

Product: TRUCK

Model: 789D TRUCK SHH

Configuration: 789D XQ Off-Highway Truck SHH00001-UP (MACHINE) POWERED BY 3516 Engine

Disassembly and Assembly

3500 and 3500B High Displacement Engines for Caterpillar Built Machines

Media Number -SEN1126-33

Publication Date -01/07/2015

Date Updated -14/09/2018

i04376313

Valve Mechanism Cover - Remove and Install

SMCS - 1107-010

Removal Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

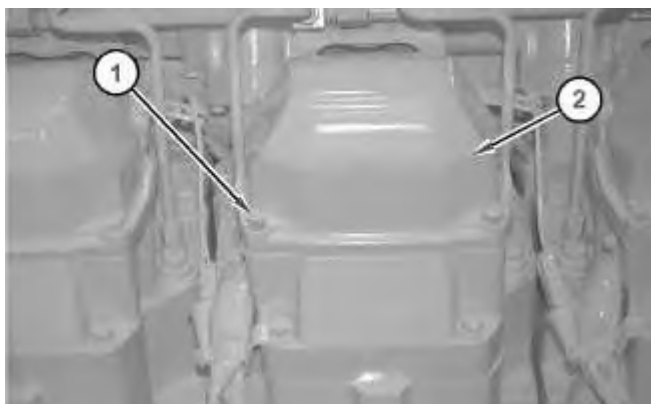


Illustration 1

g01052600

1. Remove bolts (1). Remove valve mechanism cover (2) .
-

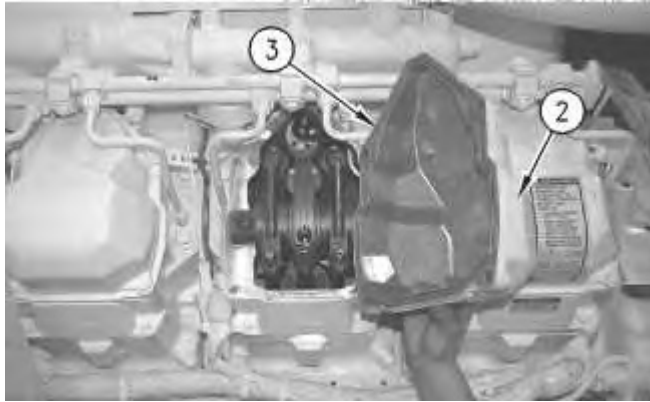


Illustration 2

g00923171

2. If necessary, remove O-ring seal (3) from valve mechanism cover (2) .

Installation Procedure

NOTICE

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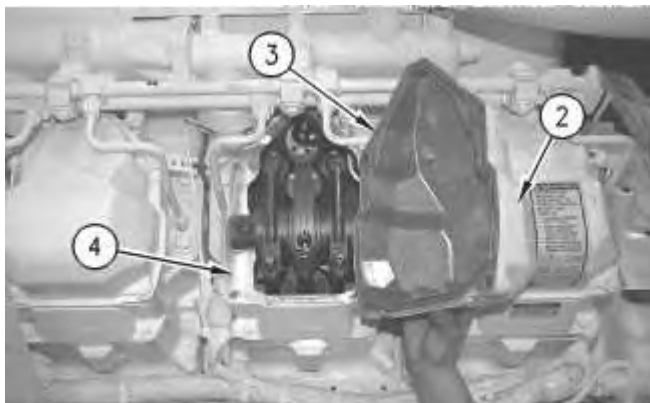


Illustration 3

g00605124

1. Install O-ring seal (3) in the groove of valve mechanism cover (2). Position valve mechanism cover (2) onto rocker arm base (4) .
-

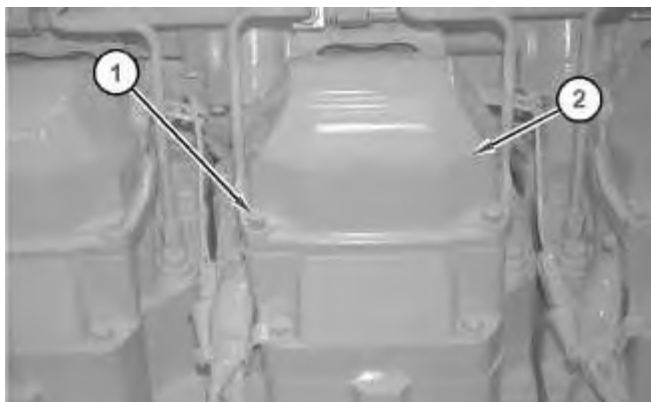


Illustration 4

g01052600

2. Install bolts (1) in valve mechanism cover (2). Tighten bolts (1) to a torque of 10 N·m (89 lb in). Tighten bolts (1) again to a torque of 20 ± 3 N·m (177 ± 27 lb in).
-

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i04376330

Valve Mechanism Cover Base - Remove and Install

SMCS - 1120-010

Removal Procedure

Start By:

- A. Remove the electronic unit injectors. Refer to Disassembly and Assembly, "Electronic Unit Injector - Remove".

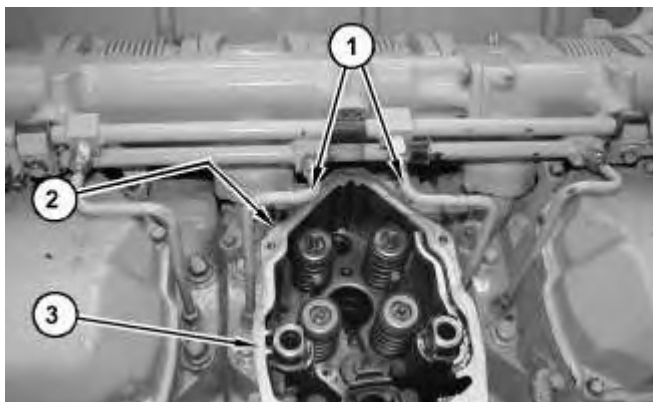


Illustration 1

g01052887

1. Remove tube assemblies (1) .
2. Remove bolts (2) (not shown) and valve mechanism cover base (3) .

Installation Procedure

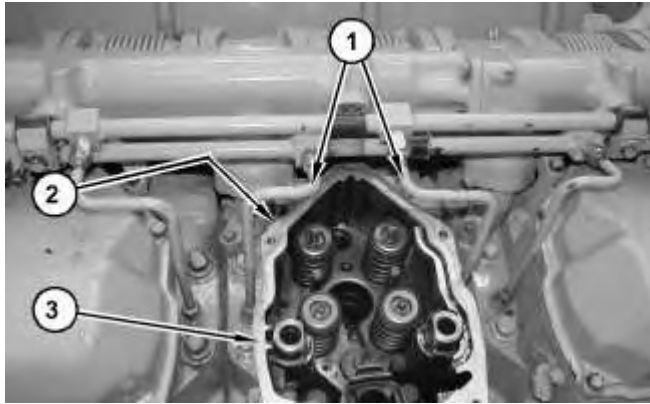


Illustration 2

g01052887

1. Position valve mechanism cover base (3) and install bolts (2) (not shown).
2. Install tube assemblies (1) .

End By: Install the electronic unit injectors. Refer to Disassembly and Assembly, "Electronic Unit Injector - Install".

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i06002194

Rocker Shaft and Push Rods - Remove

SMCS - 1102-011

Removal Procedure

Start By:

- A. Remove the valve covers. Refer to Disassembly and Assembly, "Valve Cover - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

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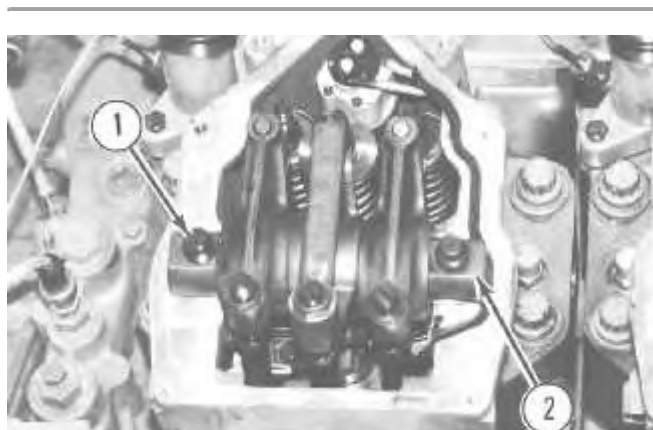


Illustration 1

g00605234

Note: Mark the orientation of the rocker shaft assembly (2) before removal.

1. Remove bolts (1) . Remove rocker shaft assembly (2) from the rocker arm base.

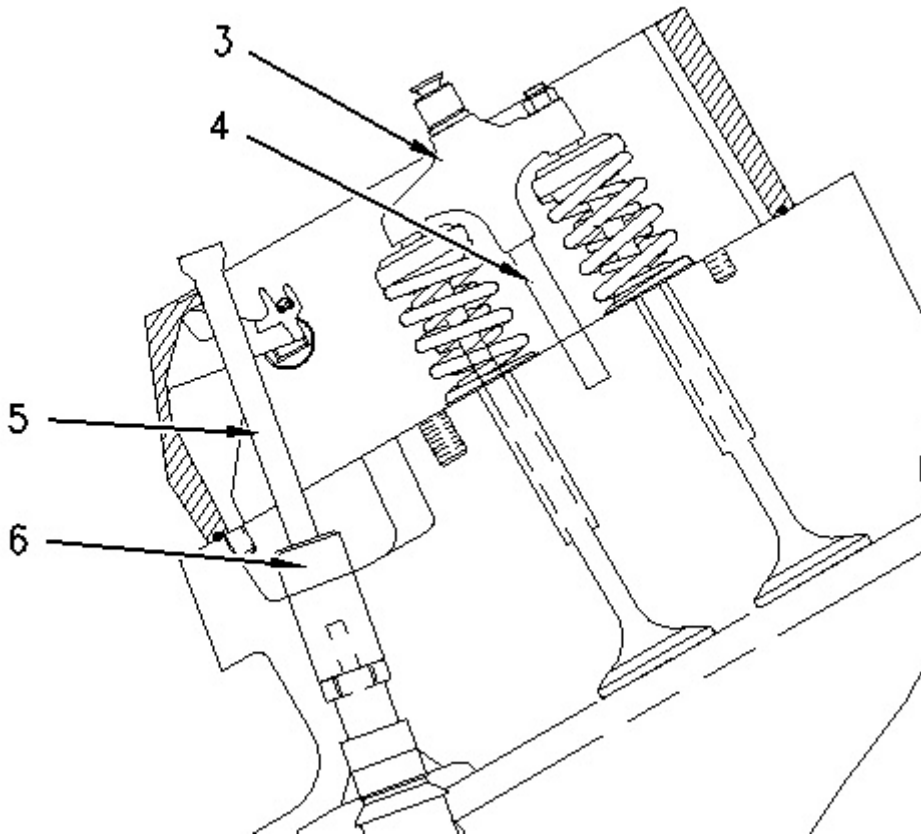


Illustration 2

g00636958

Note: Mark the pushrods and bridge assemblies for identification of location upon assembly.

2. Remove bridge assemblies (3) from dowels (4) (if equipped).
 3. Remove pushrods (5) from the cup of valve lifters (6) .
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i02047273

Rocker Shaft - Disassemble

SMCS - 1102-015

Disassembly Procedure

Table 1

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

Start By:

- Remove the rocker shaft assemblies. Refer to Disassembly and Assembly, "Rocker Shaft and Push Rods - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

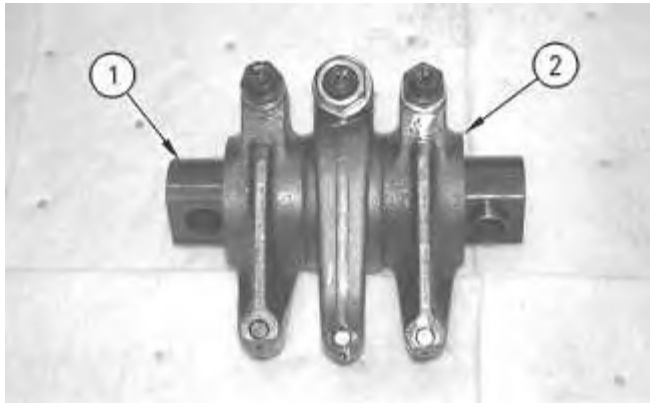


Illustration 1

g00605478

1. Slide shaft (1) out of rocker arms (2). If necessary, remove the dowel from the shaft.

Note: Perform the following Steps for each rocker arm.

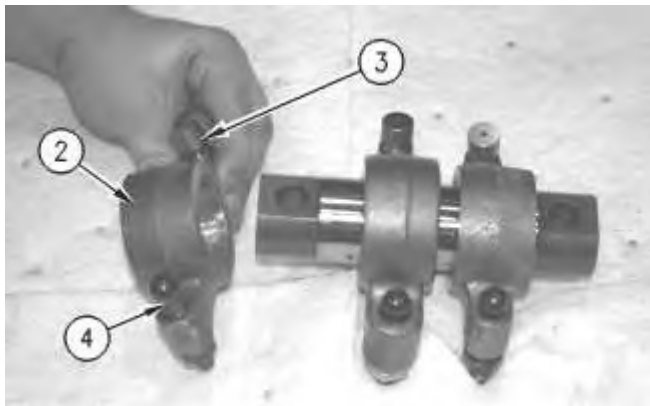
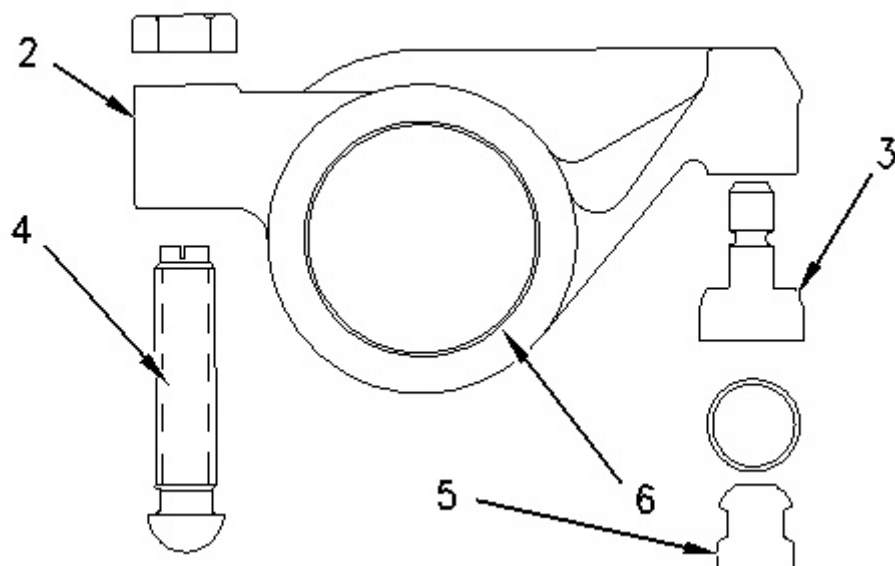


Illustration 2

g00605479



2. Remove adjustment screw (4) and the nut from rocker arm (2).
 3. Use a hammer and a punch to remove socket (3) from rocker arm (2).
 4. Remove button (5) from socket (3). Remove the retaining ring from the button.
 5. Use Tooling (A) to remove sleeve bearing (6) from rocker arm (2).
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i06517032

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.

Perform Steps 1 through 4 for each rocker arm.

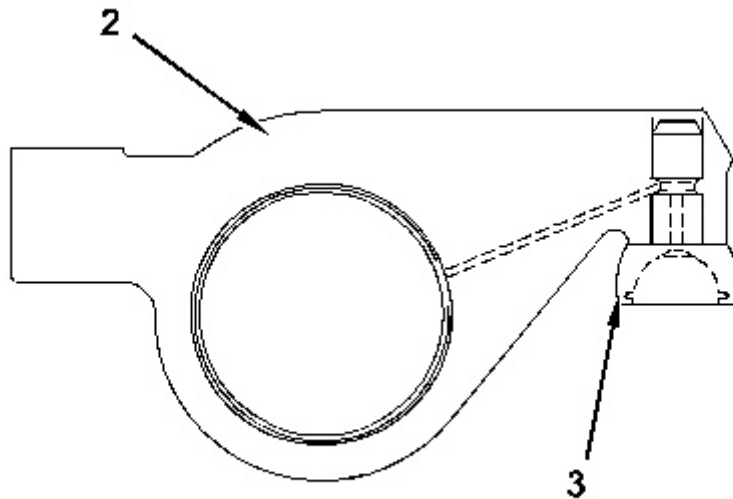


Illustration 1

g01050986

Note: Make sure that the bore of the rocker arm and the sleeve bearing are thoroughly clean.

1. The sleeve bearing and the rocker arm have oil supply holes. The holes must be aligned when the bearing is installed in the rocker arm. Align the joint of the bearing toward the top of the rocker arm. Align the oil hole in the bearing with the oil hole in the rocker arm. Use Tooling (A) to install the sleeve bearing in rocker arm (2).

After the bearing is installed, measure the bore of the bearing. The bore must be 45.077 ± 0.015 mm (1.77468 ± 0.00059 inch). Machine the bearing, if necessary.

2. Align the scribe mark on socket (3) with the scribe mark on rocker arm (2). Press the socket fully into the rocker arm.

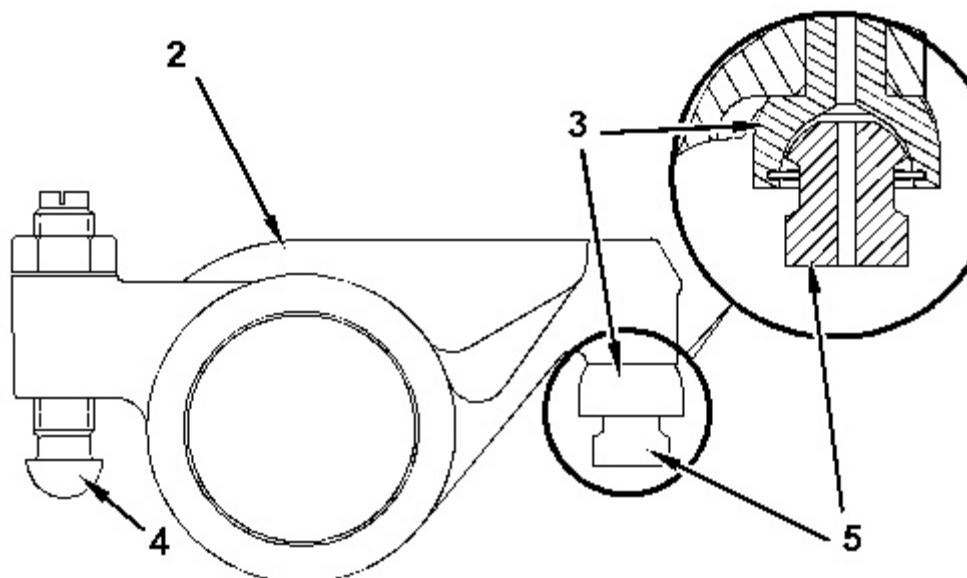


Illustration 2

g01050990

3. Place the retaining ring on button (5). Install the button in socket (3).
4. Install adjustment screw (4) and the nut on rocker arm (2).

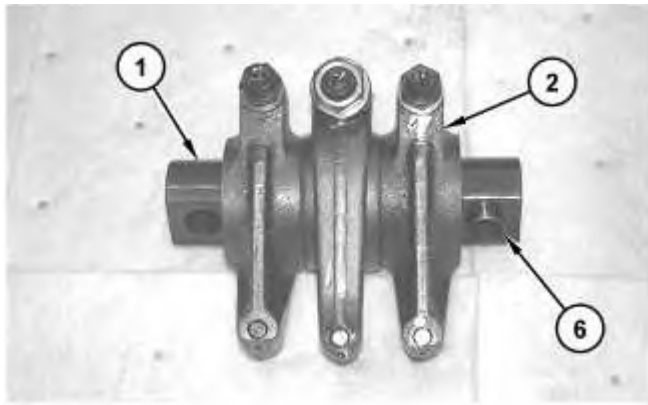


Illustration 3

g02360516

5. If necessary, replace dowel (6) with new. The dowel (6) must project 6.0 mm (0.24 inch) above the surface of the shaft.

Note: The dowel (6) will be on the left side of shaft (1) and the oil hole will be on the right. The dowel (6) and oil hole locations are for the assembly and installation of the rocker arm shaft assemble.

6. Coat the bearings of the rocker arms and coat the shaft with clean engine oil. Install rocker arms (2) on shaft (1).

End By:

- a. Install the rocker shaft assemblies. Refer to Disassembly and Assembly, "Rocker Shaft and Push Rods - Install".
-

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i07163868

Rocker Shaft and Pushrod - Install

SMCS - 1102-012; 1208-012

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: For installing valve bridges with a dowel refer to Step 1 through Step 4. For installing floating bridge assemblies refer to Step 5 through Step 6.

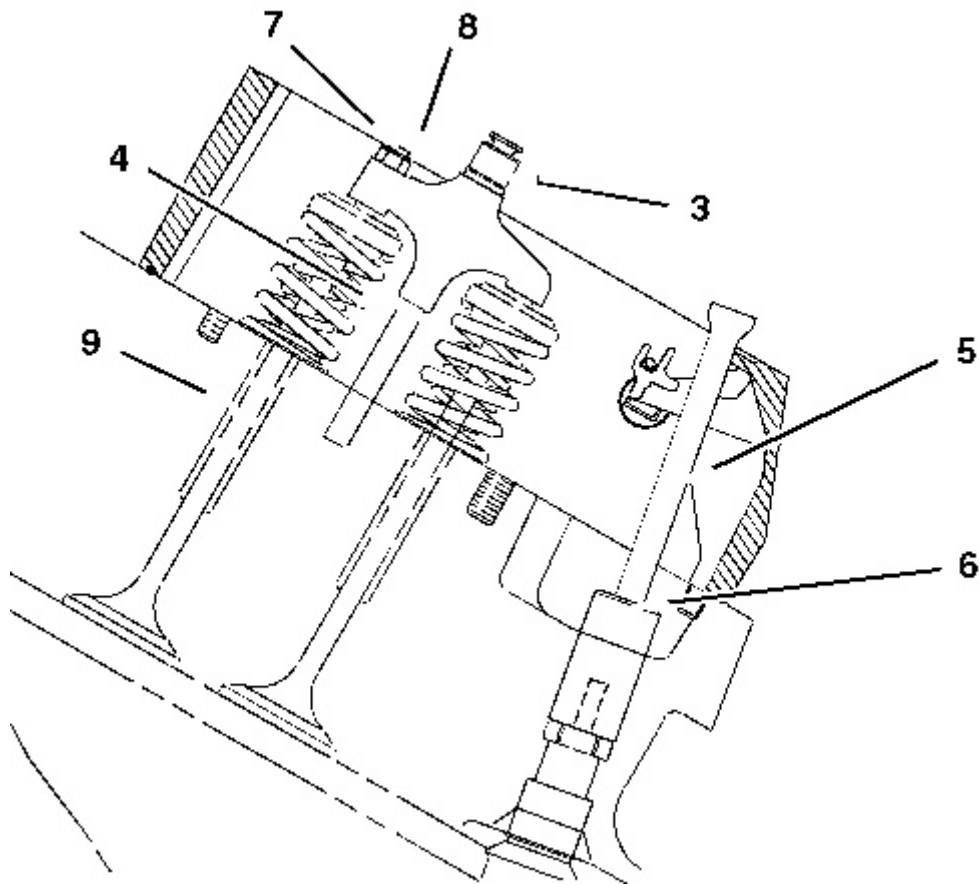


Illustration 1

g01051014

1. Loosen adjustment screw (7) and jam nut (8) on the bridge assembly.
2. Coat these items with clean engine oil: dowels (4), the receptacle of the bridge for the dowels and the uppermost contact surface of bridge assembly (3).
3. Place the bridge assembly into position on the dowel. Apply 1 to 14 N·m (1 to 10 lb ft) of downward force on the uppermost contact surface of bridge assembly (3). While you apply the force, turn adjustment screw (7) until the screw contacts valve stem (9).

Adjust screw an additional 20 to 30 degrees ($1/3$ to $1/2$ of the hex) to straighten the dowel in the guide.

Note: The bridges should be oriented so that the bridge marked “EX” is above the exhaust valves. The part numbers on the bridges should face the front of the engine.

4. Hold the adjustment screw in position and tighten jam nut (8) to a torque of 30 ± 4 N·m (22 ± 3 lb ft).

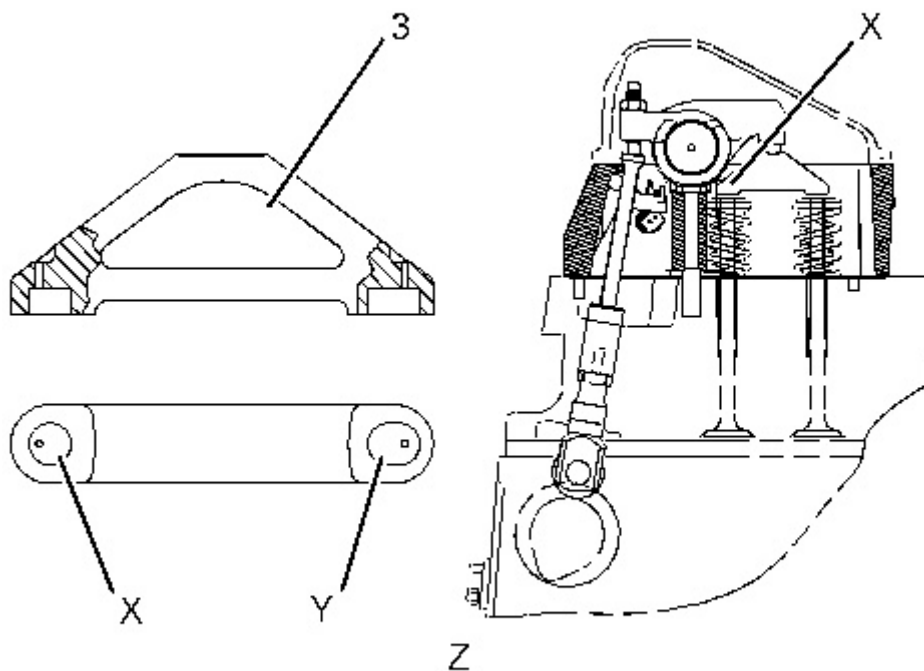


Illustration 2

g01946786

Floating valve bridge

(X) Round pocket

(Y) Slotted pocket

(Z) Outside of engine

5. Apply clean engine oil to the contact surface of bridge assemblies (3) and the valve stems. Install bridge assemblies (3) on the valve stems.
6. Install the bridge assemblies with the round pocket toward the outside of the engine. Refer to Illustration 2.

Note: Installing each pushrod in the original location is critical.

7. Coat pushrods (5) and the cups of the valve lifters (6) with clean engine oil. Place the pushrods into position on the valve lifters.

NOTICE

Ensure that the crankshaft and the camshafts are in time with each other. Also ensure that the adjustment screws in the rocker arms are loosened completely before the bolts on the rocker shaft are tightened or damage to the valves and the pistons may occur.

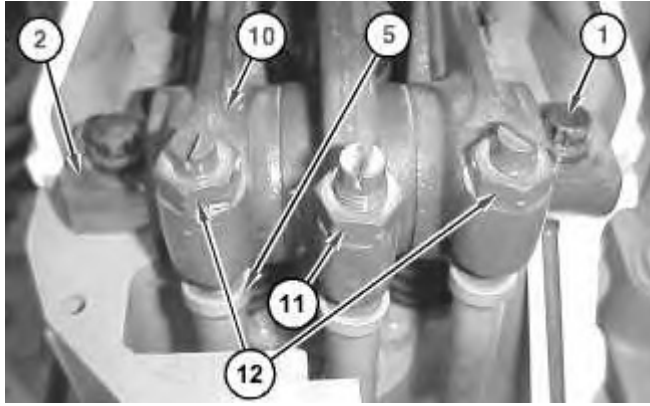


Illustration 3

g01051017

NOTICE

If the rocker shaft is not positioned correctly, the oil supply to the sleeve bearings in the rocker arm will be shut off. This will cause seizure of the bearings and severe damage to the engine.

Be sure to orient the rocker shaft in the correct position.

8. Place rocker shaft assembly (2) in position on the rocker arm base. Make sure that rocker arms (10) and pushrods (5) are aligned. Install bolts (1). If bolt (1) is a 5/8 inch bolt, tighten to a torque of $215 \pm 40 \text{ N}\cdot\text{m}$ ($159 \pm 30 \text{ lb ft}$). If bolt (1) is a 1/2 inch bolt, tighten to a torque of $120 \pm 20 \text{ N}\cdot\text{m}$ ($88 \pm 15 \text{ lb ft}$).
9. Adjust the valve bridge and the valve lash according to Testing and Adjusting, "Valve Lash and Valve Bridge Adjustment".
10. Adjust the fuel injection pump according to Testing and Adjusting, "Fuel Injector Adjustment".

Tighten nuts (12) to a torque of $70 \pm 15 \text{ N}\cdot\text{m}$ ($52 \pm 11 \text{ lb ft}$).

11. Tighten nut (11) for the rocker arm of the fuel injection pump. If nut (11) is 5/8 inch thread, tighten to a torque of $120 \pm 15 \text{ N}\cdot\text{m}$ ($89 \pm 11 \text{ lb ft}$). If nut (11) is 1/2 inch thread, tighten to a torque of $70 \pm 15 \text{ N}\cdot\text{m}$ ($52 \pm 11 \text{ lb ft}$).

End By:

- a. Install the valve covers. Refer to Disassembly and Assembly, "Valve Cover - Remove and Install".
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i02415328

Electronic Unit Injector - Remove

SMCS - 1290-011

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	5F-4764	Pry Bar	1

Start By:

- Remove the rocker shaft assembly and the pushrods. Refer to Disassembly and Assembly, "Rocker Shaft Assembly and Push Rods - Remove".

NOTICE

Keep all parts clean from contaminants.

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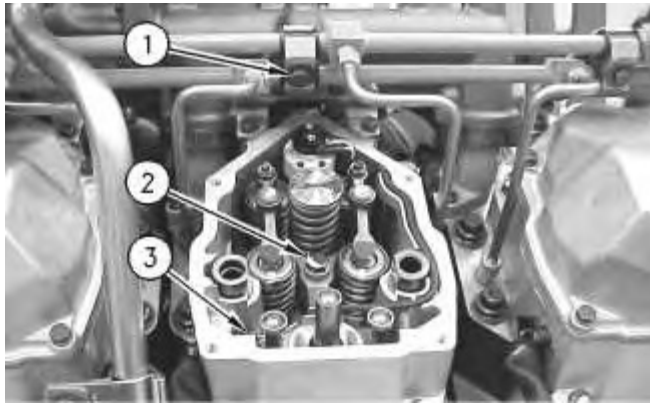


Illustration 1

g00903832

1. Remove bolt (1) and the clamp.
2. Remove bolt (2) and the clamp.
3. Disconnect harness assembly (3).

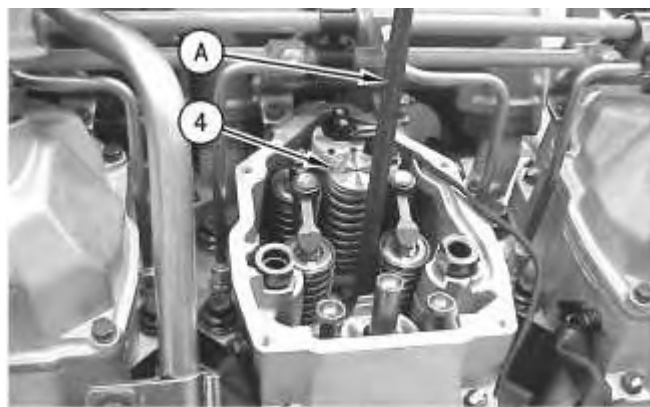


Illustration 2

g00903932

4. Use Tooling (A) to remove electronic unit injector (4).
5. Remove fuel / fluids from the cylinder. **WARNING!** Turning over (cranking) an engine with an injector removed could result in personal injury or death from fluids escaping at high velocity.

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