

Product: INDUSTRIAL ENGINE  
Model: 3512B INDUSTRIAL ENGINE 8DF  
Configuration: 3512B Locomotive Engine 8DF00001-UP

## Disassembly and Assembly 3500B Engines

Media Number -SEN6564-29

Publication Date -01/03/2015

Date Updated -14/09/2018

i03455280

# Auxiliary Water Pump - Assemble - Auxiliary Pump (Type 1)

SMCS - 1052-016

## Assembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
B	193-8094	Spline Socket	1
C	193-8100	Socket	1
E	136-1452	Retaining Ring Pliers As	1
F	152-7159	Socket As	1
L	1P-0520	Driver Gp	1
M	5P-4197	Spacer	1
N	4C-4030	Thread Lock Compound	1
P	4C-4032	Bearing Mount Compound	1
Q	9S-3263	Thread Lock Compound	1

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### NOTICE

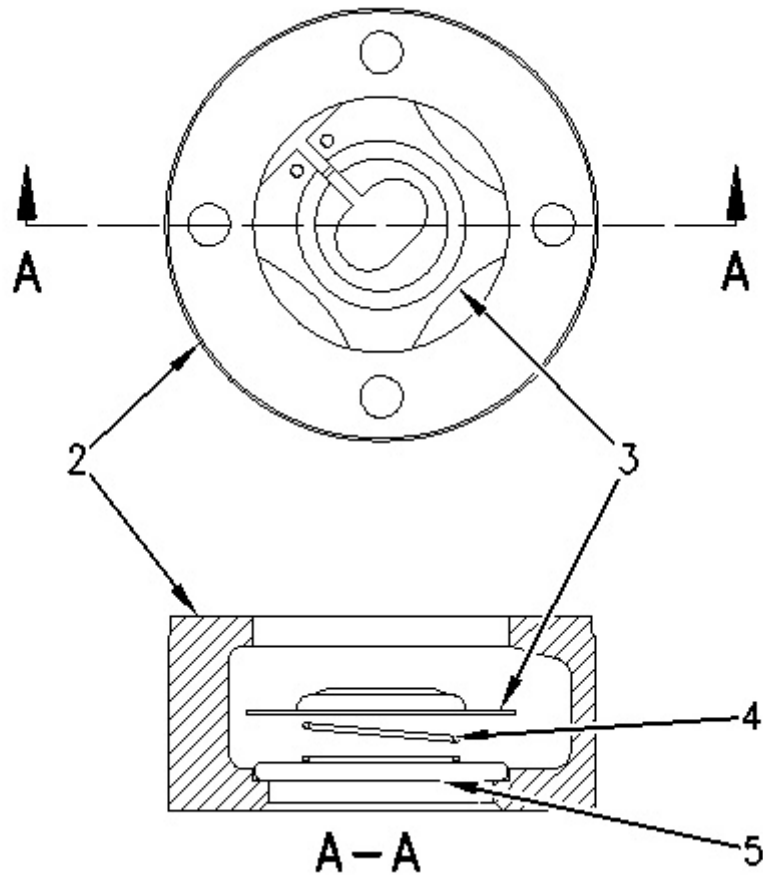
**Keep all parts clean from contaminants.**

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

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## Assemble the Check Valve

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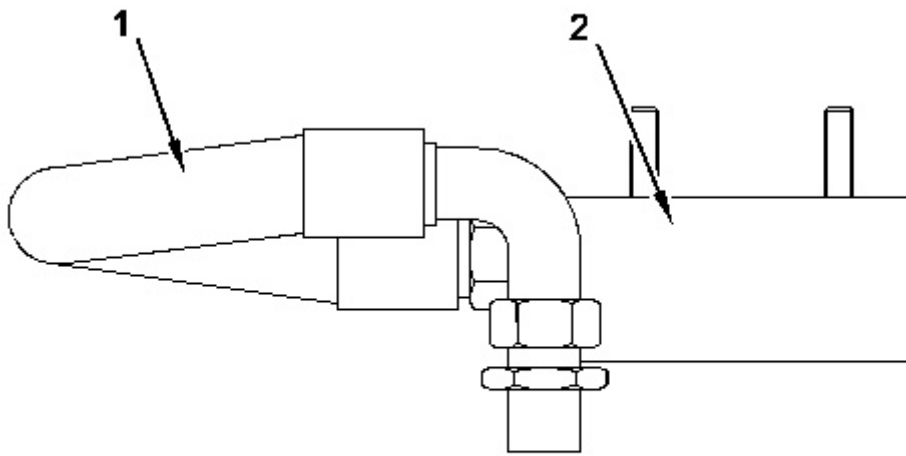


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Illustration 1

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1. Install disc (5) and spring (4) into the body of check valve (2).
  2. Use Tooling (E) in order to install retainer (3) into the body of check valve (2). After the retainer is installed, strike the retainer in order to ensure that the retainer is properly seated.
-



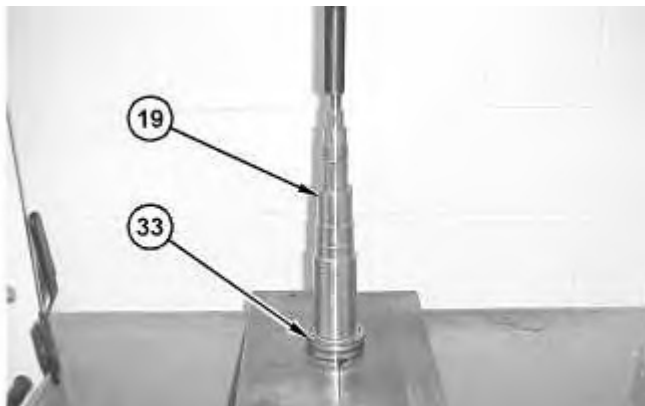
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Illustration 2

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3. Install hose assembly (1) to the body of check valve (2).

### Assemble the Pump



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Illustration 3

g01056378

1. Place shaft (19) and bearing (33) in a suitable press. Make sure that the serial number on the bearing is toward the driven end of the shaft. Insert the driven end of the shaft into the bearing. Press the shaft into the bearing until the shoulder of the shaft contacts the bearing.
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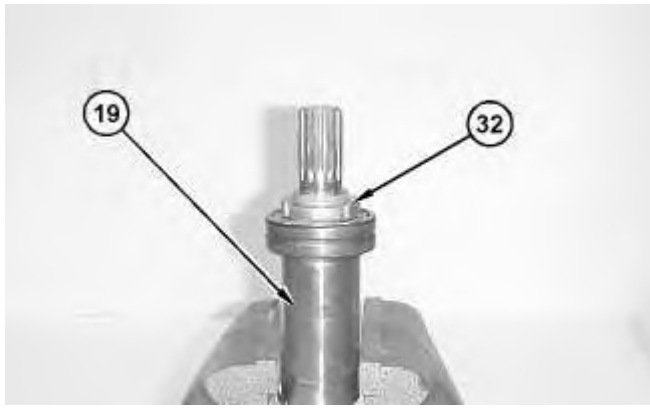


Illustration 4

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**Note:** Thoroughly clean the threads of shaft (19) and nut (32) with solvent before assembly.

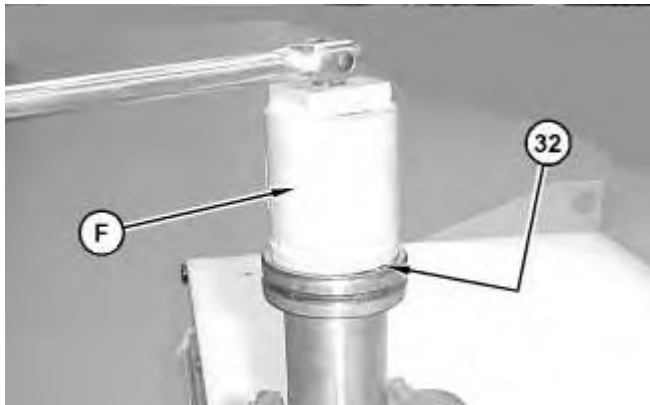


Illustration 5

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2. Secure the shaft in a vise with the driven end of the shaft in the upward position. Apply Tooling (N) to the threads of the shaft. Orient the tapered end of nut (32) (not shown) toward the bearing. Use Tooling (F) in order to tighten the nut to a torque of  $140 \pm 10 \text{ N}\cdot\text{m}$  ( $103 \pm 7 \text{ lb ft}$ ).

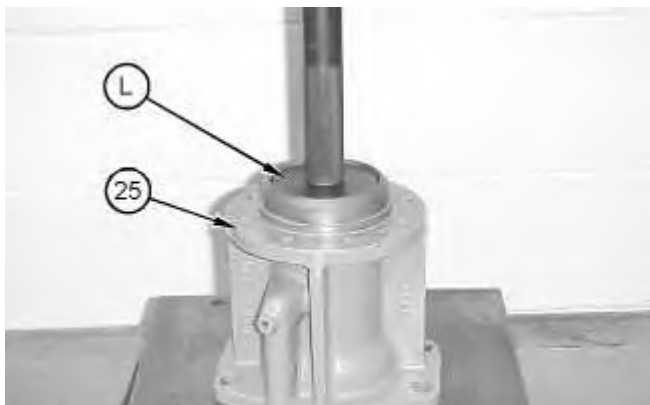


Illustration 6

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Illustration 7

g01056415

3. Use a suitable press and Tooling (L) in order to install bearing race (38) into bearing housing (25).

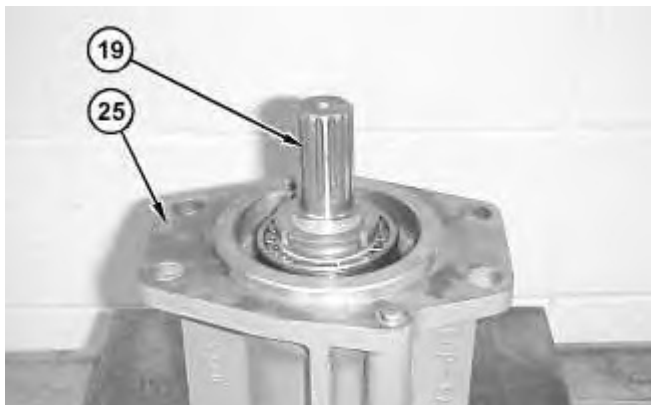


Illustration 8

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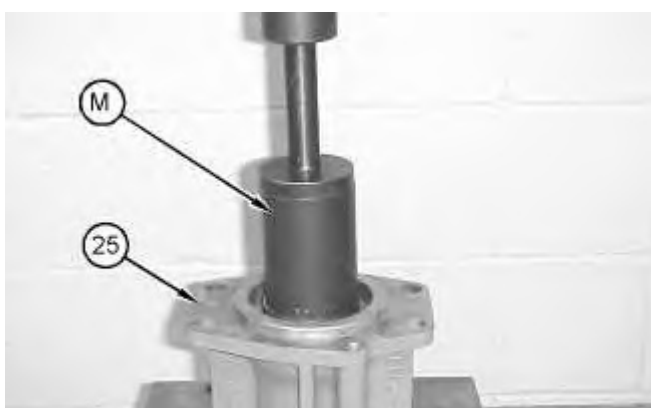


Illustration 9

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4. Place shaft (19) into bearing housing (25) with the driven end of the shaft in the upward position. Use a suitable press and Tooling (M) in order to install the shaft into the bearing housing.

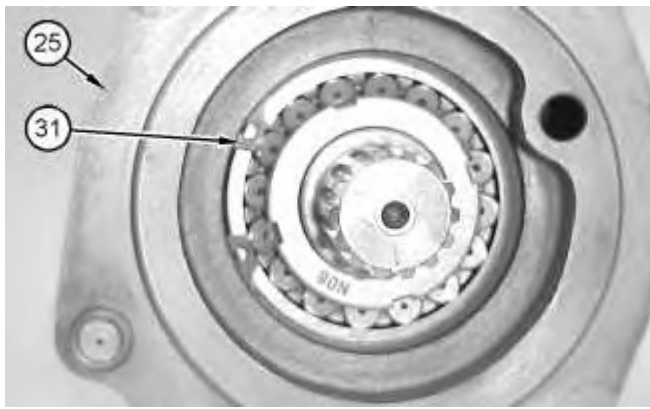


Illustration 10

g01055804

5. Place bearing housing (25) into a vise with the driven end of the shaft in the upward position. Use Tooling (E) in order to install retaining ring (31) into the bearing housing. After the retaining ring is installed, strike the ring with a punch in order to ensure that the ring is properly seated.



Illustration 11

g01055817

6. Place bearing housing (25) into a vise with the impeller end of the shaft in the upward position. Place bearing (37) into position with the serial number in the upward position. Use a hammer and a brass driver to install the bearing into the bearing housing.

Alternatively, use a suitable press with an appropriate sleeve to press the bearing into the housing.

7. Use Tooling (E) in order to install retaining ring (36) into bearing housing (25). Make sure that the side of the retaining ring with the bevel is upward. After the retaining ring is installed, strike the ring with a punch in order to ensure that the ring is properly seated.

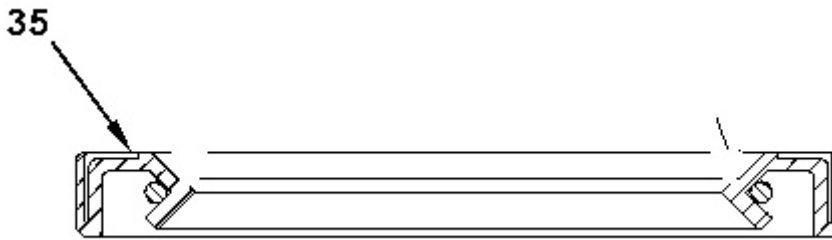


Illustration 12

g01056429

8. Lubricate the inner diameter (lip) of oil seal (35) with clean engine oil.



Illustration 13

g01056434

9. Lubricate the outer diameter of oil seal (35) with a solution of water and five percent soap. Install the oil seal into bearing housing (25).

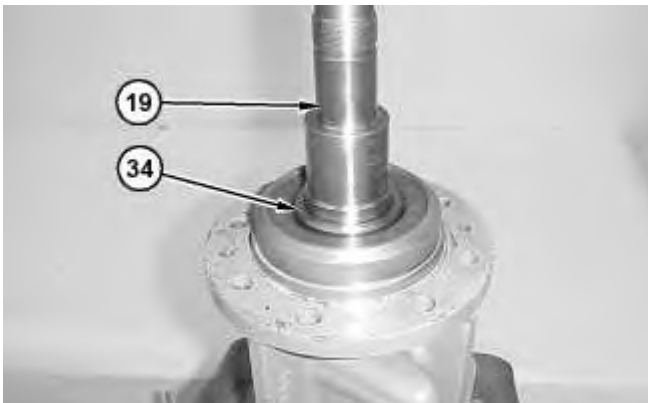


Illustration 14

g01056485

10. Thoroughly clean shaft (19) and collar (34) with solvent. Apply Tooling (P) to the shaft for 15 mm (0.6 inch) from the shoulder of the shaft at the bearing diameter. Install the collar onto the shaft. Rotate the collar for 180 degrees in both directions. Allow the compound to cure for 30 minutes.

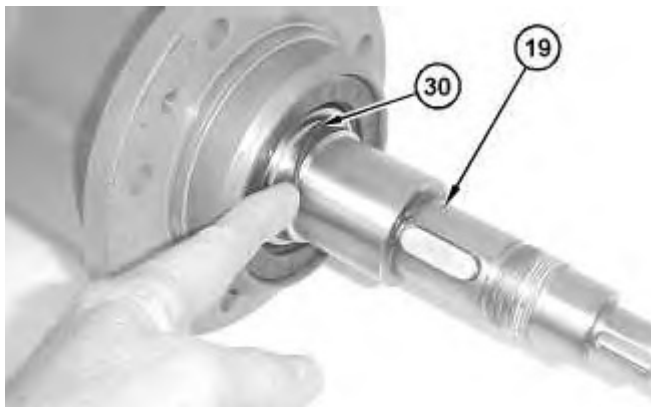


Illustration 15

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11. Install O-ring seal (30) on shaft (19) and install the O-ring seal over the collar.

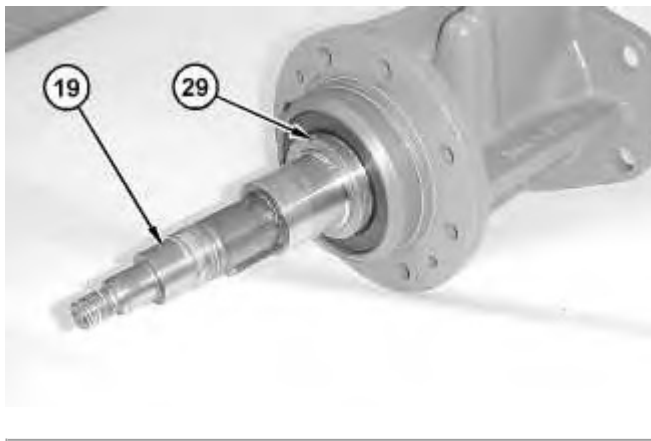


Illustration 16

g01055802

12. Install ring (29) on shaft (19) and install the ring over the O-ring seal. Make sure that the side of the ring with the step is oriented toward the O-ring seal. Maintain approximately  $490 \pm 45$  N ( $110 \pm 10$  lb) of pressure on ring (29) and use an allen wrench to tighten the screws to a torque of  $0.9 \pm 0.1$  N·m ( $7.97 \pm 0.10$  lb in). After the screws are tightened, use a small center punch to peen the threads in the ring.

**Note:** Carefully inspect the surface of the ceramic seal. If the surface is cracked or scratched, discard the seal and obtain a new seal for installation. Ensure that the faces of the seal are clean.





Illustration 17

g01056491

13. Orient the inside of body (23) to the upward position. Lubricate the stationary segment of ceramic seal (26) with a solution of water and five percent soap. Place the marked side of the segment in the downward position. Use hand pressure to install the segment into body (23). After the seal is installed, wipe the surface dry.



Illustration 18

g01055793

14. Place body (23) on blocks. Orient the inside of the body to the downward position. Place bearing housing (25) onto the body. Attach the bearing housing to the body with bolts and washers (24). Tighten the bolts to a torque of  $22 \pm 4$  N·m ( $16 \pm 3$  lb ft).

**Note:** Carefully inspect the surface of the ceramic seal. If the surface is cracked or scratched, discard the seal and obtain a new seal for installation. Ensure that the faces of the seal are clean.



Illustration 19

g01055799

15. Place the body with the inside of the body in the upward position. Lubricate the rotating segment of ceramic seal (28) with a solution of water and five percent soap. Orient the side of the segment with the spring to the upward position. Use hand pressure to install the rotating segment of ceramic seal (28) over shaft (19).
16. Install ring (27) onto shaft (19). If the key was removed from the shaft, install the key.

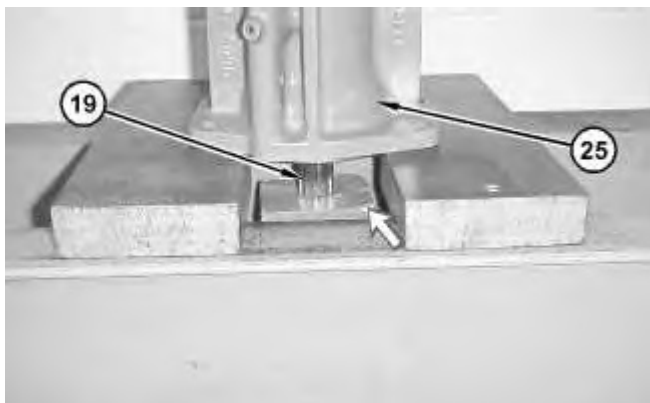


Illustration 20

g01056519

17. Place bearing housing (25) onto a suitable press. Orient the driven end of shaft (19) in the downward position. Use a jack and/or blocking in order to help prevent damage to the shaft when the impeller is installed.



18. Press impeller (22) onto the shaft.



Illustration 22

19. Thoroughly clean the threads of the shaft and locknut (21) with solvent. Install lockwasher (20) onto the shaft. Coat the threads of the shaft with Tooling (Q). Install locknut (21) onto the shaft.

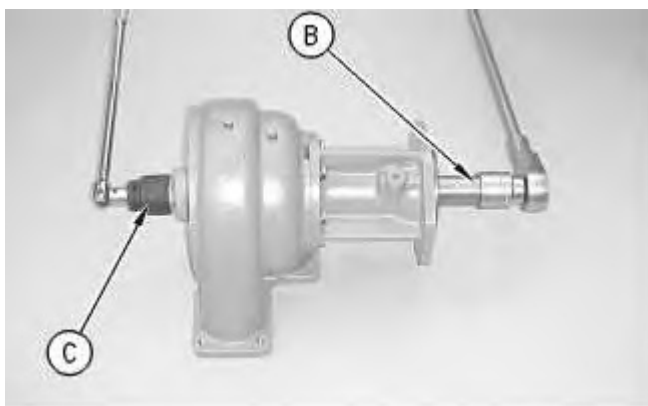
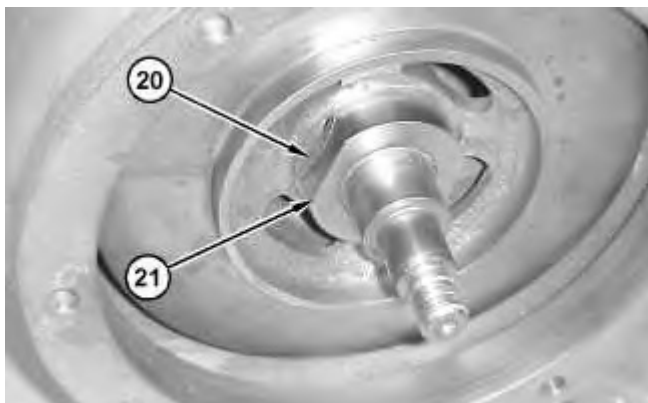


Illustration 23

20. Hold the driven end of the shaft with Tooling (B). Tighten the locknut with Tooling (C). Tighten the locknut to a torque of  $271 \pm 15 \text{ N}\cdot\text{m}$  ( $200 \pm 10 \text{ lb ft}$ ).



21. Bend the edges of lockwasher (20) against the flats of locknut (21).

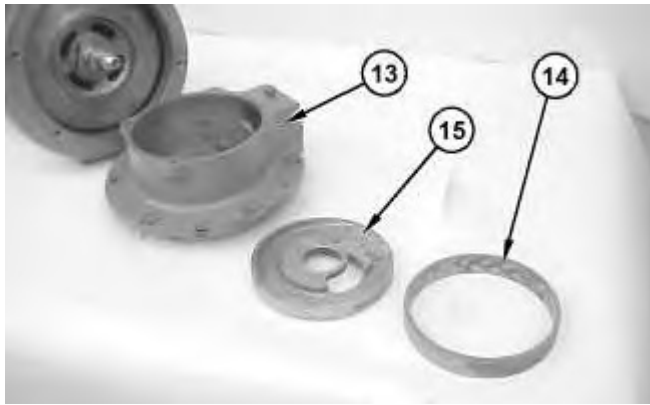


Illustration 25



Illustration 26

22. Lubricate port plate (15) with a solution of water and five percent soap. Install port plate (15) and ring (14) into body (13). Make sure that the lug on the port plate fits into the slot in the body.



Illustration 27

23. Make sure that O-ring seal (16) is in good condition. Coat the O-ring seal with a solution of water and five percent soap in order to make installation easier. Install the O-ring seal onto body (13).

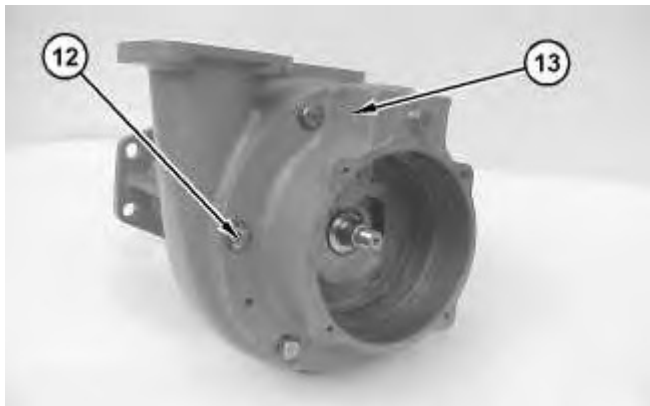


Illustration 28

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24. Install body (13). Install washers and bolts (12) in body (13). Tighten the bolts to a torque of  $22 \pm 4 \text{ N}\cdot\text{m}$  ( $16 \pm 3 \text{ lb ft}$ ).

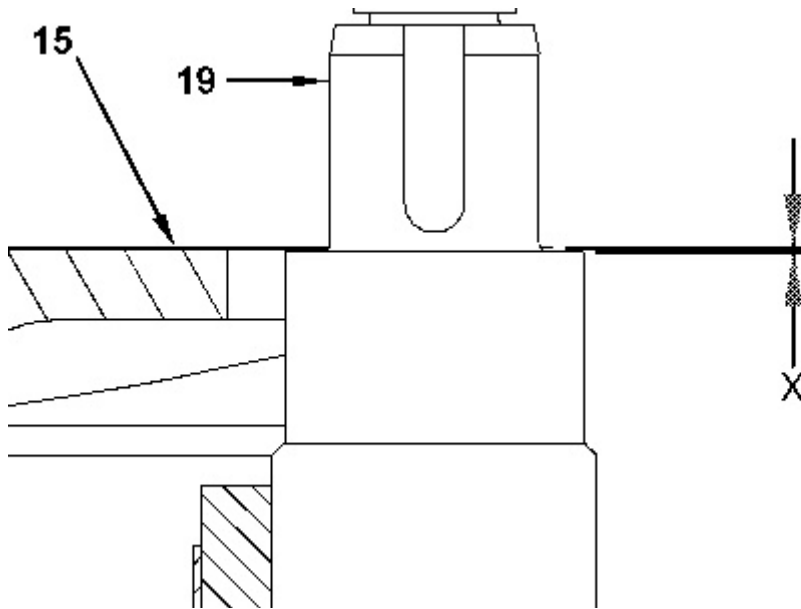


Illustration 29

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25. Determine the thickness of the shims for the impeller.

The shims will be used in order to obtain a clearance of 0.10 to 0.15 mm (0.004 to 0.006 inch) on each side of the impeller.

Place a straight edge on the face of the port plate (15) across the opening for shaft (19). Use a feeler gauge to measure Dimension (X) between the shoulder of the shaft and the face of the port plate.

The correct thickness of the shims is Dimension (X) plus the specification of the clearance. Table 2 is an example of the calculation.

Table 2

Example of the Calculation for Determining the Thickness of the Shims				
Dimension (X)		Clearance Specification		Thickness of the Shims
0.56 mm (0.022 inch)	+	0.125 mm (0.005 inch)	=	0.685 mm (0.0270 inch)

In the example, the proper thickness for the shims is 0.685 mm (0.0269 inch).

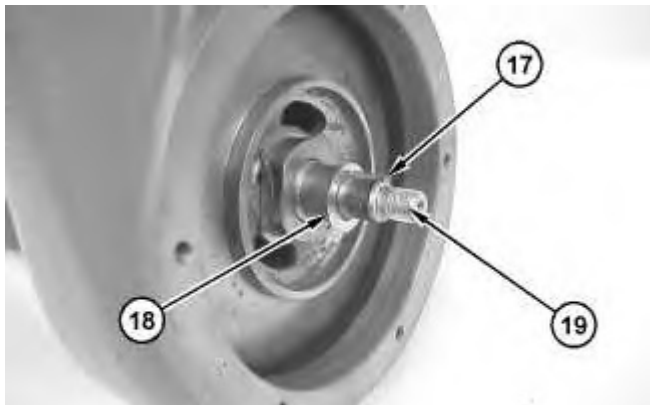


Illustration 30

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26. Install shim (18) and key (17) onto shaft (19).

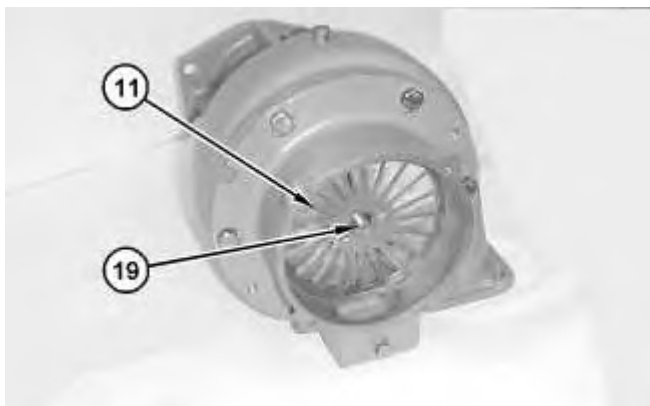


Illustration 31

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27. Fit the keyway of impeller (11) onto the key of shaft (19). Install the impeller onto the shaft. If you use a suitable press in order to install the impeller, be sure to support the shaft with a jack and/or blocks.



Illustration 32

g01055769

28. Thoroughly clean the threads of the shaft and nut (10) with solvent. Coat the threads of the shaft with Tooling (Q). Install the washer and nut (10) onto the shaft. Tighten the nut to a torque of  $70 \pm 5 \text{ N}\cdot\text{m}$  ( $52 \pm 4 \text{ lb ft}$ ).

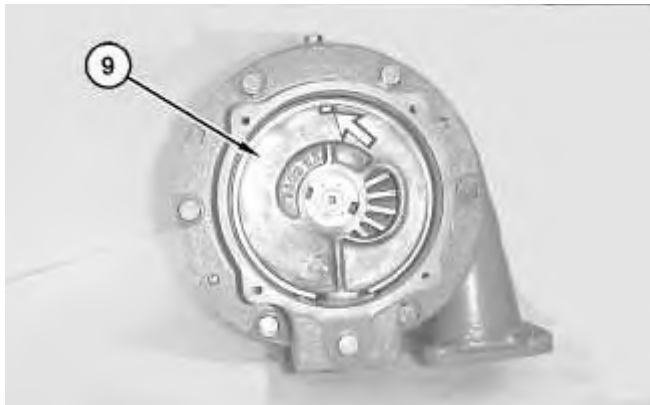


Illustration 33

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29. Lubricate port plate (9) with a solution of water and five percent soap. Install port plate (9). Note the position of the lug on the port plate.

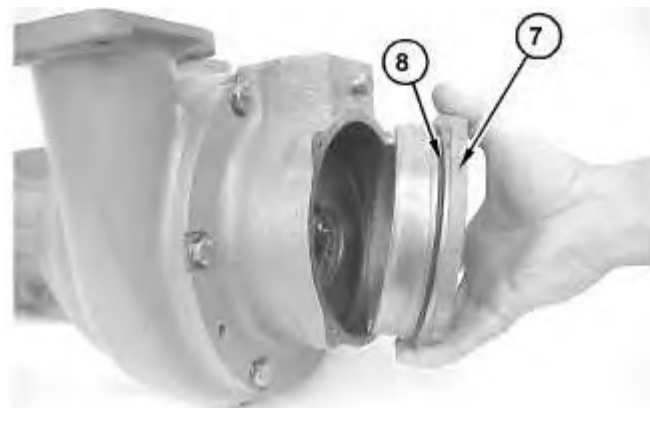


Illustration 34

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30. Ensure that O-ring seal (8) is in good condition. Install the O-ring seal onto cover (7). Install the cover. Fit the slot of the cover over the lug on the port plate.

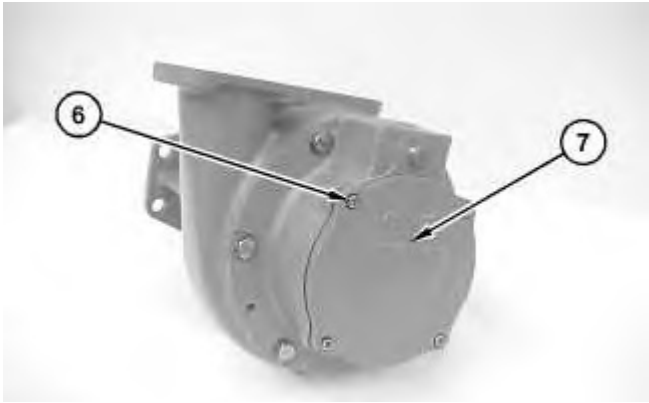


Illustration 35

g01055763

31. Thoroughly clean the threads of bolts (6) with solvent. Coat the threads of bolts (6) with Tooling (Q). Install the bolts in cover (7). Tighten the bolts to a torque of  $5 \pm 1$  N·m ( $4 \pm 1$  lb ft).

**End By:**

- a. Install the auxiliary water pump. Refer to Disassembly and Assembly, "Auxiliary Water Pump - Install".
-



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Model: 3512B INDUSTRIAL ENGINE 8DF  
Configuration: 3512B Locomotive Engine 8DF00001-UP

## Disassembly and Assembly 3500B Engines

Media Number -SEN6564-29

Publication Date -01/03/2015

Date Updated -14/09/2018

i05019494

# Auxiliary Water Pump - Assemble - Auxiliary Pump (Type 2)

SMCS - 1052-016

## Assembly Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
B	193-8094	Spline Socket	1
C	1P-0510	Driver Gp	1
D	5P-4758	Retaining Ring Pliers As	1
E	280-2059	Spanner Wrench Assembly	1
H	FT-2462	Tube	1
J	1P-0520	Driver Gp	1
K	9S-8096	Seal Installer Sleeve	1
L	4C-4030	Thread Lock Compound	-
M	154-9731	Thread Lock Compound	-

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### NOTICE

**Keep all parts clean from contaminants.**

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

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# Assemble the Pump

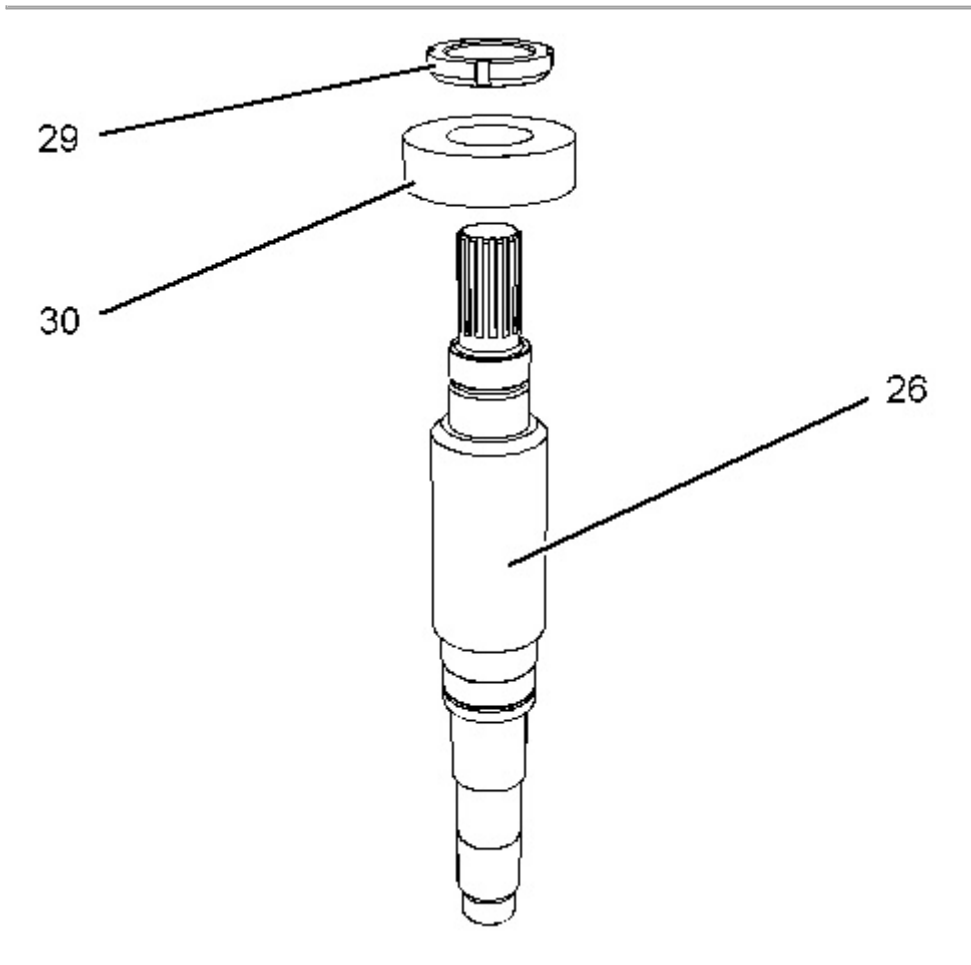


Illustration 1

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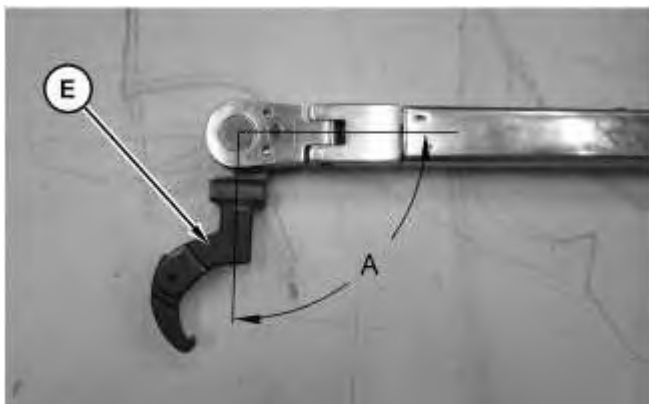


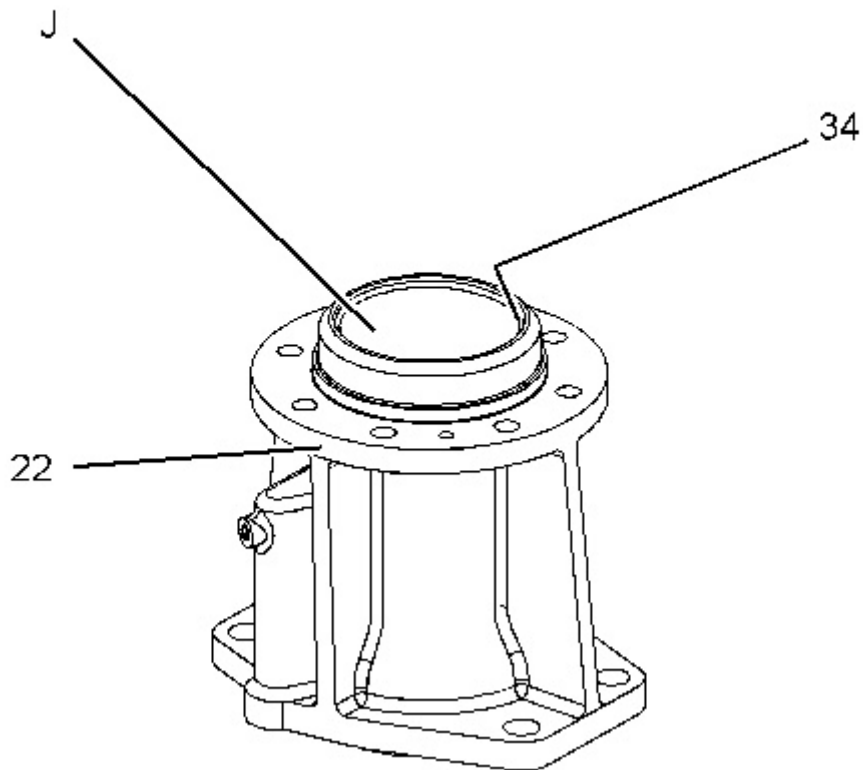
Illustration 2

g01648125

Dimension (A) is 90 degrees.

**Note:** Thoroughly clean the threads of shaft assembly (26) and locknut (29) with solvent before assembly.

1. Raise the temperature of bearing (30) . Install bearing (30) on shaft assembly (26) .
2. Apply Tooling (N) to the threads and face of locknut (29) . Orient the tapered end of locknut (29) toward bearing (30) . Install locknut (29) on shaft assembly (26) . Use Tooling (B) and Tooling (E) to tighten locknut (29) to a torque of  $135 \pm 15 \text{ N}\cdot\text{m}$  ( $100 \pm 11 \text{ lb ft}$ ).

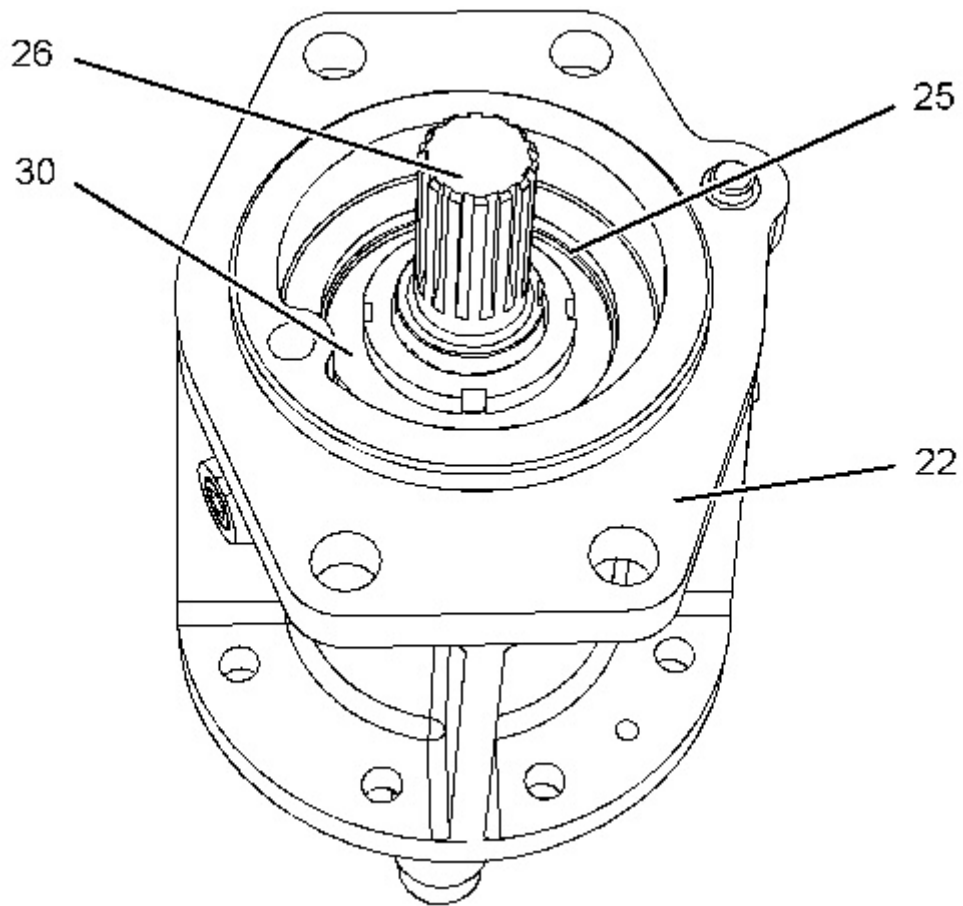


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Illustration 3

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3. Lower the temperature of bearing race (34) . Use Tooling (J) to install bearing race (34) in bearing housing (22) .
-

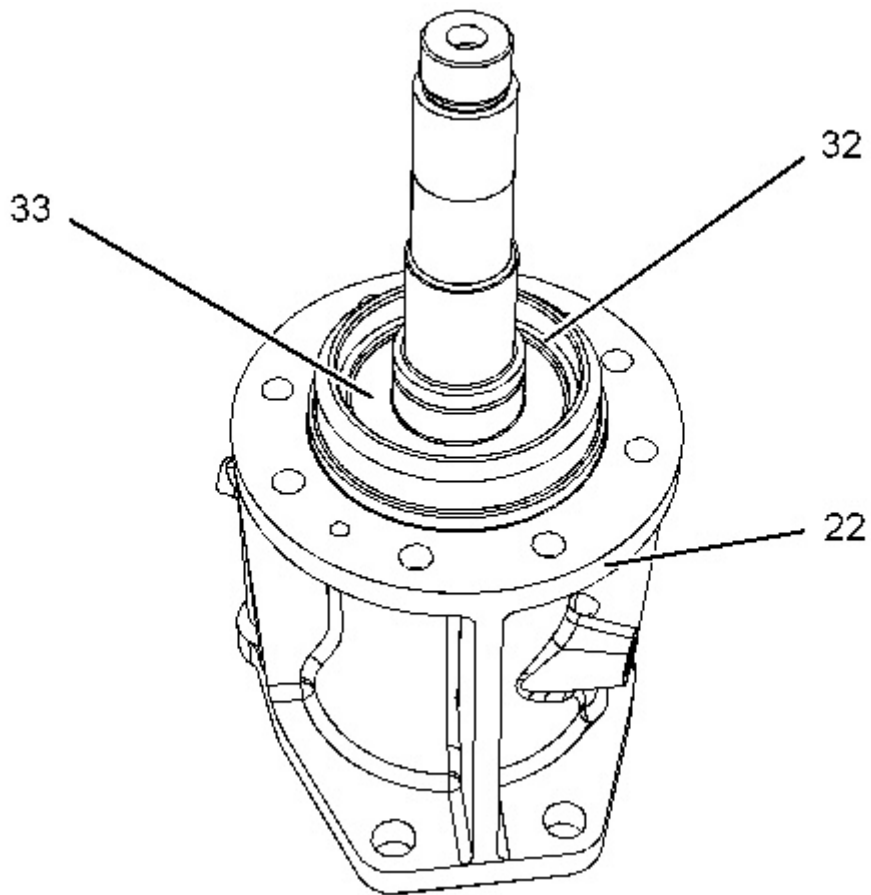


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Illustration 4

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4. Use Tooling (H) , Tooling (J) , and a suitable press to install shaft assembly (26) and bearing (30) into bearing housing (22) . Use Tooling (D) to install retaining ring (25) .
-



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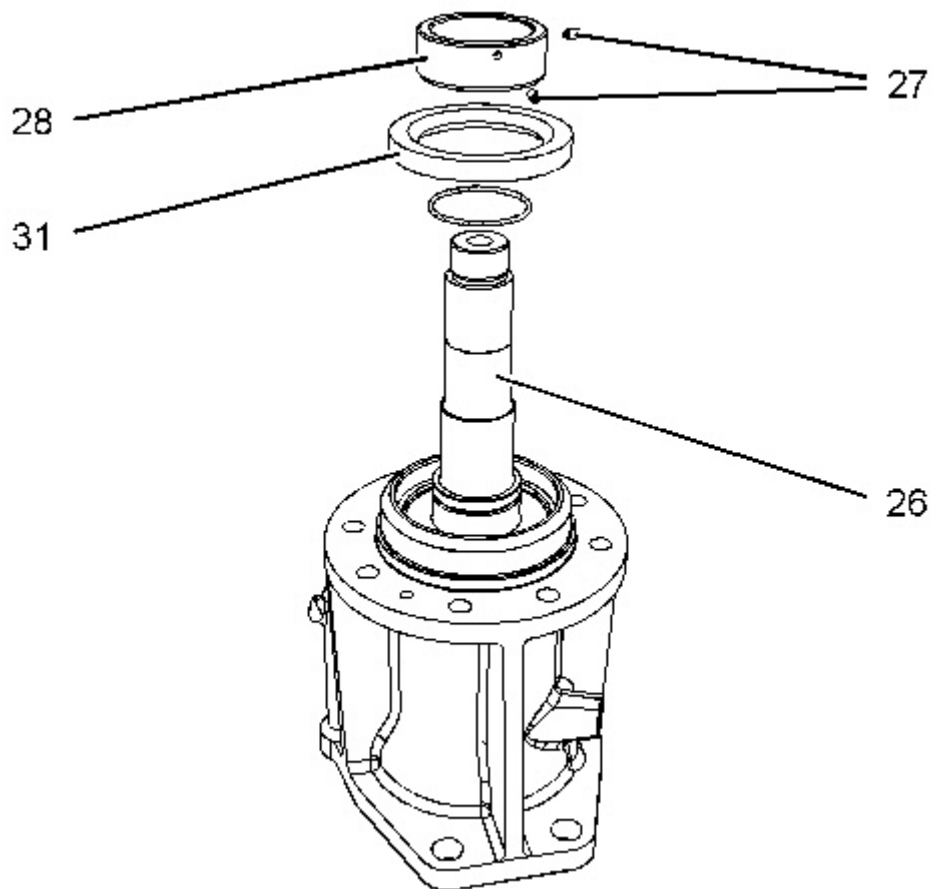
Illustration 5

g01647715

5. Position bearing housing (22) on suitable cribbing, as shown. Ensure that the shaft assembly is supported. Raise the temperature of roller bearing (33) . Install roller bearing (33) into bearing housing (22) .

Alternatively, use a suitable press with an appropriate sleeve to press the bearing into the housing.

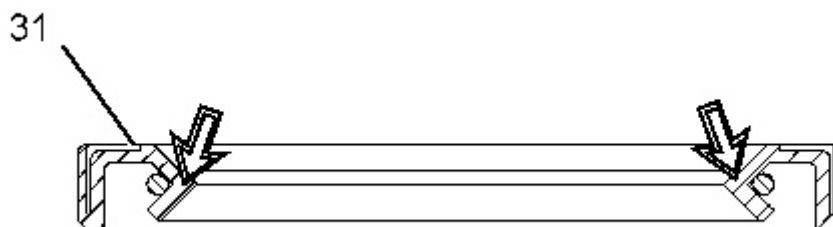
6. Use Tooling (D) to install retaining ring (32) .
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Illustration 6

g01647718

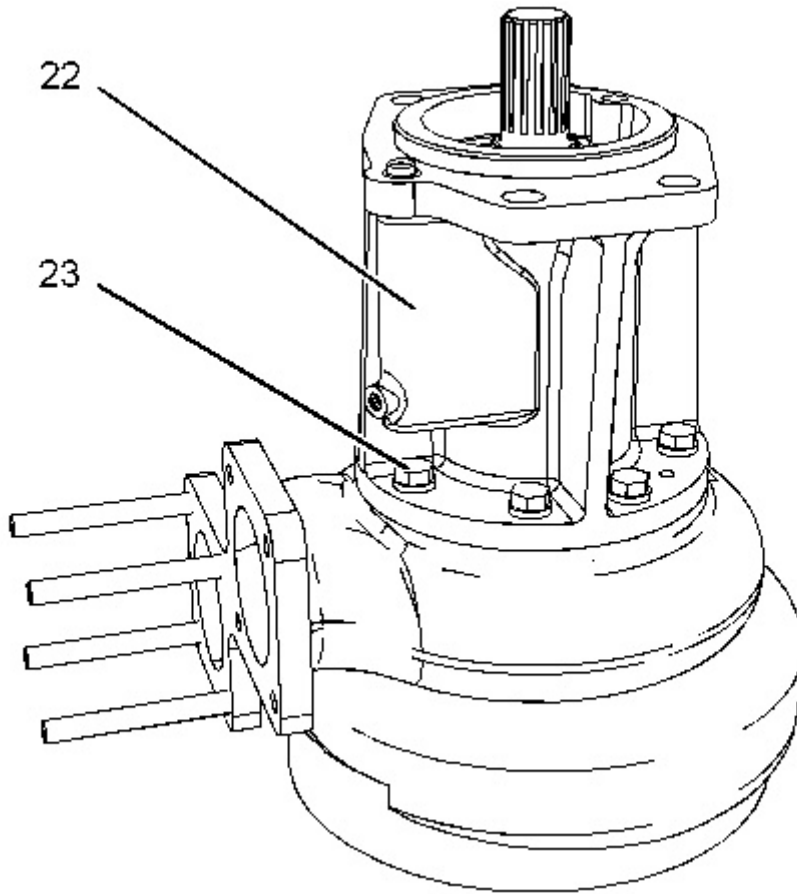


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Illustration 7

g01647854

7. Install the O-ring seal on shaft assembly (26) .
8. Lubricate the inner diameter (lip) of oil seal (31) with clean engine oil.
9. Lubricate the outer diameter of oil seal (31) with a solution of water and five percent soap. Use Tooling (H) and Tooling (J) to install oil seal (31) into bearing housing (22) .
10. Install seal collar (28) on shaft assembly (26) . Apply a slight downward pressure on seal collar (28) and install setscrews (27) . Tighten setscrews (27) to a torque of 3 N·m (27 lb in).

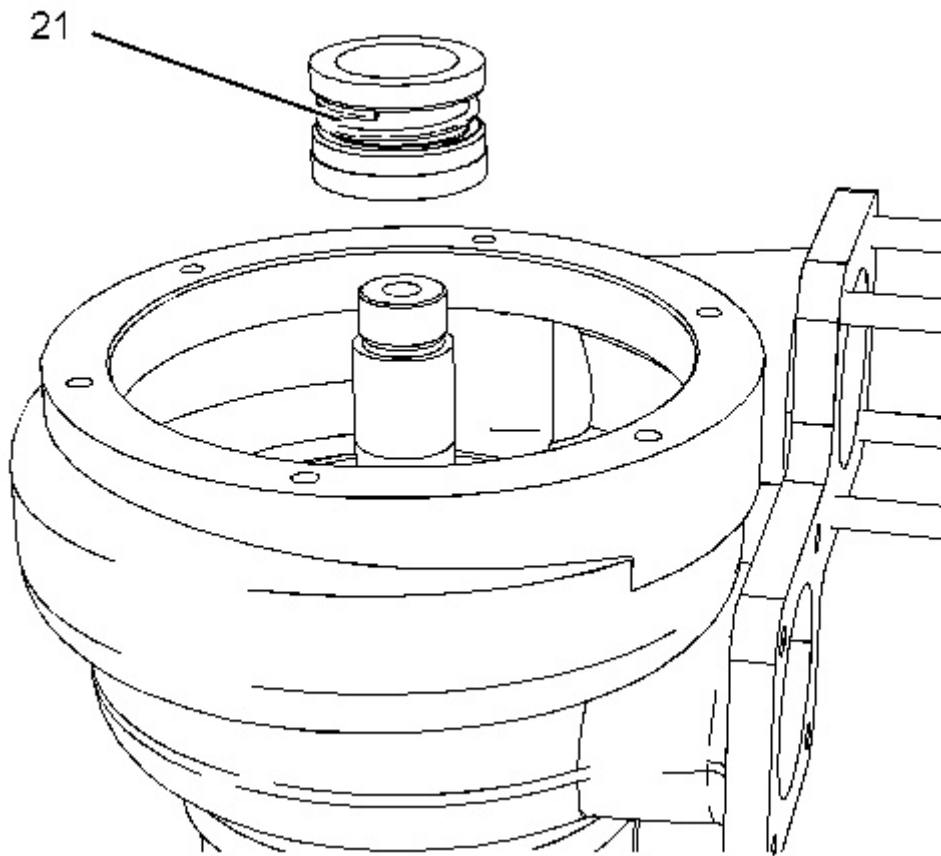


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Illustration 8

g01723657

11. Position the pump body on suitable cribbing, as shown. Place bearing housing (22) onto the pump body. Install bolts (23) in bearing housing (22) . Tighten bolts (23) to a torque of  $22 \pm 4$  N·m ( $195 \pm 35$  lb in).
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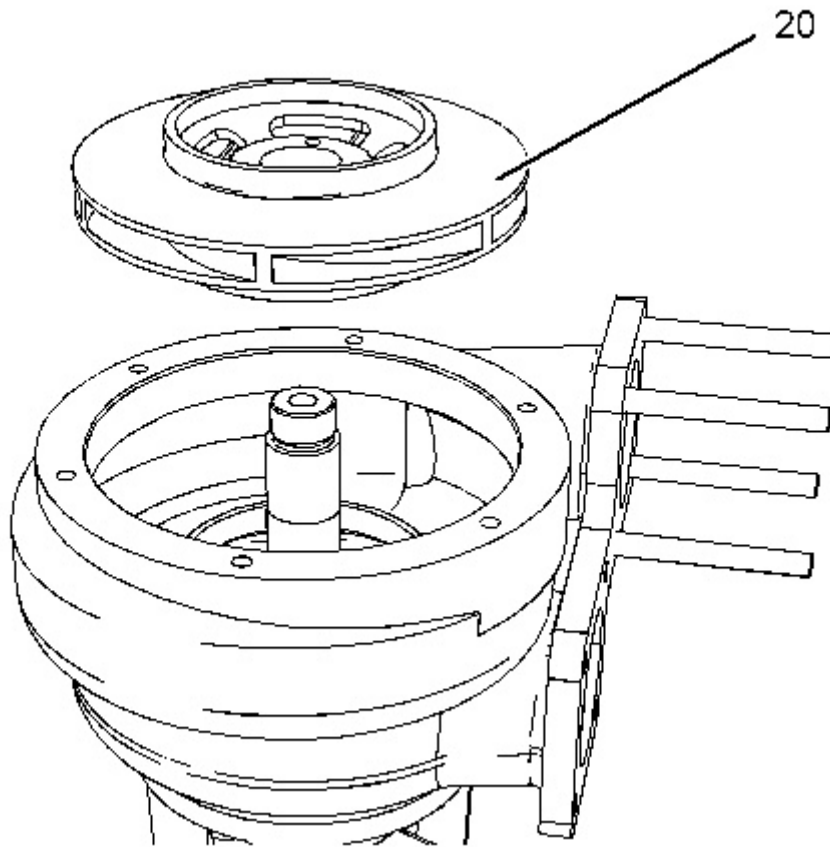
Illustration 9

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**Note:** Reposition the auxiliary water pump on suitable cribbing. Ensure that the shaft assembly is supported. Carefully inspect the surface of the seal assembly. If the surface is cracked or scratched, discard the seal assembly and obtain a new seal assembly for installation. Ensure that the faces of the seal assembly are clean.

12. Lubricate the stationary segment of seal assembly (21) with a solution of water and five percent soap. Use hand pressure to install the stationary segment of seal assembly (21) into the pump body. After the seal is installed, wipe the surface dry. Lubricate the rotating segment of seal assembly (21) with a solution of water and five percent soap. Use hand pressure to install the rotating segment of seal assembly (21) over the shaft assembly.
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Illustration 10

g01646414

13. Ensure that the shaft assembly is supported. Use Tooling (C) , Tooling (L) , and a suitable press to install impeller (20) .
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