UENR0624-02
May 2013

Disassembly and Assembly

854E-E34TA and 854F-E34T Industrial Engines

JR1 1-Up (Engine)
JS1 1-Up (Engine)
JT1 1-Up (Engine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Perkins cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Perkins is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Perkins dealers or Perkins distributors have the most current information available.

⚠ WARNING

When replacement parts are required for this product Perkins recommends using Perkins replacement parts.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

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Disassembly and Assembly Section

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Inspection of Parts

Reuse Guideline for the Flexible Exhaust Pipe

This Information Element will address the following applications for the lines group - flex pipe: the installation, the handling and the reusability. The lines group - flex pipe is defined as the connection between the turbocharger diffuser outlet and the Clean Emissions Module (CEM) inlet.

Removal of the Lines Group

Removal Procedure

⚠ CAUTION

The ends of the bellows are very sharp. Injury could occur if the bellows are not handled properly. Handle the bellows by the convolutions.

NOTICE

The alignment of the bellows is important. Improper alignment may lead to premature failure of the bellows. Misalignment can be identified by visually inspecting the uniformity of the spacing between the convolutions.

Inspect the bellows for damage prior to installation. If there is any damage to the convolutions, discard the bellows. If there is any difficulty in installation after the repair, discard the bellows.

The alignment of the bellows is important. Improper lateral alignment is two sealing surfaces that do not align with each other. The proper lateral adjustment is shown in Illustration 1 .

Proper alignment means that initial alignment of all components that are held together by the components referenced in Illustration 1 are maintained.

Note: Do not force the bellows into the position.

Note: Failure to reinstall the bellows into the as removed alignment will result in a failure of the part and a needed replacement.

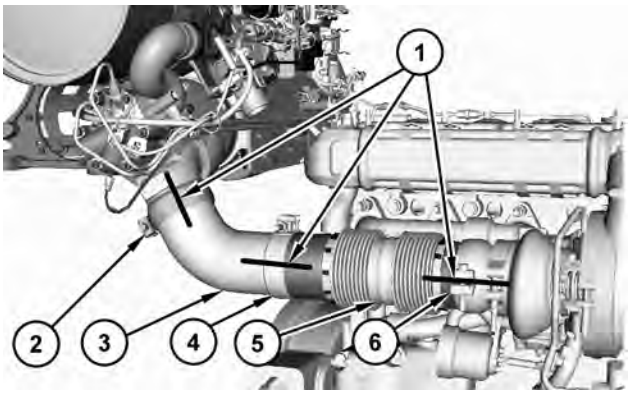

Illustration 1 g02211913

Typical example

(1) Alignment marks
(2) Ball clamp
(3) Tube
(4) Slip joint clamp
(5) Bellows
(6) Ball clamp

1. Draw alignment marks that will cover both the lines group and the associated clamps. Refer to Illustration 1 .

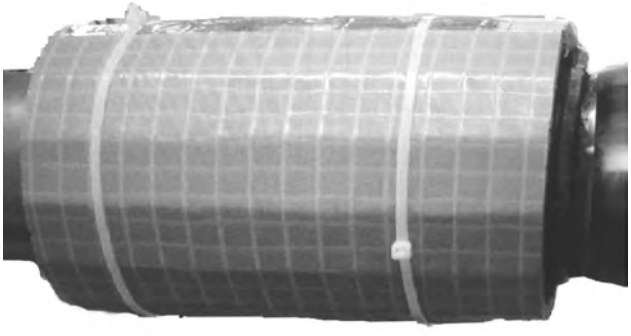

Illustration 2 g02239794

Typical example

Bellows with protective covering installed

2. Wrap the bellows with a protective cover to avoid possible damage to the bellows during the removal and installation.

3. Loosen clamp assemblies (2), and (6).

4. Remove the lines group.

Note: Removal of the entire line group as a whole is ideal. However, in some applications the assembly must be disassembled further in order for the assembly to be removed.

Note: Care should be taken when handling the lines group. The slightest bump or drop can result in a misalignment of the bellows and a possible need for replacement.

5. Discard clamp assemblies (2) and (6). The clamp assemblies are a one time use part.

Note: Steps 6 through 7 are only necessary if clamp (4) was loosened to remove the entire lines group.

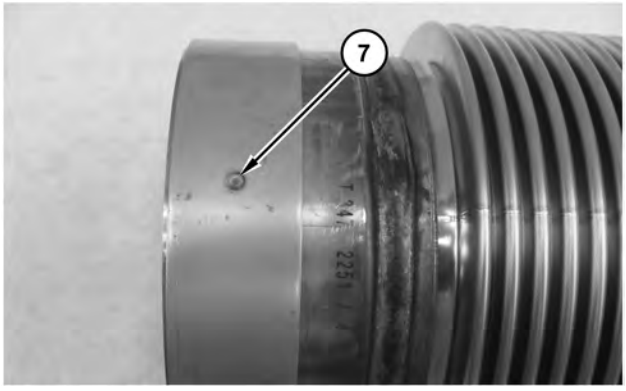

Illustration 3 g02231056

Typical example

(7) Weld

6. Remove clamp (4) from bellows (5) by removing weld (7). Use a grinding device to remove the spot weld.

Note: Use care not to remove excessive amounts of material and grind on the bellows.

Note: Do not use a vice to secure the lines group. The bellows cannot be damaged in any way during this procedure.

Note: Use the proper personal protective equipment when removing clamp (4) from the bellows assembly.

Illustration 4 g02231059

Typical example

Remove the weld from the bellows assembly with a grinding device

7. Inspect the clamping surface on the outside of the bellows. Deburr the surface if necessary.

Note: If the bellows assembly is damaged during the removal of clamp (4), replace the bellows assembly.

Installation

Note: Step 1 is only necessary if clamp (4) was loosened to remove the entire lines group.

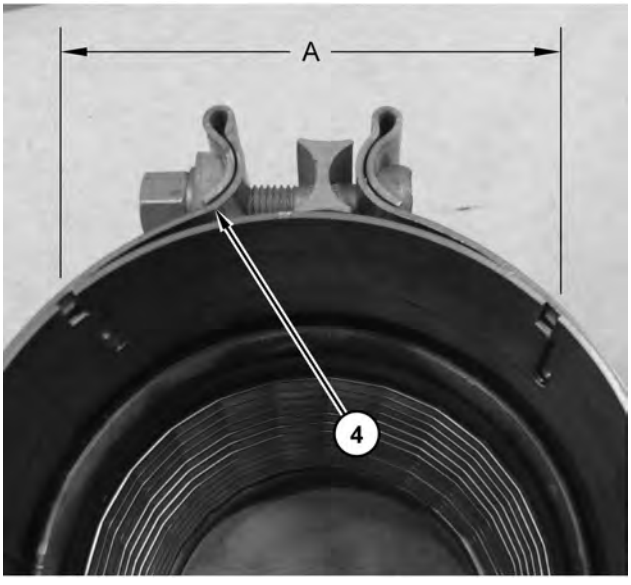

Illustration 5 g02231073

Typical example

1. Install new clamp (4) with the tightening assembly centered between reliefs (A). Do not torque the clamp until Step 12

Note: The end of the clamp must be flush with the end of the bellows assembly.

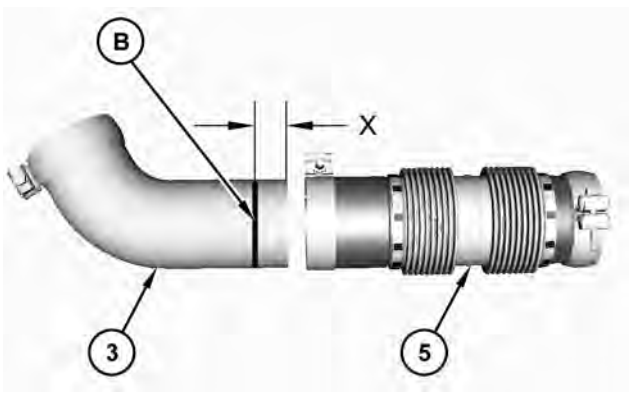

Illustration 6 g02211937

Typical example

2. Distance (X) is 40 mm (1.6 inch). Place Mark (B) onto tube (3) at Distance (X) from the end of tube (3).

3. Insert tube (3) into the bellows. The tube should be inserted as far as possible without using force. This action will minimize the overall length of the lines group and will help with installation.

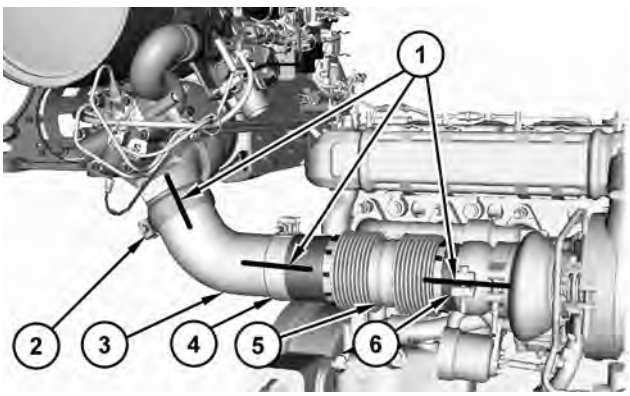

Illustration 7 g02211913

Typical example

Alignment wrap is not shown for photographic purposes.

4. Prior to installation, position both ball clamp assemblies (2) and (6) onto the lines group.

5. Position the lines group between the Clean Emissions Module and the turbocharger adapter. Adjust the length of tube (3) in the slip joint at clamp assembly (4) in order to position the lines group.

Note: Do not force any of the components into the position.

Note: Make sure that you loosely fit all of the parts before the final torquing is started.

Note: Failure to reinstall the bellows into the original alignment will result in a failure of the part and a needed replacement.

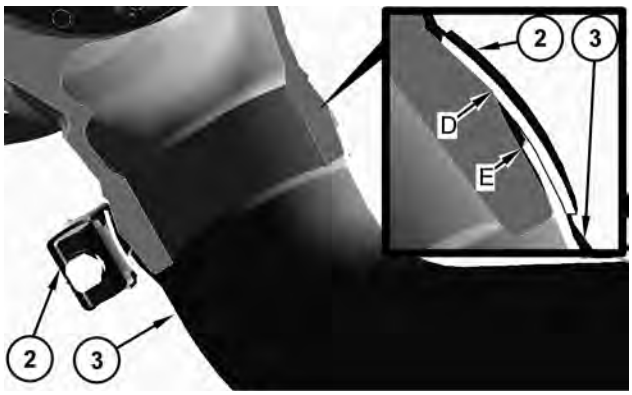

Illustration 8 g02211953

Typical example

The photo is a cutaway view of the ball clamp assembly.

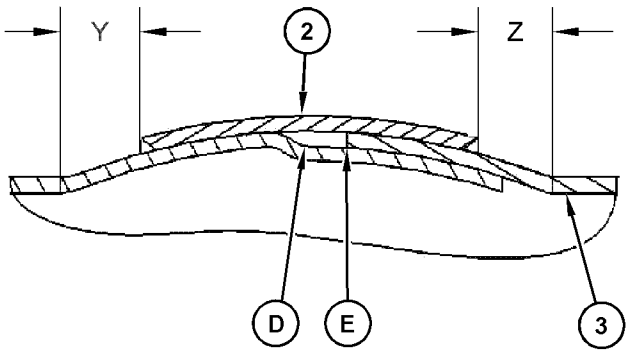

Illustration 9 g02211955

Typical example

The photo is a cutaway view of the ball clamp assembly.

6. Verify that the cup of the ball joint (E) does not touch the radius of the ball (D). Position ball clamp (2) and loosely tighten ball clamp (2).

Note: The ball clamp that is opposite the bellows must always be tightened first. Clamp (2) which can be located at the turbocharger diffuser outlet or the CEM inlet must be tightened first. Refer to Illustration 10 and Illustration 11 for example of the possible placement of clamp (2).

7. Verify that the ball clamp is centered. Measurement (Y) and measurement (Z) must be within 2 mm (0.07874 inch) of each other. Refer to Illustration 9 .

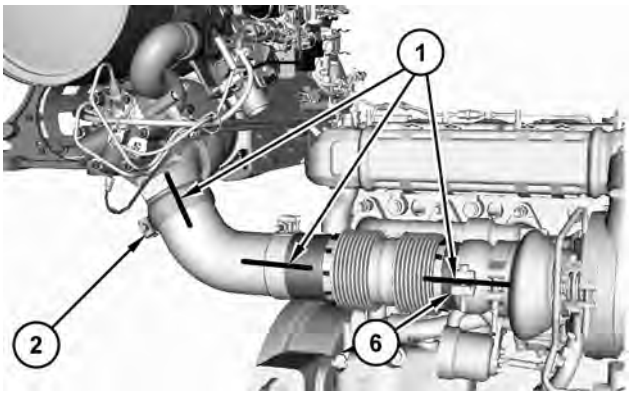

Illustration 10 g02239874

Typical example

Example of configuration with the bellows located near the turbocharger outlet

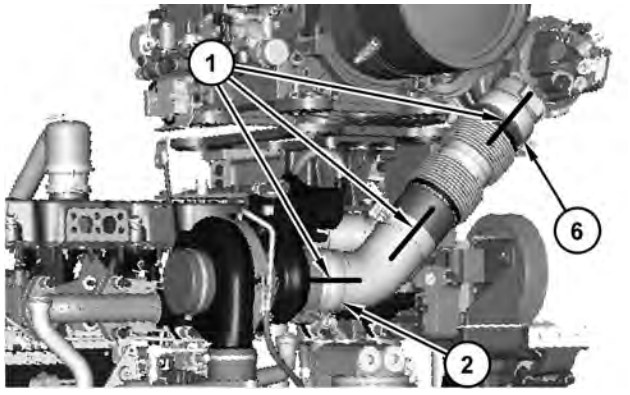

Illustration 11 g02239877

Typical example

Example of configuration with the bellows located near the CEM inlet

8. Repeat Step 6 and 7 for ball clamp (6).

9. Verify that Mark (B) is not visible at the slip joint that is positioned near clamp assembly (4).

Note: Use hand tools to torque clamps on Steps 10 through 12. Do not use power tools in order to torque clamp assemblies (2), (4), and (6).

Note: The ball clamp that is opposite the bellows must always be tightened first. In Illustration 10 the ball clamp that must be tightened first is located at the CEM inlet. In Illustration 11 the ball clamp that must be tightened first is located at the turbocharger diffuser outlet.

10. Torque ball clamp (2) to a torque of 35 ± 2 N·m (26 ± 1 lb ft).

11. Torque ball clamp (6) to a torque of 35 ± 2 N·m (26 ± 1 lb ft).

12. Torque clamp assembly (4) to a torque of 55 ± 8 N·m (41 ± 6 lb ft).

13. Remove the protective cover that was installed in Step 2 of the removal section.

Examples of Possible Misalignment and Results

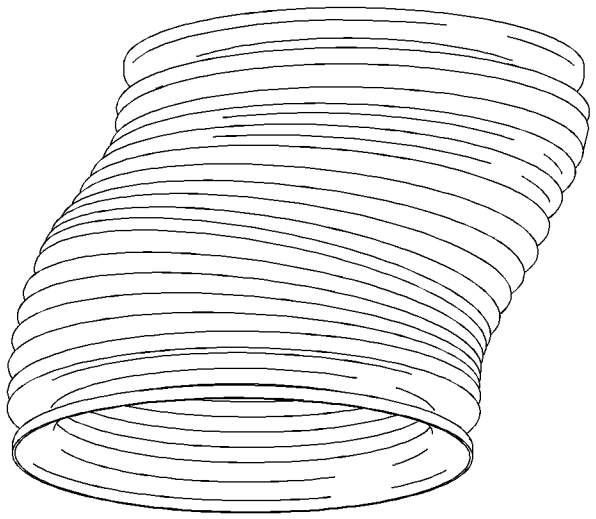

Illustration 12 g01023261

Typical example

Example of lateral misalignment

Lateral misalignment is shown in Illustration 12 . Lateral misalignment on the exhaust bellows can lead to contact between liner and convolutions. The misalignment can cause premature failure.

Lateral misalignment is identified by visually inspecting the convolutions on the bellows. The visual inspection will help ensure an even amount of spacing between each of the convolutions.

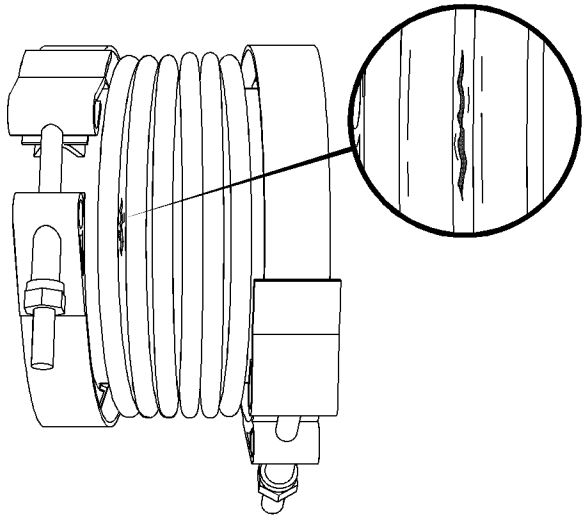

Illustration 13 g01016673

Typical example

Example of premature failure due to lateral misalignment

Improper alignment during installation can lead to premature failure of the bellows. An Example of premature failure is shown in Illustration 13 .

Handling

Bellows should be handled by the convolutions. The convolutions are the ribbed portion of the bellows. The ends of the bellows could be sharp and the ends should be handled carefully. The bellows can be damaged if the bellows are dropped.

Reusability

Note: If there are any indications of separation of the layers or difficulty with the installation, discard the bellows. Failure to replace the bellows could result in the following problems: improper seating, subsequent air leakage and Exhaust leakage.

The bellows consist of multiple layers of material that are pressed together.

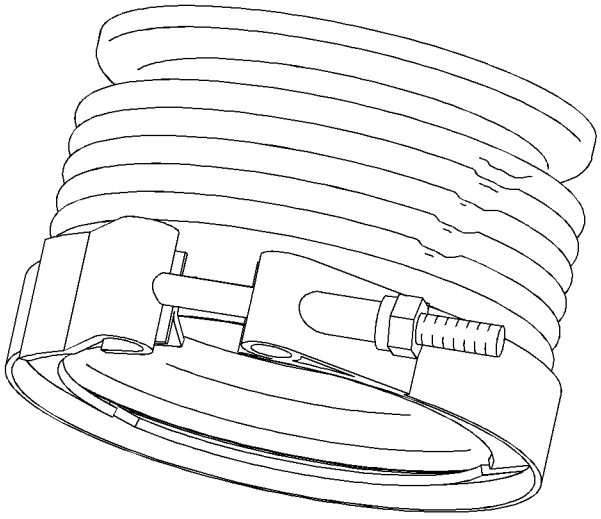

Illustration 14 g01016669

Typical example

Example of damage to the convolutions

Inspect the bellows for damage. The part should be discarded if damage to the convolutions is present. Illustration 14 shows that damage to the convolutions.

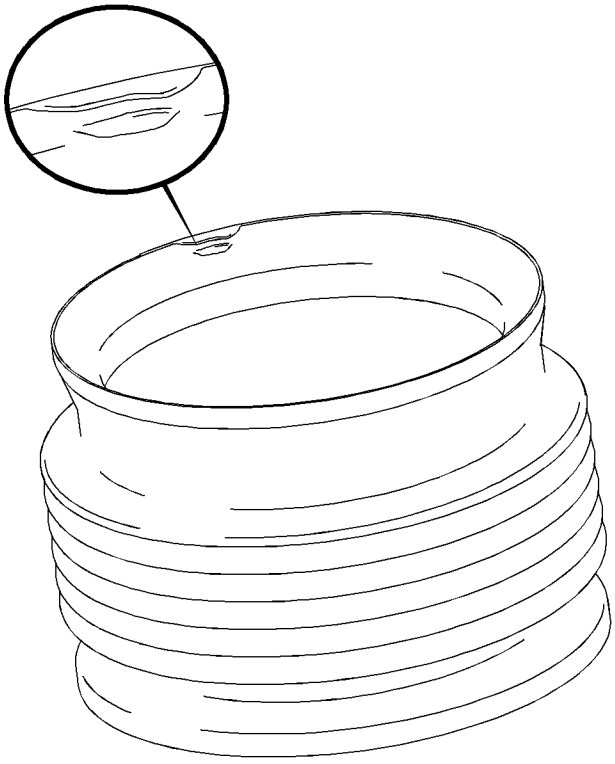

Illustration 15 g02240434

Typical example

Example of a bad edge

If damage has occurred to the edges of the bellow, the bellows must be replaced.

i05268254

Fuel Priming Pump - Remove and Install

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

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.

1. Turn the fuel supply to the OFF position.

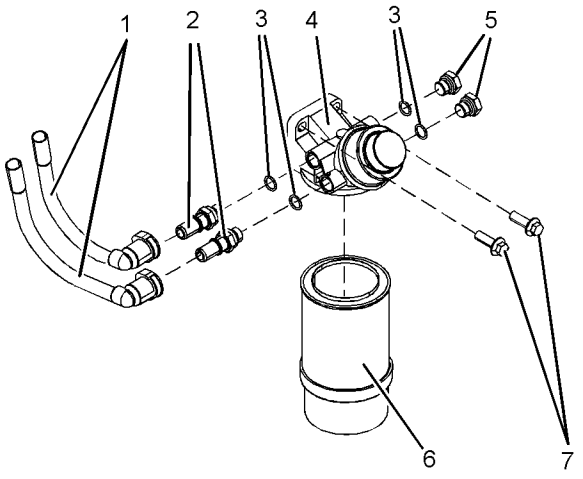

Illustration 16 g02988817

Typical example

2. Make a temporary identification mark on plastic tube assemblies (1) in order to show the correct position of the tube assemblies.

3. Place a suitable container below the fuel priming pump in order to catch any fuel that might be spilled. Drain primary filter (7). Refer to Operation and Maintenance Manual, "Fuel System Primary Filter (Water Separator) Element - Replace".

4. Disconnect plastic tube assemblies (1). Use Tooling (A) to plug the tube assemblies with new plugs.

5. Use Tooling (A) cap open connectors (2) on the fuel priming pump with new caps.

6. Remove primary filter (6) from fuel priming pump (4). Refer to Operation and Maintenance, "Fuel System Primary Filter (Water Separator) Element - Replace".

7. Remove bolts (7) from fuel priming pump (4). Remove fuel priming pump (4) from the mounting bracket.

8. If necessary, follow Steps 8.a. through 8.d. in order to disassemble fuel priming pump (4).

a. Remove connectors (2) from fuel priming pump (4). Use Tooling (A) to plug fuel priming pump (4).

b. Use Tooling (A) to cap connectors (2).

c. Remove plugs (5) from fuel priming pump (4). Use Tooling (A) to plug fuel priming pump (4).

d. Remove O-ring seals (3) from connectors (2) and plugs (5).

Installation Procedure (Mechanical Priming Pump)

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

1. Ensure that fuel priming pump (4) is clean and free from wear or damage. If necessary, replace the fuel priming pump.

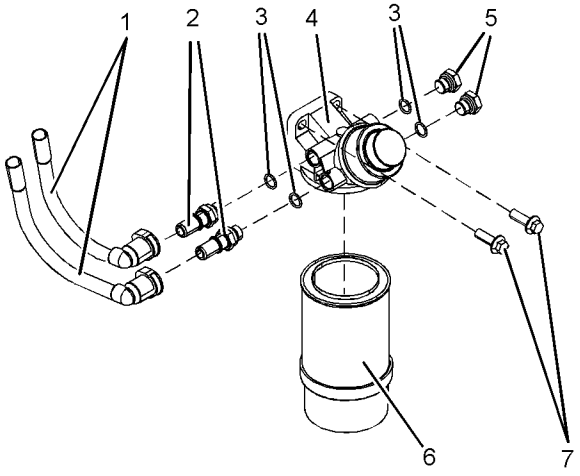

Illustration 17 g02988817

Typical example

2. If necessary, follow Steps 2.a. through 2.f. in order to assemble fuel priming pump (4).

a. Install new O-ring seals (3) to plugs (5).

b. Remove caps from connectors (2). Install new O-ring seals (3) connectors (2).

c. Remove plugs from fuel priming pump (4).

d. Install connectors (2) to fuel priming pump (4).

e. Install plugs (5) to fuel priming pump (4).

f. Tighten the plugs and the connectors to a torque of 20 N·m (14 lb ft).

3. Position fuel priming pump (4) on the mounting bracket. Install bolts (7) to the fuel priming pump . Tighten the bolts to a torque of 44 N·m (32 lb ft).

4. Remove the plugs from the plastic tube assemblies. Remove the caps from the connectors.

5. Connect plastic tube assemblies (1) to connectors (2).

Note: Ensure that the plastic tube assemblies are installed in the original positions.

6. Install a new primary filter (6) to fuel priming pump (4). Refer to Operation and Maintenance Manual, "Fuel System Primary Filter (Water Separator) Element - Replace".

7. Turn the fuel supply to the ON position.

8. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime".

i05268256

Flow Control Valve - Remove and Install

Removal Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1

⚠ WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

1. Turn the fuel supply to the OFF position.

2. Turn the battery disconnect switch to the OFF position.

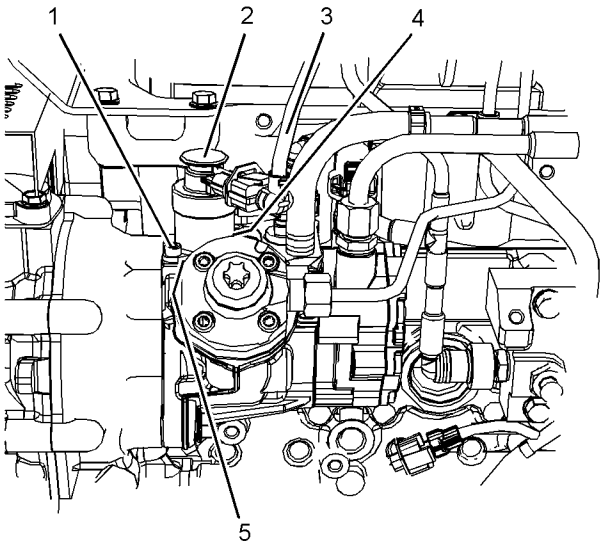

Illustration 18 g02986577

3. Clean the area around flow control valve (2) and fuel injection pump. Ensure that the area is free from contamination before beginning disassembly.

4. Disconnect harness assembly (3) from flow control valve (2).

5. Make temporary marks on the flow control valve and the fuel injection pump for installation purpose.

6. Remove Torx heads screws (1) from the flow control valve.

7. Remove flow control valve (2) from the fuel injection pump.

8. Use Tooling (A) in order to plug the fuel injection pump.

9. Remove O-ring seal (4) (not shown) and O-ring seal (5) (not shown).

Installation Procedure

1. Ensure that all component at free from wear and damage. If any part of the flow control valve is worn or damaged, the flow control valve must be replaced as an assembly.

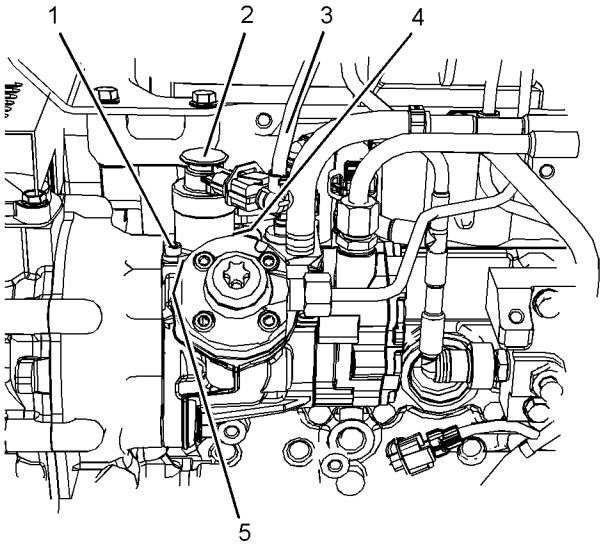

Illustration 19 g02986577

2. Position a new O-ring seal (4) (not shown) and new O-ring seal (5) (not shown) onto the flow control valve assembly.

3. Check O-ring seal (4) (not shown) and O-ring seal (5) (not shown) are correctly positioned. Ensure that O-ring seals are not damaged.

4. Lubricate O-ring seal (4) (not shown) and O-ring seal (5) (not shown) with clean fuel.

Note: Ensure that the O-ring seals are not damaged or misaligned.

5. Remove Tooling (A) from the fuel injection pump.

6. Install flow control valve (3) to the fuel injection pump.

7. Install Torx head screws (2) from the flow control valve repair kit.

8. Tighten Torx head screws (2) equally until the flow control valve is seated correctly onto the fuel injection pump.

Note: Ensure that the Torx screws are tightened equally. Failure to ensure that the Torx screws are tightened equally will result in damage to the fuel injection pump.

9. Tighten the Torx head screws to a torque of 9 N·m (80 lb in).

10. Connect harness assembly (1) to flow control valve (3).

11. Replace the filters for primary fuel system. Refer to Operation and Maintenance Manual, “Fuel System Primary (Water Separator) Element - Replace” for the correct procedure.

12. Replace the filters for secondary fuel system. Refer to Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for the correct procedure.

13. Turn the fuel supply to the ON position.

14. Turn the battery disconnect switch to the ON position.

15. Remove the air from the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime” for more information.

End By:

After replacement of the flow control valve, the fuel injection pump requires a high-pressure fuel pump calibration procedure to be performed. Refer to Troubleshooting, “Fuel Rail Pressure Problem” for the correct procedure.

i05268269

Fuel Filter Base - Remove and Install

Removal Procedure

Table 3

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, “General Hazard Information and High Pressure Fuel Lines” for safety information.

Refer to System Operation, Testing and Adjusting, “Cleanliness of Fuel System Components” for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

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.

1. Turn the battery disconnect switch to the OFF position.

2. Turn the fuel supply to the OFF position.

3. Drain the secondary filter. Refer to Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for the correct procedure.

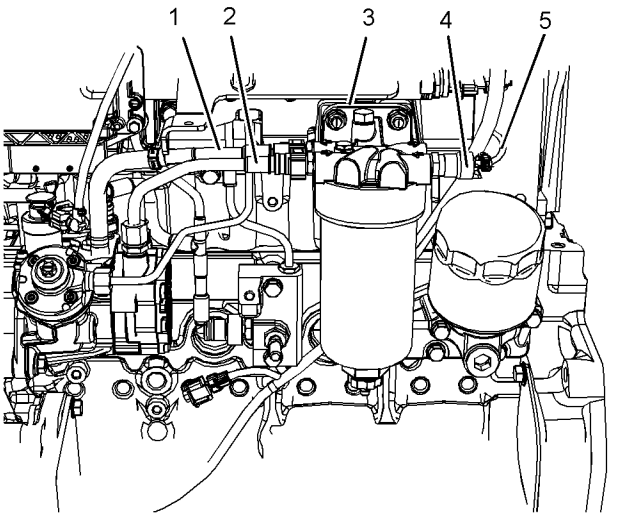

Illustration 20 g03011036

4. Make temporary identification marks on plastic tube assembly (1) and plastic tube assembly (2) in order to show the correct position of the plastic tube assemblies.

5. Place a suitable container below the fuel filter base in order to catch any fuel that might be spilled.

6. Disconnect plastic tube assembly (1) and plastic tube assembly (2) from fuel filter base (3).

7. Use Tooling (A) in order to plug plastic tube assembly (1) and plastic tube assembly (2)

8. Use Tooling (A) in order to cap the connection on fuel filter base (3).

9. Slide locking tab in to the unlock position. Disconnect harness assembly (5) from fuel temperature sensor (4).

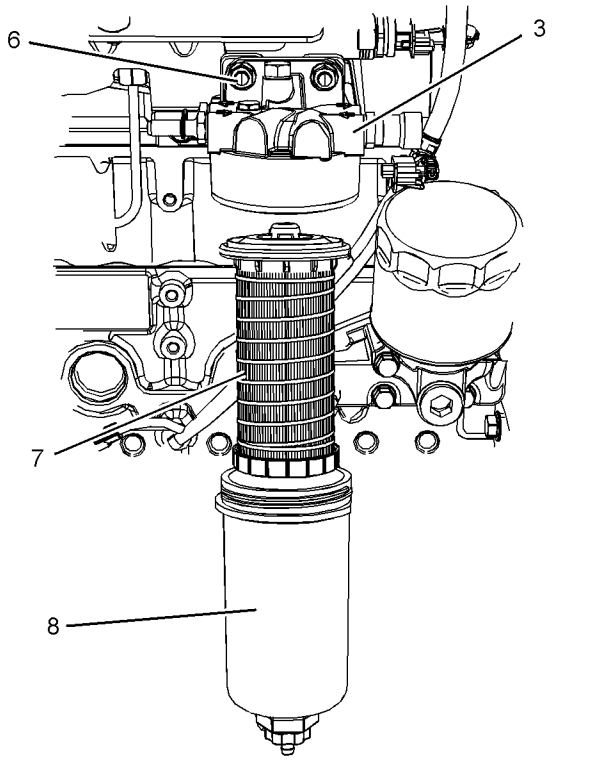

Illustration 21 g03011037

10. Remove cannister (8) from fuel filter base (3). Remove secondary filter (7). Refer to Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for the correct procedure.

11. Remove nuts (6) from fuel filter base (3). Remove the fuel filter base from the mounting bracket.

Note: Do not disassemble the fuel filter base.

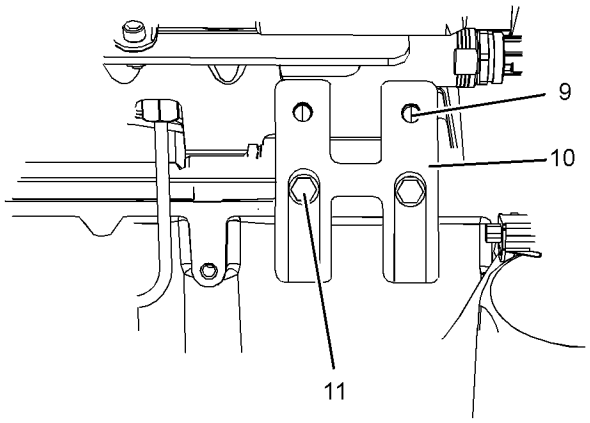

Illustration 22 g03011038

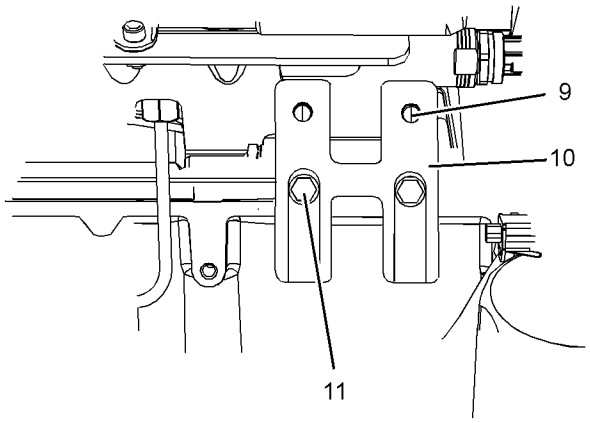

Illustration 23 g03011038

12. If necessary, follow Step 1.c. through Step 12.c. in order to remove the bracket for secondary fuel filter.

a. Remove bolts (11) fuel filter bracket (10).

b. Remove fuel filter bracket (10) from the valve mechanism cover.

c. If necessary, remove studs (9). from fuel filter bracket (10).

Installation Procedure

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

NOTICE

Ensure that the wiring harness assembly is correctly routed and the cable straps are not over tightened. Over tightening of the cable straps will damage the wiring harness and the convoluting.

1. If necessary, follow Step 1.a. through Step 1.c. in order to install the bracket for secondary fuel filter.

a. If necessary, install studs (9) to fuel filter bracket (10). Tighten studs (9) to a torque of 18 N·m (159 lb in).

b. Position fuel filter bracket (10) onto the valve mechanism cover. Install bolts (11) to fuel filter bracket (10).

c. Tighten bolts (11) to a torque of 25 N·m (221 lb in).

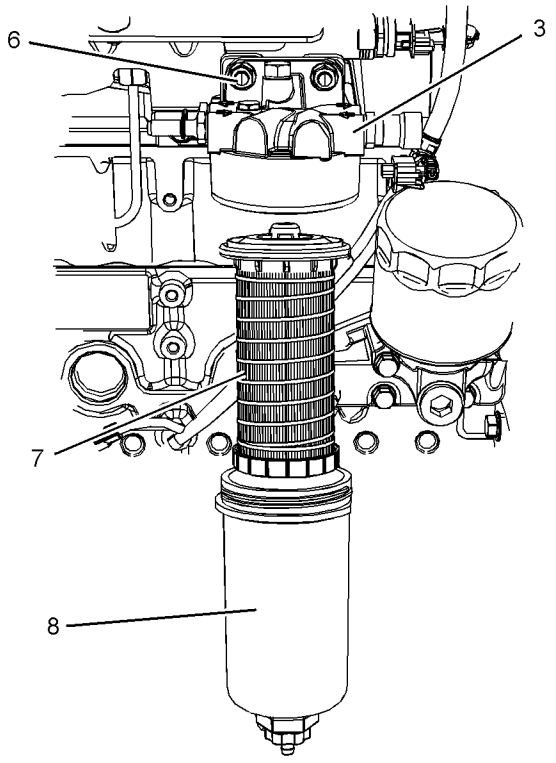

Illustration 24 g03011037

2. Ensure that fuel filter base (3) is clean and free from damage. If necessary, replace the complete fuel filter base and filter assembly.

3. Position fuel filter base (3) on the mounting bracket. Install nuts (6). Tighten the bolts to a torque of 25 N·m (221 lb in).

4. If necessary, install a new fuel filter (7) to canister (8). Install cannister (8) to fuel filter base (3). Refer to Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for the correct procedure.

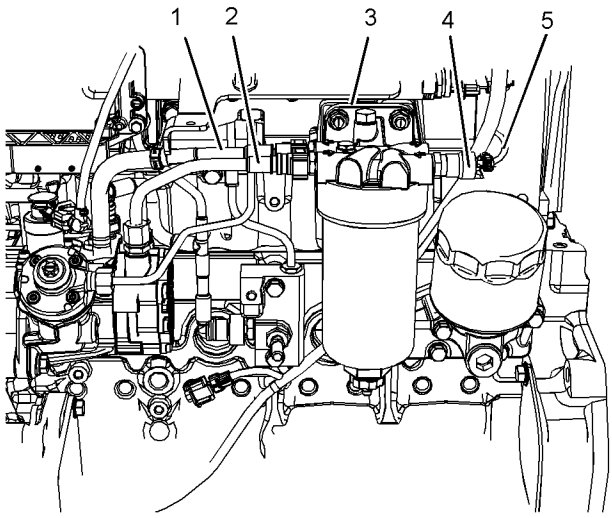

Illustration 25 g03011036

5. Remove the plugs from the plastic tube assemblies. Remove the caps from the ports in the fuel filter base.

NOTICE
Ensure that the plastic tube assemblies are installed in the original positions. Failure to connect the plastic tube assemblies to the correct ports will allow contamination to enter the fuel system. Allowing contamination to enter the fuel system will cause serious damage to the engine.

6. Connect plastic tube assembly (1) and plastic tube assembly (2) to the fuel filter base.

7. Connect harness assembly (5) to fuel temperature sensor (4). Slide locking tab in to the lock position.

8. Turn the fuel supply to the ON position.

9. Turn the battery disconnect switch to the ON position.

End By:

Remove the air from the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime” for the correct procedure.

i05268272

Water Separator and Fuel Filter (Primary) - Remove and Install

Removal Procedure

Table 4

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

1. Turn the battery disconnect switch to the OFF position.

2. Turn the fuel supply to the OFF position.

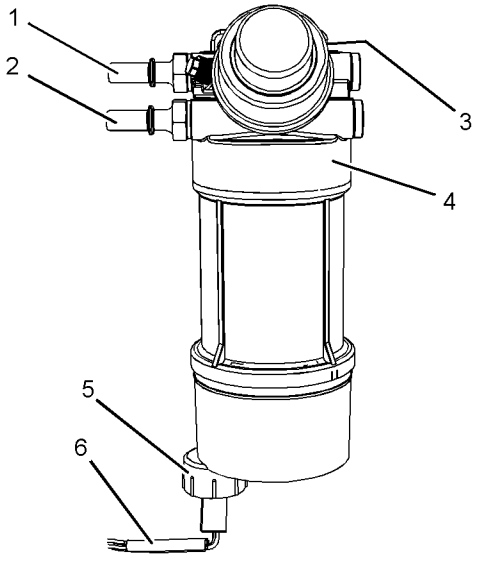

Illustration 26 g03011667

3. Make temporary identification marks on plastic tube assemblies in order to show the correct position of the plastic tube assemblies.

4. Place a suitable container below the fuel filter base in order to catch any fuel that might be spilled.

5. Disconnect the plastic tube assembly from connecting (1). Use Tooling (A) in order to plug the plastic tube assemblies. Use Tooling (A) in order to cap connection (1).

6. Disconnect the plastic tube assembly from connecting (2). Use Tooling (A) in order to plug the plastic tube assemblies. Use Tooling (A) in order to cap connection (2).

7. Disconnect the Original Equipment Manufactures (OEM) harness assembly (6) from water in fuel sensor (5).

8. Remove bolts (2) (not shown) and remove the assembly of primary fuel filter (4) from the mounting bracket.

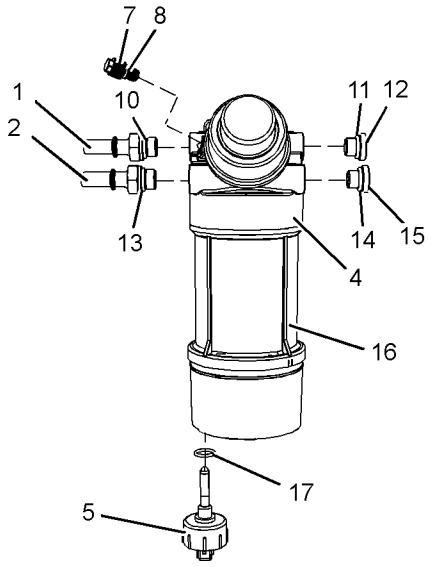

Illustration 27 g03011668

9. If necessary, follow Step 9.a. through Step 9.g. in order to disassembly the assembly of primary fuel filter (4).

a. Remove vent screw assembly (7) and remove O-ring seal (8). Use Tooling (A) in order to plug the primary fuel filter (4). Use Tooling (A) in order to cap vent screw assembly (7).

b. Remove connection (1) and remove O-ring seal (10). Use Tooling (A) in order to plug primary fuel filter (4). Use Tooling (A) in order to cap connection (1).

c. Remove connection (2) and remove O-ring seal (13). Use Tooling (A) in order to plug primary fuel filter (4). Use Tooling (A) in order to cap connection (1).

d. Remove plug (12) and remove O-ring seal (13). Use Tooling (A) in order to plug primary fuel filter (4).

e. Remove plug (15) and remove O-ring seal (14). Use Tooling (A) in order to plug primary fuel filter (4).

f. Remove water in fuel sensor (6) and remove O-ring seal (17).

g. Remove the filter element from fuel filter canister (16). Refer to Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) Element - Replace” for the correct procedure.

Installation Procedure

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, “General Hazard Information and High Pressure Fuel Lines” for safety information.

Refer to System Operation, Testing and Adjusting, “Cleanliness of Fuel System Components” for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

1. Ensure that the fuel filter base is clean and free from damage. If necessary, replace the complete fuel filter base and filter assembly.

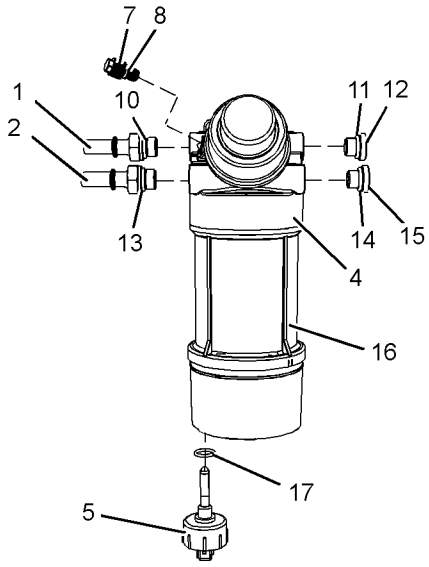

Illustration 28 g03011668

2. If necessary, follow Step 2.a. through Step 2.i. in order to assembly primary fuel filter (1).

a. Install a new filter element to fuel filter canister (16). Refer to Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) Element - Replace” for the correct procedure.

b. Remove cap from connection (1). Install a new O-ring seal (10) to connection (1).

c. Remove plug from primary fuel filter (4). Install connection (1) to primary fuel filter (4). Tighten the connection to a torque of 20 N·m (177 lb in).

d. Remove cap from connection (2). Install a new O-ring seal (13) to connection (2).

e. Remove plug from primary fuel filter (4). Install connection (2) to primary fuel filter (4). Tighten the connection to a torque of 20 N·m (177 lb in).

f. Install a new O-ring seal (13) to plug (12). Install plug (12) to primary fuel filter (4). Tighten the plug to a torque of 20 N·m (177 lb in).

g. Install a new O-ring seal (14) to plug (15). Install plug (15) to primary fuel filter (4). Tighten the plug to a torque of 20 N·m (177 lb in).

h. Remove cap from vent screw assembly (7). Install a new O-ring seal (8) to vent screw assembly (7). Install vent screw assembly (7) to primary fuel filter (4). Tighten the vent screw assembly securely.

i. Install a new O-ring seal (17) to water in fuel sensor (5). Install water in fuel sensor (5) to primary fuel filter (4). Tighten water in fuel sensor (5) hand tight.

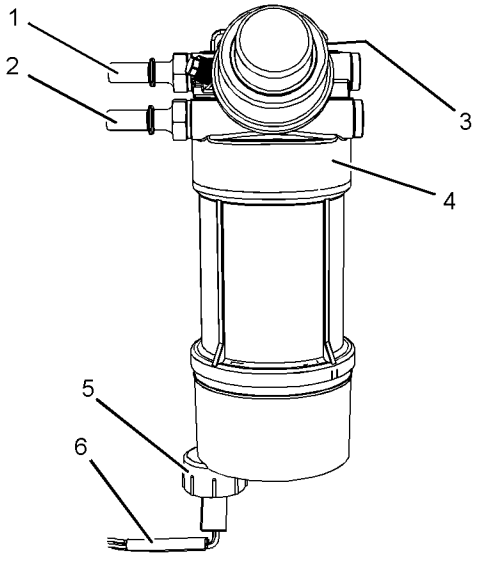

Illustration 29 g03011667

3. Position the assembly of primary fuel filter (4) onto the mounting bracket.

4. Install bolts (3) (not shown) to the assembly of primary fuel filter (4). Tighten the bolts to a torque of 50 N·m (37 lb ft).

NOTICE
Ensure that the plastic tube assemblies are installed in the original positions. Failure to connect the plastic tube assemblies to the correct ports will allow contamination to enter the fuel system. Serious damage to the engine will result if contaminated fuel enters the fuel system.

5. Remove plug from the plastic tube assembly. Remove cap from connecting (1) on primary fuel filter (4). Connect the plastic tube assembly to connecting (1) on primary fuel filter (4).

6. Remove plug from the plastic tube assembly. Remove cap from connecting (2) on primary fuel filter (4). Connect the plastic tube assembly to connecting (2) on primary fuel filter (4).

7. Connect the OEM harness assembly (6) to water in fuel sensor (5).

8. Turn the fuel supply to the ON position.

9. Turn the battery disconnect switch to the ON position.

End By:

Remove the air from the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime" for the correct procedure.

i05268273

Fuel Manifold (Rail) - Remove and Install

Removal Procedure

Table 5

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1

Start By:

Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove" for the correct procedure.

⚠ WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

Note: Plug or cap all open ports with new plugs or new caps.

1. Thoroughly clean the area around fuel manifold (12).

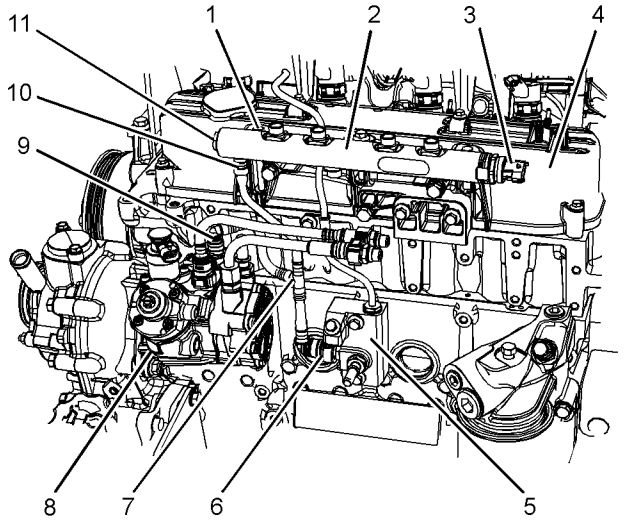

Illustration 30 g02652897

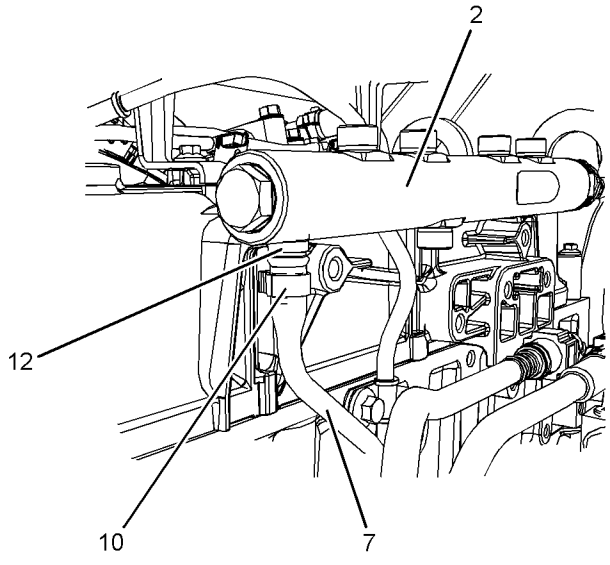

Illustration 31 g02856697

2. Disconnect hose assembly connection (8) from fuel injection pump (7).

3. Disconnect hose assembly connection (5) from fuel distribution block (4).

4. Remove bolts (1) from fuel manifold (2). Remove the fuel manifold from the valve mechanism cover (3).

5. If necessary, follow Step 5.a. through Step 5.e. in order to remove plastic tube assembly (6).

a. Release hose clamp (9) on plastic tube assembly (6).

b. Disconnect plastic tube assembly (6) from the fuel manifold (2).

c. Use Tooling (A) to cap the open port in fuel manifold (2) with a new cap.

d. Remove seal (10).

e. Use Tooling (A) to plug the open end of plastic tube assembly (6) with a new plug.

Installation Procedure

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, "General Hazard Information and High Pressure Fuel Lines" for safety information.

Refer to System Operation, Testing and Adjusting, "Cleanliness of Fuel System Components" for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

1. Ensure that all ports on the fuel manifold are capped. Ensure that the fuel manifold is externally clean and free from damage.

Note: Do not install a fuel manifold that has not been plugged. All plugs and caps must be left in place until the fuel injection lines are about to be installed.

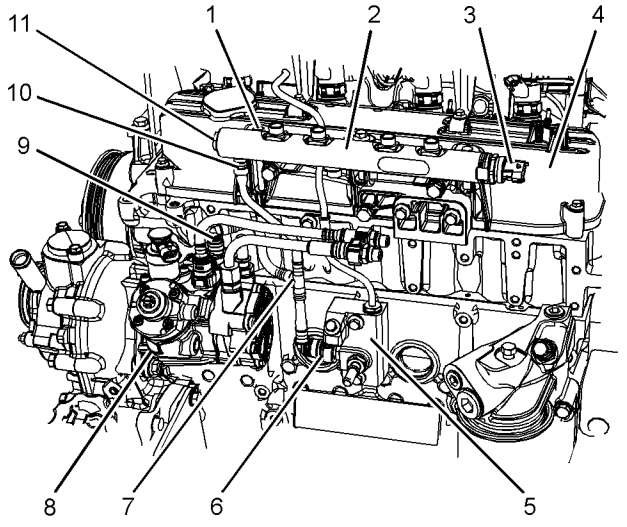

Illustration 32 g02652897

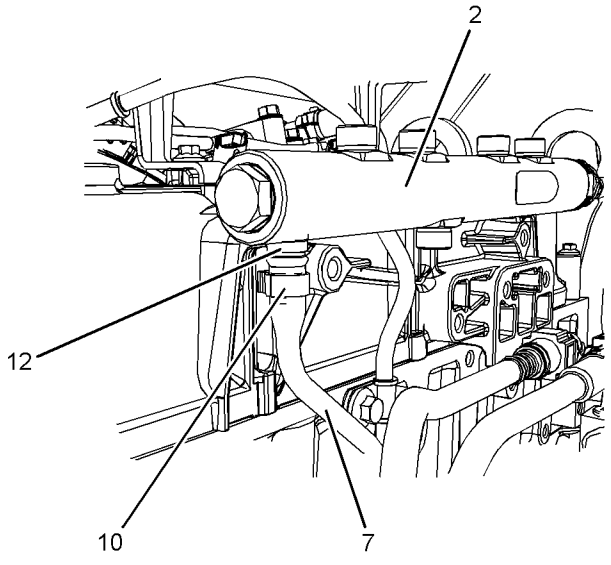

Illustration 33 g02856697

2. If necessary, follow Step 2.a. through Step 2.d. in order to install tube assembly (6) to fuel manifold (2).

a. Position hose clamp (9) onto plastic tube assembly (6).

b. Install new seal (10) into plastic tube assembly (6).

c. Install plastic tube assembly (6) to fuel manifold (2).

Note: Ensure that the plastic tube assembly is correctly orientated.

d. Tighten hose clamp (9) securely.

3. Position fuel manifold (2) onto valve mechanism cover (3). Install bolts (1) to fuel manifold (2) finger tight.

4. Install new fuel injection lines finger tight. Refer to Disassembly and Assembly, “Fuel Injection Lines - Install” for the installation procedure.

Note: Do not torque the nuts for the fuel injection lines at this stage of the assembly procedure.

5. Tighten bolts (1) to a torque of 27 N·m (239 lb in).

6. Tighten the nuts for the fuel injection lines. Refer to Disassembly and Assembly, “Fuel Injection Lines - Install” for the correct torque.

7. Remove the plug from connection (8) and install plastic tube assembly (6) to the fuel injection pump (7).

8. Remove the plug from connection (5) and install plastic tube assembly (6) to distribution block (4).

9. For the remaining installation procedure for the fuel injection lines, refer to Disassembly and Assembly, “Fuel Injection Lines - Install”.

End By:

If a new fuel manifold is installed, it will be necessary to use the electronic service tool in order to perform the “Rail Pressure Valve Learn Reset” procedure.

i05268277

Fuel Injection Lines - Remove

Removal Procedure

Table 6

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	T412504	Capping Kit	1
B	-	LASER 4920 1/2 Inch Drive HP Fuel Line Socket Set	1

⚠ WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

NOTICE

Ensure that all adjustments and repairs that are carried out to the fuel system are performed by authorized personnel that have the correct training.

Before beginning ANY work on the fuel system, refer to Operation and Maintenance Manual, “General Hazard Information and High Pressure Fuel Lines” for safety information.

Refer to System Operation, Testing and Adjusting, “Cleanliness of Fuel System Components” for detailed information on the standards of cleanliness that must be observed during ALL work on the fuel system.

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: Put identification marks on all hoses on all hose assemblies and on wires and all tube assemblies for installation purposes. Plug all hose assemblies and tube assemblies. Plugging all hose assemblies and tube assemblies will help to prevent fluid loss and helps to keep contaminants from entering the system.

1. Turn the fuel supply to the OFF position.

2. Turn the battery disconnect switch to the OFF position.

3. If necessary, remove the Diesel Particulate Filter (DPF). Refer to Disassembly and Assembly, “Diesel Particulate Filter - Remove” for the correct procedure.