

Product: INDUSTRIAL ENGINE
Model: C6.6 INDUSTRIAL ENGINE 666
Configuration: C6.6 Industrial Engine 66600001-UP

Disassembly and Assembly C6.6 Industrial Engine

Media Number -REN9722-03

Publication Date -01/03/2014

Date Updated -03/10/2017

i04751009

Crankshaft Front Seal - Remove and Install

SMCS - 1160-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	278-2636	Front Oil Seal Removal Tool	1
A ⁽²⁾	1P-2320	Combination Puller	1

⁽¹⁾ Use this tool with earlier crankshafts.

⁽²⁾ Use this tool with later crankshafts.

Start By:

- A. Remove the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - Remove and Install".

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

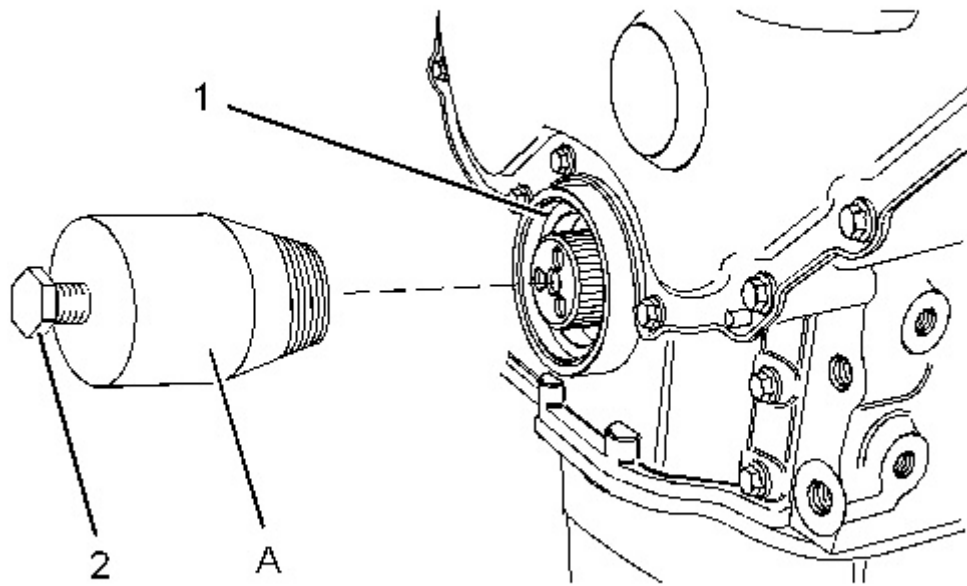


Illustration 1

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Use this tool with earlier crankshafts.

1. Position Tooling (A) on the nose of the crankshaft. Screw Tooling (A) into crankshaft front seal (1) .

Note: Do not damage the edge of the housing for the crankshaft front seal.

2. Screw bolt (2) into Tooling (A) in order to remove crankshaft front seal (1) .
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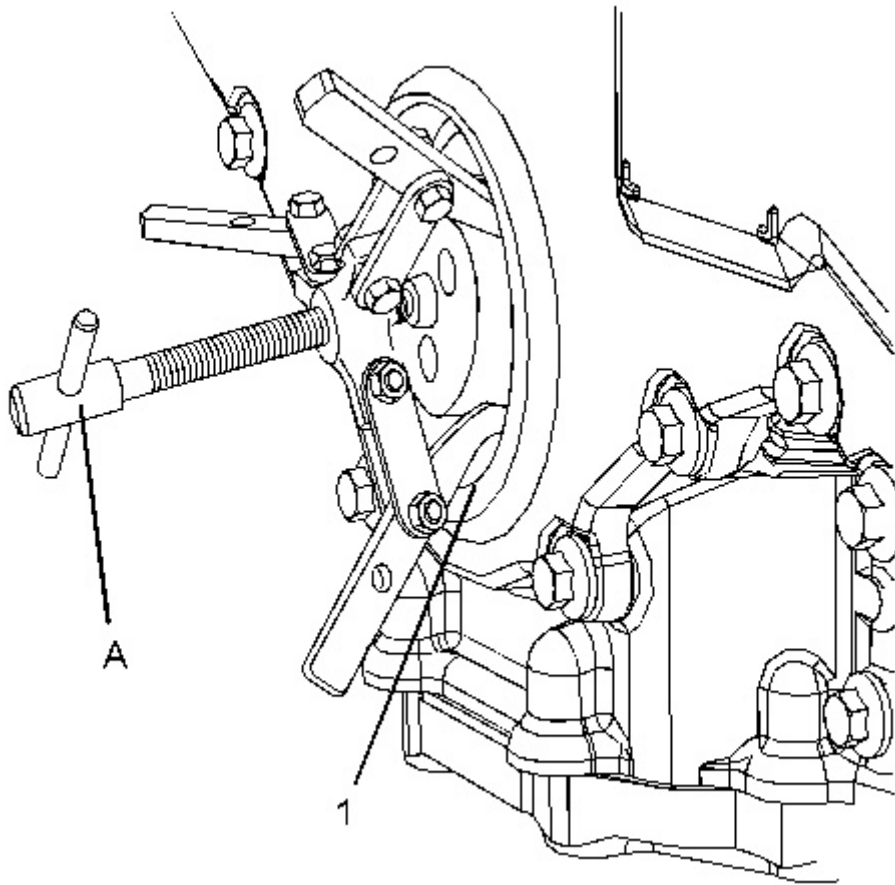


Illustration 2

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Use this tool with later crankshafts.

3. Install the legs of Tooling (A) behind crankshaft front seal (1) . Install a suitable spacer between Tooling (A) and the crankshaft.
4. Use Tooling (A) in order to pull crankshaft front seal (1) out of the housing.

Note: Do not damage the edge of the housing for the crankshaft front seal.

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
	276-1209	Seal Installer	1
B	9U-6206	Stud	1
	9U-6207	Plate	1
	9U-6209	Sleeve	1
C ⁽¹⁾	276-1207	Anchor Plate	1

D ⁽²⁾	366-5984	Anchor Plate	1
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⁽¹⁾ Use this tool with earlier crankshafts.

⁽²⁾ Use this tool with later crankshafts.

NOTICE

Keep all parts clean from contaminants.

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1. Ensure that the bore for the crankshaft front seal in the front housing is clean and free from damage.

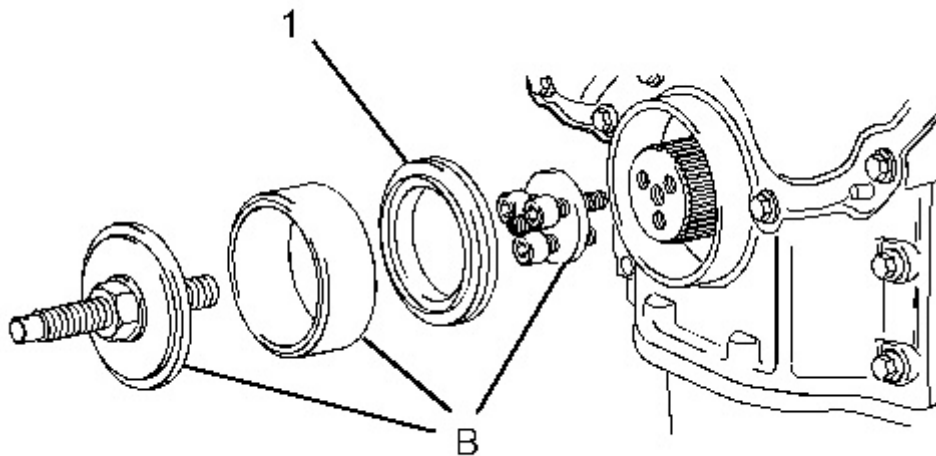


Illustration 3

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Typical example

2. Assemble Tooling (B) , Tooling (C) , or Tooling (D) .
3. Align new crankshaft front seal (1) to the front housing.

Note: If the crankshaft front seal is supplied with a sleeve, remove the sleeve from the crankshaft front seal before installation.

4. Use Tooling (B) , Tooling (C) , or Tooling (D) to install crankshaft front seal (1) . Ensure that the front face of the seal is installed to a depth of 6.5 ± 0.2 mm (0.256 ± 0.008 inch) into the front housing.

5. Remove Tooling (B) , Tooling (C) , or Tooling (D) from the crankshaft.

End By: Install the crankshaft pulley. Refer to Disassembly and Assembly, "Crankshaft Pulley - Remove and Install".

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i02786783

Front Cover - Remove and Install

SMCS - 1166-010

Removal Procedure

Start By:

- a. If the engine has a fan, remove the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install".
- b. Remove the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove".

Note: In order to remove the front cover, it is not necessary to remove the crankshaft pulley or the alternator.

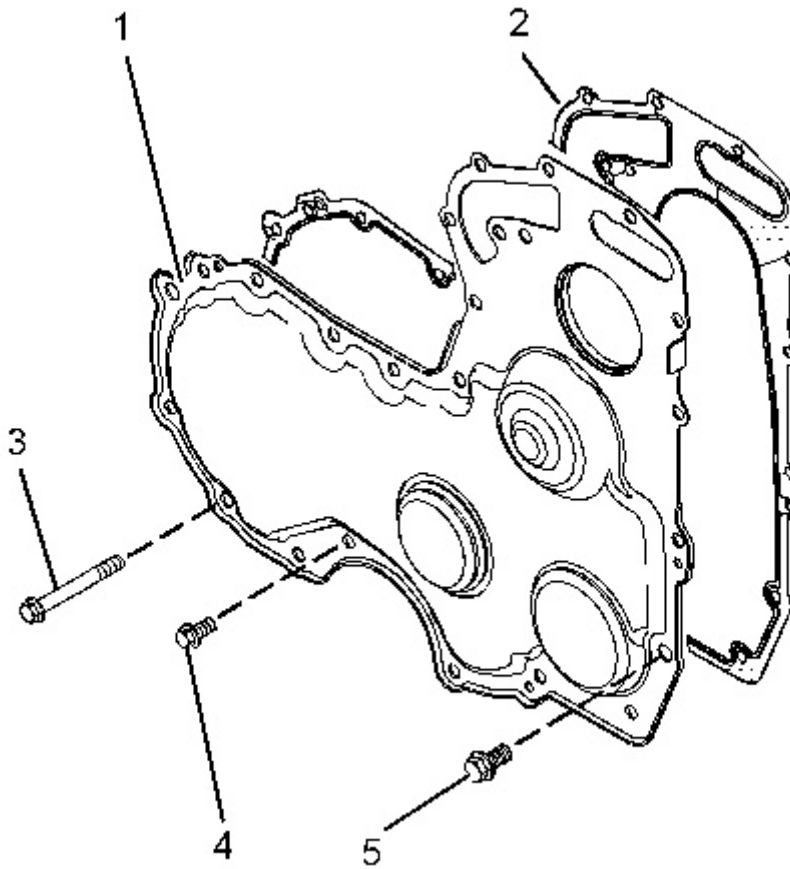


Illustration 1
Typical example

g01337873

1. Remove bolts (3) and (4). Remove bolt (5). Identify the positions of the different bolts .

Note: The bolt (5) may not be installed to some engines.

2. Remove front cover (1) from the front housing.
3. Remove joint (2) from front cover (1).

Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Guide Stud (M8 by 70 mm)	2

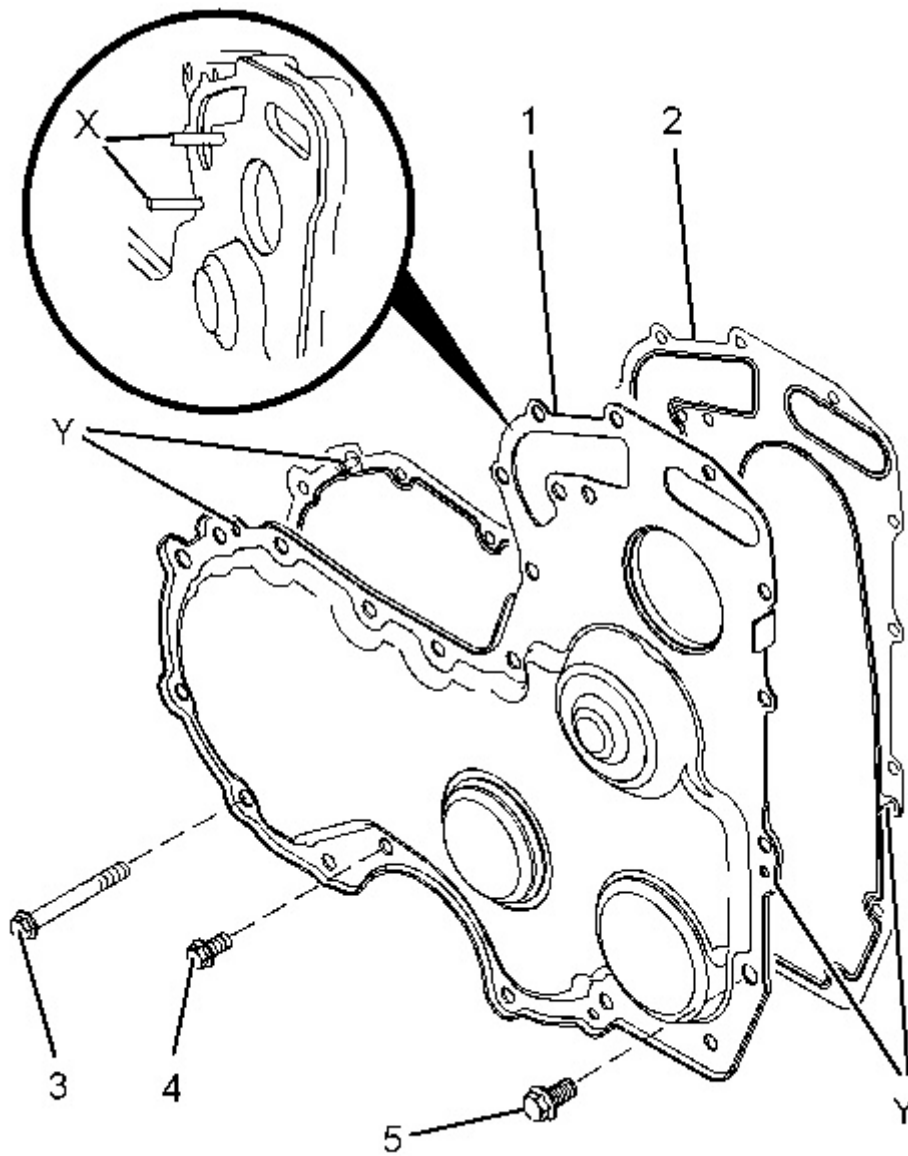


Illustration 2

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Typical example

1. Thoroughly clean the mating surface of the front housing.
2. If the original front cover is installed, follow Steps 2.a through 2.b.
 - a. Thoroughly clean front cover (1).
 - b. Install a new joint (2) to front cover (1). Engage three locators (Y) into the holes in the front cover.
3. Install Tooling (A) into holes (X) in the front housing.
4. Use Tooling (A) in order to position the front cover assembly onto the front housing.
5. Install bolts (3) and (4). Install bolt (5) finger tight. Ensure that the different bolts are installed in the correct positions.

Note: The bolt (5) may not be installed to some engines.

6. Loosely install the water pump assembly and remove Tooling (A). Refer to Disassembly and Assembly, "Water Pump - Install" for the correct procedure.
7. Tighten bolts (3), (4) and (5) to a torque of 22 N·m (16 lb ft).
8. Tighten the bolts for the water pump to a torque of 22 N·m (16 lb ft).

End By:

- a. If the engine has a fan, install the fan. Refer to Disassembly and Assembly, "Fan - Remove and Install".
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i06192499

Gear Group (Front) - Remove and Install

SMCS - 1206-010

Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A ⁽¹⁾	9U-6198	Crankshaft Turning Tool	1
A ⁽²⁾	9U-7336	Housing	1
	5P-7305	Engine Turning Tool	1
B	230-6284	Timing Pin (Camshaft)	1
C	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1

⁽¹⁾ The Crankshaft Turning Tool is used on the front pulley.

⁽²⁾ This Tool is used in the aperture for the electric starting motor.

Start By:

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

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

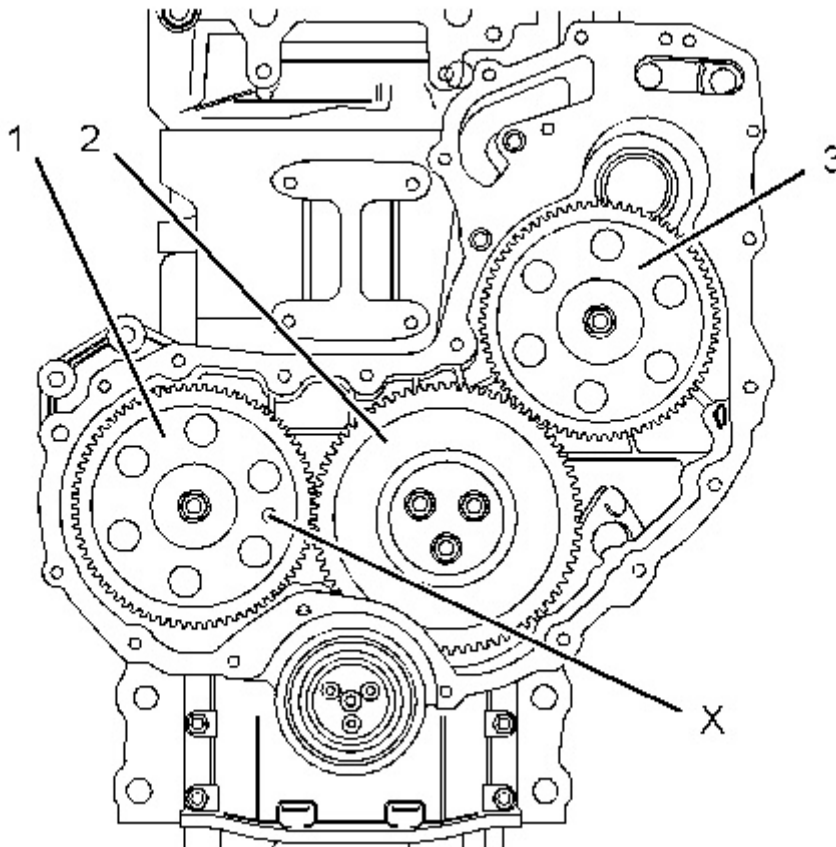
NOTICE

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.

Dispose of all fluids according to local regulations and mandates.

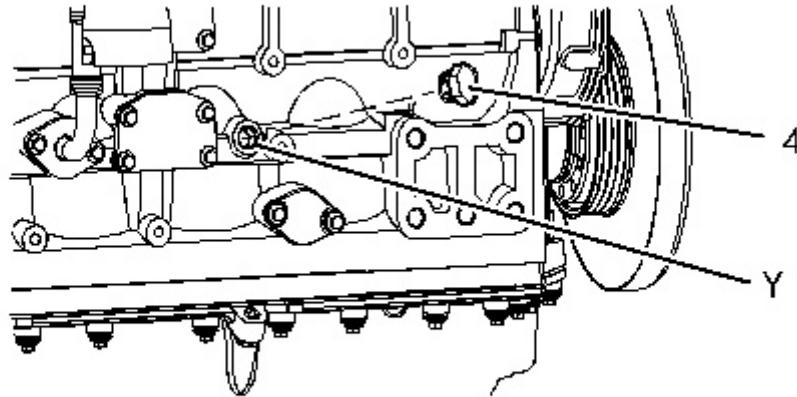
Note: Either Tooling (A) can be used. Use the Tooling that is most suitable. Care must be taken in order to ensure that the fuel injection pump timing is not lost during the removal of the front gear group. Carefully follow the procedure in order to remove the gear group.

1. Use Tooling (A) in order to rotate the crankshaft so that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston".



Typical example

2. Install Tooling (B) through hole (X) in camshaft gear (1) into the front housing. Use Tooling (B) in order to lock the camshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston".



3. Remove plug (4) from the cylinder block. Install Tooling (C) into hole (Y) in the cylinder block. Use Tooling (C) in order to lock the crankshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston".

Note: Do not use excessive force to install Tooling (C) . Do not use Tooling (C) to hold the crankshaft during repairs.

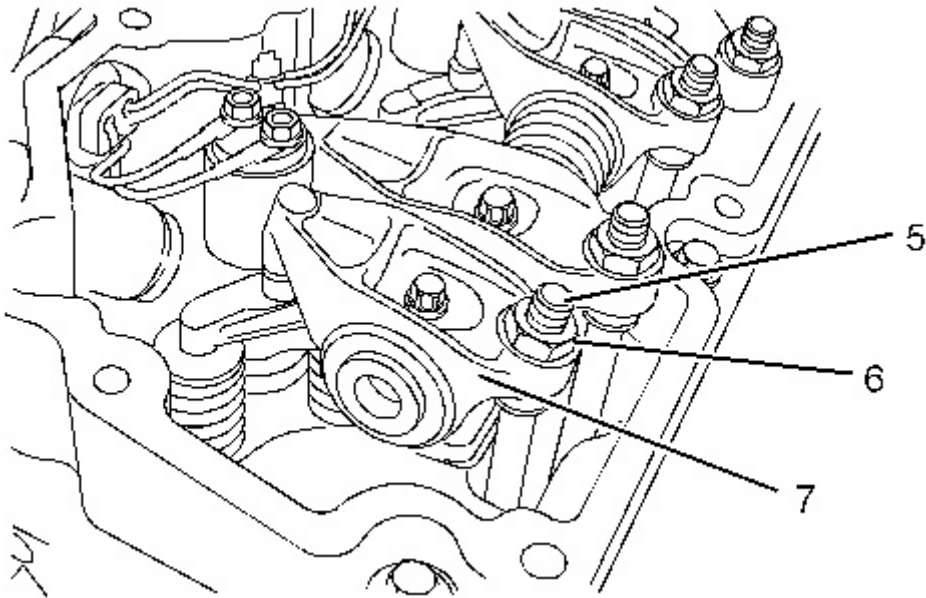


Illustration 3

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4. Loosen nuts (6) on all rocker arms (7) . Unscrew adjusters (5) on all rocker arms (7) until all valves are fully closed.

Note: Failure to ensure that ALL adjusters are fully unscrewed can result in contact between the valves and pistons.

5. Apply sufficient pressure to fuel injection pump gear (3) in a counterclockwise direction in order to remove the backlash. Lock the fuel injection pump in this position. Refer to Disassembly and Assembly, "Fuel Pump Gear - Remove" for the correct procedure.

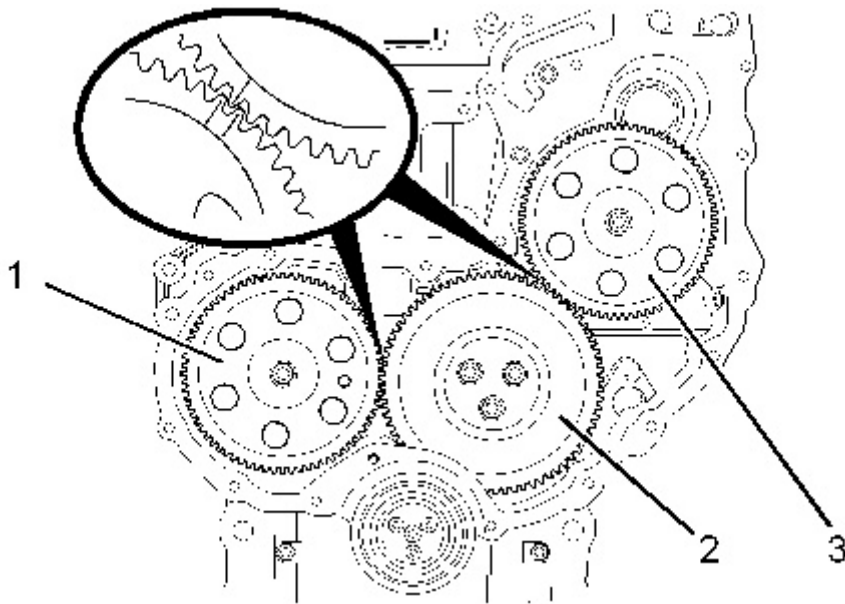


Illustration 4

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Typical example

6. Mark gears (1) , (2) and (3) in order to show alignment. Refer to Illustration 4.

Note: Identification will ensure that the gears can be installed in the original alignment.

7. Remove fuel pump gear (3) . Refer to Disassembly and Assembly, "Fuel Pump Gear - Remove and Install" for the correct procedure.

8. Remove camshaft gear (1) . Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install".

9. Remove idler gear (2) . Refer to Disassembly and Assembly, "Idler Gear - Remove and Install".

Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
B	230-6284	Timing Pin (Camshaft)	1
C	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: The fuel injection pump must remain locked until the procedure instructs you to unlock the fuel injection pump.

1. Ensure that number one piston is at top dead center on the compression stroke. Refer to System Operation, Testing and Adjusting, "Finding Top Center for No. 1 Piston".

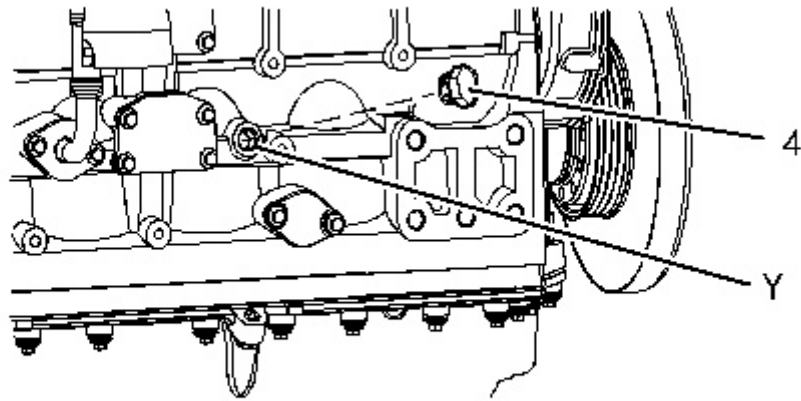


Illustration 5

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2. If necessary, install Tooling (C) into hole (Y) in the cylinder block. Use Tooling (C) in order to lock the crankshaft in the correct position. Refer to System Operation, Testing and Adjusting, "Finding Top Center Position for No.1 Piston".

Note: Do not use excessive force to install Tooling (C) . Do not use Tooling (C) to hold the crankshaft during repairs.

3. Ensure that all of the components of the front gear group are clean and free from wear of damage. If necessary, replace any components that are worn or damaged.

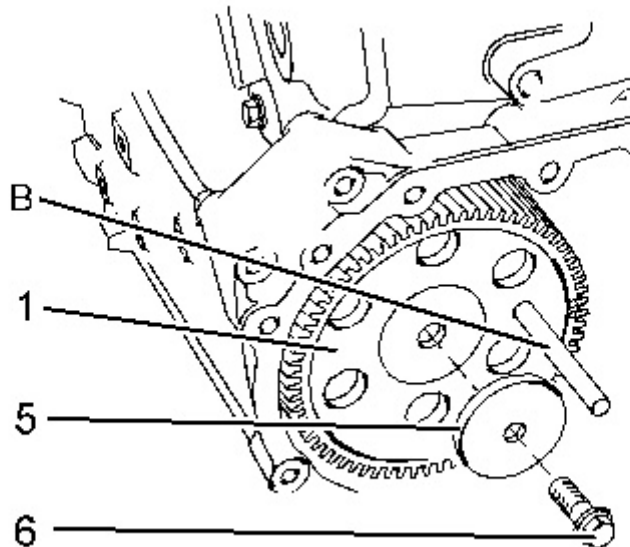


Illustration 6

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4. Install camshaft gear (1) . Loosely install bolt (6) and washer (5) for the camshaft gear. Refer to Disassembly and Assembly, "Camshaft Gear - Remove and Install" for more information.

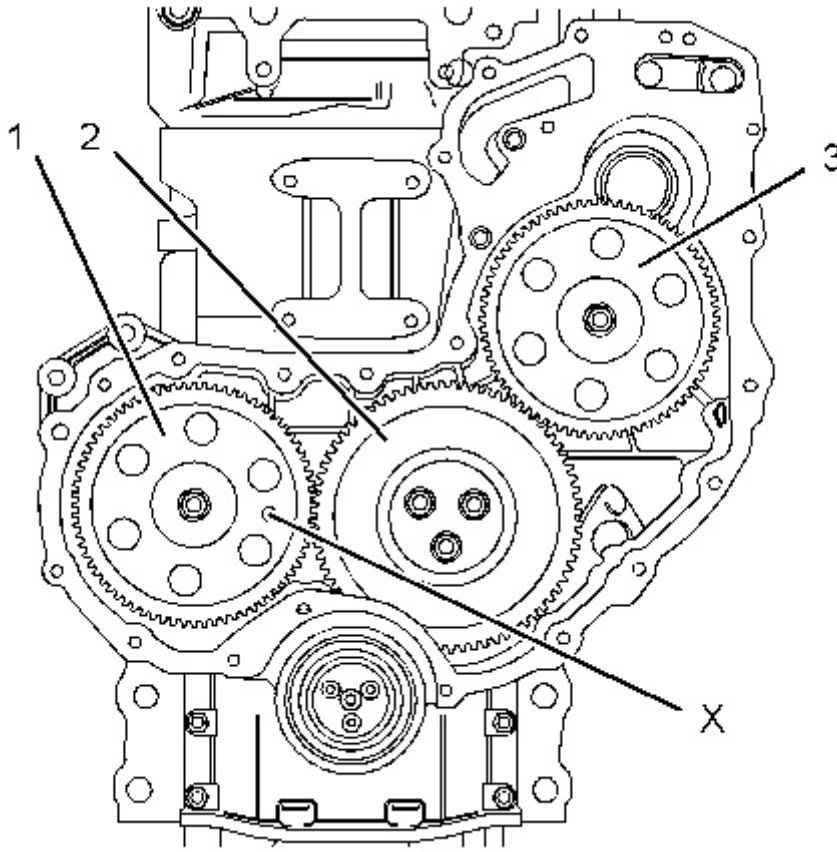


Illustration 7

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Typical example

5. Install Tooling (B) through hole (X) in camshaft gear (1) into the front housing.
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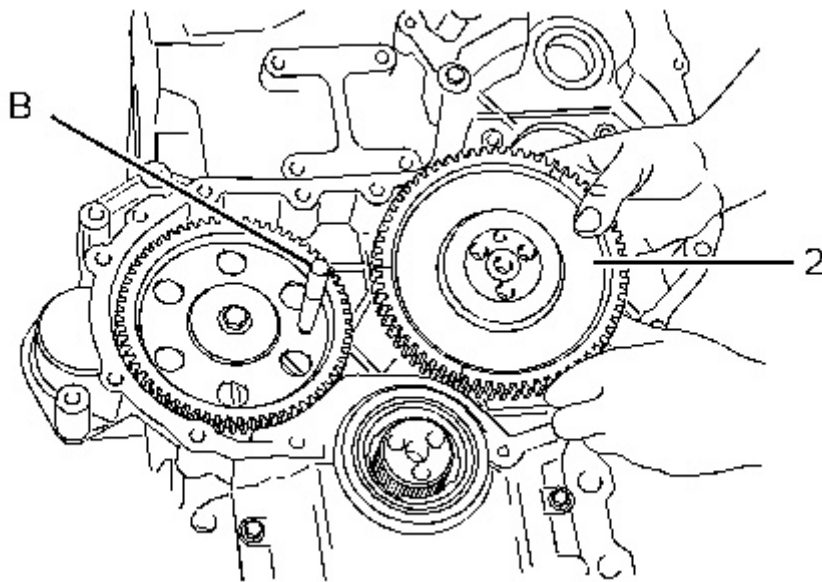


Illustration 8

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Typical example

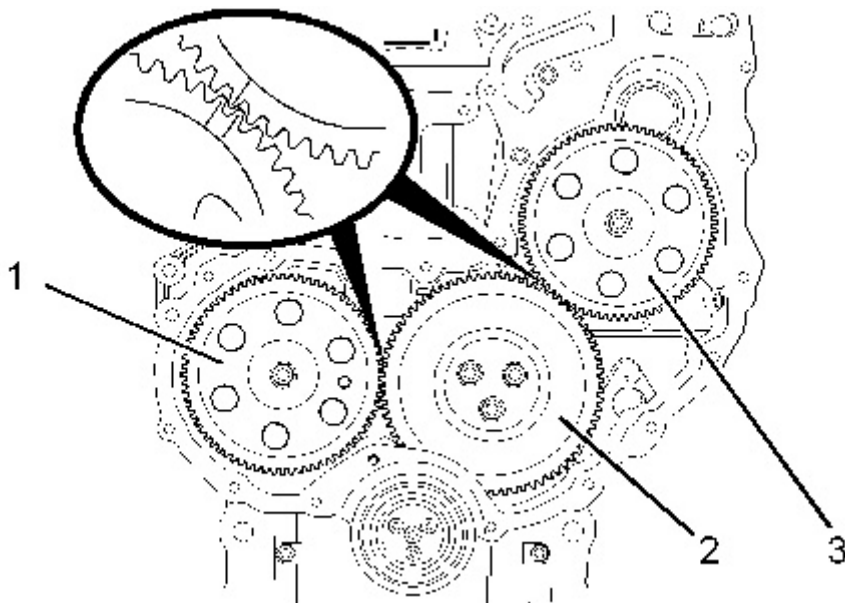


Illustration 9

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Alignment of timing marks

6. Install idler gear (2) . Ensure that the timing marks on gear (1) and gear (2) are in alignment and that the mesh of the gears is correct. Refer to Disassembly and Assembly, "Idler Gear - Remove and Install". Check the end play of the idler gear. Refer to Specifications, "Gear Group (Front)" and refer to Disassembly and Assembly, "Idler Gear - Remove and Install" for further information.

7. Tighten bolt (6) for the camshaft gear to a torque of 95 N·m (70 lb ft). Check the end play of the camshaft gear. Refer to Specifications, "Camshaft" for more information.
8. Ensure that the fuel injection pump is locked in the correct position. Refer to Disassembly and Assembly, "Fuel Injection Pump - Install".
9. Install fuel injection pump gear (3) . Ensure that the timing marks on gear (2) and gear (3) are in alignment. See Illustration 9. Ensure that the mesh of the gears is correct. Refer to Disassembly and Assembly, "Fuel Injection Pump Gear - Install" for more information.
10. Remove Tooling (B) and (C) . Install plug (4) into hole (Y) in the cylinder block. Refer to Illustration 5.

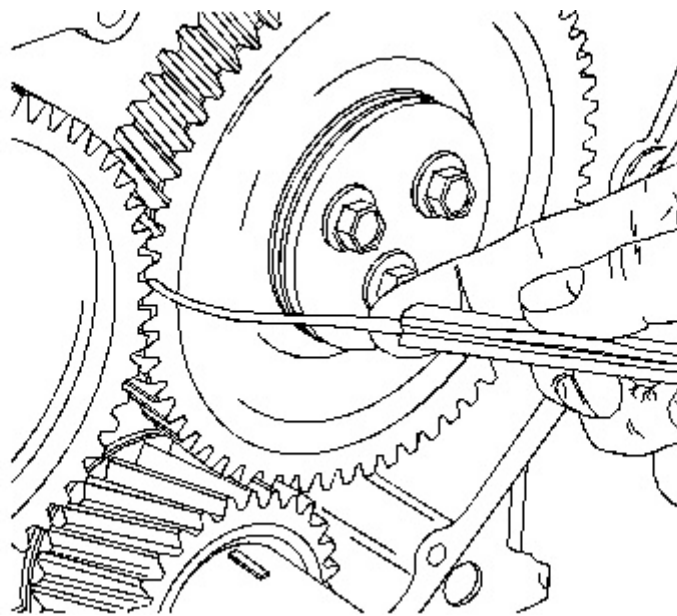


Illustration 10

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Checking backlash

11. Ensure that the backlash for gears (1) , (2) and (3) is within specified values. Refer to Specifications, "Gear Group (Front)" for further information.
12. Lubricate each gear with clean engine oil.
13. Adjust the engine valve lash. Refer to System Operation, Testing and Adjusting, "Engine Valve Lash - Inspect/Adjust".

End By:

- a. Install the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install".
 - b. Install the front cover. Refer to Disassembly and Assembly, "Front Cover - Remove and Install".
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i05735237

Idler Gear - Remove

SMCS - 1206-011

Removal Procedure (Standard Idler Gear)

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	230-6284	Timing Pin (Camshaft)	1
B	136-4632	Timing Pin (Crankshaft)	1
	268-1966	Adapter	1

Start By:

- a. Remove the fuel injection pump gear. Refer to Disassembly and Assembly, "Fuel Pump Gear - Remove" for the correct procedure.
- b. Remove the valve mechanism cover. Refer to Disassembly and Assembly, "Valve Mechanism Cover - Remove and Install" for the correct procedure.

Note: Care must be taken in order to ensure that the fuel injection pump timing is not lost during the removal of the fuel pump gear. Carefully follow the procedure in order to remove the fuel pump gear.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

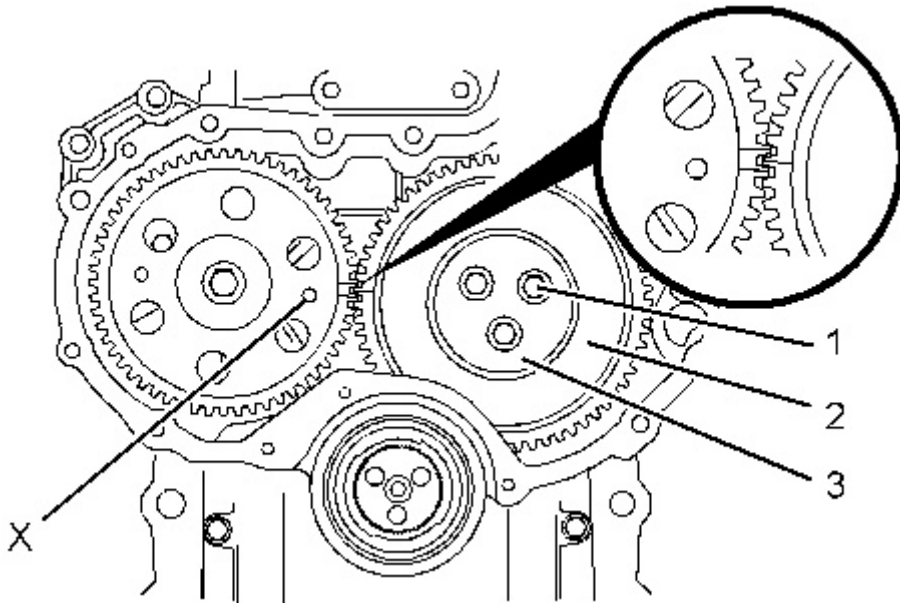


Illustration 1

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Alignment of timing marks

1. Ensure that Tooling (A) is installed into Hole (X) in the camshaft gear. Use Tooling (A) in order to lock the camshaft in the correct position.

Note: Ensure that the gears are marked in order to show alignment. Refer to Illustration 1.

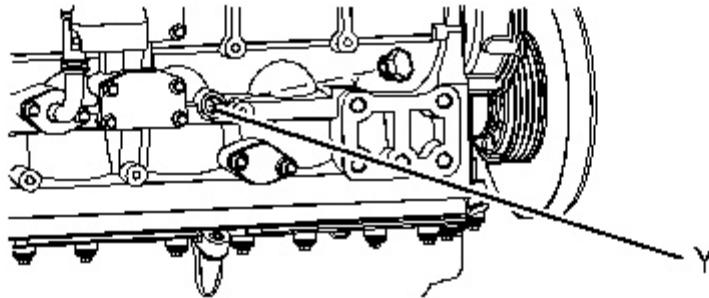


Illustration 2

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2. Ensure that Tooling (B) is installed in Hole (Y) in the cylinder block. Use Tooling (B) in order to lock the crankshaft in the correct position.
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