

Product: INDUSTRIAL ENGINE
Model: C13 INDUSTRIAL ENGINE SK2
Configuration: C13 Combat Vehicle Engine SK200001-UP

Disassembly and Assembly C11 and C13 Industrial Engines

Media Number -REN8632-06

Publication Date -01/10/2018

Date Updated -24/10/2018

i07024216

Exhaust Manifold - Remove and Install

SMCS - 1059-010

Removal Procedure

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.

Start By:

- a. Remove the high-pressure turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove".
- b. Remove the precooler. Refer to Disassembly and Assembly, "Precooler - Remove".
- c. Remove the low-pressure turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Remove".

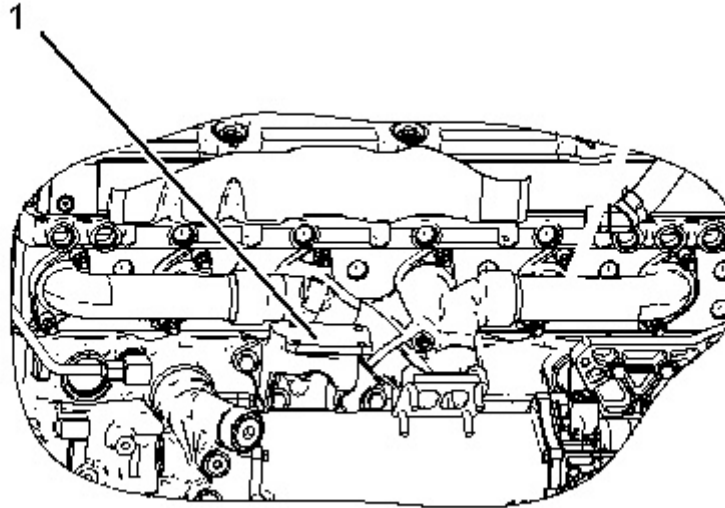


Illustration 1

g06199242

1. Remove the lower bracket for the precooler, the upper bracket for the precooler, and the middle bracket for the precooler.
2. Remove bracket (1).

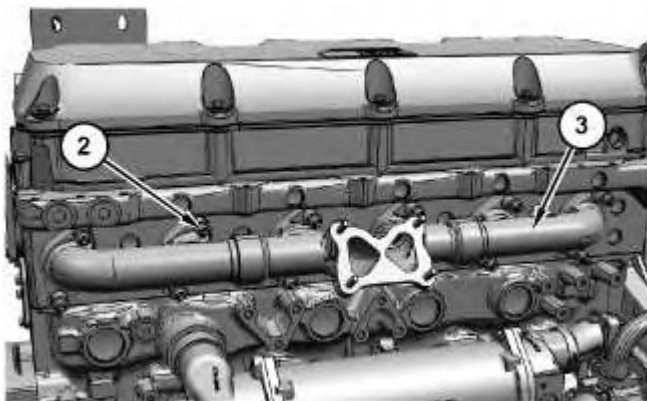


Illustration 2

g06199244

3. Remove locknuts (2) and the spacers. Remove exhaust manifold (3) and the gaskets.
-

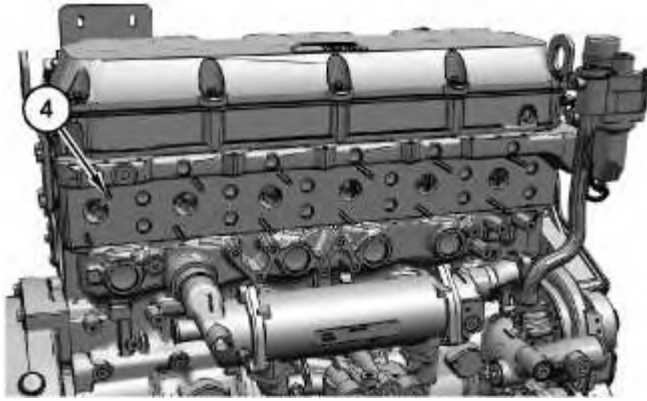


Illustration 3

g06199252

4. If necessary remove studs (4).

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Loctite MR2000	-
B	-	Loctite C5-A	-
	-	Loctite 8008 ⁽¹⁾	-

⁽¹⁾ For use in EAME only

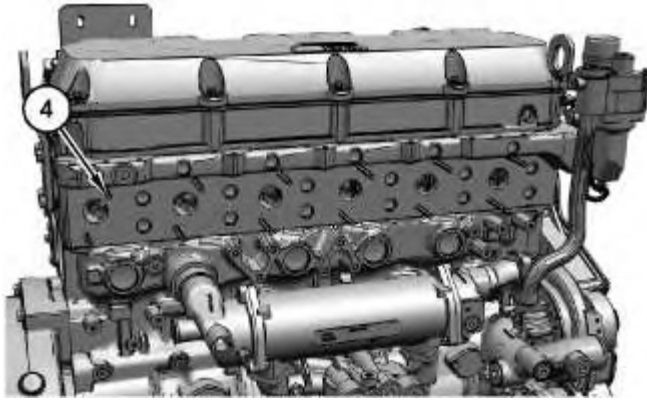


Illustration 4

g06199252

1. Install studs (4). Tighten studs (4) to a torque of 35 ± 5 N·m (26 ± 4 lb ft)

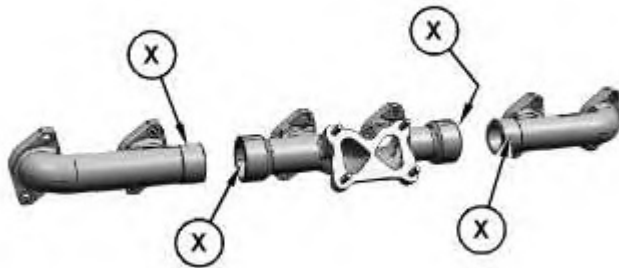


Illustration 5

g06199259

2. Apply Tooling (A) at locations (X) and assembly exhaust manifold (3).

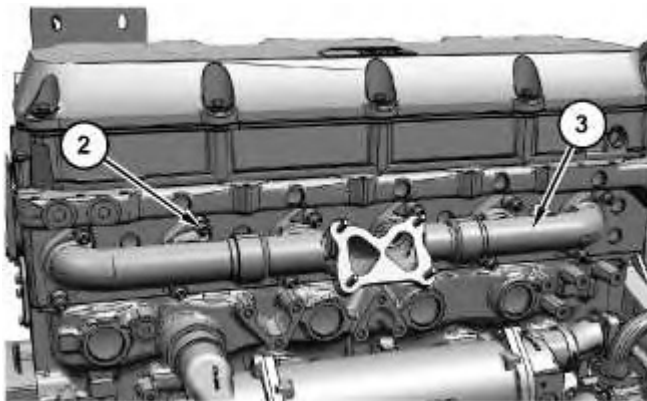


Illustration 6

g06199244

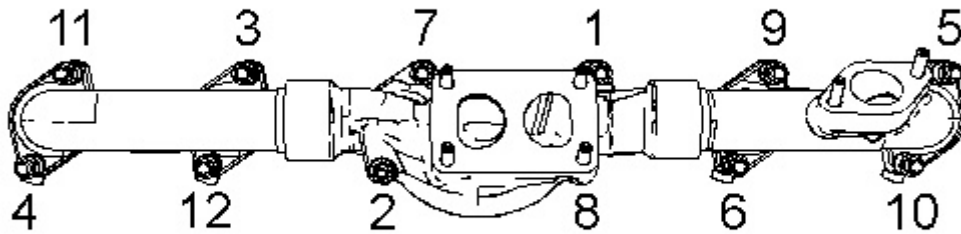


Illustration 7
Typical Example

g01866113

Note: Discard the nuts after use. Use new nuts for installation.

3. Install new gaskets with tabs facing down. Install exhaust manifold (3) and nuts (2). Tighten nuts (2) to a torque of $55 \pm 10 \text{ N}\cdot\text{m}$ ($41 \pm 7 \text{ lb ft}$) in the sequence shown.

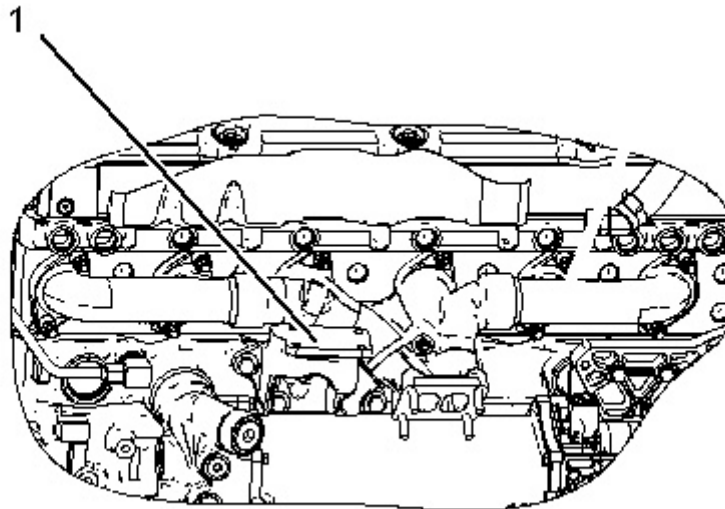


Illustration 8

g06199242

4. Install bracket (1).
5. Install the lower bracket for the precoolers, the upper bracket for the precoolers, and the middle bracket for the precoolers.

End By:

- a. Install the low-pressure turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Install".
 - b. Install the precooler. Refer to Disassembly and Assembly, "Precooler - Install".
 - c. Install the high-pressure turbocharger. Refer to Disassembly and Assembly, "Turbocharger - Install".
-

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i02247521

Inlet and Exhaust Valve Springs - Remove and Install

SMCS - 1108-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	235-0518	Valve Spring Compression Group	1

Start By:

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The following procedure is for the removal of the inlet valve springs and the exhaust valve springs without removing the cylinder head. This procedure can be performed on only one cylinder at a time. This will prevent the inlet valves and the exhaust valves from falling into the cylinder.

1. Rotate the crankshaft in order to bring the piston to the top center position in the cylinder.
-

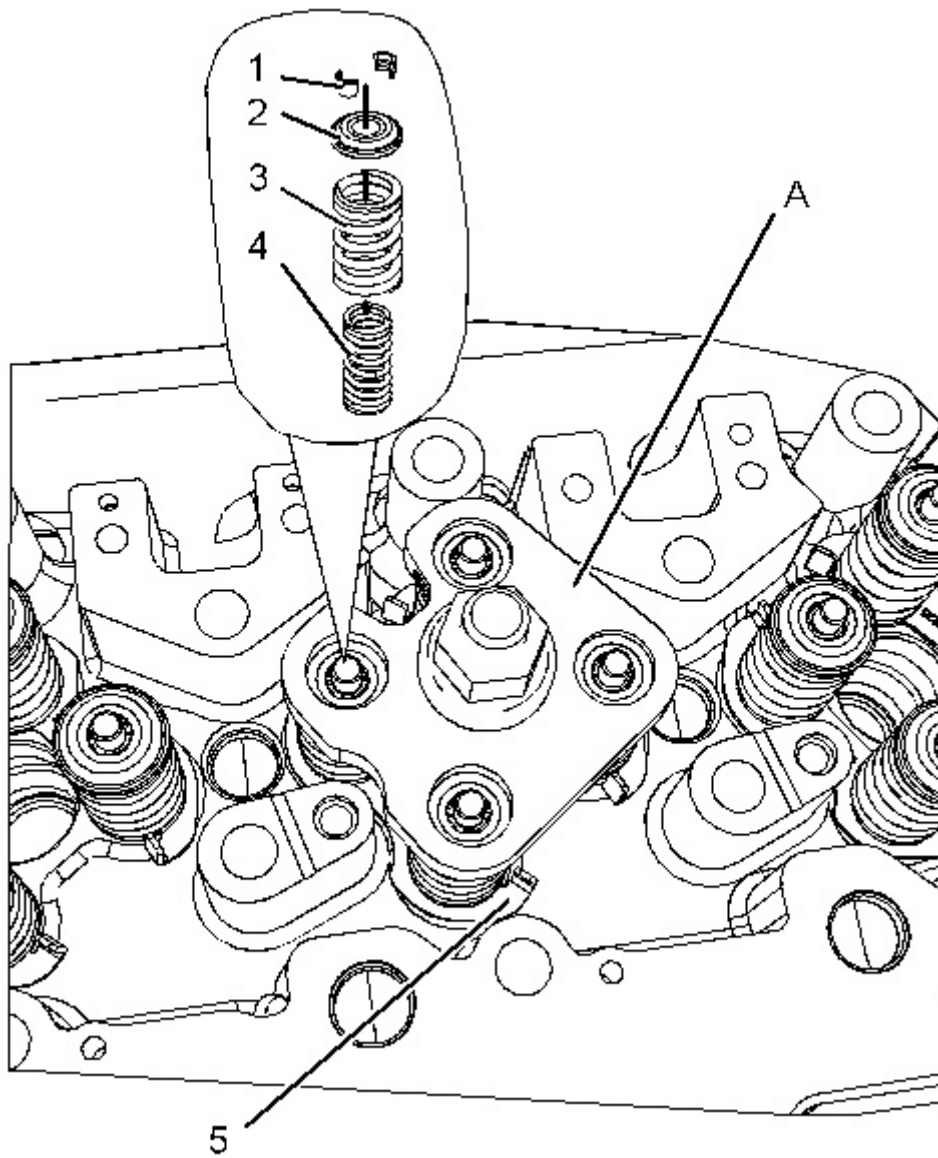


Illustration 1

g01136330

⚠ 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.

2. Install Tooling (A) on the cylinder head.
3. Remove retainer locks (1).

4. Remove Tooling (A).
5. Remove valve rotators (2).
6. Remove valve springs (3) and valve springs (4) from each valve.
7. Remove bases (5) from the cylinder head.

Note: Install the valve springs before you rotate the crankshaft.

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	235-0518	Valve Spring Compression Group	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

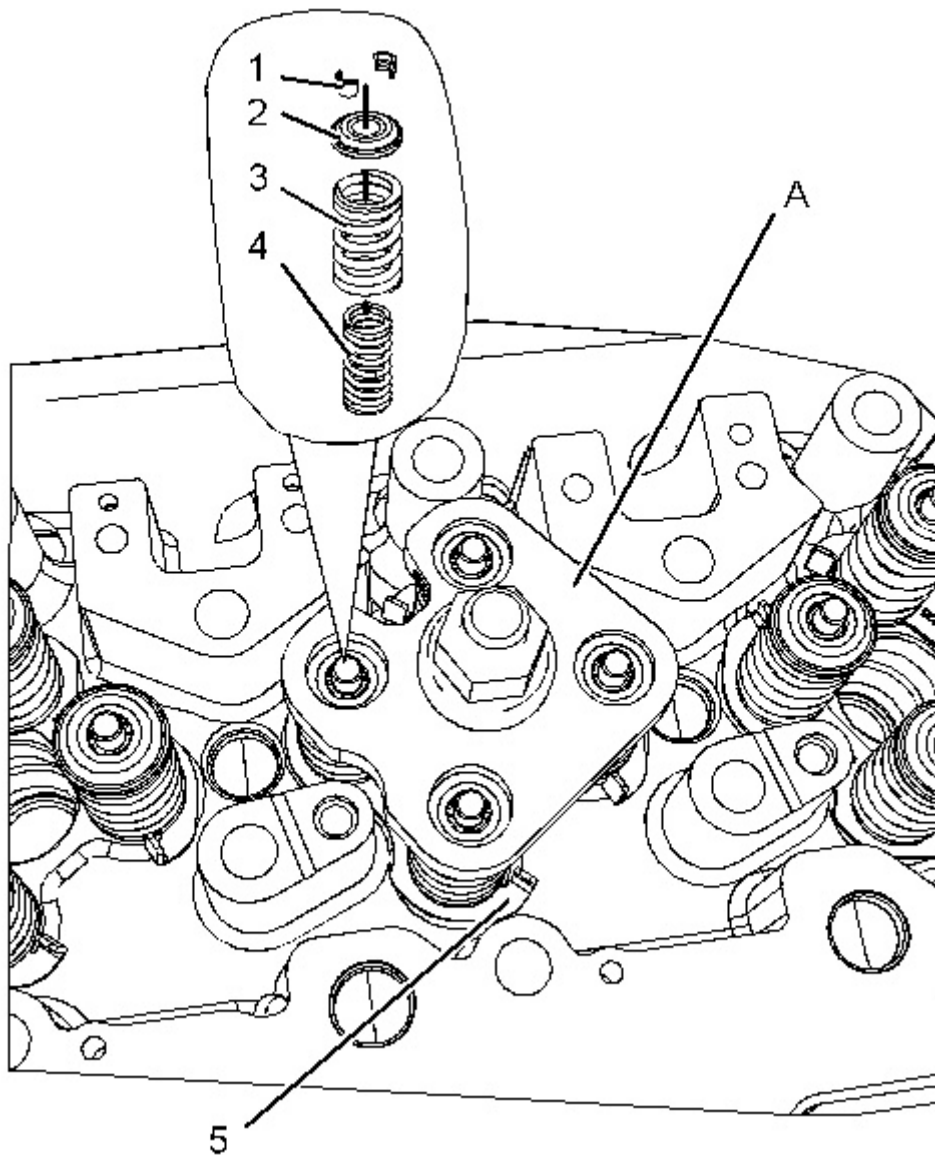


Illustration 2

g01136330

! 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.

1. Install bases (5) for the valve springs.
2. Install valve springs (4) and valve springs (3).

3. Install valve rotators (2).
4. Install Tooling (A).
5. Install retainer locks (1).
6. Remove Tooling (A).

End By:

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

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i02247841

Inlet and Exhaust Valves - Remove and Install

SMCS - 1105-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	5S-1330	Valve Spring Compressor	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.

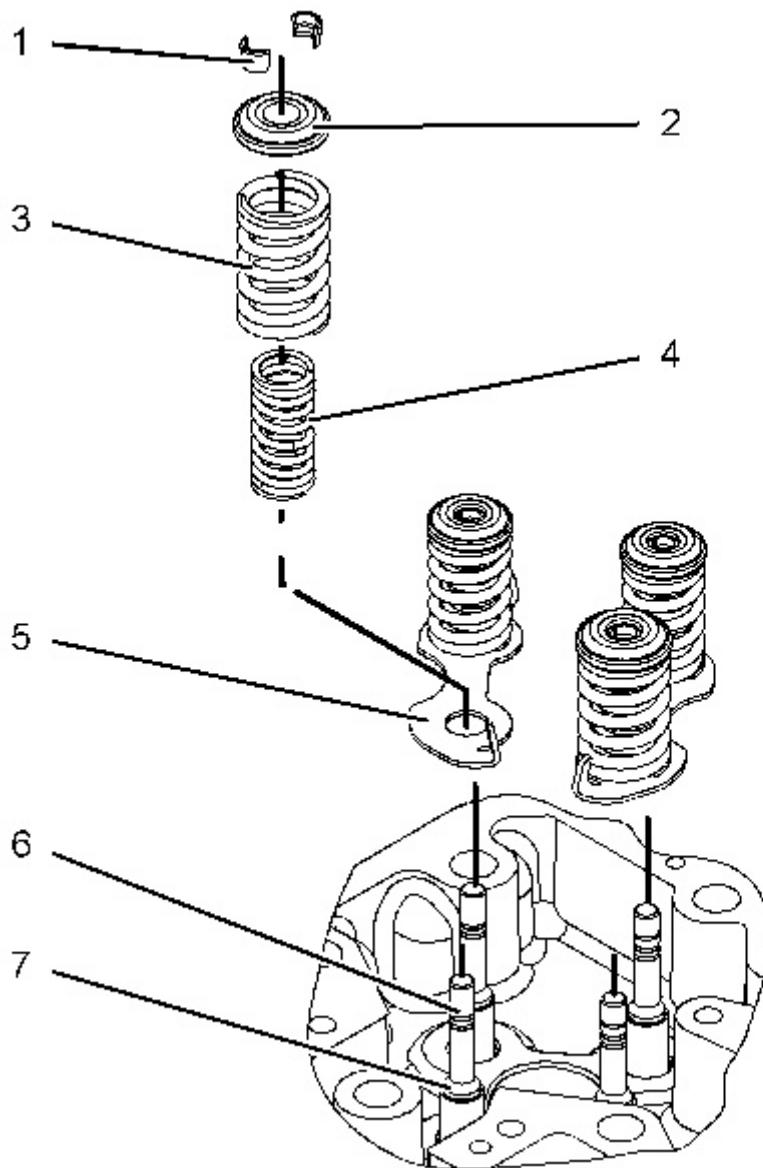


Illustration 1

g01131781

 **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.

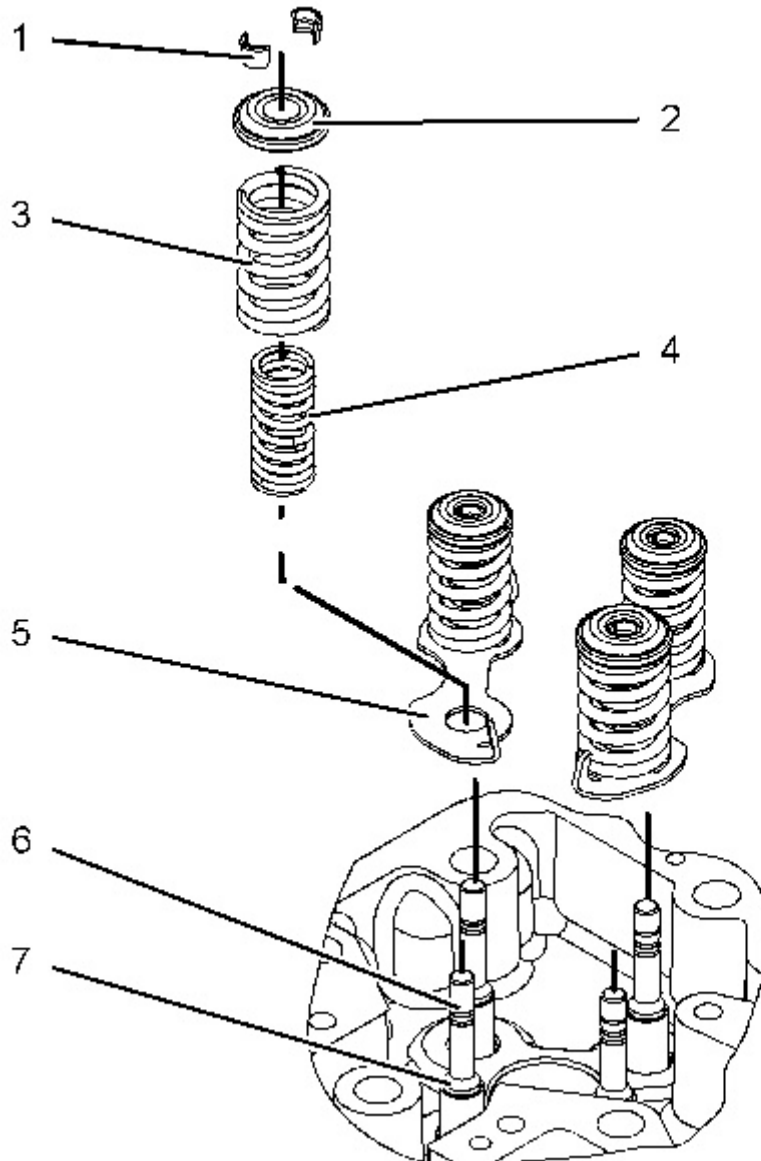
1. Use Tooling (A) to remove retainer locks (1).
2. Remove valve rotators (2).

3. Remove valve springs (3) and valve springs (4).
4. Remove base (5).
5. Remove valves (6) from the cylinder head.
6. Remove valve seals (7).

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	5S-1330	Valve Spring Compressor	1





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.

Note: A small amount of grease can be used to hold the retainer locks in position during installation.

1. Lubricate valves (6) with clean engine oil. Install the valves in the cylinder head assembly.
2. Install valve seals (7).
3. Install base (5).
4. Install valve springs (3) and valve springs (4).
5. Install valve rotators (2).
6. Use Tooling (A) to install retainer locks (1).

End By:

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

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i04496931

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 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.

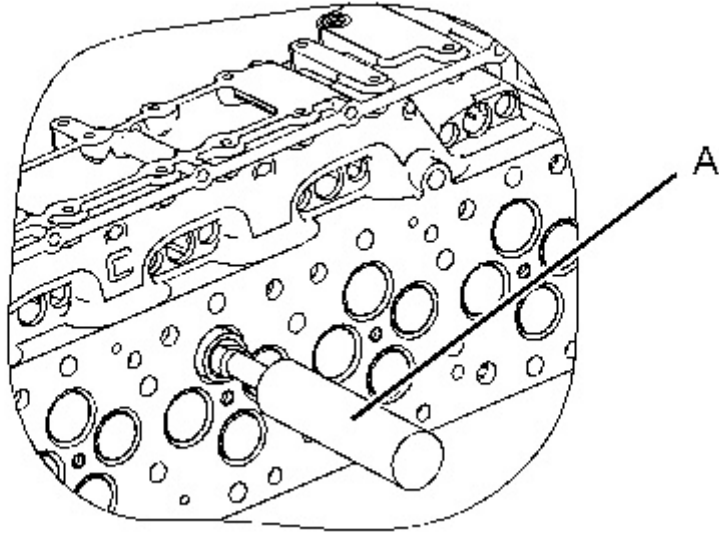


Illustration 1

g01015291

1. Use Tooling (A) to remove the valve guides from the cylinder head assembly.

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
B	124-9057	Guide Collar	1
	9U-6895	Valve Guide Driver	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

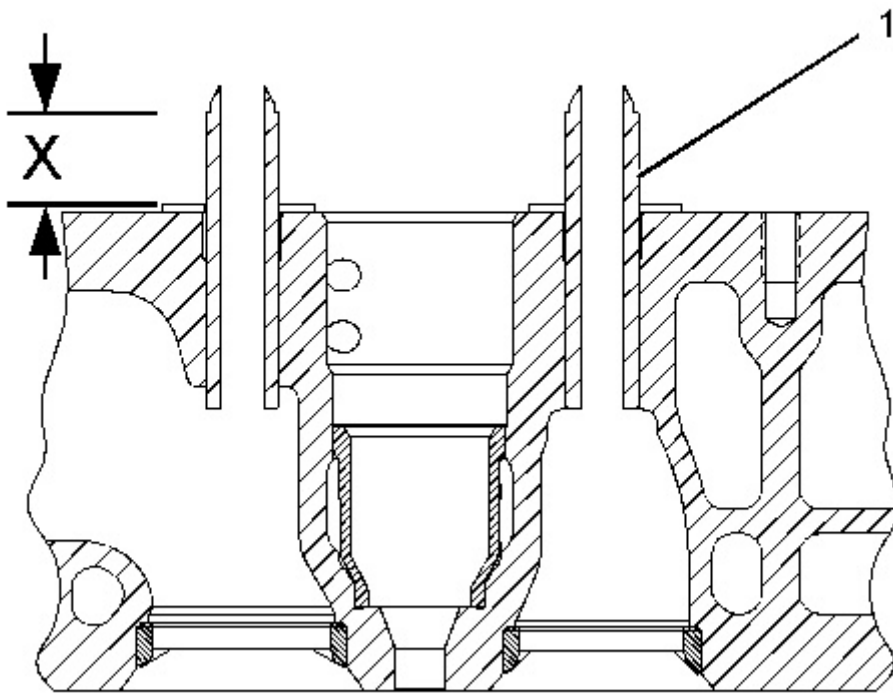


Illustration 2

g02676390

1. Use Tooling (B) to install valve guides (1) . Install the valve guides until Length (X) is 20.0 ± 0.5 mm (0.79 ± 0.02 inch) above the cylinder head assembly.

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

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i04526310

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 Tool	1

Start By:

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

NOTICE

Keep all parts clean from contaminants.

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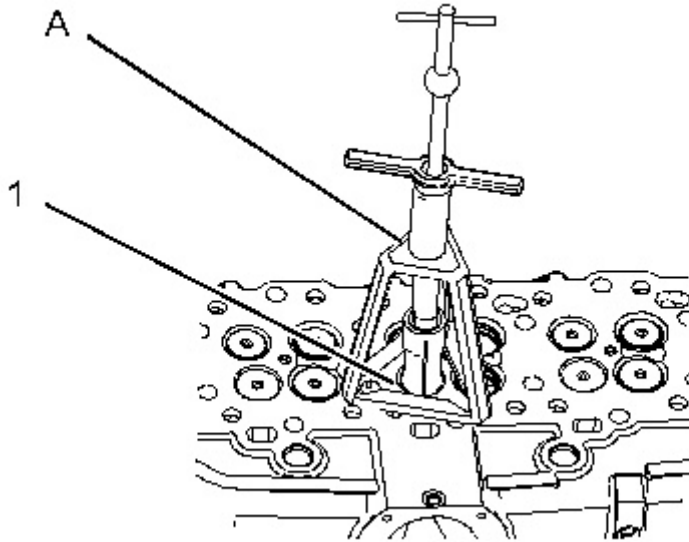


Illustration 1

g01082582

1. Use Tooling (A) to remove valve seat inserts (1).

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
B	1U-9170	Valve Seat Driver ⁽¹⁾	1
	9U-6898	Valve Seat Driver ⁽²⁾	1

⁽¹⁾ INLET

⁽²⁾ EXHAUST

NOTICE

Keep all parts clean from contaminants.

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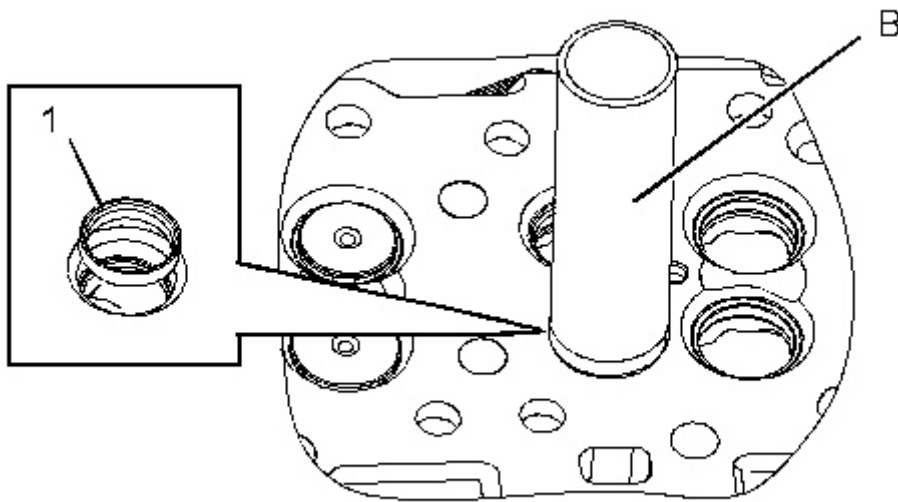


Illustration 2

g01079028

Note: Do not machine the prefabricated valve seat inserts in order to correct the valve stem projection. An excessive valve stem projection indicates that the valve seat insert is not seated or material was not cleaned from the bottom of the counterbore.

1. Lower the temperature of new valve seat inserts (1).
2. Use Tooling (B) to install the new valve seat inserts in the cylinder head assembly.

End By:

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

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i02285414

Engine Oil Filter Base - Remove

SMCS - 1306-011

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

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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.

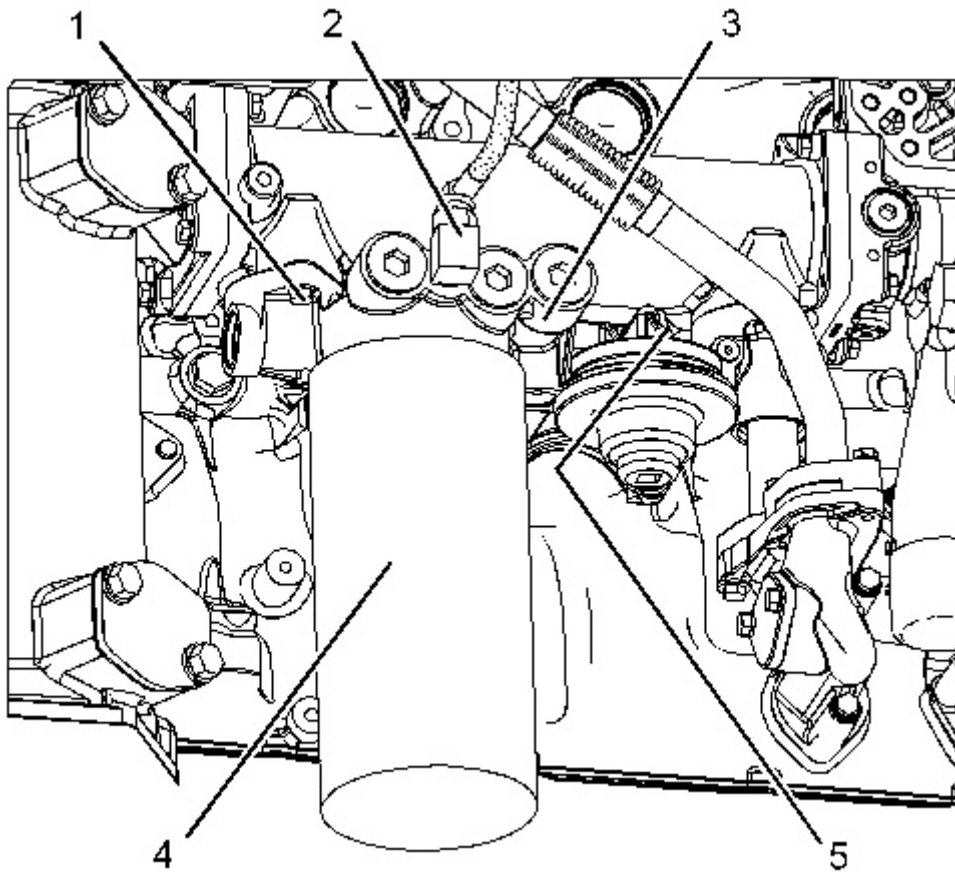


Illustration 1

g01143629

1. Use Tooling (A) to remove oil filter (4) from engine oil filter base (3).
 2. Disconnect hose assembly (2).
 3. Remove bolts (1) and bolts (5) (not shown).
 4. Remove engine oil filter base (3) and the gasket.
-

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i01942432

Engine Oil Filter Base - Disassemble

SMCS - 1306-015

Disassembly Procedure

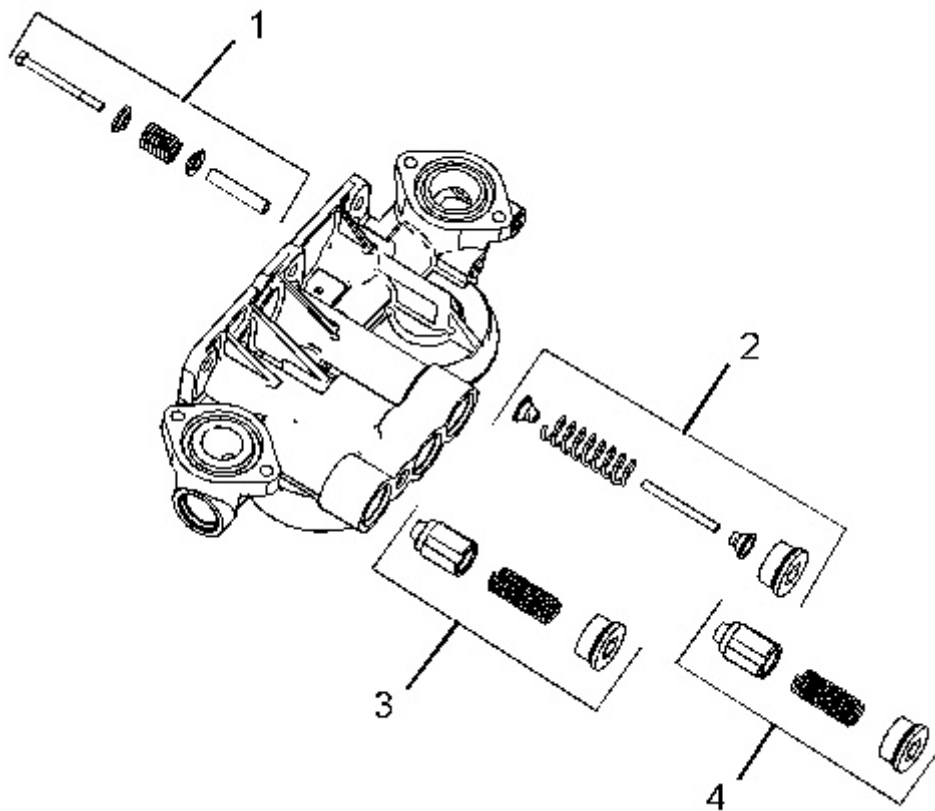


Illustration 1

g01010792

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