

Product: TRACK LOADER

Model: 933 TRACK LOADER 9EL

Configuration: 933 & 933 LGP Track Loaders Power Shift 9EL00001-UP (MACHINE) POWERED BY 3046 Engine

## Disassembly and Assembly 3046 Engine For Caterpillar Built Machines

Media Number -SEN6458-05

Publication Date -01/04/2004

Date Updated -22/04/2004

i01027796

# Crankshaft Front Seal - Remove

SMCS - 1160-011

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1U-7600	Slide Hammer Puller	1

### Start By:

- A. Remove the vibration damper and the crankshaft pulley. Refer to Disassembly and Assembly, "Vibration Damper and Pulley - Remove and Install".

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### NOTICE

**Keep all parts clean from contaminants.**

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

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### NOTICE

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**Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide", for tools and supplies suitable to collect and contain fluids in Caterpillar machines.**

**Dispose of all fluids according to local regulations and mandates.**

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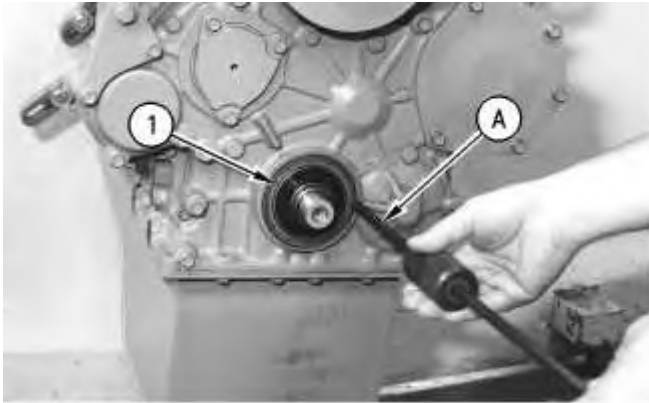


Illustration 1

g00529162

1. Drill three evenly spaced 3 mm (.12 inch) holes in crankshaft front seal (1) .
  2. Use Tool (A) and remove crankshaft front seal (1) .
-

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i01027827

# Crankshaft Front Seal - Install

SMCS - 1160-012

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	4C-6376	Seal Installer Stud	1
	4C-6377	Seal Installer Washer	1
	4C-6378	Seal Installer Sleeve	1

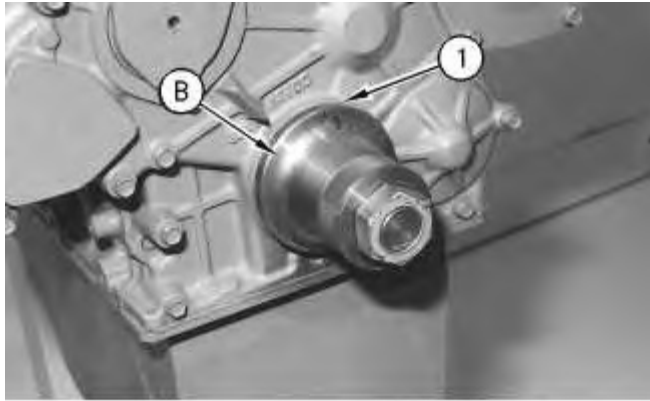
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### NOTICE

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---



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Illustration 1

g00529163

1. Clean the faces of all the mating parts. Apply a thin coat of clean engine oil to a new crankshaft front seal.
2. Install new crankshaft front seal (1) with Tool (A) .
3. Remove Tool (A) and check crankshaft front seal (1) for correct installation.
4. Apply clean engine oil to the face of the crankshaft pulley that will be in contact with the new crankshaft front seal.

**End By:** Install the vibration damper and the pulley. Refer to Disassembly and Assembly, "Vibration Damper and Pulley - Remove and Install".

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i01646292

# Gear Group (Front) - Remove - Idler Gear Only

SMCS - 1206-011

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	9U-6148	Idler Shaft Puller	1

### Start By:

- A. Remove the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Remove".

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**Note:** Before removal, ensure that the marks on the timing gears are in alignment. Align the fuel injection drive gear with the "33" mark with the "3" mark on the idler gear. Make an alignment of the "2" mark on the camshaft gear with the "22" mark on the idler gear. Align the "1" mark on the crankshaft gear with the "11" mark on the idler gear. The No. 1 cylinder is at the top center position when these marks are in alignment.

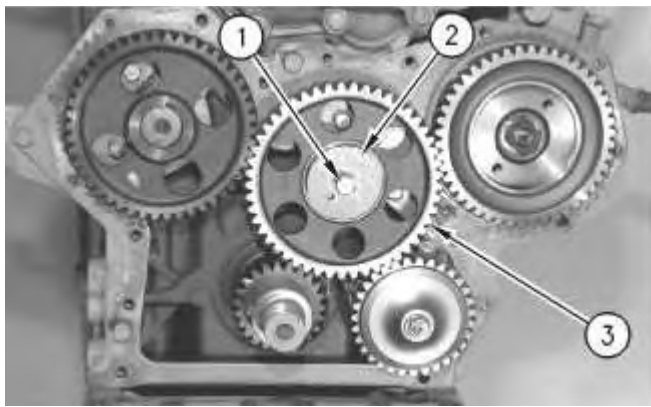


Illustration 1

g00559575

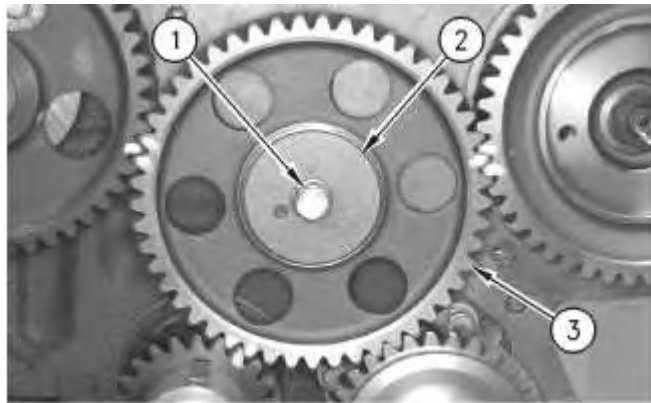


Illustration 2

g00559536

1. Remove idler gear bolt (1) and the washer from the idler gear shaft .
2. Remove thrust plate (2) .
3. Remove idler gear (3) .

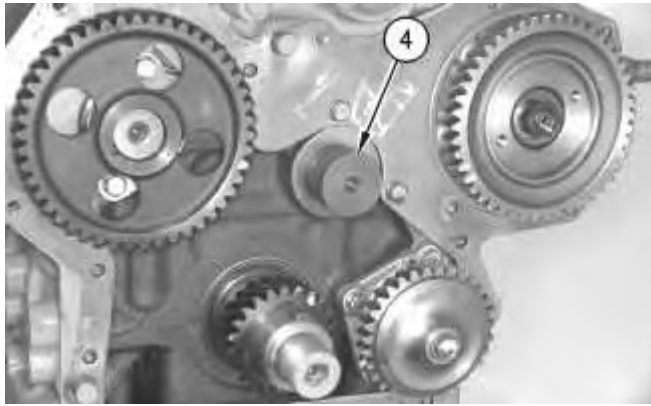


Illustration 3

g00559567

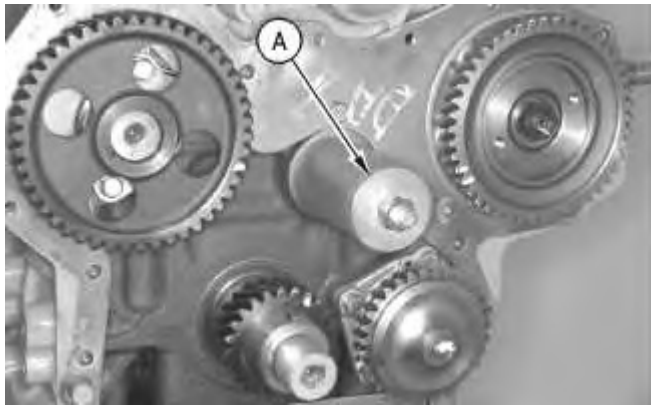


Illustration 4

g00559569

4. Use Tool (A) and remove idler shaft (4) from the cylinder block.



Illustration 5

g00559572

5. If necessary, remove five bolts (5) that hold front plate (6) to the cylinder block.

6. Remove front plate (6) and the gasket.

**Note:** See the following list for the removal of the other gears in the front gear group.

- In order to remove the camshaft gear, refer to Disassembly and Assembly, "Camshaft - Remove and Install".
  - In order to remove the fuel injection pump gear, refer to Disassembly and Assembly, "Fuel Injection Pump Housing and Governor - Remove".
  - In order to remove the gear to the engine oil pump, refer to Disassembly and Assembly, "Engine Oil Pump - Remove".
  - In order to remove the crankshaft front gear, refer to Disassembly and Assembly, "Crankshaft Gear - Remove and Install".
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Media Number -SEN6458-05

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i01045442

# Gear Group (Front) - Install - Idler Gear Only

SMCS - 1206-012

## 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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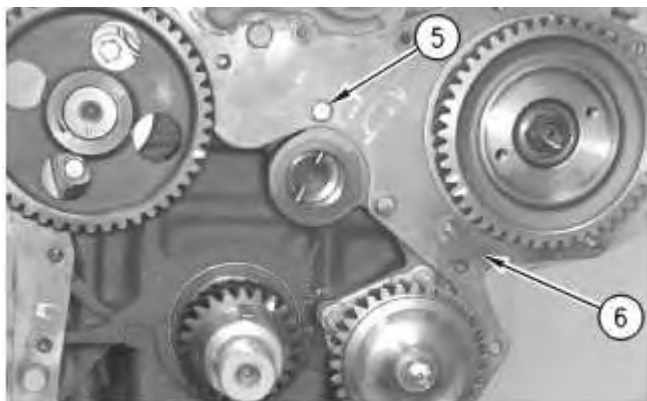


Illustration 1

g00559572

1. Install a new gasket and front plate (6) .

**Note:** Ensure that all mating surfaces are clean and free of old gasket material.

2. Install five bolts (5) that hold front plate (6) to the cylinder block. Tighten these bolts to a torque of 10 to 13 N·m (7 to 10 lb ft).

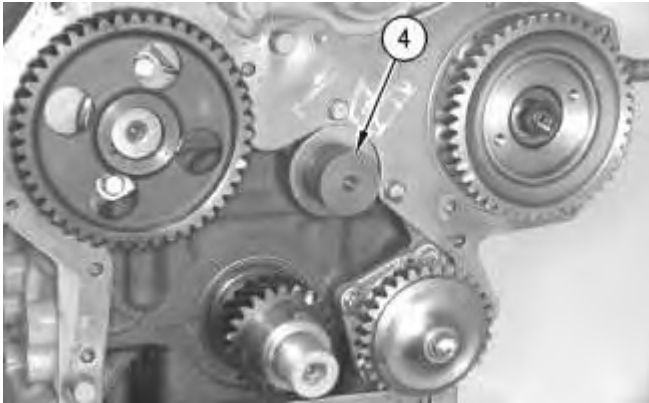


Illustration 2

g00559567

3. Install idler shaft (4) onto the cylinder block.

**Note:** If necessary, cool the idler shaft to 0 °C (32 °F) before installation.

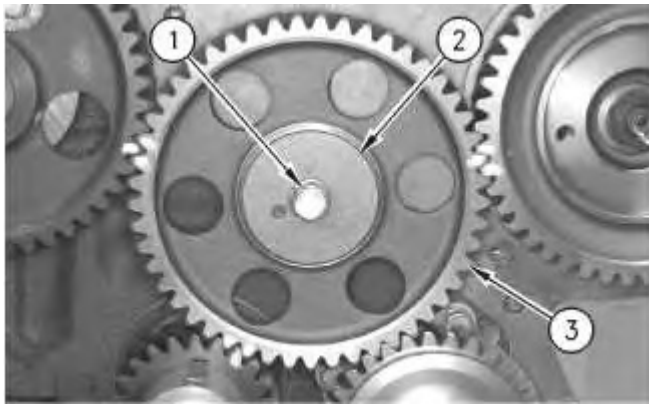


Illustration 3

g00559536

**Note:** Ensure that the marks on the timing gears are in alignment. Align the fuel injection drive gear with the "33" mark with the "3" mark on the idler gear. Make an alignment of the "2" mark on the camshaft gear with the "22" mark on the idler gear. Align the "1" mark on the crankshaft gear with the "11" mark on the idler gear. The No. 1 cylinder is at the top center position when these marks are in alignment.

4. Install idler gear (3) .
5. Install thrust plate (2) .
6. Install the washer and idler gear bolt (1) onto thrust plate (2). Tighten idler gear bolt (1) to a torque of  $34 \pm 5$  N·m ( $25 \pm 4$  lb ft).

**Note:** For more information, refer to the Specifications Module, "Gear Group (Front)".

**Note:** See the following list for the installation of the other gears in the front gear group.

- In order to install the camshaft gear, refer to Disassembly and Assembly, "Camshaft - Remove and Install".
- In order to install the fuel injection pump gear, refer to Disassembly and Assembly, "Fuel Injection Pump Housing and Governor - Install".
- In order to install the gear from the engine oil pump, refer to Disassembly and Assembly, "Engine Oil Pump - Install".
- In order to install the crankshaft front gear, refer to Disassembly and Assembly, "Crankshaft Front Gear - Remove and Install".

**End By:** Install the front housing. Refer to Disassembly and Assembly, "Housing (Front) - Install".

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## **Disassembly and Assembly 3046 Engine For Caterpillar Built Machines**

Media Number -SEN6458-05

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Date Updated -22/04/2004

i01646584

## **Housing (Front) - Remove**

SMCS - 1162-011

### **Removal Procedure**

#### **Start By:**

- A. Remove the alternator. Refer to Disassembly and Assembly, "Alternator - Remove and Install".
- B. Remove the vibration damper and the pulley. Refer to Disassembly and Assembly, "Vibration Damper and Pulley - Remove and Install".

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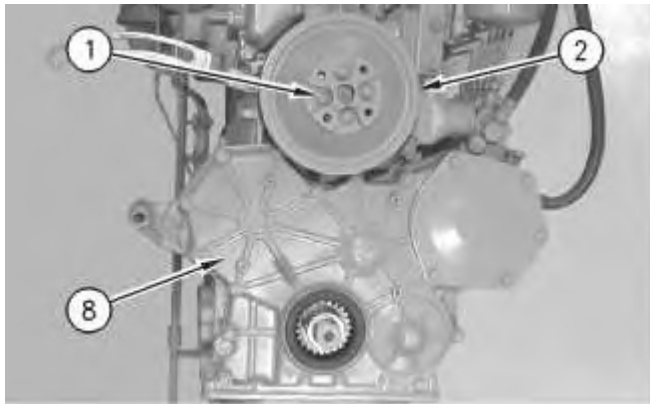


Illustration 1

g00560210

1. Remove four bolts (1) and the washers from fan pulley (2) .
2. Remove fan pulley (2) .

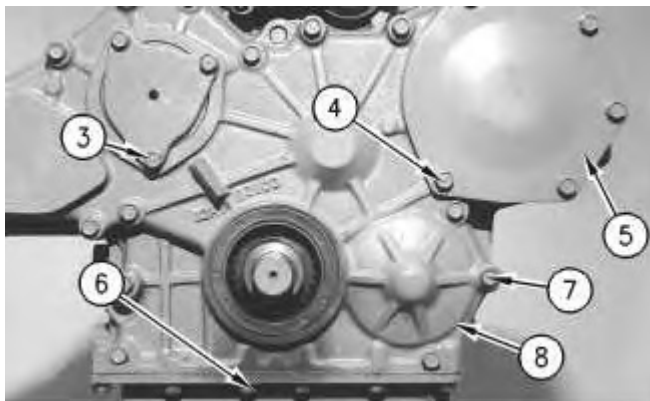


Illustration 2

g00529390

3. If equipped, remove bolts (3) and the washers from front housing (8) .
4. Remove five bolts (4) and the washers from cover (5) for the fuel injection pump gear.
5. Remove cover (5) for the engine oil pump.
6. Remove six bolts (6) and the washers that secure the engine oil pan to the front housing.
7. Remove bolts (7) that secure front housing (8) to the cylinder block.
8. Remove front housing (8) .

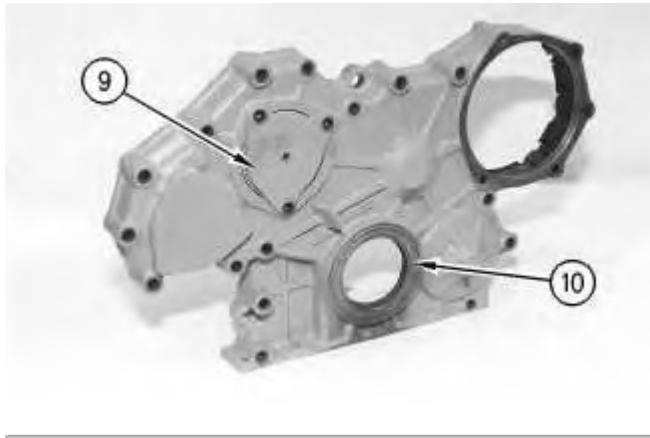


Illustration 3

g00529391

9. If equipped, remove cover (9) for the camshaft gear.
10. Check the condition of crankshaft front seal (10). If the crankshaft front seal is worn or damaged, use a new part for replacement. Refer to Disassembly and Assembly, "Crankshaft Front Seal - Remove" for removal of the crankshaft front seal .

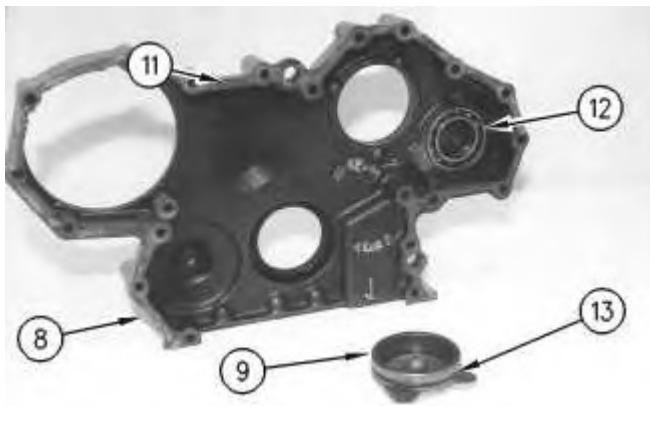


Illustration 4

g00529392

11. Remove bearing (12), if equipped. If the bearing is worn or damaged, use a new part for replacement.
  12. Clean old gasket material (11) from the contact surface of front housing (8) and the timing gear plate.
-

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Publication Date -01/04/2004

Date Updated -22/04/2004

i01646599

### Housing (Front) - Install

SMCS - 1162-012

### Installation Procedure

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#### NOTICE

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**Note:** Check the condition of the gaskets and the O-ring seals. If the gaskets or the O-ring seals are damaged or worn, use new parts for replacement.

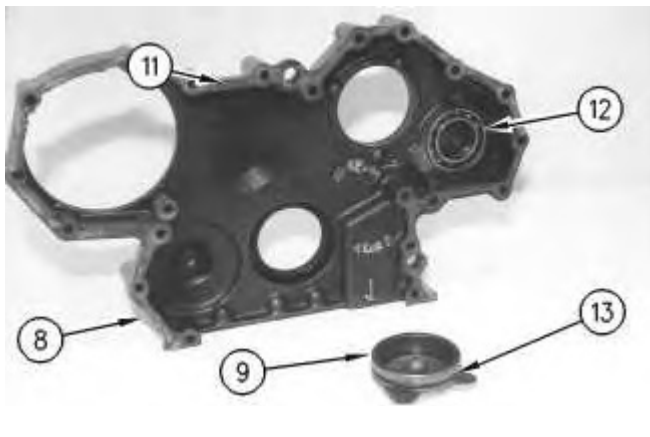


Illustration 1

g00529392

1. Clean old gasket material (11) from the contact surface of front housing (8) and the timing gear plate. Install a new gasket.
2. Install bearing (12), if equipped. If the bearing is worn or damaged, use a new part for replacement.
3. Install O-ring seal (13) onto cover (9), if equipped.

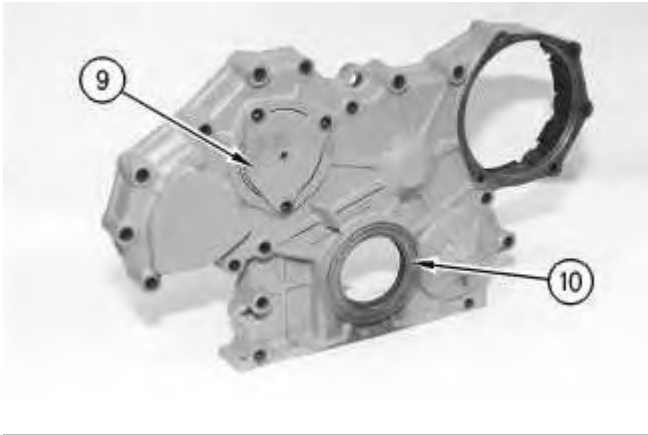


Illustration 2

g00529391

4. Install a new crankshaft front seal (10), if the crankshaft front seal was removed. Refer to Disassembly and Assembly, "Crankshaft Front Seal - Install".
5. If equipped, install camshaft gear cover (9) onto front housing (8) .

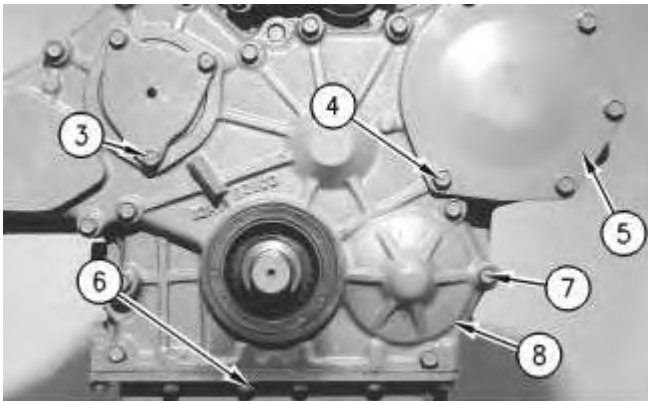


Illustration 3

g00529390

6. Install front housing (8) .
7. Install bolts (7) in order to fasten front housing (8) onto the cylinder block.
8. Install the washers and six bolts (6) in order to secure front housing (8) onto engine oil pan.
9. Install cover (5) for fuel injection pump gear.



10. Install the washers and five bolts (4) in order to secure cover (5) for fuel injection pump gear onto front housing (8) .
11. If equipped, install the washers and bolts (3) in order to secure camshaft gear cover (9) onto front housing (8) .

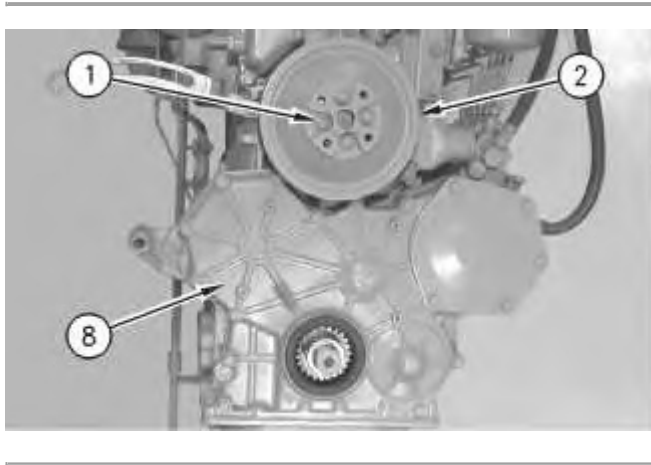


Illustration 4

g00560210

12. Install fan pulley (2) .
13. Install the washers and four bolts (1) in order to secure fan pulley (2) onto the water pump.

**End By:**

- a. Install the vibration damper and the pulley. Refer to Disassembly and Assembly, "Vibration Damper and Pulley - Remove and Install".
  - b. Install the alternator. Refer to Disassembly and Assembly, "Alternator - Remove and Install".
-

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Date Updated -22/04/2004

i01579643

# Valve Mechanism Cover - Remove and Install

SMCS - 1107-010

## Removal Procedure

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### NOTICE

**Keep all parts clean from contaminants.**

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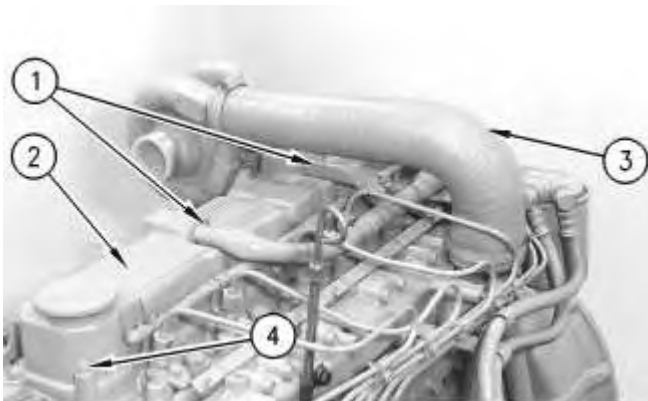


Illustration 1

g00530277

1. Loosen two hose clamps and remove hose (3) from the air inlet manifold and the turbocharger.

2. Loosen the clamps and disconnect two hoses (1) from valve mechanism cover (2) .
3. Remove seven bolts (4) and the washers from valve mechanism cover (2) .
4. Remove valve mechanism cover (2) .



Illustration 2

g00530278

5. Remove gasket (5) from valve mechanism cover (2) .

## Installation Procedure

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### NOTICE

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Illustration 3

g00530278

1. Check the condition of gasket (5) on valve mechanism cover (2). If the gasket is worn or damaged, use a new part for replacement.

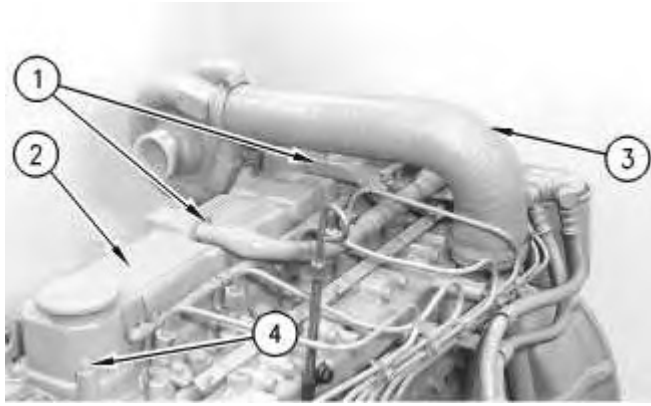


Illustration 4

g00530277

2. Install valve mechanism cover (2) and bolts (4). Torque the bolts to 3 N·m to 5 N·m (26 lb in to 44 lb in).
  3. Install two hoses (1) onto valve mechanism cover (2) and tighten the clamps that secure the hoses.
  4. Install hose (3) and tighten the two clamps that secure the hose.
-

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Date Updated -22/04/2004

i01030044

# Rocker Shaft and Pushrod - Remove

SMCS - 1102-011; 1208-011

## Removal Procedure

### Start By:

- A. Remove the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".

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### NOTICE

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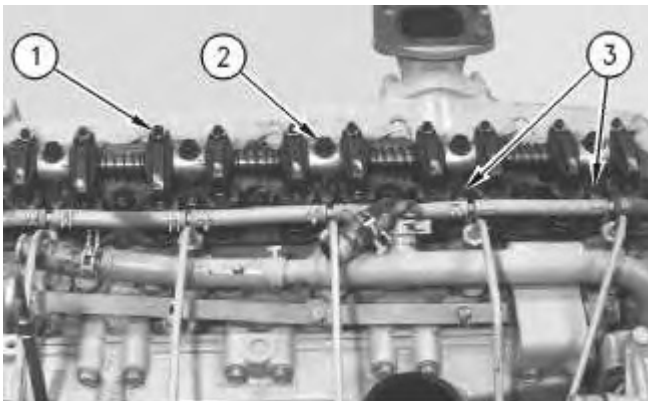


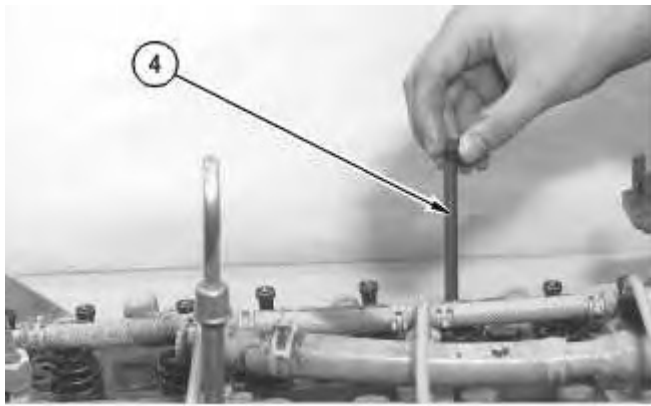
Illustration 1

g00530465

1. Loosen adjusting screws (1) on rocker arms.
2. Loosen six short bolts (3) and the washers on the rocker arm brackets.
3. Loosen six rocker bracket bolts (2) .

**Note:** Rocker bracket bolts are the longer bolts.

4. Remove six rocker bracket bolts (2) from the rocker arm brackets.
5. Remove six short bolts (3) and the washers from the rocker arm brackets.
6. Remove the rocker shaft assembly.



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Illustration 2

g00530467

7. Put identification marks on pushrods (4) in order to identify the location of the pushrods in the engine. Remove pushrods (4) .
-

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