

Product: INDUSTRIAL ENGINE
Model: C13 INDUSTRIAL ENGINE N3F
Configuration: C13 Industrial Engine N3F00001-UP

Disassembly and Assembly C13 Industrial Engine

Media Number -UENR0184-02

Publication Date -01/06/2014

Date Updated -09/06/2014

i05351528

Air Inlet Elbow - Remove and Install

SMCS - 1087-010-E4

Removal Procedure

Table 1

| Required Tools | | | |
|----------------|-------------|-------------------------------|-----|
| Tool | Part Number | Part Description | Qty |
| A | - | LOCTITE 592 Thread Sealant | - |

Start By:

- A. Remove the solenoid valve (exhaust balance).

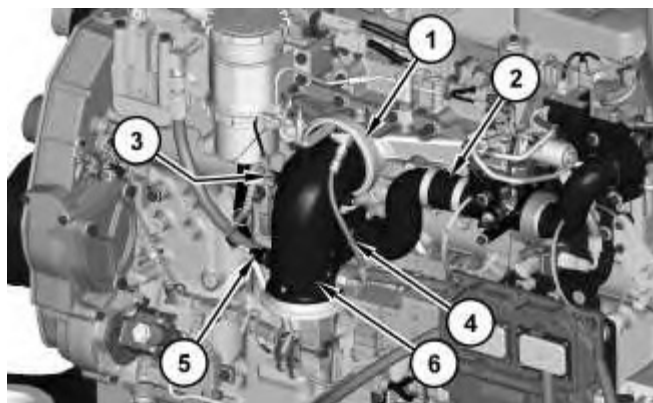


Illustration 1

g02849799

1. Disconnect the harness assembly from temperature sensor (5). Remove temperature sensor (5) .
2. Remove hose assembly (4) and the fittings. Remove clip (3) .
3. Loosen the clamps for hose (2) and remove hose (2) .
4. Loosen clamp (1) and remove air inlet elbow (6) .

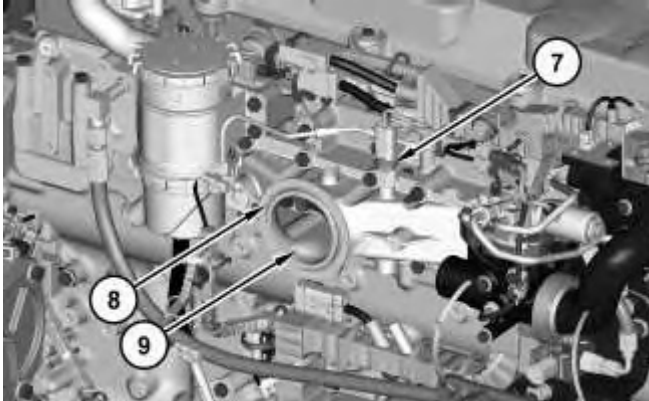


Illustration 2

g02849824

5. Disconnect the harness assembly from pressure sensor (7). Remove pressure sensor (7) .
6. Remove O-ring seal (8) and remove air inlet manifold (9). Remove and discard the gasket from air inlet manifold (9) .

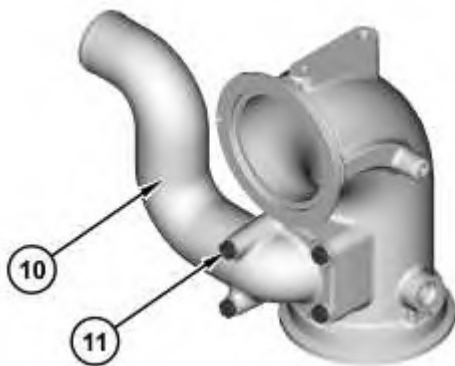


Illustration 3

g02849857

7. Remove bolts (11) and remove tube (10) and the O-ring seal.
-



Illustration 4

g02849867

8. Remove pin spring (12) and dowel (14) .
9. Remove tube (14) and the wave ring.



Illustration 5

g02849879

10. Remove plug (15) .

Installation Procedure

1. Install air inlet elbow (6) in the reverse order of removal.
 - a. Apply Tooling (A) to plug (15) .
-

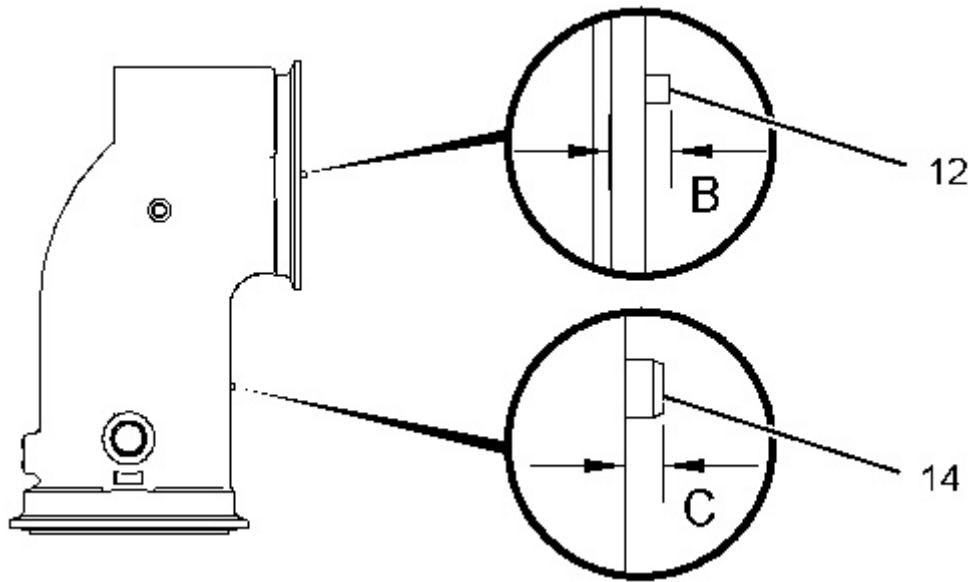


Illustration 6

g02849917

- b. Install pin spring (12) to the depth illustrated by Dimension (B). Dimension (B) is 6.0 ± 0.50 mm (0.20 ± 0.020 inch).
- c. Install dowel (14) to the depth illustrated by Dimension (C). Dimension (C) is 2.9 mm (0.11 inch).
- d. Tighten pressure sensor (7) to a torque of 10 ± 2 N·m (89 ± 18 lb in).
- e. Tighten temperature sensor (5) to a torque of 20 ± 3 N·m (177 ± 27 lb in).
- f. Tighten clamp (1) to a torque of 8.5 ± 2 N·m (75 ± 18 lb in).

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i03537718

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.

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.
-

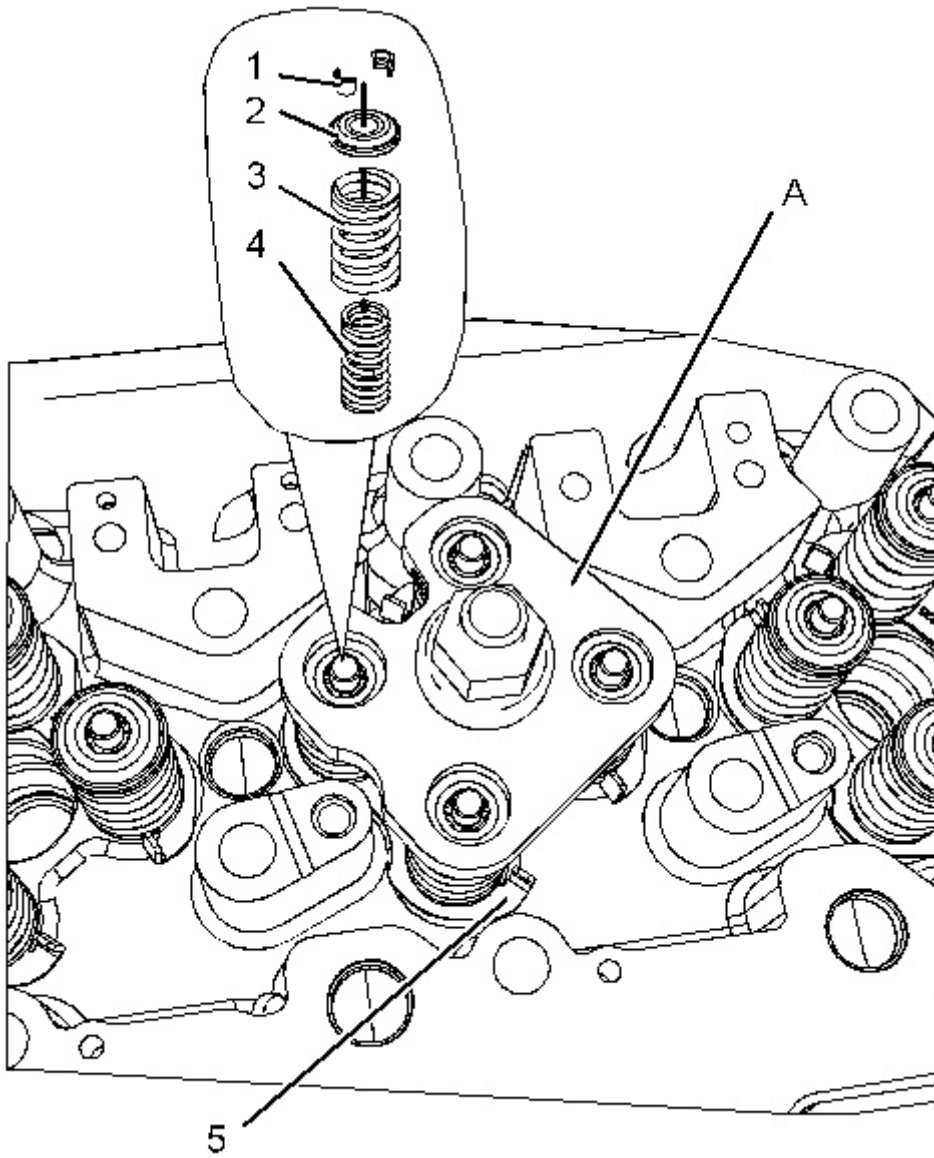


Illustration 1

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



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.

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

Note: Lubricate the valve stems with clean engine oil.

1. Install valve springs (3) and (4) in reverse order of removal.
-

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i03538279

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.
-

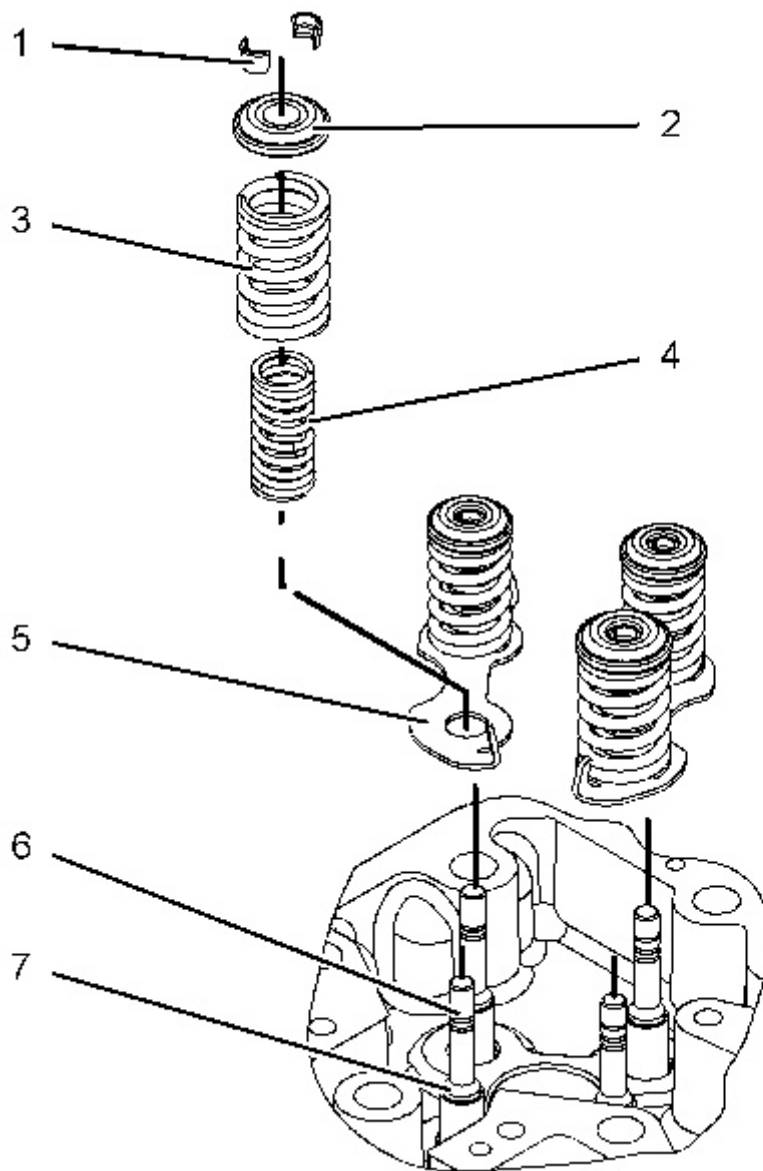


Illustration 1

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



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.

Note: Lubricate valves (6) with clean engine oil.

1. Install valves (6) in reverse order of removal.
-

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i05888682

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 |
| B | 124-9057 | Guide Collar | 1 |
| | 9U-6895 | Valve Guide Driver | 1 |
| C ⁽¹⁾ | 455-0128 | Seal Installer | 1 |
| | 375-2773 | Seal Installer | 1 |

⁽¹⁾ Use Seal Installer 455-0128 with Seal 163-2478. Use Seal Installer 375-2773 with Seal 361-3926.

Start By:

- a. Remove the inlet valves and exhaust valves.
-

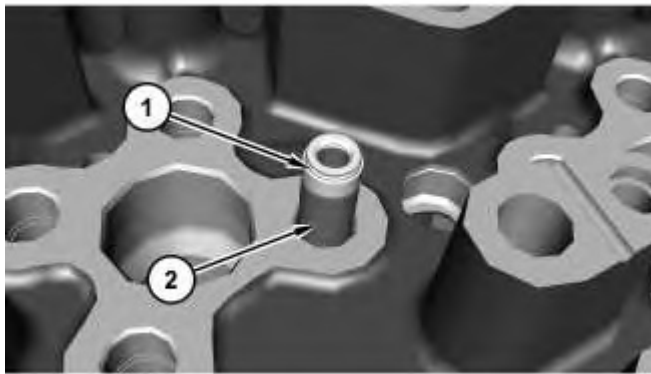


Illustration 1

g03711984

1. Remove seals (1) from valve guides (2).

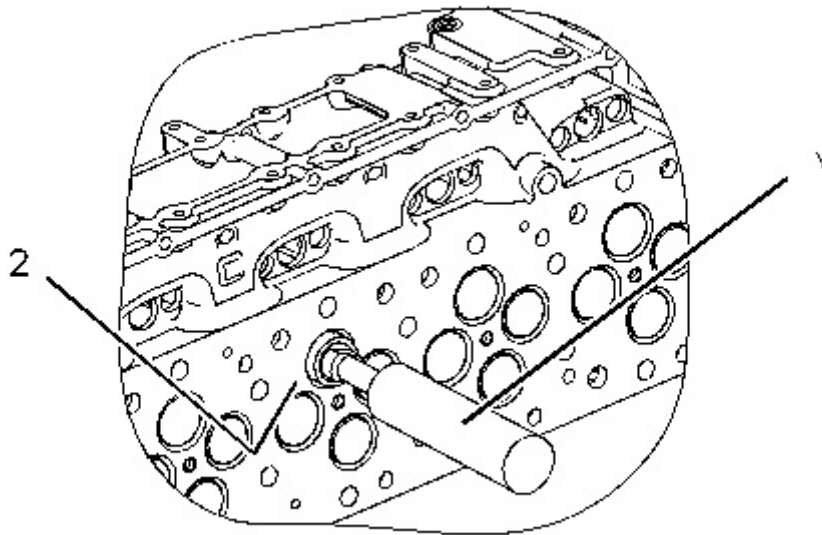


Illustration 2

g03711987

2. Use Tooling (A) to remove the valve guides (2) from the cylinder head assembly.

Installation Procedure

Note: Lubricate the bores for the valve guides with clean engine oil.

1. Use Tooling (B) to install valve guides (2) in reverse order of removal.
-

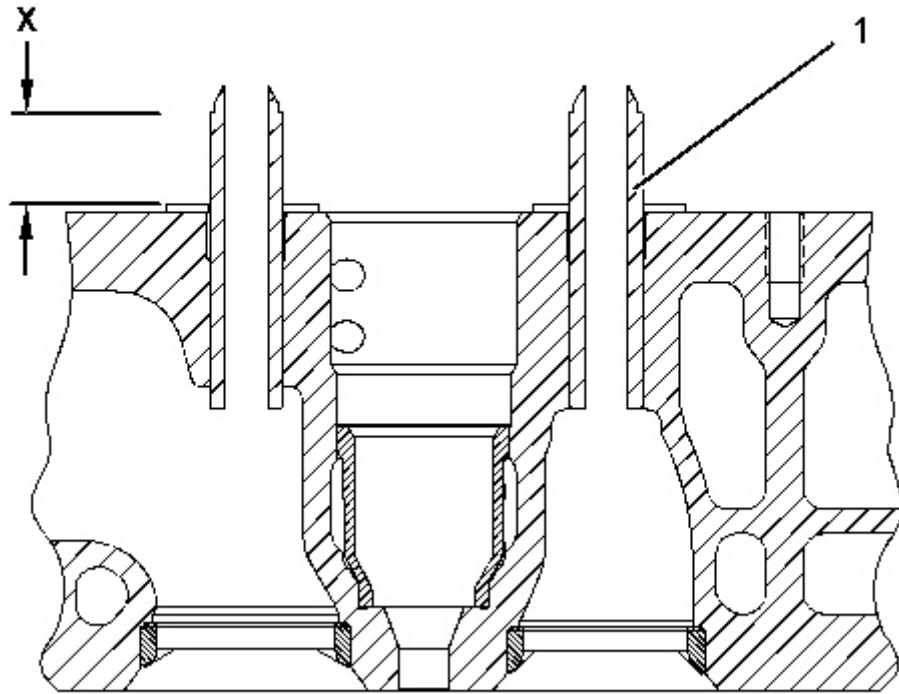


Illustration 3

g01301738

- a. Install valve guides (1) until the protrusion is Dimension (X) above the cylinder head assembly. Dimension (X) is 20.0 ± 0.5 mm (0.79 ± 0.02 inch).
 - b. Use Tooling (C) to install seals (1).
-

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i03538303

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 |
| B | 1U-9170 | Valve Seat Driver | 1 |

Start By:

- a. Remove the inlet and exhaust valves.
-

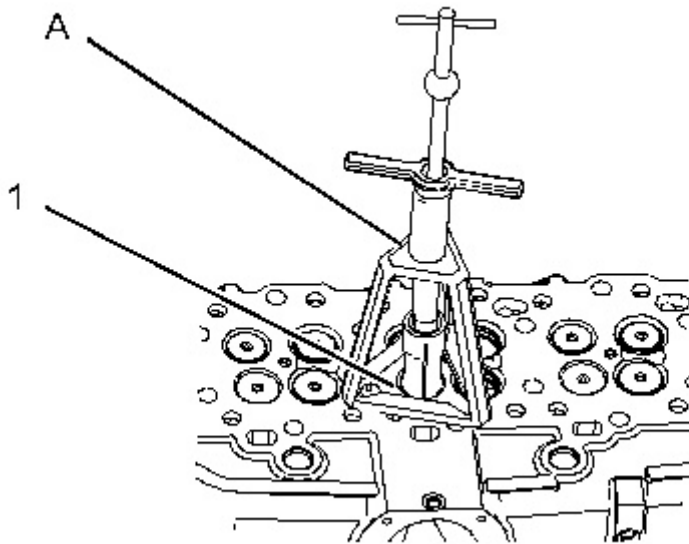


Illustration 1

g01082582

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

Installation Procedure

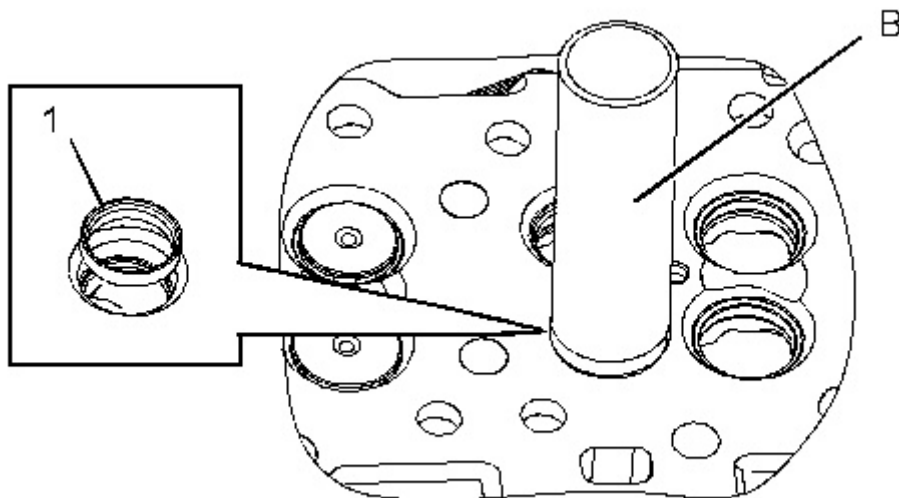


Illustration 2

g01079028

Note: Do not machine the prefinished 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 (1) in reverse order of removal.

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i05351529

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 |

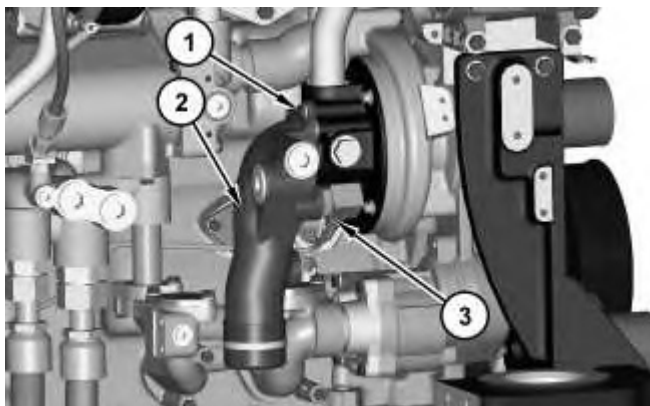


Illustration 1

g02174574

1. Refer to Operation and Maintenance Manual, "Engine Oil and Filter - Change" for the proper draining and filling procedures.
2. Disconnect tube assembly (3). Remove bolts (1) and elbow (2).

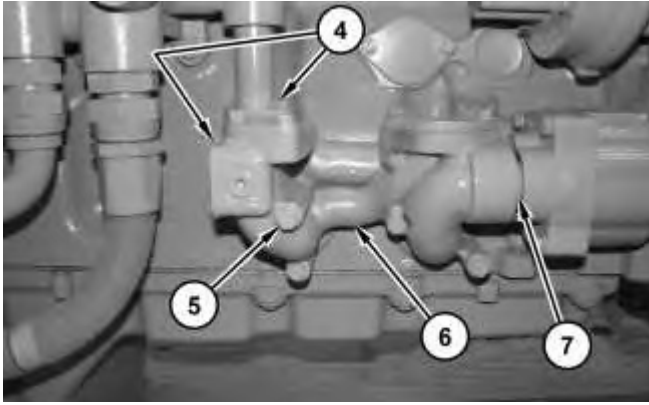


Illustration 2

g02174551

3. Remove bolts (4) and bolts (5). Remove manifold (6) and coupling (7) .

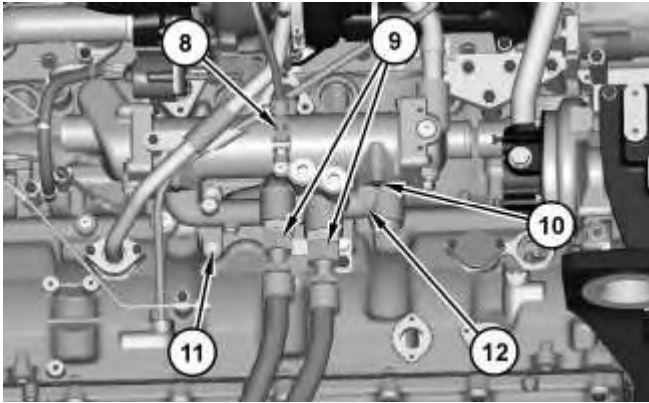


Illustration 3

g01859093

4. Disconnect hose assembly (8). Remove hose assemblies (9). Remove bolts (10) and bolts (11). Remove oil filter base (12) and the O-ring seals.



Illustration 4

g02850764

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.

5. Remove plug (15), spring (14), and plunger (13) from oil filter base (12) .

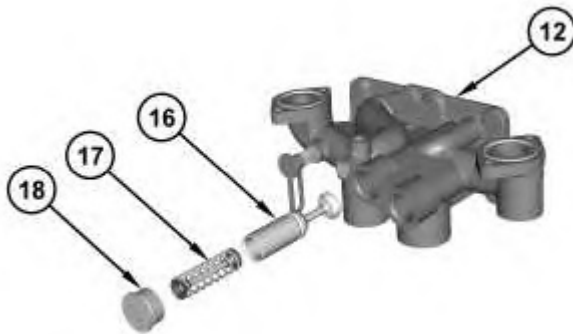


Illustration 5

g02850770

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.

6. Remove plug (18), spring assembly (17), and valve (16) from oil filter base (12) .
-

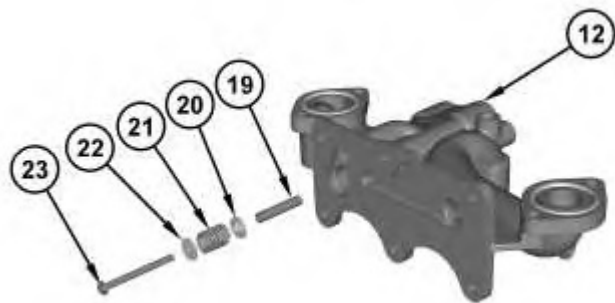


Illustration 6

g02850774

! 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.

7. Remove bolt (23), seat (22), spring (21), retainer (20), and spacer (19) from oil filter base (12) .

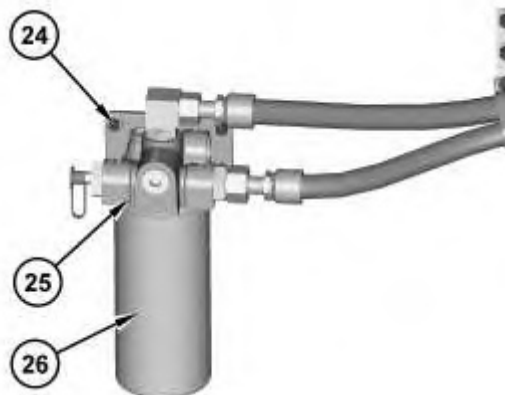


Illustration 7

g02850818

8. Use Tooling (A) to remove oil filter (26) from remote engine oil filter base (25). Remove bolts (24) and remote engine oil filter base (25) .

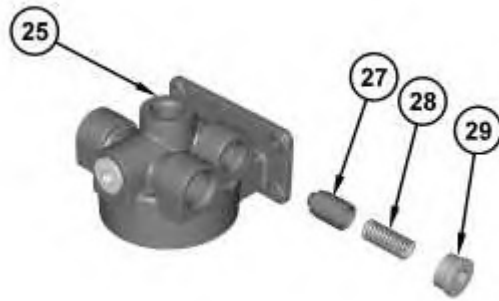


Illustration 8

g02850820

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.

9. Remove plug (29), spring (28), and plunger (27) from remote engine oil filter base (25) .

Installation Procedure

1. Install remote engine oil filter base (25) and oil filter base (12) in the reverse order of removal.
 - a. Apply lubricant that is being sealed to all O-ring seals and the filters.
 - b. Tighten plug (29) to a torque of 100 ± 15 N·m (74 ± 11 lb ft).
 - c. Use Tooling (A) to tighten oil filter (26) to a torque of 65 ± 3 N·m (48 ± 2 lb ft).
 - d. Tighten plug (18) to a torque of 100 ± 15 N·m (74 ± 11 lb ft).
 - e. Tighten plug (15) to a torque of 100 ± 15 N·m (74 ± 11 lb ft).
-

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i03529781

Engine Oil Cooler - Remove and Install

SMCS - 1378-010

Removal Procedure

Start By:

- a. Remove the turbocharger
 1. Refer to Operation and Maintenance Manual, "Cooling System Coolant (ELC) - Change" for the correct draining and filling procedures.

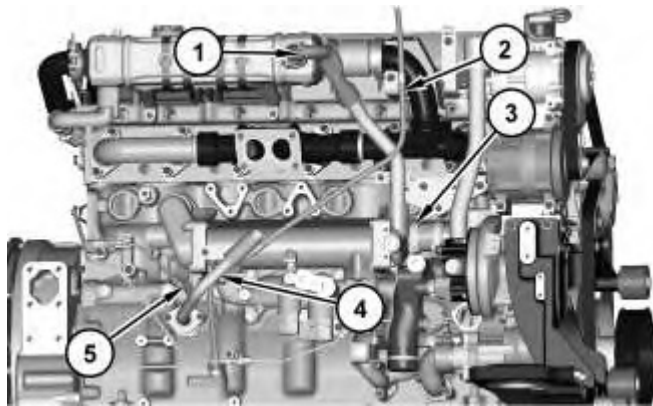


Illustration 1

g02175060

2. Remove tube assemblies (1) and (2).
 3. Remove clamps (3) and the hose.
 4. Remove tube assembly (4).
 5. Disconnect hose assembly (5).
-

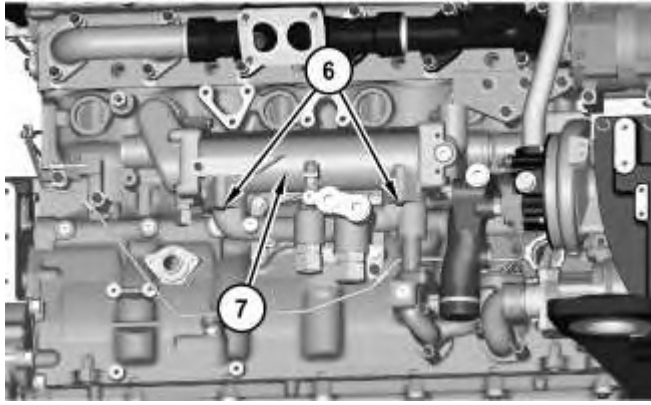


Illustration 2

g01858607

6. Remove bolts (6). Remove engine oil cooler (7).

Installation Procedure

1. Install engine oil cooler (7) in reverse order of removal.
 - a. Tighten hose clamps (3) to a torque of 14 ± 1 N·m (124 ± 9 lb in).
-

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i06302536

Engine Oil Pump - Remove and Install

SMCS - 1304-010

Removal Procedure

1. Drain the coolant from the cooling system into a suitable container for storage or for disposal. Refer to Operation and Maintenance Manual, "Cooling System Coolant (ELC) - Change".

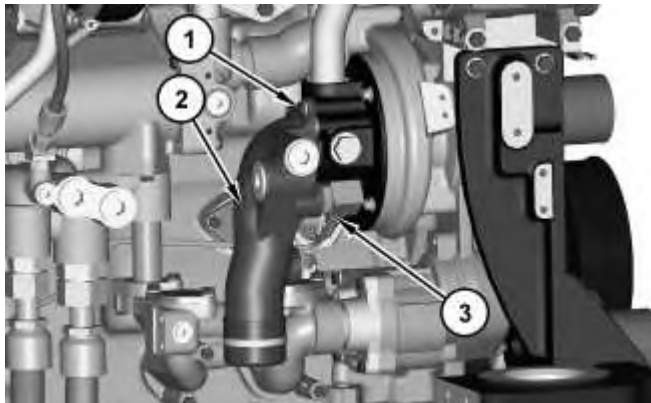


Illustration 1

g02174574

2. Remove bolts (1) and elbow (2) .
 3. Disconnect hose assembly (3) .
-

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