

Product: INDUSTRIAL ENGINE  
Model: 3512E INDUSTRIAL ENGINE MR2  
Configuration: 3512E Marine Engine MR200001-UP

## Disassembly and Assembly 3512E and 3516E Marine Engines

Media Number -M0075247-08

Publication Date -01/09/2018

Date Updated -11/09/2018

i02707237

# 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

### Start By:

- a. Remove the inlet valves and the exhaust valves. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install".

**Note:** For information on the reusability of valve seats, refer to Guideline For Reusable Parts And Salvage Operation, SEBF8155.

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### NOTICE

**Keep all parts clean from contaminants.**

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

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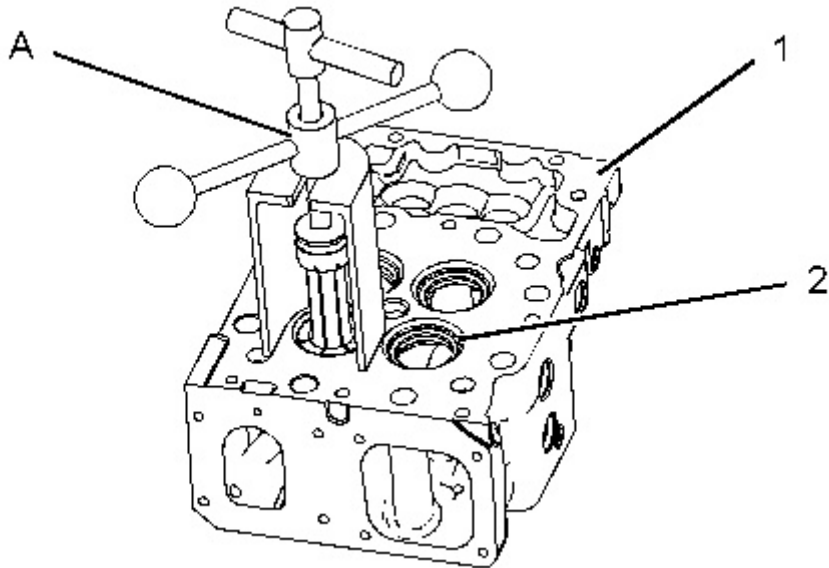


Illustration 1

g01133493

1. Use Tooling (A) to remove valve seat inserts (2) from cylinder head (1).
2. Thoroughly clean the valve seat bores in the cylinder head.

## Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
B	1P-0510	Driver Gp	1

**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.

**Note:** If the valve seats are replaced, you must replace the valve guides.

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### NOTICE

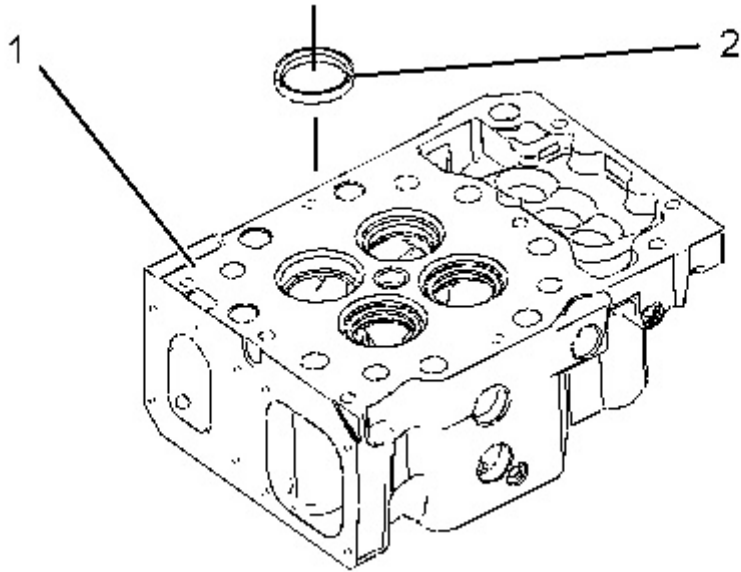
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Illustration 2

g01133494

1. Lower the temperature of valve seat inserts (2).
2. Use Tooling (B) to install valve seat inserts (2) in cylinder head (1).

**End By:**

- a. Install the inlet valves and the exhaust valves. Refer to Disassembly and Assembly, "Inlet and Exhaust Valves - Remove and Install".
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i02486937

# Accessory Drive (Front) - Remove - Engine Oil Pump and Water Pump

SMCS - 1207-011

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	-	Forcing Screw 3/8 - 16 by 1 1/2 inch	2
B	-	Forcing Screw 1/2 - 13 by 1 1/2 inch	2

### Start By:

- Remove the auxiliary water pump. Refer to Disassembly and Assembly, "Auxiliary Water Pump - Remove".
- Remove the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Remove".
- Remove the water pump. Refer to Disassembly and Assembly, "Water Pump - Remove".

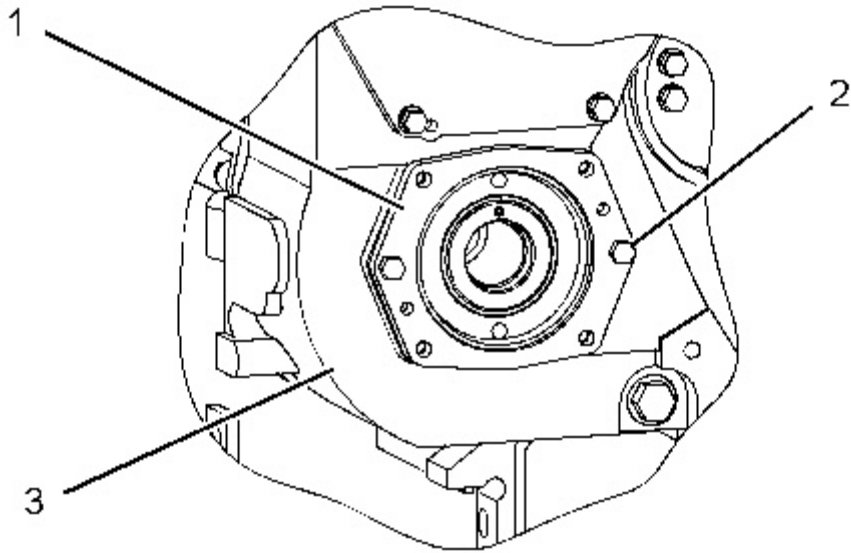
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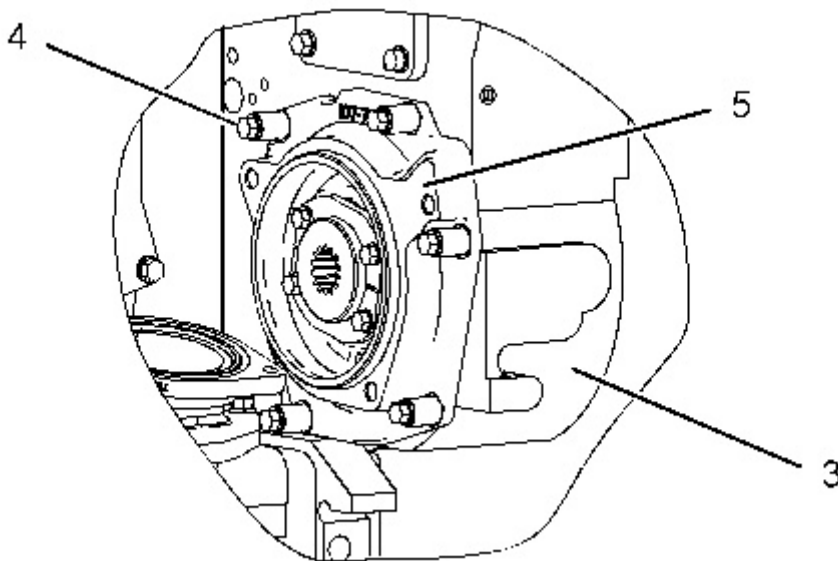


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Illustration 1

g01132543

1. Remove bolts (2).
2. Use Tooling (A) to remove pump adapter assembly (1) from front housing (3). Remove the O-ring seal from the pump adapter assembly.



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Illustration 2

g01132545

3. Remove bolts (4).
  4. Use Tooling (B) to remove pump adapter assembly (5) from front housing (3). Remove the O-ring seal from the pump adapter assembly.
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Publication Date -01/09/2018

Date Updated -11/09/2018

i02249939

# Accessory Drive (Front) - Disassemble - Engine Oil Pump and Water Pump

SMCS - 1207-015

## Disassembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0520	Driver Group	1

### Start By:

- Remove the accessory drive for the engine oil pump and the water pump. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Remove".

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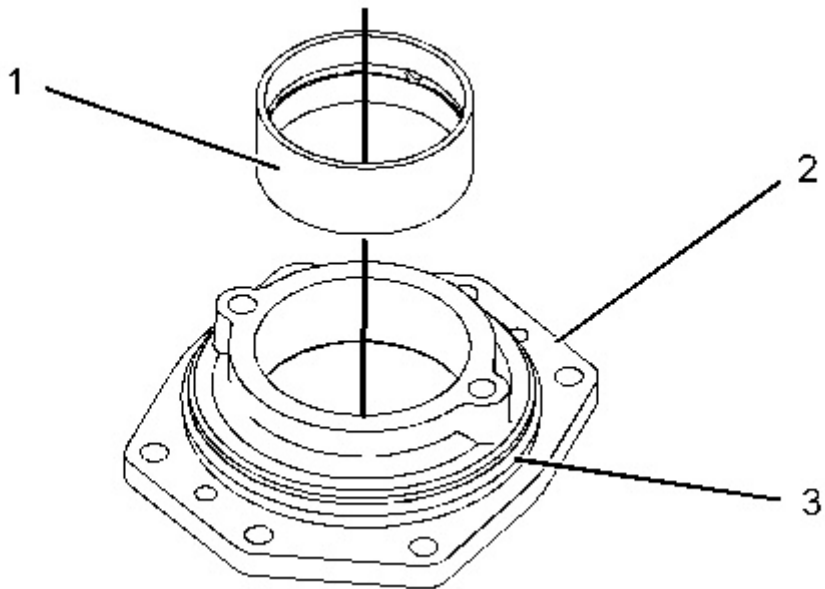
### NOTICE

**Keep all parts clean from contaminants.**

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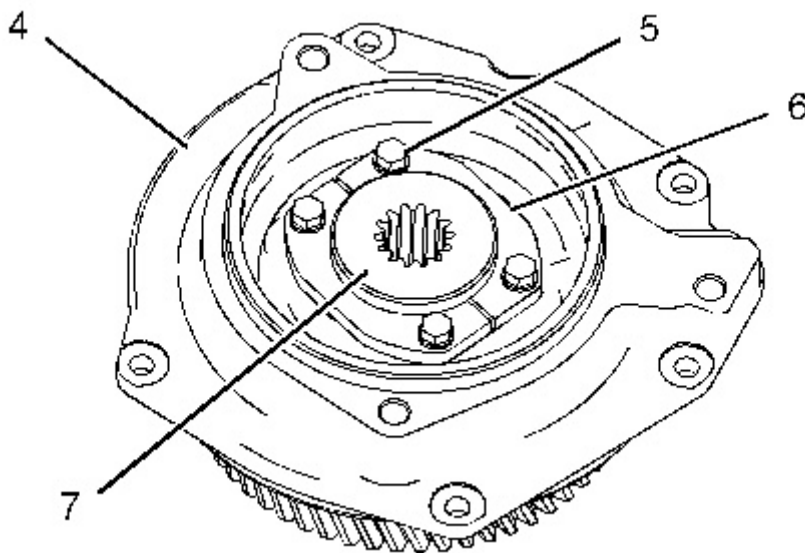


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Illustration 1

g01132964

1. Remove O-ring seal (3) from pump adapter assembly (2).
2. Use Tooling (A) and a suitable press to remove sleeve bearing (1) from pump adapter assembly (2).

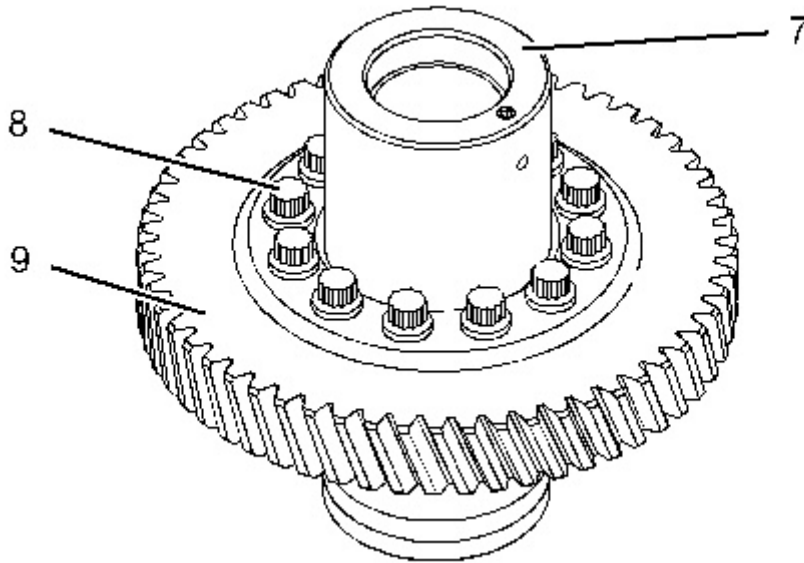


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Illustration 2

g01132967

3. Remove bolts (5).
  4. Remove thrust washers (6) from pump adapter assembly (4).
  5. Remove pump adapter assembly (4) from pump drive shaft (7).
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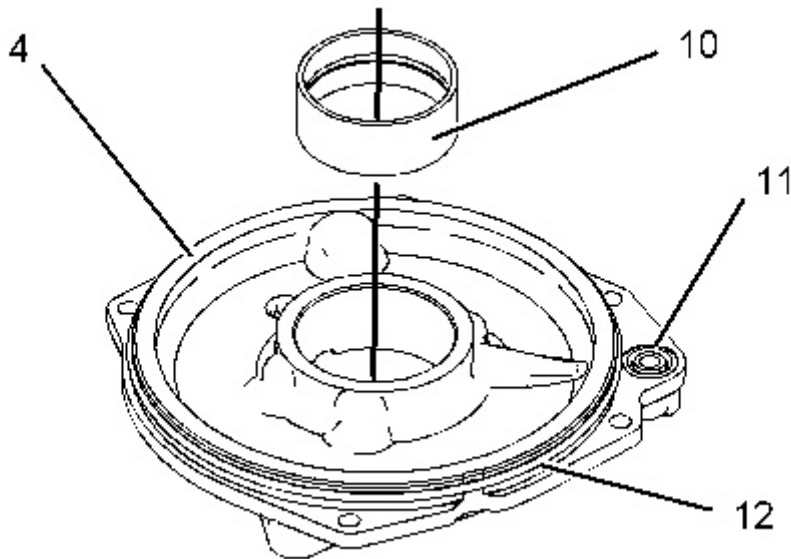


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Illustration 3

g01132971

6. Remove bolts (8).
  7. Remove accessory drive gear (9) from pump drive shaft (7).
  8. If necessary, remove the socket setscrew from the end of pump drive shaft (7).
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Illustration 4

g01132974

9. Remove O-ring seal (11) and O-ring seal (12) from pump adapter assembly (4).
  10. Use Tooling (A) and a suitable press to remove sleeve bearing (10) from pump adapter assembly (4).
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i02249940

# Accessory Drive (Front) - Assemble - Engine Oil Pump and Water Pump

SMCS - 1207-016

## Assembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0520	Driver Group	1

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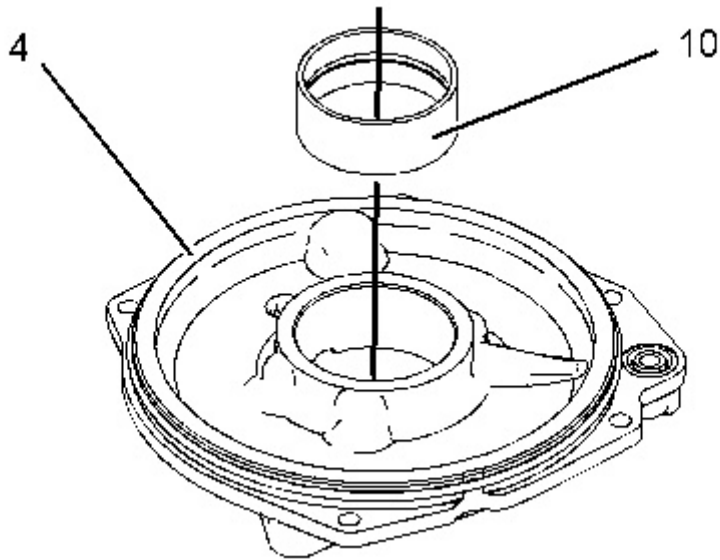


Illustration 1

g01133092

1. Align the oil hole in sleeve bearing (10) and the oil hole in pump adapter assembly (4). Use Tooling (A) and a suitable press to install sleeve bearing (10) into pump adapter assembly (4).

**Note:** The sleeve bearing must not project above the pump adapter assembly.

2. Apply clean engine oil to sleeve bearing (10).

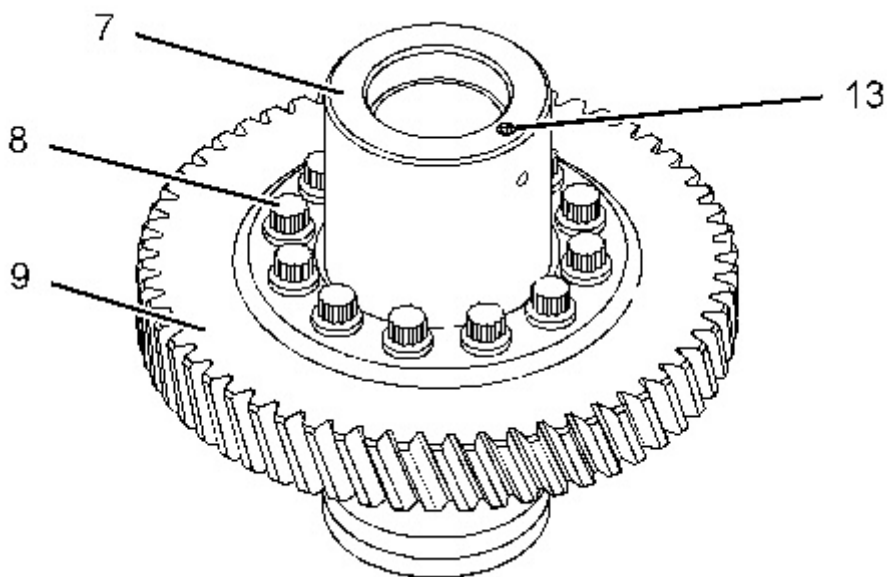


Illustration 2

g01133098

3. Position accessory drive gear (9) on pump drive shaft (7). Install bolts (8).
4. If necessary, install socket setscrew (13) in the end of pump drive shaft and tighten to a torque of  $6 \pm 1$  N·m ( $53 \pm 9$  lb in).

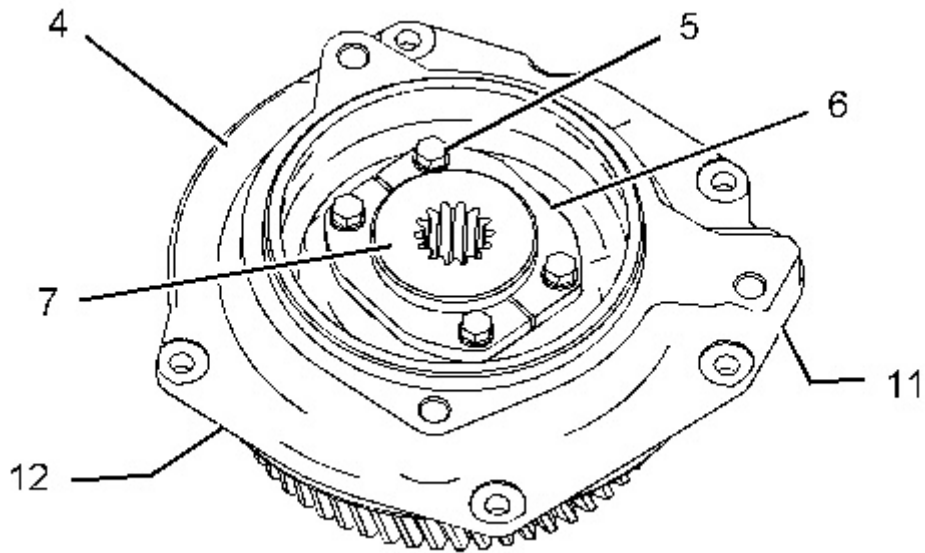


Illustration 3

g01133086

5. Install pump adapter assembly (4) onto pump drive shaft (7).
6. Install thrust washer (6) and bolts (5).
7. Install O-ring seal (12) and O-ring seal (11) on pump adapter assembly (4).

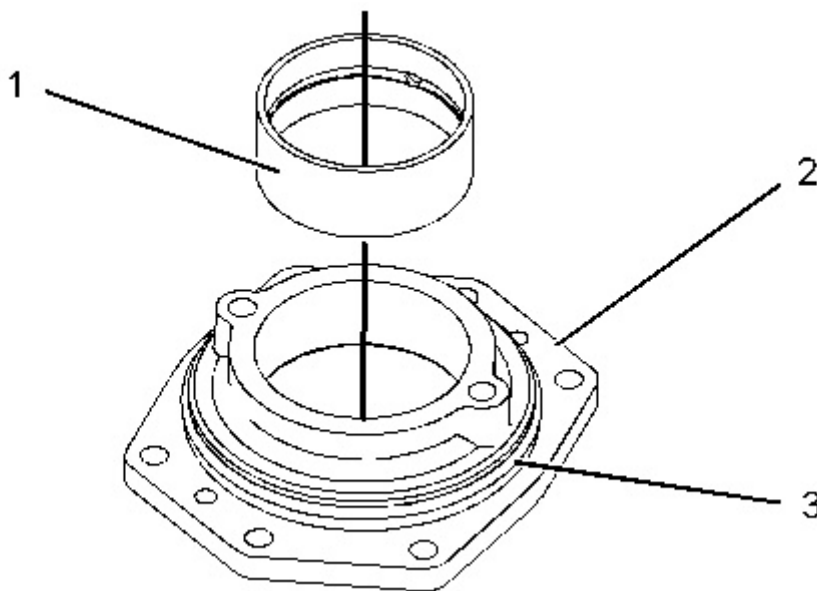


Illustration 4

g01132964

8. Align the oil hole in sleeve bearing (1) and the oil hole in pump adapter assembly (2). Use Tooling (A) and a suitable press to install sleeve bearing (1) into pump adapter assembly (2).
9. Install O-ring seal (3) on the pump adapter assembly.

**End By:**

- a. Install the accessory drive for the engine oil pump and the water pump. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Install".
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i02487020

# Accessory Drive (Front) - Install - Engine Oil Pump and Water Pump

SMCS - 1207-012

## Installation Procedure

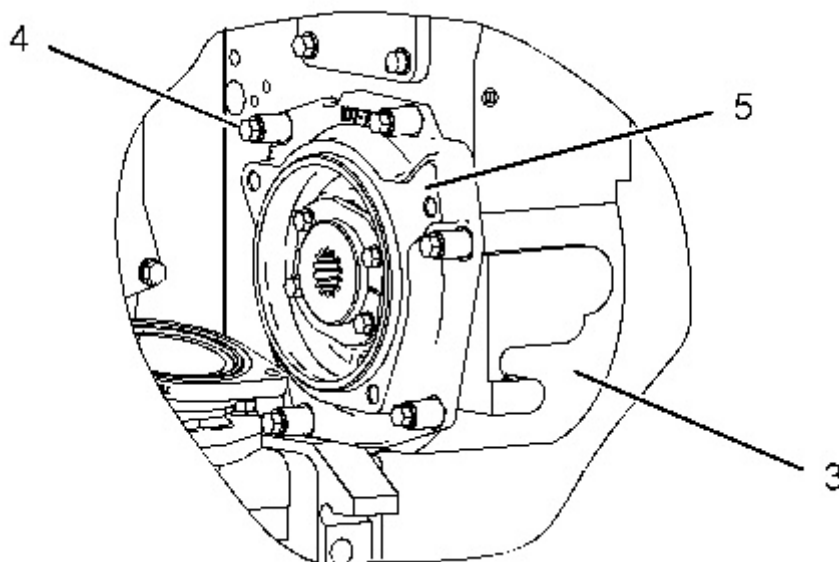
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### NOTICE

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

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1. Install the O-ring seal in pump adapter assembly (5). Apply clean engine oil to the bore in front housing (3) for pump adapter assembly (5).
  2. Position pump adapter assembly (5) in the front housing and install bolts (4).
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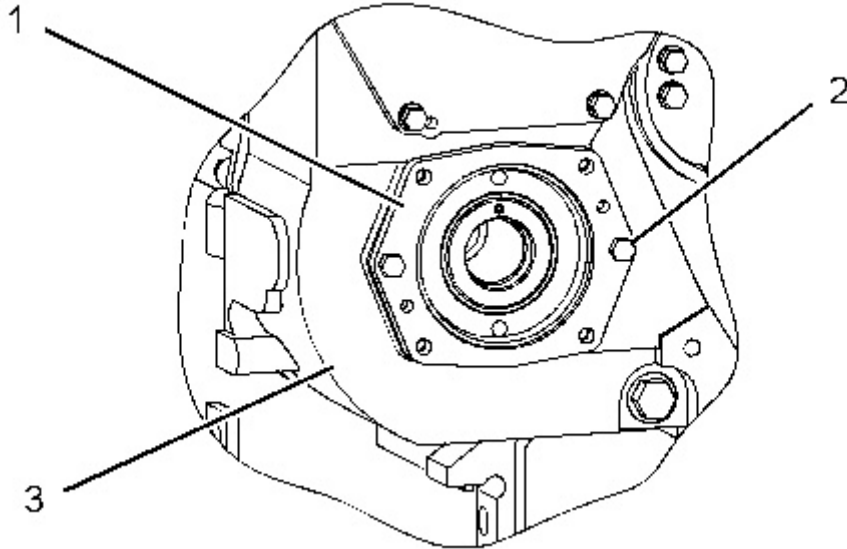


Illustration 2

3. Install the O-ring seal in pump adapter assembly (1). Apply clean engine oil to the bore in front housing (3) for pump adapter assembly (1).
4. Position pump adapter assembly (1) in the front housing and install bolts (2).

**End By:**

- a. Install the water pump. Refer to Disassembly and Assembly, "Water Pump - Install".
  - b. Install the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Install".
  - c. Install the auxiliary water pump. Refer to Disassembly and Assembly, "Auxiliary Water Pump - Install".
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Publication Date -01/09/2018

Date Updated -11/09/2018

i04188249

## Housing (Front) - Remove

SMCS - 1151-011

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0074	Slide Hammer Puller	1
	8B-7557	Threaded Adapter	1
B	138-7573	Link Bracket	2
C	1P-0520	Driver Group	1
D	-	Guide Stud 5/8 - 11 by 8 inch	2

### Start By:

- Remove the engine oil filter housing. Refer to Disassembly and Assembly, "Engine Oil Filter Housing - Remove".
  - Remove the crankshaft front seal and the wear sleeve. Refer to Disassembly and Assembly, "Crankshaft Front Seal and Wear Sleeve - Remove".
  - If necessary, remove the accessory drive. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Remove".
  - If necessary, remove the engine oil pump and water pump drive. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Remove".
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## NOTICE

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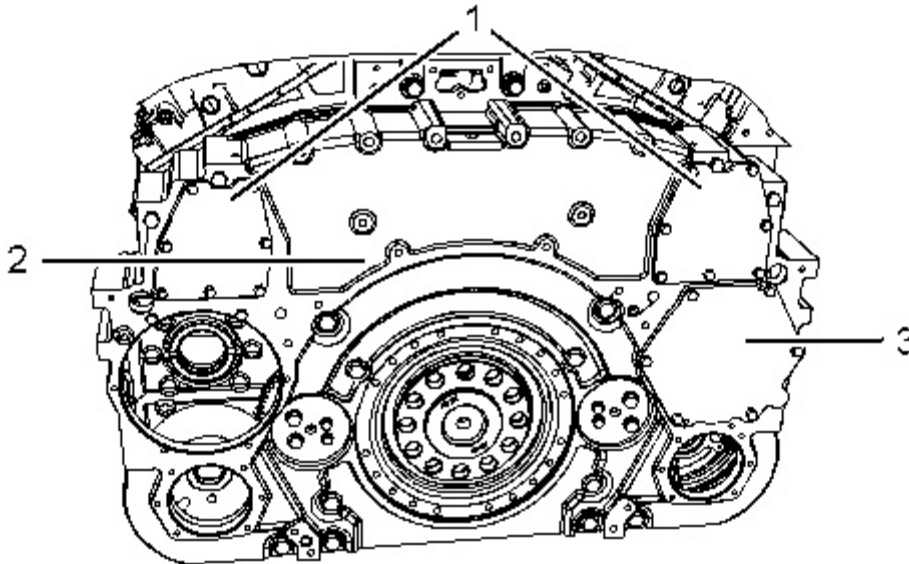


Illustration 1

g01246380

1. Remove bolts and covers (1). Remove the gaskets from front housing (2).
2. Remove bolts and cover (3). Remove the O-ring seal from the cover.

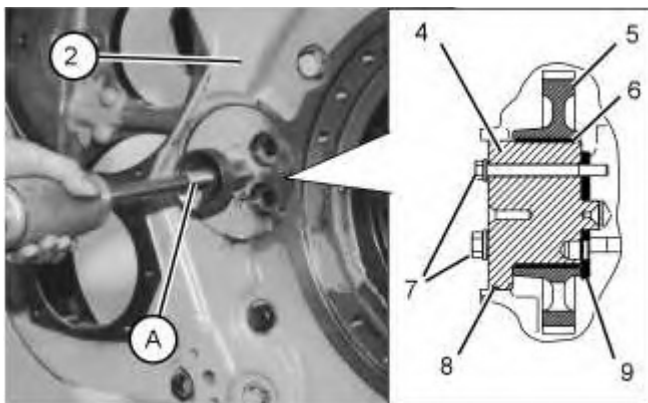


Illustration 2

g01131889

3. Remove bolts (7). Use Tooling (A) to remove shaft (4) from front housing (2). Remove O-ring seal (8) from the shaft.
4. Remove idler gear (5) and thrust washer (9) from the front housing.



5. Use Tooling (C) and a suitable press to remove sleeve bearing (6) from idler gear (5).

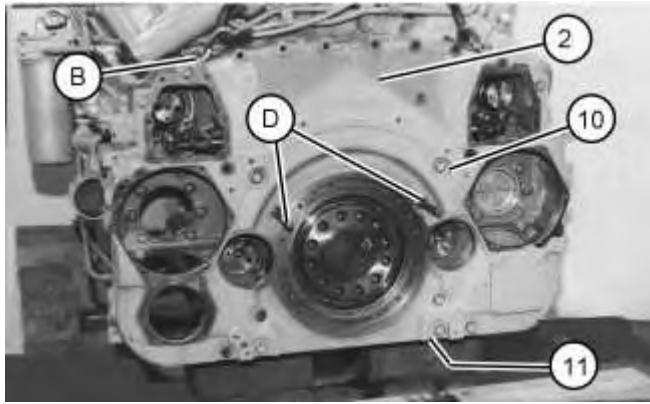


Illustration 3

g01131907

6. Attach Tooling (B) and attach a suitable lifting device to front housing (2). The weight of front housing (2) is approximately 181 kg (400 lb). Remove two bolts (10) and install Tooling (D). Remove remaining bolts (10) that hold the front housing to the cylinder block. Remove the front housing.
  7. Remove gasket (11) from the front housing and the cylinder block.
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Publication Date -01/09/2018

Date Updated -11/09/2018

i04188291

## Housing (Front) - Install

SMCS - 1151-012

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
B	138-7573	Link Bracket	2
C	1P-0520	Driver Group	1
D	-	Guide Stud 5/8 - 11 by 8 inch	2

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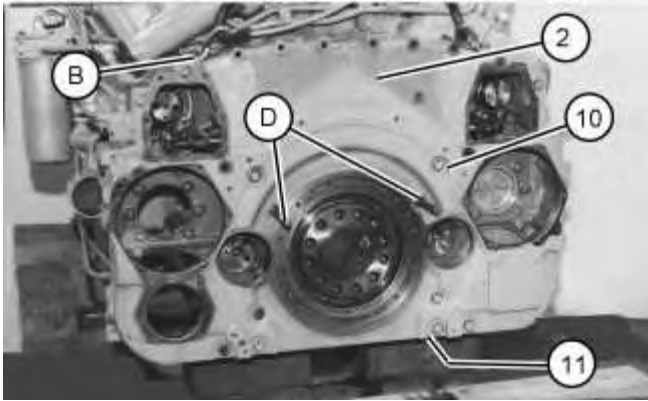


Illustration 1

g01131907

1. Install gasket (11) on the cylinder block. Install Tooling (D) into the cylinder block.
2. Attach Tooling (B) and attach a suitable lifting device to front housing (2). The weight of front housing (2) is approximately 181 kg (400 lb). Position the front housing onto Tooling (D).
3. Install bolts (10) that hold front housing (2) to the cylinder block. Remove Tooling (D) and install remaining bolts (10). Tighten the bolts evenly.
4. Cut any excess gasket (11) from the bottom of the front housing.

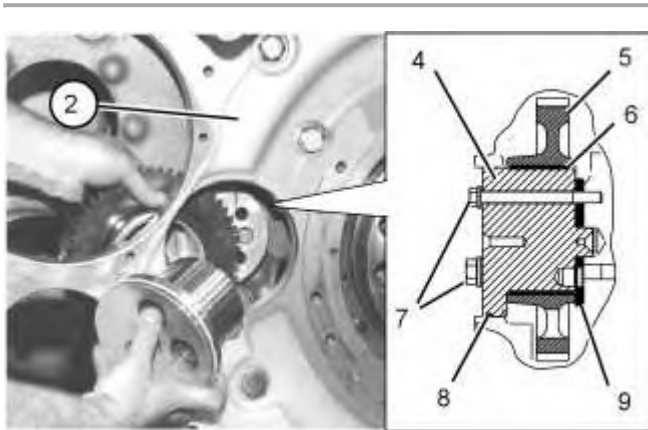
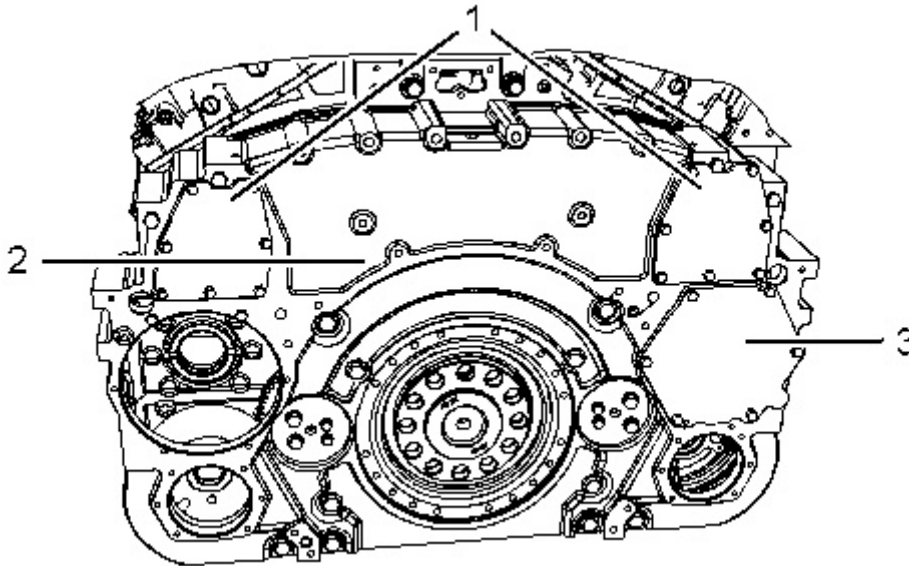


Illustration 2

g01131955

5. Use Tooling (C) to install sleeve bearing (6) in idler gear (5).
6. Install O-ring seal (8) on shaft (4). Apply clean engine oil to the bore in front housing (2) for the shaft.
7. Position thrust washer (9), idler gear (5), and shaft (4) in the front housing. Install bolts (7).



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Illustration 3

g01246380

8. Install the O-ring seal in cover (3). Position cover (3) on front housing (2) and install the bolts.
9. Position the gaskets and covers (1) on front housing (2) and install the bolts.

**End By:**

- a. If necessary, install the engine oil pump and water pump drive. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Install".
  - b. If necessary, install the accessory drive. Refer to Disassembly and Assembly, "Accessory Drive (Front) - Install".
  - c. Install the crankshaft front seal and the wear sleeve. Refer to Disassembly and Assembly, "Crankshaft Front Seal and Wear Sleeve - Install".
  - d. Install the engine oil filter housing. Refer to Disassembly and Assembly, "Engine Oil Filter Housing - Install".
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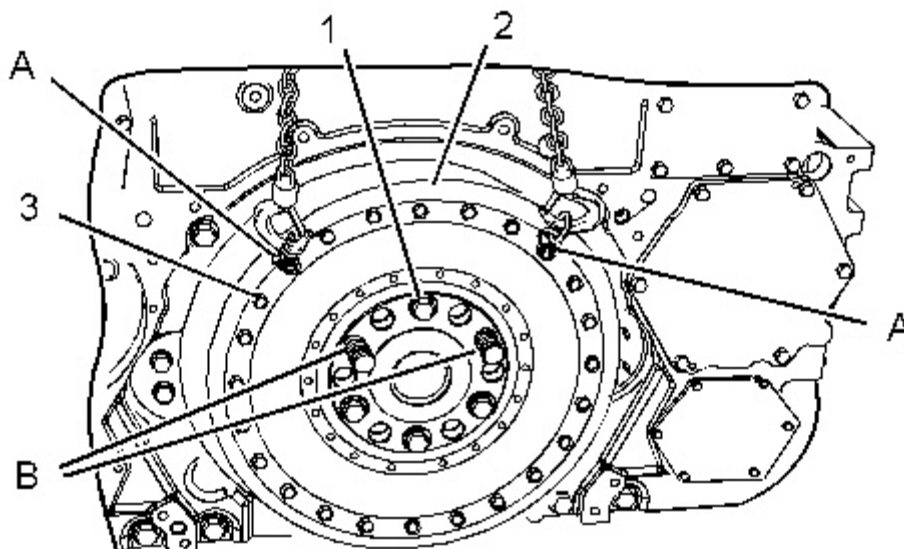
# Vibration Damper - Remove and Install

SMCS - 1205-010

## Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7573	Lifting Bracket	2
B	-	Guide Stud 1 - 14 by 10 inch	2

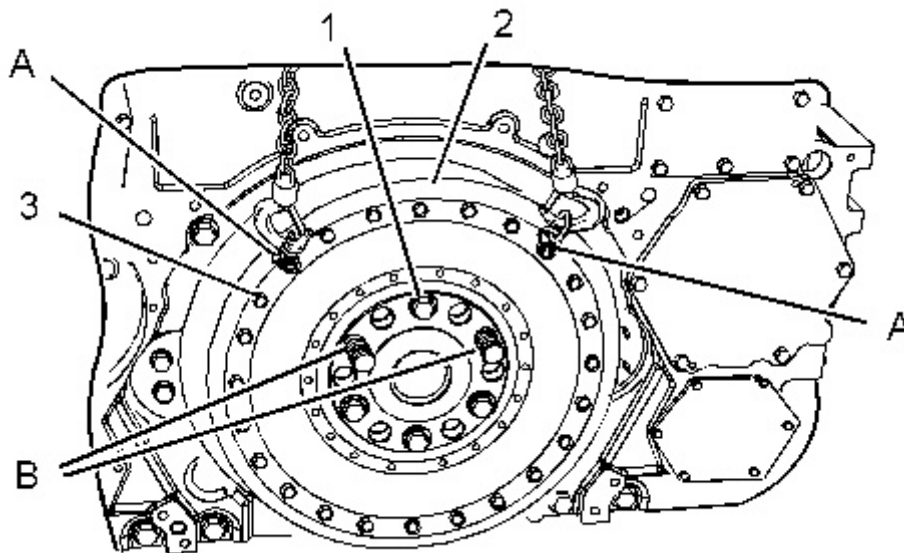


1. Remove two bolts (1) and install Tooling (B).
2. Remove two bolts (3) and attach Tooling (A) and a suitable lifting device to vibration damper (2). The weight of vibration damper (2) is approximately 175 kg (385 lb). Remove remaining bolts (1). Remove vibration damper (2).

## Installation Procedure

Table 2

Required Tools			
Tool	Part Number	Part Description	Qty
A	138-7573	Lifting Bracket	2
B	-	Guide Stud 1 - 14 by 10 inch	2
C		Loctite 243	-



1. Install Tooling (B) in the crankshaft.
2. Attach Tooling (A) and a suitable lifting device to vibration damper (2). The weight of vibration damper (2) is approximately 175 kg (385 lb).
3. Install the vibration damper on Tooling (B). Install bolts (1). Remove Tooling (B) and install remaining bolts (1). Tighten bolts (1) to a torque of  $1125 \pm 100 \text{ N}\cdot\text{m}$  ( $820 \pm 74 \text{ lb ft}$ ).
4. Remove Tooling (A). Apply Tooling (C) to the threads of bolts (3). Install bolts (3) and tighten to a torque of  $55 \pm 7 \text{ N}\cdot\text{m}$  ( $41 \pm 5 \text{ lb ft}$ ).

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