



# Service Repair Manual

## **Model**

432D BACKHOE LOADER

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i01598347

# Exhaust Manifold - Remove and Install - Type 2 Engines and 7BJ Engines

SMCS - 1059-010

## Removal Procedure

### Start By:

- A. Remove the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove".
- B. Remove the air inlet manifold. Refer to Disassembly and Assembly, "Air Inlet Manifold - Remove and Install".

**Note:** For a complete description of Type 1 and Type 2 Engines, refer to the Disassembly and Assembly, "Engine Design" topic.

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### NOTICE

**Keep all parts clean from contaminants.**

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

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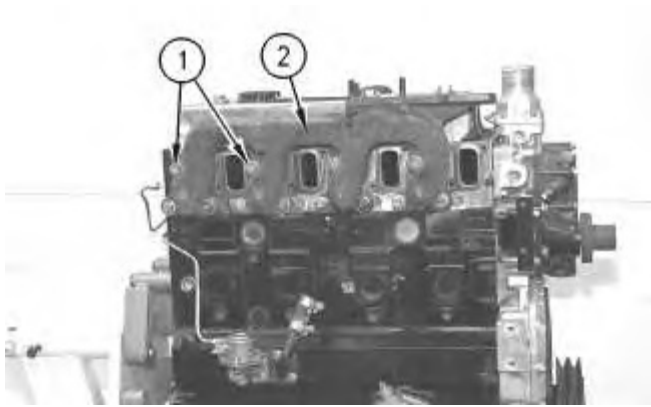


Illustration 1

g00557287

Typical example

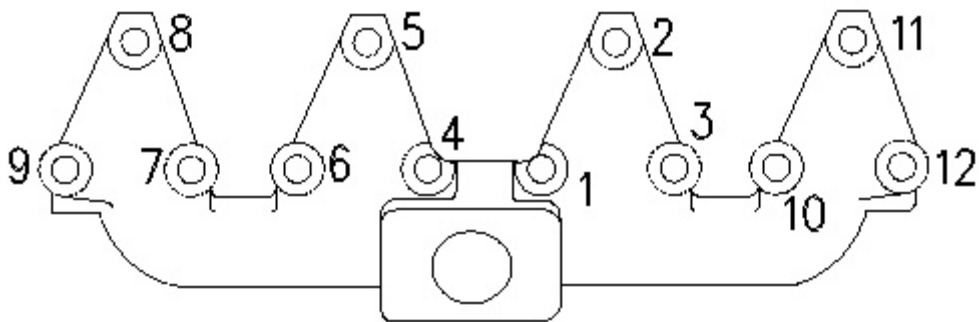


Illustration 2

g00557337

1. Remove exhaust manifold nuts or bolts (1) in reverse order of the numbered sequence.
2. Remove exhaust manifold (2) from the engine.

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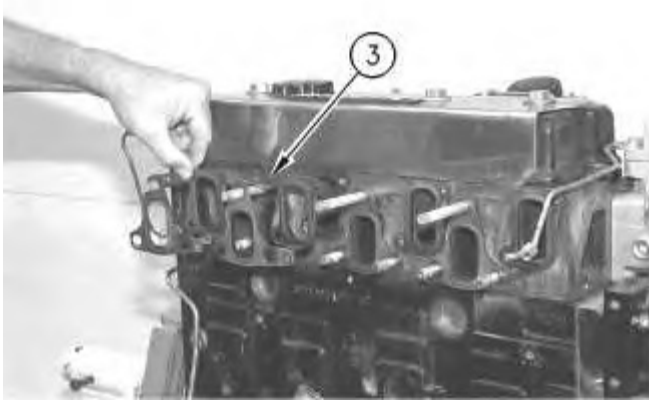


Illustration 3

g00557351

Typical example

3. Remove exhaust manifold gaskets (3) from the engine.
4. Remove old sealant from stud threads.

## 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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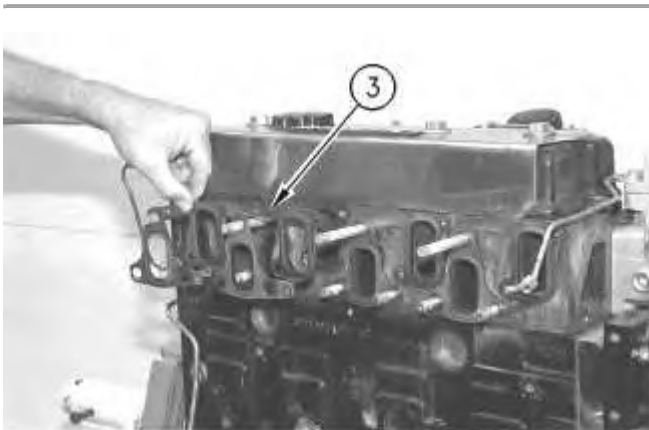


Illustration 4

g00557351

Typical example

1. Inspect the condition of the gaskets. If the gaskets are damaged, use new parts for replacement. Install exhaust manifold gaskets (3) on the cylinder head. Apply **4C-9507 Retaining Compound** to the stud threads.

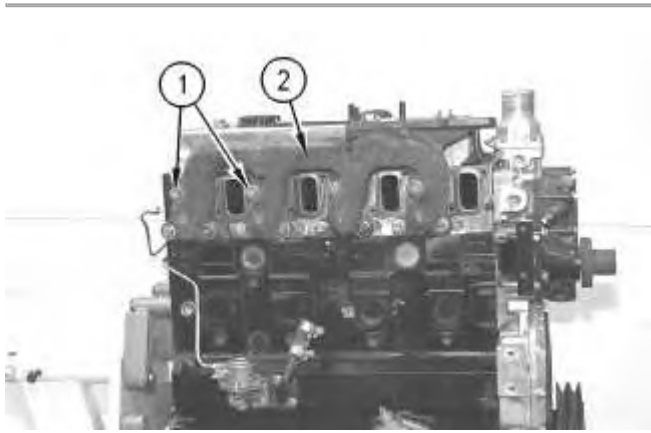


Illustration 5

g00557287

Typical example

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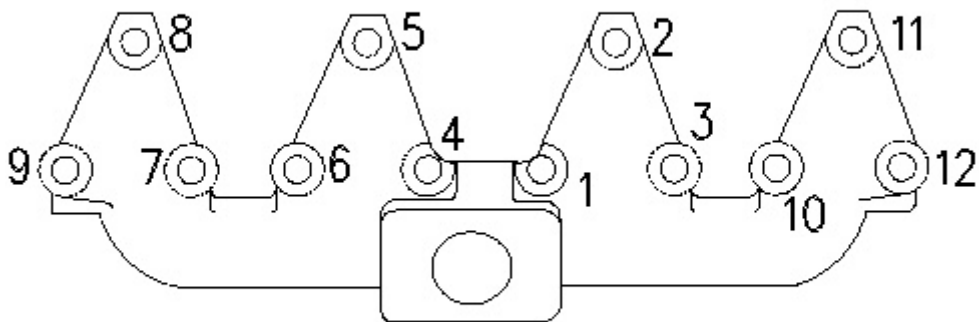


Illustration 6

g00557337

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### NOTICE

**Damage to the exhaust manifold can occur if the exhaust manifold is not aligned and tightened correctly.**

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2. Install exhaust manifold (2) on the cylinder head.

**Note:** Some of the exhaust manifolds have large clearance holes for the bolts. If a new exhaust manifold is installed ensure that the **148-7132** Ferrule mountings that are supplied with the exhaust manifold are installed.

3. Install exhaust manifold nuts or bolts (1). Tighten the exhaust manifold nuts or bolts in the numerical sequence to a torque of 44 N·m (33 lb ft).

**End By:**

- a. Install the air inlet manifold. Refer to Disassembly and Assembly, "Air Inlet Manifold - Remove and Install".
- b. Install the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Install".

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i01068659

# Exhaust Manifold - Remove and Install - Type 1 Engines and 9RM Engines

SMCS - 1059-010

## Removal Procedure

### Start By:

- A. Remove the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove".

**Note:** For a complete description of Type 1 and Type 2 Engines, refer to the Disassembly and Assembly, "Engine Design" topic.

---

### NOTICE

**Keep all parts clean from contaminants.**

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

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Illustration 1

g00542541

Typical example

1. Remove exhaust manifold nuts (1) .
2. Remove exhaust manifold (2) and the gasket.

## Installation Procedure

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### NOTICE

**Keep all parts clean from contaminants.**

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

---



Illustration 2

g00542541

Typical example

1. Inspect the condition of the gasket. Replace the gasket, if necessary.
2. Install the gasket and exhaust manifold (2) .
3. Install exhaust manifold nuts (1). Tighten the plated nuts to a torque of 44 N·m (32 lb ft). Tighten the nuts that are not plated to a torque of 50 N·m (37 lb ft).

**End By:** Install the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Install".

---

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i02870246

# Inlet Manifold - Remove - Type 2 Engines and 7BJ Engines

SMCS - 1058-011

## Removal Procedure

**Note:** For a complete description of Type 1 and Type 2 engines, refer to Disassembly and Assembly, "Engine Design".

---

### 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 Dealer Service Tool Catalog" 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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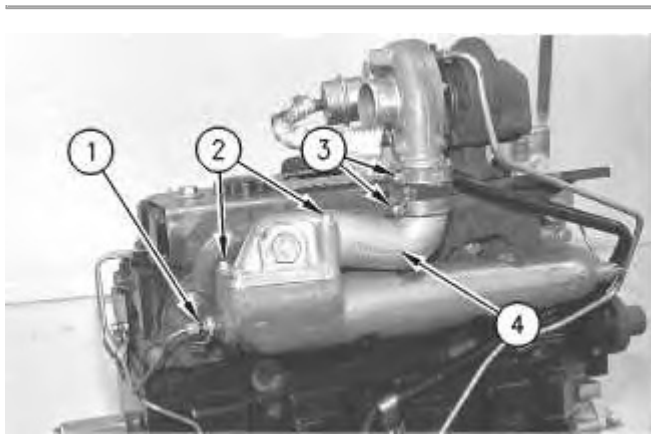


Illustration 1

g00557838

Typical example

1. Disconnect tube (1) from the air inlet heater.
2. Loosen hose clamps (3) and slide the hose toward the turbocharger.
3. Remove four bolts (2) and remove elbow (4) from the air inlet manifold.

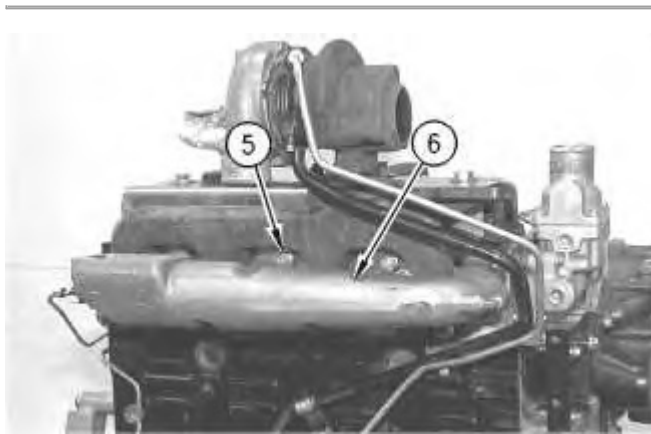


Illustration 2

g00558245

Typical example

4. Remove bolts (5) that fasten air inlet manifold (6) to the engine.
5. Remove air inlet manifold (6) .

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i02870245

# Inlet Manifold - Remove - Type 1 Engines and 9RM Engines

SMCS - 1058-011

## Removal Procedure

**Note:** For a complete description of Type 1 and Type 2 engines, refer to Disassembly and Assembly, "Engine Design".

---

### NOTICE

**Keep all parts clean from contaminants.**

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

---

---

### 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 Dealer Service Tool Catalog" 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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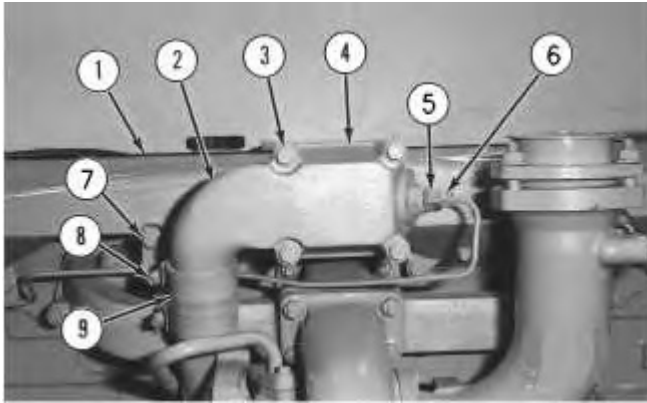


Illustration 1

g00545513

Typical example

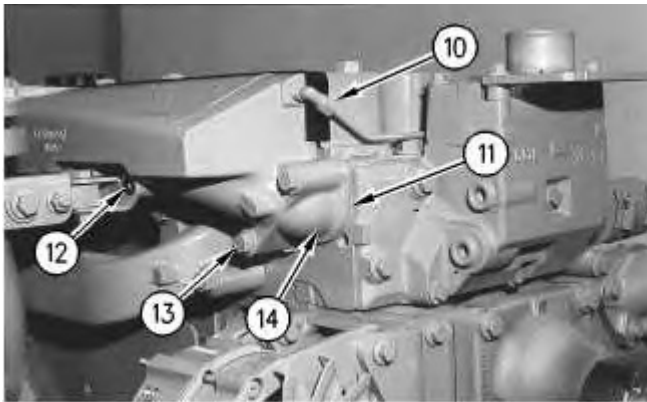


Illustration 2

g00545514

Typical example

1. Disconnect electrical connector (5) for the air inlet heater.
2. Disconnect fuel line (6) to the air inlet heater.
3. Remove two bolts (7) that hold the bracket for fuel line (6) in position.
4. Loosen two hose clamps (8) and slide hose (9) toward the turbocharger.
5. Remove four bolts (3) in order to remove elbow (2) and gasket (4) .
6. Disconnect boost pressure hose (10) .
7. Remove bolts (12) that hold the turbocharger support to air inlet manifold (14) .
8. Remove bolts (13) that hold air inlet manifold (14) to the cylinder head.

9. Remove air inlet manifold (14) and gaskets (11) .

10. Remove seal (1) .

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i02870254

# Inlet Manifold - Install - Type 1 Engines and 9RM Engines

SMCS - 1058-012

## Installation Procedure

**Note:** For a complete description of Type 1 and Type 2 engines, refer to Disassembly and Assembly, "Engine Design".

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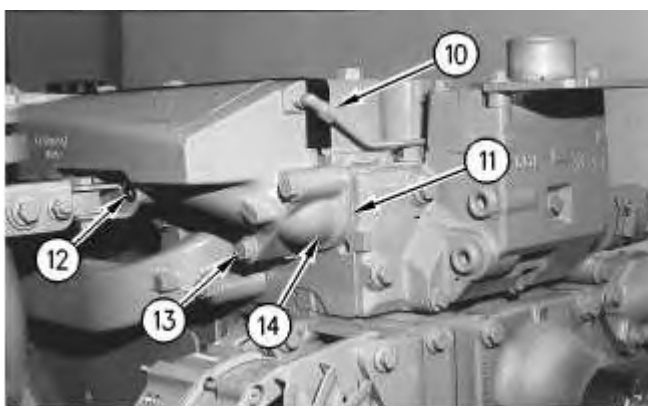
### NOTICE

**Keep all parts clean from contaminants.**

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

---

1. Inspect the gaskets for wear or damage. If the gaskets are worn or damaged, use new parts for replacement.



Typical example

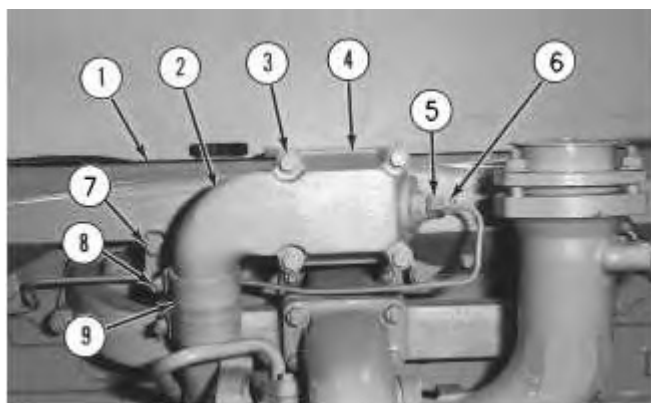


Illustration 2

Typical example

2. Install seal (1) on the engine.
3. Position gaskets (11) and air inlet manifold (14) on the engine.

**Note:** Ensure that the front gaskets and the rear gaskets are installed with the notch at the top left side. The center gasket can be installed in either direction.

4. Install bolts (13) .
5. Position the turbocharger support on air inlet manifold (14) and install bolts (12) .
6. Connect boost pressure hose (10) .
7. Install gasket (4) and elbow (2) with four bolts (3) .
8. Slide hose (9) in position and tighten hose clamps (8) .
9. Place the bracket for fuel line (6) in position and install two bolts (7) .
10. Connect fuel line (6) to the air inlet heater.
11. Connect electrical connector (5) for the air inlet heater.

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

## Disassembly and Assembly 3054 Engine for Caterpillar Built Machines

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i02870255

# Inlet Manifold - Install - Type 2 Engines and 7BJ Engines

SMCS - 1058-012

## Installation Procedure

**Note:** For a complete description of Type 1 and Type 2 engines, refer to Disassembly and Assembly, "Engine Design".

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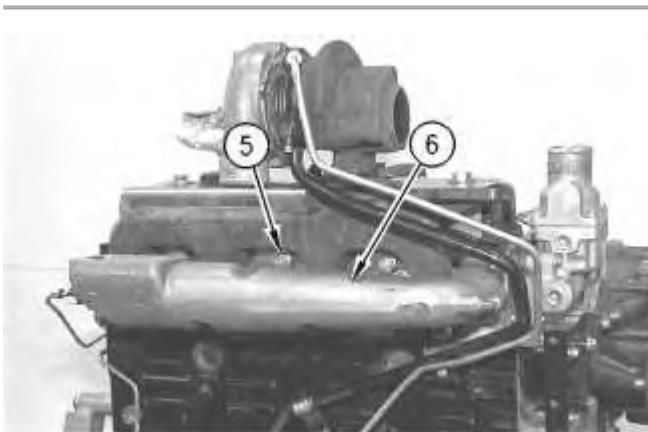
### NOTICE

**Keep all parts clean from contaminants.**

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

---

1. Inspect the gaskets for wear or damage. If the gaskets are worn or damaged, use new parts for replacement.



Typical example

2. Install the gasket and air inlet manifold (6) with bolts (5) . Tighten bolts (5) to a torque of 33 N·m (24 lb ft).

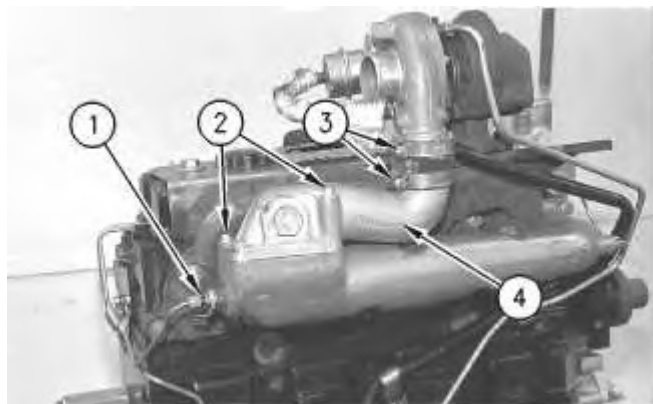


Illustration 2

Typical example

3. Put the gasket and elbow (4) in position on the air inlet manifold.
4. Install four bolts (2) .
5. Slide the hose into position and tighten hose clamps (3) .
6. Connect tube (1) to the air inlet heater.

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

**Disassembly and Assembly  
3054 Engine for Caterpillar Built Machines**

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i01458210

## Inlet and Exhaust Valve Springs - Remove and Install

SMCS - 1108-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6195	Valve Spring Compressor	1

**Start By:**

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

---

**NOTICE**

**Keep all parts clean from contaminants.**

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

---

**Note:** Before you begin the removal of the valve springs, refer to the Specifications Module, "Cylinder Head Valves" topic for appropriate information on the valve springs.

1. Ensure that the piston is at the top center position.

**Note:** If the rocker arm assembly has not been removed, rotate the crankshaft in the normal direction of rotation until the inlet valve of the appropriate cylinder has just opened and the

exhaust valve has not fully closed. If the rocker arm assembly has been removed, go to Step 2.

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## NOTICE

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

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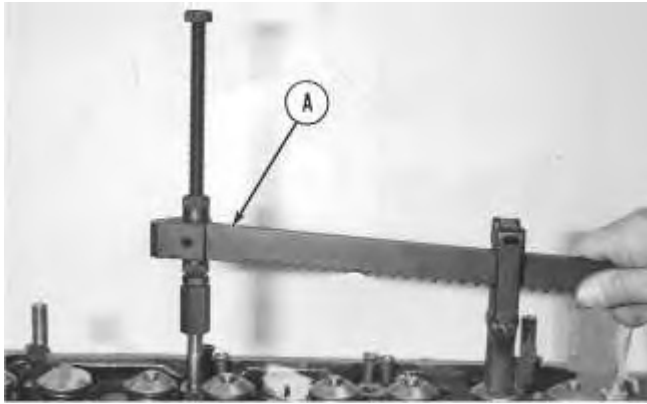


Illustration 1

g00762206

- a. Install Tool (A) .
- b. Compress the valve springs in order to open the valve.
- c. Turn the crankshaft until the piston touches the valve.
- d. Continue to turn the crankshaft and release the pressure of Tool (A) until the piston is at the top center position.

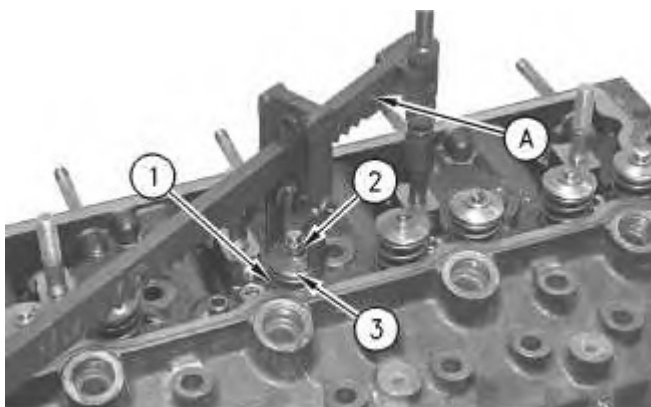


Illustration 2

g00762210

2. Install Tool (A) .

3. Compress valve springs (1). Remove two valve keepers (2) .

---

**NOTICE**

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

---

4. Release the pressure on Tool (A). Remove valve spring retainer (3) and valve springs (1) .

**Note:** If you are replacing all of the valve springs, the procedure can be done on two cylinders at the same time. The procedure can be done on cylinder 1 and cylinder 4, or on cylinder 2 and cylinder 3.

---

**NOTICE**

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

---

## Installation Procedure

Table 2

<b>Required Tools</b>			
<b>Tool</b>	<b>Part Number</b>	<b>Part Description</b>	<b>Qty</b>
<b>A</b>	9U-6195	Valve Spring Compressor	1

---

**NOTICE**

**Keep all parts clean from contaminants.**

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

---

1. Place the new valve springs into position.

**Note:** Ensure that the closed damper coils are toward the cylinder head if double valve springs are used.

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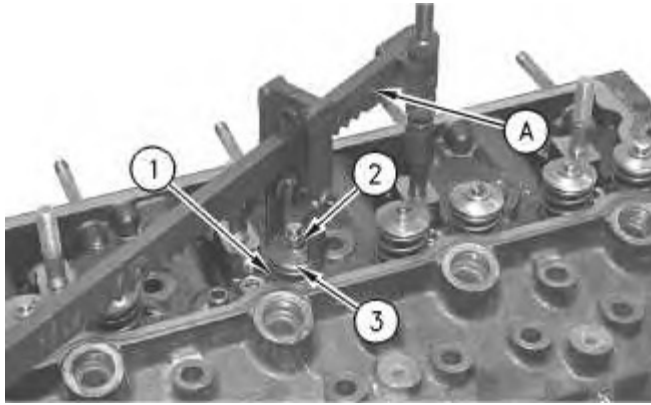


Illustration 3

g00762210

2. Install valve spring retainer (3) .
3. Install Tool (A). Compress valve springs (1) .

---

### NOTICE

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

---

4. Install two valve keepers (2) .
5. Release the pressure slowly on Tool (A). Remove Tool (A). Strike the top of the valves with a soft faced hammer in order to ensure that the valve keepers are properly installed.

**Note:** If you are replacing all of the valve springs the procedure can be done on two cylinders at the same time. The procedure can be done on cylinder 1 and cylinder 4, or on cylinder 2 and cylinder 3.

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

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

**Disassembly and Assembly**  
**3054 Engine for Caterpillar Built Machines**

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i01739737

## 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

**Start By:**

- a. Remove the cylinder head assembly. 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. Use a dial indicator to check the depth of the valves below the face of the cylinder head before the valve springs are removed. Refer to Specifications, RENR2401, "Cylinder Head Valves" for the correct dimensions.
  2. Place an index mark on the heads of the inlet valves and the exhaust valves for installation purposes.
-

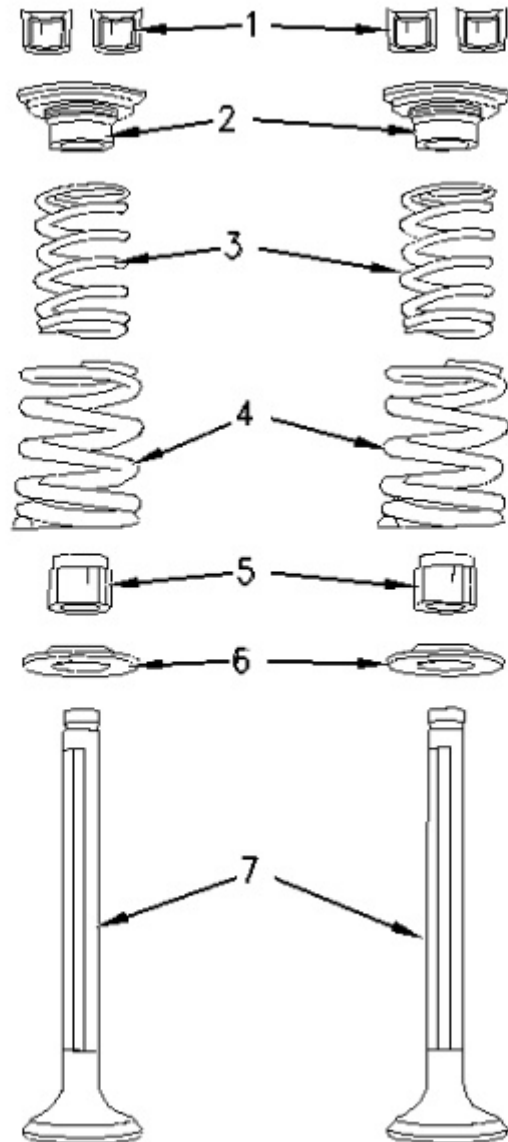


Illustration 1

g00545731

3. Use Tooling (A) to compress inner springs (3) and outer springs (4).

**Note:** Some engines may have only a single inlet valve spring and a single exhaust valve spring.

4. Remove valve keepers (1).

**WARNING**

The valve keepers can be thrown from the valve when the valve spring compressor is released. Ensure that the valve keepers are properly

**installed on the valve stem. To help prevent personal injury, keep away from the front of the valve keepers and valve springs during the installation of the valves.**

---

5. Slowly release the pressure on Tooling (A) and remove Tooling (A).
6. Remove valve spring retainers (2).
7. Remove inner springs (3) and outer springs (4).
8. Remove seals (5).
9. Remove valve spring seat washers (6).
10. Remove inlet valves (7) and exhaust valves (7).

## **Installation Procedure**

Table 2

<b>Required Tools</b>			
<b>Tool</b>	<b>Part Number</b>	<b>Part Description</b>	<b>Qty</b>
<b>A</b>	9U-6195	Valve Spring Compressor	1

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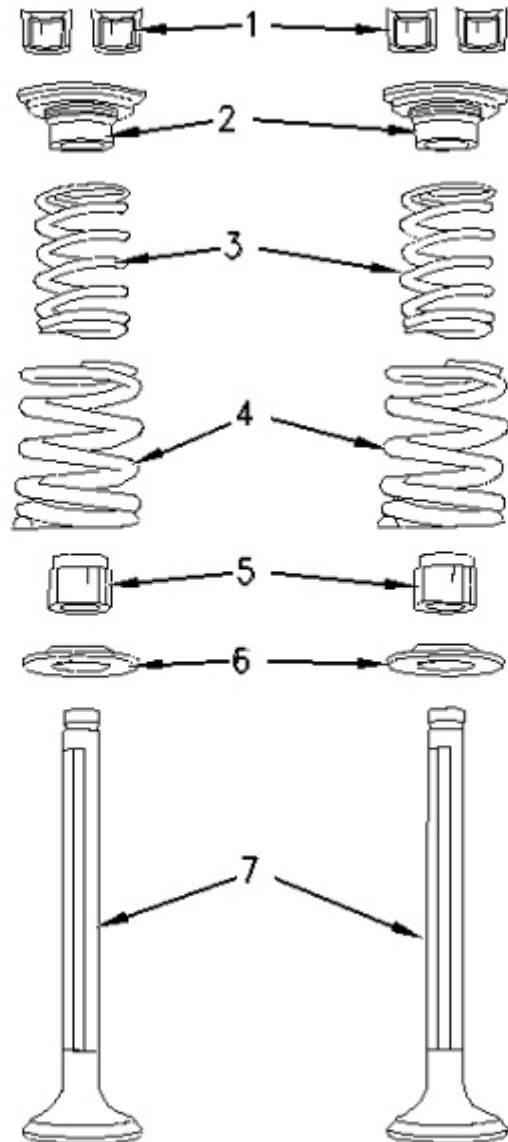
### **NOTICE**

**Keep all parts clean from contaminants.**

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

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---



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Illustration 2

g00545731

1. Lubricate the stems of inlet valves (7) and the stems of exhaust valves (7) with clean engine oil.
2. Install inlet valves (7) and exhaust valves (7) in the respective positions.
3. Install valve spring seat washers (6).
4. Install new seals (5).
5. Install inner springs (3) and outer springs (4).

**Note:** Install inner springs (3) and outer springs (4) on the valve spring seat washers with the damper coils toward the cylinder head. This is done with double valve springs. If single valve springs are used, the springs can be installed in either way.

6. Install valve spring retainers (2).



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

---

7. Use Tooling (A) to compress inner springs (3) and outer springs (4).

**Note:** Some engines may have only a single inlet valve spring and a single exhaust valve spring.

8. Install valve keepers (1).

9. Slowly release the pressure on Tooling (A) and remove Tooling (A). Strike the top of the valves with a soft hammer in order to ensure that the valve keepers are properly installed.

**Note:** Refer to Specifications, RENR2401, "Cylinder Head Valves" for more information on inlet valves and exhaust valves.

10. Use a dial indicator to check the depth of the new valves below the cylinder head. If the depth of the new valves is below the correct depth, the valve seat inserts must be replaced. Refer to Disassembly and Assembly, "Inlet and Exhaust Valve Seat Inserts - Remove and Install".

**End By:**

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

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Product: BACKHOE LOADER

Model: 432D BACKHOE LOADER BLD

Configuration: 432D Backhoe Loader BLD00001-01594 (MACHINE) POWERED BY 3054 Engine

**Disassembly and Assembly  
3054 Engine for Caterpillar Built Machines**

Media Number -SEN6241-13

Publication Date -01/08/2008

Date Updated -04/08/2008

i01739745

## Inlet and Exhaust Valve Guides - Remove and Install

SMCS - 1104-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1U-9169	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**

**Keep all parts clean from contaminants.**

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

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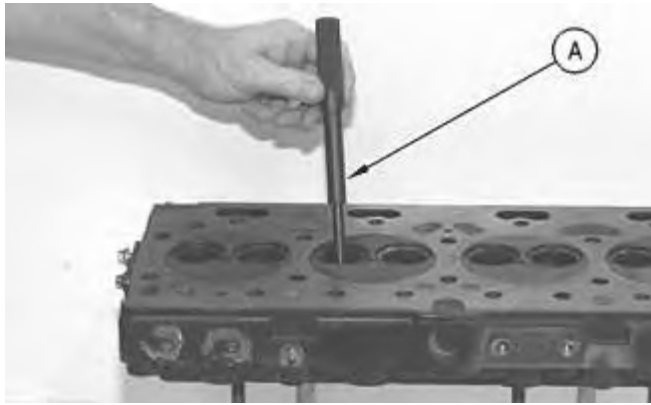


Illustration 1  
Typical example

g00632175

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

## Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	1U-9169	Valve Guide Driver	1
B	9U-6220	Stop Collar	1
C	157-3720	Valve Seat Cutter	1

---

### NOTICE

**Keep all parts clean from contaminants.**

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

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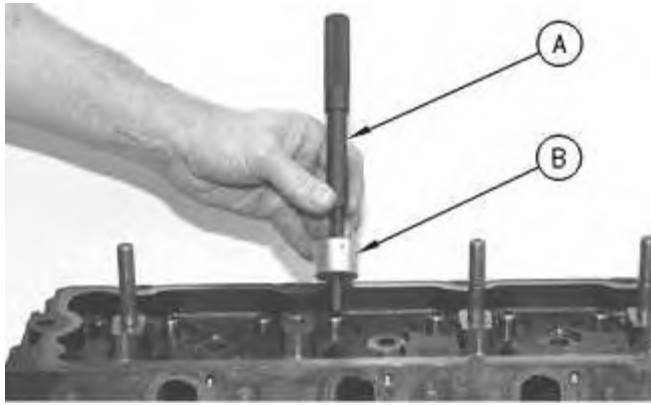


Illustration 2

g00632176

Typical example

1. Put the valve guide in position. Carefully tap the valve guide in order to start the installation. Use Tooling (A) and Tooling (B) to seat the valve guide in the cylinder head.

**Note:** After installing the unfinished valve guides and valve seat inserts, you must ream the valve guides and valve seat inserts to the finished diameter. The valve guides and valve seat inserts are cut and reamed in one operation. This operation is performed by using the **157-3720** Valve Seat Cutter. Refer to Specifications, RENR2401, "Cylinder Head Valves" for the finished diameter of the valve guides and valve seat inserts.

2. Check the protrusion of the valve guides. The valve guides should protrude 14.85 to 15.15 mm (0.585 to 0.597 inch) above the valve spring recess.
3. Repeat the procedure for the remaining valve guides.

### End By:

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

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