



# Service Repair Manual

## **Models**

303.5E2 Mini Hydraulic  
Excavator

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Previous Screen

Product: MINI HYD EXCAVATOR

Model: 303.5E2 MINI HYD EXCAVATOR JWY

Configuration: 303.5E2 Mini Hydraulic Excavator JWY00001-UP (MACHINE) POWERED BY C1.7 Engine

## Disassembly and Assembly

### C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built Machines

Media Number -UENR0128-11

Publication Date -01/08/2015

Date Updated -09/06/2016

i05243403

## Inlet and Exhaust Valve Springs - Remove and Install

SMCS - 1108-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	7F-4292	Valve Spring Compressor	1
	9U-6144	Adapter	1

#### Start By:

- a. Remove the rocker shaft and push rod.

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#### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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

**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.



Illustration 1

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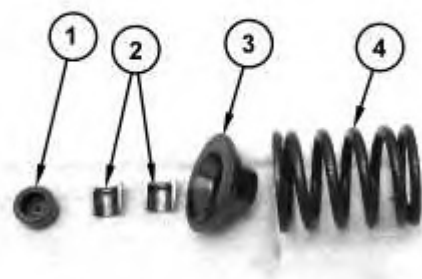


Illustration 2

g02725099

 **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.**

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**NOTICE**

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

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1. Follow Step 1.a through Step 1.d in order to position the appropriate piston at top dead center.

a. Install Tooling (A) in position on the cylinder head in order to compress a valve spring (4) for the appropriate piston.

b. Use Tooling (A) in order to compress valve spring (4) and open the valve slightly.

**Note:** Do not compress the spring so that valve spring retainer (3) touches the valve stem seal.

c. Rotate the crankshaft carefully, until the piston touches the valve.

**Note:** Do not use excessive force to turn the crankshaft. The use of force can result in bent valve stems.

d. Continue to rotate the crankshaft and gradually release the pressure on Tooling (A) until the piston is at the top dead center position. The valve is now held in a position that allows the valve spring to be safely removed.

**Note:** If all valve springs require replacement, the procedure can be carried out on two cylinders at the same time. The procedure can be carried out on the following pairs of cylinders. 1 with 4 and 2 with 3. Ensure that all of the valve springs are installed before changing from one pair of cylinders to another pair of cylinders.

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## NOTICE

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

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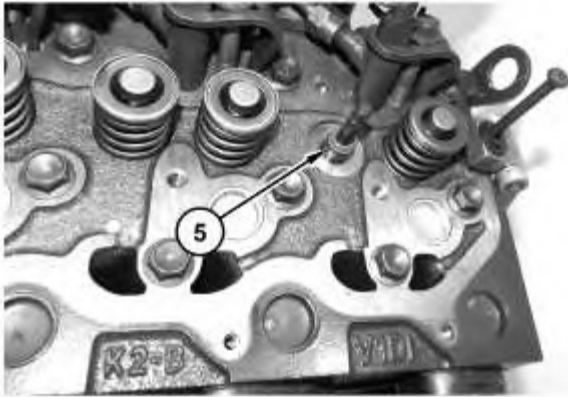
2. Remove valve cap (1). Apply sufficient pressure to Tooling (A) in order to allow removal of valve keepers (2).

**Note:** Do not compress the spring so that valve spring retainer (3) touches the valve stem seal.

3. Slowly release pressure on Tooling (A).

4. Remove valve spring retainer (3) and remove valve spring (4).

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Illustration 3

g02725101

5. Remove Tooling (A).
6. Remove valve stem seals (5).
7. Repeat Step 2 through Step 5 in order to remove the remaining valve springs from the appropriate cylinder.

## Installation Procedure

1. Install the inlet and exhaust valve springs (4) in the reverse order of removal.
  - a. Inspect valve springs (4) for damage and for the correct length. Refer to Specifications, "Cylinder Head Valves " for further information.

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Model: 303.5E2 MINI HYD EXCAVATOR JWY

Configuration: 303.5E2 Mini Hydraulic Excavator JWY00001-UP (MACHINE) POWERED BY C1.7 Engine

## Disassembly and Assembly

### C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built Machines

Media Number -UENR0128-11

Publication Date -01/08/2015

Date Updated -09/06/2016

i05243407

## Inlet and Exhaust Valves - Remove and Install

SMCS - 1105-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	5S-1330	Valve Spring Compressor	1

#### Start By:

- a. Remove the cylinder head.

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#### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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1. Clean the bottom mating surface 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 a temporary identification mark on the heads of the valves in order to identify the correct position.

3. Use a suitable lifting device to position the cylinder head with the valve springs upward. The weight of the cylinder head is approximately 23 kg (51 lb).
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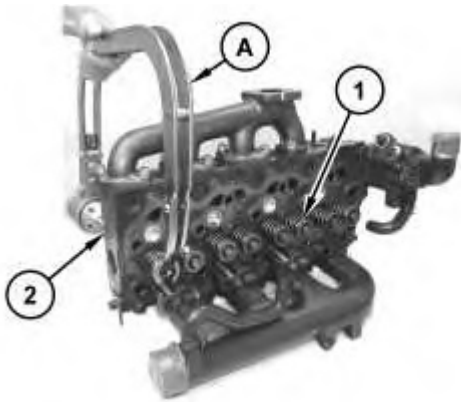


Illustration 1

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**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.**

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4. Install Tooling (A) in position on cylinder head (2) and compress the valve spring in order to remove inlet and exhaust valves (1).
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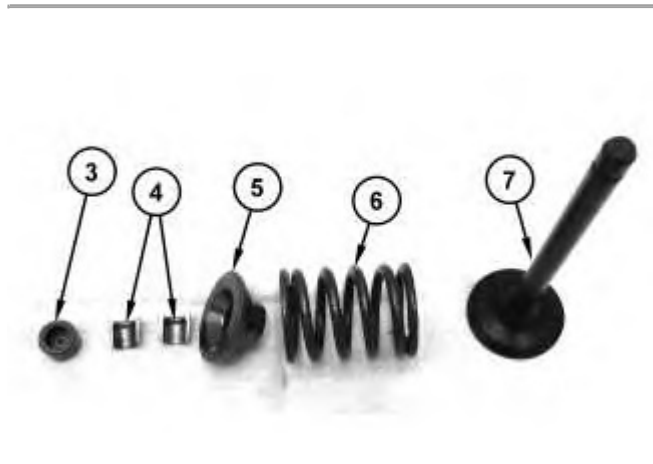


Illustration 2

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**NOTICE**

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

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5. Remove valve cap (3). Apply sufficient pressure to Tooling (A) in order to remove valve keepers (4).
6. Slowly release pressure on Tooling (A).
7. Place a temporary identification mark on valve spring (3) in order to identify the correct position.
8. Remove valve spring retainer (5). Remove valve spring (6).
9. Repeat Step 4 through Step 8 for the remaining valves.
10. Remove Tooling (A).



Illustration 3

g02722928

11. Remove valve stem seals (8) from cylinder head (2).
12. Use a suitable lifting device in order to turn over cylinder head (2).
13. Remove the inlet and exhaust valves.

## **Installation Procedure**

1. Install inlet and exhaust valves (4) in the reverse order of removal.
2. Clean all components of the cylinder head assembly. Ensure that all ports, all coolant passages, and all lubrication passages in the cylinder head are free from debris. Follow Step 2.a through Step 2.d in order to inspect the components of the cylinder head assembly. Replace any components that are worn or damaged.
  - a. Inspect the cylinder head for wear and for damage. Refer to System Operation, Testing and Adjusting, "Cylinder Head Inspect" for the correct procedure.

- b. Inspect the valve seats for wear and for damage. Refer to Specifications, "Cylinder Head Valves" for further information.
  - c. Inspect the valve guides for wear and for damage. Refer to Specifications, "Cylinder Head Valves" and System Operation, Testing and Adjusting, "Valve Guide - Inspect" for further information.
  - d. Inspect the valves for wear and for damage. Refer to Specifications, "Cylinder Head Valves" for further information.
  - e. Inspect valve springs (3) for damage and for the correct length. Refer to Specifications, "Cylinder Head Valves " for further information.
3. Lubricate the stems of valves (8) with clean engine oil. Install valves (8) in the appropriate positions in the cylinder head. Check the depth of the valves below the face of the cylinder head. Refer to System Operation, Testing and Adjusting, "Valve Depth - Inspect" for more information.

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## Disassembly and Assembly

### C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built Machines

Media Number -UENR0128-11

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i05243419

## Inlet and Exhaust Valve Guides - Remove and Install

SMCS - 1104-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	387-1311	Valve Guide Driver Kit	1

#### Start By:

- a. Remove the inlet valves and the exhaust valves.

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#### NOTICE

**Removal and installation of the valve guide and valve seat must be carried out by personnel with the correct training. Also special machinery is required. For more information, refer to your authorized Caterpillar dealer.**

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#### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

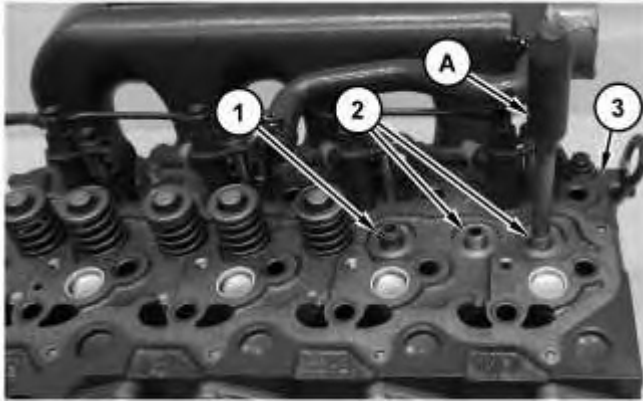


Illustration 1

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1. Remove inlet and exhaust valve seals (1). Use Tooling (A) in order to remove valve guides (2) from cylinder head (3).
2. Repeat the Step 1 for the remaining valve guides.

## Installation Procedure

**Note:** Ensure that the cylinder head is clean and free from machining debris. Clean the parent bores in the cylinder head and lubricate the new valve guides.

1. Install inlet and exhaust valve guides (2) in the reverse order of removal.
  - a. Use Tooling (A) to install inlet and exhaust valve guides (2).

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## Disassembly and Assembly

### C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built Machines

Media Number -UENR0128-11

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i05243425

# Inlet and Exhaust Valve Seat Inserts - Remove and Install

SMCS - 1103-010

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	389-7515	Inlet Valve Seat Extractor Tool	1
B	389-7514	Exhaust Valve Seat Extractor Tool	1

### Start By:

- a. Remove the inlet and exhaust valves.

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### NOTICE

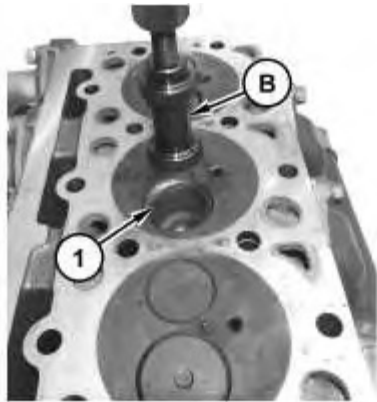
**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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Illustration 1

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Illustration 2

g02731132

1. Use Tooling (B) to remove exhaust valve seat inserts (1).

**Note:** The bigger valve seat inserts (1) are for the inlet valves. The smaller valve seat inserts (1) are for the exhaust valves.

2. Use Tooling (A) to remove inlet valve seat inserts (1).

## Installation Procedure

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### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

---

1. Install new inlet and exhaust valve seat inserts (1) in the reverse order of removal.

**Note:** The bigger valve seat inserts (1) are for the inlet valves. The smaller valve seat inserts (1) are for the exhaust valves.

2. If necessary, correct the seat surface with the valve seat cutter. Refer to System Operation, Testing and Adjusting, "Valve Guide - Inspect".

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## Disassembly and Assembly C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built Machines

Media Number -UENR0128-11

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i05243427

# Engine Oil Relief Valve - Remove and Install

SMCS - 1315-010

## Removal Procedure

### Start By:

- a. Remove the engine oil filter.

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### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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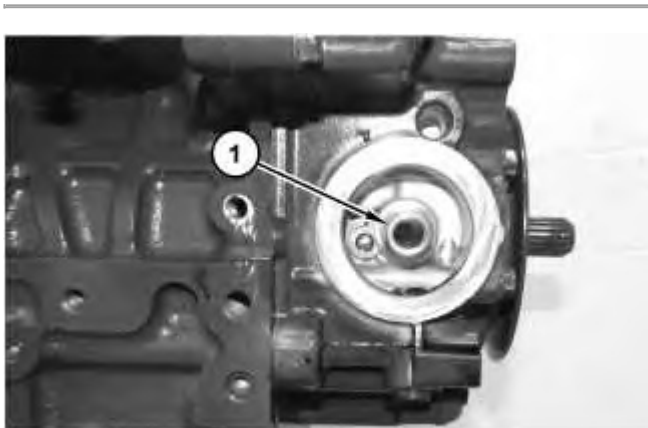


Illustration 1

g02720288

1. Remove adapter (1).



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**Make sure to wear all necessary protective equipment.**

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

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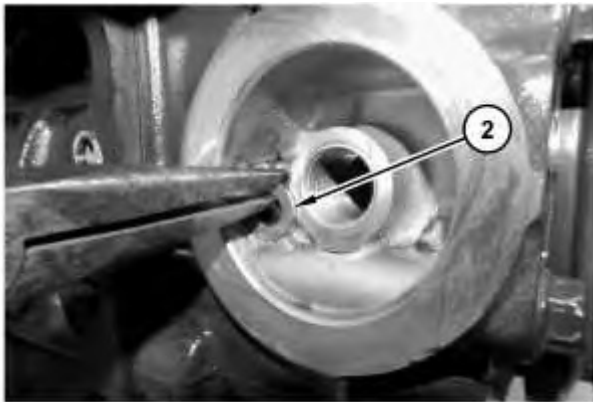


Illustration 2

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2. Remove relief valve assembly (2).
- 

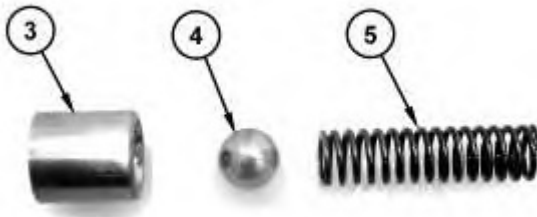


Illustration 3

g02720293

3. Use long nose pliers to remove sleeve (3) from the housing. Remove ball (4) and spring (5) from the bore for the relief valve.

## **Installation Procedure**

**Note:** Ensure that all components are clean and free from wear or damage. If necessary, replace any components that are worn or damaged. If the bore for the relief valve in the housing is worn or damaged, the complete relief valve assembly must be replaced.

1. Install the engine oil relief valve in the reverse order of removal.

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**Disassembly and Assembly  
C1.7, C1.8 and C2.4 Tier 4 Interim and EU Stage 3A Engines for Caterpillar Built  
Machines**

Media Number -UENR0128-11

Publication Date -01/08/2015

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i05243463

## Engine Oil Pump - Remove

SMCS - 1304-011

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-2321	Puller As.	1

**Start By:**

- a. Remove the front housing.

---

**NOTICE**

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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**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.**

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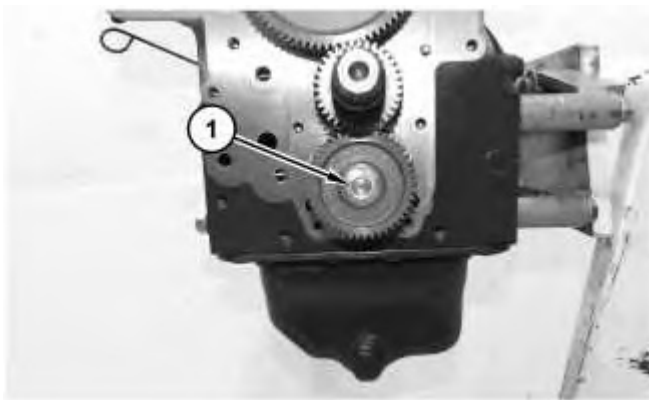


Illustration 1

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1. Remove nut (1) and the washer.

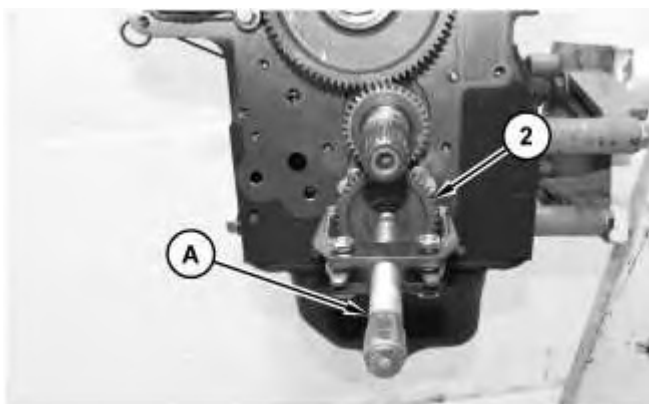


Illustration 2

g02718965

2. Use Tooling (A) and remove gear (2).

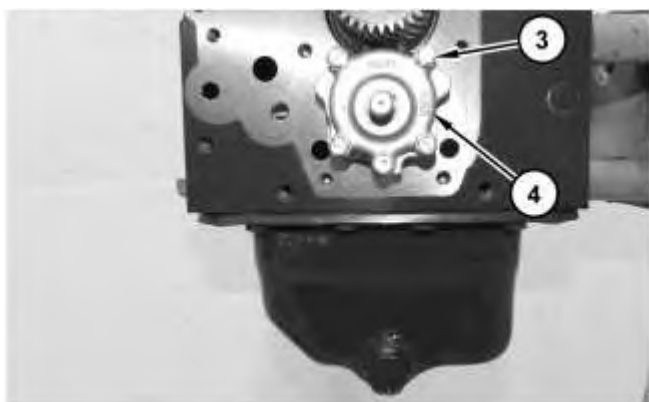


Illustration 3

g02718966

3. Remove bolts (3). Remove engine oil pump (4) and the gasket.

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## Disassembly and Assembly

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## Engine Oil Pump - Install

SMCS - 1304-012

### Installation Procedure

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#### NOTICE

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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#### NOTICE

**If any part of the engine oil pump is worn or damaged, the complete assembly of the engine oil pump must be replaced.**

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1. Ensure that all components of the engine oil pump are clean and free from wear and damage.
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