

Product: VIBRATORY COMPACTOR

Model: CB-225D VIBRATORY COMPACTOR 9FZ

Configuration: CB-214D CB-224D CB-225D Vibratory Compactors 9FZ00001-UP (MACHINE) POWERED BY 3013 Engine

Disassembly and Assembly 3003, 3013, 3014 and 3024 Engines for Caterpillar Built Machines

Media Number -SEN5027-05

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Date Updated -16/05/2005

i01429179

Valve Mechanism Cover - Remove and Install

SMCS - 1107-010

Removal Procedure (3003 Engine)

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: The inlet manifold that is used on 3013, 3014, and 3024 Engines is removable as a separate part. The inlet manifold on the 3003 Engine is part of the valve mechanism cover.

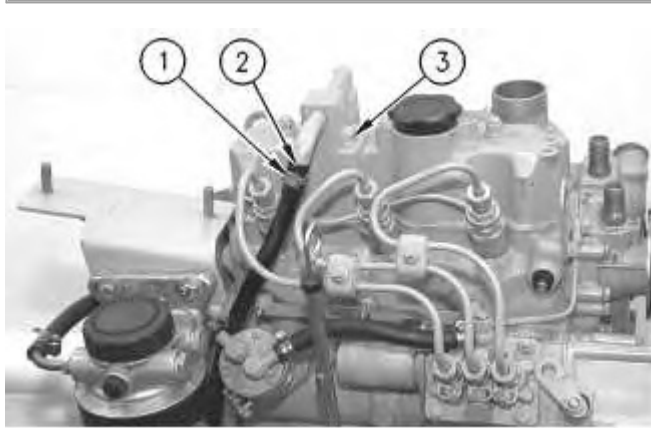


Illustration 1

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1. Loosen clamp (1) and remove breather hose (2) from valve mechanism cover (3) .

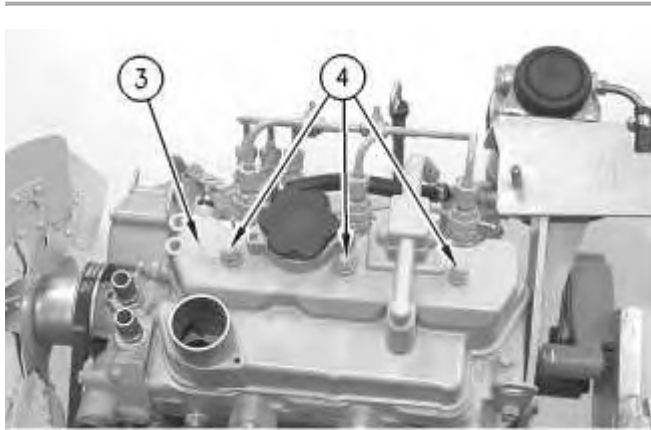


Illustration 2

g00592620

2. Remove three cap nuts (4) that fasten the valve mechanism cover to the engine.
3. Remove valve mechanism cover (3) and the gasket for the valve mechanism cover.

Installation Procedure (3003 Engine)

NOTICE

Keep all parts clean from contaminants.

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1. Clean all surfaces thoroughly. Inspect the condition of the gasket for the valve mechanism cover. Replace the gasket, if necessary.

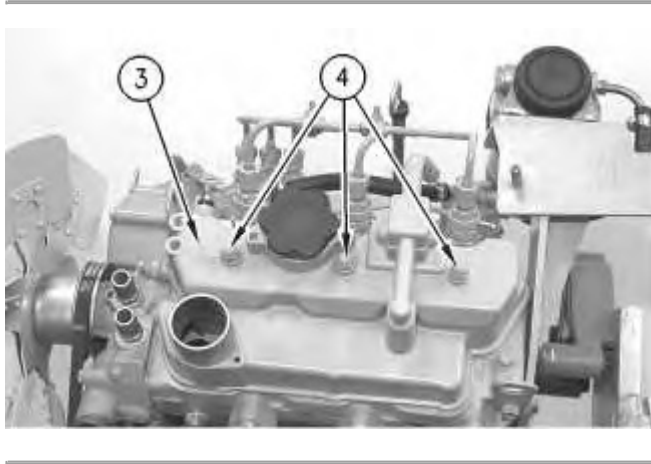


Illustration 3

g00592620

2. Position the gasket for the valve mechanism cover on the cylinder head and install valve mechanism cover (3) .

Note: Before you install three cap nuts (4), lubricate the threads with clean engine oil.

3. Install cap nuts (4) and tighten the nuts to a torque of 11 N·m (8 lb ft).

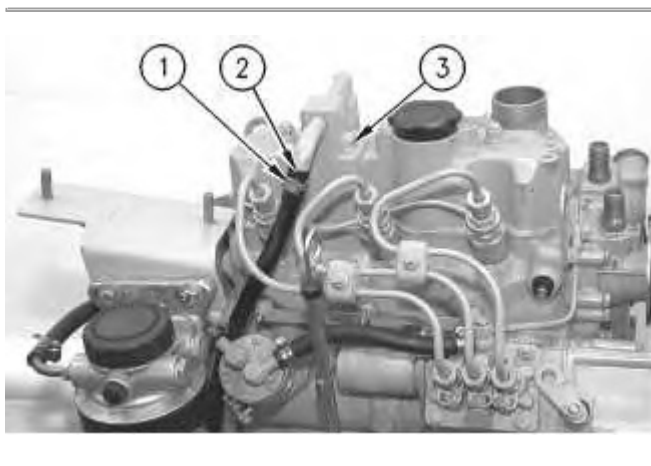


Illustration 4

g00592619

4. Install breather hose (2) and clamp (1) for the crankcase breather.

Removal Procedure (3013, 3014, and 3024 Engines)

NOTICE

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Note: The inlet manifold that is used on 3013, 3014, and 3024 Engines is removable as a separate part. The inlet manifold on the 3003 Engine is part of the valve mechanism cover.

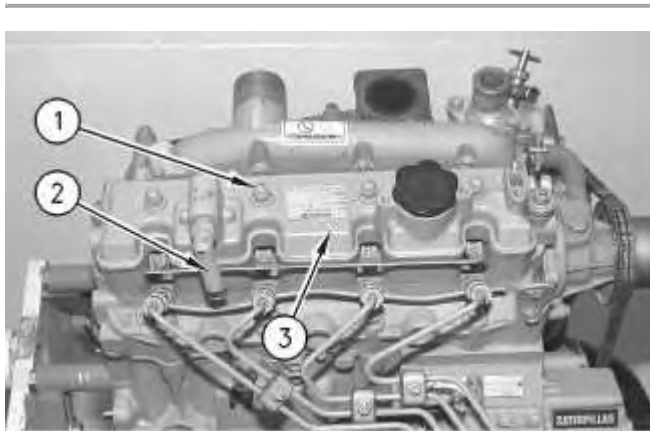


Illustration 5

g00592664

1. Remove the breather hose from crankcase breather (2) .
2. Remove cap nuts (1) from valve mechanism cover (3) .
3. Remove valve mechanism cover (3) from the base for the valve mechanism cover.

Installation Procedure (3013, 3014, and 3024 Engines)

NOTICE

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1. Clean all surfaces thoroughly. Inspect the condition of the gasket for the valve mechanism cover. Replace the gasket, if necessary.

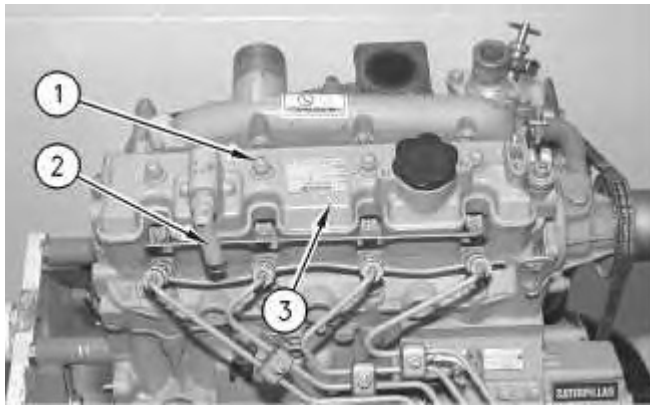


Illustration 6

g00592664

2. Position the gasket for the valve mechanism cover on the cylinder head and install valve mechanism cover (3) .

Note: Before you install cap nuts (1), lubricate the threads with clean engine oil.

3. Install cap nuts (1) and tighten the cap nuts to the following torque:

3013 Engine ... 10 N·m (90 lb in)

3014 and 3024 Engines ... 14 N·m (11 lb ft)

4. Install the breather hose on crankcase breather (2) .
-

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i01480606

Cylinder Head - Remove

SMCS - 1100-011

Removal Procedure

Start By:

- A. Remove the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove".
- B. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold-Remove and Install".
- C. Remove the rocker shaft and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".
- D. Remove the fuel injection nozzles. Refer to Disassembly and Assembly, "Fuel Injection Nozzles - Remove".
- E. On 3003 engines, remove the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".
- F. On 3003 engines, remove the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Remove".
- G. On 3013 engines, remove the water temperature regulator housing. Refer to Disassembly and Assembly, "Water Temperature Regulator Housing - Remove and Install".
- H. On 3013, 3014, and 3024 engines, remove the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Remove".

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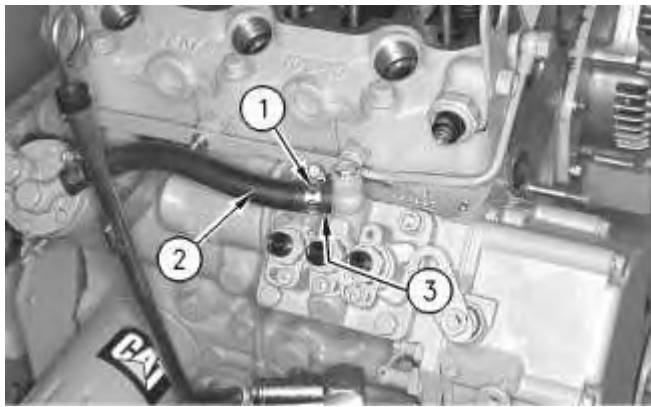


Illustration 1

g00597200

1. Loosen hose clamp (1) and remove fuel hose (2) from the fuel injection pump.
2. Remove nut (3) (not shown) that connects the external oil line to the fuel injection pump.

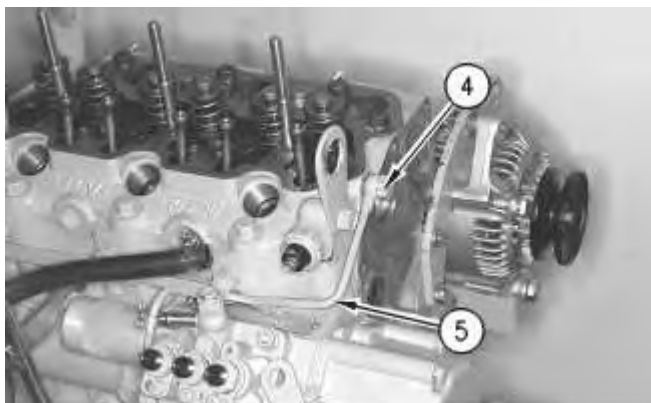


Illustration 2

g00597210

3. Remove bolt (4) and the two washers that fasten external oil line (5) to the front of the cylinder head.

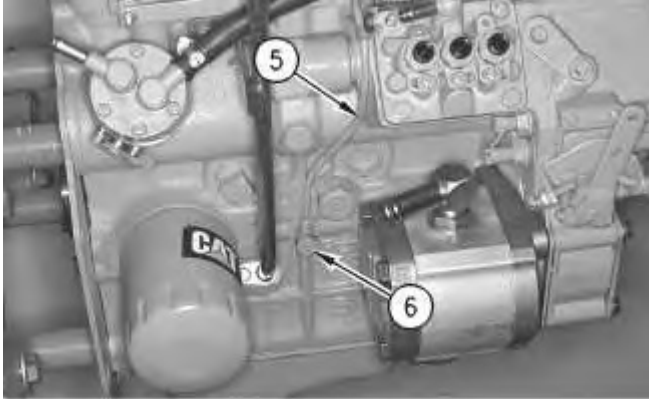


Illustration 3

g00597219

4. Remove bolt (6) and the two washers that fasten external oil line (5) to the side of the engine.

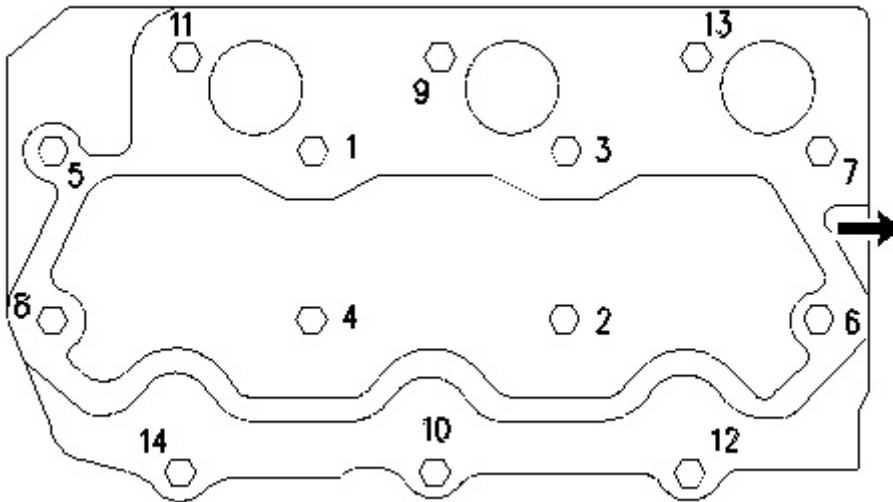


Illustration 4

g00454966

Bolt tightening sequence for 3 cylinder engines

The arrow points toward the front of the engine.

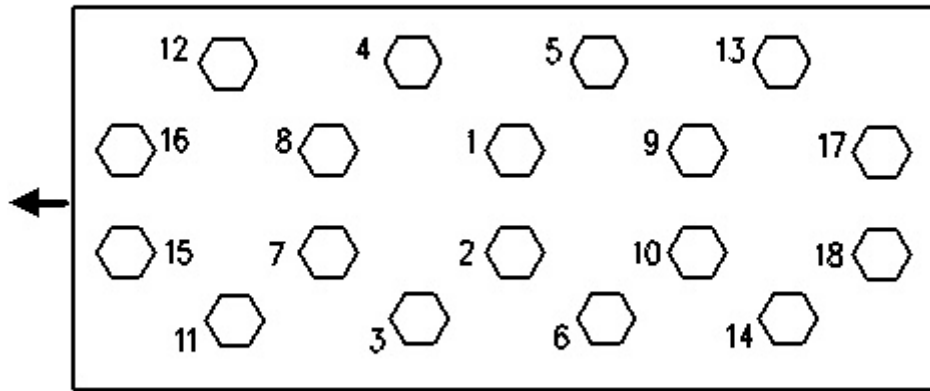


Illustration 5

g00597449

Bolt tightening sequence for 4 cylinder engines

The arrow points toward the front of the engine.

5. Gradually loosen the cylinder head bolts in the reverse order that is shown above. This will help prevent distortion of the cylinder head.

Note: Do not use a pry bar to separate the cylinder head from the cylinder block. Use a rubber mallet to loosen the cylinder head from the cylinder block.

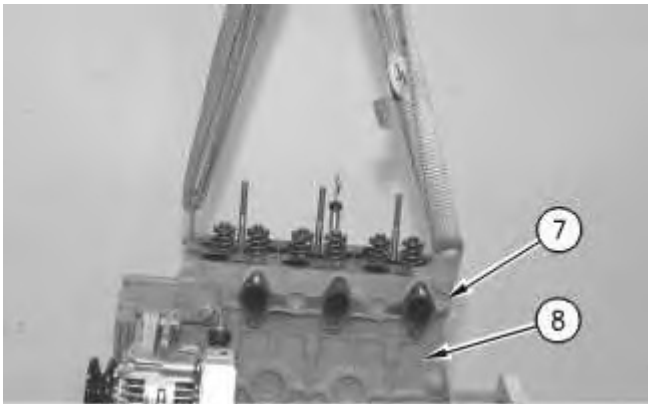


Illustration 6

g00597552

6. Attach a suitable lifting device to cylinder head (7). Carefully lift cylinder head (7) off cylinder block (8). The weight of the cylinder head for 3 cylinder engines is 16 kg (35 lb). The weight of the cylinder head for 4 cylinder engines is 19 kg (42 lb).

NOTICE

Place the cylinder head on a surface that will not scratch the face of the cylinder head.

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i01480631

Cylinder Head - Install

SMCS - 1100-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

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1. Thoroughly clean the top of the cylinder block and the bottom of the cylinder head. Ensure that there is no debris in the cylinder bores.

Note: A number with four digits is stamped on the gasket in order to ensure the correct positioning of the gasket. This number faces the cylinder head. Make sure that the cylinder head is the correct thickness before installation.

2. Place the cylinder head gasket on the dowels on the top of the cylinder block. Do not use any gasket sealant or compound on the cylinder head gasket.
-

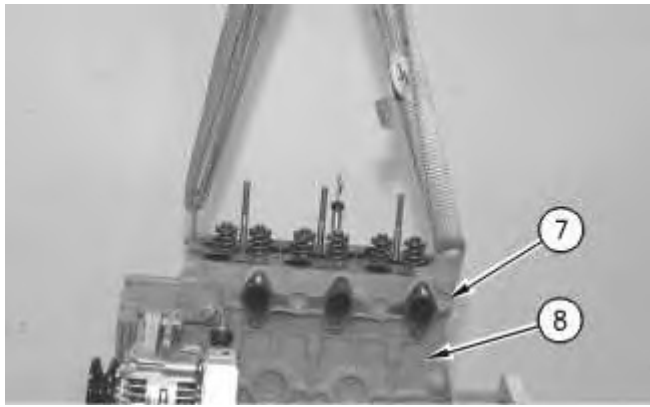


Illustration 1

g00597552

3. Attach a suitable lifting device to cylinder head (7) .
4. Place cylinder head (7) on the cylinder block. Ensure that the cylinder head is positioned on the dowels and that the cylinder head gasket is positioned correctly.
5. Lubricate the cylinder head bolts with clean engine oil.

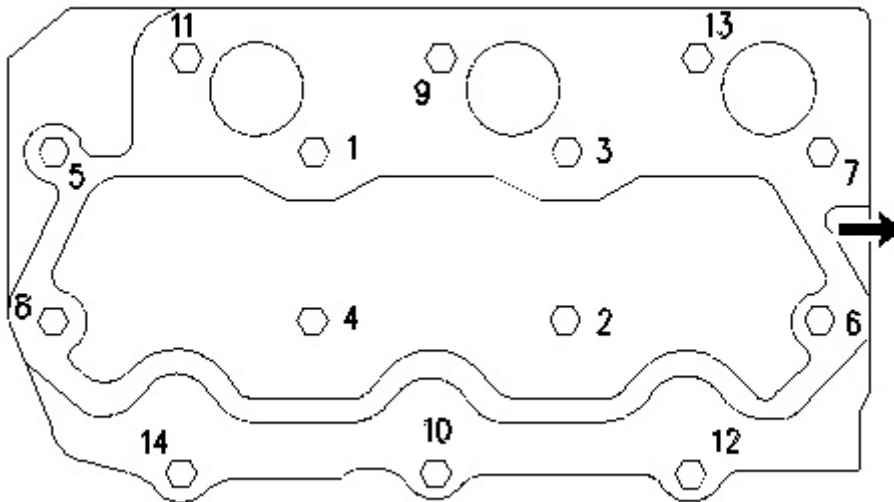


Illustration 2

g00454966

Bolt tightening sequence for 3 cylinder engines

The arrow points toward the front of the engine.

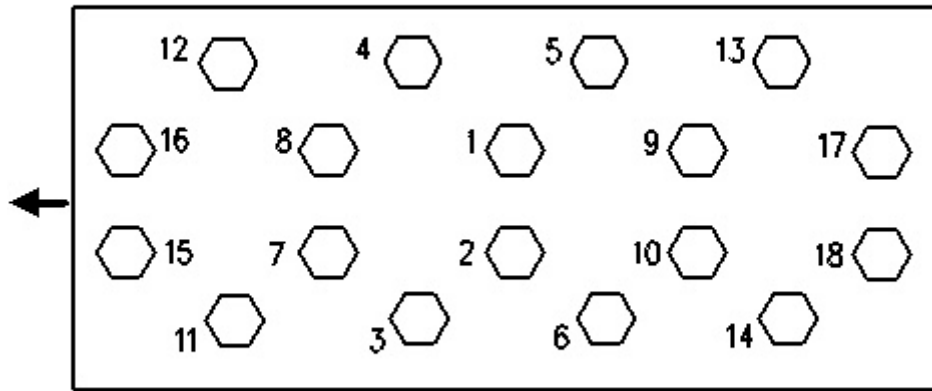


Illustration 3

g00597449

Bolt tightening sequence for 4 cylinder engines

The arrow points toward the front of the engine.

6. Install the cylinder head bolts and gradually tighten the cylinder head bolts in a numerical sequence. The numerical sequence is shown in Illustration 2 and in Illustration 3. Tighten the cylinder head bolts to the following torque:

3003 Engine ... 51 N·m (38 lb ft)

3013, 3014, and 3024 Engines ... 100 N·m (74 lb ft)

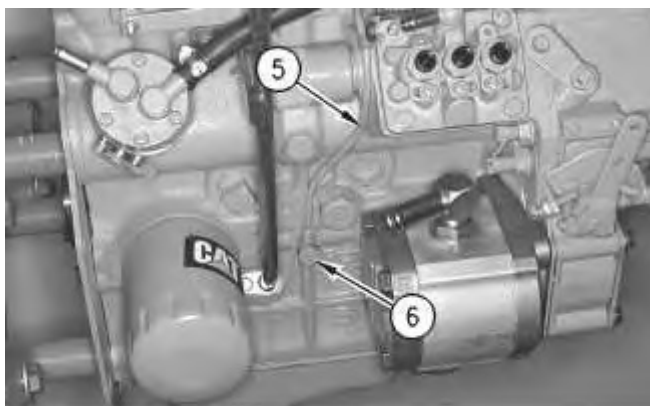


Illustration 4

g00597219

7. Position external oil line (5) on the side of the engine and install bolt (6) .

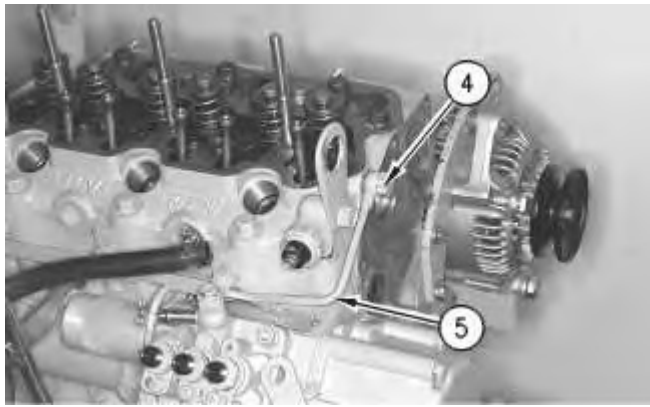


Illustration 5

g00597210

8. Install bolt (4) and the two washers that fasten external oil line (5) to the front of the cylinder head.

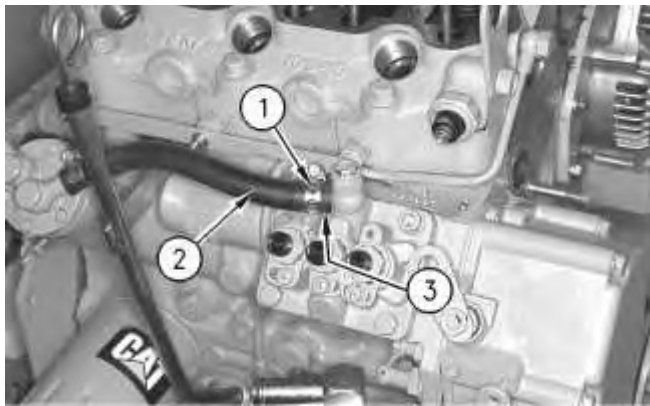


Illustration 6

g00597200

9. Install nut (3) (not shown) that connects the external oil line to the fuel injection pump.
10. Install fuel hose (2) on the fuel injection pump and tighten hose clamp (1) .

End By:

- a. On 3013, 3014, and 3024 engines, install the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Install".
- b. On 3013 engines, install the water temperature regulator housing. Refer to Disassembly and Assembly, "Water Temperature Regulator Housing - Remove and Install".
- c. On 3003 engines, install the fuel filter base. Refer to Disassembly and Assembly, "Fuel Filter Base - Install".
- d. On 3003 engines, install the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Install".
- e. Install the fuel injection nozzles. Refer to Disassembly and Assembly, "Fuel Injection Nozzles - Install".
- f. Install the rocker shaft and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".

- g. Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".
 - h. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
 - i. Install the water pump. Refer to Disassembly and Assembly, "Water Pump - Install".
-

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i02405583

Lifter Group - Remove and Install

SMCS - 1209-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1U-7262	Telescoping Magnet	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.

Note: Mark the original location of the lifters for later installation.

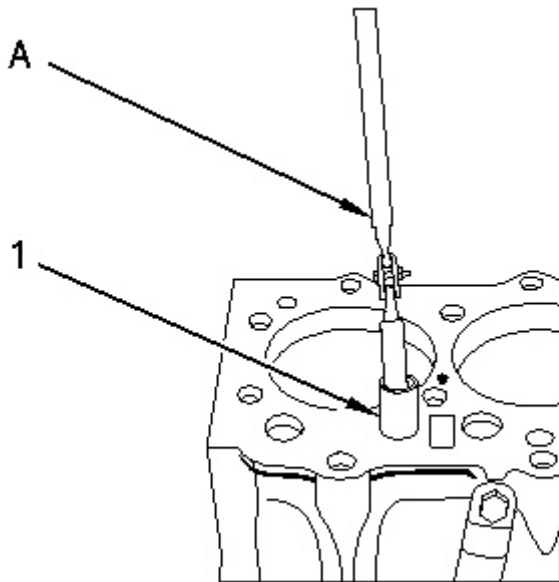


Illustration 1

g00828101

1. Use Tooling (A) to remove lifter (1) from the cylinder block.
2. Inspect lifter (1) for wear or damage. If the lifters are worn or damaged, use new parts for replacement.
3. Repeat Steps 1 and 2 for the remaining lifters.

Installation Procedure

NOTICE

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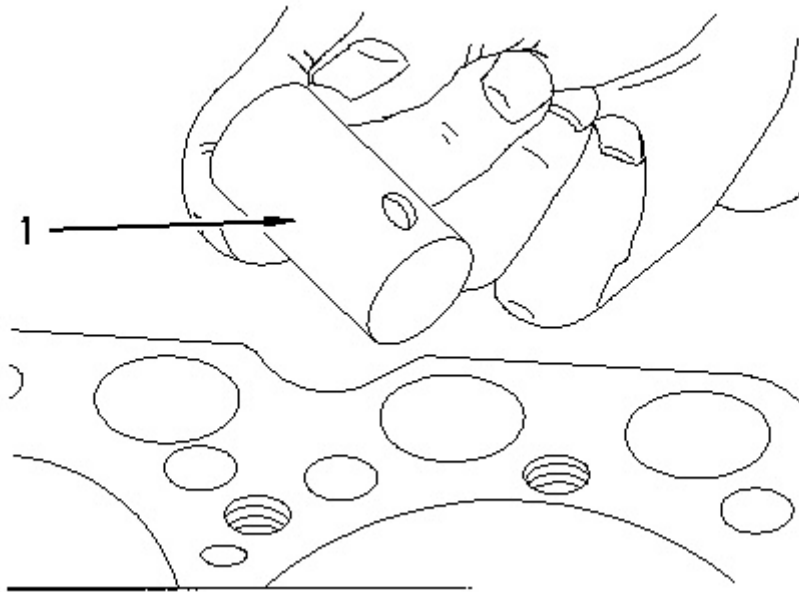


Illustration 2

g00692979

1. Ensure that lifter (1) is clean and that the oil hole in the lifter is not restricted. Lubricate the lifter with clean engine oil and install the lifter in the cylinder block.

Note: Ensure that the lifters are installed in the original location.

2. Repeat Step 1 for the remaining lifters.

End By: Install the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Install".

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i01908247

Camshaft - Remove

SMCS - 1210-011

Removal Procedure

Start By:

- A. Remove the lifters. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".
- B. Remove the fuel injection pump. Refer to Disassembly and Assembly, "Fuel Injection Pump - Remove".
- C. Remove the fuel transfer pump. Refer to Disassembly and Assembly, "Fuel Transfer Pump - Remove".
- D. Remove the engine front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".

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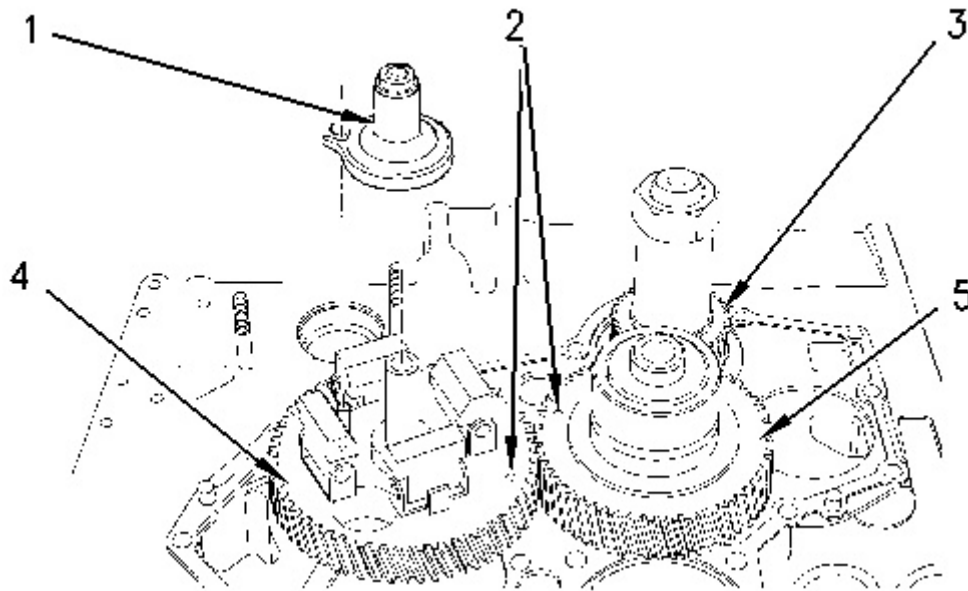


Illustration 1

g00828467

1. Remove slider (1) from camshaft gear (4) .
2. Rotate the crankshaft until timing marks (2) on the following components are aligned.

Note: The No. 1 cylinder is at the top center position when these marks are in alignment. Refer to Illustration 1.

- Camshaft gear (4)
- Idler gear (5)
- Crankshaft gear (3)

3. Remove idler gear (5). Refer to Disassembly and Assembly, "Engine Oil Pump - Remove".
-

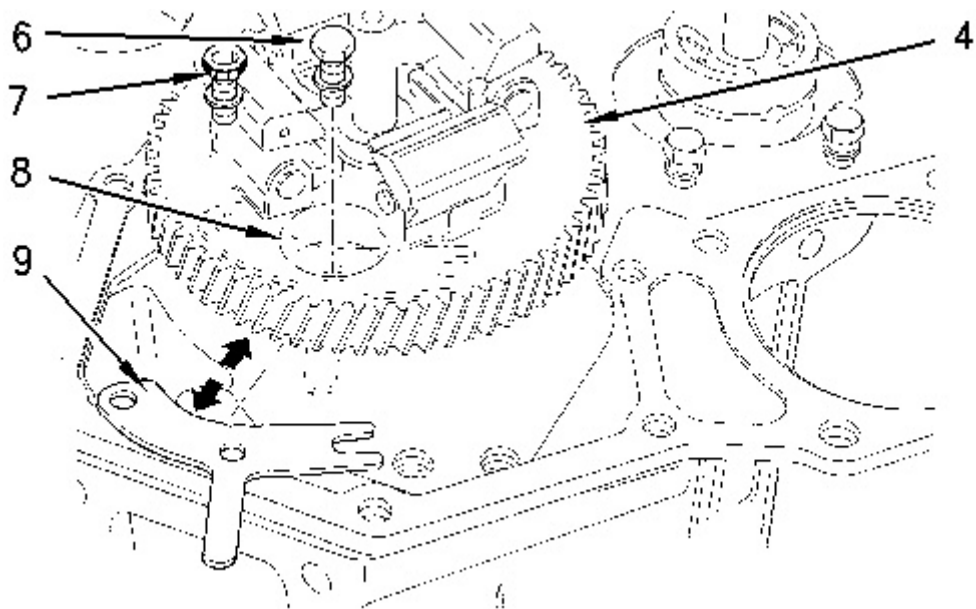


Illustration 2

g00828468

4. Rotate camshaft gear (4) in order to align access hole (8) in the camshaft gear with bolt (6). Remove bolt (6) and remove bolt (7) from camshaft retainer (9).

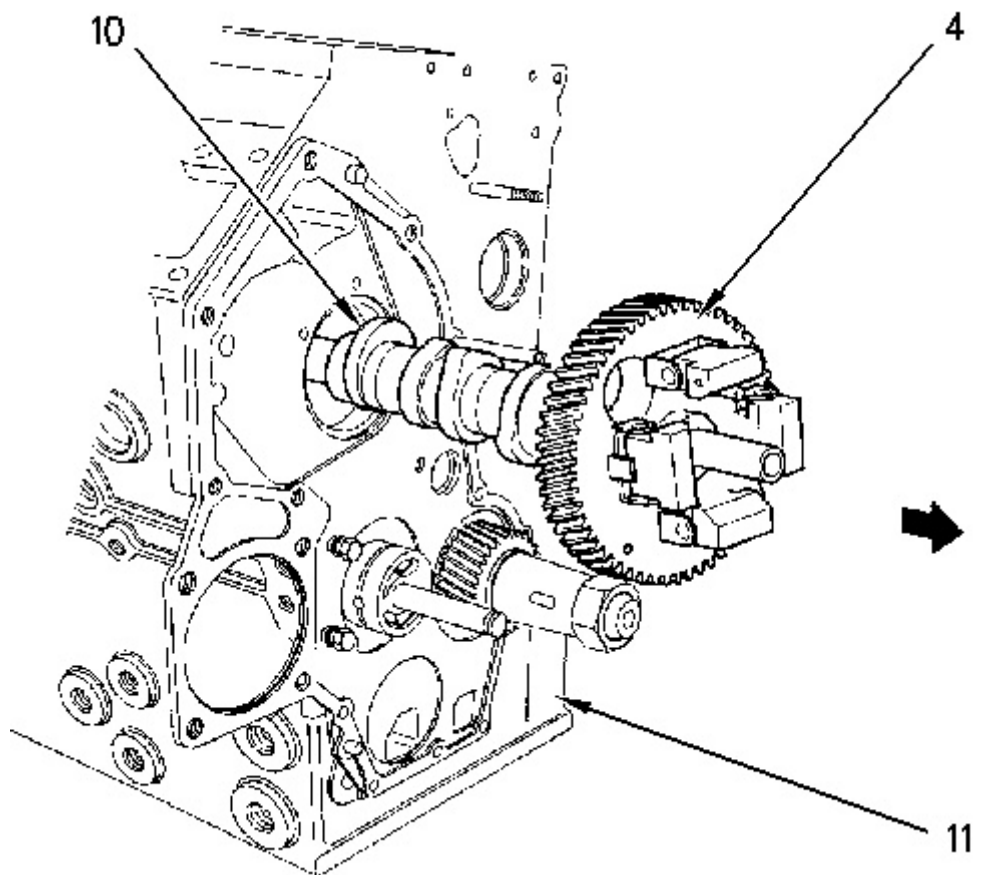


Illustration 3

g01003180

5. Carefully remove camshaft gear (4) and camshaft (10) from cylinder block (11). Be careful not to damage the lobes of the camshaft or the camshaft bearings.
 6. Inspect the components for wear or damage. Replace the components that are worn or damaged.
-

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i02005467

Camshaft - Install

SMCS - 1210-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

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1. Ensure that the camshaft is clean. Lubricate the camshaft with clean engine oil.
-



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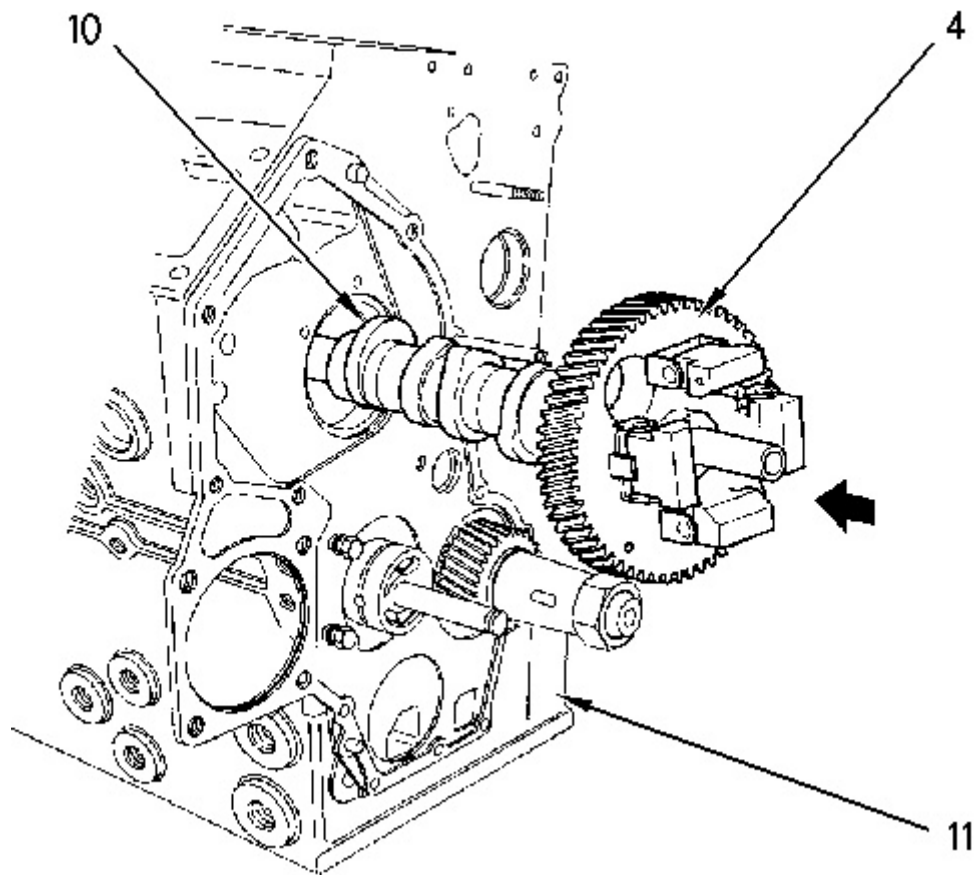


Illustration 1

g01003212

2. Carefully install camshaft (10) and camshaft gear (4) in cylinder block (11). Be careful not to damage the lobes of the camshaft or the camshaft bearings.

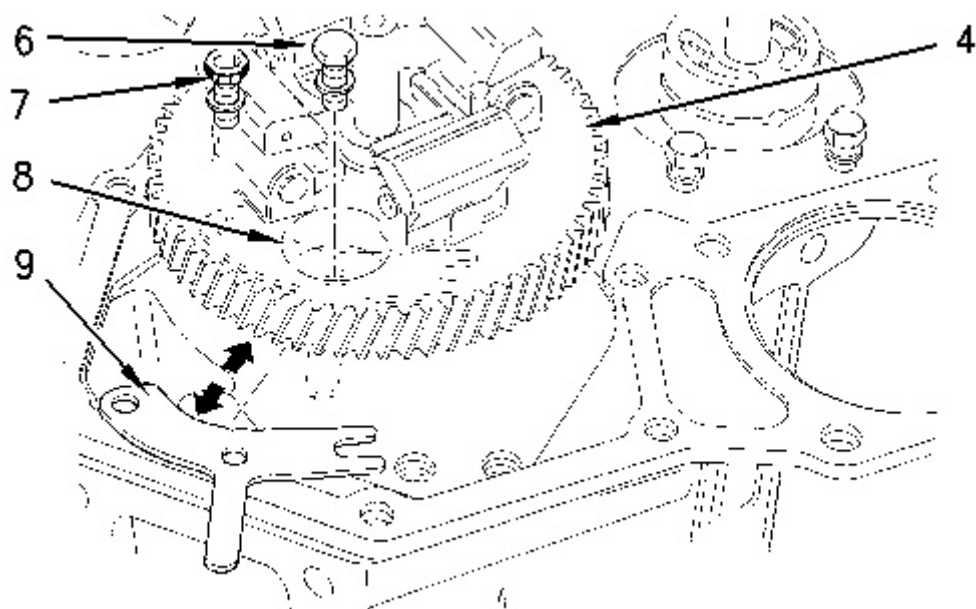


Illustration 2

g00828468

3. Align the bolt holes in camshaft retainer (9) with the bolt holes in cylinder block (11). Rotate camshaft gear (4) in order to align access hole (8) in the camshaft gear with the hole for bolt (6). Install bolt (6) and bolt (7) that secures camshaft retainer (9) in position on cylinder block (11). Tighten bolt (6) and bolt (7) to a torque of 11 N·m (95 lb in).

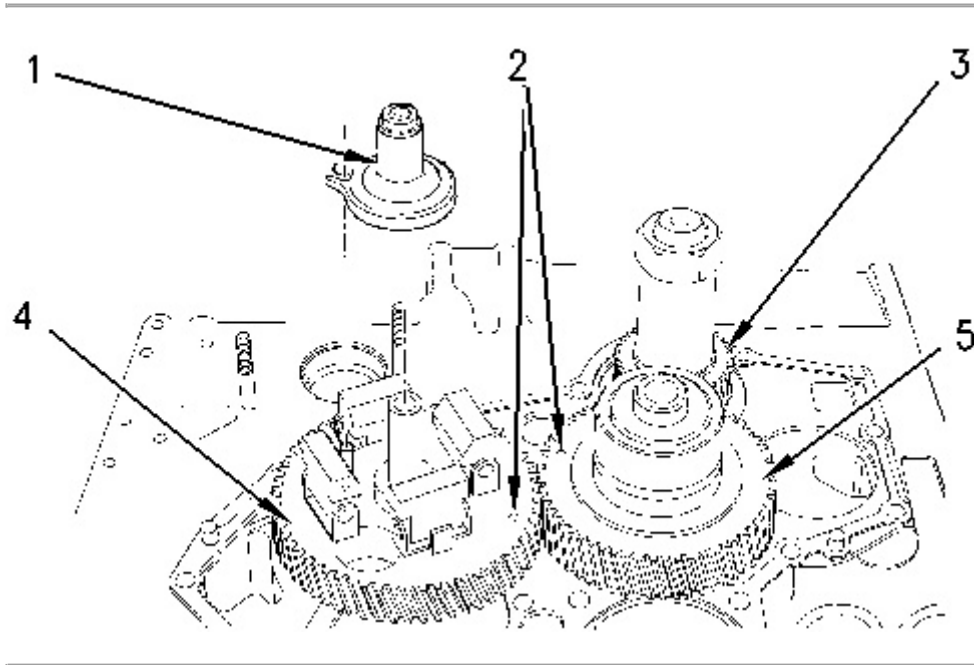


Illustration 3

g00828467

4. Install idler gear (5). Refer to Disassembly and Assembly, "Engine Oil Pump - Install".

Note: When you install the idler gear, ensure that timing marks (2) are aligned on the following components.

- Camshaft gear (4)
 - Idler gear (5)
 - Crankshaft gear (3)
5. Install slider (1) to camshaft gear (4) .
- End By:**
- a. Install the engine front housing. Refer to Disassembly and Assembly, "Housing (Front) - Install".
 - b. Install the fuel transfer pump. Refer to Disassembly and Assembly, "Fuel Transfer Pump - Install".
 - c. Install the fuel injection pump. Refer to Disassembly and assembly, "Fuel Injection Pump - Install".
 - d. Install the lifters. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".

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