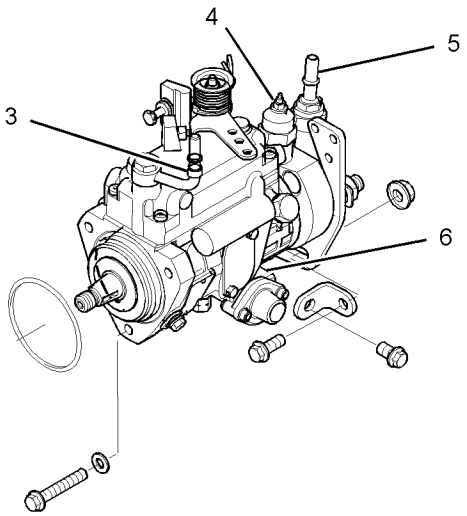

Illustration 20 g01062395

3. Disconnect the fuel return line (3).

4. Disconnect the fuel line (5).

5. Disconnect the harness assembly (4) from the timing advance solenoid (6).

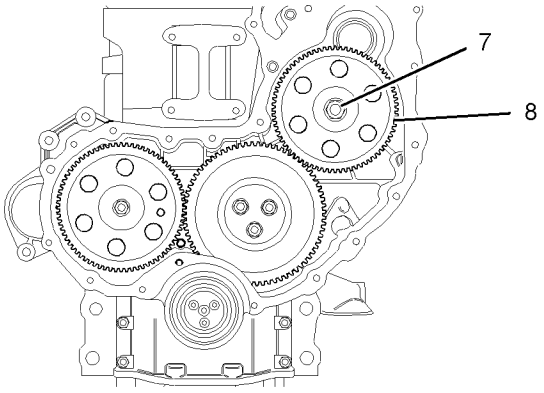

Illustration 21 g01062397

Typical example

6. Remove the nut (7) and the washer from the shaft of the fuel injection pump.

7. Use a suitable puller in order to remove the fuel injection pump gear (8).

Note: Do not pry the fuel injection pump gear (9) from the shaft of the fuel injection pump.

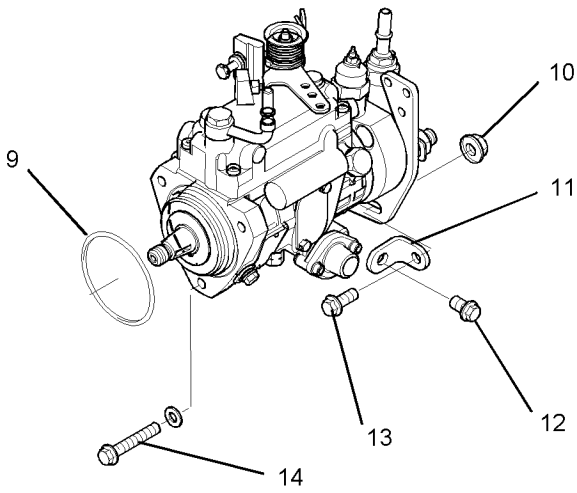

Illustration 22 g01062396

8. Remove the nut (10). Remove the bolt (13).

9. If necessary, remove the setscrew (14) and the bracket (11) from the cylinder block.

10. Remove the setscrews (14) in order to remove the fuel injection pump.

11. Remove the fuel injection pump from the front housing. Remove the O-ring (9) and discard the O-ring from the fuel injection pump.

i02224700

Fuel Injection Pump - Remove (Delphi DPG)

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Remove”.

b. Remove the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Remove the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Finding Top Center Position for No. 1 Piston”.

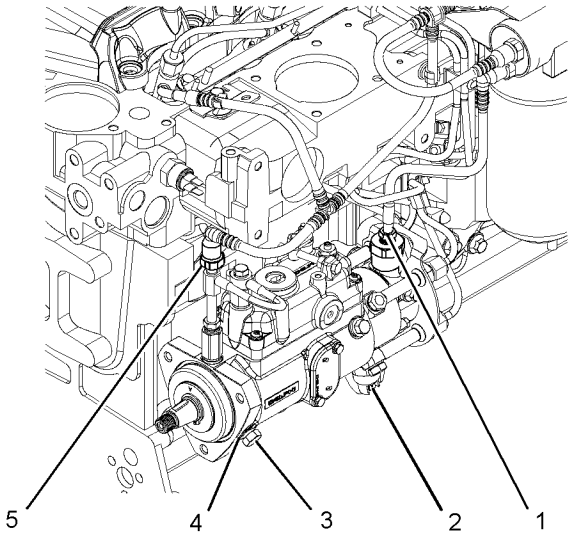

Illustration 23 g01122132

2. Loosen the locking screw (3). Rotate the spacer (4) in order to allow the locking screw (3) to tighten against the shaft of the fuel injection pump. Rotate the fuel injection pump gear in a counterclockwise direction in order to remove the backlash. Tighten the locking screw (3) to a torque of 13 N·m (9.6 lb ft).

Note: The locking screw (3) must be tightened in order to prevent the shaft of the fuel injection pump from rotating. The shaft of the fuel injection pump must not be rotated after the fuel injection pump has been removed from the engine.

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies with suitable plastic plugs. Also install dust caps on all of the connectors on the fuel injection pump. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

3. Disconnect the fuel return line (5).

4. Disconnect the fuel line (1).

5. Disconnect the harness assembly from the fuel shutoff solenoid (2).

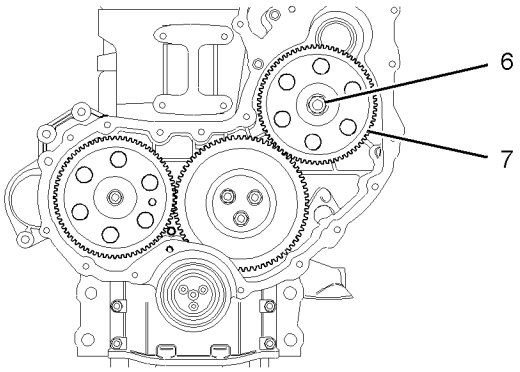

Illustration 24 g01122133

6. Remove the nut (6) and the washer from the shaft of the fuel injection pump.

7. Use a suitable puller in order to remove the fuel injection pump gear (7).

Note: Do not pry the fuel injection pump gear (7) from the shaft of the fuel injection pump.

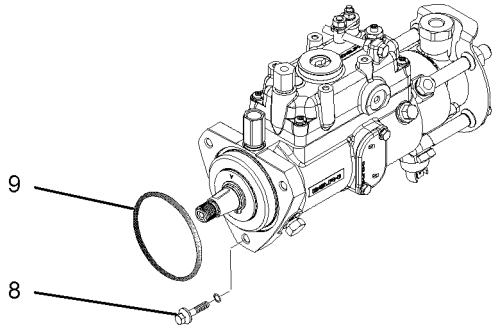

Illustration 25 g01122134

8. Remove the setscrews (8) in order to remove the fuel injection pump.

9. Remove the fuel injection pump from the front housing. Remove the O-ring (9) and discard the O-ring from the fuel injection pump.

i01941022

Fuel Injection Pump - Remove (Bosch EPVE for the 1104 engines only)

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Remove and Install”.

b. Remove the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Remove the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Finding Top Center Position for No. 1 Piston”.

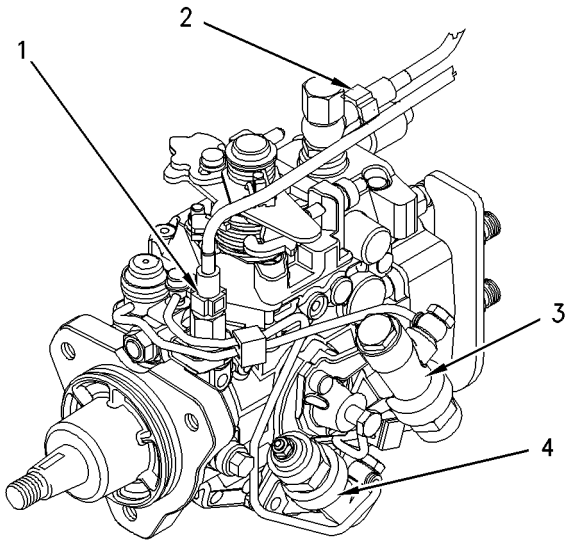

Illustration 26 g00996409

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies with suitable plastic plugs. Also install dust caps on all of the connectors on the fuel injection pump. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

2. Disconnect the tube assembly (1) from the fuel injection pump. Disconnect the tube assembly (2) from the fuel injection pump.

3. Disconnect the wiring harness assembly from the cold start advance unit (3). Disconnect the wiring harness assembly from the engine shutoff solenoid (4).

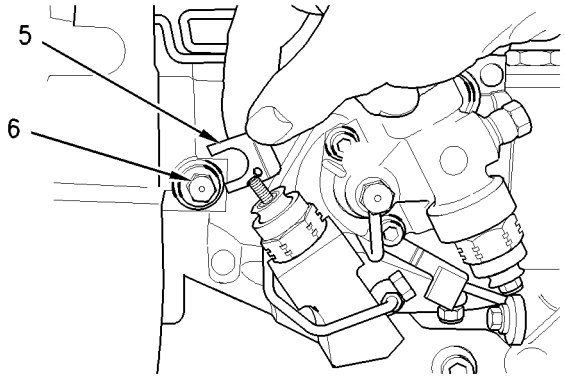

Illustration 27 g00996410

4. Loosen the locking screw (6). Move the spacer (5) in order to allow the locking screw (6) to tighten against the shaft of the fuel injection pump. Rotate the fuel injection pump gear in a counterclockwise direction in order to remove the backlash. Tighten the locking screw (6) to a torque of 31 N·m (23 lb ft).

Note: The locking screw (6) must be tightened in order to prevent the shaft of the fuel injection pump from rotating. The shaft of the fuel injection pump must not be rotated after the fuel injection pump has been removed from the engine.

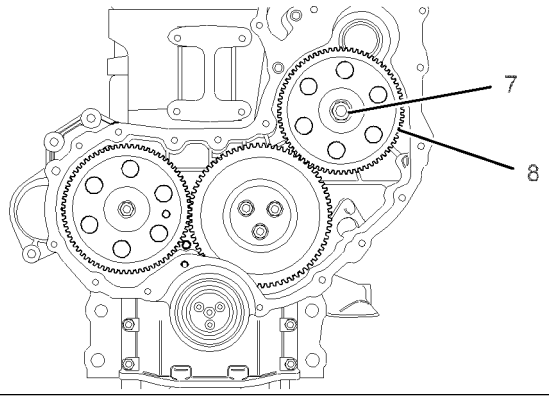

Illustration 28 g01011474

5. Remove the nut (7) and the washer from the shaft of the fuel injection pump.

6. Use a suitable puller in order to remove the fuel injection pump gear (8).

Note: Do not pry the fuel injection pump gear from the shaft of the fuel injection pump.

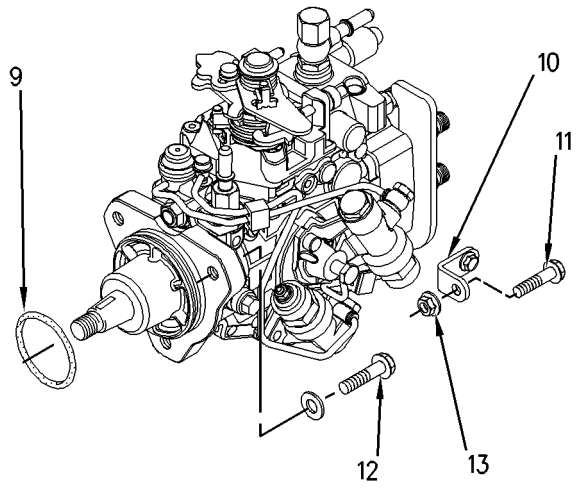

Illustration 29 g00996474

7. Remove the nut (13). Remove the bolt (11).

8. If necessary, remove the setscrew and the bracket (10) from the cylinder block.

9. Remove the setscrews (12) in order to remove the fuel injection pump.

10. Remove the fuel injection pump from the front housing. Remove the O-ring (9) from the fuel injection pump and discard the O-ring.

i02220108

Fuel Injection Pump - Remove (Delphi DPA)

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Remove”.

b. Remove the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Remove the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Finding Top Center Position for No. 1 Piston”.

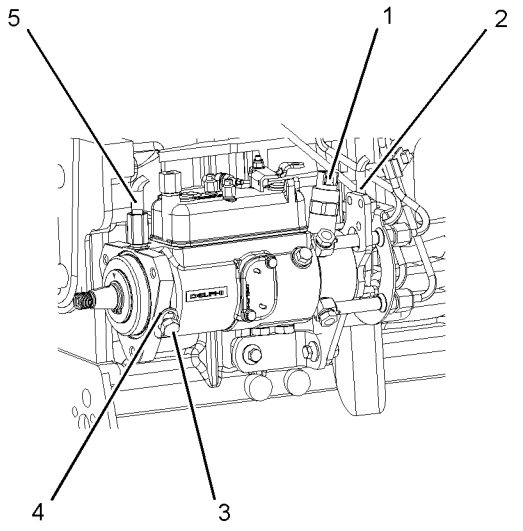

Illustration 30 g01120559
Typical example

2. Loosen the locking screw (3). Rotate the spacer (4) in order to allow the locking screw (3) to tighten against the shaft of the fuel injection pump. Rotate the fuel injection pump gear in a counterclockwise direction in order to remove the backlash. Tighten the locking screw (3) to a torque of 13 N·m (9.6 lb ft).

Note: The locking screw (3) must be tightened in order to prevent the shaft of the fuel injection pump from rotating. The shaft of the fuel injection pump must not be rotated after the fuel injection pump has been removed from the engine.

Note: Put identification marks on all fuel hose assemblies and on all tube assemblies for installation purposes. After being disconnected, plug all fuel hose assemblies and plug all tube assemblies with suitable plastic plugs. Also install dust caps on all of the connectors on the fuel injection pump. This helps prevent fluid loss, and this helps to keep contaminants from entering the system.

3. Disconnect the fuel return line (5).

4. Disconnect the fuel line (2).

5. Disconnect the harness assembly from the fuel shutoff solenoid (1).

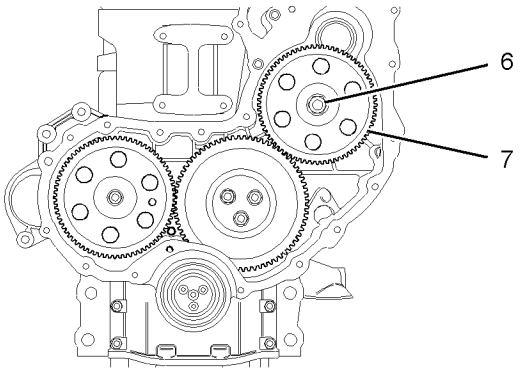

Illustration 31 g01120567
Typical example

6. Remove the nut (6) and the washer from the shaft of the fuel injection pump.

7. Use a suitable puller in order to remove the fuel injection pump gear (7).

Note: Do not pry the fuel injection pump gear (7) from the shaft of the fuel injection pump.

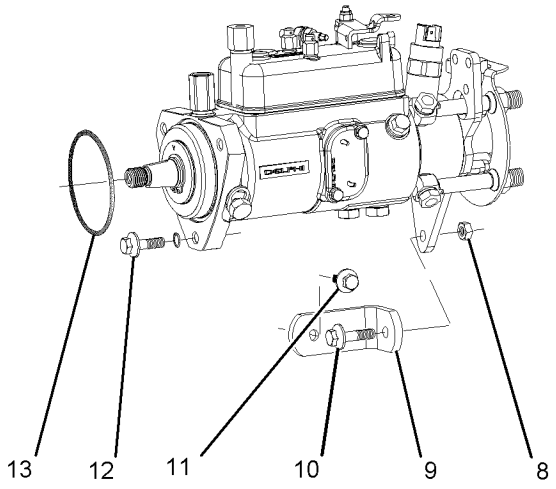

Illustration 32 g01120575
Typical example

8. Remove the nut (8). Remove the bolt (10).

9. If necessary, remove the setscrew (11) and the bracket (9) from the cylinder block.

10. Remove the setscrews (12) in order to remove the fuel injection pump.

11. Remove the fuel injection pump from the front housing. Remove the O-ring (13) and discard the O-ring from the fuel injection pump.

i02216957

Fuel Injection Pump - Install (Delphi DP210)

Installation Procedure

Note: The installation procedure is identical for the four cylinder and the three cylinder engines. The illustrations show the four cylinder engine.

Note: The shaft of the fuel injection pump must remain locked until the timing gear (9) has been installed and tightened onto the shaft of the fuel injection pump. The locking screw (5) must remain locked until you are instructed to loosen the locking screw. The fuel injection pump must be returned to your Perkins Dealer if the shaft of the fuel injection pump was rotated accidentally.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Fuel Injection Timing - Check”.

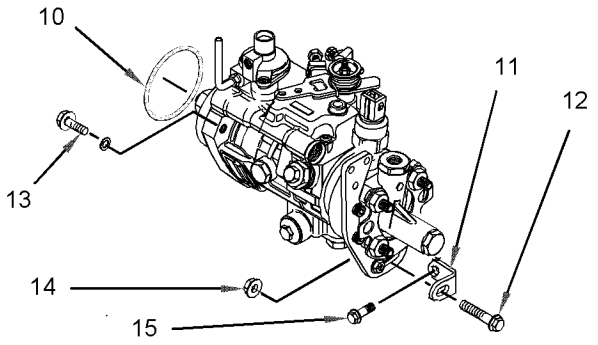

Illustration 33 g01062058
Typical example

Note: Do not lubricate the new O-ring (10). The O-ring should be installed dry.

2. Install the new O-ring (10) onto the fuel injection pump. Position the fuel injection pump onto the front housing. Install the setscrews (13). Tighten the setscrews (13) to a torque of 25 N·m (18 lb ft).

Note: The two steps that follow are only required if the bracket (11) is installed on the fuel injection pump.

3. Install the setscrew (15) and the bracket (11) onto the cylinder block if the bracket was previously removed. Ensure that the bracket (11) supports the fuel injection pump without applying any other external force on the fuel injection pump. Tighten the setscrew (15) to a torque of 44 N·m (32 lb ft).

4. Install the bolt (12) and the nut (14).

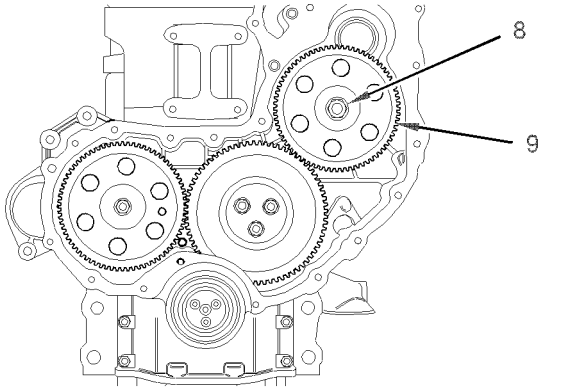

Illustration 34 g01011369
Typical example

Note: Ensure that the mating surfaces of the fuel injection pump gear and the shaft of the fuel injection pump are clean. Lubricate the threads of the shaft for the fuel injection pump. The nut (8) must turn freely until contact is made with the fuel injection pump gear.

5. Position the fuel injection pump gear (9) onto the shaft of the fuel injection pump. Install the washer and the nut (8). Rotate the fuel injection pump gear (9) in a counterclockwise direction in order to remove the backlash. Tighten the nut (8) to a torque of 24 N·m (17 lb ft).

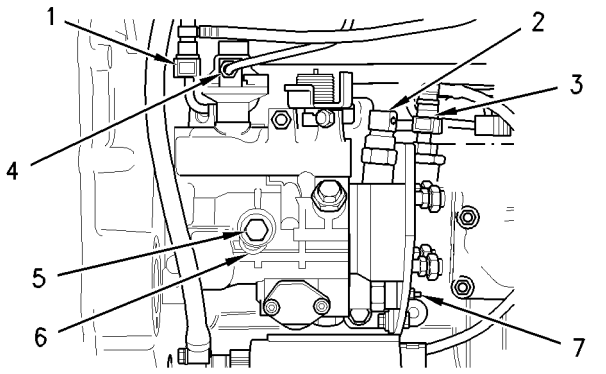

Illustration 35 g00956204
Typical example

6. Connect the harness assembly to the timing advance solenoid (7).

7. Connect the harness assembly (2).

8. Remove all of the dust caps from the connectors on the fuel injection pump. Remove all of the plugs from the fuel hose assemblies and from the tube assemblies.

9. Connect the fuel line (3), the fuel return line (1), and the tube assembly (4) to the fuel injection pump.

10. Loosen the locking screw (5). Move the spacer (6) in order to prevent the locking screw (5) from tightening against the shaft of the fuel injection pump. Tighten the locking screw (5) to a torque of 12 N·m (106 lb in).

Note: The spacer (6) must be correctly positioned and locking screw (5) must be tightened in order to prevent the locking screw from contacting the shaft of the fuel injection pump.

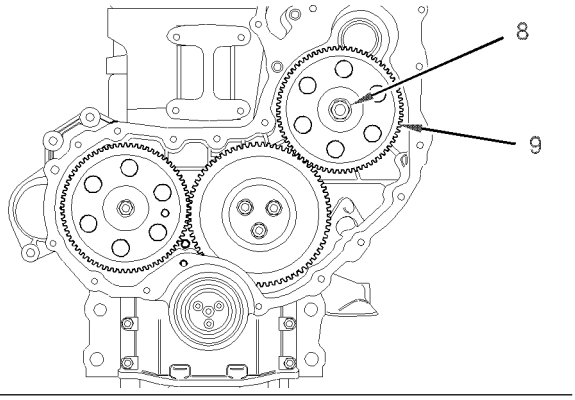

Illustration 36 g01011369
Typical example

11. Tighten the nut (8) to a torque of 88 N·m (65 lb ft).

End By:

a. Install the front cover. Refer to this Disassembly and Assembly Manual, “Front Cover - Remove and Install”.

b. Install the crankshaft pulley. Refer to this Disassembly and Assembly Manual, “Crankshaft Pulley - Remove and Install”.

c. Install the fuel injection lines. Refer to this Disassembly and Assembly Manual, “Fuel Injection Lines - Install”.

i02075327

Fuel Injection Pump - Install (Delphi STP)

Installation Procedure

Note: The shaft of the fuel injection pump must remain locked until the timing gear (8) has been installed and tightened onto the shaft of the fuel injection pump. The locking screw (1) must remain locked until you are instructed to loosen the locking screw. The fuel injection pump must be returned to your Perkins Dealer if the shaft of the fuel injection pump was rotated accidentally.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Ensure that the No. 1 cylinder is at top dead center on the compression stroke. Refer to the Testing and Adjusting Manual, “Fuel Injection Timing - Check”.

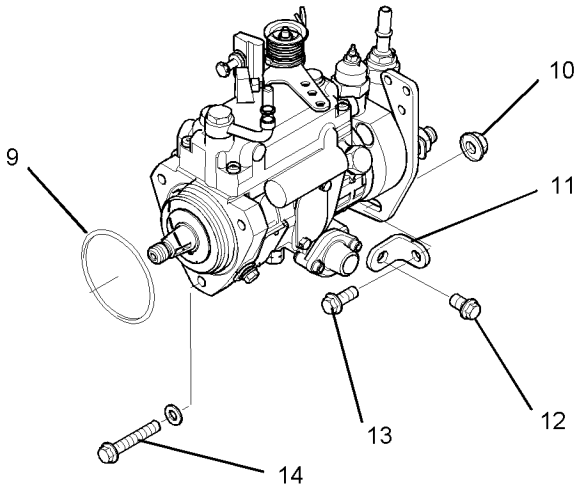

Illustration 37 g01062396

Note: Do not lubricate the new O-ring (9). The O-ring should be installed dry.

2. Install the new O-ring (9) onto the fuel injection pump. Position the fuel injection pump onto the front housing. Install the setscrews (14). Tighten the setscrews (14) to a torque of 25 N·m (18 lb ft).

3. Install the setscrew (12) and the bracket (11) onto the cylinder block if the bracket was previously removed. Ensure that the bracket (11) supports the fuel injection pump without applying any other external force on the fuel injection pump. Tighten the setscrew (12) to a torque of 44 N·m (32 lb ft).

4. Install the bolt (13) and the nut (10).

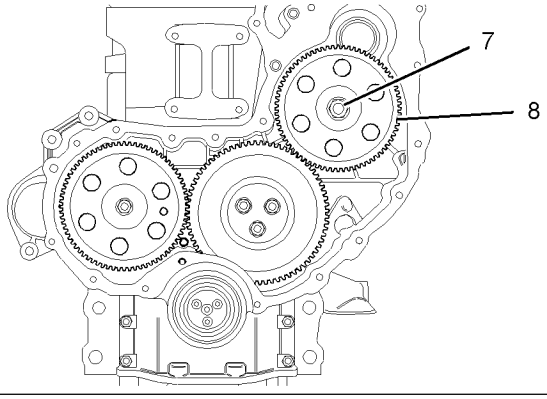

Illustration 38 g01062397
Typical example

Note: Ensure that the mating surfaces of the fuel injection pump gear and the shaft of the fuel injection pump are clean. Lubricate the threads of the shaft for the fuel injection pump. The nut (7) must turn freely until contact is made with the fuel injection pump gear.

5. Position the fuel injection pump gear (8) onto the shaft of the fuel injection pump. Install the washer and the nut (7). Rotate the fuel injection pump gear (8) in a counterclockwise direction in order to remove the backlash. Tighten the nut (7) to a torque of 24 N·m (17 lb ft).

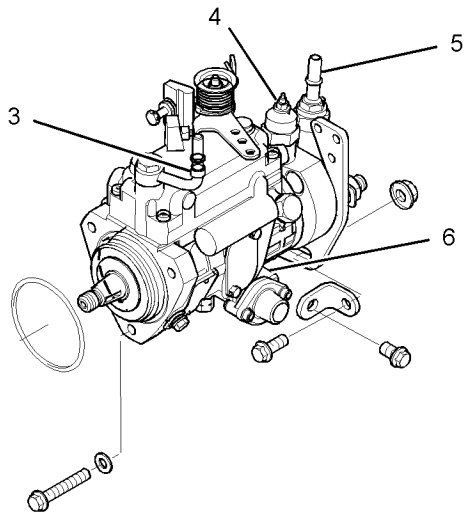

Illustration 39 g01062395

6. Connect the harness assembly to the timing advance solenoid (6).

7. Connect the harness assembly (4).

8. Remove all of the dust caps from the connectors on the fuel injection pump. Remove all of the plugs from the fuel hose assemblies and from the tube assemblies.

9. Connect the fuel line (5) to the fuel injection pump. Connect the fuel return line (3) to the fuel injection pump.