

Product: TRACK-TYPE TRACTOR

Model: D5H TRACK-TYPE TRACTOR 9HC

Configuration: D5H & D5H LGP SERIES II TRACTORS - DIRECT DRIVE 9HC04000-UP (MACHINE) POWERED BY 3304 ENGINE

## **Disassembly and Assembly 3304B and 3306B Engines for Caterpillar Built Machines**

Media Number -SEN5598-09

Publication Date -01/01/2013

Date Updated -25/01/2013

i00991114

# **Cylinder Head - Remove**

SMCS - 1100-011

## **Removal Procedure**

### **Start By:**

- A. Remove the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
- B. Remove the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
- C. Remove the rocker shaft and pushrods. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrods - Remove".

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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 machine. 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 in Caterpillar machines.**

**Dispose of all fluids according to local regulations and mandates.**

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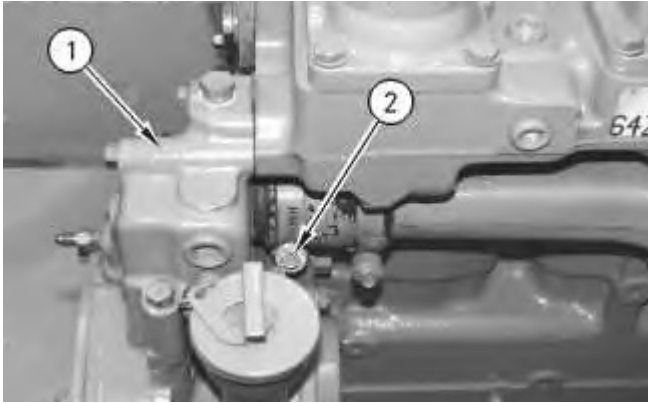


Illustration 1

g00505124

1. Loosen hose clamp (2) on the hose that connects the oil cooler to water pump elbow (1) .

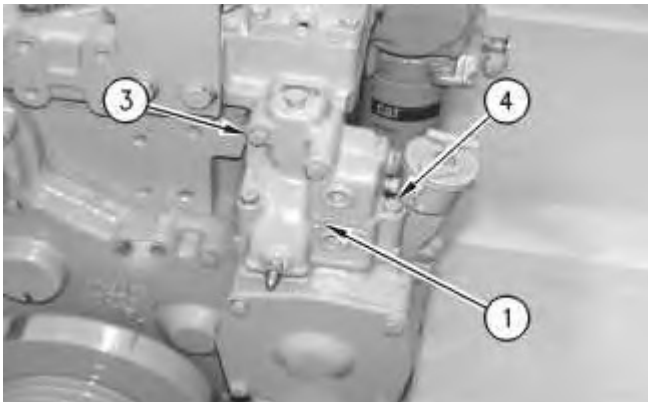


Illustration 2

g00505164

2. Remove two bolts (3) that fasten water pump elbow (1) to the cylinder head. Remove two bolts (4) that fasten water pump elbow (1) to the water pump.
  3. Carefully remove water pump elbow (1) and the gaskets from the engine.
-

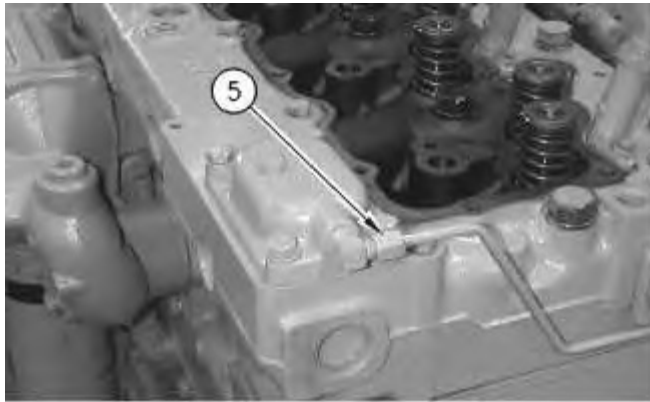


Illustration 3

g00538842

4. Disconnect tube (5) from the inlet manifold.

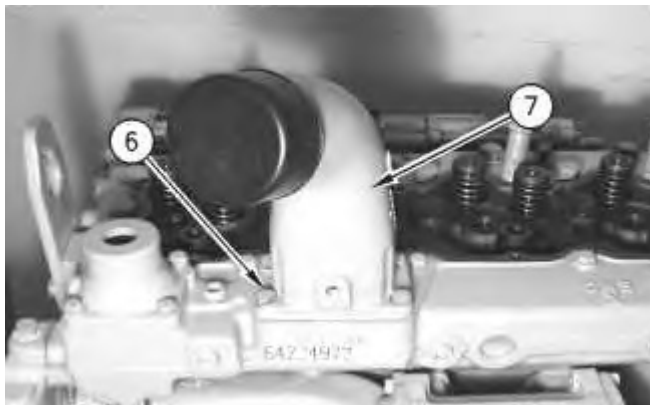


Illustration 4

g00538845

5. Remove four bolts (6) and remove air inlet pipe (7) .

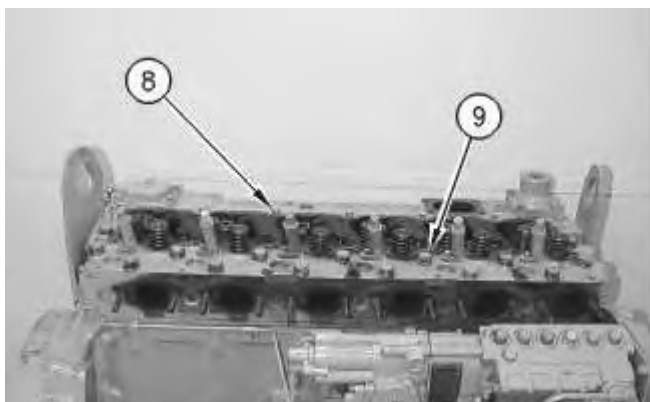


Illustration 5

g00541454

## NOTICE

**Do not set the cylinder head on a hard, flat surface. Damage may occur to the fuel injection nozzle tips.**

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6. Remove all bolts (8) and (9) that hold the cylinder head to the cylinder block.

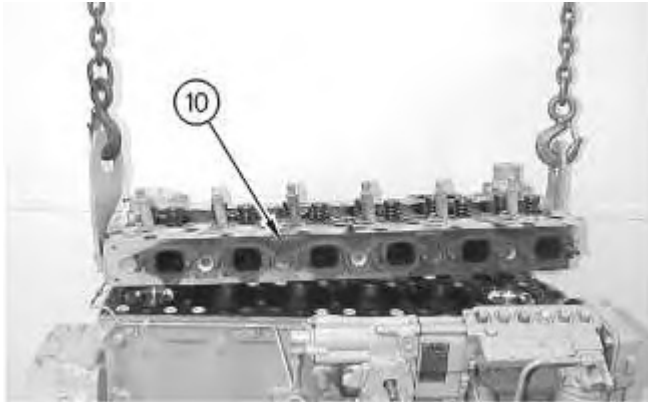


Illustration 6

g00505311

7. Attach the proper lifting device in order to remove cylinder head (10) from the engine. Remove cylinder head (10) from the engine. The weight of cylinder head (10) is approximately 95 kg (210 lb).
-

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## Disassembly and Assembly 3304B and 3306B Engines for Caterpillar Built Machines

Media Number -SEN5598-09

Publication Date -01/01/2013

Date Updated -25/01/2013

i07489822

# Cylinder Head - Install

SMCS - 1100-012

## 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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**Note:** When the cylinder head is removed, a new spacer plate gasket must be installed. Refer to Disassembly and Assembly, "Spacer Plate - Remove and Install".

1. Ensure that the surface of the cylinder head is clean and dry. Install a new dry cylinder head gasket onto the cylinder block.

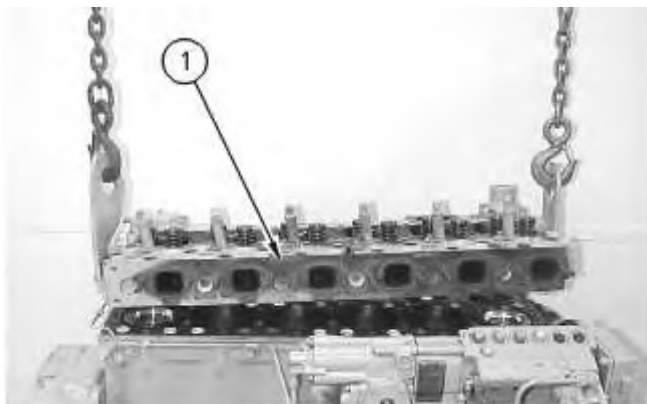
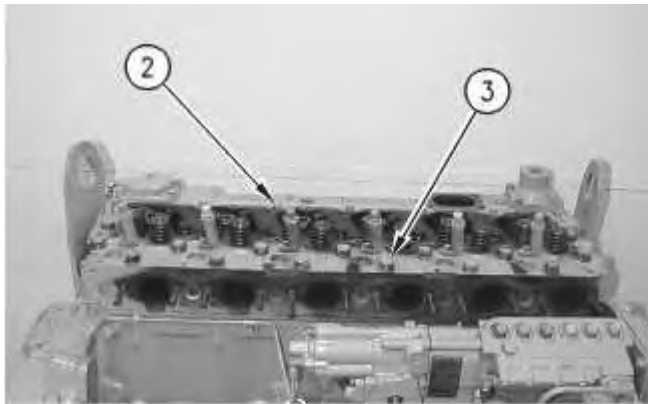


Illustration 1

g00541495

2. Fasten the proper lifting device to cylinder head (1). Put cylinder head (1) in position on the cylinder block. Remove the lifting device after cylinder head (1) is positioned.



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Illustration 2

g00541497

3. Apply clean engine oil to the threads and the washer faces of cylinder head bolts (2) and (3). Install cylinder head bolts (2) and (3). Tighten the cylinder head bolts finger tight.

**Note:** Do not tighten the cylinder head bolts at this time.



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Illustration 3

g00511493

4. Install pushrods (4). Make sure that the pushrods are installed in the original location and that the pushrods are seated correctly in the valve lifters.
  5. Loosen the adjusting screws on rocker arms (5) for valve clearance. This will prevent a bent valve or a broken pushrod during installation.
  6. Install a new O-ring seal in the rear rocker arm support.
  7. Apply clean engine oil to all the rocker shaft bolts except bolt (25). Refer to illustration 5.
  8. Put rocker shaft assembly (5) in position on the cylinder head. Make sure that the dowels in the rocker shaft supports are aligned with the dowel holes in the cylinder head.
  9. Ensure that the rocker arms are aligned with the pushrods and install the rocker shaft mounting bolts. Tighten the rocker shaft mounting bolts finger tight.
-

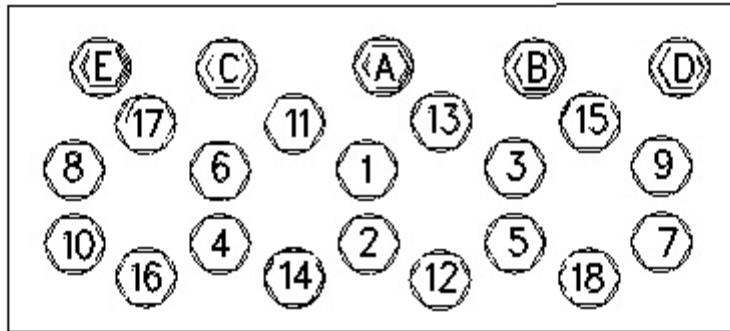


Illustration 4

g00602759

3304B torque sequence

10. Tighten the cylinder head bolts by hand, as follows:
  - a. Tighten all the bolts (1 through 18) in the numerical sequence to a torque of  $150 \pm 15 \text{ N}\cdot\text{m}$  ( $115 \pm 12 \text{ lb ft}$ ).
  - b. Tighten all the bolts (1 through 18) again in the numerical sequence to a torque of  $250 \pm 17 \text{ N}\cdot\text{m}$  ( $185 \pm 13 \text{ lb ft}$ ).
  - c. Tighten all the bolts (1 through 18) again in the numerical sequence to a final torque of  $250 \pm 17 \text{ N}\cdot\text{m}$  ( $185 \pm 13 \text{ lb ft}$ ).
  - d. Tighten all the remaining bolts (A through E) to a torque of  $43 \pm 7 \text{ N}\cdot\text{m}$  ( $32 \pm 5 \text{ lb ft}$ ).

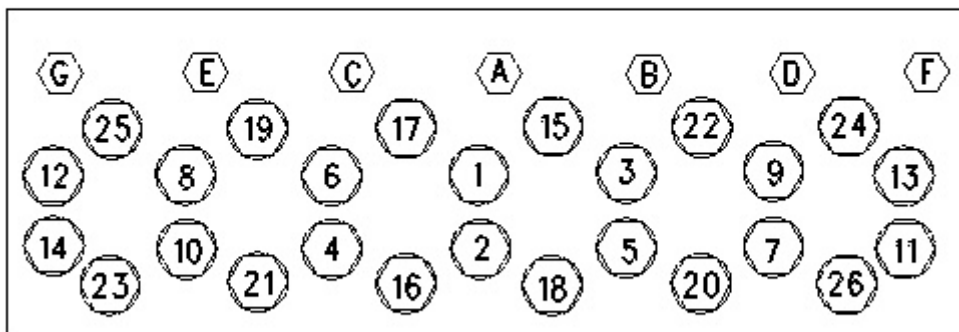


Illustration 5

g00328807

11. Tighten the cylinder head bolts by hand, as follows:
  - a. Tighten all the bolts (1 through 26) in the numerical sequence to a torque of  $150 \pm 15 \text{ N}\cdot\text{m}$  ( $115 \pm 12 \text{ lb ft}$ ).
  - b. Tighten all the bolts (1 through 26) in the numerical sequence to a torque of  $250 \pm 17 \text{ N}\cdot\text{m}$  ( $185 \pm 13 \text{ lb ft}$ ).
  - c. Tighten all the bolts (1 through 26) again in the numerical sequence to a final torque of  $250 \pm 17 \text{ N}\cdot\text{m}$  ( $185 \pm 13 \text{ lb ft}$ ).
  - d. Tighten all the remaining bolts (A through G) to a torque of  $43 \pm 7 \text{ N}\cdot\text{m}$  ( $32 \pm 5 \text{ lb ft}$ ).
12. Adjust the inlet valve lash to 0.38 mm (.015 inch) and the exhaust valve lash to 0.64 mm (.025 inch). Tighten the locknuts for the adjusting screws to a torque of  $29 \pm 7 \text{ N}\cdot\text{m}$  ( $22 \pm 5 \text{ lb ft}$ ). Refer to the Testing and Adjusting, "Air Inlet and Exhaust System" topic for additional information on valve lash adjustments.

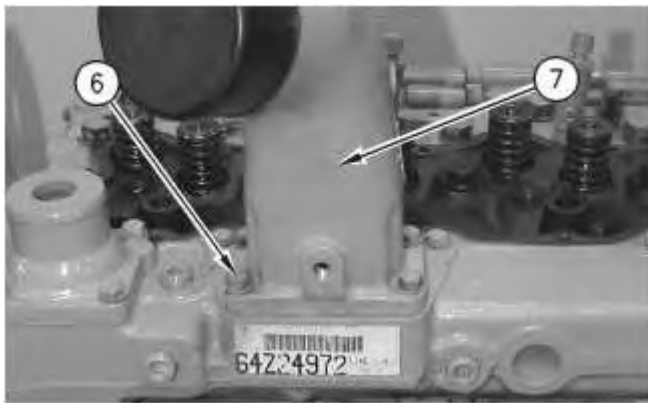


Illustration 6

g00511911

13. Put the gasket and air inlet pipe (7) in position on the cylinder head. Install four bolts (6) to fasten air inlet pipe (7) to the cylinder head.

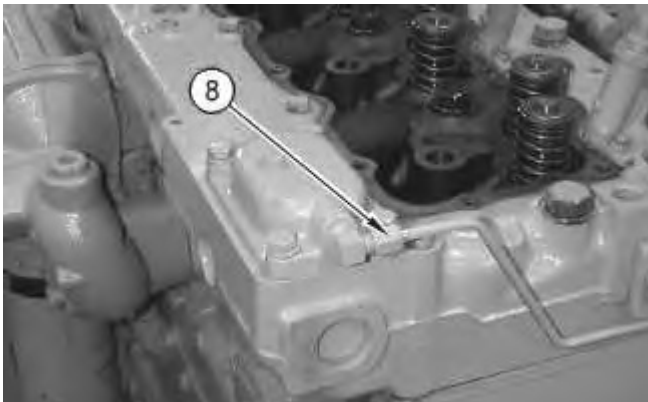


Illustration 7

g00541522

14. Connect tube (8) to the inlet manifold.

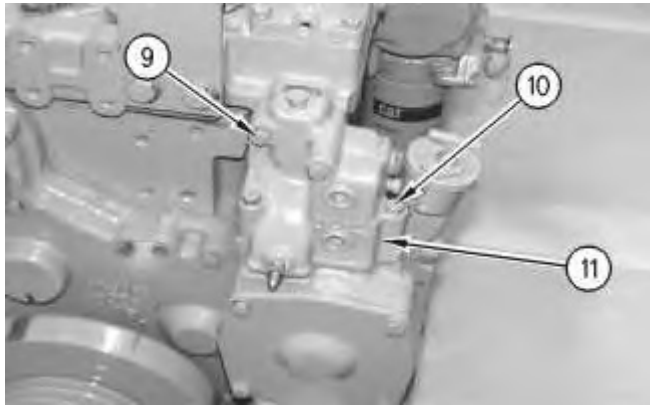


Illustration 8

g00541524

15. Put the gaskets and water pump elbow (11) in position on the engine. Install two bolts (9) that fasten water pump elbow (11) to the cylinder head. Install two bolts (10) that fasten water pump elbow (11) to the water pump.

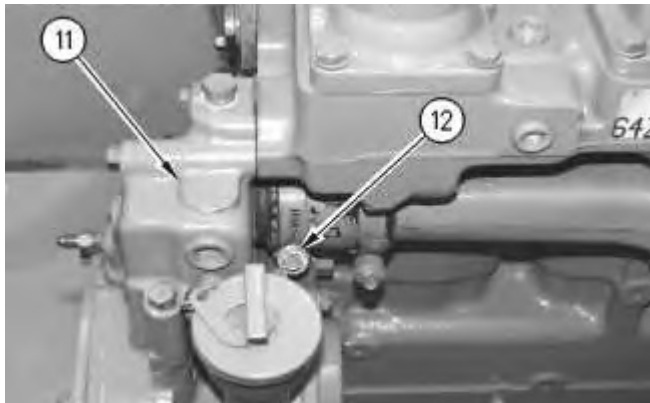


Illustration 9

g00541527

16. Tighten hose clamp (12).

**End By:**

- a. Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".
  - b. Install the exhaust manifold. Refer to Disassembly and Assembly, "Exhaust Manifold - Remove and Install".
  - c. Install the fuel injection lines. Refer to Disassembly and Assembly, "Fuel Injection Lines - Remove and Install".
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## Disassembly and Assembly 3304B and 3306B Engines for Caterpillar Built Machines

Media Number -SEN5598-09

Publication Date -01/01/2013

Date Updated -25/01/2013

i01045029

# Spacer Plate - Remove and Install

SMCS - 1221-010

## Removal Procedure

### Start By:

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

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### NOTICE

**Keep all parts clean from contaminants.**

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

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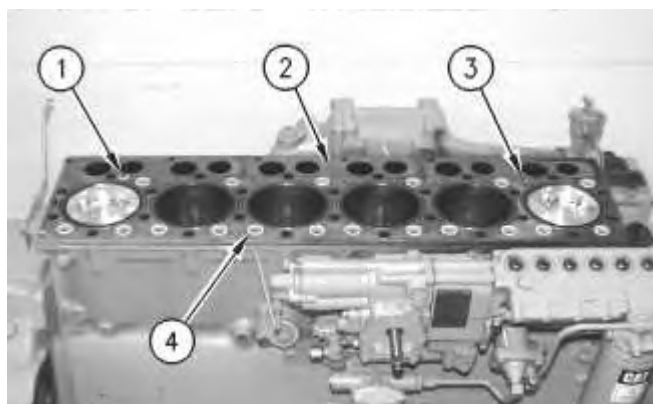


Illustration 1

g00540847

1. Remove O-ring seal (1), water seals (3) and water directors (4) from spacer plate (2) .

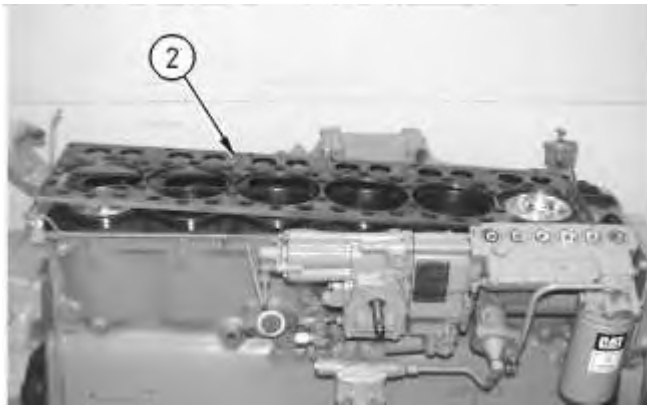


Illustration 2

g00540857

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### NOTICE

**Do not damage the dowels as the spacer plate is removed.**

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2. Remove spacer plate (2) from the cylinder head.

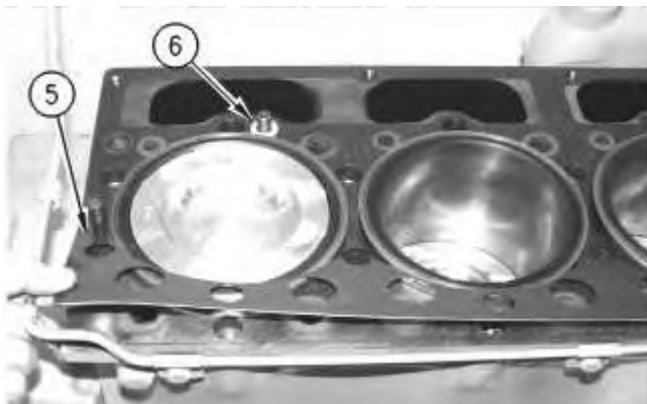


Illustration 3

g00540895

3. Remove O-ring seal (6) and spacer plate gasket (5) from the cylinder head.

## 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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1. Thoroughly clean the mating surfaces between the spacer plate and the cylinder block.

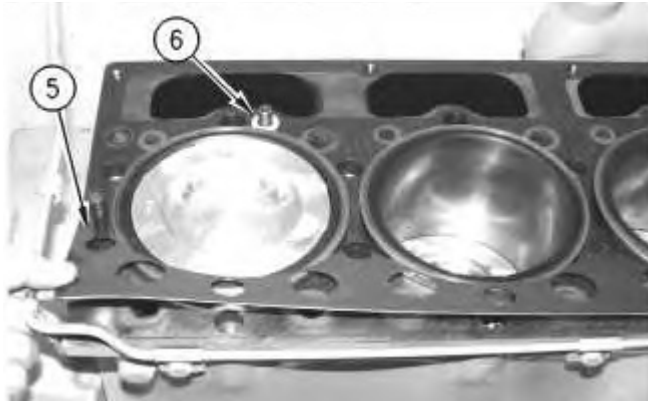


Illustration 4

g00540895

2. Install new spacer plate gasket (5) and new O-ring seal (6) .

**Note:** If the dowels in the cylinder block have been removed for any reason, the overall height of the installation is  $16.0 \pm 5.0$  mm ( $.63 \pm .20$  inch).

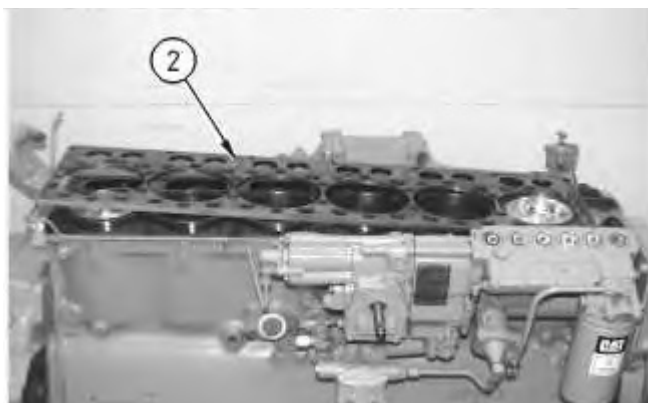
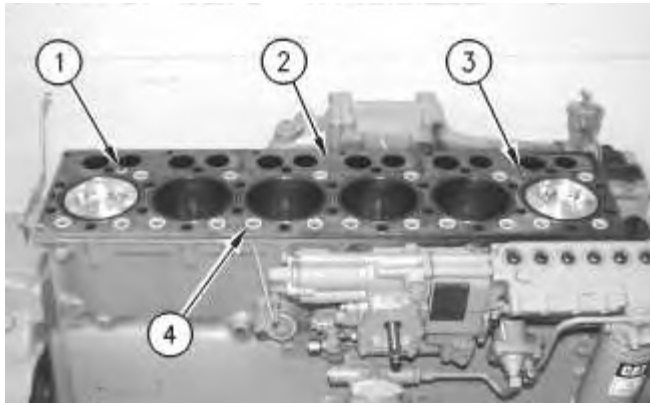


Illustration 5

g00540857

**Note:** Both surfaces of the spacer plate, spacer plate gasket and the top of the cylinder block must be clean and dry. Do not use any gasket adhesive or other substances on these surfaces.

3. Install spacer plate (2) on the cylinder head.
-



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Illustration 6

g00540847

4. Install a new O-ring seal (1). Install new water seals (3). Install new water directors (4) .
5. Check the cylinder liner projection. Refer to Disassembly and Assembly, "Cylinder Liner - Install".

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

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## **Disassembly and Assembly 3304B and 3306B Engines for Caterpillar Built Machines**

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Publication Date -01/01/2013

Date Updated -25/01/2013

i00943364

# **Water Directors - Remove and Install**

SMCS - 1115-010

## **Removal Procedure**

### **Start By:**

- A. Remove the spacer plate. Refer to Disassembly and Assembly, "Spacer Plate - Remove and Install".

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### **NOTICE**

**Keep all parts clean from contaminants.**

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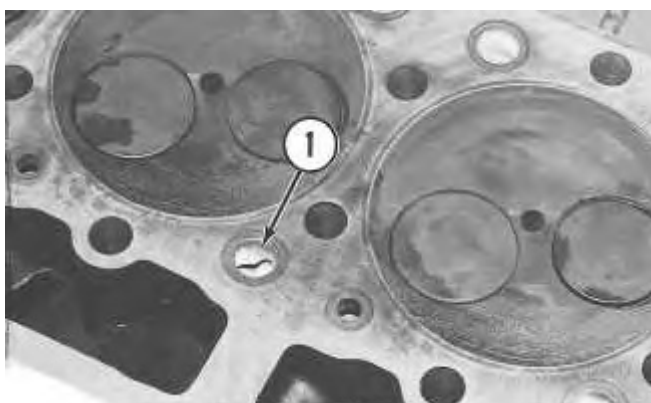


Illustration 1

g00481082

1. Remove water directors (1) from the cylinder head.

## 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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1. Thoroughly clean the cylinder head before assembly.

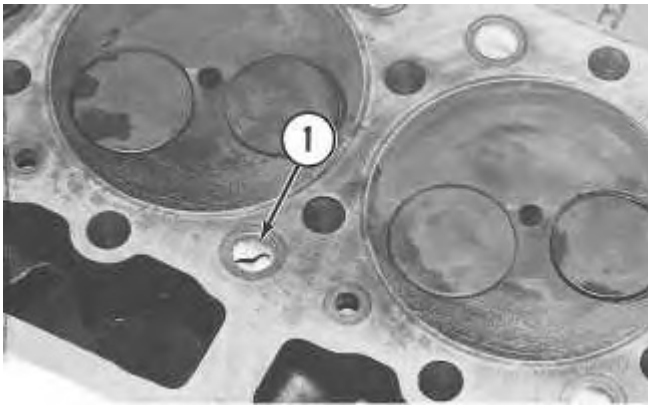


Illustration 2

g00481082

2. Install new water director (1) into the cylinder head. Align the notch in water director (1) with the "V" mark on the cylinder head.
3. Install water director (1) to a depth of  $0.8 \pm 0.6$  mm ( $0.031 \pm 0.023$  inch) below the surface of the cylinder head.

**End By:** Install the spacer plate. Refer to Disassembly and Assembly, "Spacer Plate - Remove and Install".

---

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## Disassembly and Assembly 3304B and 3306B Engines for Caterpillar Built Machines

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Date Updated -25/01/2013

i01042782

# 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:

- Remove the spacer plate. Refer to Disassembly and Assembly, "Spacer Plate - Remove and Install".

---

### NOTICE

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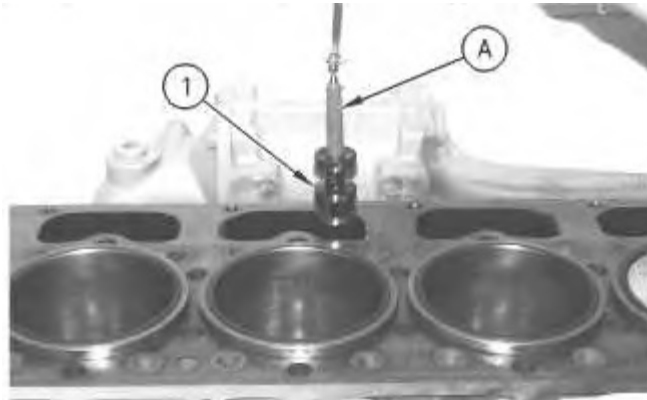


Illustration 1

g00538891

1. Use Tool (A) to remove valve lifter (1), as shown. Put identification marks on the valve lifters for installation purposes.
2. Repeat Step 1 for the remainder of the valve lifters.
3. Check the diameter of the valve lifters. The diameter of a new valve lifter must be  $33.285 \pm 0.015$  mm ( $1.3105 \pm 0.0005$  inch). The diameter of the bore in the cylinder block for a new valve lifter must be  $33.388 \pm 0.050$  mm ( $1.3145 \pm 0.0020$  inch). The maximum permissible clearance between the valve lifter and the valve lifter bore in the cylinder block must be 0.30 mm (0.012 inch).

## Installation Procedure

Table 2

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

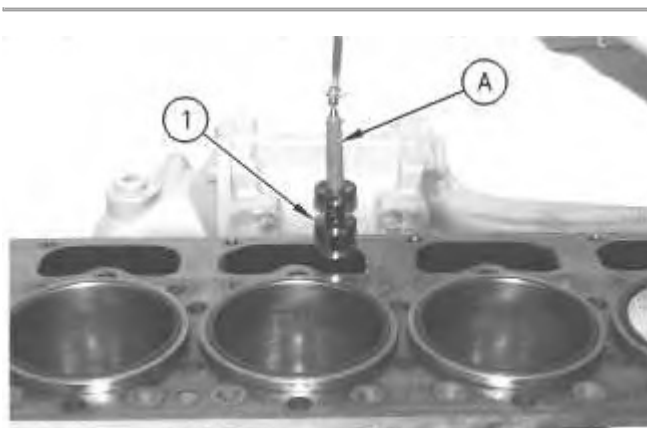


Illustration 2

g00538891

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