

Product: INDUSTRIAL ENGINE  
Model: C15 INDUSTRIAL ENGINE N5F  
Configuration: C15 Industrial Engine N5F00001-UP

## Disassembly and Assembly C15 and C18 Industrial Engines

Media Number -UENR0185-03

Publication Date -01/08/2015

Date Updated -27/08/2015

i05949761

## Gear Group (Front) - Remove and Install

SMCS - 1206-010

S/N - N5F1-UP

S/N - N8F1-UP

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0510	Driver Gp	1
B	8T-2998	Lubricant	-
C	8T-9022	Silicone Gasket	-
D	9S-3263	Thread Lock Compound	-

### Start By:

- a. Remove the front housing.
- b. Remove the air compressor, if necessary.
- c. Remove the water pump, if necessary.

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### NOTICE

**Keep all parts clean from contaminants.**

Contaminants may cause rapid wear and shortened component life.

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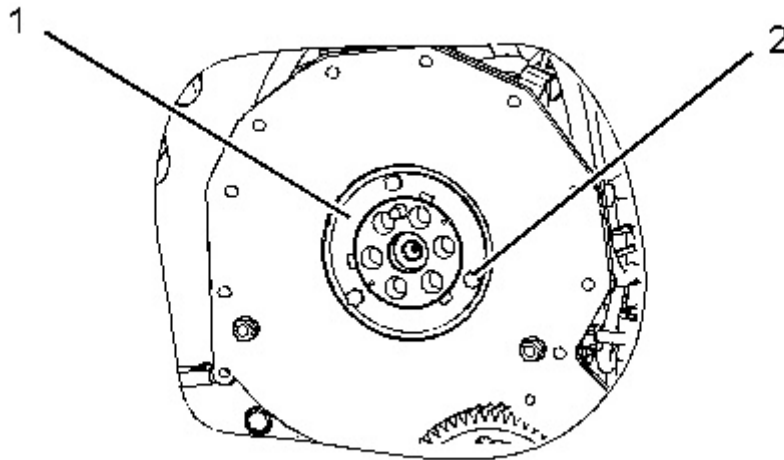
## NOTICE

**Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.**

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**Note:** Be sure to mark the orientation of each of the gears for installation purposes.

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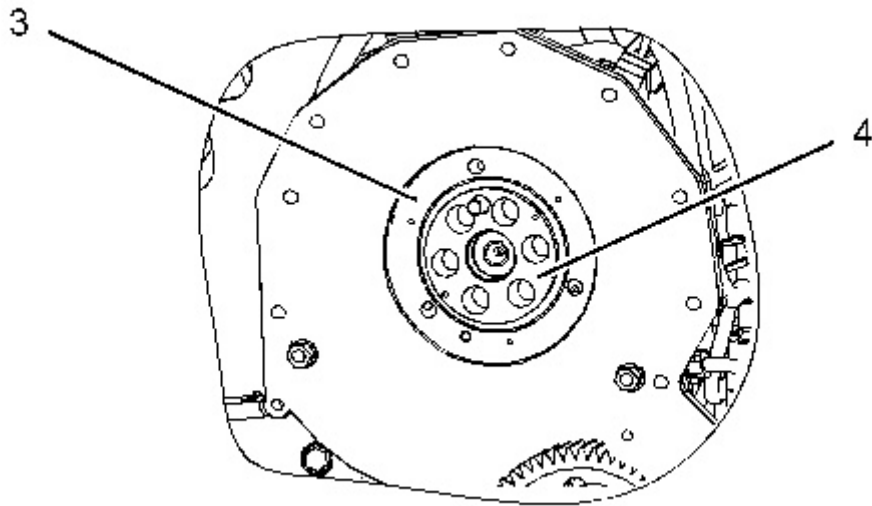


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Illustration 1

g01008429

1. Remove bolts (2) and thrust plate (1).
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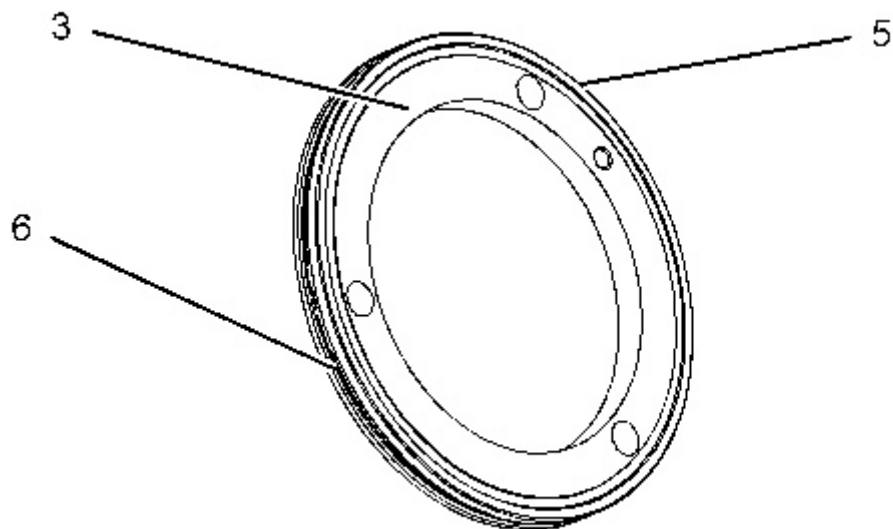
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Illustration 2

g01008430

2. Remove sealing plate (3) and adapter (4).

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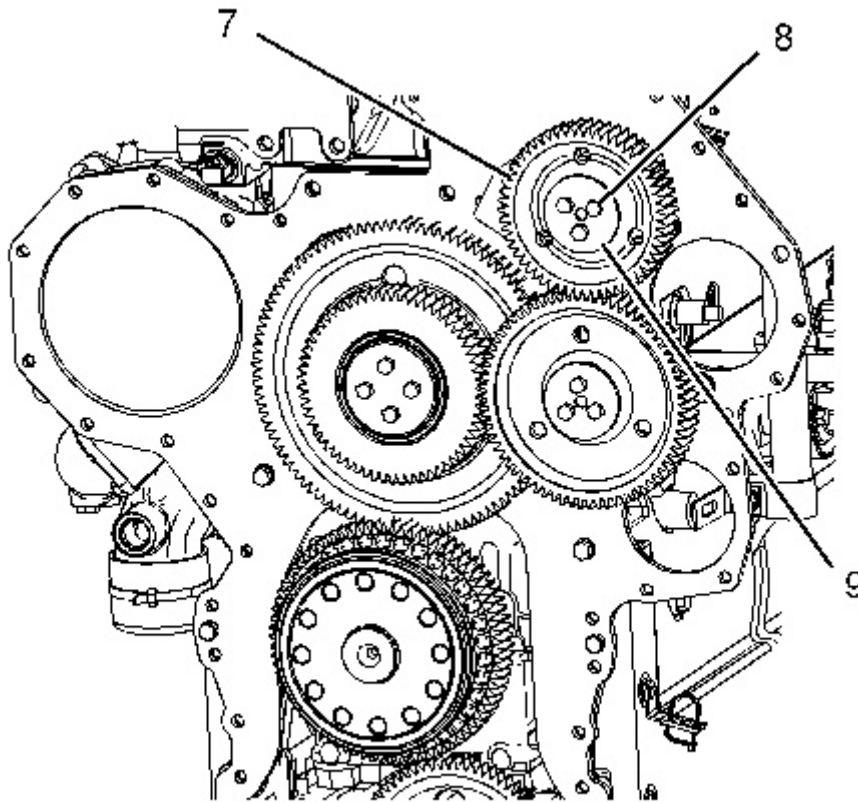
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Illustration 3

g01008431

3. Remove O-ring seal (5) and O-ring seal (6) from sealing plate (3).

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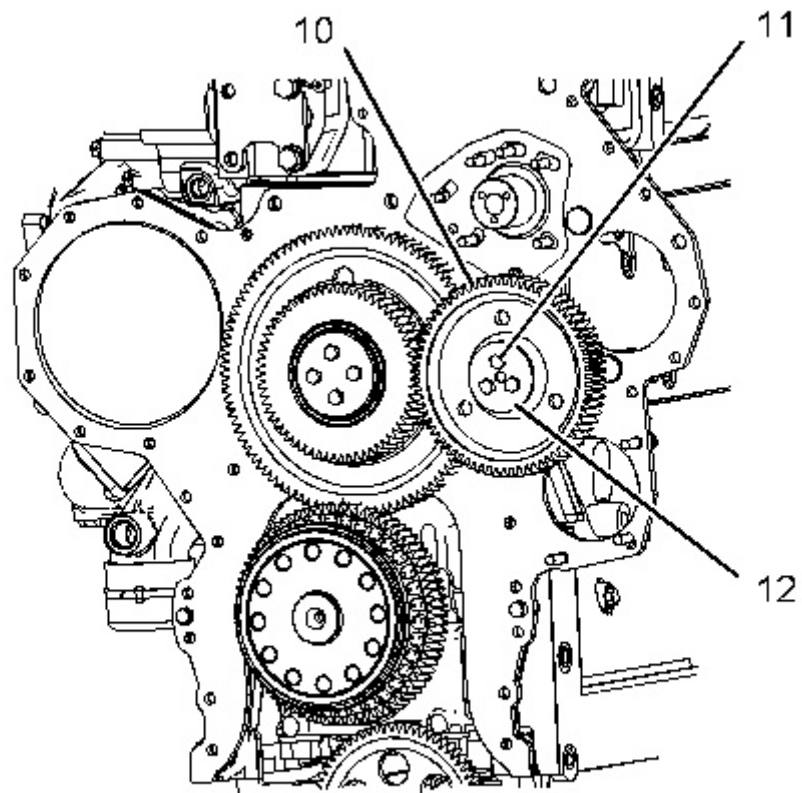


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Illustration 4

g01101536

4. Remove bolts (8), plate (9), and adjustable idler gear assembly (7).
  5. Use Tooling (A) and remove the sleeve bearing from adjustable idler gear assembly (7).
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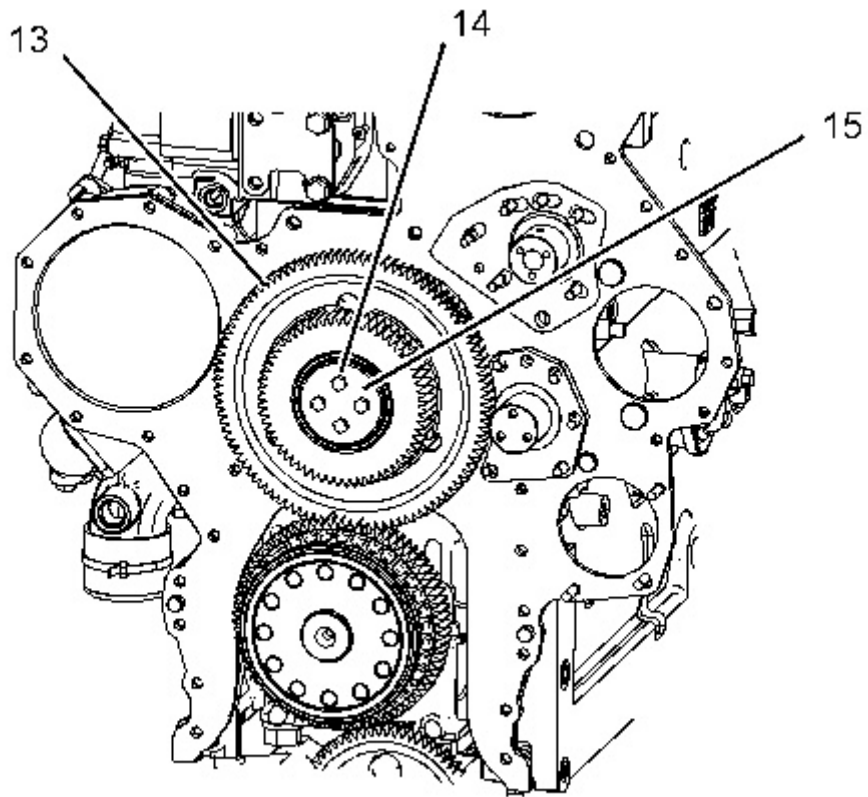


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Illustration 5

g01101045

6. Remove bolts (11), plate (12), and idler gear assembly (10).
  7. Use Tooling (A) and remove the sleeve bearing from idler gear assembly (10).
-

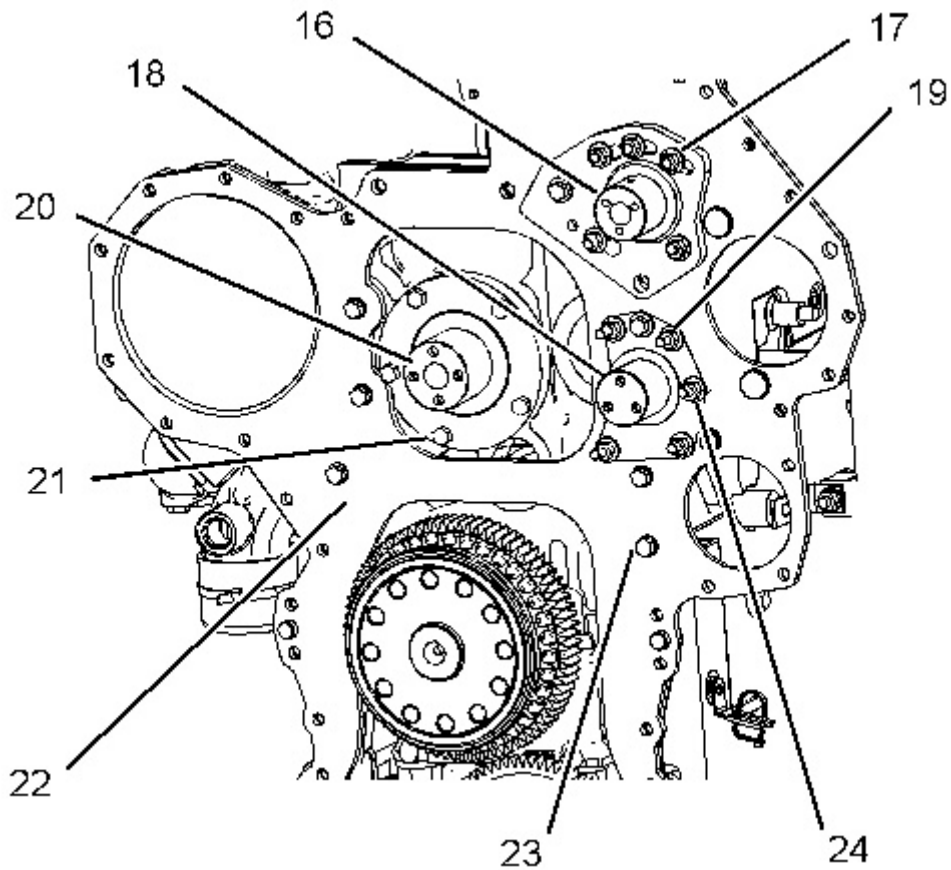


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Illustration 6

g01101048

8. Remove bolts (14), plate (15), and cluster gear assembly (13).
  9. Use Tooling (A) and remove the sleeve bearing from cluster gear assembly (13).
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Illustration 7

g01101050

**Note:** Stub shaft assembly (16) must be removed in order to remove plate (22). The backlash for the camshaft gear and the adjustable idler gear assembly will need to be readjusted at assembly.

10. Remove nuts (17) and remove stub shaft assembly (16).

**Note:** Stub shaft (18) must be removed in order to remove plate (22).

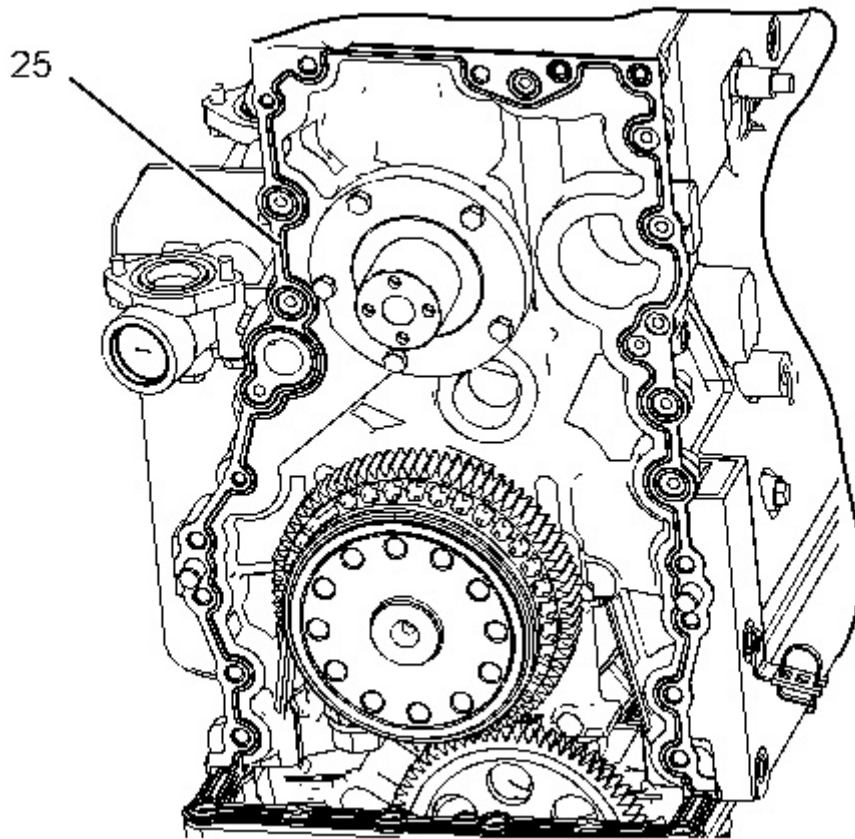
11. Remove nuts (19) and remove stub shaft (18).

12. Remove bolts (21) and remove stub shaft (20).

13. Remove bolts (23) that hold plate (22) to the cylinder block. Remove plate (22).

14. If studs (24) are loose or the threads are damaged, remove the studs from the front plate.

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Illustration 8

g01101052

15. Remove integral seal (25) from the cylinder block.

## 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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### NOTICE

**Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.**

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1. Thoroughly clean the gasket material from the cylinder block and both sides of the plate.
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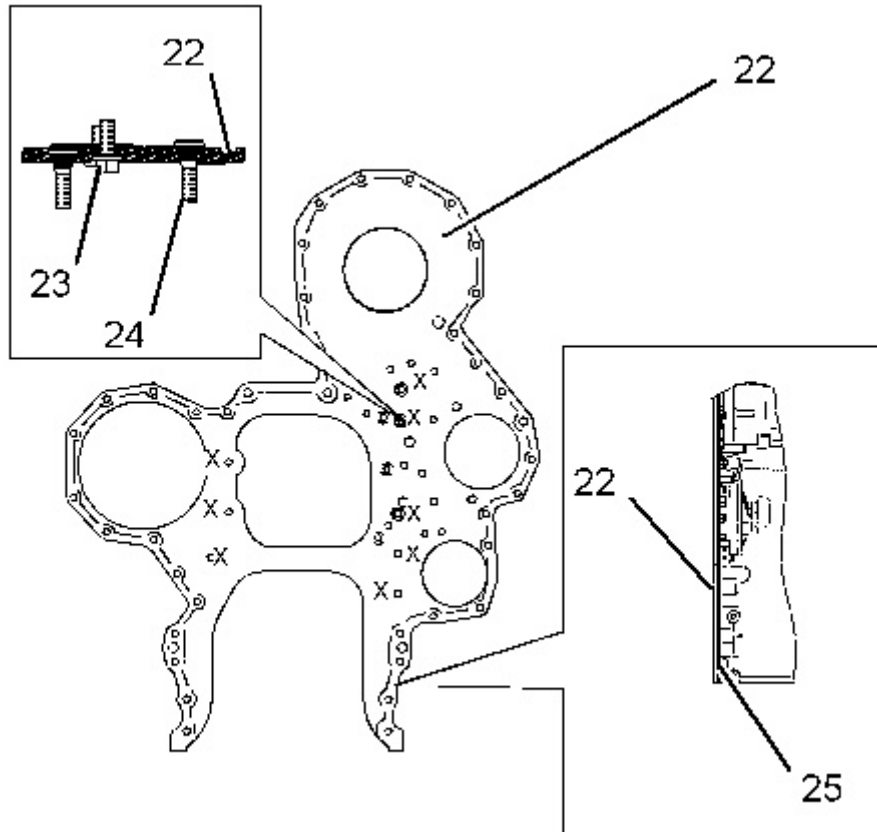


Illustration 9

g01101567

2. If studs (24) are loose or the threads are damaged, install new studs (24) in the front plate. Apply Tooling (D) to the serrations of studs (24). Install studs (24) in the front plate.
3. Install integral seal (25) on the dowel pins on the cylinder block.

**Note:** Apply Tooling (C) to the bottom of integral seal (25) in order to fill the space at the cylinder block, the front housing, and the engine oil pan.

4. Install plate (22) on the dowel pins on the cylinder block. Install new locking bolts (23) (Marked "X") in order to fasten the front plate to the cylinder block. Tighten locking bolts (23) to a torque of 55 N·m (41 lb ft).

**Note:** Clean the old sealant from the bolts and apply Tooling (D) to the bolts.

5. Tighten locking bolts (23) again to a torque of 55 N·m (41 lb ft).
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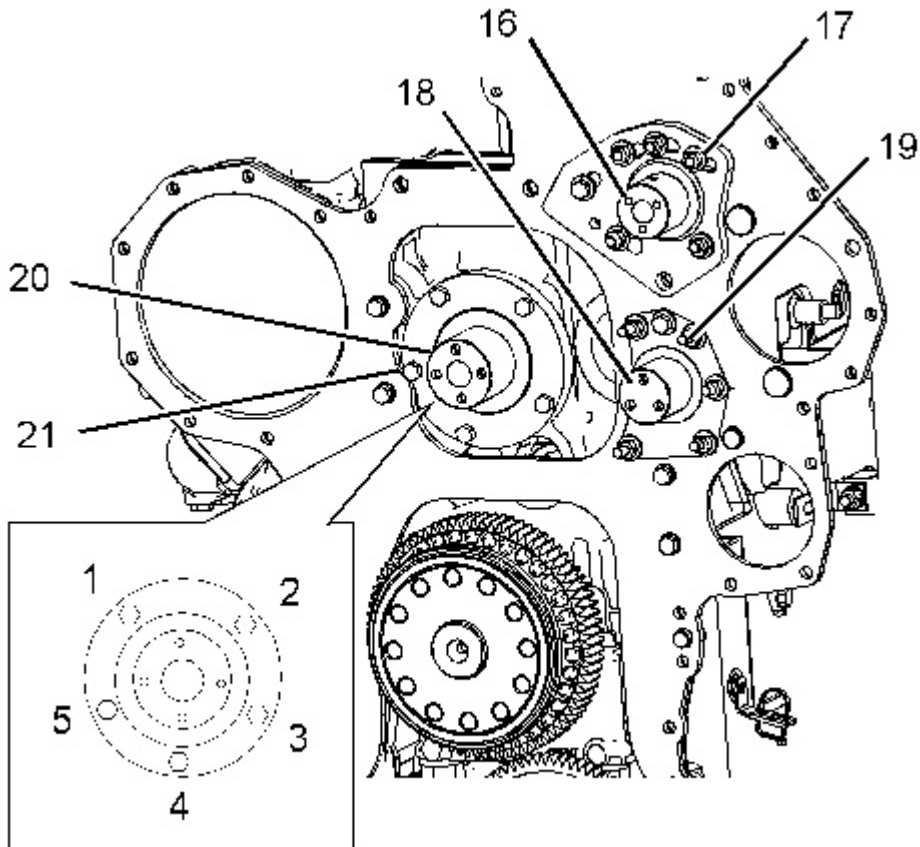
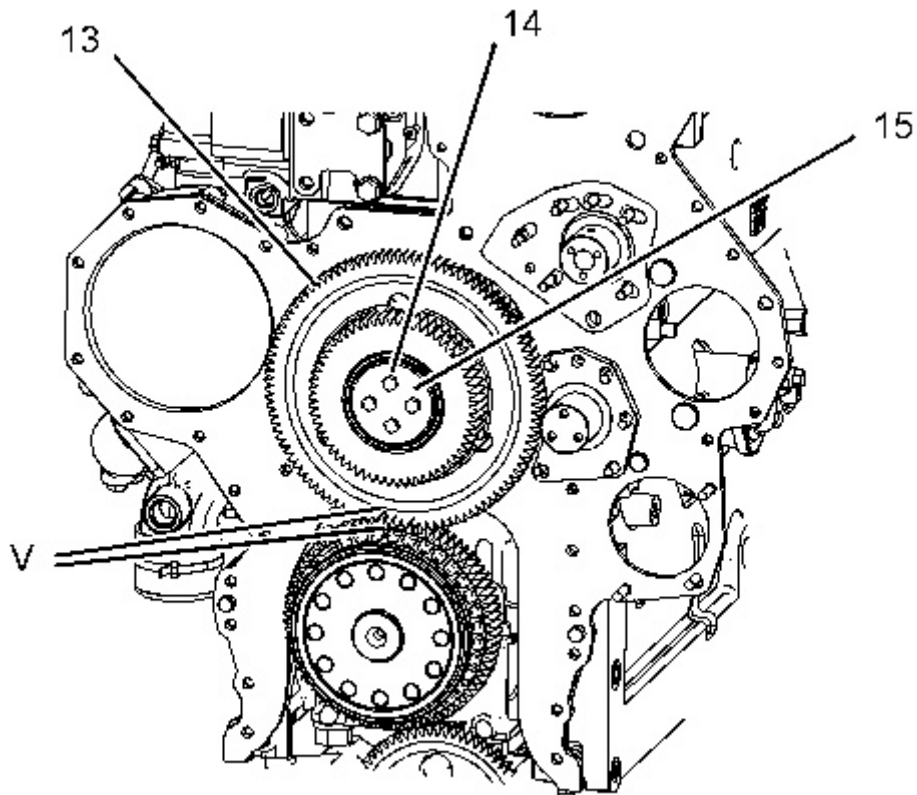


Illustration 10

g01101565

6. Install stub shaft (18). Apply Tooling (D) to the studs and the bolt for stub shaft (18). Tighten nuts (19) and the bolt to a torque of  $55 \pm 10 \text{ N}\cdot\text{m}$  ( $41 \pm 7 \text{ lb ft}$ ).
7. Install stub shaft assembly (16). Apply Tooling (D) to the studs and the bolt for stub shaft assembly (16). Do not tighten nuts (17) and the bolt for stub shaft assembly (16) at this time. Nuts (17) and the bolt for stub shaft assembly (16) will need to be tightened when the backlash is adjusted.
8. Adjust the backlash between the camshaft gear and the adjustable idler gear assembly. The backlash should be  $0.356 \pm 0.254 \text{ mm}$  ( $0.014 \pm 0.010 \text{ inch}$ ). Refer to Testing and Adjusting, "Gear Group (Front) - Time" for the backlash adjustment procedure. Tighten nuts (17) and the bolt to a torque of  $55 \pm 10 \text{ N}\cdot\text{m}$  ( $41 \pm 7 \text{ lb ft}$ ).
9. Install stub shaft (20). Apply Tooling (D) to bolts (21). Install bolts (21) and tighten in a numeric sequence 1, 3, 4, 5, 2, 1, 2, 3, 4, 5, 1 to a torque of  $55 \pm 10 \text{ N}\cdot\text{m}$  ( $41 \pm 7 \text{ lb ft}$ ).

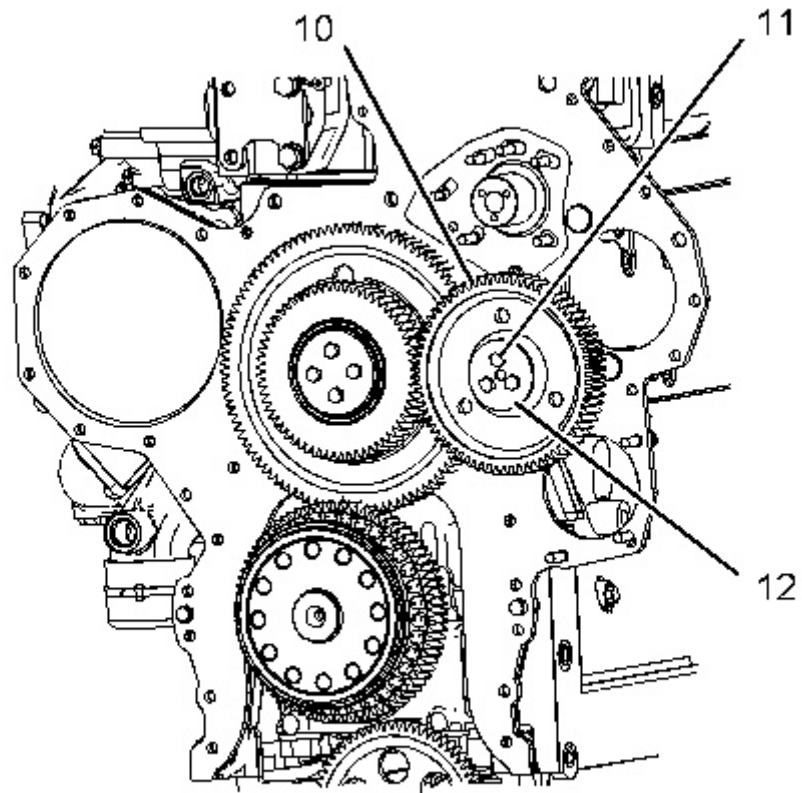


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Illustration 11

g01101161

10. Use Tooling (A) to install the sleeve bearing in cluster gear assembly (13).
  11. Put cluster gear assembly (13) on the stub shaft. Ensure that Timing Marks (V) are aligned on the cluster gear assembly and the crankshaft gear.
  12. Position plate (15) with the oil groove toward the face of the gear. Apply Tooling (D) to bolts (14). Install bolts (14). Tighten bolts (14) to a torque of  $30 \pm 7$  N·m ( $22 \pm 5$  lb ft).
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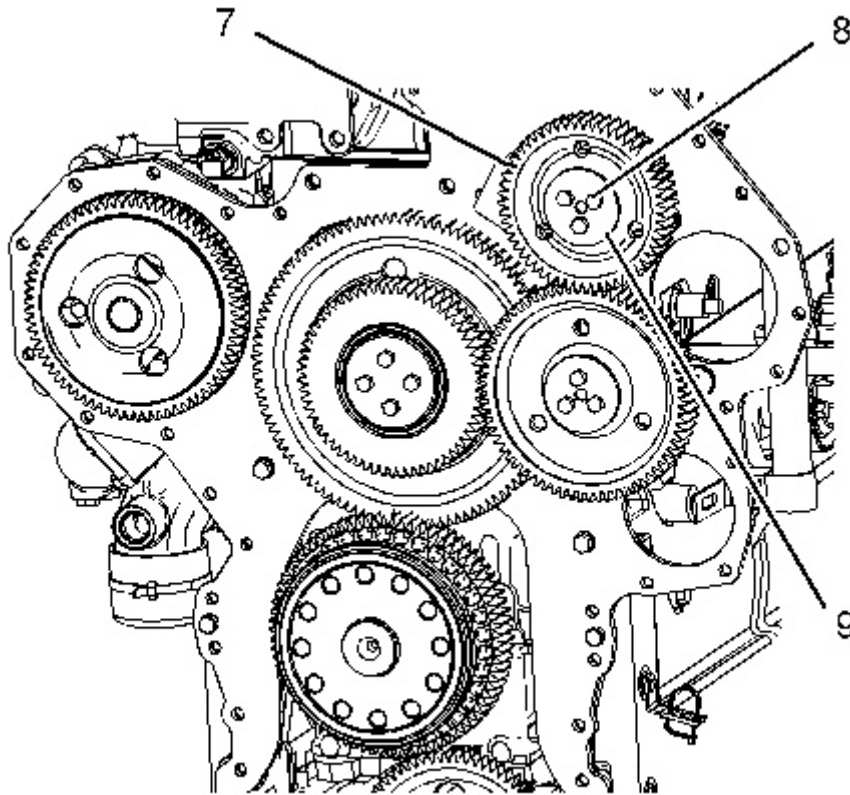


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Illustration 12

g01101045

13. Use Tooling (A) to install the sleeve in idler gear (10).
  14. Put idler gear assembly (10) on the stub shaft. Install plate (12) with the oil groove toward the gear face. Apply Tooling (D) to bolts (11). Install bolts (11). Tighten bolts (11) to a torque of  $30 \pm 7$  N·m ( $22 \pm 5$  lb ft).
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Illustration 13

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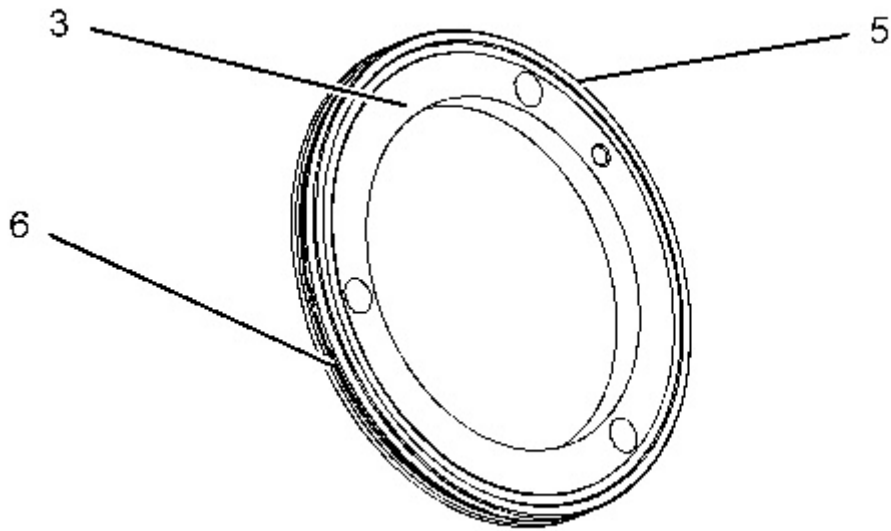
15. Use Tooling (A) to install the sleeve bearing in adjustable idler gear (7).

**Note:** Align the oil hole in the bearing with the oil hole in the adjustable idler gear.

16. Put adjustable idler gear assembly (7) on the stub shaft assembly. Position plate (9) with the oil groove toward the face of the gear. Apply Tooling (D) to bolts (8). Install bolts (8). Tighten bolts (8) to a torque of  $30 \pm 7$  N·m ( $22 \pm 5$  lb ft).

**Note:** Check the backlash for the camshaft gear and the adjustable idler gear assembly. The camshaft gear must be installed and the adjustable idler gear assembly must be removed in order to perform the backlash adjustment procedure. Refer to Testing and Adjusting, "Gear Group (Front) - Time".

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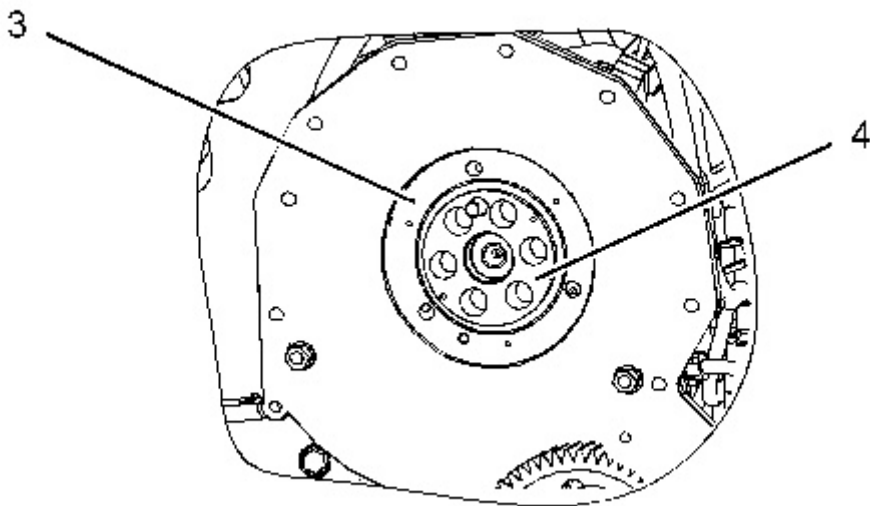


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Illustration 14

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17. Install O-ring seal (5) and O-ring seal (6) in sealing plate (3). Lubricate O-ring seal (6) with a 50/50 mixture of Tooling (B) and clean engine oil.
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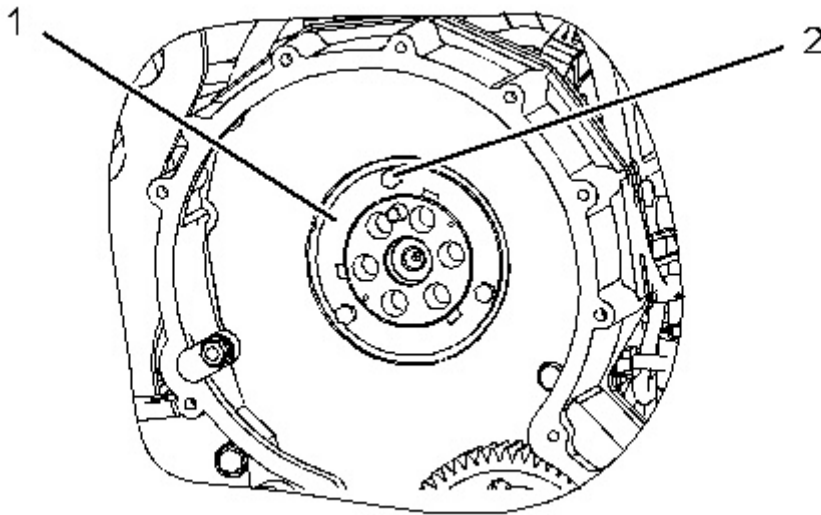


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Illustration 15

g01008430

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Illustration 16

g01010256

18. Install adapter (4). Ensure that the dowel in the adapter engages the hole in the camshaft.
19. Install sealing plate (3) and thrust plate (1). Ensure that the dowel in the adapter engages the hole in the thrust plate. Apply Tooling (D) to bolts (2). Install bolts (2). Evenly tighten bolts (2) in order to ensure that sealing plate (3) and O-ring seal (5) are seated against the cylinder head.
20. Adjust the backlash for the camshaft gear and the adjustable idler gear, if necessary. Refer to Testing and Adjusting, "Gear Group (Front) - Time".

**Note:** The camshaft gear must be installed and the adjustable idler gear must be removed in order to perform the backlash adjustment procedure.

**End By:**

- a. Install the water pump.
  - b. Install the air compressor, if necessary.
  - c. Install the front housing.
-

Product: INDUSTRIAL ENGINE  
Model: C15 INDUSTRIAL ENGINE N5F  
Configuration: C15 Industrial Engine N5F00001-UP

## Disassembly and Assembly C15 and C18 Industrial Engines

Media Number -UENR0185-03

Publication Date -01/08/2015

Date Updated -27/08/2015

i05356423

## Housing (Front) - Remove and Install

SMCS - 1151-010

S/N - N5F1-UP

S/N - N8F1-UP

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	154-9731	Thread Lock Compound	-
B	8T-9022	Silicone Gasket	-

### Start By:

- a. Remove the camshaft position sensor.
- b. Remove the crankshaft position sensor.
- c. Remove the engine support.
- d. Remove the camshaft gear.
- e. Remove the crankshaft front seal.

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### 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.

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### NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

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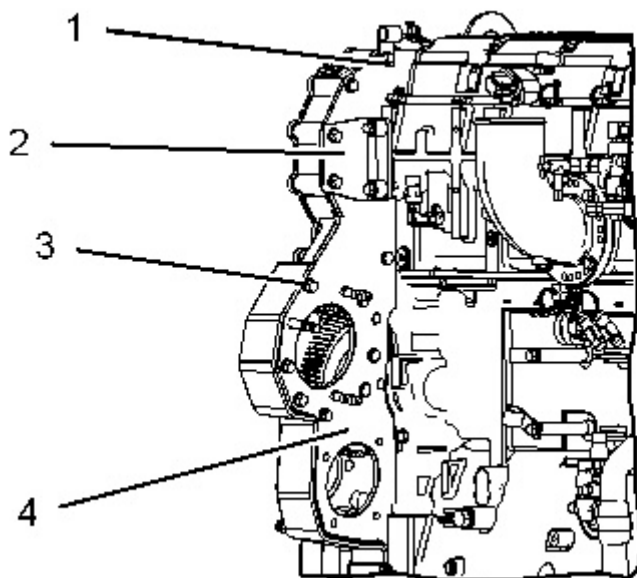
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### NOTICE

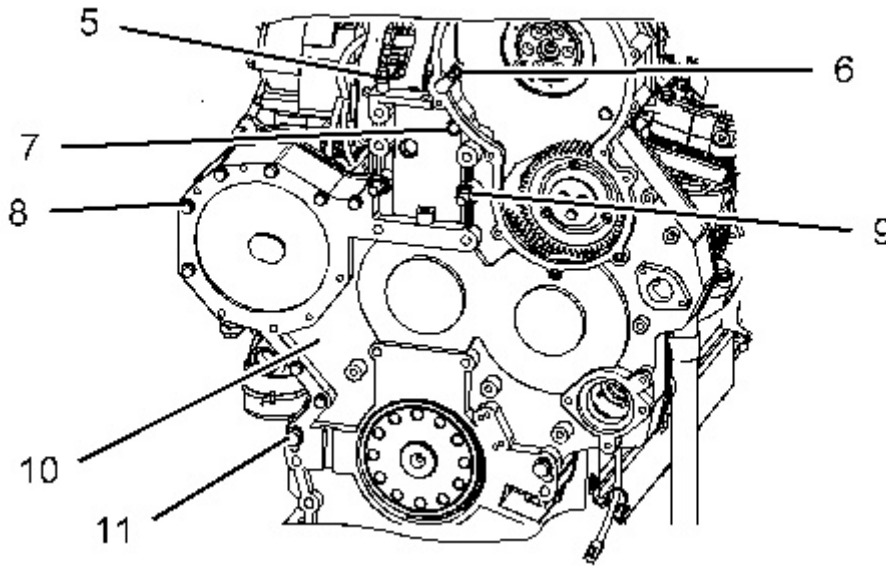
Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.

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1. Remove the bolts and clips (1).
2. Remove bracket (2) from plate (4) and the cylinder head.
3. Remove bolts (3).

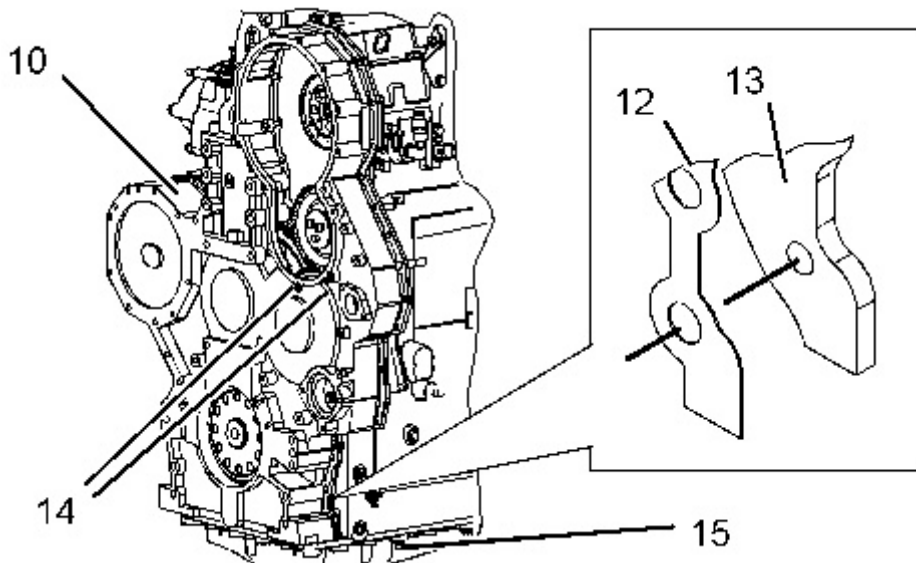


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Illustration 2

g01078084

4. Remove cable strap (5) from the cylinder head and front housing (10).
5. Remove bolt (7) and nut (6) from the front housing.
6. Remove bolts (8) and nuts (9) from the front housing.
7. Remove bolts (11) from the front housing.



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Illustration 3

g01078119

8. Loosen bolts (15) from the engine oil pan.

**Note:** It is not necessary to remove the engine oil pan from the engine.

9. Remove front housing (10).

10. If necessary, remove studs (14) and the O-ring seals from the front housing.

11. Remove gasket (12) from plate (13) and the front housing.

## Installation Procedure

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### NOTICE

**Keep all parts clean from contaminants.**

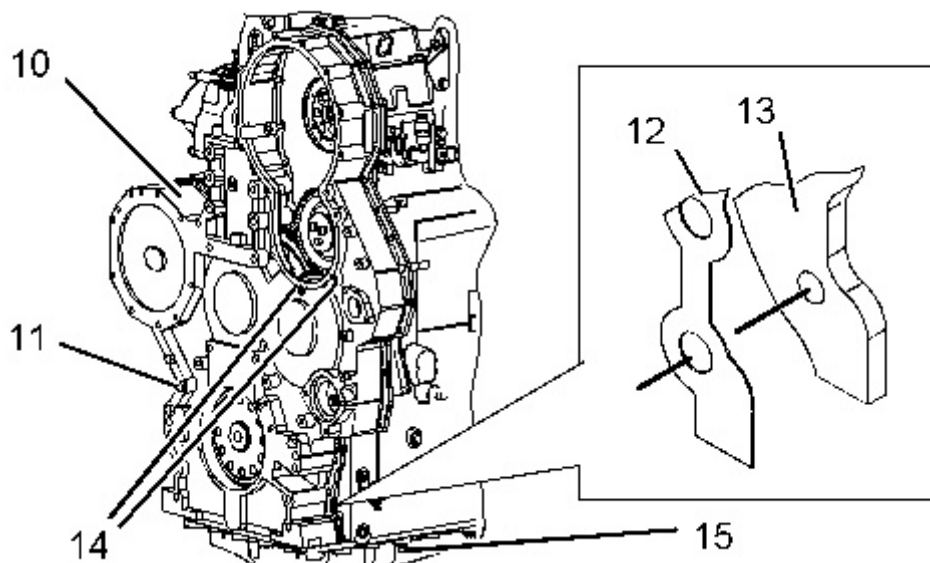
**Contaminants may cause rapid wear and shortened component life.**

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### NOTICE

**Do not turn the crankshaft or the camshaft while the camshaft gear is removed. If the front gear group is not correctly timed during installation, interference can occur between the pistons and the valves, resulting in damage to the engine.**

---



1. If studs (14) are loose or the threads are damaged, install new studs in front housing (10). Apply Tooling (A) to the threads of studs (14). Install the O-ring seals on the studs and install the studs in the front housing.
2. Thoroughly clean the mating surfaces of plate (13) and front housing (10).
3. Install gasket (12) on plate (13).

**Note:** Trim the gasket even with the bottom of the front housing after assembly.

4. Apply Tooling (B) to the bottom of gasket (12) in order to fill the space at the front housing and the engine oil pan.
5. Install front housing (10) on the dowel pins on the cylinder block.
6. Install bolts (11) in front housing (10).
7. Tighten bolts (15).

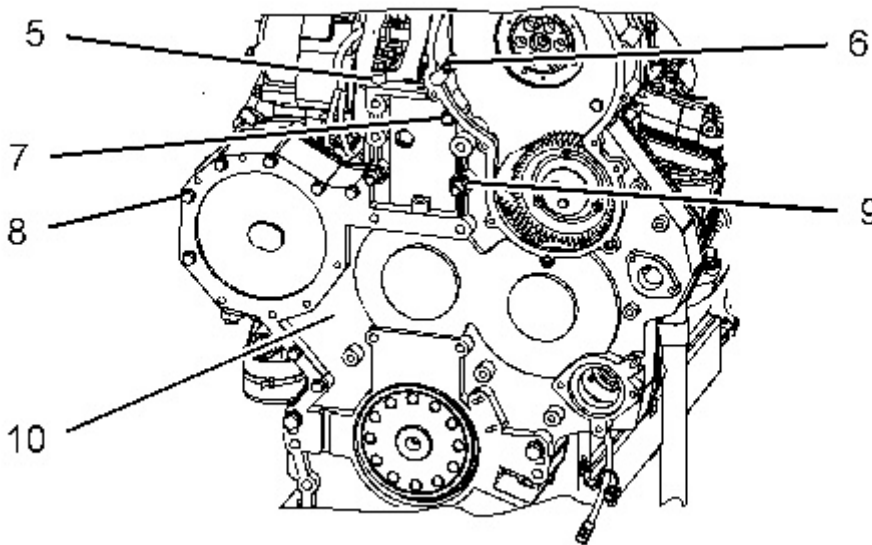
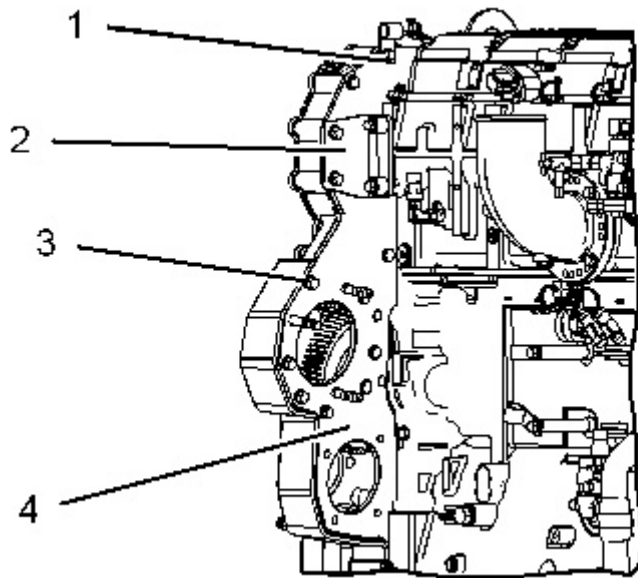


Illustration 5

g01078272

8. Install bolt (7) and nuts (6).
  9. Install bolts (8) and nuts (9).
  10. Install cable strap (5) on the front housing and on the cylinder head.
-



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Illustration 6

g01078059

11. Install the bolts and clips (1).
12. Install bolts (3).
13. Install bracket (2) on plate (4) and the front housing.

**End By:**

- a. Install the crankshaft front seal and the wear sleeve.
  - b. Install the camshaft gear.
  - c. Install the engine support.
  - d. Install the camshaft position sensor.
  - e. Install the crankshaft position sensor.
-

Product: INDUSTRIAL ENGINE  
Model: C15 INDUSTRIAL ENGINE N5F  
Configuration: C15 Industrial Engine N5F00001-UP

## Disassembly and Assembly C15 and C18 Industrial Engines

Media Number -UENR0185-03

Publication Date -01/08/2015

Date Updated -27/08/2015

i04730375

# Fumes Disposal Filter - Remove and Install

SMCS - 1317-010

S/N - N5F1-UP

S/N - N8F1-UP

## Removal Procedure

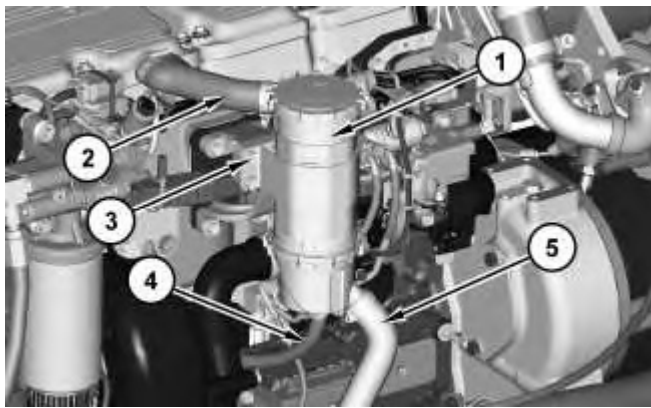
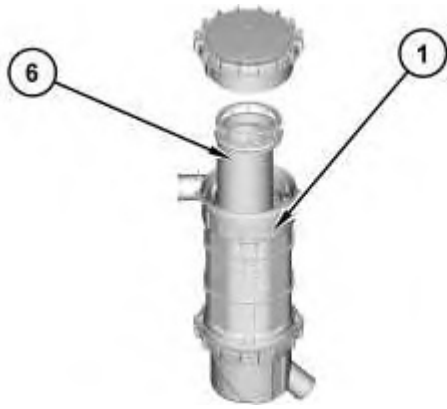


Illustration 1

g02831020

1. Disconnect hoses (2), (4), (5).
2. Remove bolts (3) and remove fumes disposal filter assembly (1).



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Illustration 2

g02831066

3. Remove the cap from fumes disposal filter assembly (1). Remove element (6) and the O-ring seal.

## **Installation Procedure**

1. Install fumes disposal filter assembly (1) in the reverse order of removal.
-

Product: INDUSTRIAL ENGINE  
Model: C15 INDUSTRIAL ENGINE N5F  
Configuration: C15 Industrial Engine N5F00001-UP

## **Disassembly and Assembly C15 and C18 Industrial Engines**

Media Number -UENR0185-03

Publication Date -01/08/2015

Date Updated -27/08/2015

i05375406

# **Valve Mechanism Cover - Remove and Install**

SMCS - 1107-010

S/N - N5F1-UP

S/N - N8F1-UP

## **Removal Procedure**

### **Start By:**

- A. Remove the clean emissions module.

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### **NOTICE**

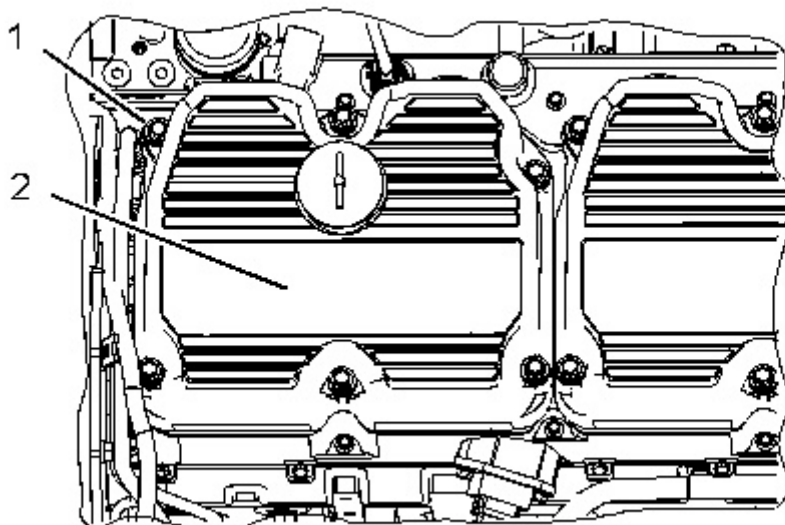
**Keep all parts clean from contaminants.**

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

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Illustration 1

g01078498

1. Remove bolts (1).
2. Remove valve mechanism cover (2) .

## 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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