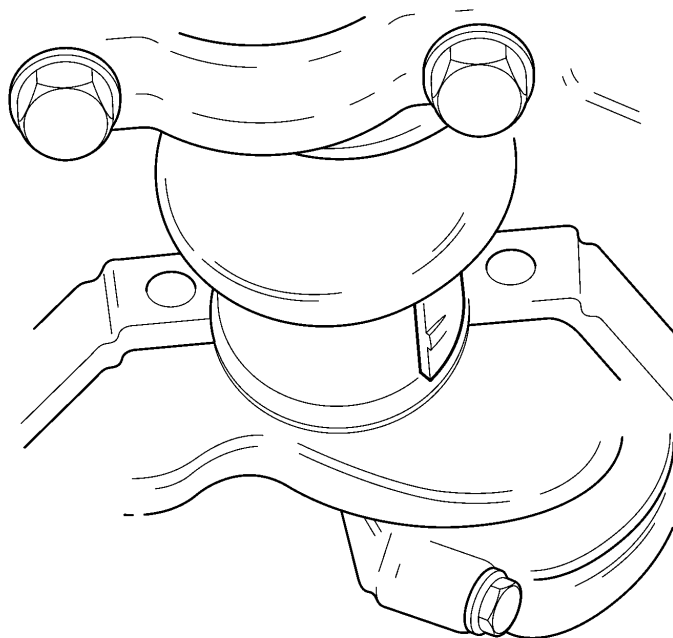


**Main Bearings, Replacement (All)**  
**D16F****Main Bearings, Replacement (All)**

W2006096

This information covers procedures for replacing the crankshaft main bearings on the Volvo D16F engine.

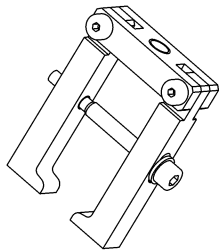
**Contents**

- “Main Bearings, Replacement (All)” page 3
- “Special Tools” page 2

**Note:** Information is subject to change without notice.  
Illustrations are used for reference only and may differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

## Special Tools

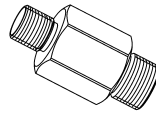
For special tools ordering instructions, refer to Tool Information, group 08.



T0010584

**9990114**

Main Bearing Cap Puller



T0011428

**9990262**

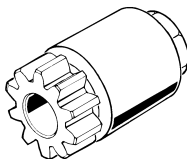
Slide Hammer Adapter



C0001802

**9996400**

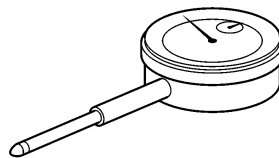
Slide Hammer



T0012612

**88800014**

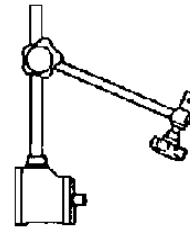
Flywheel Turning Tool



T0010788

**9989876**

Dial Indicator



W0001790

**9999696**

Magnetic Stand

## **2162-03-03-01**

### **Main Bearings, Replacement (All)**

**Oil pan removed**

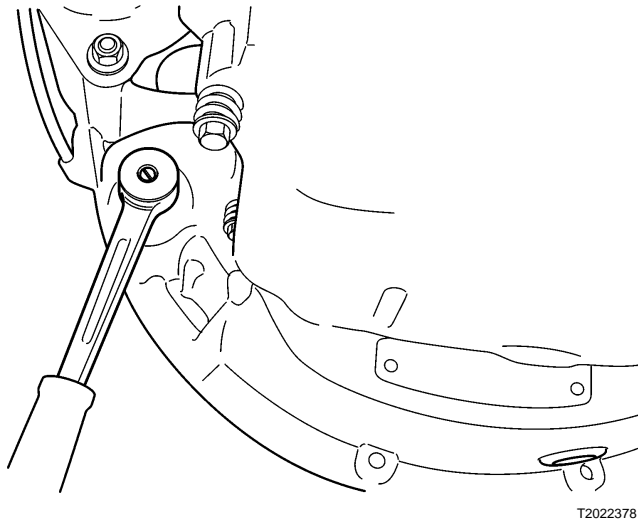
You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

*Special tools: 9989876, 9990114, 9990262, 9996400, 9999696, 88800014*

**1**

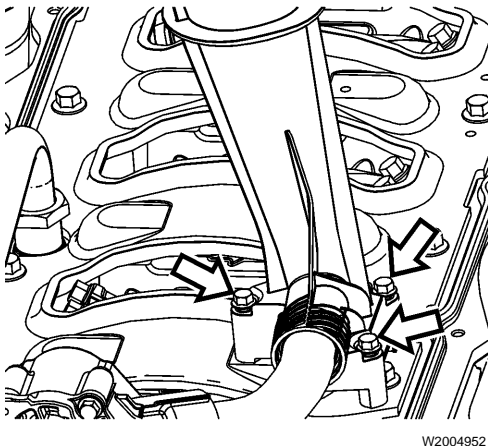
Remove the plug from the flywheel housing and install cranking tool 88800014.

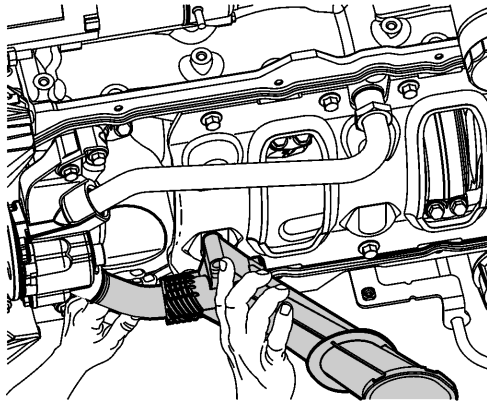
88800014



**2**

Remove the fasteners from the oil pickup.



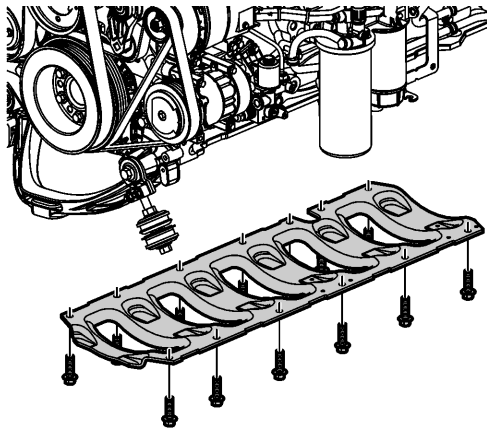


W2004957

**3**

Remove the oil pickup from the oil pump.

**Note:** Use care when removing the oil pickup from the oil pump assembly. The plastic oil pickup has an O-ring attached to the pipe that is installed into the oil pump.



W2005149

**4**

Remove the stiffening frame mounting bolts and remove the stiffening frame from the engine.



**WARNING**

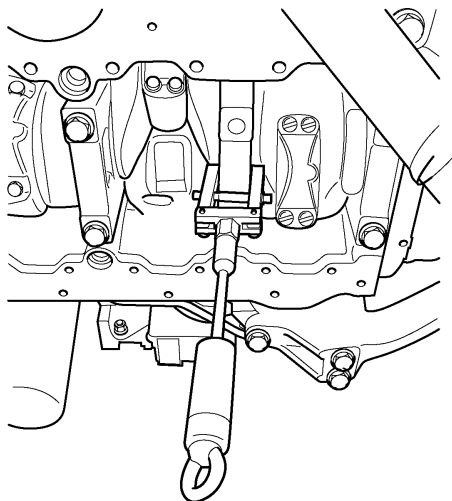
The stiffening frame has sharp edges. To prevent personal injury, use protective gloves.

**5**

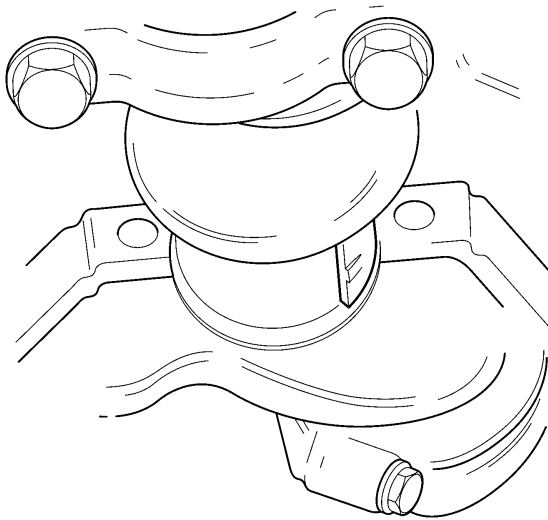
**Note:** Before removing bearing caps, make sure the caps are properly marked. They should be marked on the center of the cap. The part number on the cap should face the front of the engine. Remove one main bearing cap at a time.

Remove the main bearing caps with the puller 9990114, adapter 9990262 and slide hammer 9996400.

9990114, 9990262, 9996400



W2006389



W2006096

**6**

Remove the upper bearings by inserting a flexible putty knife between the crankshaft and the block.

**Note:** Turn the crankshaft with the flywheel turning tool. Turn the crankshaft in the proper direction. Be careful not to damage the crankshaft, block or bearing.

88800014

**7**

Perform a visual inspection of the crankshaft journals, block and bearing caps for signs of wear and/or damage. Check the back of the bearing for the bearing size. Bearings can be stamped "STD" for standard, or, with a number indicating the oversize of the bearing shell.

**8**

Install the upper bearing shell by turning the crankshaft in the direction of the rotation with flywheel turning tool.

**Note:** Lubricate the bearing shell surfaces with clean engine oil.

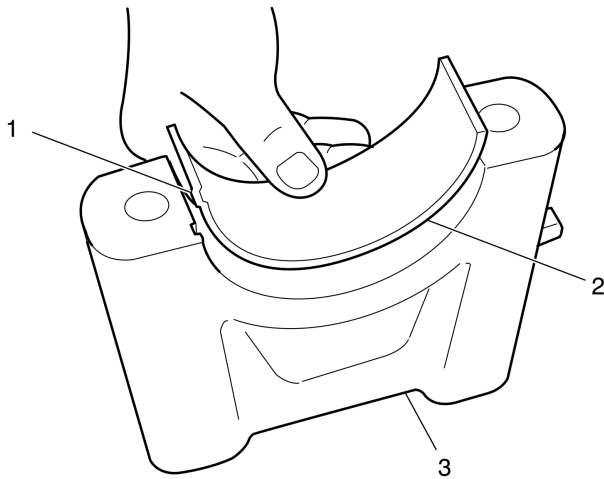
**Note:** Due to tight tolerances, the crankshaft should be aligned with the engine block before installing.

**Note:** Check that the locating tab on the bearing shell fits correctly into the recess in the bearing seat (use Special tool 88800014).

88800014

**9**

Clean the bore of the bearing cap and back of the lower bearing.



- 1 Bearing Shell Locating Tab
- 2 Main Bearing Shell
- 3 Main Bearing Cap

W2005542

**10**

Install the bearing shell in the bearing cap. The bearing must be installed dry.

**Note:** Lubricate the bearing shell surfaces with clean engine oil.

**11**

Lubricate the threads of the bolts with clean engine oil and install the main bearing cap together with the lower bearing shell. Hand tighten the main bearing cap bolts.

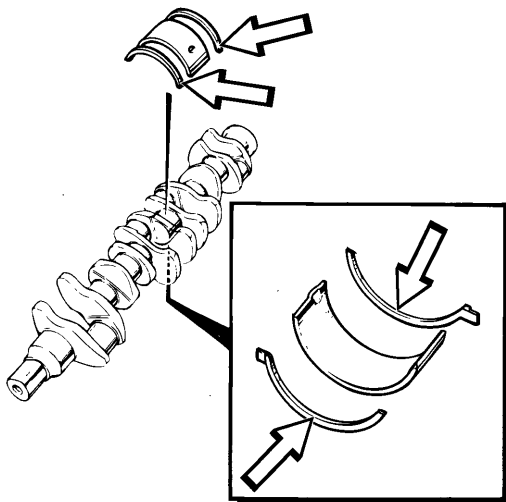
**12**

Replace the other main bearings, one at a time and in the same manner as the first one. Lubricate the crankshaft side of the new bearing shells. After replacing each bearing, verify that the crankshaft rotates freely by turning it around with the flywheel turning tool.

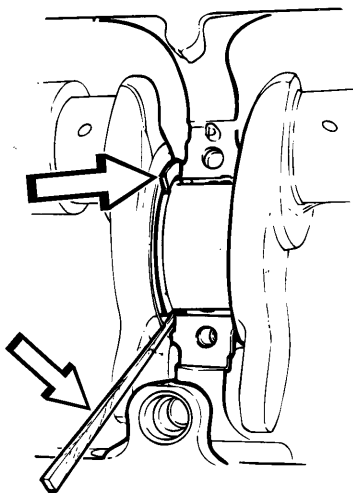
**Note:** Make sure the bearing caps are correctly fitted (see markings on the cap).

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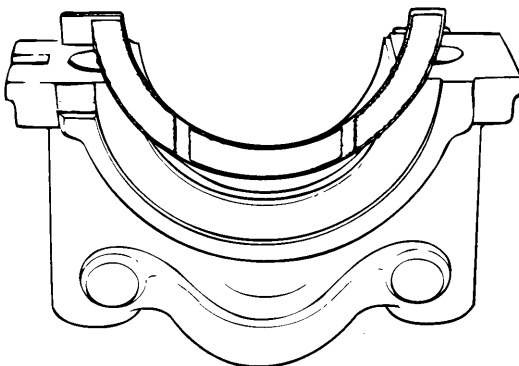
88800014



T2006736



T2006737



T2006738

**13**

The crankshaft thrust bearing is mounted in the center main bearing (No. 4). Thrust bearing washers are available in several oversize dimensions.

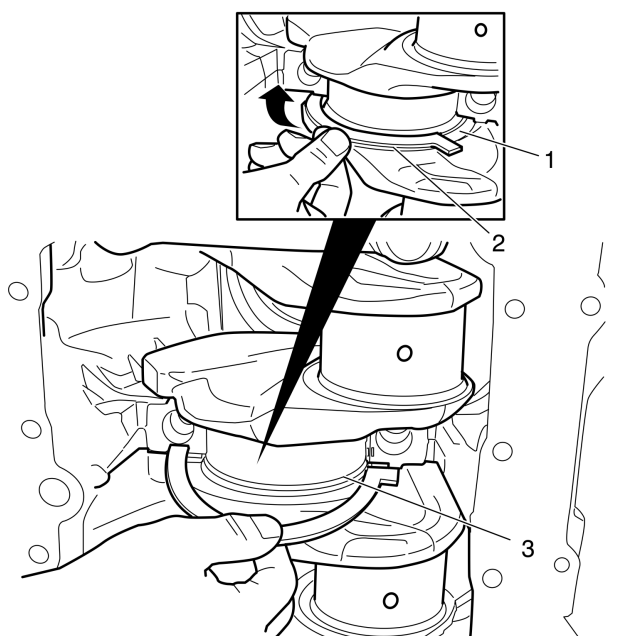
**14**

Use a narrow piece of wood or plastic to remove the thrust bearing washers from the cylinder block bearing seat.

**15**

Remove the thrust bearing washers from the milled grooves in the No. 4 bearing cap.

**Note:** Thrust washers are steel with aluminum facing. The aluminum facing has oil reservoir grooves cut into the material.



W2005543

- 1 Thrust Washer Groove
- 2 Thrust Washer Upper Insert
- 3 No. 4 Crankshaft Journal

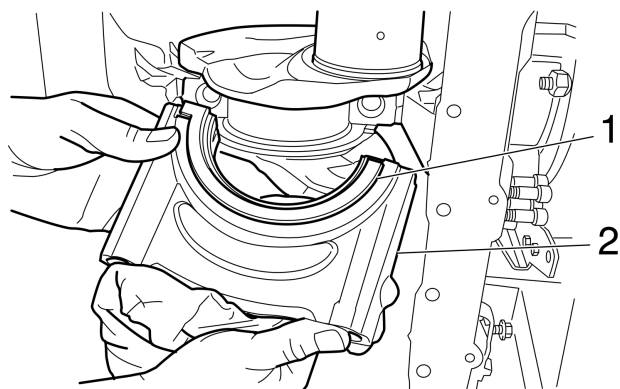
#### 16

Place the upper thrust washer sections in position in the cylinder block at the center bearing location. The steel side of the thrust washer faces the block. The aluminum side faces the crankshaft. This applies to both the upper and the lower sections.

**Note:** Use standard thickness thrust washers initially.

#### 17

Position the lower thrust washer sections on the center bearing cap with the aluminum side facing the crankshaft and lubricate the crankshaft side of the new bearing shells and thrust bearings. Assemble the cap and cap bolts in the engine block. Using the flywheel turning tool, rotate the engine several rotations to verify that the bearings and thrust washers have been properly installed.



W2005539

- 1 Thrust Washer Lower Insert
- 2 No. 4 Main Bearing Cap

#### 18

Using a torque wrench, tighten the bearing cap bolts to specifications,  $300 \pm 20$  Nm ( $221 \pm 15$  ft-lb) plus  $120^\circ \pm 5^\circ$  angle.

$300 \pm 20$  Nm ( $221 \pm 15$  ft-lb)  
plus  $120^\circ \pm 5^\circ$  **Angle of tightening**



### 19

Check the crankshaft end play and replace the thrust bearings if there is too much play or if the bearings are damaged. Using a dial indicator and a magnetic stand, measure end play as follows:

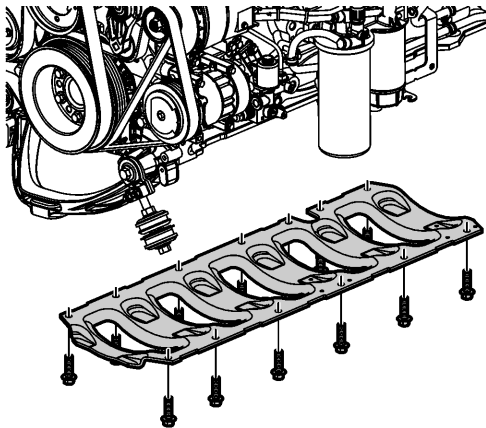
- 1 Set the dial indicator to zero.
- 2 Using a pry bar, move the crankshaft endwise and read the indicator.
- 3 If the end play is out of specification (0.15 mm [0.0059 inch]), remove the thrust washer and install washers of suitable thickness to meet specification. Torque-tighten the No. 4 bearing cap bolts to specification.



### CAUTION

The thickness of the thrust washers in the bearing cap must match the thickness of the thrust washers in the block. Be sure to put the aluminum bearing surface against the crankshaft. Failure to heed this caution may result in component damage.

9989876, 9999696



W2005149

### 20

Install the stiffening frame into position against the engine block, and install mounting bolts hand tight.



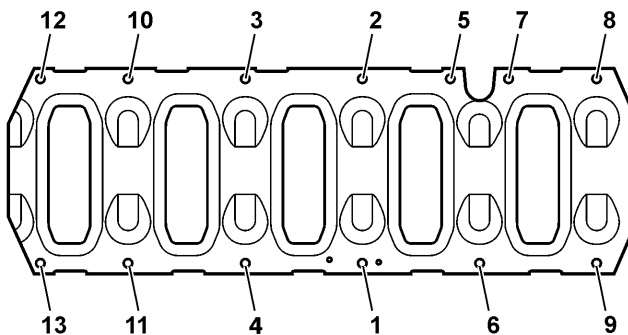
### WARNING

The stiffening frame has sharp edges. To prevent personal injury, use protective gloves!

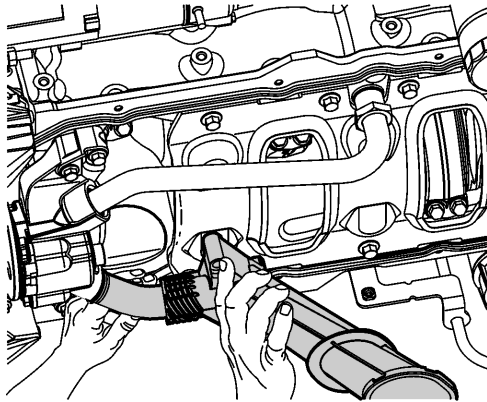
### 21

Torque-tighten the stiffening frame bolts in sequence shown in the illustration to  $65 \pm 5$  Nm ( $48 \pm 4$  ft-lb), plus  $90^\circ \pm 5^\circ$  angle of tightening.

$65 \pm 5$  Nm ( $48 \pm 4$  ft-lb)  
 $90^\circ \pm 5^\circ$  **Angle of tightening**



T2020549

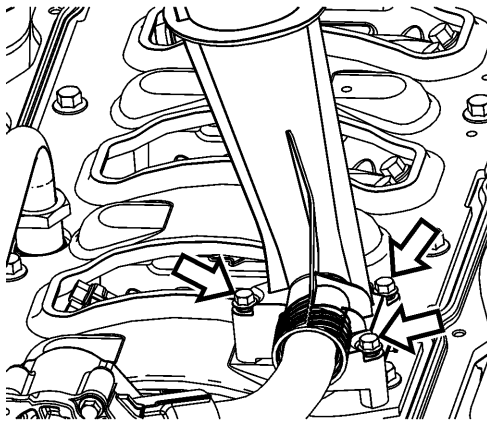


W2004957

**22**

Lubricate the O-ring seal with clean engine oil. Install the oil pickup to the oil pump.

**Note:** Use care when installing the oil pickup to the oil pump assembly. Inspect the O-ring attached to the pipe, and replace if necessary.



W2004952

**23**

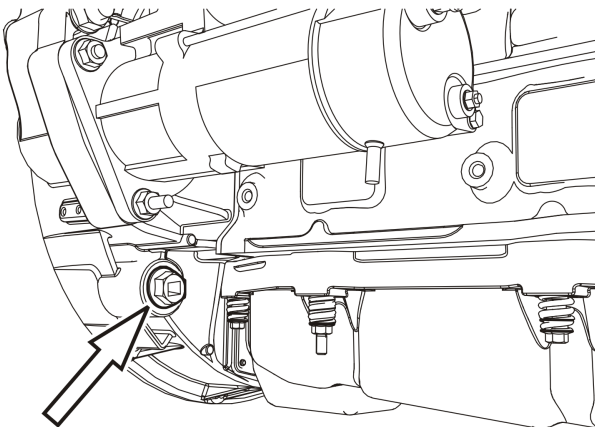
Install the bolts to the oil pickup. Tighten the bolts to  $24 \pm 3$  Nm ( $18 \pm 2$  ft-lb).

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$24 \pm 3$  Nm  
( $18 \pm 2$  ft-lb)

**24**

Remove the cranking tool and reinstall the plug in the flywheel housing.



W0002368