Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02736078

Fuel Injection Pump - Remove

SMCS - 1251-011

Removal Procedure

Start By:

a. Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".

b. Remove the fuel shutoff solenoid. Refer to Disassembly and Assembly, "Fuel Shutoff Solenoid - 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.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

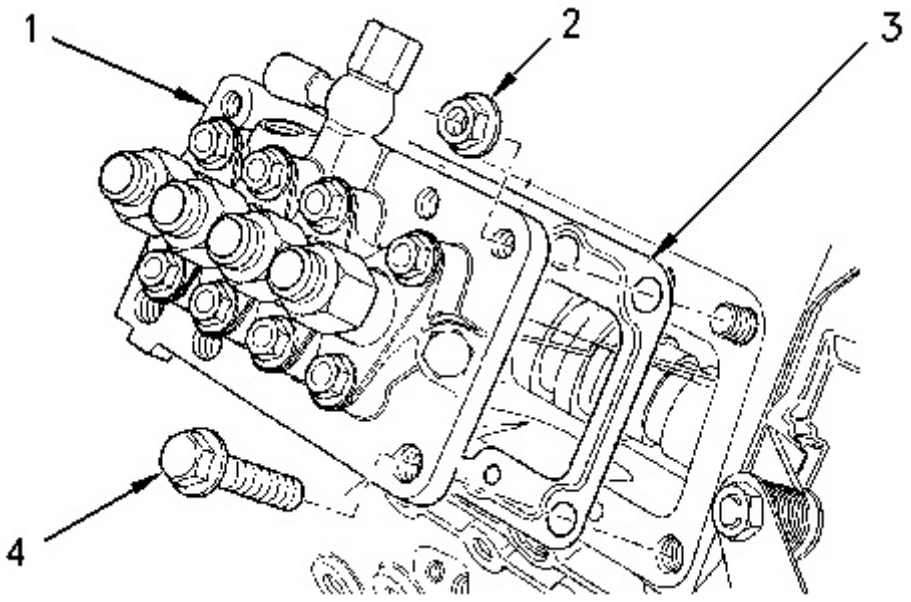

Illustration 1 g00825132

Typical example

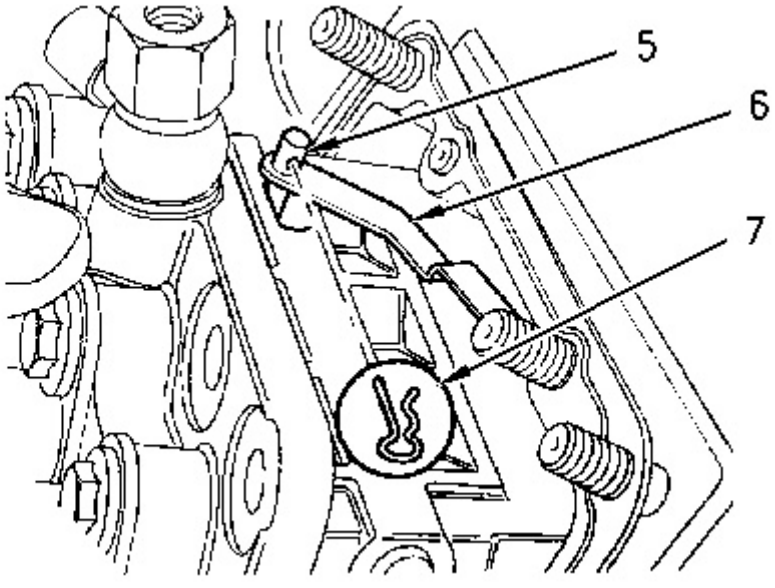

Illustration 2 g00825137

Typical example

1. Remove the setscrews (4) and the nuts (2) that fasten the fuel injection pump to the cylinder block.

2. Carefully raise the fuel injection pump (1) from the cylinder block and remove the clip (7) that connects the link (6) to the fuel rack control (5).

3. Remove the fuel injection pump (1) from the cylinder block.

4. Remove the shims (3) from the mounting face of the cylinder block.

   Note: Record the thickness of each shim and the number of shims for reassembly. The fuel injection timing is determined by the thickness of the shim pack that is between the fuel injection pump and the mounting face on the cylinder block. For more information on the fuel injection pump, refer to Specifications, "Fuel Injection Pump".

Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02848636

Fuel Injection Pump - Install

SMCS - 1251-012

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.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

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1. Clean the mounting face of the fuel injection pump on the cylinder block. Clean the mating surface of the fuel injection pump.

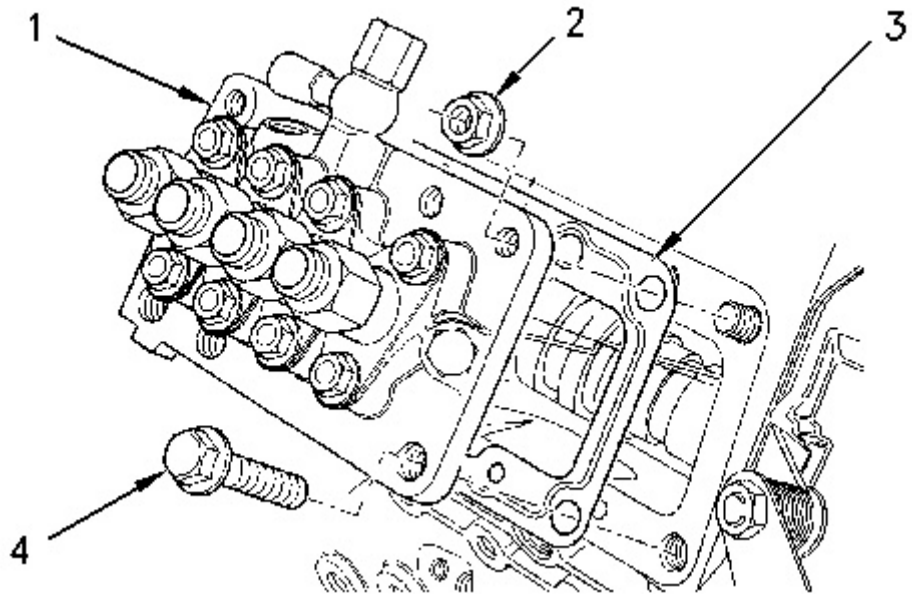

Illustration 1 g00825132

Typical example

2. Install the correct thickness and the correct number of shims (3) on the mounting face of the cylinder block. Refer to Specifications, "Fuel Injection Pump".

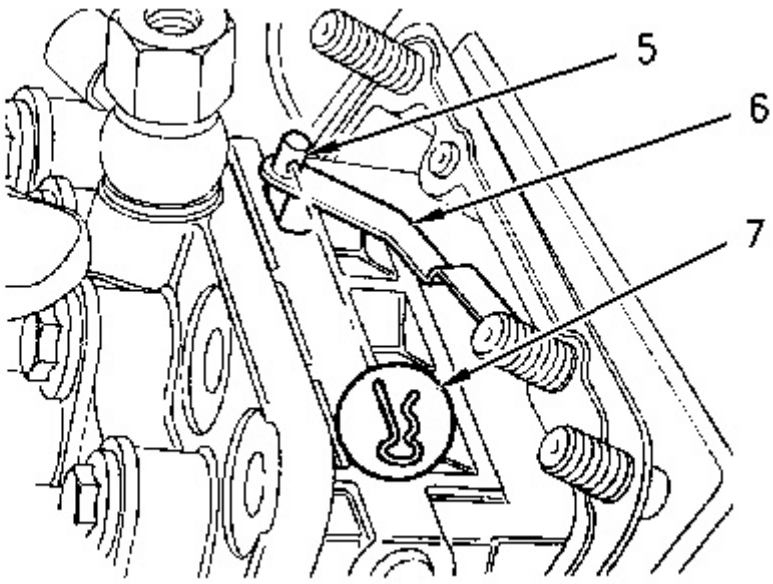

Illustration 2 g00825137

Typical example

3. Position the fuel injection pump (1) close to the mounting face of the cylinder block, and connect the link (6) and the fuel rack control (5) with the clip (7).

4. Put fuel injection pump (1) in position on the mounting face of the cylinder block.

5. Install the setscrews (4) and the nuts (2) that fasten the fuel injection pump to the cylinder block.

For C1.1 engines, tighten the setscrews (4) and the nuts (2) to a torque of 6 N·m (53 lb in).

For C1.5 and C2.2 engines, tighten the setscrews (4) and the nuts (2) to a torque of 15 N·m (11 lb ft).

End By:

a. Install the fuel shutoff solenoid. Refer to Disassembly and Assembly, "Fuel Shutoff Solenoid - Remove and Install".

b. Install the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".

Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02848639

Exhaust Manifold - Remove and Install

SMCS - 1059-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

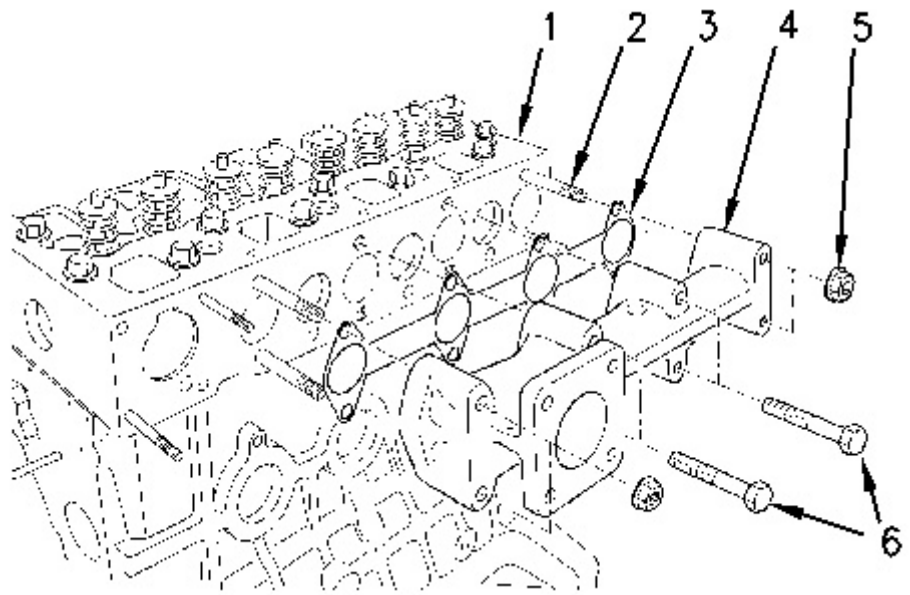

Illustration 1 g00825291

Typical example

1. Loosen the nuts (5) and the setscrews (6).

   Note: In order to prevent distortion of the exhaust manifold, loosen the outer fasteners first.

2. Remove the nuts (5) and the setscrews (6).

   Note: Identify setscrews of different lengths so that the setscrews can be reinstalled in the correct positions.

3. Remove the exhaust manifold (4) from the cylinder head (1).

4. Remove the gasket (3) from the cylinder head.

5. Remove any remaining gasket material and carbon from the cylinder head and the exhaust manifold. Be careful not to damage the mating surface on the cylinder head or the mating surface on the exhaust manifold.

6. If necessary, remove the exhaust manifold studs (2) from the cylinder head (1).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

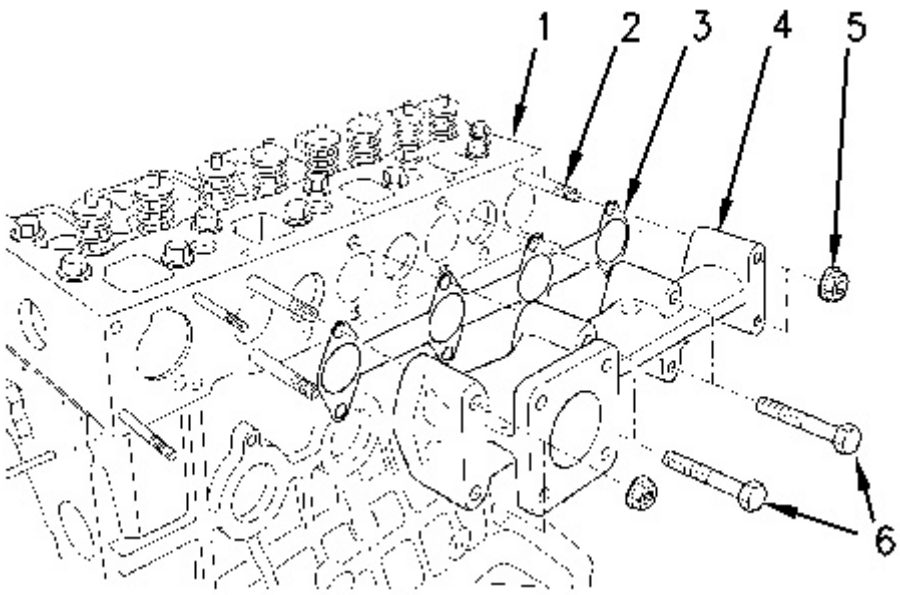

Illustration 2 g00825291

Typical example

1. If necessary, install the exhaust manifold studs (2) to cylinder head (1).
2. Install a new exhaust manifold gasket (3) to the cylinder head (1).

   Note: Do not use any sealant on the exhaust manifold gasket.
3. Put the exhaust manifold (4) in position on the cylinder head (1).
4. Install the nuts (5) and the setscrews (6).

   Note: Ensure that setscrews with different lengths are installed in the correct holes.
5. For C1.1 engines, tighten the nuts (5) and the setscrews (6) to a torque of 10 N·m (89 lb in). For C1.5 and C2.2 engines, tighten the nuts (5) and the setscrews (6) to a torque of 25 N·m (18 lb ft).

   Note: On three cylinder engines, tighten the two inner setscrews first.

Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02736114

Inlet and Exhaust Valve Springs - Remove and Install

SMCS - 1108-010

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	9U-6195	Valve Spring Compressor	1

Start By:

a. Remove the rocker shaft assembly. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The following procedure should be adopted in order to remove the valve springs when the cylinder head is still installed onto the cylinder block. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install" for the correct procedure that should be used to remove the valve springs from a cylinder head that has been removed from the cylinder block.

Note: Before you begin the removal of the valve springs, refer to Specifications, "Cylinder Head - Valves" and Systems Operation, Testing and Adjusting, "Cylinder Head - Inspect" for appropriate information on the valve springs.

Note: Ensure that the appropriate piston is at top dead center before the valve spring is removed. Failure to ensure that the piston is at top dead center may allow the valve to drop into the cylinder bore.

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

NOTICE

Install suitable plugs to the inlet ports of the cylinder head in order to prevent the entry of loose parts into the engine.

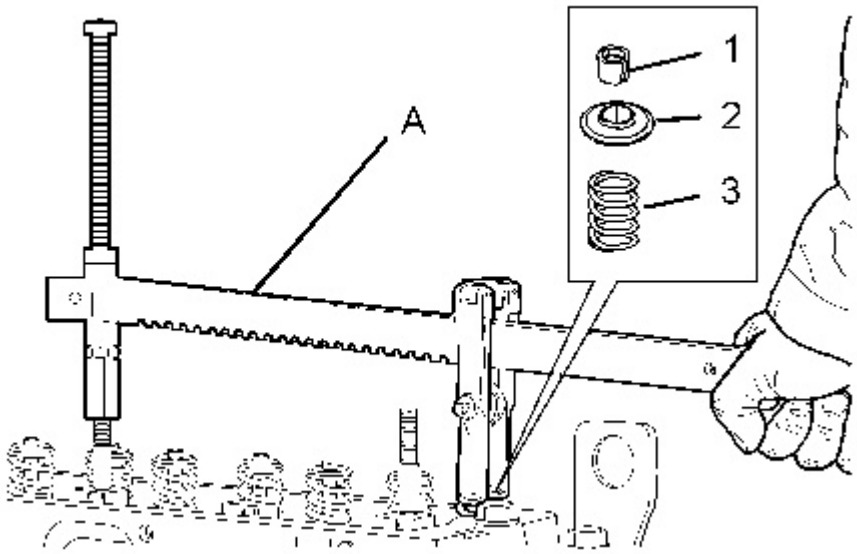

Illustration 1 g01129177

Typical example

1. Use the following procedure in order to find the top dead center position of the appropriate piston.

    a. Install tool (A) in position on the cylinder head in order to compress the appropriate valve spring (3).

b. Compress the valve spring (3) sufficiently in order to open the valve only. Do not compress the valve spring so that the valve keepers (1) could be removed from the recess in the valve stem or so that the valve stem seal (not shown) could be damaged.

c. Slowly turn the crankshaft until the piston touches the valve.

d. Continue to turn the crankshaft and release the pressure on tool (A) until the piston is at the top center position.

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

NOTICE

Do not turn the crankshaft while the valve springs are removed.

---

2. Use tool (A) in order to compress the valve spring (3). Remove the valve keepers (1).

3. Remove the valve spring retainer (2) and remove the valve spring (3).

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	9U-6195	Valve Spring Compressor	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

NOTICE

Install suitable plugs to the inlet ports of the cylinder head in order to prevent the entry of loose parts into the engine.

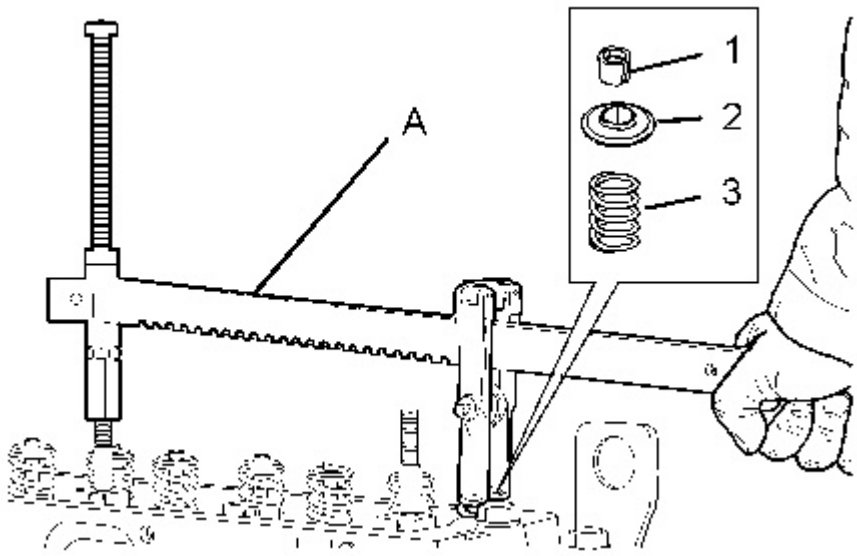

Illustration 2 g01129177

Typical example

1. Place the valve springs (3) into position on the cylinder head.
2. Install the valve spring retainer (2).
3. Install tool (A) in position on the cylinder head in order to compress the appropriate valve spring (3). Compress the valve spring.

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

4. Install two valve keepers (1) in order to lock the valve springs in position.

NOTICE

Do not turn the crankshaft while the valve springs are removed.

---

5. Carefully release the pressure on tool (A). Remove tool (A). Ensure that all of the valves are secured in place by a valve spring and valve keepers. Rotate the crankshaft through about 45 degrees in order to clear the piston from the valve. Lightly strike the top of the valve with a soft hammer in order to ensure that the valve keepers (1) are properly installed.

End By:

a. Install the rocker shaft assembly. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".

Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02736119

Inlet and Exhaust Valves - Remove and Install

SMCS - 1105-010

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	9U-6195	Valve Spring Compressor	1

Start By:

a. Remove the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

---

1. Clean the bottom face of the cylinder head. Check the depth of the valves below the face of the cylinder head before the valve springs are removed. Refer to Specifications, "Cylinder Head Valves" for the correct dimensions.
2. Place an identification mark on the heads of the valves for installation purposes.

   Note: The head of the inlet valve has a larger diameter than the head of the exhaust valve.
3. Position the cylinder head on a suitable surface with the valve springs facing upward.

Note: Ensure that the machined face of the cylinder head is kept on a clean, soft surface in order to prevent damage to the machined surface.

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

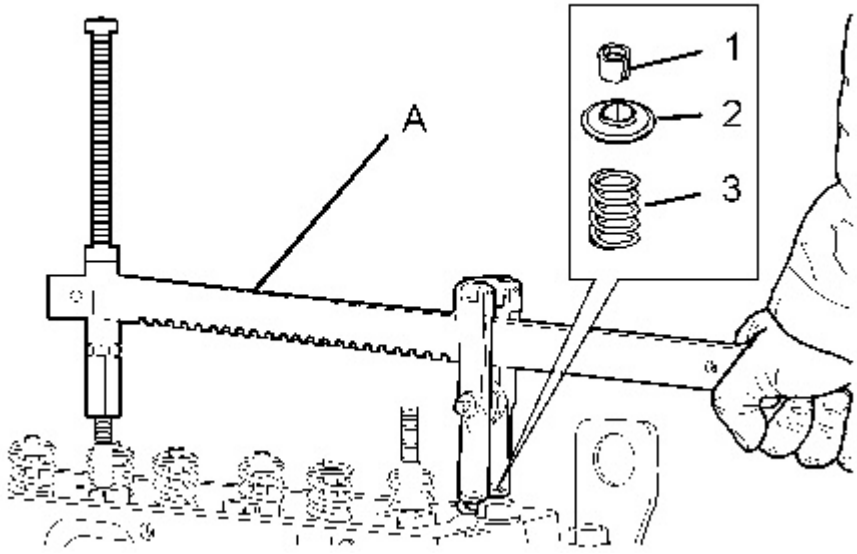

Illustration 1 g01129177

Typical example

4. Install tool (A) in position on the cylinder head in order to compress the appropriate valve spring (3).

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

5. Apply pressure to tool (A). Remove the valve keepers (1).
6. Slowly release the pressure on tool (A).

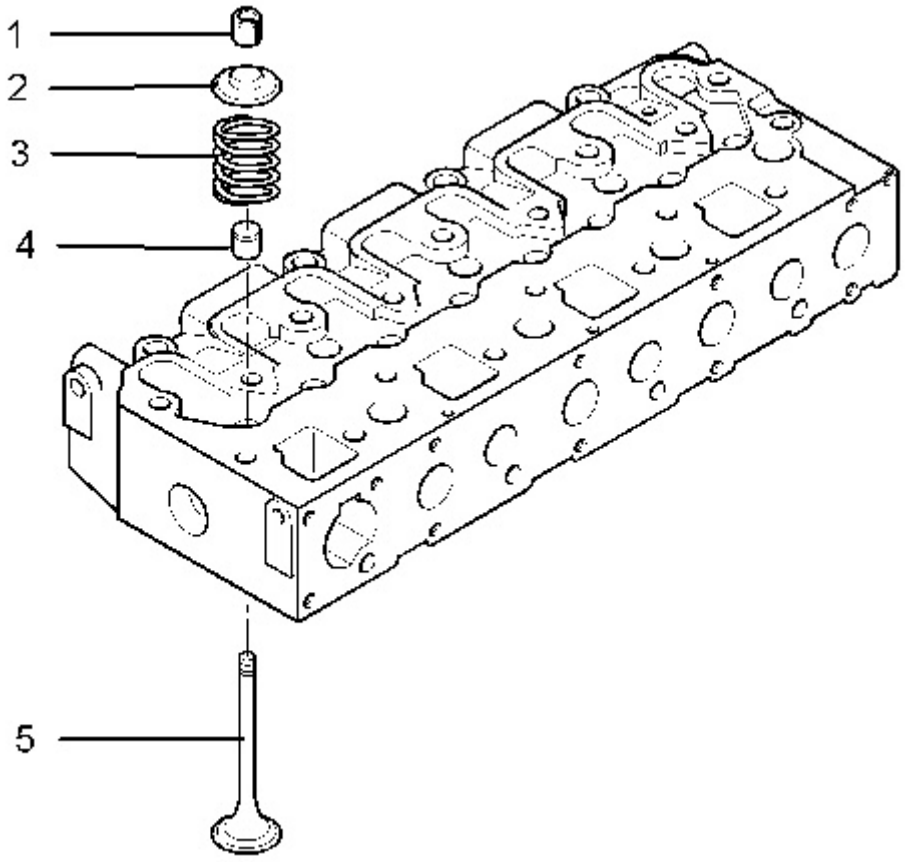

Illustration 2 g01129220

Typical example

7. Remove the valve spring retainer (2).
8. Remove valve spring (3).
9. Repeat steps 4 to 8 for the remaining valves.
10. Remove tool (A).
11. Remove the valve stem seals (4).
12. Carefully turn over the cylinder head.
13. Remove the valves (5).

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	9U-6195	Valve Spring Compressor	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Clean all parts. Ensure that all ports, all coolant passages and all lubrication passages are free from debris. To inspect the cylinder head, refer to Systems Operation, Testing and Adjusting, "Cylinder Head Inspect" for further information.

2. Inspect all of the valve seats for wear and for damage. Refer to Specifications, "Cylinder Head Valves" and refer to Systems Operation, Testing and Adjusting, "Valve Depth - Inspect " for further information.

3. Inspect all of the valve guides for wear and for damage. Refer to Specifications, "Cylinder Head Valves" and refer to Systems Operation, Testing and Adjusting, "Valve Guide - Inspect" for further information.

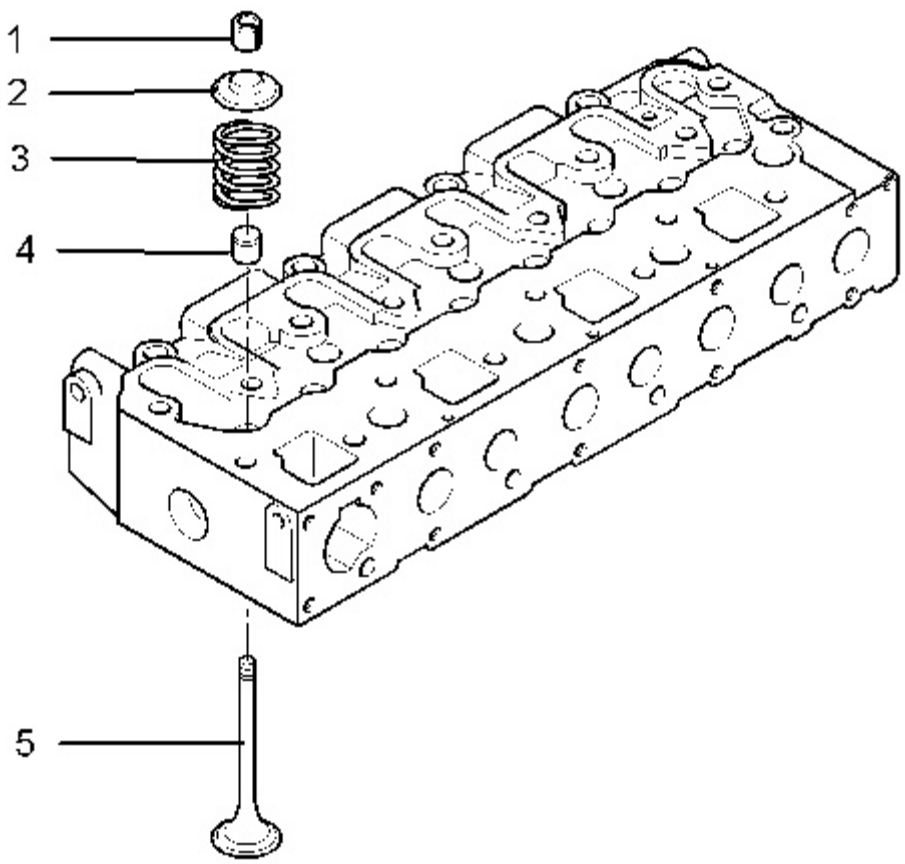

Illustration 3 g01129220

Typical example

4. Lubricate the stems of all valves (5) with clean engine oil. Install the valves (5) in the appropriate positions.

5. Carefully turn over the cylinder head and ensure that all of the valves remain in place.
6. Use a suitable tool to install the new valve stem seals (4) onto each of the valve guides.

   Note: The outer face of the valve guides must be clean and dry before installing the valve stem seals (4). The inlet valve stem and the exhaust valve stem use seals that are different parts.
7. Inspect the valve springs (3) for wear and for the correct installed length. Refer to Specifications, "Cylinder Head Valves " for further information.
8. Install the valve spring (3) onto the cylinder head.
9. Install the valve spring retainer (2).

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

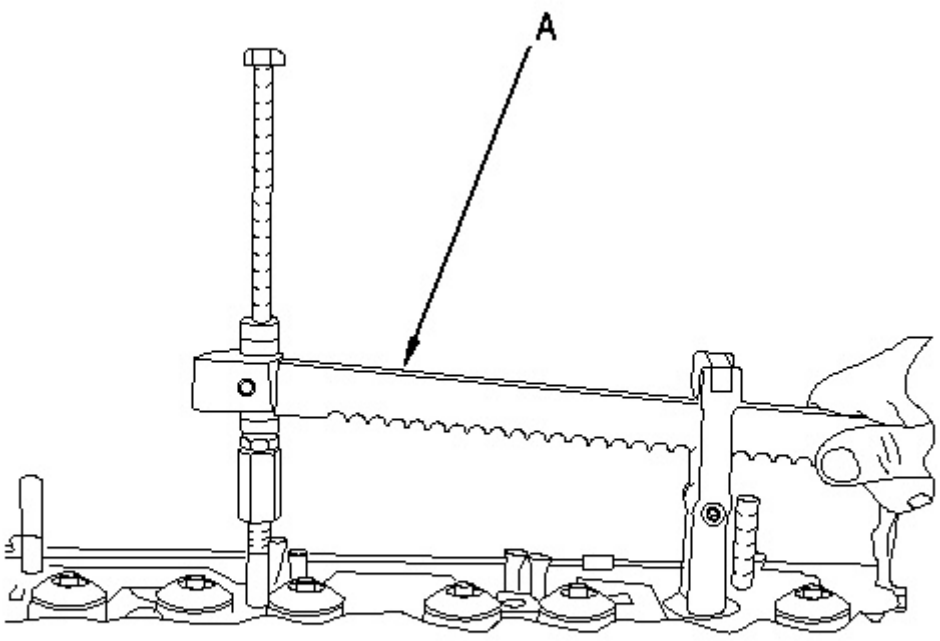

Illustration 4 g00825742

Typical example

10. Install tool (A) in position on the cylinder head in order to compress the appropriate valve spring (3).

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

11. Apply pressure to tool (A). Install the valve keepers (1).

WARNING

The valve spring keepers can be thrown from the valve when the valve spring compressor is released. Ensure that the valve spring keepers are properly installed on the valve stem. To help prevent personal injury, keep away from the front of the valve spring keepers and valve springs during the installation of the valves.

12. Carefully release the pressure on tool (A).
13. Repeat steps 8 to 12 for all of the valves.
14. Remove tool (A) from the cylinder head.
15. Place the cylinder head on a suitable support. Ensure that the heads of the valves are not obstructed. Gently strike the top of the valves with a soft hammer in order to ensure that the valve keepers (1) are properly installed.
16. Turn over the cylinder head and check the depth of the valves below the face of the cylinder head. Refer to Specifications, "Cylinder Head Valves" for more information.

End By:

a. Install the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Install".

Product: COMPACTOR
Model: CB-24B COMPACTOR 2X4
Configuration: CB24B Compactor 2X400001-UP (MACHINE) POWERED BY C1.5 Engine

Disassembly and Assembly
C1.1, C1.5 and C2.2 Engines for Caterpillar Built Machines
Media Number -KENR8103-03 **Publication Date -01/02/2015** **Date Updated -09/06/2016**

i02848641

Engine Oil Line - Remove and Install

SMCS - 1307-010

Removal 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.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

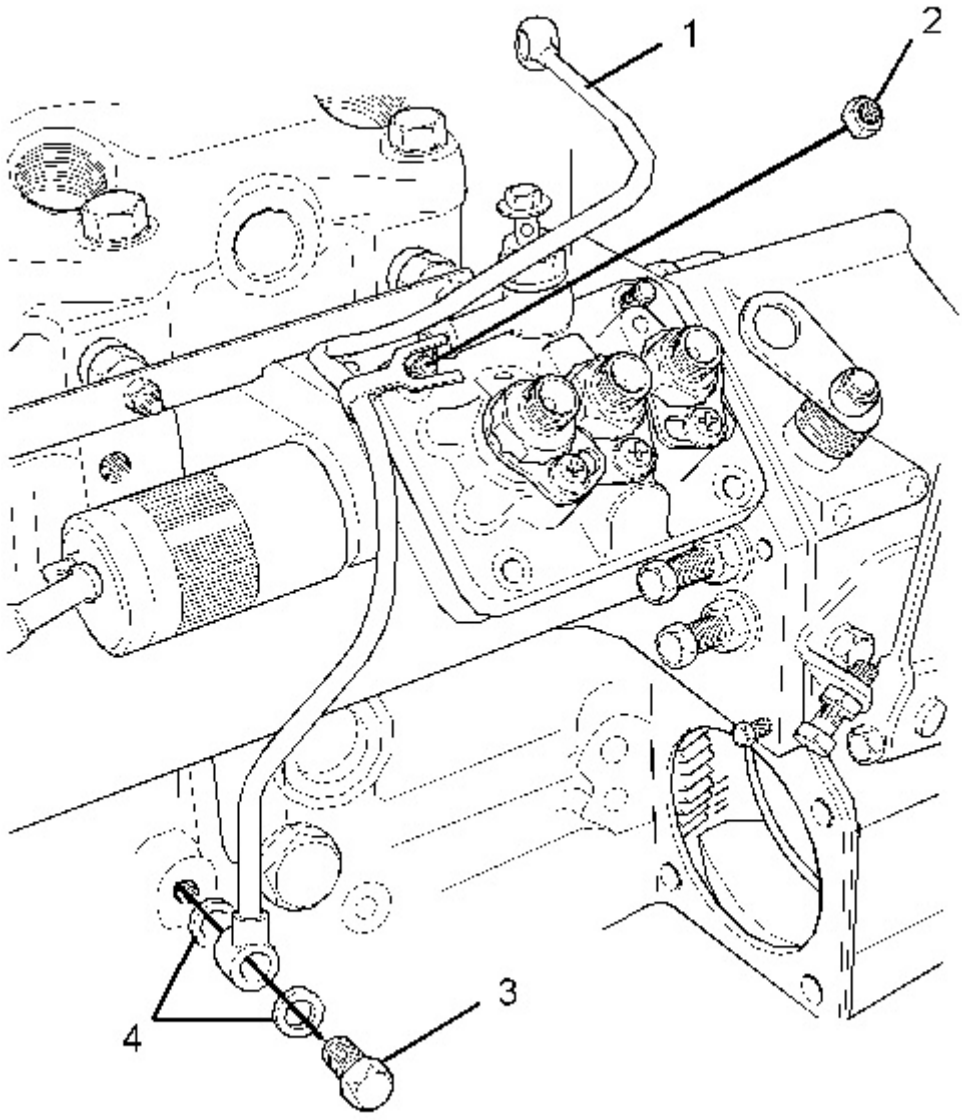

Illustration 1 g01117696

Typical example

1. Loosen the nut (2) that attaches the oil line (1) to the cylinder block.
2. Remove the banjo bolt (3) and remove the washers (4) from the cylinder block. Discard the washers (4).

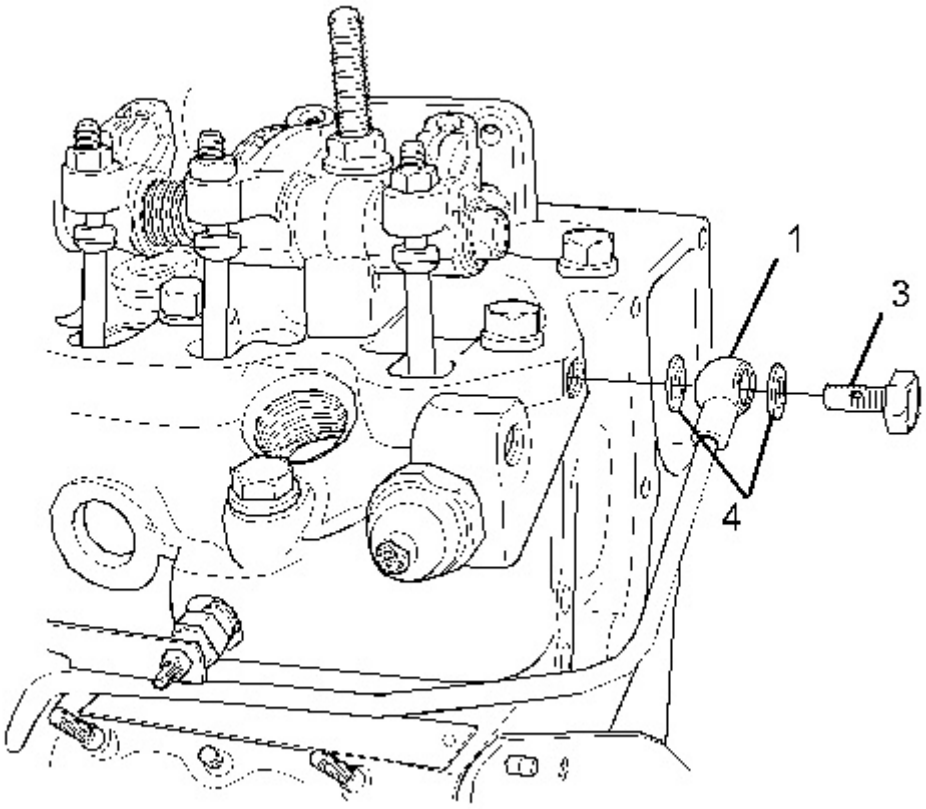

Illustration 2 g01117697

Typical example

3. Remove the banjo bolt (3) and remove the washers (4) from the cylinder head. Discard the washers (4).
4. Remove the oil line (1) from the engine.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

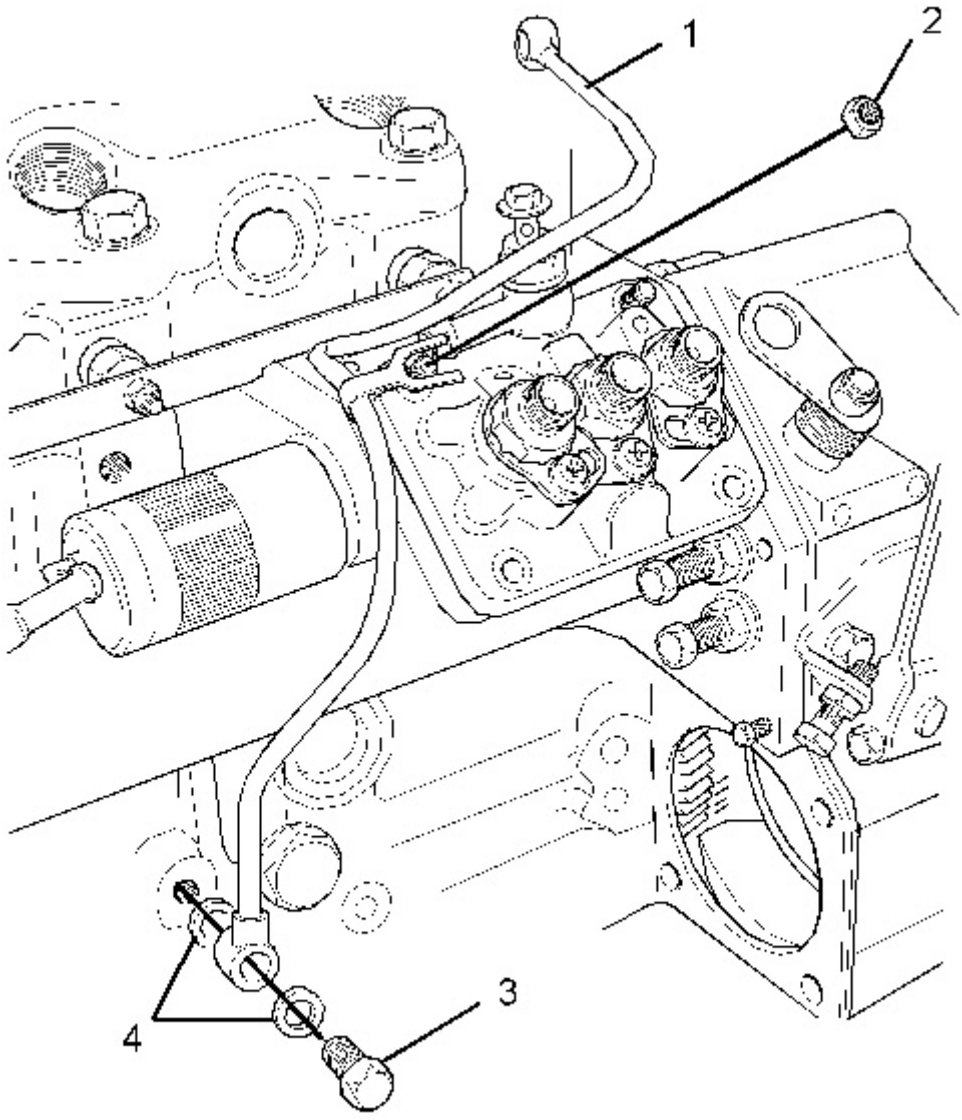

Illustration 3 g01117696

Typical example

1. Position the oil line (1) on the engine.
2. Position the banjo bolt (3) and the new washers (4) on the oil line (1). Install the oil line to the cylinder block.

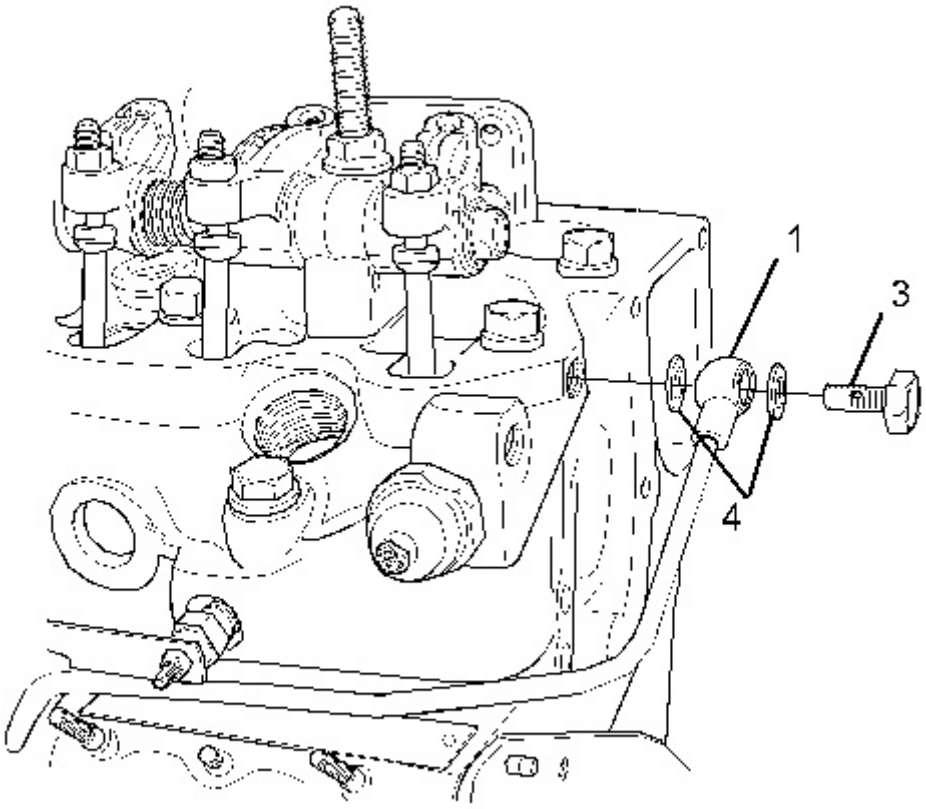

Illustration 4 g01117697

Typical example

3. Position the banjo bolt (3) and the new washers (4) to the oil line (1). Install the oil line to the cylinder head.

4. For C1.1 engines, install the nut (2) that attaches the oil line (1) to the cylinder block. Tighten the nut (2) to a torque of 6 N·m (4.4 lb ft). For C1.5 and C2.2 engines, install the nut (2) that attaches the oil line (1) to the cylinder block. Tighten the nut (2) to a torque of 15 N·m (11 lb ft).

5. Tighten the banjo bolts (3) to 11.5 N·m (8.5 lb ft).