

Product: ENGINE  
Model: 3512E ENGINE SY9  
Configuration: 3512E Marine Engine SY900001-UP

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

Media Number -M0075247-08

Publication Date -01/09/2018

Date Updated -11/09/2018

i05838306

# **Auxiliary Water Pump - Install**

SMCS - 1371-012

## **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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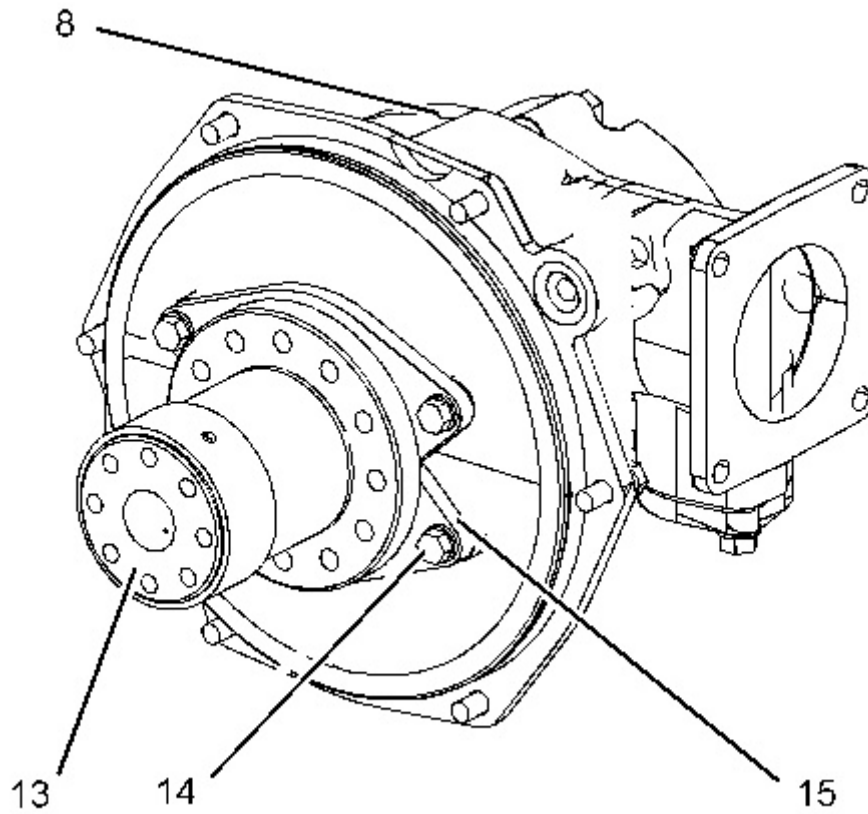
### **NOTICE**

**Water pumps may leak as a result of damaged face seals. Relative movement between the shaft and the housing may allow the drive shaft to contact the face seal in the water pump. If contact occurs, the face seal will be damaged, and very early hour failures can result.**

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**Note:** Do not lift the auxiliary water pump by the shaft. Do not bump the shaft when installing the auxiliary water pump onto the engine.

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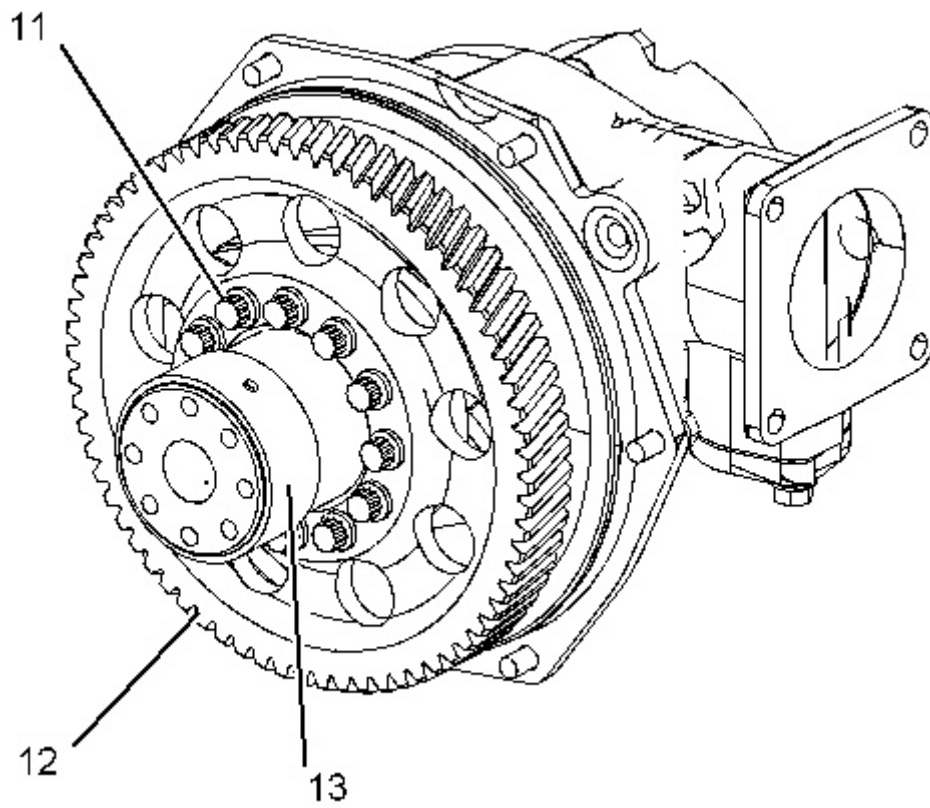


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Illustration 1

g01009132

1. Slide accessory drive shaft (13) on the shaft of auxiliary water pump (8) . Position thrust washers (15) on the auxiliary water pump and install bolts (14) .
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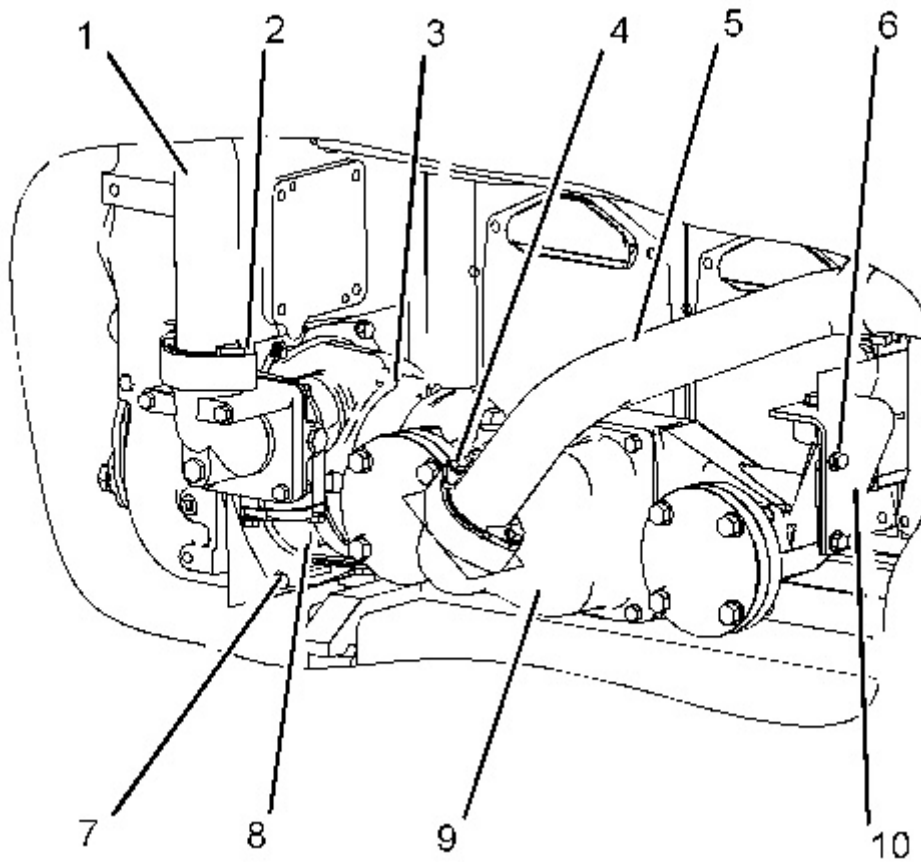


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Illustration 2

g01009118

2. Position accessory drive gear (12) on accessory drive shaft (13) . Install bolts (11) .
-



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Illustration 3

g01009100

3. The weight of auxiliary water pump (8) , the accessory drive shaft, and the accessory drive gear is approximately 48 kg (106 lb). Use a suitable lifting device to install the components in the front drive housing. Install bolts (7) .
  4. The weight of thermostatic control valve group (9) is approximately 28 kg (62 lb). Use a suitable lifting device to position thermostatic control valve group (9) . Install bolts (3) . Install bolts (6) in order to fasten thermostatic control valve group (9) to bracket (10) .
  5. Install the O-ring seal on tube (1) and install tube (1) in the elbow on auxiliary water pump (8) . Install retaining ring (2) , the retainers, and the bolts to secure tube (1) .
  6. Install the O-ring seal on tube (5) and install tube (5) in thermostatic control valve group (9) . Install retaining ring (4) , the retainers, and the bolts to secure tube (5) .
-

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

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Publication Date -01/09/2018

Date Updated -11/09/2018

i02724031

# **Engine Oil Cooler - Remove**

SMCS - 1378-011

## **Removal Procedure**

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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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1. Drain the coolant from the cooling system into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Change".
-

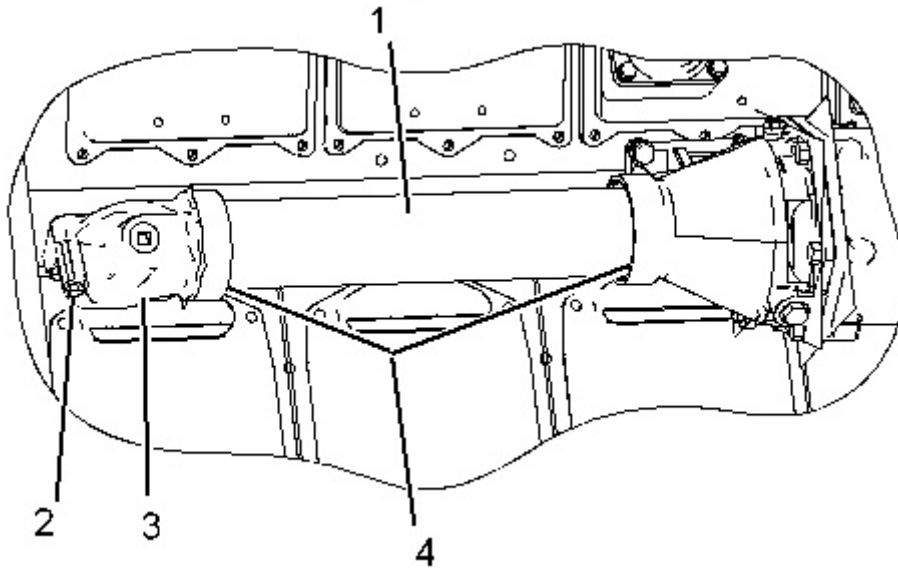


Illustration 1

g01135600

2. Remove bolts (2). Remove elbow (3) and tube assembly (1). Remove the gasket from the elbow.
3. Remove tube assembly (1) from elbow (3). Remove O-ring seals (4) from the tube.

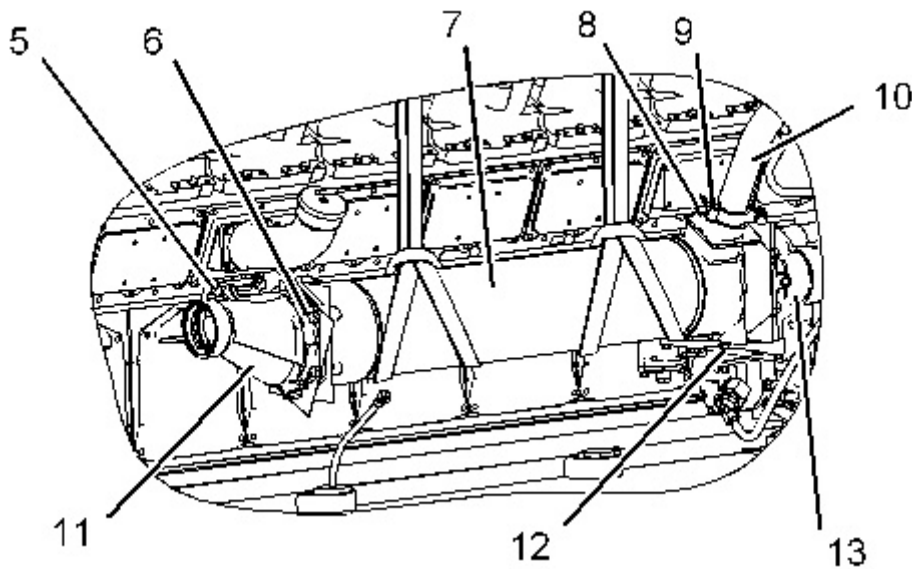


Illustration 2

g01135604

4. Attach a suitable lifting device to engine oil cooler (7). The weight of engine oil cooler (7) is approximately 78 kg (172 lb).
5. Remove bolts (8) and bolts (9). Remove the clamp assembly from tube assembly (10).
6. Remove tube assembly (10) from the cooler bypass elbow. Remove the O-ring seal and the retaining ring from the tube assembly.

7. Remove bolts (5) and bolts (6). Remove adapter (11) from the engine oil cooler. Remove the gasket from the adapter.
  8. Remove bolts (12).
  9. Remove engine oil cooler (7) from tube (13). Remove the O-ring seal from the tube.
-

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Publication Date -01/09/2018

Date Updated -11/09/2018

i02259012

# **Engine Oil Cooler - Disassemble**

SMCS - 1378-015

## **Disassembly Procedure**

### **Start By:**

- a. Remove the engine oil cooler. Refer to Disassembly and Assembly, "Engine Oil Cooler - Remove".

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### **NOTICE**

**Keep all parts clean from contaminants.**

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

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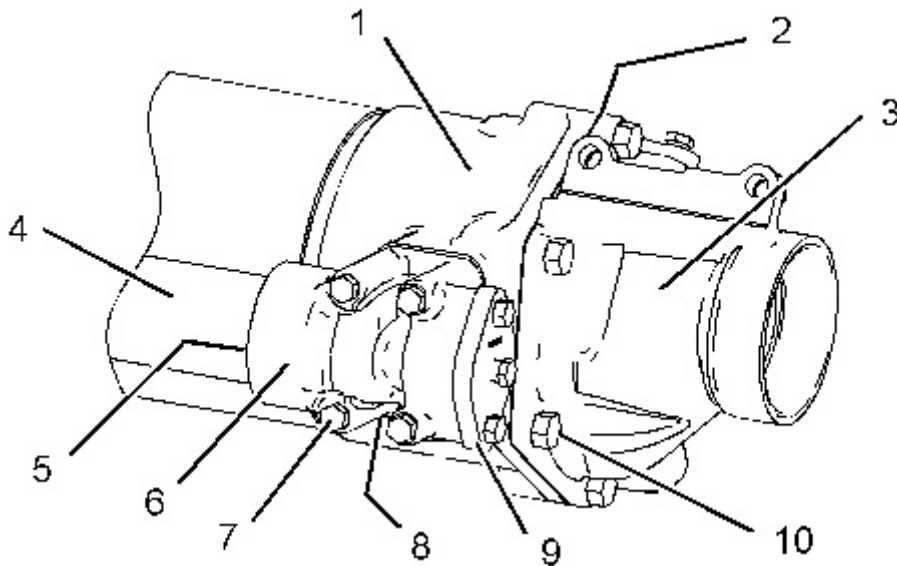


Illustration 1

g01135749

1. Remove bolts (7). Remove elbow (6). Remove gasket (8) from the elbow.
2. Remove tube (4) from elbow (6). Remove O-ring seals (5) from tube (4).
3. Remove the bolts and cover (9) from elbow (6). Remove the gasket from the elbow.
4. Place an identification mark on oil cooler bonnet (3) and on engine oil cooler core (1) for assembly purposes. Remove bolts (10) and remove oil cooler bonnet (3) from engine oil cooler core (1). Remove gasket (2) from the engine oil cooler core.

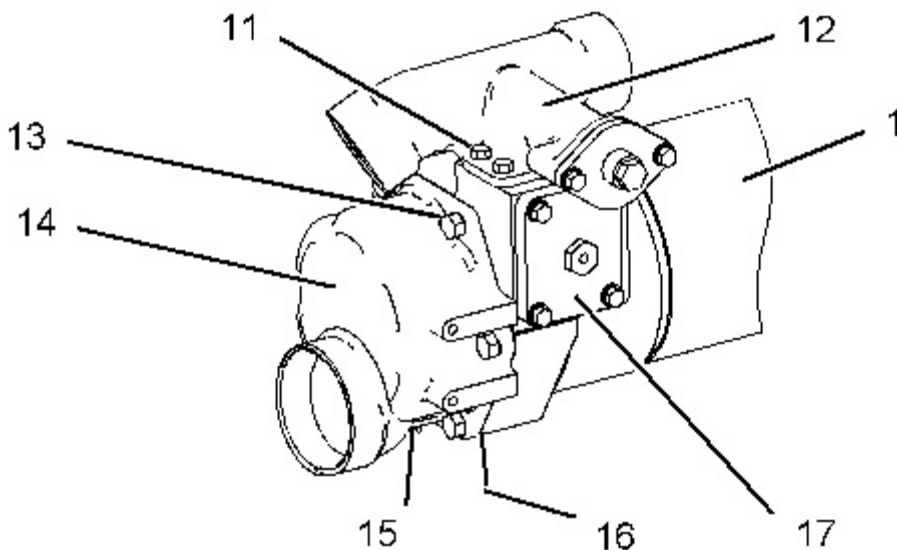


Illustration 2

g01135795

5. Place an identification mark on oil cooler bonnet (14) and on engine oil cooler core (1) for assembly purposes. Remove bolts (13) and remove oil cooler bonnet (14) from engine oil cooler core (1). Remove gasket (16) from the engine oil cooler core.

6. Remove bolts (11) and elbow (12) from the engine oil cooler bypass. Remove the O-ring seals from the elbow.
  7. Remove cover (17) and the O-ring seal.
  8. If necessary, remove drain plug (15) and the O-ring seal.
  9. Thoroughly clean the tubes in the engine oil cooler core.
- 

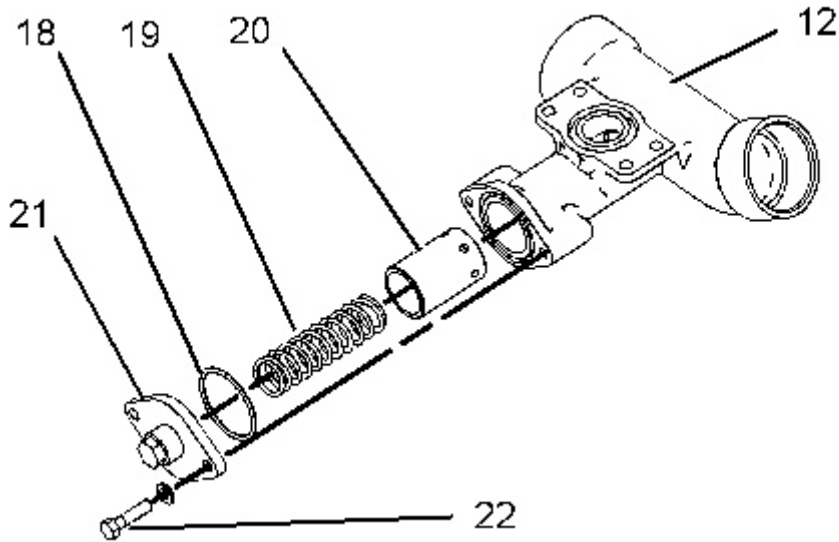


Illustration 3

g01135796

**! 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.**

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10. Remove bolts (22), cover (21), O-ring seal (18), spring (19), and bypass valve (20) from elbow (12).
-

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

Media Number -M0075247-08

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Date Updated -11/09/2018

i02259048

## Engine Oil Cooler - Assemble

SMCS - 1378-016

### Assembly Procedure

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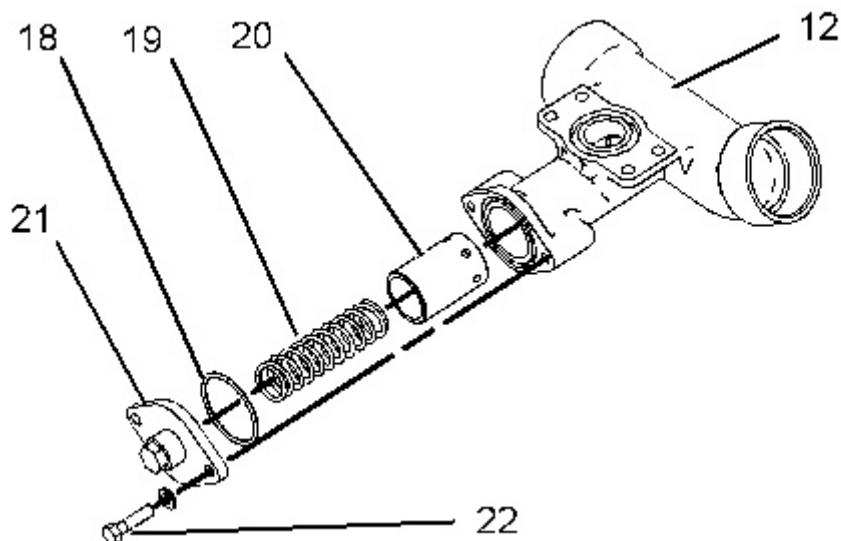
#### NOTICE

**Keep all parts clean from contaminants.**

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

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1. Thoroughly clean the tubes in the engine oil cooler core.




**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.**

- 
2. Install bypass valve (20) and spring (19) in elbow (12). Install O-ring seal (18) and lubricate the O-ring seal with clean engine oil. Install cover (21) and bolts (22).
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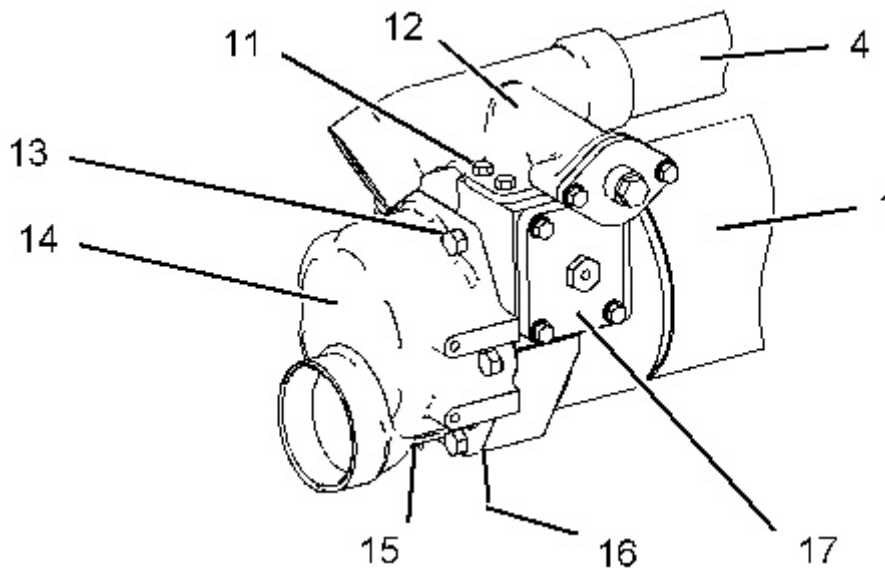
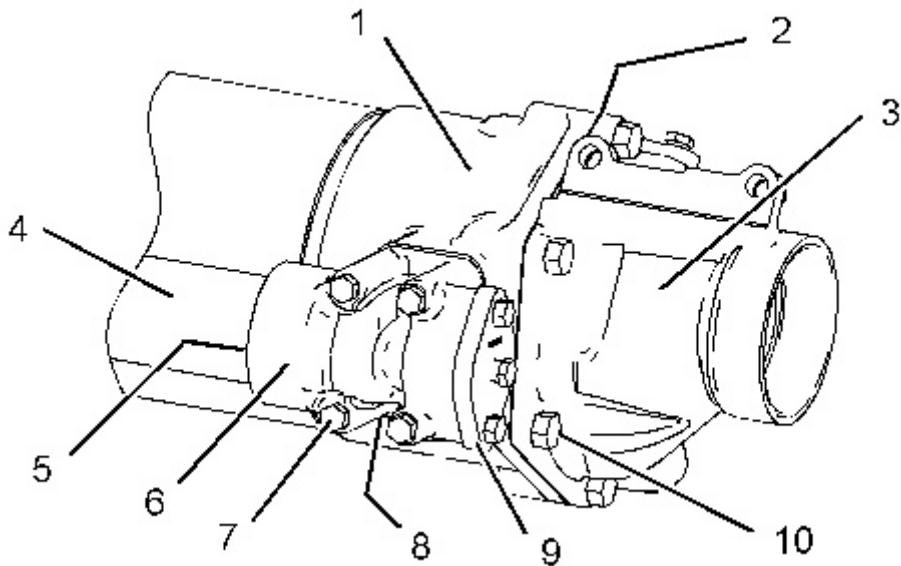


Illustration 2

g01135915

3. Install gasket (16) and oil cooler bonnet (14) on engine oil cooler core (1) in the orientation that was noted during the disassembly procedure. Install bolts (13).
  4. Install the O-ring seal and cover (17).
  5. Install the O-ring seal and drain plug (15).
  6. Install the O-ring seal and elbow (12) on the engine oil cooler core. Install bolts (11).
  7. Install the O-ring seal on tube (4). Apply clean engine oil on the O-ring seal. Install tube (4) in elbow (12).
-



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Illustration 3

g01135749

8. Install gasket (2) and oil cooler bonnet (3) on engine oil cooler core (1) in the orientation that was noted during the disassembly procedure. Install bolts (10).
9. Install O-ring seal (5) on tube (4). Apply clean engine oil on the O-ring seal. Install elbow (6) on tube (4).
10. Position gasket (8) and elbow (6) on engine oil cooler core (1). Install bolts (7).
11. Position the gasket and cover (9) on elbow (6). Install the bolts.

**End By:**

- a. Install the engine oil cooler. Refer to Disassembly and Assembly, "Engine Oil Cooler - Install".
-

Product: ENGINE  
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## Disassembly and Assembly 3512E and 3516E Marine Engines

Media Number -M0075247-08

Publication Date -01/09/2018

Date Updated -11/09/2018

i02255502

## Engine Oil Cooler - Install

SMCS - 1378-012

### Installation Procedure

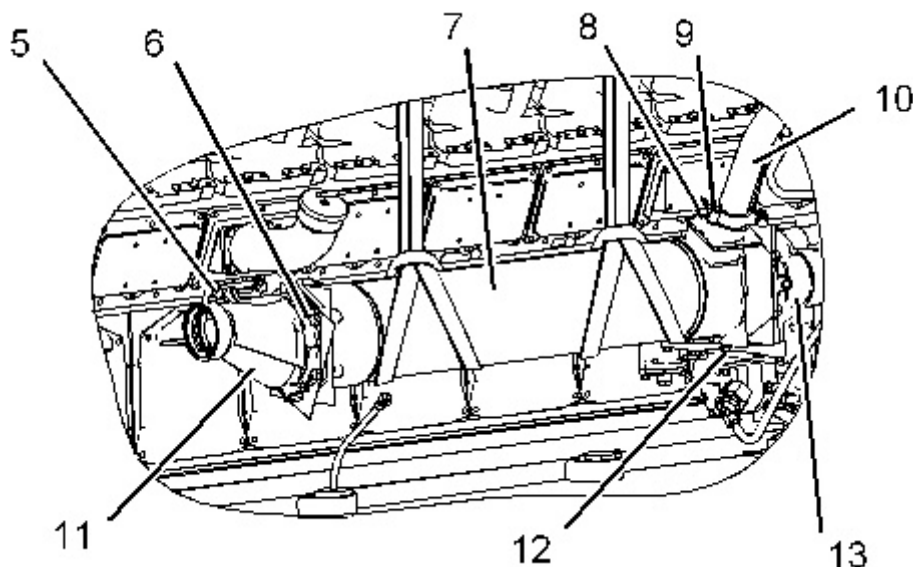
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#### NOTICE

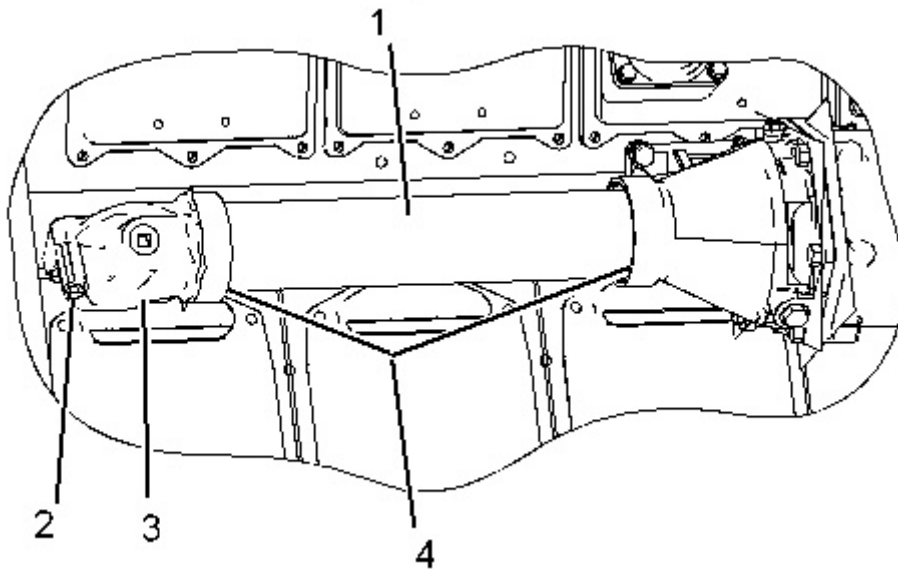
**Keep all parts clean from contaminants.**

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

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1. Attach a suitable lifting device to engine oil cooler (7). The weight of engine oil cooler (7) is approximately 78 kg (172 lb).
  2. Install the O-ring seal on tube (13). Apply clean engine oil to the O-ring seal.
  3. Position engine oil cooler (7) on tube (13). Install bolts (12).
  4. Position the gasket and adapter (11) on the engine oil cooler. Install bolts (6) and bolts (5).
  5. Install the O-ring seal and the retaining ring on tube assembly (10). Install tube assembly (10).
  6. Install the clamp, bolts (8), and bolts (9). Tighten bolts (8) to a torque of  $47 \pm 9 \text{ N}\cdot\text{m}$  ( $35 \pm 7 \text{ lb}\cdot\text{ft}$ ). Tighten bolts (9) to a torque of  $47 \pm 9 \text{ N}\cdot\text{m}$  ( $35 \pm 7 \text{ lb}\cdot\text{ft}$ ).
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Illustration 2

g01135600

7. Install O-ring seals (4) on tube assembly (1). Apply clean engine oil to the O-ring seals.
  8. Install elbow (3) on tube assembly (1). Install tube assembly (1) in the adapter. Position the gasket and elbow (3) on the cylinder block and install bolts (2).
  9. Fill the cooling system. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Change".
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## **Disassembly and Assembly 3512E and 3516E Marine Engines**

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Date Updated -11/09/2018

i02724021

# **Engine Oil Pump - Remove**

SMCS - 1304-011

## **Removal Procedure**

### **Start By:**

- a. Remove the fuel transfer pump. Refer to Disassembly and Assembly, "Fuel Transfer Pump - Remove".

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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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1. Drain the coolant from the cooling system into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Change".

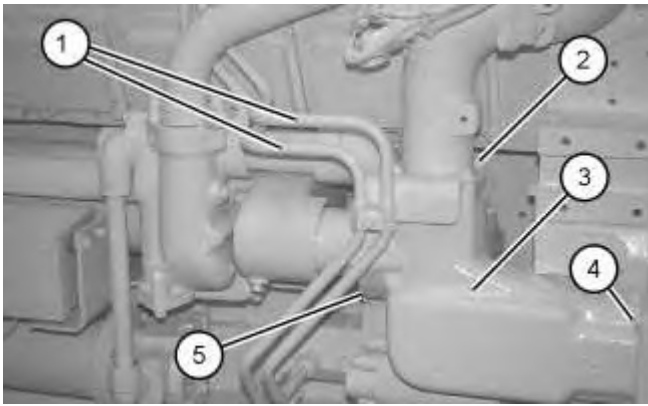


Illustration 1

g01141965

2. Remove tube assemblies (1) and the brackets.
3. Remove bolts (2), (4), and (5). Remove adapter (3). Remove the gaskets from the adapter.

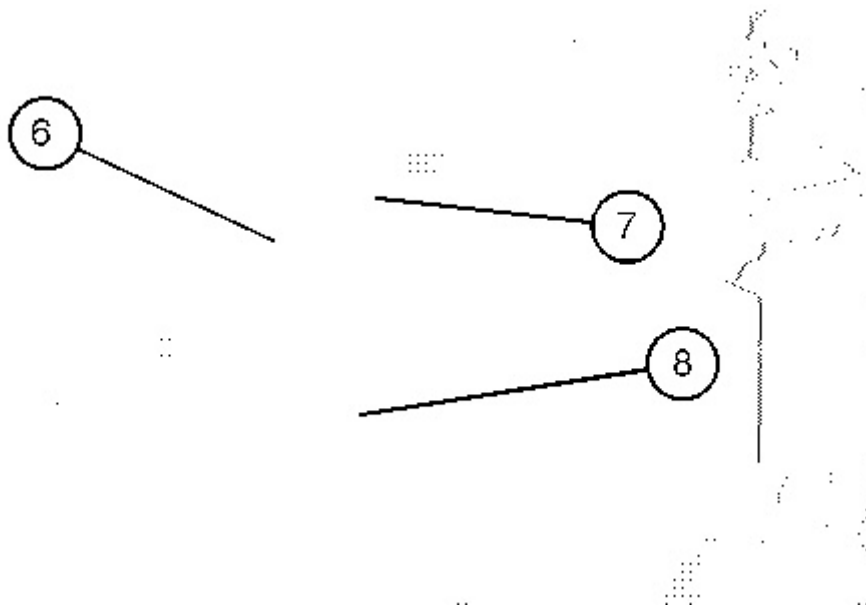
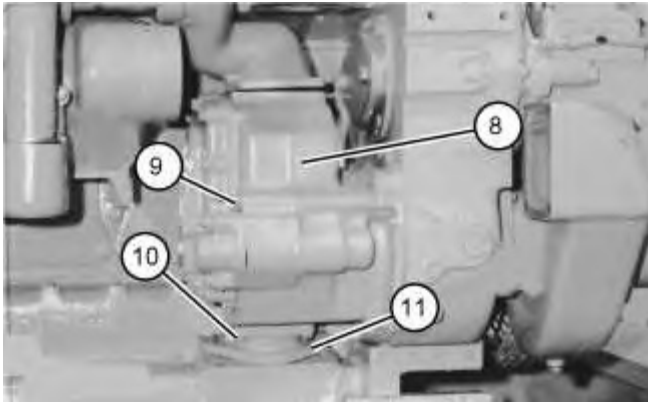


Illustration 2

g01141973

4. Remove bolts (6) in order to disconnect elbow (7) from engine oil pump (8). Remove the O-ring seal from the elbow.
-



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Illustration 3

g01141977

5. Attach a suitable lifting device to engine oil pump (8). The weight of engine oil pump (8) is approximately 42 kg (93 lb). Remove bolts (9) in order to remove engine oil pump (8) from the front housing. Remove bolts (10) in order to remove engine oil pump (8) from adapter (11). Remove the engine oil pump. Remove the O-ring seal from adapter (11).
  6. Remove the O-ring seal from adapter (11). Remove the O-ring seal from engine oil pump (8).
-

Product: ENGINE

Model: 3512E ENGINE SY9

Configuration: 3512E Marine Engine SY900001-UP

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

Media Number -M0075247-08

Publication Date -01/09/2018

Date Updated -11/09/2018

i02483493

## Engine Oil Pump - Disassemble

SMCS - 1304-015

### Disassembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	1P-0510	Driver Gp	1
B	6V-2166	Bearing Puller Gp	1

#### Start By:

- a. Remove the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Remove".

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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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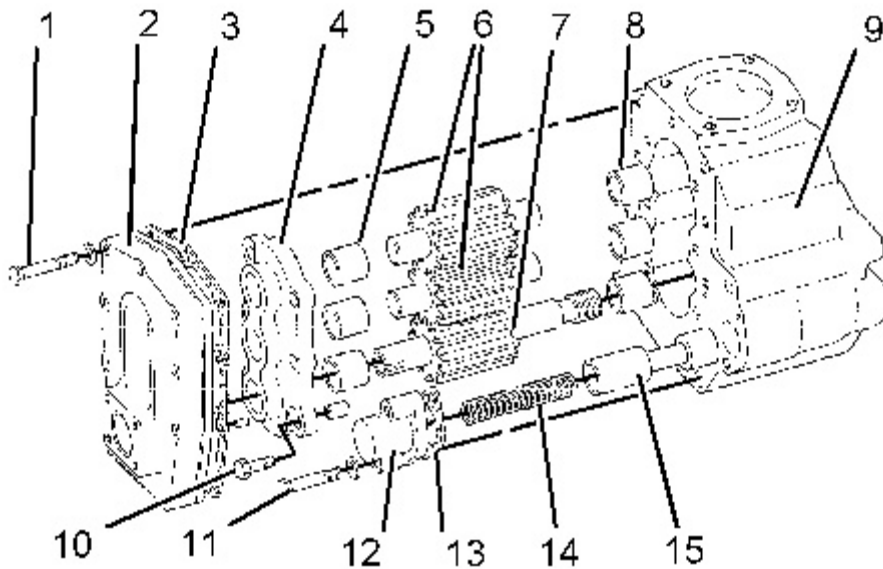
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## NOTICE

**Keep all parts clean from contaminants.**

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

---



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Illustration 1

g01142157

## **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.**

---

1. Remove bolts (11) and relief valve cover (12). Remove spring (14) and pressure relief spool (15). Remove gasket (13) from the relief valve cover.
2. Remove bolts (1) and pump cover assembly (2). Remove gasket (3) from the pump cover assembly. If necessary, remove the dowels from pump cover assembly (2).
3. Remove bolts (10) and pump cover assembly (4) from oil pump body assembly (9).

4. Use Tooling (A) to remove sleeve bearings (5) from pump cover assembly (4). If necessary, remove the hollow dowels from pump cover assembly (4).
  5. Remove idler shaft assemblies (6) and pump drive shaft assembly (7) from oil pump body assembly (9).
  6. Use Tooling (A) or Tooling (B) to remove sleeve bearings (8) from oil pump body assembly (9).
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## Disassembly and Assembly 3512E and 3516E Marine Engines

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i02483664

# Engine Oil Pump - Assemble

SMCS - 1304-016

## Assembly Procedure

Table 1

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

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### NOTICE

**Keep all parts clean from contaminants.**

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

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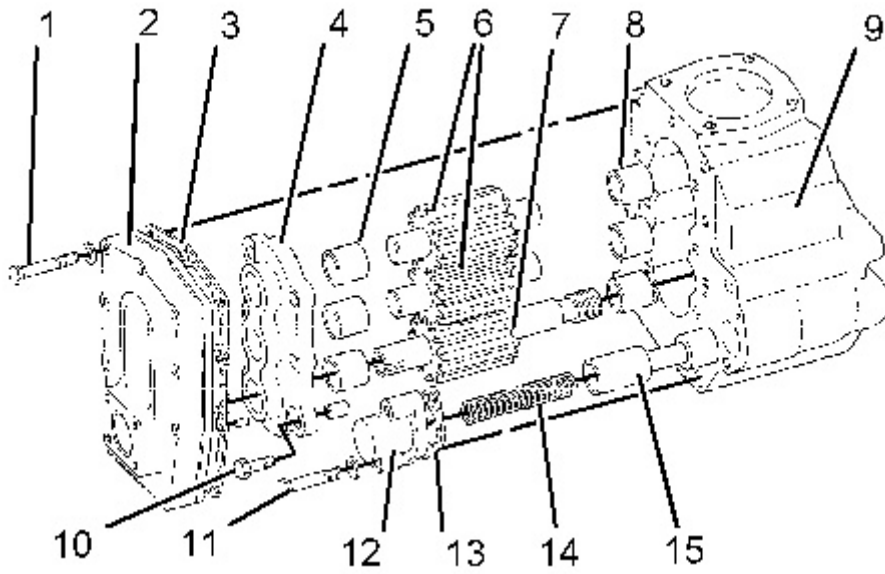


Illustration 1

g01142157

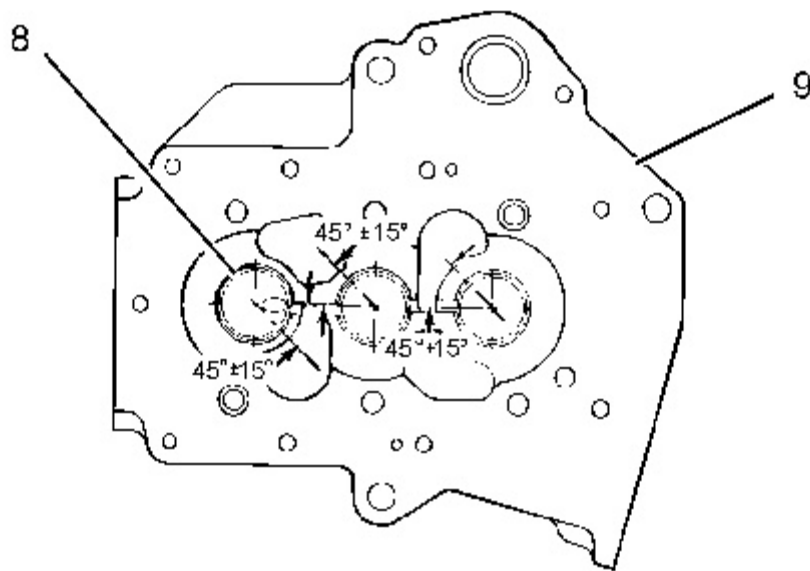


Illustration 2

g01142223

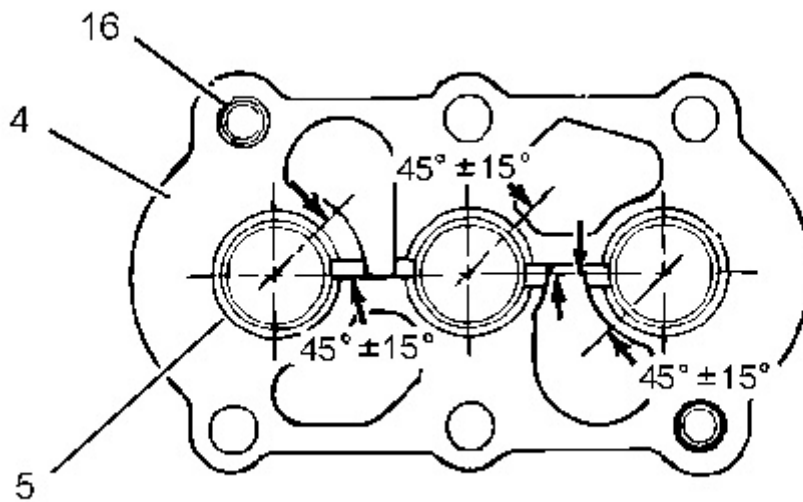


Illustration 3

g01142224

 **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. Align the joints of sleeve bearings (8) to  $45 \pm 15$  degrees from the centerlines of the bearing bores in oil pump body assembly (9). Use Tooling (A) to install sleeve bearings (8) in oil pump body assembly (9). The sleeve bearings must be  $1.5 \pm 0.5$  mm ( $0.06 \pm 0.02$  inch) below the gear bore.
2. Install hollow dowels (16) in pump cover assembly (4) at a distance of  $6.0 \pm 0.5$  mm ( $0.24 \pm 0.02$  inch) above the face of the pump cover assembly.
3. Align the joints of sleeve bearings (5) to  $45 \pm 15$  degrees from the centerlines of the bearing bores in pump cover assembly (4). Use Tooling (A) to install sleeve bearings (5) in pump cover assembly (4). The sleeve bearings must be  $1.5 \pm 0.5$  mm ( $0.06 \pm 0.02$  inch) below the face of the pump cover assembly.
4. Apply clean engine oil to pump drive shaft assembly (7) and to idler shaft assemblies (6). Install the pump drive shaft assembly and the idler shaft assemblies in oil pump body assembly (9). Position pump cover assembly (4) onto the oil pump body assembly and install bolts (10).
5. Install the dowels in pump cover assembly (2) at a distance of  $6.0 \pm 1.0$  mm ( $0.24 \pm 0.04$  inch) above the surface of the cover assembly. Position gasket (3) and pump cover assembly (2) on oil pump body assembly (9). Install bolts (1).



**Note:** The engine oil pump must turn freely after assembly. Turn the engine oil pump by hand.

6. Apply clean engine oil on pressure relief spool (15). Install pressure relief spool (15) and spring (14) in the oil pump body assembly. Install gasket (13), relief valve cover (12), and bolts (11).

**End By:**

- a. Install the engine oil pump. Refer to Disassembly and Assembly, "Engine Oil Pump - Install".
-

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