

Product: COMPACT WHEEL LOADER

Model: 902 COMPACT WHEEL LOADER 7ES

Configuration: 902 Compact Wheel Loader 7ES00001-UP (MACHINE) POWERED BY 3024 Engine

Disassembly and Assembly 3003, 3013, 3014 and 3024 Engines for Caterpillar Built Machines

Media Number -SEN5027-05

Publication Date -01/05/2005

Date Updated -16/05/2005

i02399171

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 Specifications, "Cylinder Head Valves" and Testing and Adjusting, "Cylinder Head - Inspect" for appropriate information on the valve springs.

NOTICE

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

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

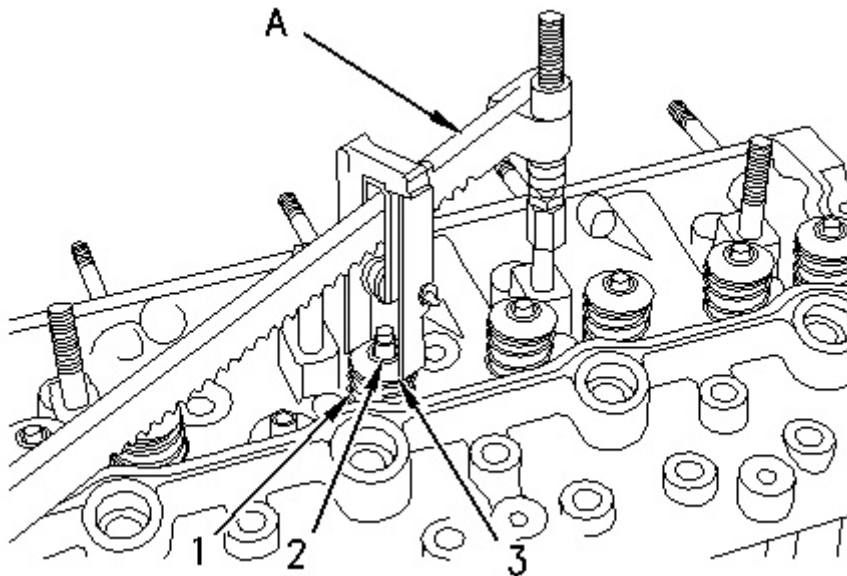


Illustration 1

g00825744

⚠ WARNING

Personal injury can result from parts and/or covers under spring pressure.

Spring force will be released when covers are removed.

Be prepared to hold spring loaded covers as the bolts are loosened.

2. Use Tooling (A) to compress valve springs (1) . Remove valve keepers (2) .
-

NOTICE

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

3. Release the pressure on Tooling (A) . Remove valve spring retainer (3) and valve springs (1) from the cylinder head.

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

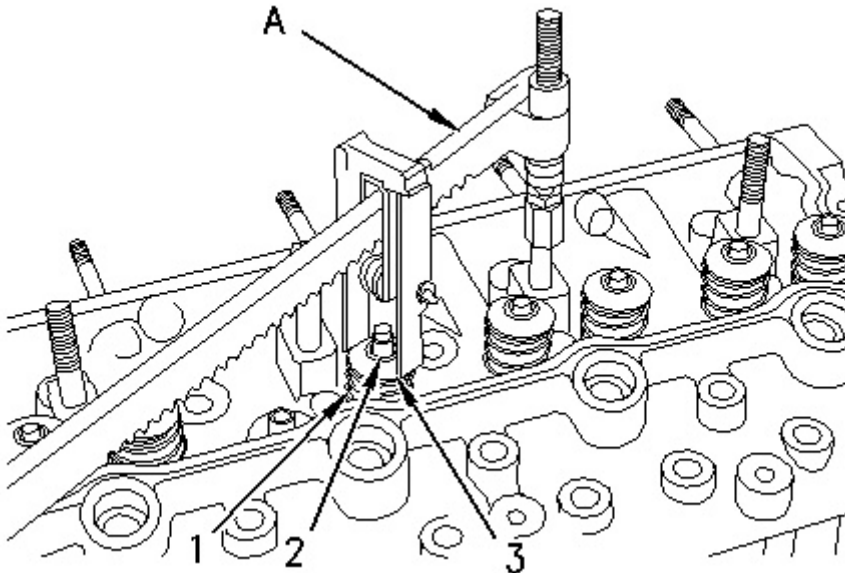


Illustration 2

g00825744

 **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 new valve springs (1) into position on the cylinder head.

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

2. Install valve spring retainer (3) .
3. Use Tooling (A) to compress valve springs (1) .

NOTICE

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

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

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

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i02015360

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. 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 the Specifications, "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.
-

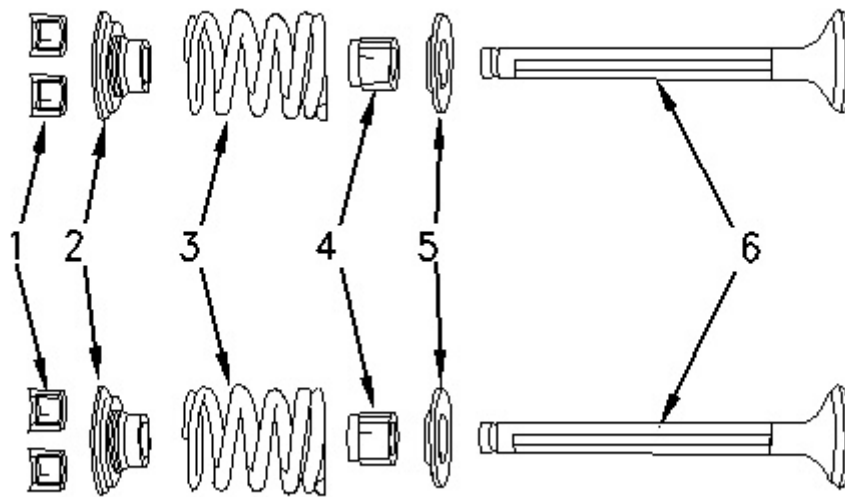


Illustration 1

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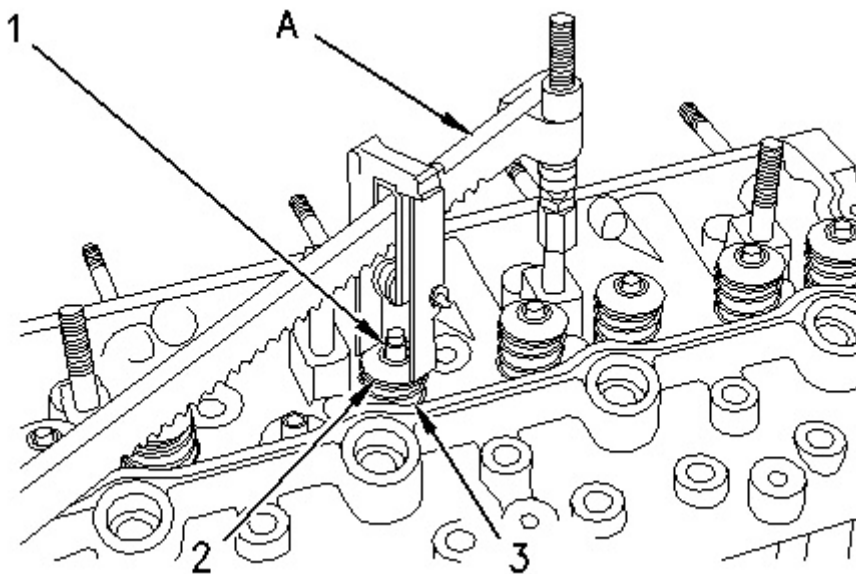


Illustration 2

g00825746

⚠ 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.

3. Use Tooling (A) to compress valve springs (3) .
4. Remove two valve keepers (1) .
5. Slowly release the pressure on Tooling (A) and remove Tooling (A) .
6. Remove valve spring retainers (2) .
7. Remove valve springs (3) .
8. Remove valve stem seals (4) .
9. Remove valve spring seat washers (5) .
10. Remove inlet valves (6) and exhaust valves (6) .

Removal Procedure (Alternate Method)

Table 2

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

Follow the instructions above using Tooling (B) .

Installation Procedure

Table 3

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

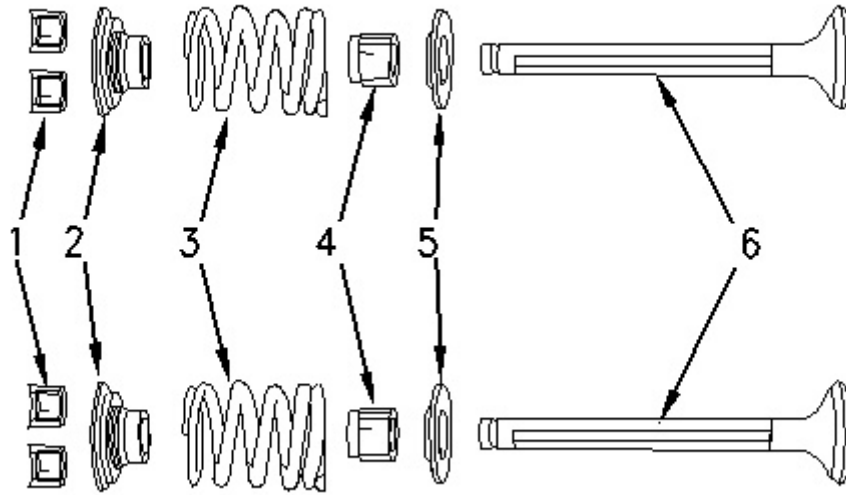


Illustration 3

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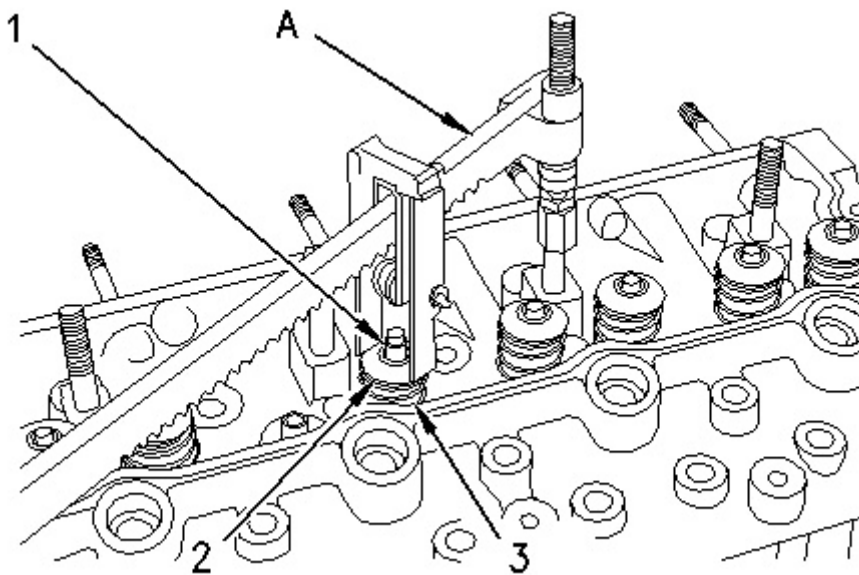


Illustration 4

g00825746

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

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.

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

Note: Install valve springs (3) on the valve spring seat washers. This is done with double valve springs.

6. Install valve spring retainers (2) .
7. Use Tooling (A) to compress valve springs (3) .
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, "Cylinder Head Valves" for more information on the inlet valves and the 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.

End By: Install the cylinder head. Refer to Disassembly and Assembly, "Cylinder Head - Install".

Installation Procedure (Alternate Method)

Table 4

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

Follow the procedure above using Tooling (B).

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3003, 3013, 3014 and 3024 Engines for Caterpillar Built Machines

Media Number -SEN5027-05

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i01591441

Engine Oil Relief Valve - Remove and Install

SMCS - 1315-010

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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

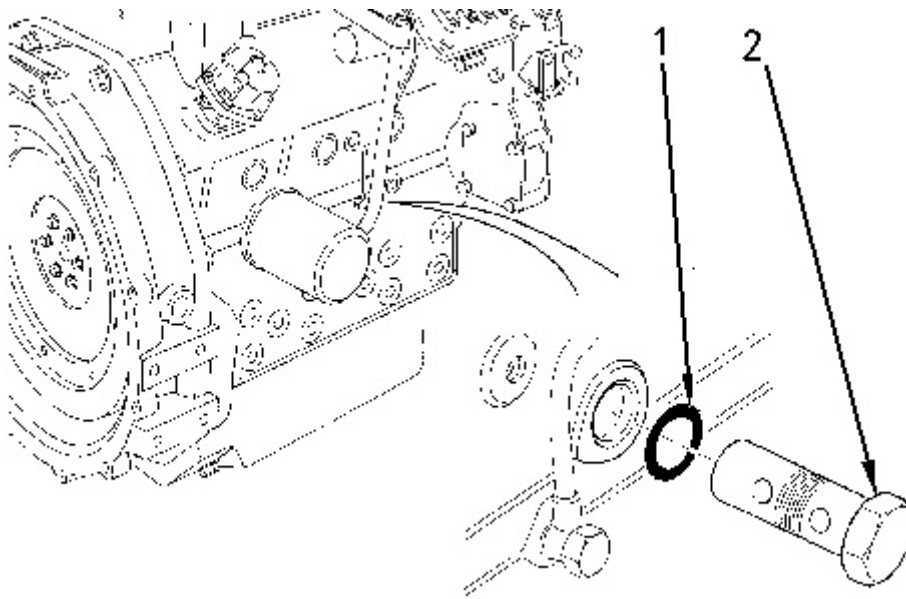


Illustration 1

g00820218

1. Remove engine oil relief valve (2) from the cylinder block.
2. Remove O-ring seal (1) from the engine oil relief valve.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

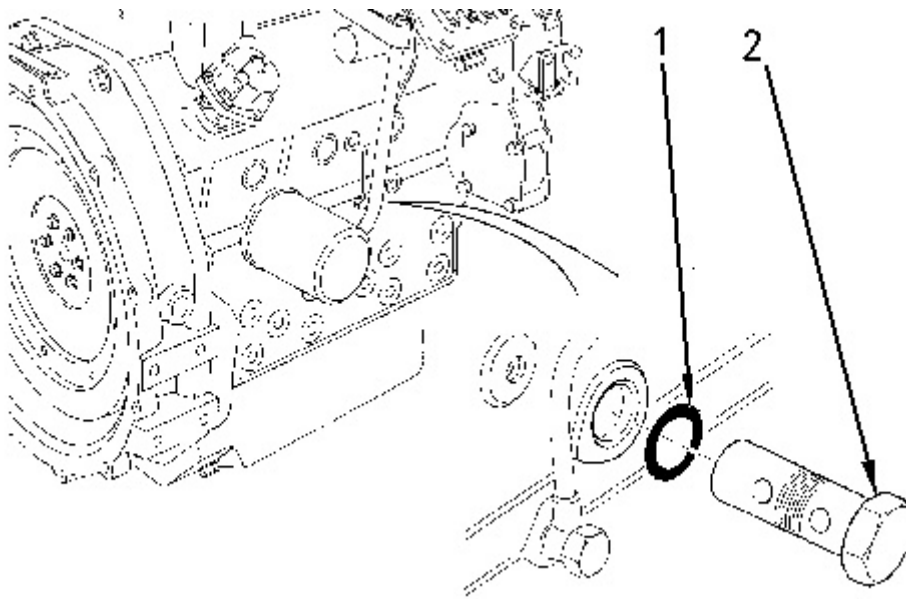


Illustration 2

g00820218

1. Install new O-ring seal (1) on engine oil relief valve (2) .
 2. Lubricate engine oil relief valve (2) with clean engine oil.
 3. Install engine oil relief valve (2) in the cylinder block. Tighten the engine oil relief valve to a torque of 64 N·m (47 lb ft).
-

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i02399591

Engine Oil Pump - Remove

SMCS - 1304-011

Removal Procedure

Start By:

- A. Remove the engine oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".
- B. Remove the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

**If the front housing is not installed, do not turn the crankshaft.
Damage to the engine may occur.**

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.

Engine Oil Pump

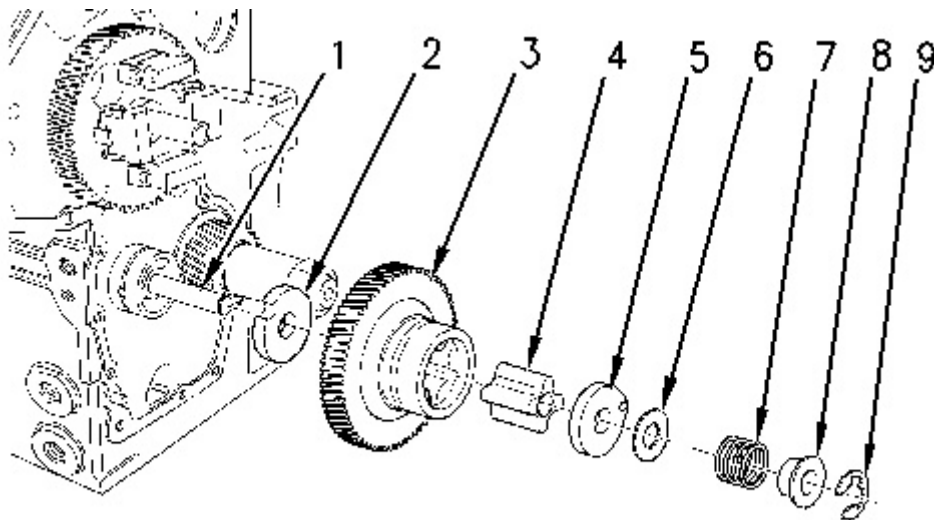


Illustration 1

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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. Remove retaining ring (9) that retains idler gear (3) on idler hub (1) .
 2. Remove the following items from idler hub (1) :
 - Collar (8)
 - Spring (7)
 - Shim (6)
 - Oil pump cover (5)
 - Inner rotor (4)
 3. Remove idler gear (3) from idler hub (1) .
 4. Remove thrust washer (2) from idler hub (1) .
 5. Inspect all the components for wear or damage. If components are worn or damaged, use new parts for replacement.
- Note:** Refer to Specifications, "Engine Oil Pump" for more information.
6. If the engine oil pump has excessive buildup of sludge, inspect the oil strainer. The oil strainer can be removed by using the following procedure:
 - a. Remove the engine oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".

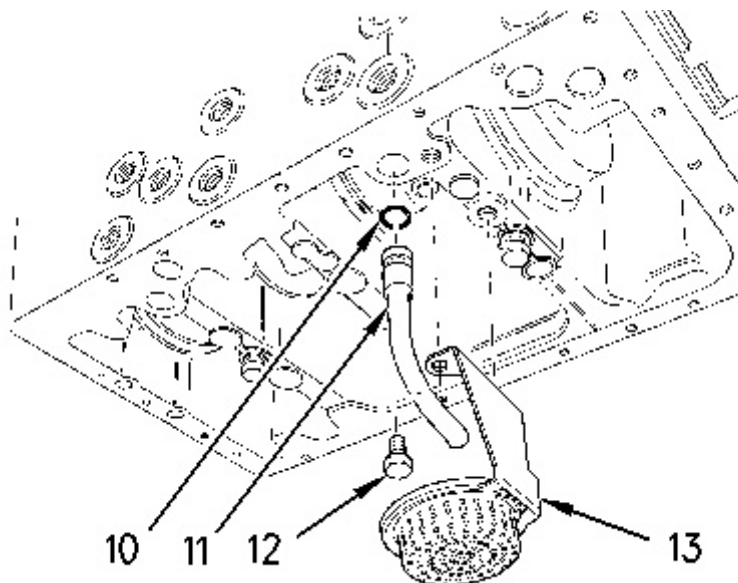


Illustration 2

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- b. Remove bolts (12) and oil strainer (13) from the cylinder block. Inspect the oil strainer for damage. If the oil strainer is damaged, use a new part for replacement.
- c. Remove tube assembly (11) from the cylinder block.

- d. Remove O-ring seal (10) from the tube assembly. Inspect the O-ring seal for wear or damage. If the O-ring seal is worn or damaged, use a new part for replacement.

Idler Hub

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0074	Slide Hammer Puller	1

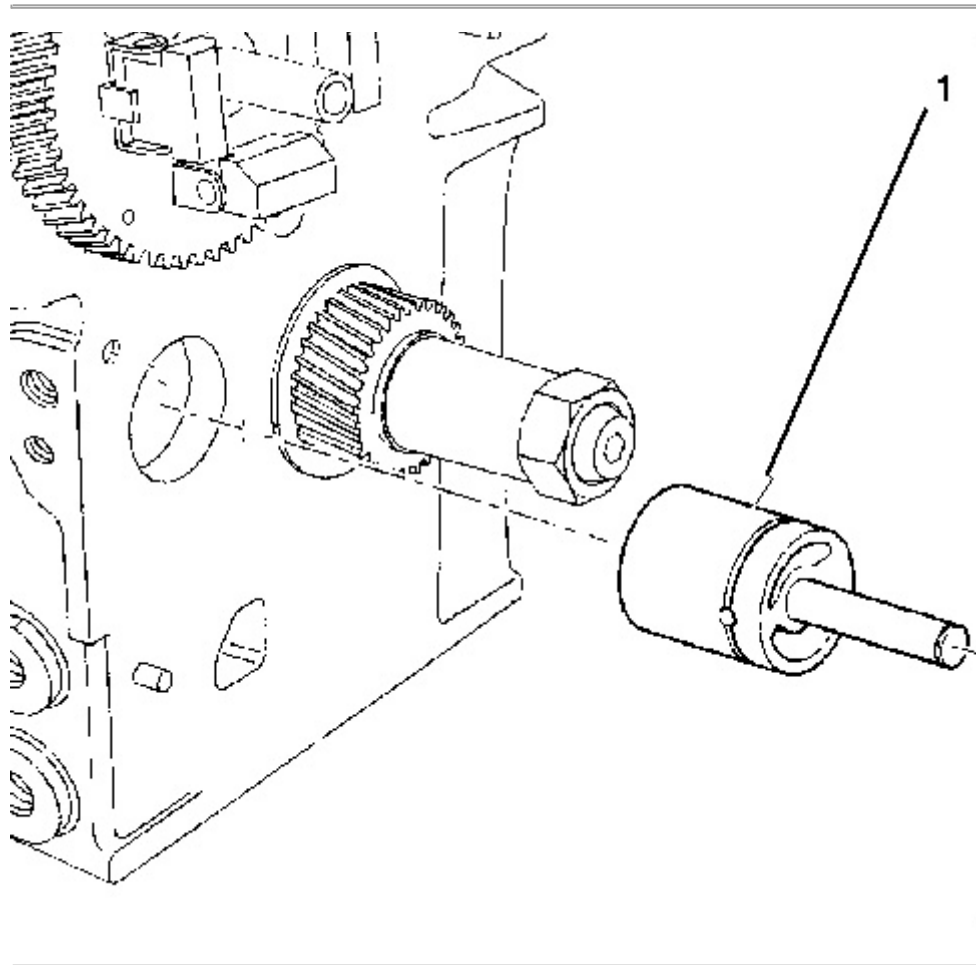


Illustration 3

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1. Use Tooling (A) to remove idler hub (1) from the cylinder block.

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i03121381

Engine Oil Pump - Install

SMCS - 1304-012

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
B	8T-5096	Dial Indicator Test Group	1
C ⁽¹⁾	256-4864	Alignment Tool	
C ⁽²⁾	241-4232	Alignment Tool	1
D	1S-0257	Ball Peen Hammer	1
E	1P-0808	Multipurpose Grease	1

⁽¹⁾ 3003 engines

⁽²⁾ 3013, 3014 and 3024 engines

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

**If the front housing is not installed, do not turn the crankshaft.
Damage to the engine may occur.**

Idler Hub

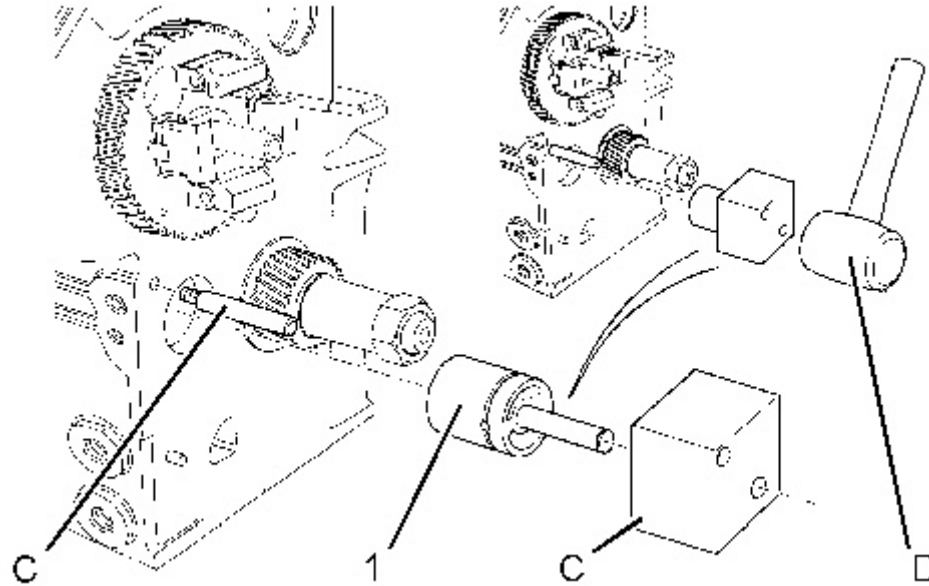


Illustration 1

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1. Use Tooling (C) and Tooling (D) to install idler hub (1) in the cylinder block.

Engine Oil Pump

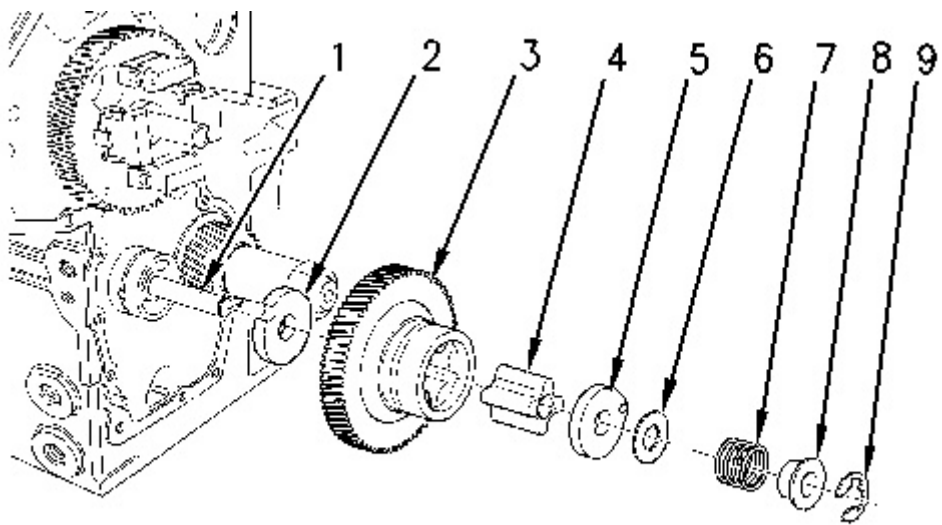


Illustration 2

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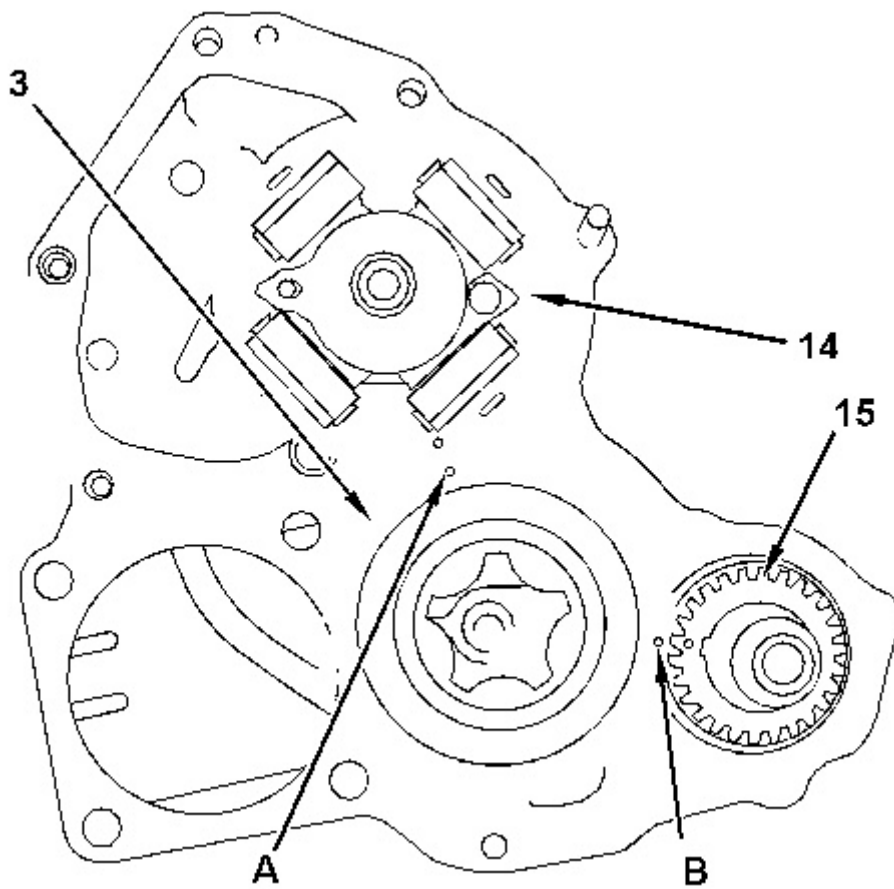


Illustration 3

g01037617



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. Apply Tooling (E) to the faces of inner rotor (4) and to the vanes of idler gear (3) .
2. Align Timing Marks (A) and (B) that are on idler gear (3) with the respective timing marks on gears (14) and (15) . Install idler gear (3) on idler hub (1) .
3. Install inner rotor (4) in idler gear (3) .



Personal injury can result from the release of the spring force.

The drive shaft, the piston, and the drive gear are under spring force.

Use a press to slowly release the spring force before the components are removed.

4. Install the following items on idler hub (1) :
 - Oil pump cover (5)
 - Shim (6)
 - Spring (7)
 - Collar (8)
 5. Install retaining ring (9) on idler hub (1) .
 6. Use Tooling (B) in order to measure the end play of the engine oil pump. Refer to Specifications, "Engine Oil Pump".
 7. If the oil strainer was removed, use the following procedure for installation:
-

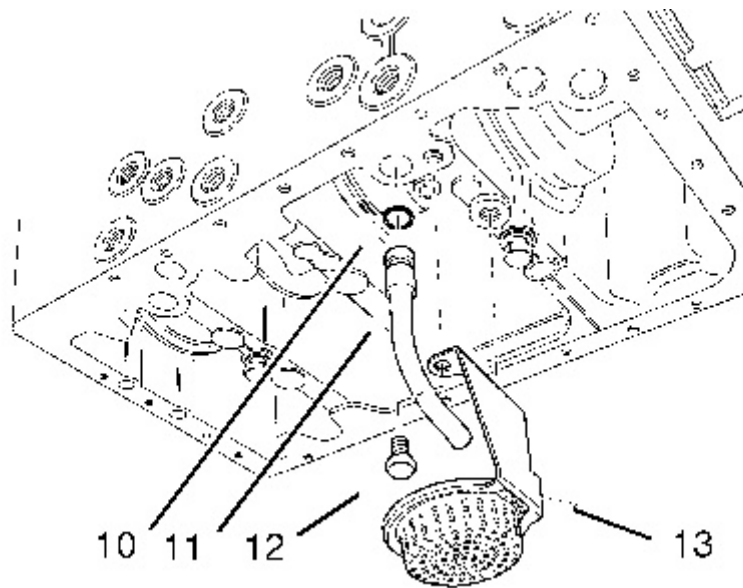


Illustration 4

g01037619

- a. Install O-ring seal (10) on tube assembly (11) .
- b. Install tube assembly (11) in the cylinder block.
- c. Install oil strainer (13) on the cylinder block and tighten bolts (12) to a torque of 11 N·m (97 lb in).

End By:

- a. Install the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Install".
 - b. Install the engine oil pan. Refer to Disassembly and Assembly, "Engine Oil Pan - Remove and Install".
-

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