CATERPILLAR®

Service Repair Manual

Models

3054E INDUSTRIAL ENGINE

Product: INDUSTRIAL ENGINE
Model: 3054E INDUSTRIAL ENGINE 304
Configuration: 3054E Industrial Engine 30400001-UP

Disassembly and Assembly
3054E Industrial Engine
Media Number -RENR7569-02 **Publication Date -01/09/2005** **Date Updated -28/04/2017**

i02291817

Exhaust Manifold - Remove and Install

SMCS - 1059-010

Removal Procedure

Start By:

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

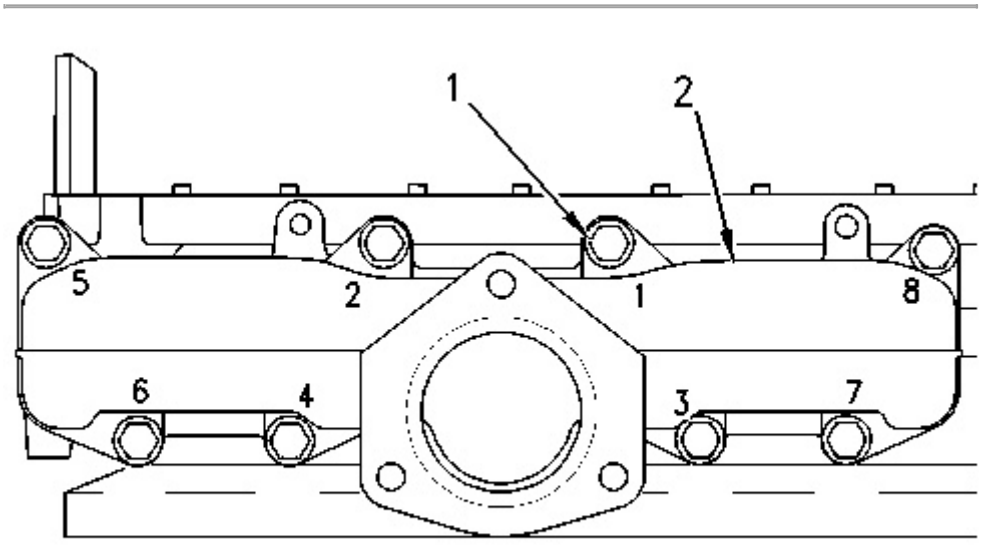

Illustration 1 g00951398

1. Remove the setscrews (1) in reverse numerical order. Refer to Illustration 1 . This will help prevent distortion of the exhaust manifold.

2. Remove the exhaust manifold from the cylinder head and the exhaust manifold gasket. Discard the exhaust manifold gasket.

Installation Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	-	Guide Bolt (M10 X 1.5 by 100 mm)	2

Note: Improper installation of the exhaust manifold can result in a cracked exhaust manifold. The setscrews that secure the exhaust manifold must be tightened in the correct sequence and to the correct torque.

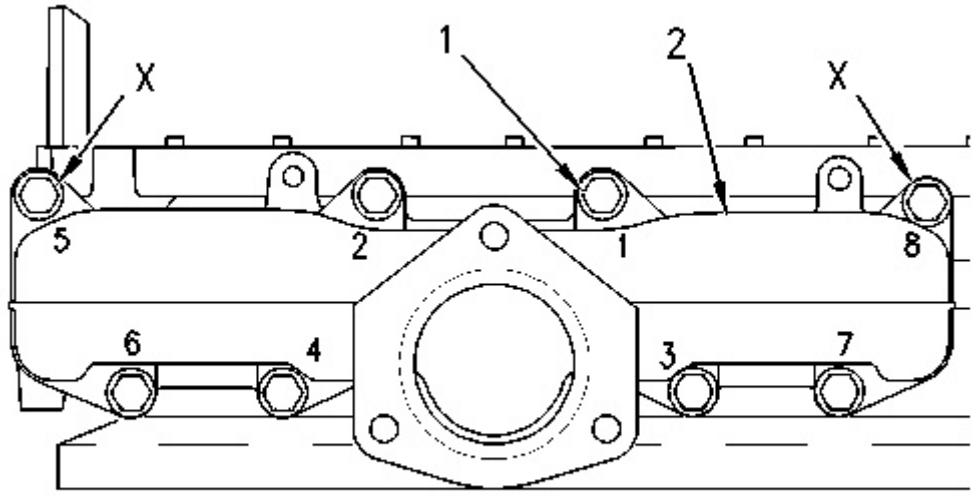

Illustration 2 g00951297

1. Install Tooling (A) in the cylinder head in Hole (X).

   Note: Do not use any sealant on the exhaust manifold gaskets.

2. Position a new exhaust manifold gasket on the Tooling (A) in the cylinder head. Position the exhaust manifold on the Tooling (A). Install the setscrews (1) finger tight in order to secure the exhaust manifold to the cylinder head.

3. Remove the Tooling (A). Install the remaining setscrews (1) and tighten the setscrews evenly to a torque of 33 N·m (24 lb ft). Tighten the setscrews in the sequence that is shown in Illustration 2.

End By:

a. Install the turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Install".

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i02291819

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
B	9U-6198	Crankshaft Turning Tool	1

Start By:

a. Remove the rocker shaft assembly. 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: The following procedure should be adopted in order to remove the valve springs when the cylinder head is still installed onto the cylinder block. Refer to Disassembly and Assembly Manual, "Inlet and Exhaust Valves - Remove and Install" for the correct procedure that should be used to remove the valve springs from a cylinder head that has been removed from the cylinder block.

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

1. Ensure that the piston is at the top center position before the valve keepers are removed from the valve. Failure to ensure that the piston is at top dead center may allow the valve to drop into the cylinder block. Use the following procedure in order to find the top center position for the piston.

NOTICE

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

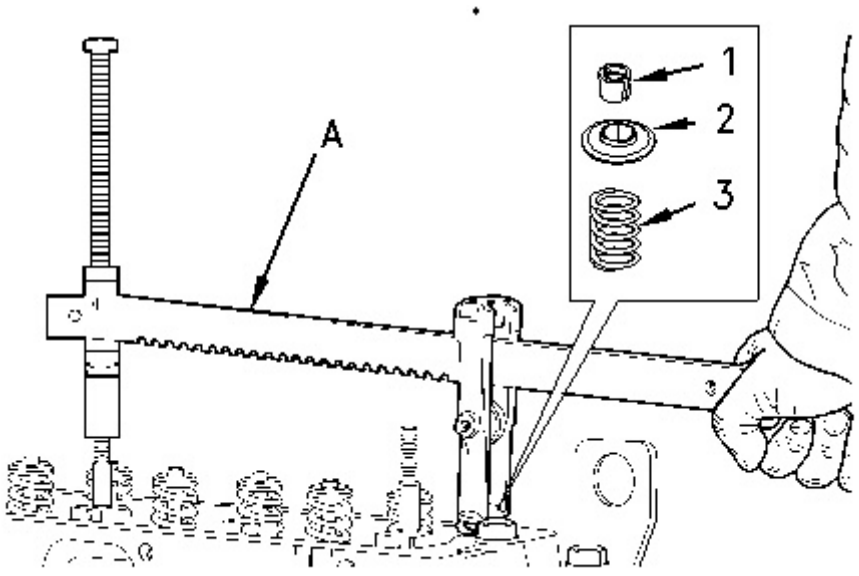

Illustration 1 g00937233

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.

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a. Install the Tooling (A).

NOTICE

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

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b. Compress the valve spring in order to open the valve. Do not compress the valve spring sufficiently so that the valve keepers (1) could be removed from the recess in the valve stem.

c. Turn the crankshaft until the piston touches the valve.

d. Continue to turn the crankshaft until the valve stem is at the highest point. The piston is now at the top center position. Release the pressure of the Tooling (A) when the piston is at the top center position.

2. Use Tooling (A) in order to compress valve spring (3). Remove valve keepers (1).

3. Carefully release the pressure on the Tooling (A). Remove the valve spring retainer (2) and the valve spring (3).

   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, and on cylinder 2 and cylinder 3.

NOTICE

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

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	9U-6195	Valve Spring Compressor	1
B	9U-6198	Crankshaft Turning Tool	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

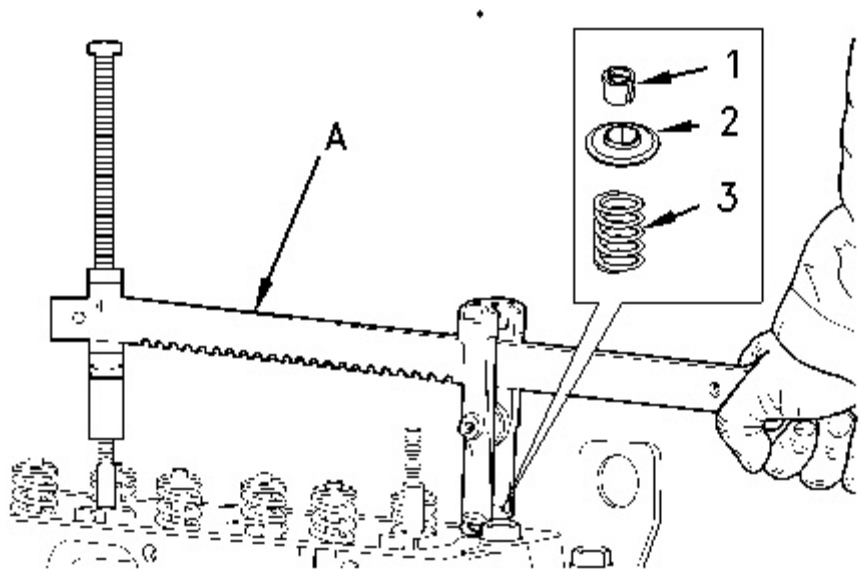

Illustration 2 g00937233

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.

1. Place the new valve spring into position.
2. Install the valve spring retainer (2).

NOTICE

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

3. Install the Tooling (A). Compress the valve spring (3).
4. Install valve keepers (1).

5. Carefully release the pressure on the Tooling (A). Remove the Tooling (A). Rotate the crankshaft by approximately 45 degrees in order to lower the piston. Strike the top of the valves with a soft 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, and on cylinder 2 and cylinder 3.

End By:

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

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Disassembly and Assembly
3054E Industrial Engine
Media Number -RENR7569-02 **Publication Date -01/09/2005** **Date Updated -28/04/2017**

i02291880

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".

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

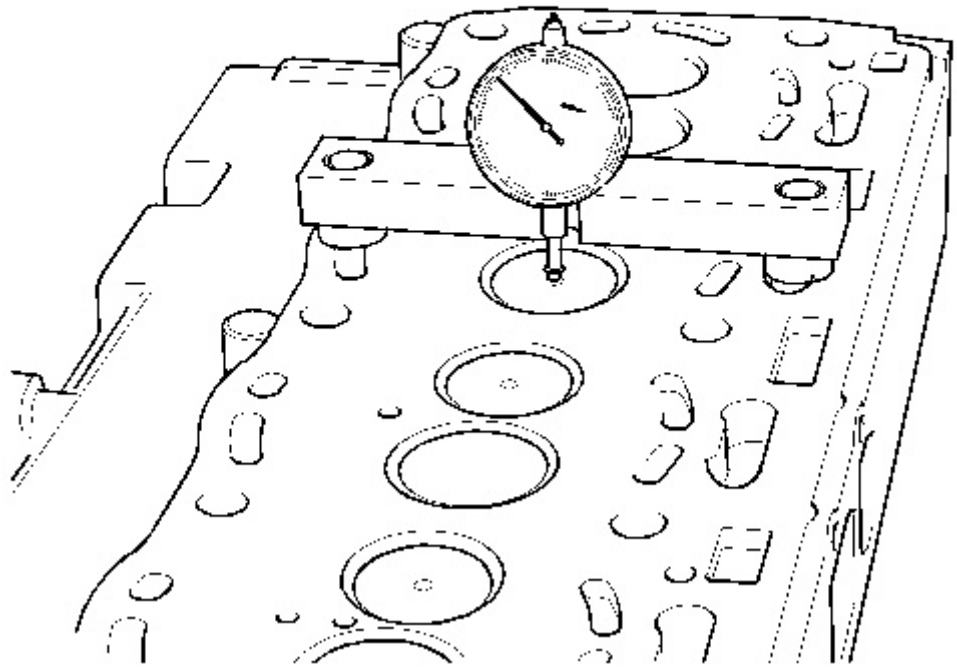

Illustration 1 g01015306

Typical example

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 the illustration 1 and refer toSpecifications, "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.

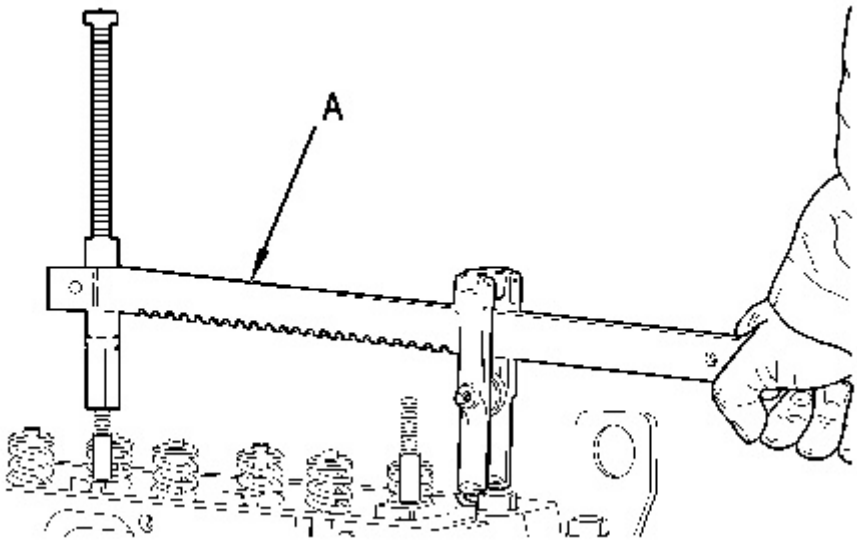

Illustration 2 g00936484

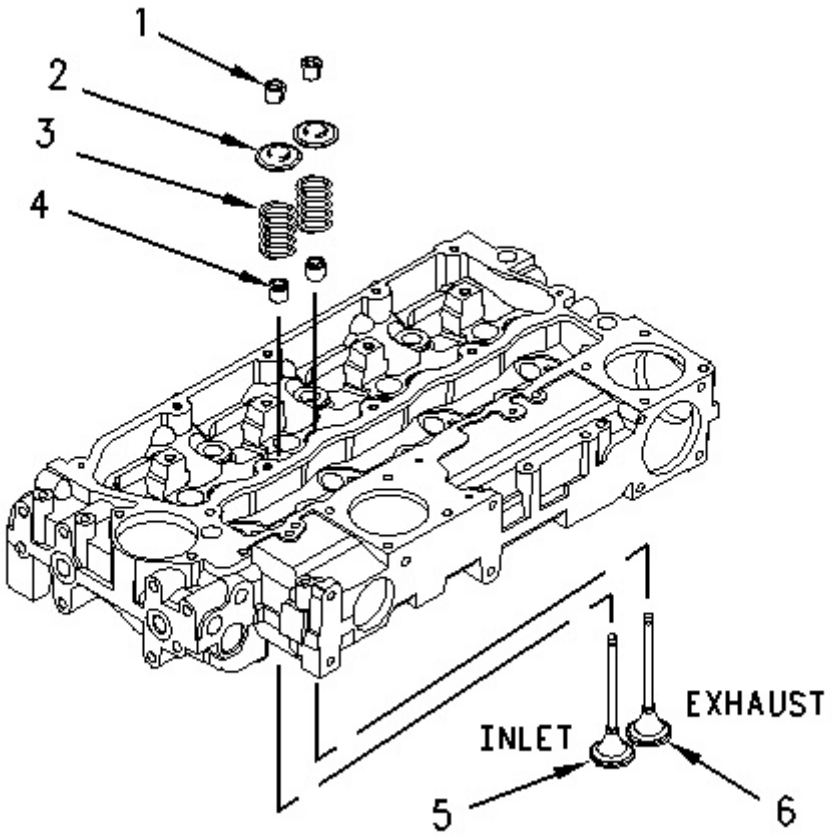

Illustration 3 g00953724

NOTICE

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

3. Use the Tooling (A) to compress spring (3).
4. Remove the valve keeper (1).

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.

5. Carefully release the pressure on the Tooling (A) and remove the Tooling (A).
6. Remove the valve spring retainer (2).
7. Remove the valve spring (3).
8. Remove the valve stem seal (4) for the inlet valve or the exhaust valve.
9. Remove the inlet valve (5) or the exhaust valve (6).
10. Repeat Step 3 to Step 9 for each inlet valve (7) and for each exhaust valve (8).

Installation Procedure

Table 2

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

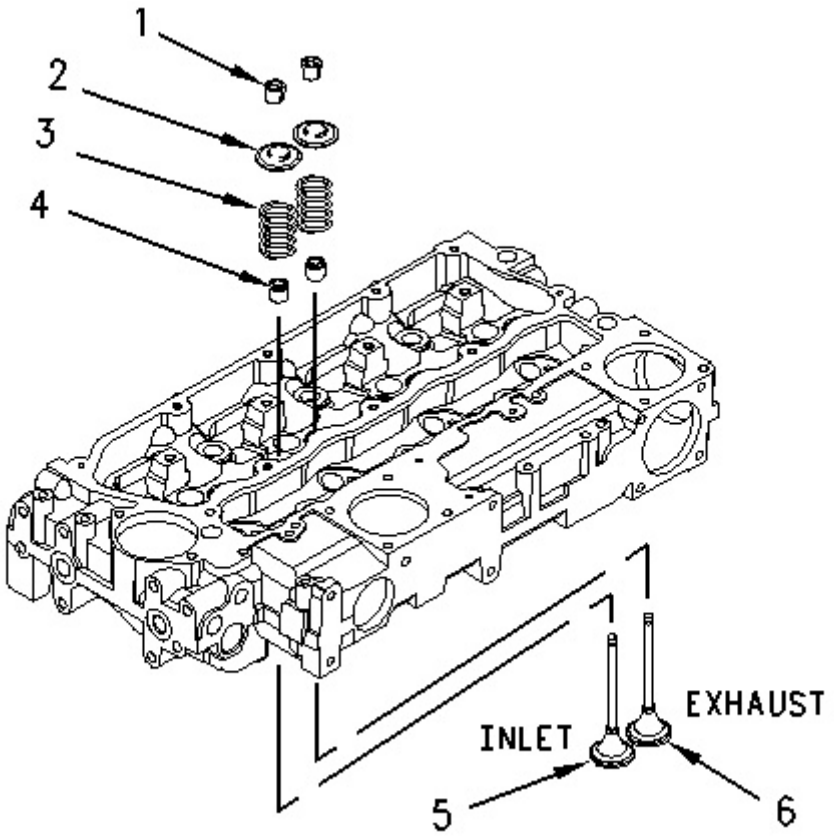

Illustration 4 g00953724

1. Carefully clean the bottom face of the cylinder head. Ensure that there is no debris in the inlet and exhaust ports. Also ensure that there is no debris in the coolant passages and in lubrication passages. Inspect the cylinder head. Refer to the Testing and Adjusting Manual, "Cylinder Head Inspect" for further information.

2. Inspect all of the valve seats for wear and for damage. Refer to the Specifications Manual, "Cylinder Head Valves" for further information. Also refer to this Disassembly and Assembly Manual, "Inlet and Exhaust Valve Seat Inserts - Remove and Install" and refer to Testing and Adjusting Manual, "Valve Depth - Inspect " for further information. Replace any worn parts.

3. Inspect all of the valve guides for wear and for damage. Refer to the Specifications Manual, "Cylinder Head Valves" for further information. Also refer to this Disassembly and Assembly Manual, "Inlet and Exhaust Valve Guides - Remove and Install" and refer to Testing and Adjusting Manual, "Valve Guide - Inspect" for further information. Replace any worn parts.

4. Inspect the valves if the valves are not replacement parts. Refer to the Specifications Manual, "Cylinder Head Valves" for further information.

5. Lubricate the stem of the inlet valve (5) and the stem of the exhaust valve (6) with clean engine oil.

6. Install inlet valve (5) and exhaust valve (6) in the respective positions.

7. Carefully turn over the cylinder head and ensure that all of the valves remain in place. Place the machined surface of the cylinder head onto a clean, soft surface.

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

8. Install a new valve stem seal (4) for the inlet valve or the exhaust valve on the valve guide.

9. Inspect the valve springs (3) for wear and for the correct installed length. Refer to the Specifications Manual, "Cylinder Head Valves " for further information on the correct installed length of the valve springs (5). Replace any worn parts.

10. Install the valve spring (3).

11. Install the valve spring retainer (2).

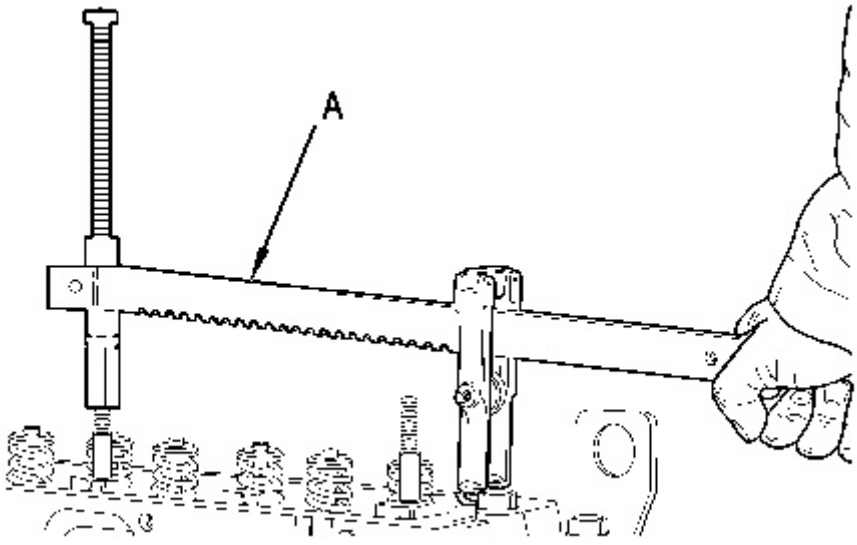

Illustration 5 g00936484

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.

NOTICE

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

12. Use the Tooling (A) to compress the valve spring (3).

13. Install the valve keeper (1).

14. Carefully 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.

15. Repeat Step 5 to Step 14 for all of the valves.

16. Use a dial indicator to check the depth of the new valves below the face of the cylinder head. Refer to Specifications, "Cylinder Head Valves" for more information on inlet valves and exhaust valves. 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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Disassembly and Assembly
3054E Industrial Engine

Media Number -RENR7569-02 **Publication Date -01/09/2005** **Date Updated -28/04/2017**

i02292376

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

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Illustration 1 g00632175

Typical example

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

   Note: When new valve guides are installed, new valves and new valve seat inserts must be installed.
3. Remove the valve seat inserts. Refer to Disassembly and Assembly, "Inlet and Exhaust Valve Seat Inserts - Remove and Install".

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	157-3722	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.

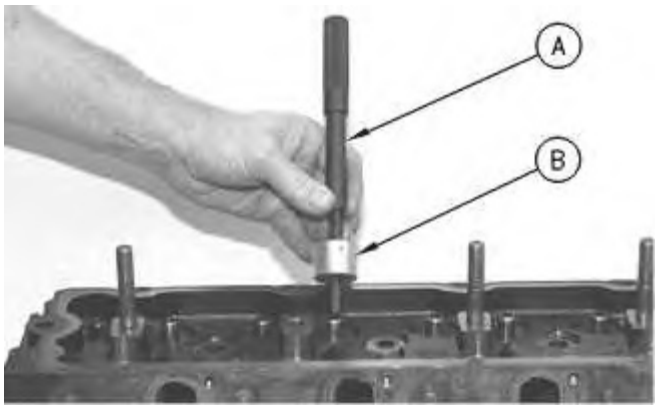

Illustration 2 g00632176

Typical example

1. Clean the parent bores in the cylinder head for all of the appropriate valve guides (4).
2. 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.
3. Check the protrusion of the valve guides. The valve guides should protrude 12.35 to 12.65 mm (0.4862 to 0.4980 inch) above the valve spring recess.
4. Repeat the procedure to install the remaining valve guides.
5. Install the valve seat inserts. Refer to Disassembly and Assembly, "Inlet and Exhaust Valve Seat Inserts - Remove and Install".

   Note: After installing the valve guides and valve seat inserts, the valve guides must be reamed and the valve seat inserts must be cut to the finished diameter. The valve guides and valve seat inserts are cut and reamed in one operation. This procedure ensures the concentricity of the valve seat to the valve guide in order to create a good seal. Refer to Specifications, "Cylinder Head Valves" for the finished diameter of the valve guides and valve seat inserts.
6. Position Tooling (C) into the valve guide. Carefully turn the handle in a clockwise direction and gradually move the reamer into the valve guide until the valve guide is reamed to the finished size.
7. Continue to turn the handle in a clockwise direction in order to cut the valve seat insert. Remove the minimum amount of material in order to ensure a good valve seat. Keep the valve seat as narrow as possible.
8. Remove Tooling (C). Clean the debris from the valve guide and the valve seat.

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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Disassembly and Assembly
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i02292377

Inlet and Exhaust Valve Seat Inserts - Remove and Install

SMCS - 1103-010

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	166-7441	Valve Seat Extractor	1
	9S-3095	Puller Handle	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.

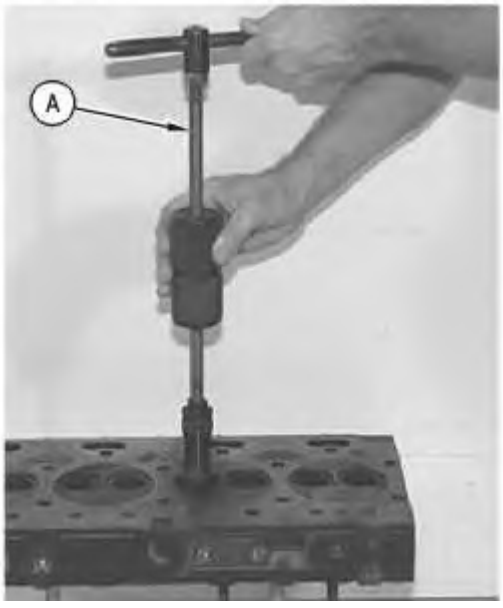

Illustration 1 g00937142

Typical example

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

   Note: When new valve seat inserts are installed, new valves and new valve guides must be installed.
3. Remove the valve guides. Install partially finished valve guides. Refer to Disassembly and Assembly, "Inlet and Exhaust Valve Guides - Remove and Install".

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
B	157-3716	Valve Seat Driver (Exhaust)	1
	157-3717	Valve Seat Driver (Inlet)	1
C	157-3720	Valve Seat Cutter	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The inserts for the inlet valves are a larger diameter than the exhaust valve inserts.

1. Use the partially finished bore of the valve guide as a pilot bore in order to machine a recess for a new valve seat. Refer to the Specifications Manual, "Cylinder Head Valves" for the required dimensions of the recess for the valve seat. Remove all debris from the cylinder head ports and passages.

   Note: If the cylinder head has been previously ground then the bottom face of valve seat must be ground in order to ensure that the valve seat will be installed correctly into the cylinder head. A 30 degree chamfer must be machined to the outer edge of the valve seat after the back face of the valve insert has been ground to the correct dimensions. The 30 degree chamfer must be within the tolerance of 0.91 mm (0.036 inch) to 1.3 mm (0.051 inch). Also, the chamfer must be inclined to the vertical face of the valve insert.

2. Repeat the Step 1 for all of the appropriate valve seats.

   Note: Do not apply any lubricant before the new valve seat insert is installed into the cylinder head.

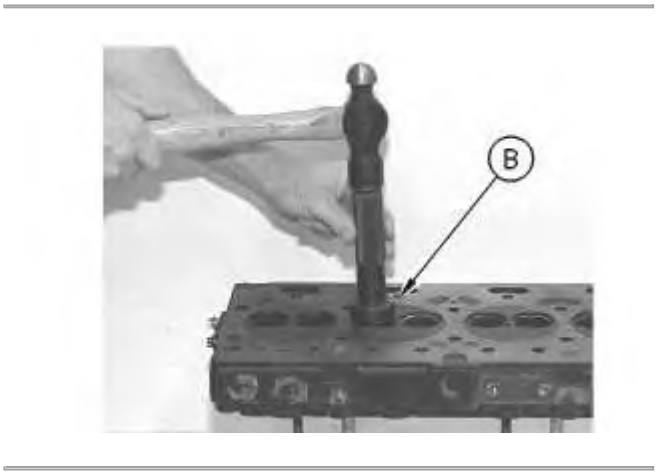

Illustration 2 g00937187

Typical example

3. Put the valve seat insert in position. Carefully tap the valve seat insert in order to start the installation. Use the Tooling (B) to seat the valve seat insert in the cylinder head.

4. Repeat the procedure for the remaining valve seat inserts.

   Note: Refer to the Specifications Module for more information on the valve seat inserts.

5. After installing the valve guides and valve seat inserts, the valve guides must be reamed and the valve seat inserts must be cut to the finished diameter. The valve guides and valve seat inserts are cut and reamed in one operation. This procedure ensures the concentricity of the valve seat to the valve guide in order to create a good seal. Refer to Specifications, "Cylinder Head Valves" for the finished diameter of the valve guides and valve seat inserts.

6. Position the Tooling (C) into the valve guide. Carefully turn the handle in a clockwise direction and gradually move the reamer into the valve guide until the valve guide is reamed to the finished size.

7. Continue to turn the handle in a clockwise direction in order to cut the valve seat insert. Remove the minimum amount of material in order to ensure a good valve seat. Keep the valve seat as narrow as possible.

8. Remove Tooling (C). Clean the debris from the valve guide and the valve seat.

9. Repeat Step 6 to Step 8 in order to cut all of the appropriate valve seats.

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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Disassembly and Assembly
3054E Industrial Engine

Media Number -RENR7569-02 **Publication Date -01/09/2005** **Date Updated -28/04/2017**

i02292381

Engine Oil Filter Base - Remove and Install

SMCS - 1306-010

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	185-3630	Strap Wrench As	1

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, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Remove all dirt, oil, and grease from the engine oil filter assembly and from the drain plug of the engine oil pan. Place a suitable container beneath the drain plug of the engine oil pan.
2. Operate the engine until the engine is warm. Stop the engine.
3. Remove the oil drain plug and the O-ring from the engine oil pan. Drain the engine oil into the container for storage or disposal.

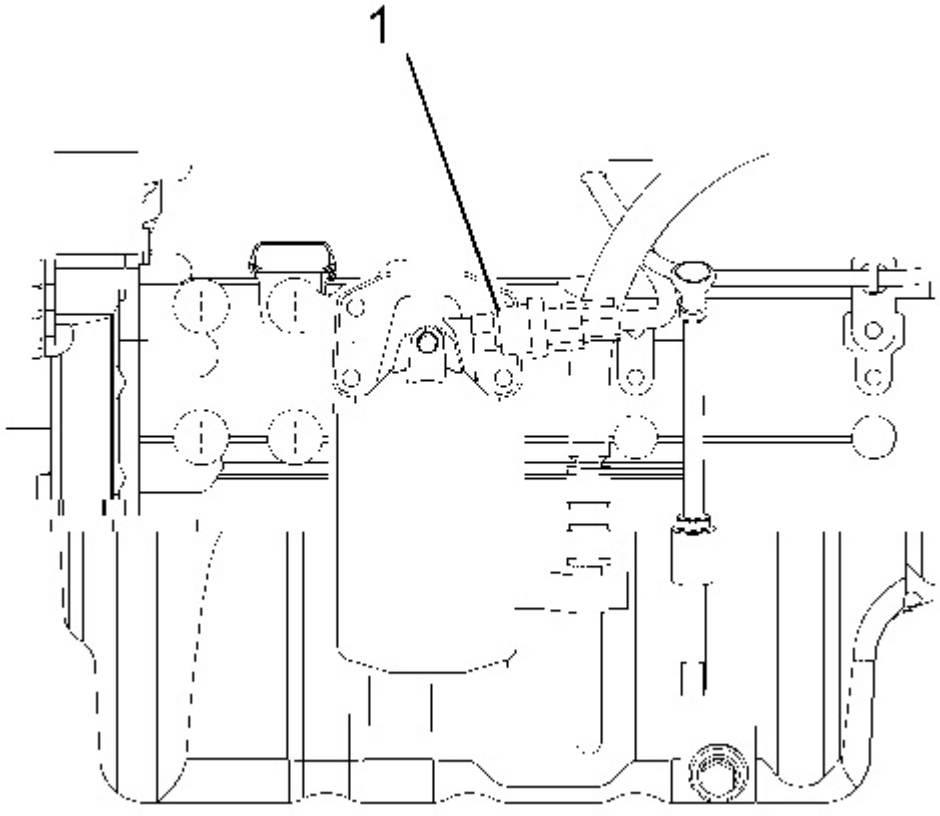

Illustration 1 g01147542

4. Remove the oil pressure sensor (1). Refer to Disassembly and Assembly manual, "Engine Oil Pressure Sensor Remove and Install".

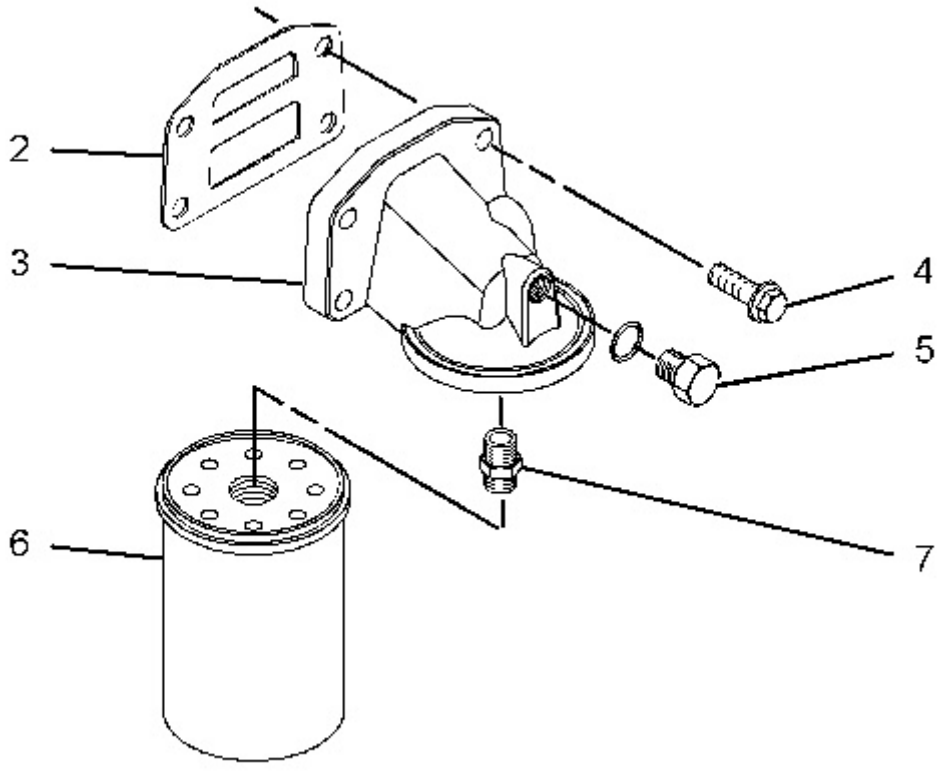

Illustration 2 g01147543

5. Remove the engine oil filter (6) with the Tooling (A).
6. Remove the setscrews (4).
7. Remove the engine oil filter base (3) from the cylinder block. Remove the gasket (2). Discard the gasket (2).
8. If necessary, remove the adapter (7) from the engine oil filter base. Remove the O-ring seal and plug (6) from the engine oil filter base. If equipped, remove the oil sampling valve.

Installation Procedure

Table 2

Required Tools		
Tool	**Part Number**	**Part Description**
B	9S-3263	Thread Lock Compound

NOTICE

Keep all parts clean from contaminants.

Suggest:

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to download the complete manual.

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Contaminants may cause rapid wear and shortened component life.

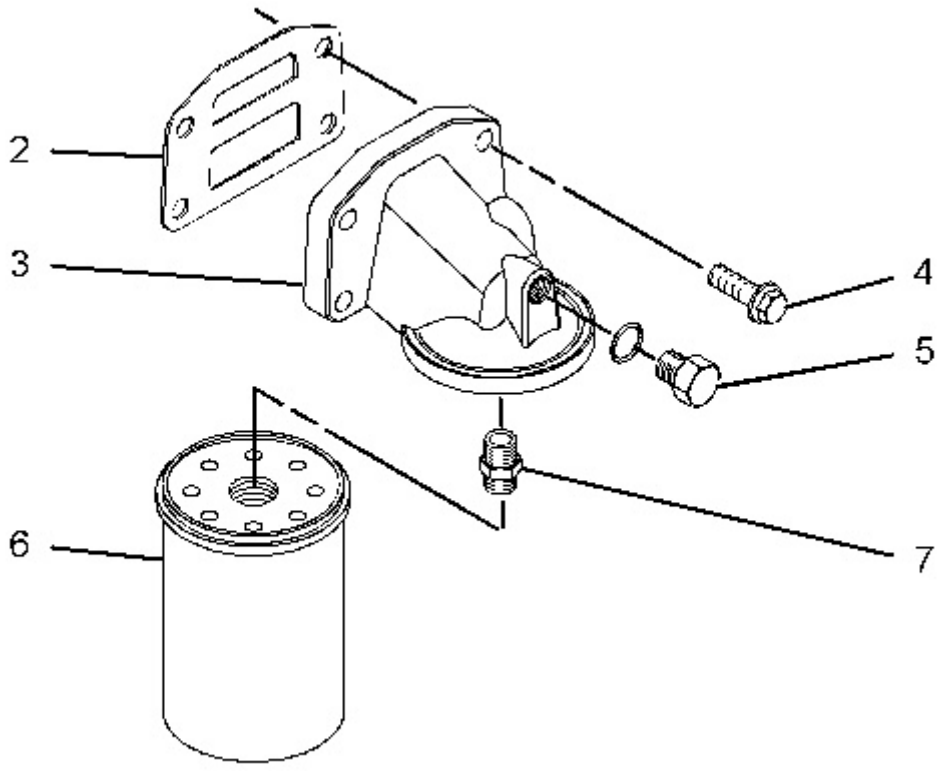

Illustration 3 g01147543

1. Clean the oil passages within the oil filter base (3). Clean the mating surfaces of the cylinder block and the engine oil filter base (3).

2. Inspect the adapter (7) if the adapter was removed from the oil filter base (3). Apply the Tooling (B) to the thread of the adapter. Install the adapter (7) into the oil filter base (3). Tighten the adapter to a torque of 28 N·m (20.6 lb ft).

3. Inspect the O-ring for the plug (5) if the plug was removed from the oil filter base (3). If necessary, replace the O-ring. Install the O-ring and the plug (5) into the oil filter base (3). Tighten the plug (5) to a torque of 12 N·m (8.8 lb ft). If equipped, install the oil sampling valve. Tighten the oil sampling valve to a torque of 12 N·m (8.8 lb ft).

   Note: New setscrews (4) have sealant on the first 13 mm (0.5 inch) of the threads. In order to reuse the old setscrews (4), clean the old sealant from the setscrews and apply Tooling (B) to the setscrews.

   Note: Do not use sealants on the gasket (2).

4. Position a new gasket (2) and the engine oil filter base (3) on the cylinder block. Install the setscrews (4) in order to secure the engine oil filter base (3).