

Product: COMPACT WHEEL LOADER

Model: 910K COMPACT WHEEL LOADER AY4

Configuration: 910K Compact Wheel Loader AY400001-UP (MACHINE) POWERED BY C3.8 Engine

Disassembly and Assembly C3.8 Engines for Caterpillar Built Machines

Media Number -UENR0129-08

Publication Date -01/09/2015

Date Updated -19/05/2016

i04663929

Rocker Shaft and Pushrod - Install

SMCS - 1102-012; 1208-012

Installation Procedure

1. Ensure that all components are clean and free from wear or damage. Refer to Specifications, "Rocker Shaft" for more information. Replace any components that are worn or damaged.

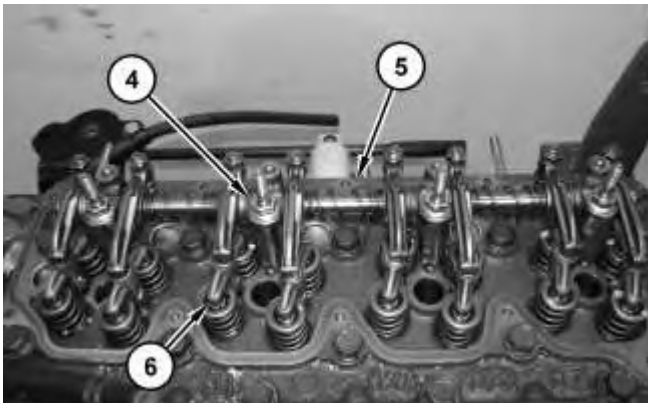
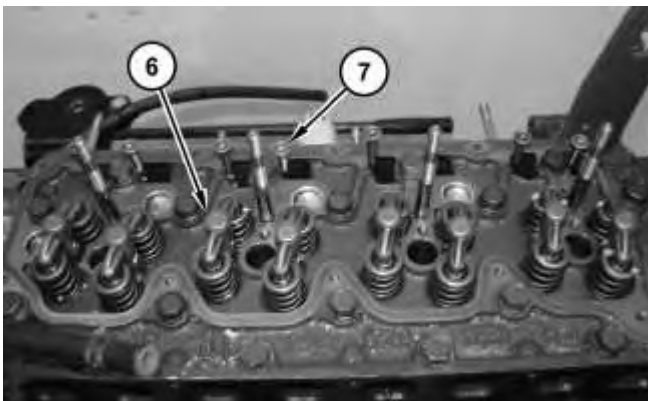


Illustration 1

g02867022



2. Apply clean engine oil onto pushrods (7) and valve arm bridges (6). Install pushrods (7) into the cylinder head. Install valve arm bridges (6) onto the valve stems.
3. Install rocker shaft assembly (5).
4. Install nuts (4). Begin at the center of the rocker shaft assembly and work toward the ends.
Note: To avoid distortion of the rocker shaft assembly, each nut should be tightened by a quarter of a turn at one time. Repeat the procedure until all nuts are tightened.
5. Tighten nuts (4) to a torque of $52 \pm 3 \text{ N}\cdot\text{m}$ ($38.4 \pm 2.2 \text{ lb ft}$).

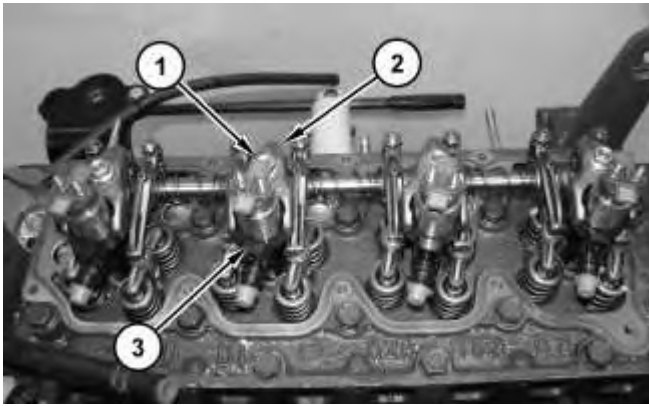


Illustration 3

6. If necessary, install electronic unit injectors (3). Refer to Disassembly and Assembly, "Electronic Unit Injector - Install".
7. Install nozzle clamps (2). Install nuts (1). Tighten nuts (1) to a torque of $25.5 \pm 1.5 \text{ N}\cdot\text{m}$ ($18.8 \pm 1.1 \text{ lb ft}$).
8. Refer to Specifications, "Rocker shaft and Pushrod" for more information.
9. Refer to Systems Operation, Testing and Adjusting, "Engine Valve Lash - Inspect/Adjust" for the correct procedure.

End By:

- a. Install the valve mechanism cover.
-

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i04825253

Cylinder Head - Remove

SMCS - 1100-011

Removal Procedure

Start By:

- a. Remove the exhaust manifold.
- b. Remove the inlet manifold.
- c. Remove the fuel injectors.
- d. Remove the rocker shaft and pushrods.

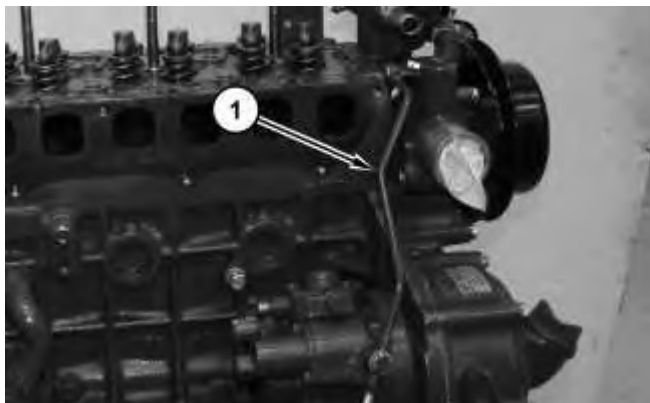
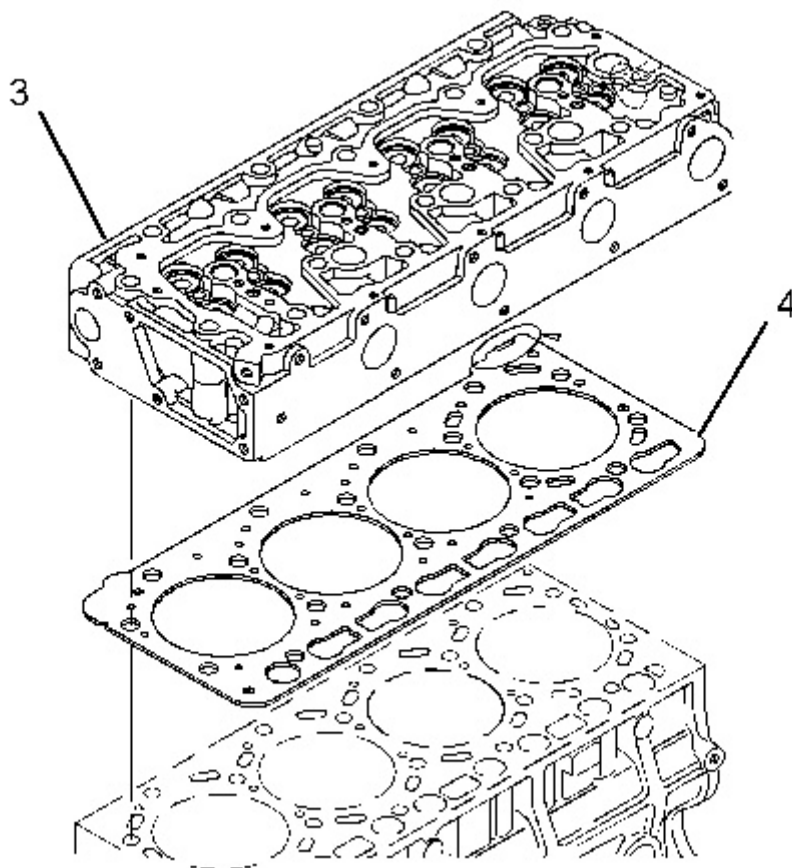


Illustration 1

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1. Remove tube assembly (1).
-



NOTICE

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

4. Use a suitable lifting device to remove cylinder head (3). The weight of cylinder head (3) is approximately 34 kg (75 lb).

Note: Do not use a lever to separate the cylinder head from the cylinder block. Take care not to damage the machined surfaces of the cylinder head during the removal procedure. Avoid contamination of the cylinder bores with coolant or with debris.

5. Remove gasket (4).

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i05823843

Cylinder Head - Install

SMCS - 1100-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7575	Link Bracket	2
	8T-4189	Bolt	2
	8T-4121	Hard Washer	2
B	-	Guide Bolt (M12 x 1.75 by 100 mm)	2
C	-	Straight Edge	1

1. Thoroughly clean the mating surfaces of the cylinder head and the cylinder block. Ensure that there is no debris in the cylinder bores, the coolant passages, or the lubricant passages.
 2. Inspect the mating surface of the cylinder head for distortion. Refer to Specifications, "Cylinder Head" for more information.
 3. Inspect the dowels for damage. If necessary, replace the dowels in the cylinder block.
-



Illustration 1

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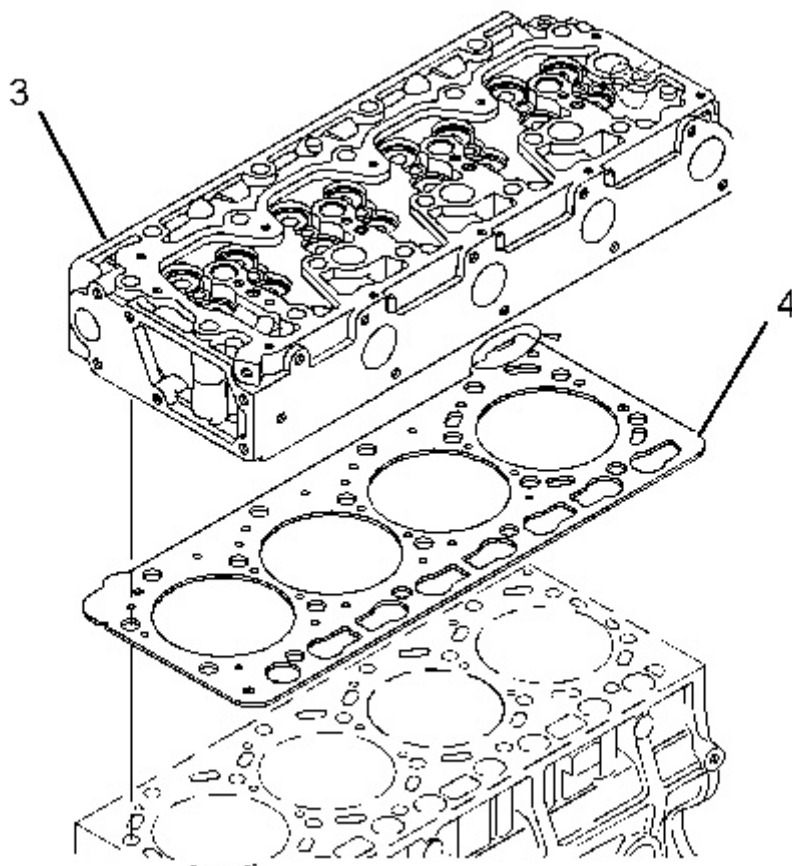


Illustration 2

g02866764

NOTICE

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

4. Install a new gasket (4) . Refer to Table 2.
5. Use a suitable lifting device to install cylinder head (3) . The weight of cylinder head (3) is approximately 34 kg (75 lb).

Note: Ensure that the cylinder head and the gasket are aligned with the dowels on the engine block.

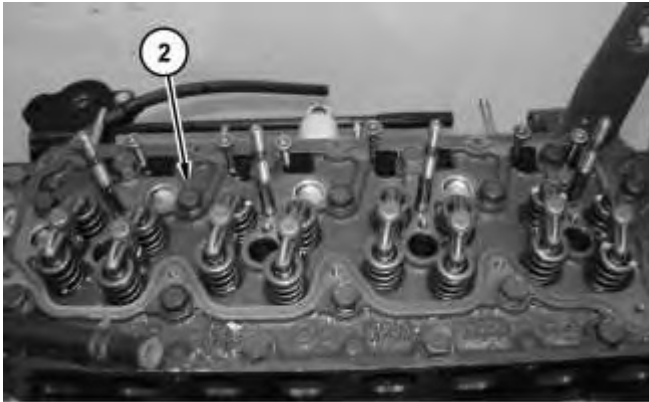


Illustration 3

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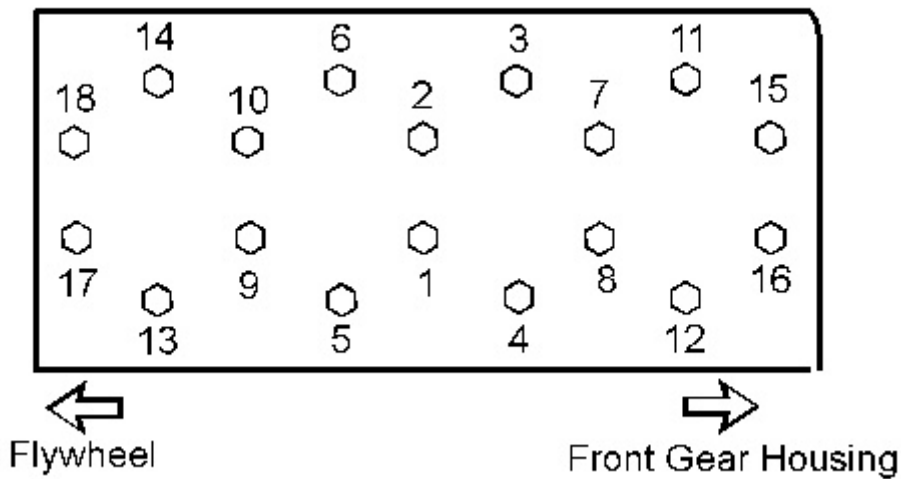


Illustration 4

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Cylinder head tightening sequence

6. Apply clean engine oil onto cylinder head bolts (2) . Install cylinder head bolts (2) . Gradually tighten cylinder head bolts (2) in the sequence that is shown in Illustration 4 to prevent distortion of the cylinder head.

7. Tighten cylinder head bolts (2) to a torque of $102.6 \pm 4.5 \text{ N}\cdot\text{m}$ ($75.7 \pm 3.3 \text{ lb ft}$).

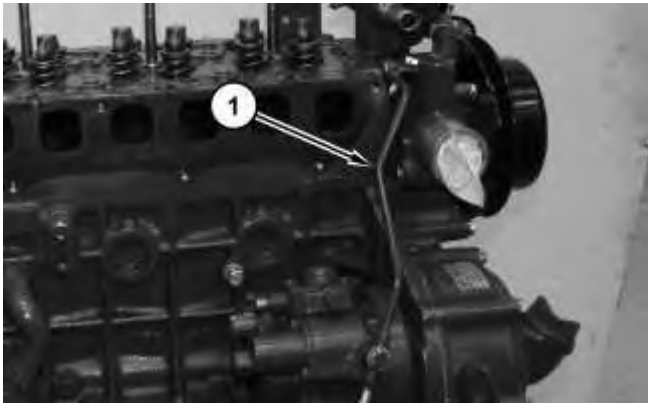


Illustration 5

g02866421

8. Install tube assembly (1) .

Cylinder Head Gasket

Table 2

Specifications for Cylinder Head Gasket Thickness			
Notch of Cylinder Head Gasket	Thickness of Cylinder Head Gasket		Piston head protrusion or recessing from the level of crankcase cylinder face (Average of four pistons).
	Before Tightening	After Tightening	
2 Notches	0.90 mm (0.035 inch)	0.80 mm (0.032 inch)	0.0700 to 0.0490 mm (0.00276 to 0.00193 inch)
1 Notch	1.00 mm (0.039 inch)	0.90 mm (0.035 inch)	0.0500 to 0.149 mm (0.00197 to 0.00586 inch)
Without notch	1.05 mm (0.041 inch)	0.95 mm (0.037 inch)	0.150 to 0.200 mm (0.00591 to 0.00787 inch)

End By:

- Install the rocker shaft and pushrods.
- Install the fuel injectors.
- Install inlet manifold.
- Install the exhaust manifold.

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i04663730

Camshaft - Remove and Install

SMCS - 1210-010

Removal Procedure

Start By:

- a. Remove the front housing.
- b. Remove the rocker shaft and pushrods.
1. Refer to Systems Operation, Testing and Adjusting, "Finding Top Center Position for No.4 Piston".

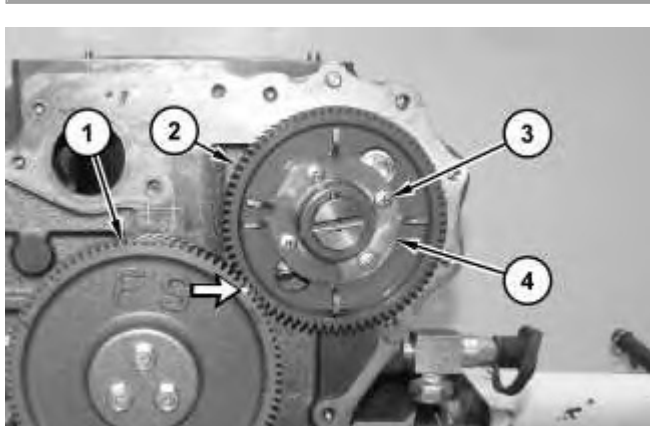


Illustration 1

g02864436

2. Mark the alignment of gear (1) and gear (2) for installation purposes.
 3. Remove bolts (3) and pulsar gear (4).
-



Illustration 2

g02863959

4. Remove bolts (5). Remove camshaft assembly (6).

Installation Procedure

1. Lubricate the camshaft assembly with clean engine oil prior to installation.
2. Ensure that the camshaft assembly is clean and free from wear or damage.



Illustration 3

g02863959

NOTICE

Do not damage the lobes or the bearings when the camshaft is removed or installed.

3. Install camshaft assembly (6). Install bolts (5). Tighten bolts (5) to a torque of $25.5 \pm 1.5 \text{ N}\cdot\text{m}$ ($18.8 \pm 1.1 \text{ lb ft}$).
-

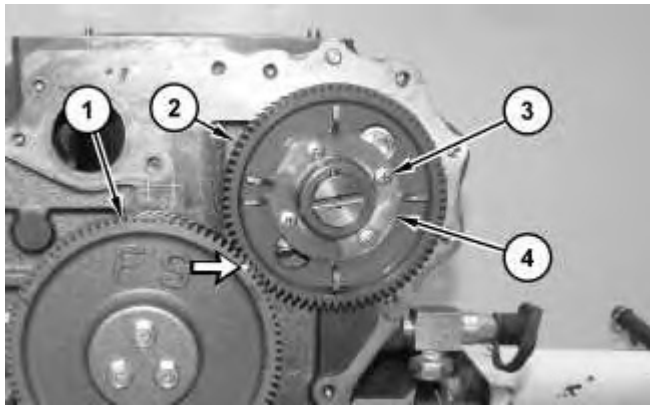


Illustration 4

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4. Install pulsar gear (4) and screws (3). Tighten screws (3) to a torque of $5.2 \pm 0.5 \text{ N}\cdot\text{m}$ ($45.6 \pm 4.0 \text{ lb in}$) Ensure that gear (1) and gear (2) are aligned.
5. Lubricate the teeth of the gears with clean engine oil.
6. Refer to Specifications, "Camshaft" for more information.

End By:

- a. Install the front housing.
 - b. Install the rocker shaft and pushrods.
-

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i04663712

Camshaft Gear - Remove and Install

SMCS - 1210-010-GE

Removal Procedure

Start By:

- a. Remove the camshaft assembly from the engine.

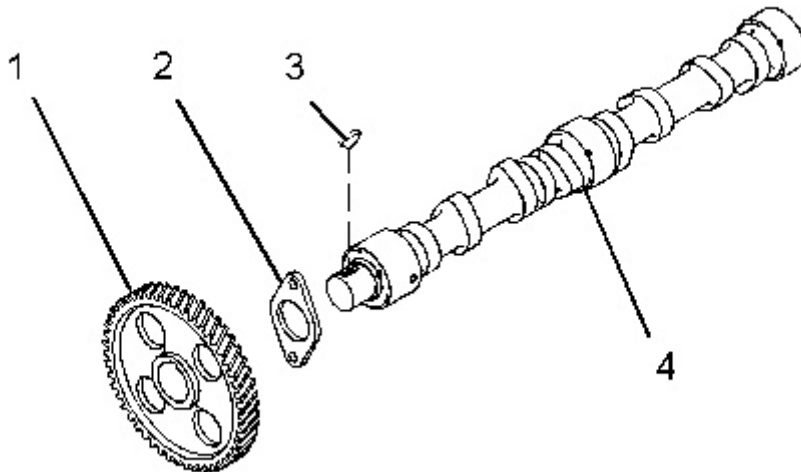


Illustration 1

g01350917

1. Place the camshaft assembly on a suitable support. Use a press to remove camshaft gear (1) from camshaft (4).
2. Remove thrust plate (2) and woodruff key (3) from camshaft (4). Note the orientation of the thrust plate for installation.

Installation Procedure

1. Ensure that all components of the camshaft assembly are clean and free from damage.
-

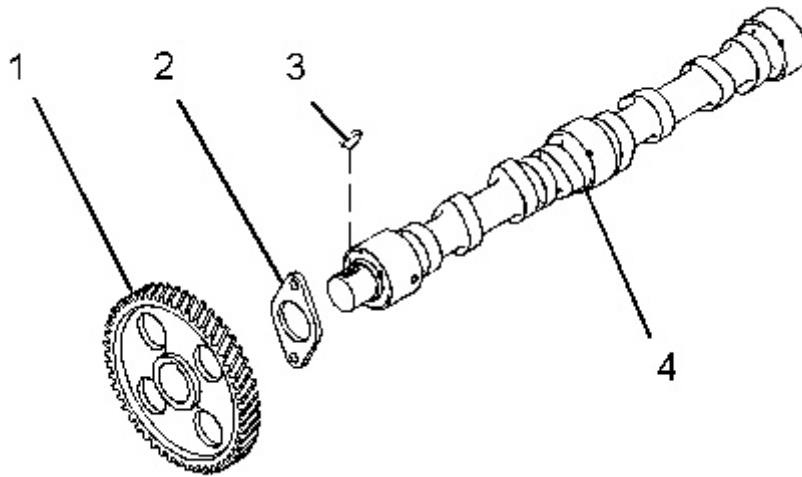


Illustration 2

g01350917

2. Install woodruff key (3) and thrust plate (2) to camshaft (4).

Note: Ensure that the machined face of the thrust plate is toward the camshaft.



Always wear protective gloves when handling parts that have been heated.

3. Raise the temperature of camshaft gear (1). Align the camshaft gear with woodruff key (3) and install the camshaft gear to camshaft (4).
4. Refer to Specifications, "Camshaft" for more information.

End By:

- a. Install the camshaft assembly to the engine.
-

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i06753571

Engine Oil Pan - Remove and Install

SMCS - 1302-010

Removal Procedure

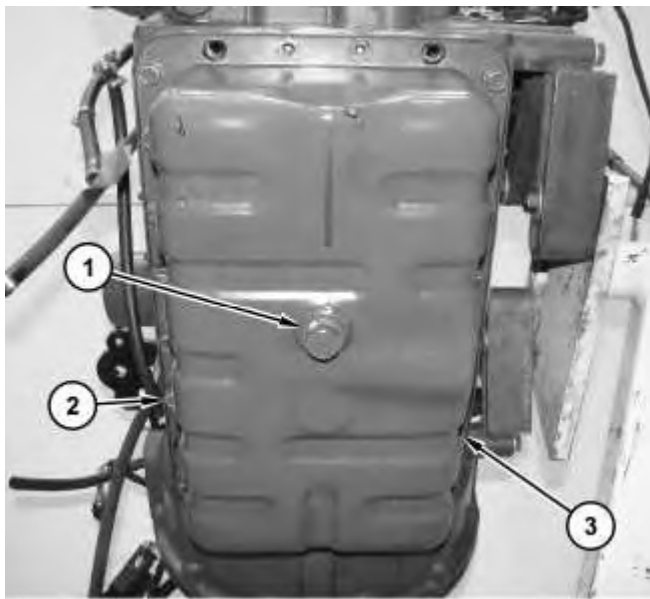


Illustration 1

g02793995

1. Remove oil drain plug (1). Drain the engine oil into a suitable container for storage or disposal.
2. Remove bolts (2). Remove engine oil pan (3).
3. Carefully separate engine oil pan (1) from the cylinder block.

Note: Avoid damage to the engine oil pan during removal.

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Three Bond 1217H	-

1. Ensure that the engine oil pan is clean and free from damage. Clean the mating surface of the cylinder block.

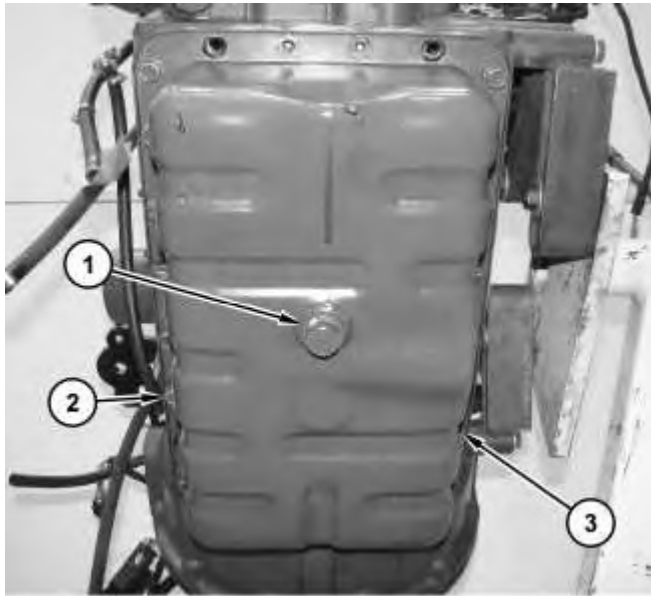


Illustration 2

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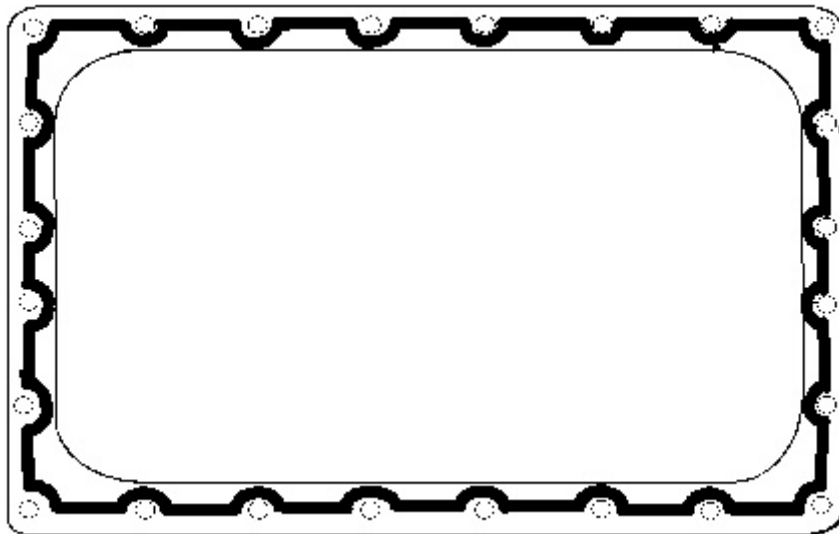


Illustration 3

g01347865

The pattern of application of sealant to the engine oil pan.

2. Apply a continuous bead of Tooling (A) to the mating surface of engine oil pan (3) inside the bolt holes. Refer to Illustration 3 for the correct pattern of application. The bead of Tooling (A) should be approximately 2 mm (0.080 inch) in diameter.
 3. Ensure that bolts (4) are clean and dry.
 4. Position engine oil pan (1) onto the cylinder block and install bolts (4).
 5. Install a new sealing washer (2) to oil drain plug (3).
 6. Install oil drain plug (3) to engine oil pan (1).
 7. Refer to Operation and Maintenance Manual, "Engine Oil and Filter - Change" for the correct draining and filling procedure.
-

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i06619802

Pistons and Connecting Rods - Remove

SMCS - 1225-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	8S-2269	Ridge Reamer	1

Start By:

- a. Remove the cylinder head.
- b. Remove the engine oil pan.

Note: Connecting rods and bearings are marked with color codes. The color codes are blue, yellow, and unmarked. The bearings must match up with the corresponding connecting rods. It is possible to have different color codes in the same engine.

1. Rotate the crankshaft until the piston that is being removed is at the bottom center position.
 2. Use Tooling (A) to remove the carbon ridge from the top inside surface of the cylinder bore.
-

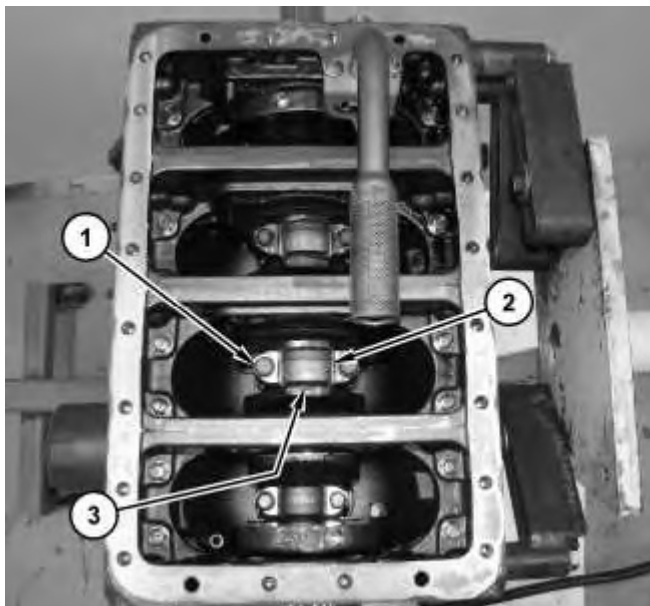


Illustration 1

g02868736



Illustration 2

g06049423

3. The connecting rod and the connecting rod cap have matching numbers on the side. Note the location of the connecting rod for installation. If necessary, make a temporary mark on the connecting rod and the connecting rod cap to identify the cylinder number.
4. Remove bolts (1).
5. Remove connecting rod cap (2) from the connecting rod.

Note: Use tape or rubber tubing on the connecting rod bolts to protect the crankshaft journals from damage.

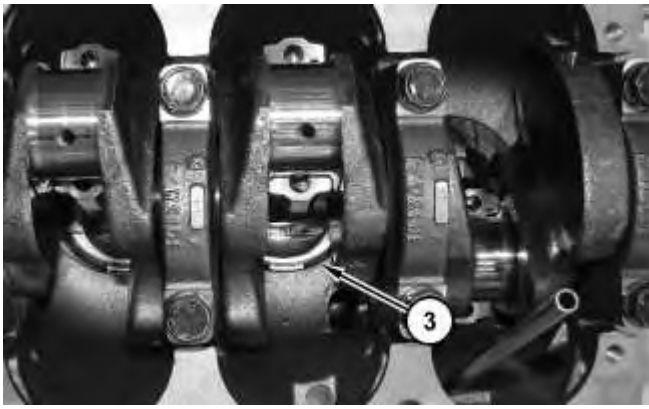


Illustration 3

g02868862

6. Carefully push the piston and the connecting rod assembly (3) out of the cylinder bore. Lift the piston out of the top of the cylinder block.
 7. Repeat Steps 1 through 6 to remove the remaining pistons and connecting rods.
-

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