

Product: INDUSTRIAL ENGINE
Model: C4.4 INDUSTRIAL ENGINE 440
Configuration: C4.4 Industrial Engine 44000001-UP

Disassembly and Assembly C4.4 (MECH) Industrial Engine and Generator Sets

Media Number -KENR6249-05

Publication Date -01/03/2014

Date Updated -02/05/2017

i02763410

Exhaust Elbow - Remove and Install

SMCS - 1061-010-E4

Removal Procedure

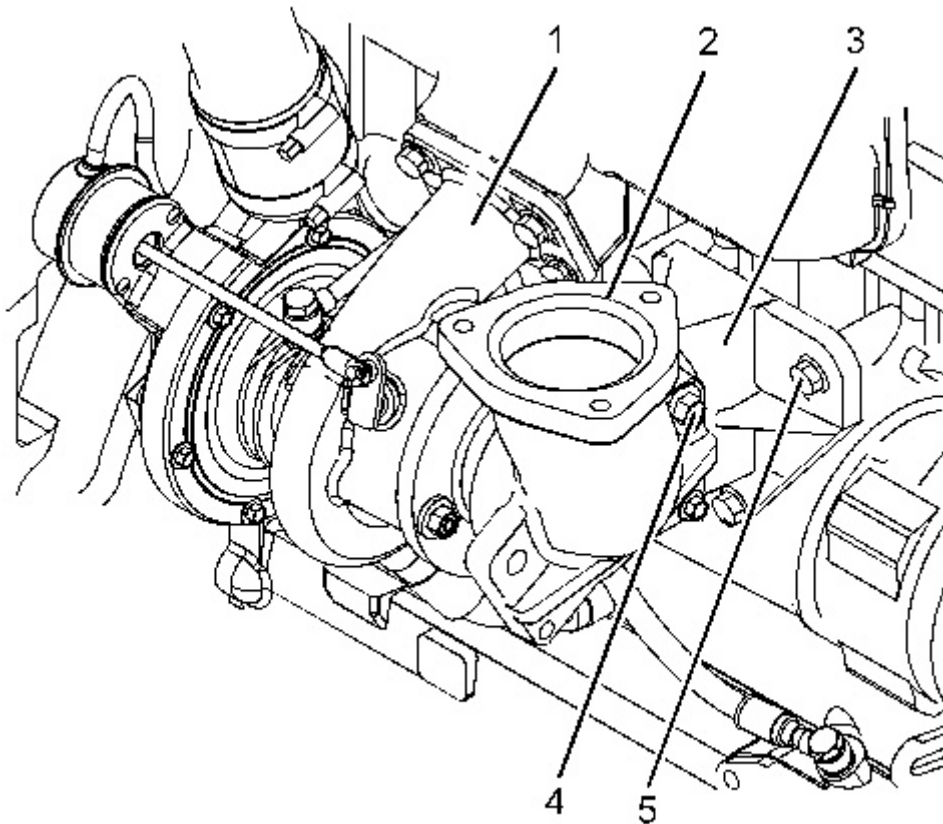


Illustration 1
Typical example

g01343547

1. Remove bolts (4) and remove exhaust elbow (2). Note the orientation of the exhaust elbow.
2. Remove bolts (5) and remove support bracket (3) from the cylinder block.

Installation Procedure

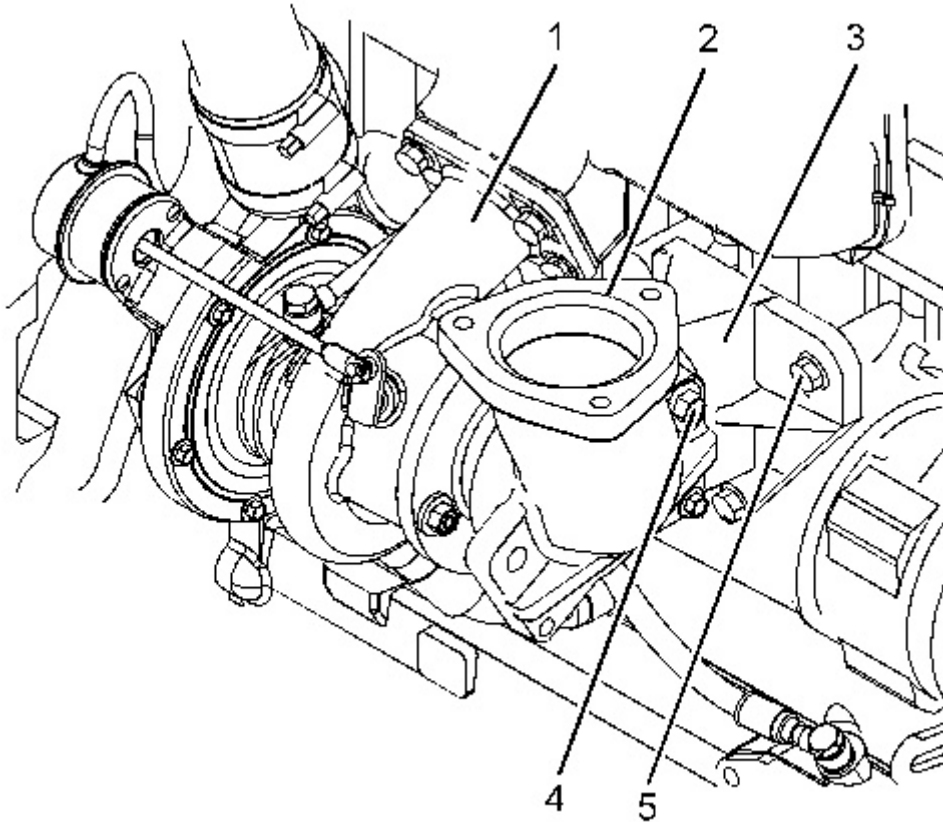


Illustration 2

g01343547

Typical example

1. Ensure that the exhaust elbow is clean and free from wear or damage.
2. Position support bracket (3) to the cylinder block and install bolts (5). Tighten bolts (5) to a torque of 44 N·m (33 lb ft).
3. Position exhaust elbow (2).

Note: Ensure the correct orientation of the exhaust elbow.

4. Install bolts (4) to support bracket (3). Tighten bolts (4) to a torque of 44 N·m (33 lb ft).
-

Product: INDUSTRIAL ENGINE
Model: C4.4 INDUSTRIAL ENGINE 440
Configuration: C4.4 Industrial Engine 44000001-UP

Disassembly and Assembly C4.4 (MECH) Industrial Engine and Generator Sets

Media Number -KENR6249-05

Publication Date -01/03/2014

Date Updated -02/05/2017

i02763412

Inlet and Exhaust Valve Springs - Remove and Install

SMCS - 1108-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	9U-7336	Housing	1
	5P-7305	Engine Turning Tool	1
B	9U-6195	Valve Spring Compressor	1
	268-1969	Adapter	1
	276-1221	Head	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

Start By:

- a. Remove the rocker shaft assembly. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Remove".

Note: Either Tooling (A) can be used. Use the Tooling that is most suitable.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The following procedure should be adopted in order to remove the valve springs when the cylinder head is installed to the engine. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install" for the procedure to remove the valve springs from a cylinder head that has been removed from the engine.

Note: Ensure that the appropriate piston is at the top center position before the valve spring is removed. Failure to ensure that the piston is at the top center position may allow the valve to drop into the cylinder bore.

NOTICE

Plug the apertures for the push rods in the cylinder head in order to prevent the entry of loose parts into the engine.



Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

1. Follow Steps 1.a through 1.d in order to position the appropriate piston at top center.
 - a. Install Tooling (B) in position on the cylinder head in order to compress a valve spring for the appropriate piston.
 - b. Use Tooling (B) in order to compress valve spring (3) and open the valve slightly.

Note: Do not compress the spring so that valve spring retainer (2) touches the valve stem seal.

- c. Use Tooling (A) in order to rotate the crankshaft carefully, until the piston touches the valve.

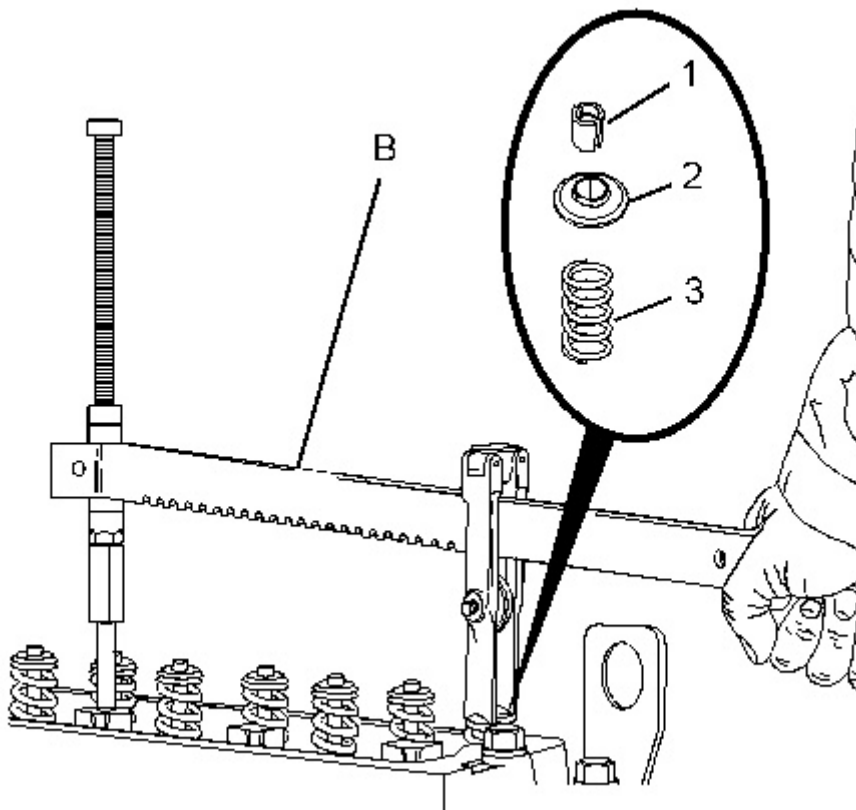
Note: Do not use excessive force to turn the crankshaft. The use of force can result in bent valve stems.

- d. Continue to rotate the crankshaft and gradually release the pressure on Tooling (B) until the piston is at the top center position. The valve is now held in a position that allows the valve spring to be safely removed.

NOTICE

Do not turn the crankshaft while the valve springs are removed.

Note: Valve springs must be replaced in pairs for the inlet valve or the exhaust valve of each cylinder. If all valve springs require replacement the procedure can be carried out on two cylinders at the same time. The procedure can be carried out on the following pairs of cylinders. 1 with 4 and 2 with 3. Ensure that all of the valve springs are installed before changing from one pair of cylinders to another pair of cylinders.



2. Apply sufficient pressure to Tooling (B) in order to allow removal of valve keepers (1).
Remove valve keepers (1).

Note: Do not compress the spring so that valve spring retainer (2) touches the valve stem seal.

3. Slowly release the pressure on Tooling (B).
4. Remove valve spring retainer (2) and remove valve spring (3).
5. If necessary, remove the valve stem seals.
6. Repeat Steps 2 through 5 in order to remove the remaining valve spring from the appropriate cylinder.
7. Remove Tooling (B).

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	9U-7336	Housing	1
	5P-7305	Engine Turning Tool	1
B	9U-6195	Valve Spring Compressor	1
	268-1969	Adapter	1
	276-1221	Head	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

Note: Either Tooling (A) can be used. Use the Tooling that is most suitable.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Do not turn the crankshaft while the valve springs are removed.

1. Inspect the valve springs for the correct length. Refer to Specifications, "Cylinder Head Valves " for more information.
2. If necessary, install a new valve stem seal onto the valve guide.

Note: The outer face of the valve guide must be clean and dry before installing the valve stem seal.

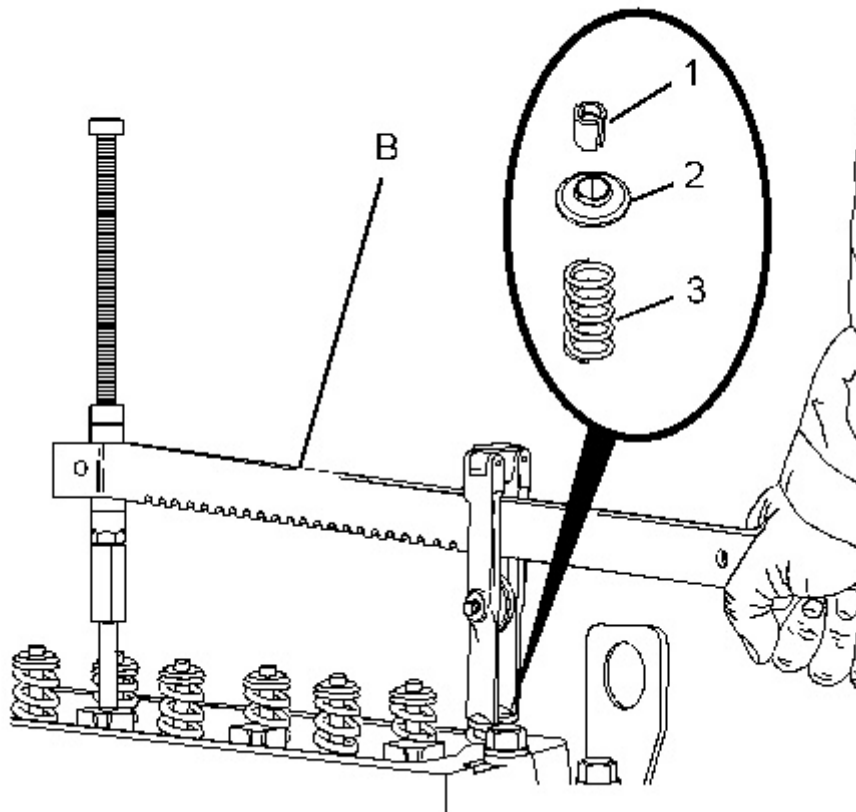


Illustration 2
Typical example

g01343550

3. Install valve spring (3) onto the cylinder head. Position valve spring retainer (2) onto valve spring (3).

! WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

4. Install Tooling (B) in the appropriate position on the cylinder head in order to compress the valve spring.

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

5. Apply sufficient pressure to Tooling (B) in order to install valve keepers (1). Install valve spring keepers (1).

Note: Do not compress the spring so that valve spring retainer (2) touches the valve stem seal .

6. Carefully release the pressure on Tooling (B).

Note: Ensure that the valve keepers are correctly seated.

7. Repeat Steps 2 to 6 for the remaining valves.



The valve spring keepers can be thrown from the valve when the valve spring compressor is released. Ensure that the valve spring keepers are properly installed on the valve stem. To help prevent personal injury, keep away from the front of the valve spring keepers and valve springs during the installation of the valves.

8. Remove Tooling (B).

End By:

- a. Install the rocker shaft assembly. Refer to Disassembly and Assembly, "Rocker Shaft and Pushrod - Install".
-

Product: INDUSTRIAL ENGINE
Model: C4.4 INDUSTRIAL ENGINE 440
Configuration: C4.4 Industrial Engine 44000001-UP

Disassembly and Assembly C4.4 (MECH) Industrial Engine and Generator Sets

Media Number -KENR6249-05

Publication Date -01/03/2014

Date Updated -02/05/2017

i02763413

Inlet and Exhaust Valves - Remove and Install

SMCS - 1105-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6195	Valve Spring Compressor	1
	268-1969	Adapter	1
	276-1221	Head	1

Start By:

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Clean the bottom face of the cylinder head. Check the depth of the valves below the face of the cylinder head before the valve springs are removed. Refer to Specifications, "Cylinder Head Valves" for the correct dimensions.

2. Place a temporary identification mark on the heads of the valves in order to identify the correct position. Inlet valves have a recess in the center of the head.

Note: Do not stamp the heads of the valve. Stamping or punching the heads of the valves could cause the valves to fracture.

3. Use a suitable lifting device to position the cylinder head with the valve springs upward. The weight of the cylinder head is approximately 56 kg (125 lb).

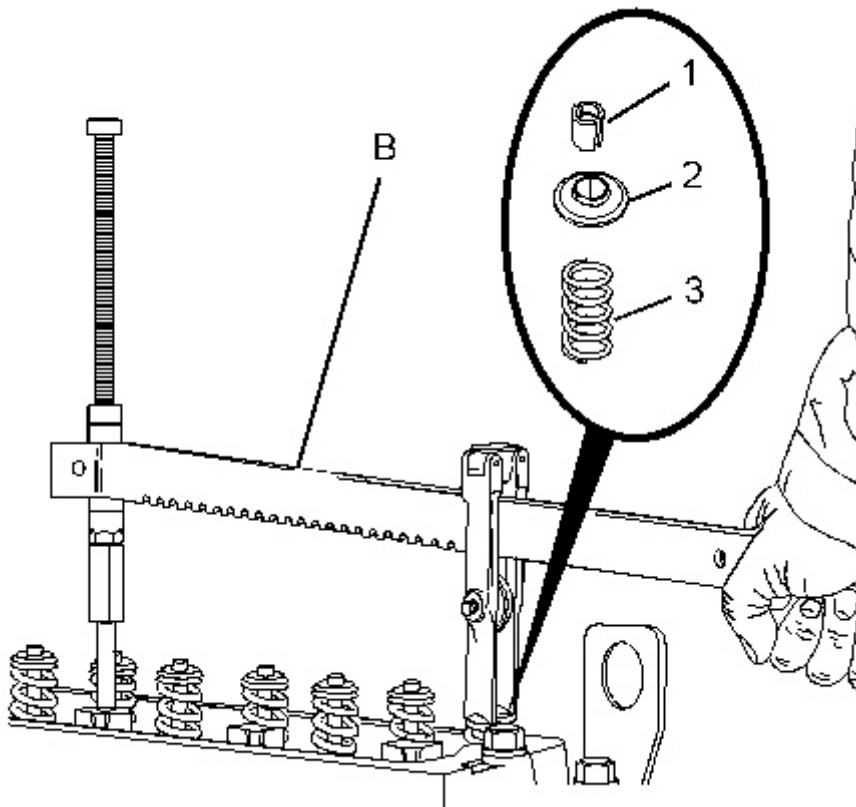
Note: Ensure that the cylinder head is kept on a clean, soft surface in order to prevent damage to the machined face.

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.



Typical example

4. Install Tooling (A) in position on the cylinder head in order to compress the appropriate valve spring.

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

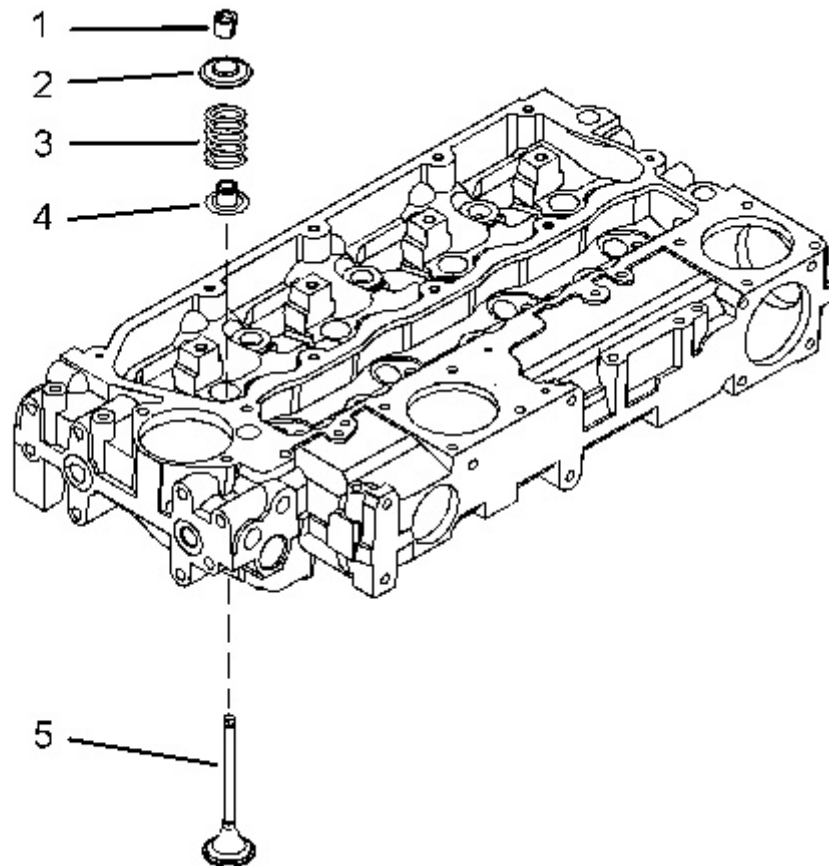


Illustration 2

g01352229

Typical example

5. Apply sufficient pressure to Tooling (A) in order to remove valve keepers (1).

Note: Do not compress the spring so that valve spring retainer (2) touches valve stem seal (4).

6. Slowly release the pressure on Tooling (A).
7. Remove valve spring retainer (2). Remove valve spring (3).
8. Repeat Steps 4 to 7 for the remaining valves.

9. Remove Tooling (A).
10. Remove valve stem seals (4).
11. Use a suitable lifting device to carefully turn over the cylinder head.
12. Remove valves (5).

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6195	Valve Spring Compressor	1
	268-1969	Adapter	1
	276-1221	Head	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Clean all components of the cylinder head assembly. Ensure that all ports, all coolant passages and all lubrication passages in the cylinder head are free from debris. Follow Steps 1.a through 1.e in order to inspect the components of the cylinder head assembly. Replace any components that are worn or damaged.
 - a. Inspect the cylinder head for wear and for damage. Refer to Systems Operation, Testing and Adjusting, "Cylinder Head Inspect".
 - b. Inspect the valve seats for wear and for damage. Refer to Specifications, "Cylinder Head Valves" for further information.
 - c. Inspect the valve guides for wear and for damage. Refer to Specifications, "Cylinder Head Valves" and Systems Operation, Testing and Adjusting, "Valve Guide - Inspect" for further information.
 - d. Inspect the valves for wear and for damage. Refer to Specifications, "Cylinder Head Valves".
 - e. Inspect the valve springs for the correct length. Refer to Specifications, "Cylinder Head Valves".
-

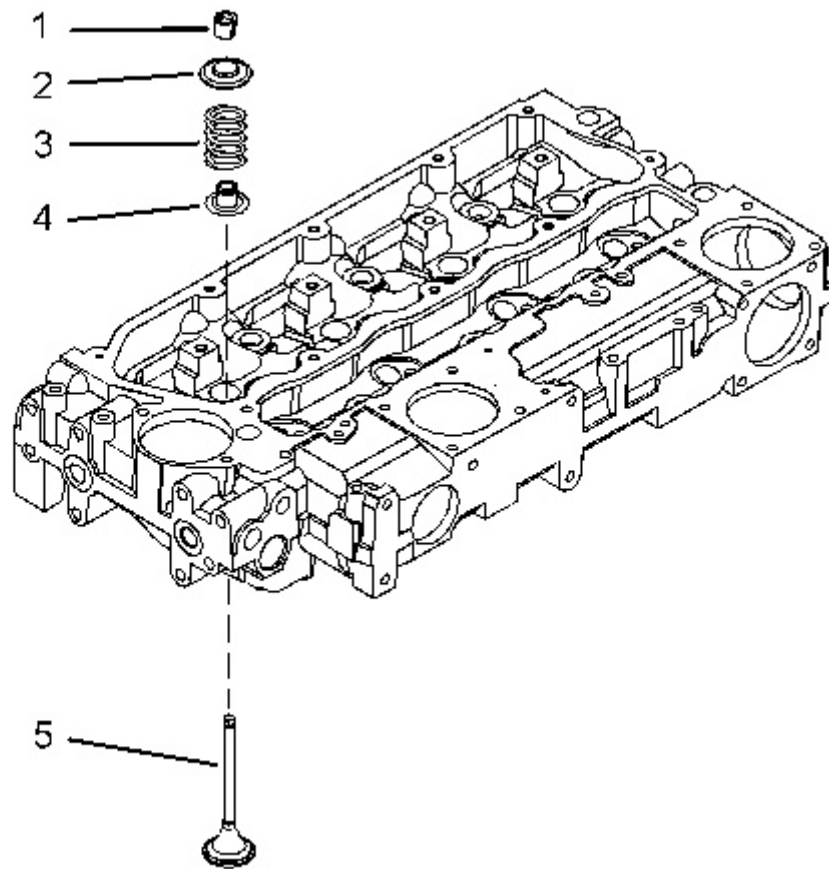


Illustration 3

g01352229

2. Lubricate the stems of valves (5) with clean engine oil. Install valves (5) in the appropriate positions in the cylinder head. Check the depth of the valves below the face of the cylinder head. Refer to Systems Operation, Testing and Adjusting, "Valve Depth - Inspect" for more information.
3. Use a suitable lifting device to carefully turn over the cylinder head. The weight of the cylinder head is approximately 56 kg (125 lb).

Note: Ensure that all of the valves remain in place.

4. Install new valve stem seals (4) onto each of the valve guides.

Note: The outer face of the valve guides must be clean and dry before installing the valve stem seals.

5. Install valve spring (3) onto the cylinder head. Position valve spring retainer (2) onto valve spring (3).

 **WARNING**

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

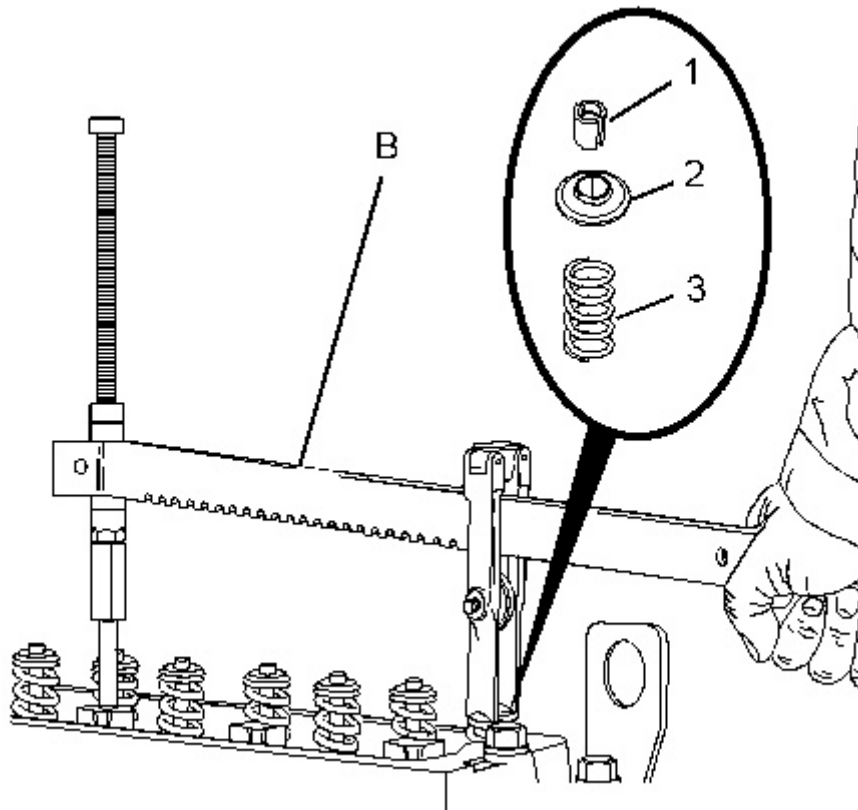


Illustration 4

g01343550

Typical example

6. Install Tooling (A) in the appropriate position on the cylinder head in order to compress valve spring (3).

NOTICE

Ensure that the valve spring is compressed squarely or damage to the valve stem may occur.

7. Apply sufficient pressure to Tooling (A) in order to install valve keepers (1).

Note: Do not compress the spring so that valve spring retainer (2) touches valve stem seal (4).

 **WARNING**

The valve spring keepers can be thrown from the valve when the valve spring compressor is released. Ensure that the valve spring keepers are properly installed on the valve stem. To help prevent personal injury, keep away from the front of the valve spring keepers and valve springs during the installation of the valves.

8. Carefully release the pressure on Tooling (A).
9. Repeat Steps 5 to 8 for the remaining valves.
10. Remove Tooling (A) from the cylinder head.
11. Use a suitable lifting device to position the cylinder head on a support. Ensure that the heads of the valves are not obstructed. Lightly strike the top of the valves with a soft hammer in order to ensure that valve keepers (1) are properly installed.

End By:

- a. Install the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Install".
-

Product: INDUSTRIAL ENGINE
Model: C4.4 INDUSTRIAL ENGINE 440
Configuration: C4.4 Industrial Engine 44000001-UP

Disassembly and Assembly C4.4 (MECH) Industrial Engine and Generator Sets

Media Number -KENR6249-05

Publication Date -01/03/2014

Date Updated -02/05/2017

i04717030

Inlet and Exhaust Valve Guides - Remove and Install

SMCS - 1104-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	157-3722	Valve Guide Driver	1

Start By:

- A. Remove the inlet valves and the exhaust valves. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install".

NOTICE

Removal and installation of the valve guide and valve seat must be carried out by personnel with the correct training. Also special machinery is required. For more information, refer to your authorized Caterpillar dealer.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

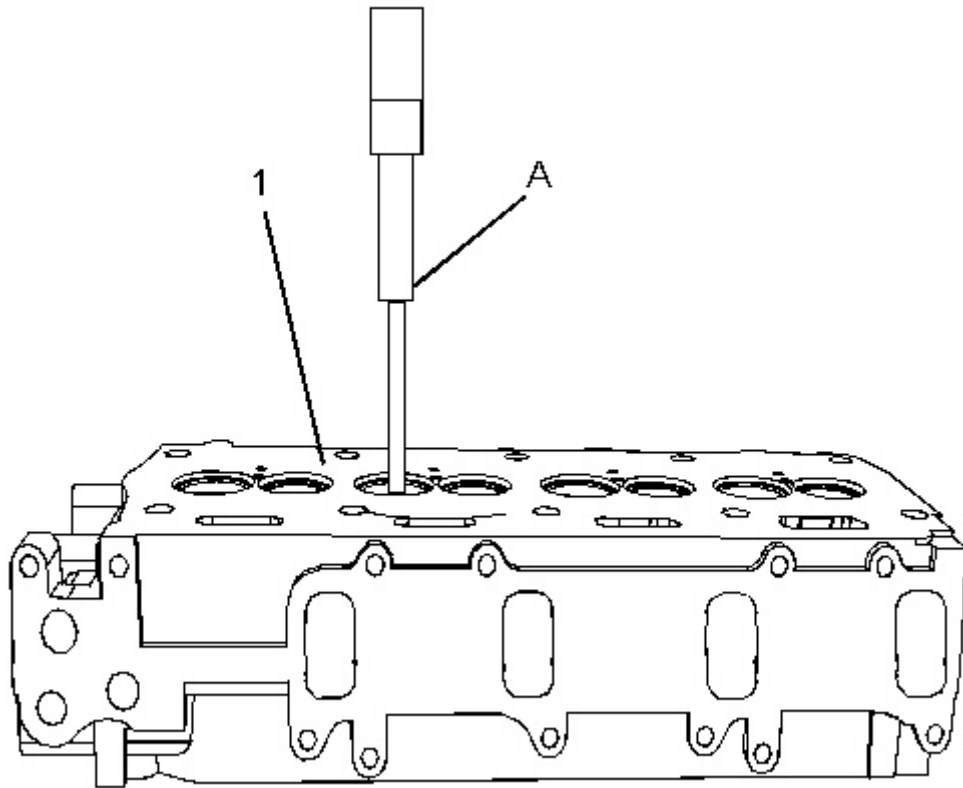


Illustration 1

g01383763

1. Use Tooling (A) in order to remove valve guides (2) from cylinder head (1) .
2. Repeat the Step 1 for the remaining valve guides.

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	157-3722	Valve Guide Driver	1
	393-0369	Stop Collar	1
B	157-3720	Valve Seat Cutter	1

NOTICE

Removal and installation of the valve guide and valve seat must be carried out by personnel with the correct training. Also special machinery is required. For more information, refer to your authorized Caterpillar dealer.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Clean the parent bores in the cylinder head for the valve guides.

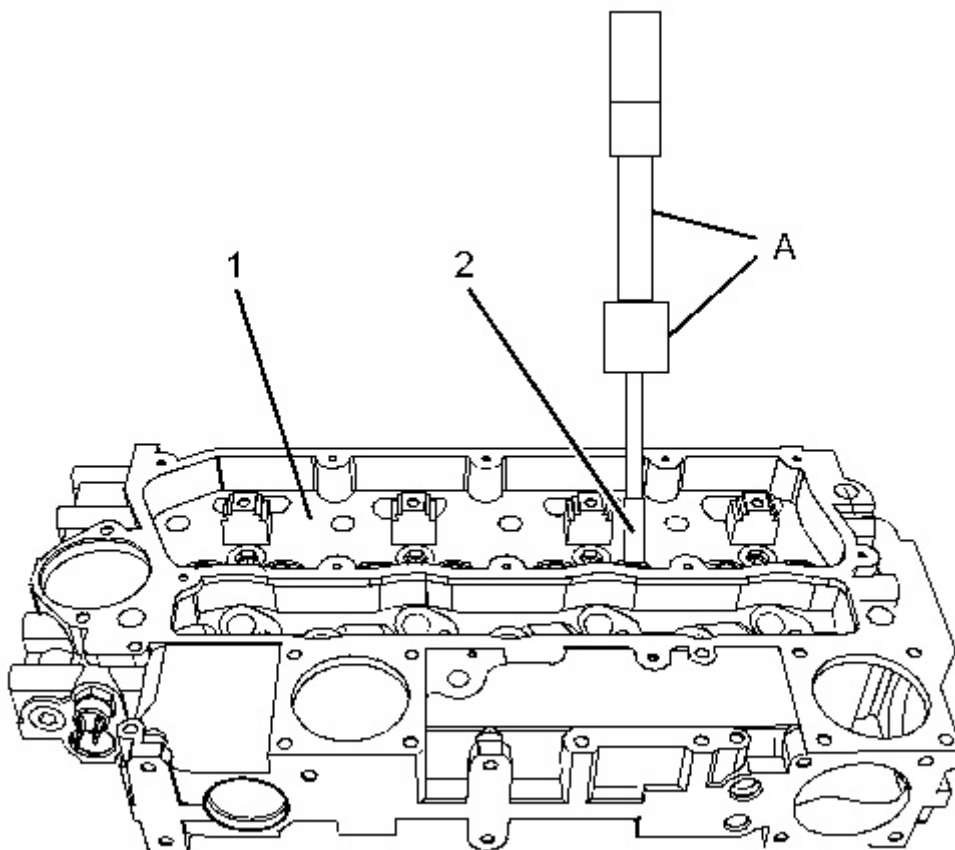


Illustration 2

g01383767

2. Lubricate a new valve guide (2) and place the valve guide in position. Carefully tap the valve guide in order to start the installation. Use Tooling (A) to install the valve guide into the cylinder head.

3. Repeat Step 2 for the remaining valve guides.

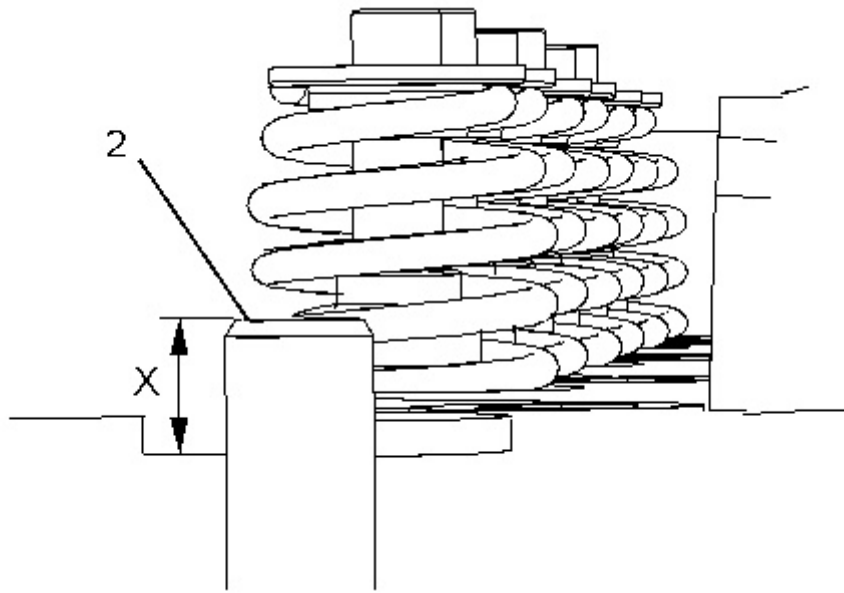


Illustration 3

g01383769

4. Check protrusion (X) of valve guides (2). The valve guides should protrude $12.5 \pm .15$ mm (0.4921 ± 0.0060 inch) above the valve spring recess. Refer to Specifications, "Cylinder Head Valves" for more information.
5. After installation of valve guides (2), the valve guides must be reamed and the valve seat inserts must be cut to the finished diameter. Follow Steps 5.a through 5.d in order to ream the valve guides and cut the valve seat inserts.
 - a. Lubricate the bores of valve guides (2) with clean engine oil.
 - b. Use Tooling (B) in order to ream the valve guides. Ensure that even pressure is applied to Tooling (B) .
 - c. Use Tooling (B) in order to cut the valve seats. Ensure that even pressure is applied to Tooling (B) .
 - d. Ensure that the cylinder head is clean and free from machining debris.
6. Check the finished diameter of valve guides (2). Refer to Specifications, "Cylinder Head - Valves" for more information.
7. Check the depths of the valves below the face of the cylinder head. Refer to System Operation, Testing and Adjusting, "Valve Depth - Inspect" for more information.

End By: Install the inlet valves and the exhaust valves. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install".

Thank you so much for reading.
Please click the “Buy Now!”
button below to download the
complete manual.



After you pay.

You can download the most
perfect and complete manual in
the world immediately.

Our support email:

ebooklibonline@outlook.com