



# Service Repair Manual

## **Models**

# 311B EXCAVATOR

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Product: EXCAVATOR

Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

**Disassembly and Assembly  
3064 and 3066 Engines for Caterpillar Built Machines**

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01615533

**Rocker Shaft - Assemble**

SMCS - 1102-016

**Assembly Procedure**

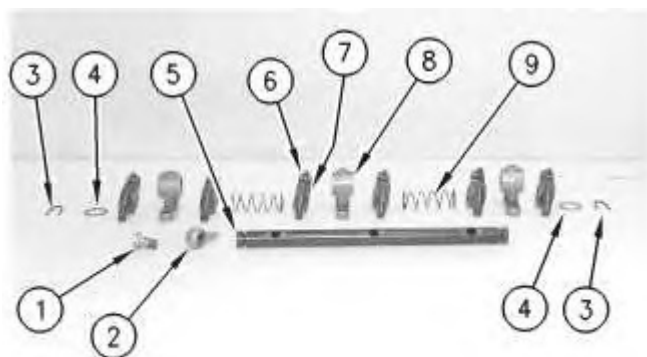
Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0510	Driver Group	1

**NOTICE**

**Keep all parts clean from contaminants.**

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



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Illustration 1

g00609491

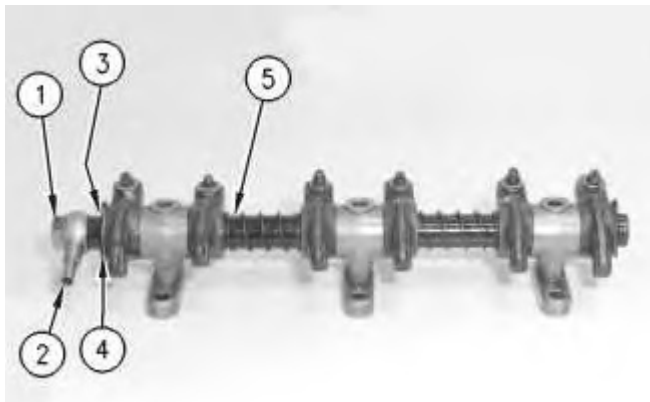


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Illustration 2

g00609490

1. Use Tool (A) to install bushing (7) into rocker arm (6), if the bushing was removed.  
Refer to Specifications, "Rocker Shaft" for more information.



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Illustration 3

g00609488

2. Install spacer (4) and clip (3) onto one end of shaft assembly (5) .
3. Slide components onto shaft (5) in the correct order. Refer to Illustration 1 in order to install the components correctly.
4. The shaft assembly includes the following components:
  - Bolt (1)
  - Oil tube (2)
  - Clip (3)

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- Spacer (4)
- Shaft assembly (5)
- Rocker arm (6)
- Bushing (7)
- Rocker shaft bracket (8)
- Spring (9)

5. Install spacer (4) and clip (3) onto the other end of shaft assembly (5) .

6. Install bolt (1) and oil supply tube (2) into the end of shaft assembly (5) .

**End By:** Install the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".

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Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

## Disassembly and Assembly 3064 and 3066 Engines for Caterpillar Built Machines

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01576835

# Rocker Shaft and Pushrod - Install

SMCS - 1102-012; 1208-012

## 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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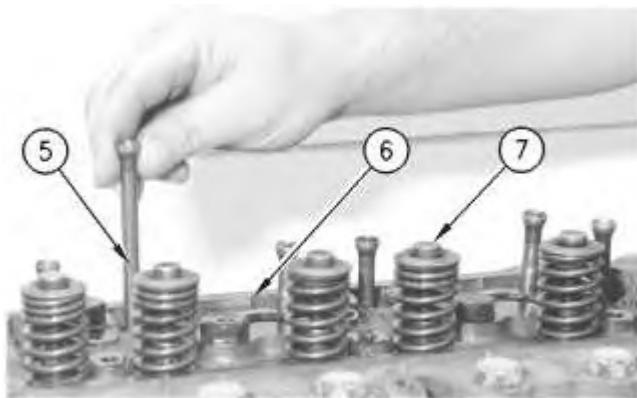


Illustration 1

g00609287

1. Install valve caps (7) on the end of the valve stem.
2. Install pushrods (5) in the cylinder head assembly (6) .

**Note:** Ensure that the pushrods are installed in the original location. Also, ensure that the pushrods are seated in the valve lifters correctly.

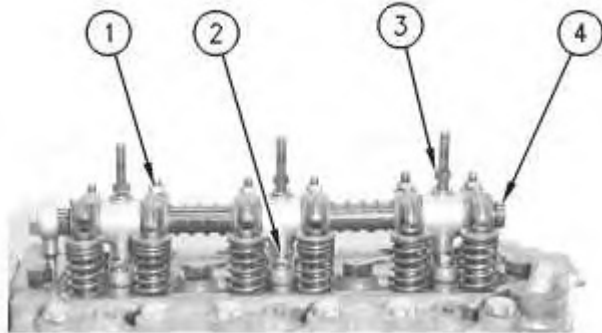


Illustration 2

g00609267

3. Place the rocker shaft assembly (4) in position on the cylinder head.
4. Install six long bolts (3) for the rocker shaft bracket and tighten the bolts to a torque of  $15 \pm 3$  N·m ( $11 \pm 2$  lb ft).
5. Install six short bolts (2) and the washers. Tighten the short bolts to a torque of  $15 \pm 3$  N·m ( $11 \pm 2$  lb ft).

**Note:** Perform Steps 1 through 5 for the other head assembly on the 3066 Engine.

6. Adjust the inlet valve lash and the exhaust valve lash to 0.25 mm (0.010 inch). Refer to Testing and Adjusting, "Air Inlet and Exhaust System" for more information on setting the valve lash. Tighten adjusting screws (1) .

**End By:** Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".

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**Disassembly and Assembly  
3064 and 3066 Engines for Caterpillar Built Machines**

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i02088121

## Cylinder Head - Remove

SMCS - 1100-011

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7573	Link Bracket	2

**Start By:**

- A. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
- B. Remove the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".
- C. Remove the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Remove".
- D. Remove the water temperature regulator. Refer to Disassembly and Assembly, "Water Temperature Regulator- Remove and Install".

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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**

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.

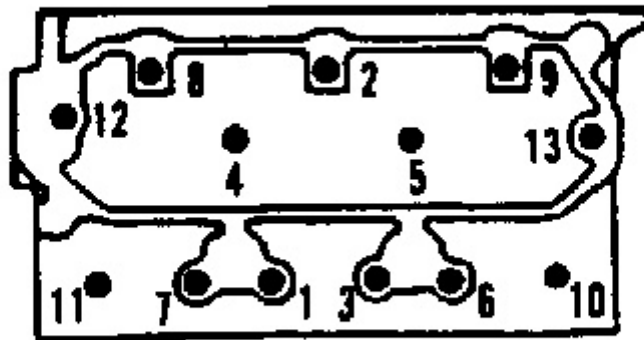
Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

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**Note:** The 3064 Engine has one cylinder head, while the 3066 Engine has two cylinder heads.

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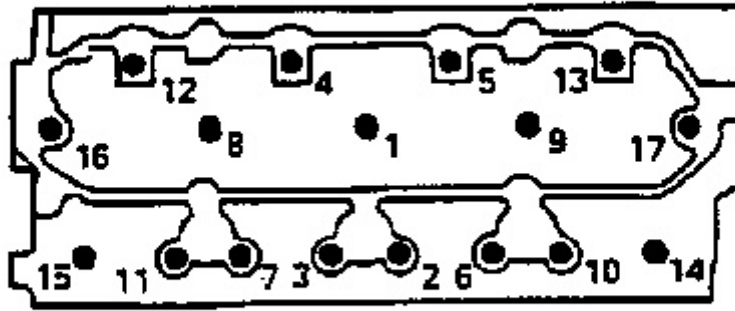
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Illustration 1

g00527527

Torque sequence for the cylinder head bolts ( 3066 Engine)

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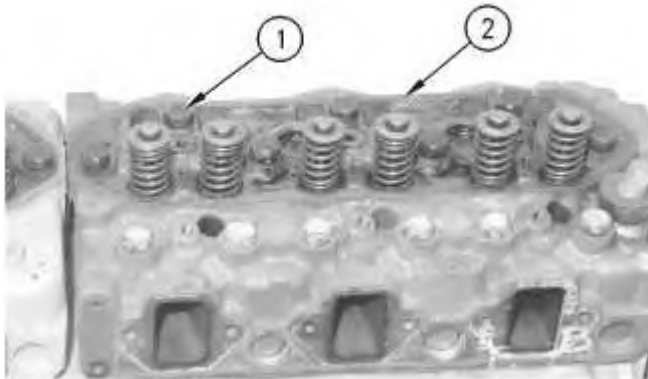


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Illustration 2

g00527556

Torque sequence for the cylinder head bolts ( 3064 Engine)



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Illustration 3

g00604993

1. Gradually remove the cylinder head bolts (1) from the cylinder head. The 3066 Engine has thirteen cylinder head bolts while the 3064 Engine has seventeen cylinder head bolts. Remove the bolts in reverse order of the torque sequence.

**Note:** Do not use a pry bar to separate the cylinder head from the engine block.

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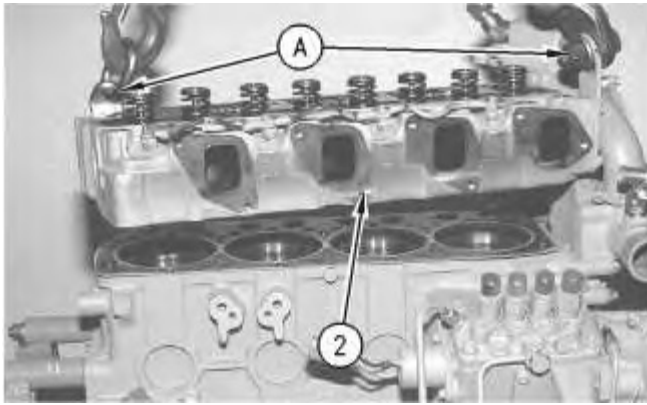


Illustration 4

g00605044

Typical example

2. Install Tooling (A), chains and a suitable lifting device to cylinder head (2) .
3. Remove the cylinder head (2) from the cylinder block. The weight of the cylinder head assembly for the 3066 Engine is 32 kg (70 lb). The weight of the cylinder head assembly for the 3064 Engine is 45 kg (100 lb).

**Note:** Place the cylinder head on a surface that will not damage the face of the cylinder head.

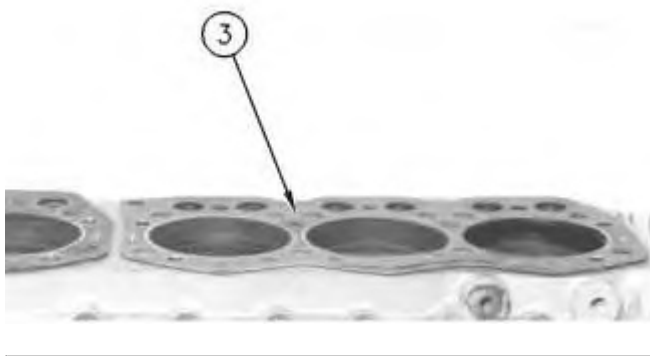


Illustration 5

g00605078

**Note:** When the gasket is removed from the cylinder block, be careful not to damage the mounting face of the cylinder block.

4. Remove the cylinder head gasket (3) from the cylinder block.
5. Repeat Step 1 through Step 4 for the other cylinder head ( 3066 Engine).

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Product: EXCAVATOR

Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

## Disassembly and Assembly 3064 and 3066 Engines for Caterpillar Built Machines

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i02795026

# Cylinder Head - Install

SMCS - 1100-012

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7573	Link Bracket	2

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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 3064 Engine has one cylinder head, while the 3066 Engine has two cylinder heads.

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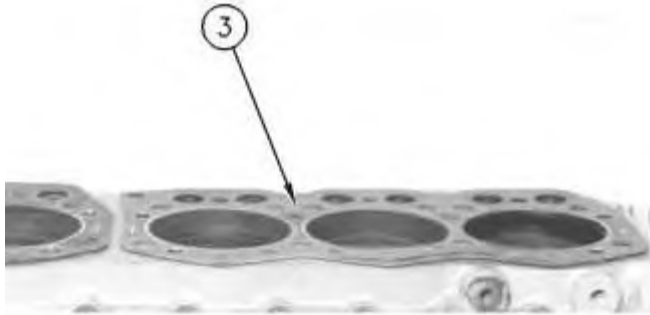


Illustration 1

g00605078

1. Clean the surfaces of the cylinder head and the cylinder block that are in contact with each other. Ensure that the surfaces are clean and dry. Install a new, dry cylinder head gasket (3) on the cylinder block.

**Note:** Do not use any sealant or gasket adhesive on the cylinder head gasket .

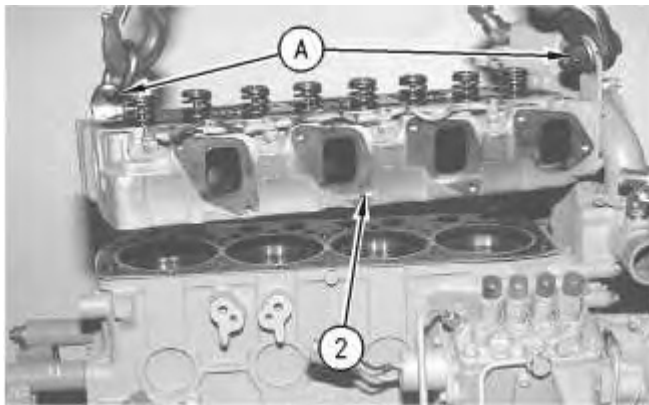


Illustration 2

g00605044

Typical example

2. Install Tooling (A) , chains, and a suitable lifting device to the cylinder head.
3. Install the cylinder head in position on the cylinder block. The weight of the cylinder head assembly for the 3066 Engine is approximately 32 kg (70 lb). The weight of the cylinder head assembly for the 3064 Engine is approximately 45 kg (100 lb).
4. Remove Tooling (A) .

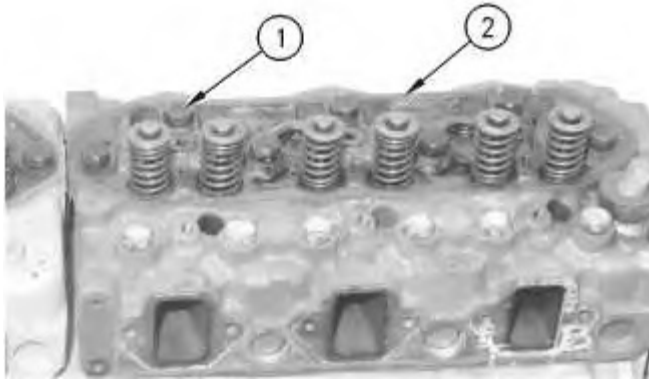


Illustration 3

g00604993

5. Put clean engine oil on the threads of the cylinder head bolts. Install thirteen cylinder head bolts (1) into cylinder head (2) ( 3066 Engine). Install seventeen cylinder head bolts (1) into cylinder head (2) ( 3064 Engine).

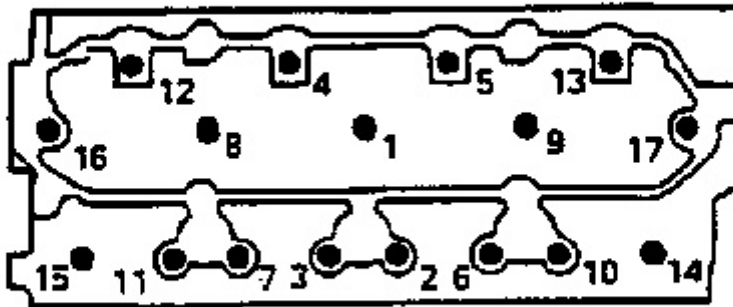
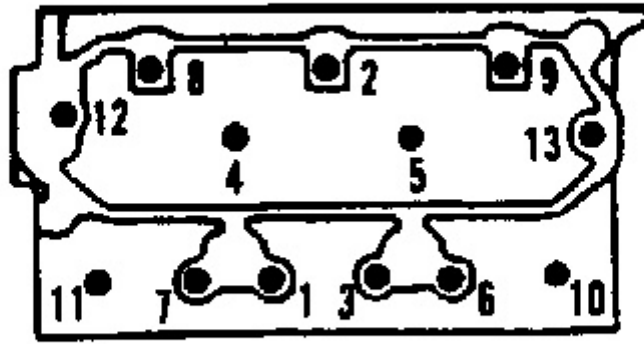


Illustration 4

g00527556

Torque sequence for the cylinder head bolts ( 3064 Engine)



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Illustration 5

g00527527

Torque sequence for the cylinder head bolts ( 3066 Engine)

6. Tighten the cylinder head bolts in the appropriate numerical sequence to torque of  $118 \pm 5$  N·m ( $87 \pm 4$  lb ft).
7. Repeat step 9 through step 6 for the other cylinder head ( 3066 Engine).
8. After assembly, run the engine to operating temperature.
9. Stop the engine and allow the engine to cool.
10. Tighten the cylinder head bolts again in the appropriate numerical sequence to a torque of  $118 \pm 5$  N·m ( $87 \pm 4$  lb ft).

**End By:**

- a. Install the water temperature regulator. Refer to Disassembly and Assembly, "Water Temperature Regulator - Remove and Install".
- b. Install the inlet manifold. Refer to Disassembly and Assembly, "Inlet Manifold - Install".
- c. Install the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".
- d. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".

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Product: EXCAVATOR

Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

## Disassembly and Assembly 3064 and 3066 Engines for Caterpillar Built Machines

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01615579

# Lifter Group - Remove and Install

SMCS - 1209-010

## Removal Procedure

### Start By:

- A. Remove the camshaft. Refer to Disassembly and Assembly, "Camshaft - Remove".

---

### NOTICE

**Keep all parts clean from contaminants.**

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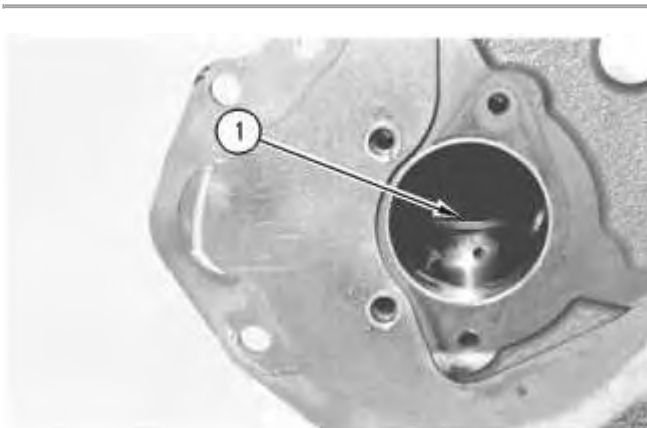


Illustration 1

g00610824

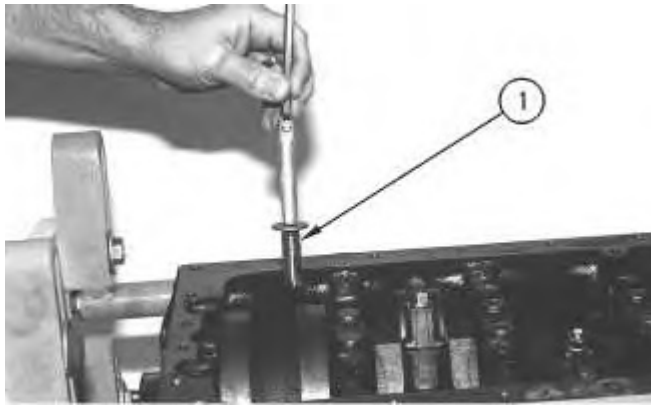


Illustration 2

g00532061

1. Use a magnet to remove valve lifter (1) from the engine cylinder block, as shown. Put identification marks on the valve lifters for installation purposes.
2. Repeat Step 1 for the remainder of the valve lifters.

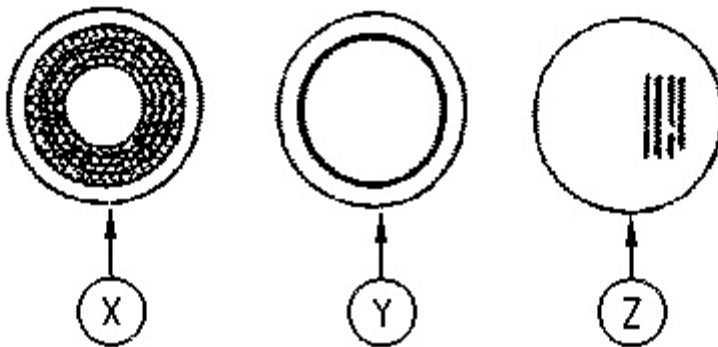


Illustration 3

g00613675

View (X) shows a good contact pattern. Views (Y) and (Z) show bad contact patterns.

**Note:** Check the valve lifters for wear.

**Note:** Refer to Specifications, "Camshaft" for more information on valve lifters.

## Installation Procedure

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## NOTICE

**Keep all parts clean from contaminants.**

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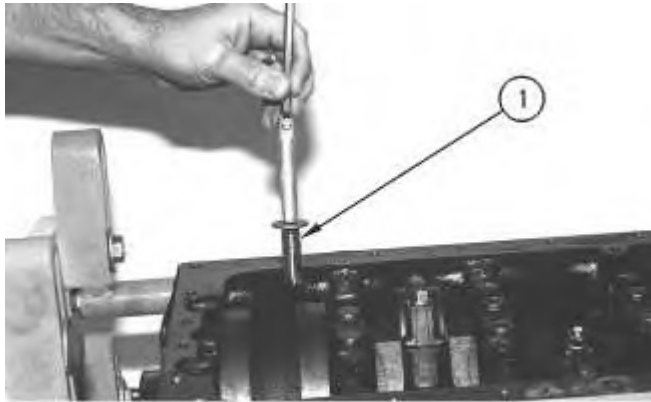


Illustration 4

g00532061

1. Put **8T-2998** Lubricant on valve lifter (1) prior to installation. Install valve lifter (1) in the original location in the engine cylinder block.
2. Repeat Step 1 for the remainder of the valve lifters.

**End By:** Install the camshaft. Refer to Disassembly and Assembly, "Camshaft - Install".

---

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Product: EXCAVATOR

Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

## Disassembly and Assembly 3064 and 3066 Engines for Caterpillar Built Machines

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01568538

## Camshaft - Remove

SMCS - 1210-011

## Removal Procedure

### Start By:

- A. Remove the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".
- B. Remove the rocker shaft assembly and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".
- C. Remove the oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".

**Note:** In this removal procedure, the engine needs to be placed in the upside-down position. This will allow the lifters to remain in position after the camshaft is removed.

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### NOTICE

**Keep all parts clean from contaminants.**

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

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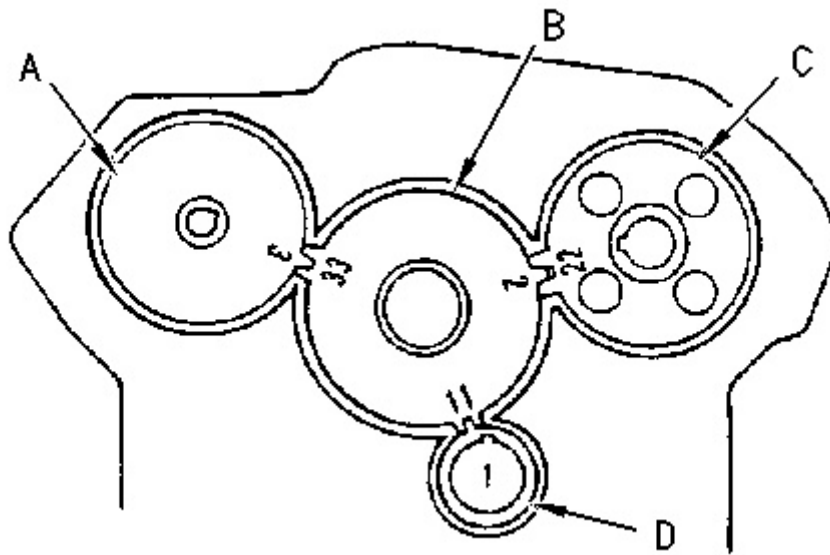
### NOTICE

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Dispose of all fluids according to local regulations and mandates.

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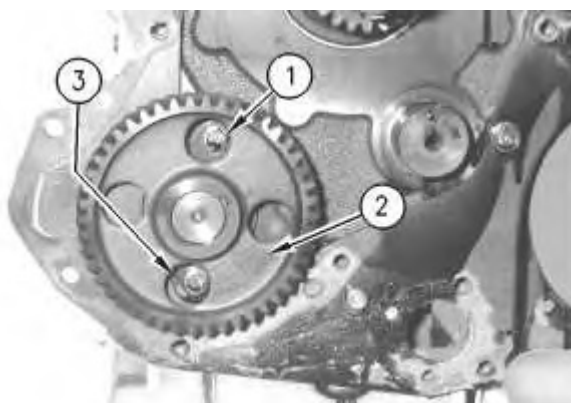
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Illustration 1

g00569371

**Note:** Ensure that the marks on the timing gears are in alignment. Align fuel injection drive gear (A) with the "33" mark with the "3" mark on idler gear (B). Make an alignment of the "2" mark on camshaft gear (C) with the "22" mark on idler gear (B). Align the "1" mark on crankshaft gear (D) with the "11" mark on idler gear (B). The No. 1 cylinder is at the top center position when these marks are in alignment.

1. Rotate the engine at 180 degrees in order to place the engine in the upside-down position. This will ease the removal of the camshaft.



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## NOTICE

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

---

2. Position camshaft gear (2) so that the gear's slots align from the top to the bottom. Remove two bolts (1) and the washers that hold thrust plate (3) (not shown).
3. Carefully remove the camshaft, the thrust plate and the camshaft gear as an assembly.
4. Remove the valve lifters. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".

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Product: EXCAVATOR

Model: 311B EXCAVATOR 2LS

Configuration: 311B TRACK-TYPE EXCAVATORS 2LS00001-UP (MACHINE) POWERED BY 3064 ENGINE

## Disassembly and Assembly 3064 and 3066 Engines for Caterpillar Built Machines

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01568556

## Camshaft - Install

SMCS - 1210-012

### Installation Procedure

**Note:** In this installation procedure, the engine needs to remain in the upside-down position in order to keep the lifters in position while the camshaft is installed.

---

#### NOTICE

**Keep all parts clean from contaminants.**

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

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**Note:** During installation, ensure that the camshaft is clean and lubricate all of the components with clean engine oil.

1. Install the valve lifters. Refer to Disassembly and Assembly, "Lifter Group - Remove and Install".
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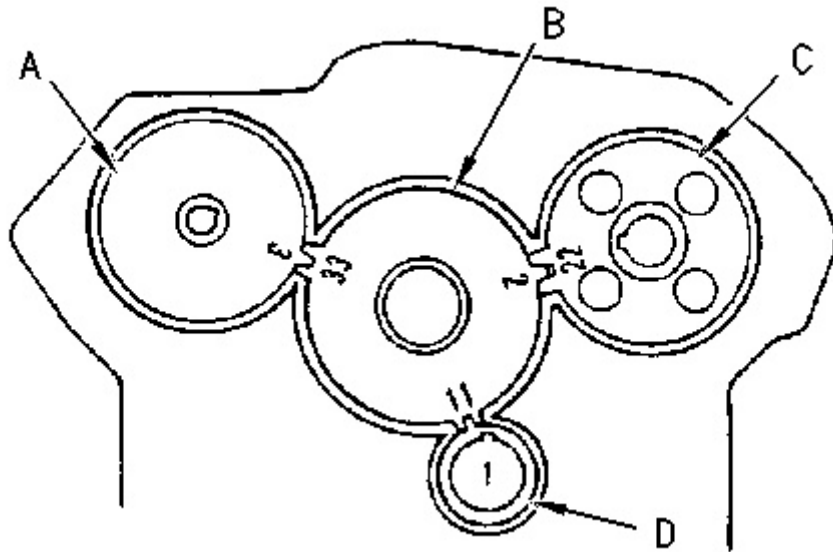


Illustration 1

g00569371

**Note:** During installation, ensure that the marks on the timing gears are in alignment. Align fuel injection drive gear (A) with the "33" mark with the "3" mark on idler gear (B). Make an alignment of the "2" mark on camshaft gear (C) with the "22" mark on idler gear (B). Align the "1" mark on crankshaft gear (D) with the "11" mark on idler gear (B). The No. 1 cylinder is at the top center position when these marks are in alignment.

2. Carefully install the camshaft assembly into the original location in the cylinder block.

**Note:** Caution must be used when the camshaft is installed in order to not damage the camshaft lobe or the camshaft bearings.

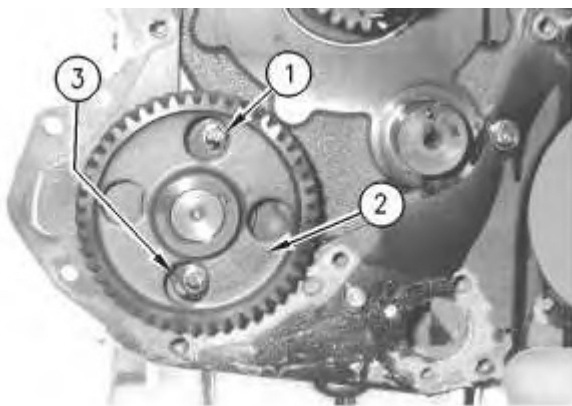


Illustration 2

g00604521

3. Position camshaft gear (2) so that the gear's slots align from the top to the bottom. Install two bolts (1) and the washers that hold thrust plate (3). Tighten bolts (1) to a torque of  $11 \pm 2$  N·m ( $8 \pm 1$  lb ft).

**End By:**

- a. Install the oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".
- b. Install the rocker shaft assembly and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".
- c. Install the timing gear cover. Refer to Disassembly and Assembly, "Housing (Front) - Install".

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**Disassembly and Assembly  
3064 and 3066 Engines for Caterpillar Built Machines**

Media Number -SEN5553-10

Publication Date -01/05/2012

Date Updated -15/05/2012

i01558850

## Camshaft Gear - Remove and Install

SMCS - 1210-010-GE

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-2321	Combination Puller	1
	9S-9153	Puller Jaws	3

**Start By:**

- A. Remove the camshaft. Refer to Disassembly and Assembly, "Camshaft - Remove".

---

**NOTICE**

**Keep all parts clean from contaminants.**

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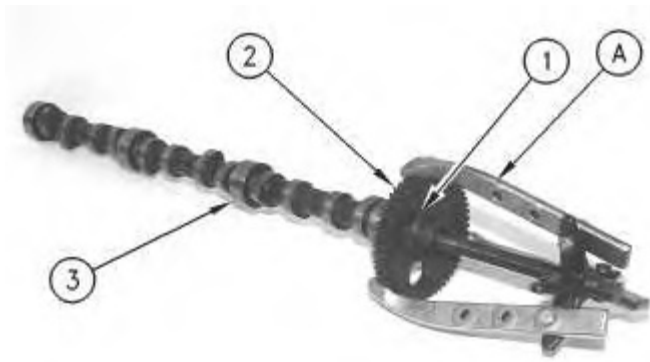


Illustration 1

g00598317

1. Use tool (A) to remove camshaft gear (1) from camshaft (3) .
2. Remove thrust plate (2) from camshaft (3) .

**Note:** It is not necessary to remove the camshaft gear unless the gear (1) or the thrust plate (2) is damaged.

**Note:** Check the slot in the camshaft for the woodruff key for wear or damage.

**Note:** Check the thrust plate (2) for wear or damage.

## Installation Procedure

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### NOTICE

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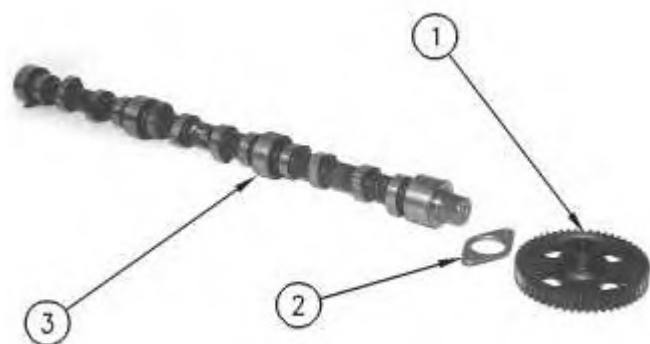


Illustration 2

g00598318

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