



# Service Repair Manual

## **Models**

# 12H Motor Grader

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Product: MOTOR GRADER

Model: 12H MOTOR GRADER 5ZM

Configuration: 12H Motor Grader 5ZM00001-UP (MACHINE) POWERED BY 3306 Engine

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

Media Number -SEN5598-09

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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.

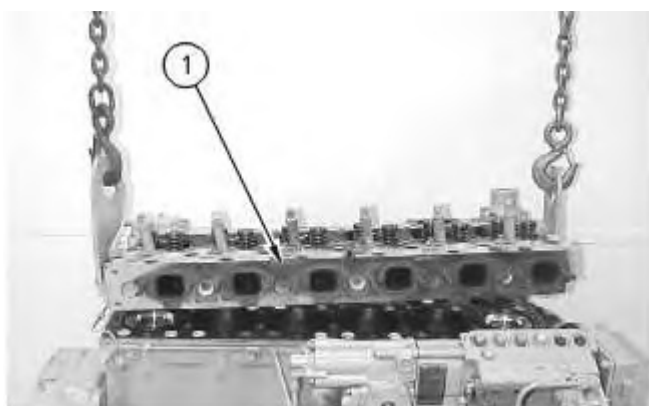


Illustration 1

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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.

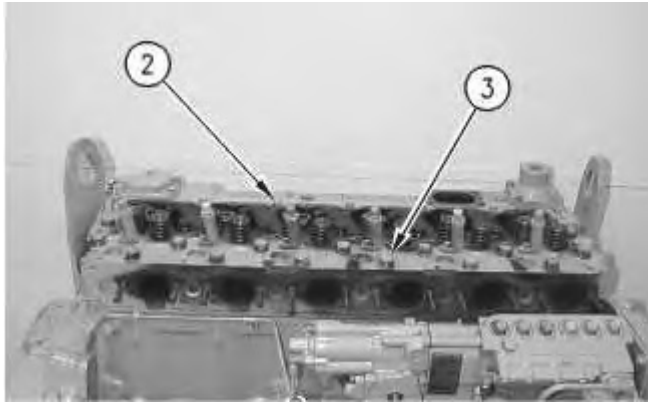


Illustration 2

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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.

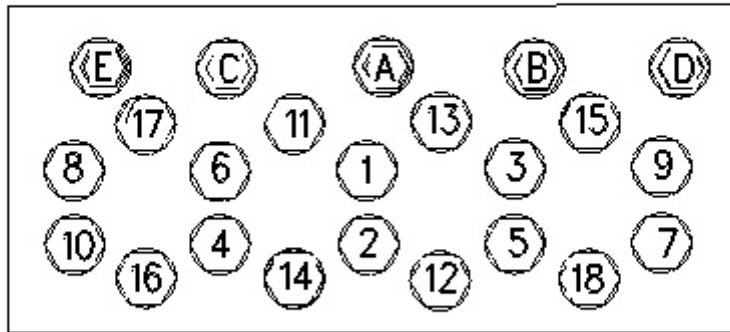
**Note:** Do not tighten the cylinder head bolts at this time.



Illustration 3

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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.



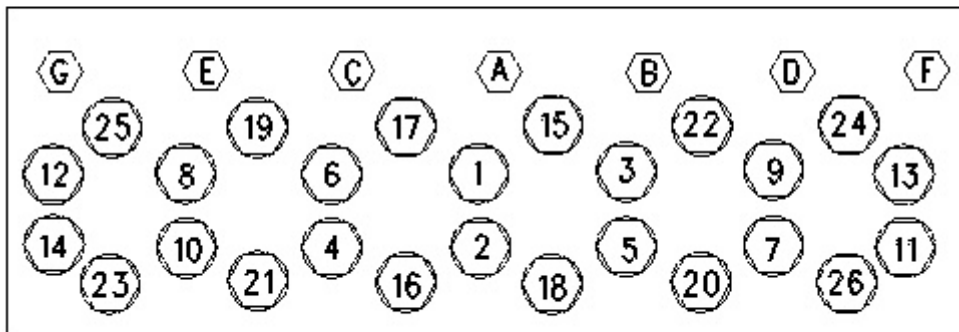
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Illustration 4

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3304B torque sequence

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



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.

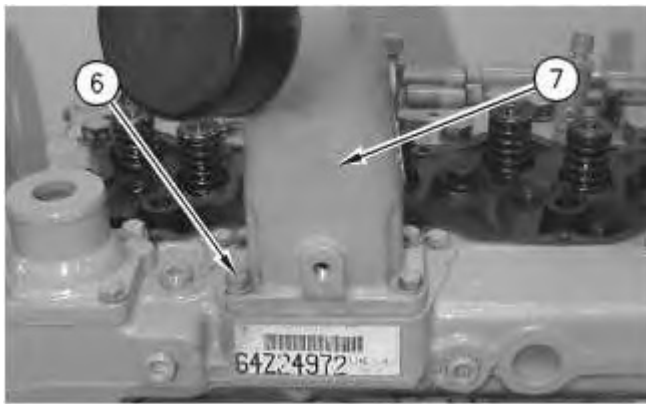


Illustration 6

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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.

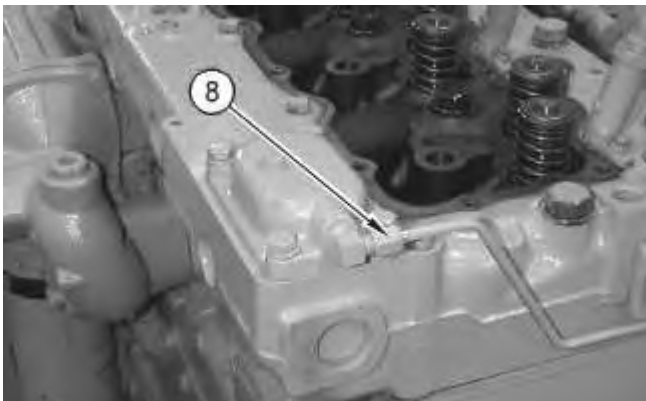


Illustration 7

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