## Preparatory Steps

The air compressor and the fuel pump can be removed as an assembly.

Remove the fuel pump. Refer to Procedure 005-016.

Remove the air compressor. Refer to Procedure 012-014.

The timing marks on the accessory drive gear and the camshaft gear **must** be aligned so that the valve and the injector set marks on the accessory drive pulley show the correct adjustment position.

Timing marks can be seen through the gear cover straight thread plug inspection hole.

Remove the accessory drive pulley. Refer to Procedure 009-004.

Remove the inspection hole straight thread plug in the gear cover.
Remove

Check to make sure the timing marks on the camshaft gear and the accessory drive gear are aligned with each other.

If only the timing mark on the accessory drive gear is visible through the inspection hole, rotate the crankshaft one complete revolution in the direction of rotation to align the timing marks on the camshaft gear and the accessory drive gear.

CAUTION

If the accessory drive dowel pin has not been correctly installed in the accessory drive shaft, the dowel pin must be removed before attempting to remove the accessory drive to prevent damage to the accessory drive bushing.

Remove the five capscrews and the accessory drive assembly.

Clean the cylinder block and the accessory drive gasket surfaces.
Remove the accessory drive seal. Refer to Procedure 001-003.

Initial Check

**WARNING**

When using solvents, acids, or alkaline materials for cleaning, follow the manufacturer's recommendations for use. Wear goggles and protective clothing to reduce the possibility of personal injury.

**WARNING**

Wear appropriate eye and face protection when using compressed air. Flying debris and dirt can cause personal injury.

Remove all gasket material from surfaces (1) and (2).

Clean the exterior of the drive with solvent.

Dry with compressed air.
Measure the drive shaft end clearance.

<table>
<thead>
<tr>
<th>Drive Shaft End Clearance</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>0.05</td>
<td>0.002</td>
</tr>
<tr>
<td>0.225</td>
<td>0.225</td>
<td>0.009</td>
</tr>
</tbody>
</table>

If the shaft end clearance does not meet these specifications, replace the drive unit.

Inspect the housing for cracks or damaged mounting holes.

Inspect the drive gear (1) and splined coupling for damaged teeth and wear.

Inspect the shaft (2) for scratches, scoring, or other damage.

Replace as necessary.

Disassemble

⚠️ CAUTION ⚠️

Install a 3/8-16 X 3/4-inch capscrew (1) without the washer into the shaft to prevent damage to the shaft while the gear is being removed.

If the accessory drive is being disassembled for gear or shaft replacement, inspect the housing.

Remove the special capscrew and washer.
Use coupling puller, Part Number 3376663, to remove the splined coupling.

Use a three-jaw puller to remove the hub-type coupling.

Remove the capscrew.

Remove the clamping washer.

Remove the gear and shaft assembly.

Remove the straight thread o-ring plugs from the housing.

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**Clean and Inspect for Reuse**

**WARNING**

When using solvents, acids, or alkaline materials for cleaning, follow the manufacturer's recommendations for use. Wear goggles and protective clothing to reduce the possibility of personal injury.

**WARNING**

...
Wear appropriate eye and face protection when using compressed air. Flying debris and dirt can cause personal injury.

Clean the parts with solvent.

Dry with compressed air.

Inspect the parts for damage.

If the gear or the shaft is damaged it must be replaced.

Inspect the shaft bore in the housing for scoring or damage.

Measure
Measure the inside diameter of the shaft bore in the drive housing.

<table>
<thead>
<tr>
<th>Drive Shaft Bore Inside Diameter</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33.426</td>
<td>1.3160</td>
</tr>
<tr>
<td></td>
<td>33.515</td>
<td>1.3194</td>
</tr>
</tbody>
</table>

Measure the drive shaft outside diameter.

<table>
<thead>
<tr>
<th>Drive Shaft Journal Outside Diameter</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point 1</td>
<td>25.476</td>
<td>1.0030</td>
</tr>
<tr>
<td></td>
<td>25.489</td>
<td>1.0035</td>
</tr>
<tr>
<td>Point 2</td>
<td>33.274</td>
<td>1.3100</td>
</tr>
<tr>
<td></td>
<td>33.325</td>
<td>1.3120</td>
</tr>
<tr>
<td>Point 3</td>
<td>50.622</td>
<td>1.9930</td>
</tr>
<tr>
<td></td>
<td>50.673</td>
<td>1.9950</td>
</tr>
<tr>
<td>Point 4</td>
<td>34.963</td>
<td>1.3765</td>
</tr>
<tr>
<td></td>
<td>34.976</td>
<td>1.3770</td>
</tr>
<tr>
<td>Point 5</td>
<td>48.374</td>
<td>1.9045</td>
</tr>
<tr>
<td></td>
<td>48.387</td>
<td>1.9050</td>
</tr>
</tbody>
</table>

Measure the inside diameter of the splined coupling gear or the hub coupling.

<table>
<thead>
<tr>
<th>Splined Coupling Inside Diameter</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.400</td>
<td>1.0000</td>
</tr>
<tr>
<td></td>
<td>25.425</td>
<td>1.0010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hub Coupling Inside Diameter</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.424</td>
<td>1.0010</td>
</tr>
<tr>
<td></td>
<td>25.438</td>
<td>1.0015</td>
</tr>
</tbody>
</table>
Measure the inside diameter of the drive pulley bore.

<table>
<thead>
<tr>
<th>Drive Pulley Bore Inside Diameter</th>
<th>mm</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>34.925</td>
<td>1.3750</td>
</tr>
<tr>
<td>MAX</td>
<td>34.945</td>
<td>1.3758</td>
</tr>
</tbody>
</table>

Assemble

Use clean 15W-40 oil to lubricate the housing shaft bore.

Use Lubriplate® 105 or its equivalent to lubricate the front thrust face on the housing.

Install the shaft and the gear.
Use Lubriplate® 105 or its equivalent to lubricate the rear thrust face on the housing.

Install the clamping washer over the shaft.

The splined-type coupling must be installed with the relieved area facing the clamping washer. The hub-type coupling must be installed with the drive tangs facing away from the clamping washer.

With the gear and shaft assembly supported in an arbor press, use a mandrel to install the coupling. Push the coupling until it touches the clamping washer.

⚠️ CAUTION ⚠️

The capscrew must contain an oil drilling if an air compressor is to be mounted on the engine.

Install the washer and the capscrew.

Torque Value: 47 n.m [35 ft-lb]

Install the straight thread o-ring plugs in the housing.

Tighten the o-ring plugs.

Aluminum Housing 5/16-24 3 n.m [30 in-lb]
<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Torque</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Iron Housing 5/16-24</td>
<td>6 n.m</td>
<td>[50 in-lb]</td>
</tr>
<tr>
<td>Aluminum Housing 3/8-24</td>
<td>6 n.m</td>
<td>[50 in-lb]</td>
</tr>
<tr>
<td>Cast Iron Housing 3/8-24</td>
<td>11 n.m</td>
<td>[100 in-lb]</td>
</tr>
</tbody>
</table>

Rotate the shaft to check for correct assembly.

Measure the drive shaft end clearance at the end of the shaft for accurate measurement.

<table>
<thead>
<tr>
<th>Drive Shaft End Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
</tr>
<tr>
<td>0.10</td>
</tr>
<tr>
<td>0.225</td>
</tr>
</tbody>
</table>

If the end clearance is **not** within specifications, make sure the coupling is positioned tightly against the clamping washer.

Install
Rotate the crankshaft until the accessory drive timing marks on the camshaft gear are at approximately the 1:00 o'clock position.

Install a new gasket onto the accessory drive assembly.

Put the accessory drive shaft dowel pin at approximately the 12:00 o'clock position when facing the shaft from the pulley end.

Install the accessory drive assembly into the gear housing accessory drive mounting hole.

Check the alignment of the camshaft gear and the accessory drive gear timing marks.

Install and tighten the five accessory drive mounting capscrews.

**Torque Value:** 61 n.m [45 ft-lb]
Install the accessory drive assembly into the gear housing accessory drive mounting hole.

Check the alignment of the camshaft gear and the accessory drive gear timing marks through the inspection hole in the gear cover.

Install and tighten the five accessory drive mounting capscrews.

**Torque Value:** 61 n.m [45 ft-lb]

Check the o-ring on the inspection hole plug. Replace the o-ring if it is damaged.

Install and tighten the plug.

**Torque Value:** 27 n.m [20 ft-lb]

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**Finishing Steps**

Install a new accessory drive seal into the gear cover. Refer to Procedure 001-003.
Install the dowel pin into the accessory drive shaft (if removed).

Install the accessory drive pulley. Refer to Procedure 009-004.

Install the air compressor. Refer to Procedure 012-014.

Install the fuel pump. Refer to Procedure 005-016.

Operate the engine until it reaches a temperature of 82°C [180°F], and check for coolant or lubricating oil leaks.