VOLVO
Volvo Trucks North America
Greensboro, NC USA

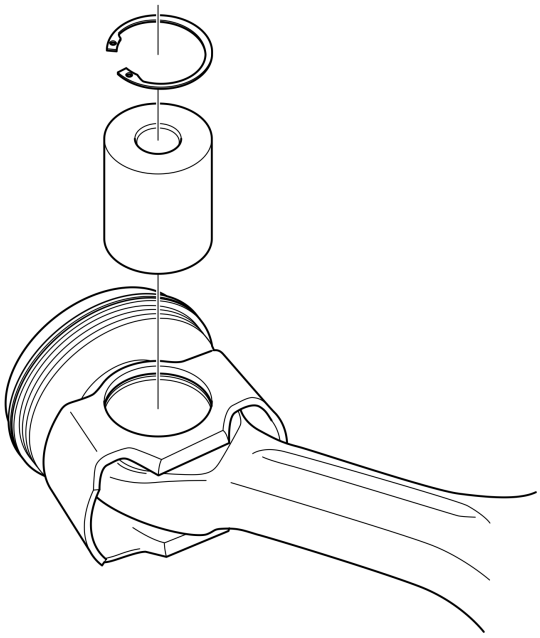
Service Bulletin Trucks

This service bulletin replaces bulletin 213–42, “Pistons and Liners, Replace” dated 03.2007.

Date	Group	No.	Page
12.2008	**213**	**42**	1(11)

Pistons and Liners, Replace
D16F

Pistons and Liners, Replace



T2022501

This information covers the proper procedure for replacing the piston and liner on the Volvo D16F engine.

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- “Piston and Liner, Replacement (One)” 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.

2131-03-03-02
Piston and Liner, Replacement (One)

Cylinder head and 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.

The cylinder liner's O-rings are made from fluorine-rubber.
When fluorine-rubber is exposed to high temperatures (above 300 °C/ 572 °F) **hydrofluoric acid** can be generated. **Hydrofluoric acid is extremely corrosive!**

- Contact with skin can result in serious corrosion injuries.
- If splashed in the eyes, corrosion sores can occur.
- Inhalation of vapors can damage the respiratory tract.

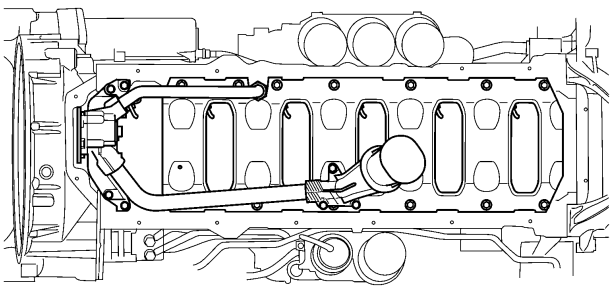
⚠ WARNING

Take great care when working on engines which can have been exposed to high temperatures, resulting for example from overheating, cutting or fire.
Under no circumstances are cylinder liner O-rings to be burnt off when dismantling or destroyed by burning under uncontrolled conditions.

- Always use neoprene gloves (gloves approved for handling chemicals) and protective goggles.
- Handle removed O-rings in the same way as corrosive acids.
- Never blow clean using compressed air.
  All remnants, including ashes, can be highly corrosive.
- Place all remnants in plastic containers, to which warning text is attached.
- Before taking the gloves off, they must be washed under running water.

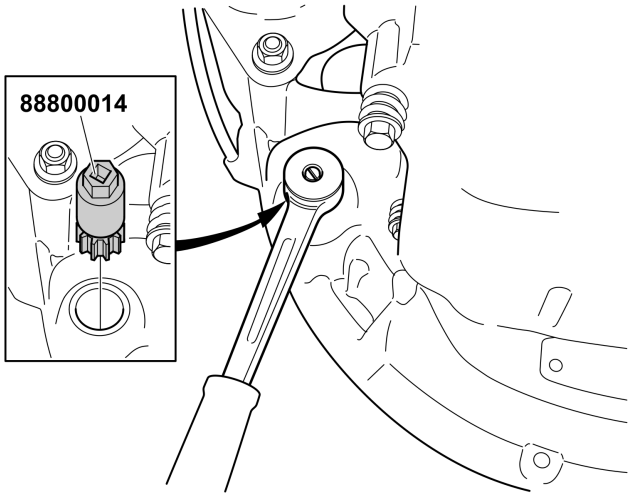
Special tools: 9989876, 85109123, 9990158, 9992479, PT 6400–C, 9998511, 88800014

Remove



W2006209

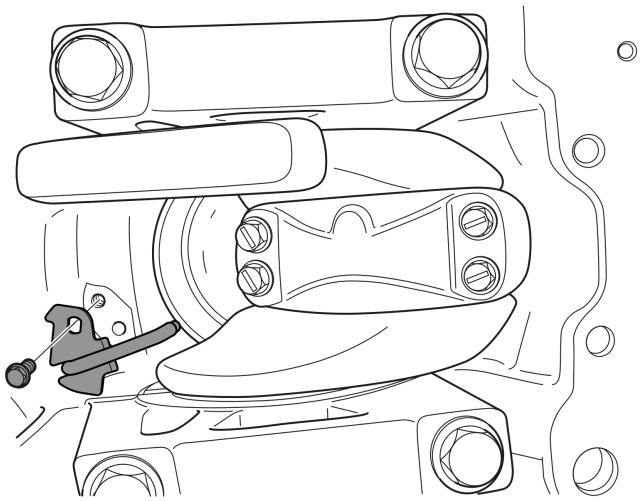
1
Remove the pipe and strainer from the reinforcing frame.
Remove the pressure pipe from the pump.
Remove the reinforcement frame.



T2022960

2
Remove the plug from the flywheel housing and install tool 88800014. Turn the crankshaft until it is possible to get at the bolts on the connecting rod that is to be removed.

88800014



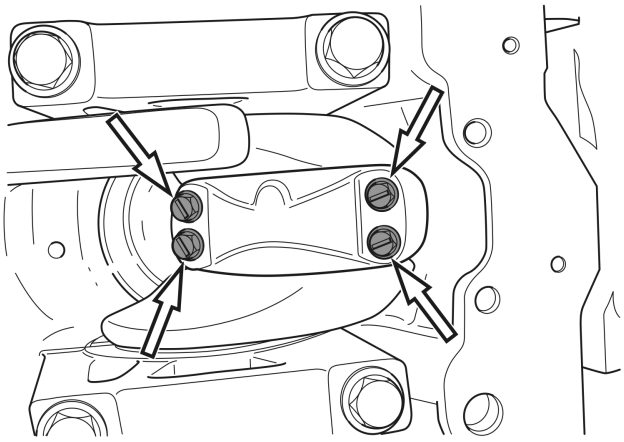
T2023154

3
Remove the piston cooling nozzle.

Note: Inspect the piston cooling nozzle. Clean the nozzle of any contamination.

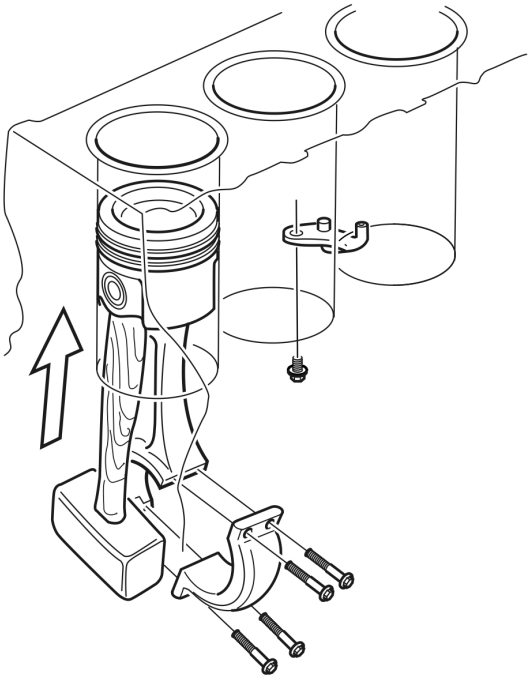
CAUTION

Do not bend the tube of the piston cooling nozzle; doing so will permanently damage the nozzle.



T2023670

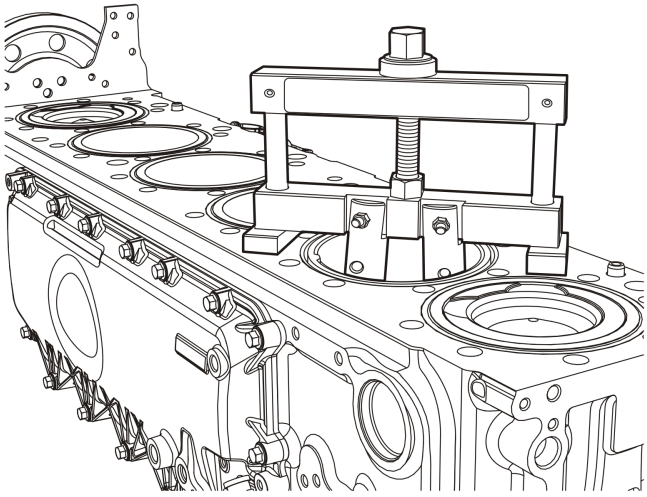
4
Remove the four connecting rod bearing cap bolts. Remove the cap and bearing shells.



T2023445

5
Remove the piston and the connecting rod.

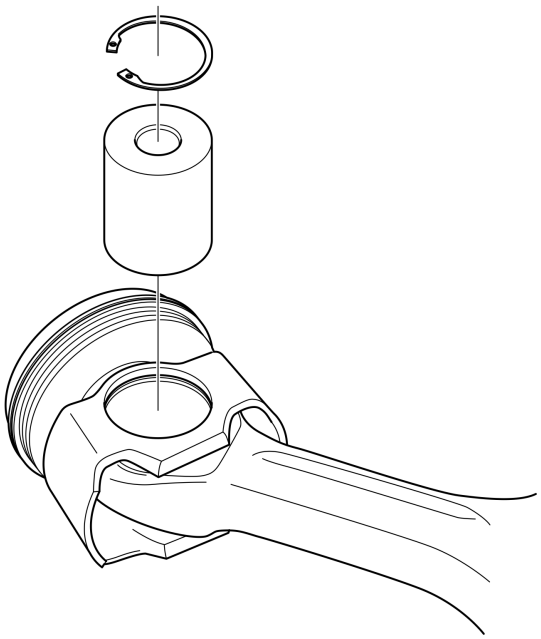
Note: Use a wooden handle or similar so that the cylinder liner is not damaged.



W2005255

6
Pull the cylinder liner out of the block.

PT 6400–C

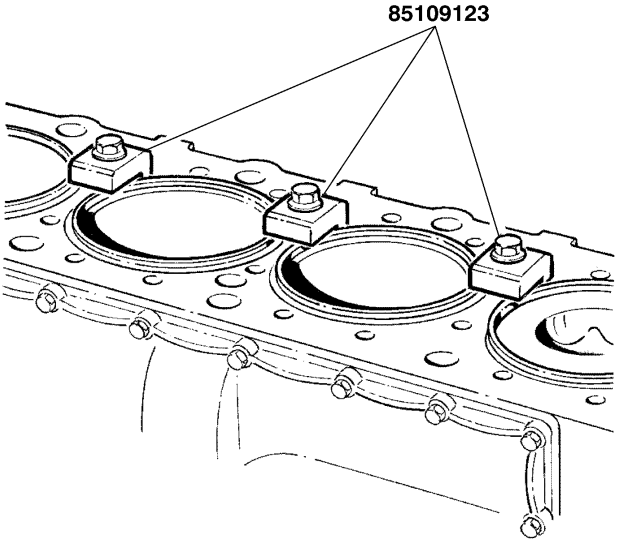


T2022501

7
Remove the snap ring from the piston and push out the piston pin. Remove the piston from the connecting rod.

8
Repeat the procedure for all pistons and liners.

9
Clean the sealing surfaces in the cylinder block. Do not use scrapers or other tools which can damage the sealing surfaces.

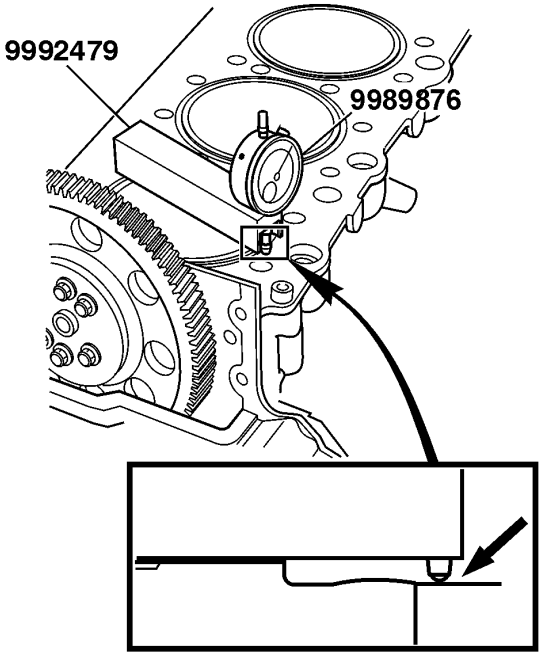


W2006210

Installation

10
Install the cylinder liner, **without** the sealing ring. Secure the cylinder liner with **two** clamping tools. Tighten the press tools to 100 ± 9 Nm (74 ± 7 ft-lb).

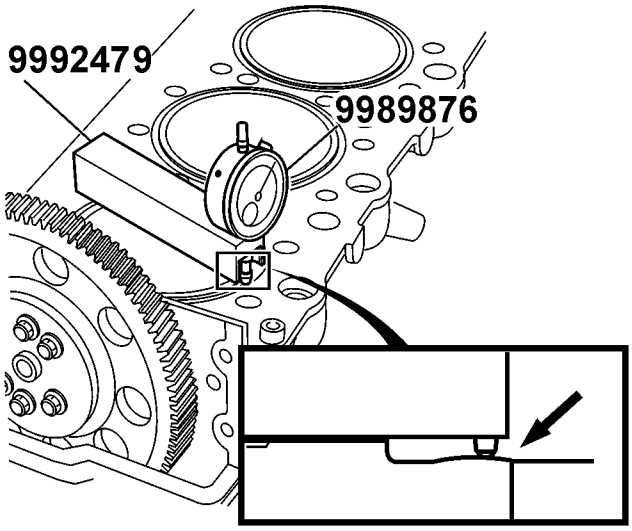
85109123



T2019670

11
Install dial gauge 9989876 to dial indicator holder 9992479. Place the holder with the dial gauge across the cylinder liner.
Zero the dial gauge with a couple of millimeters preload against the engine block face.

9989876, 9992479



T2019761

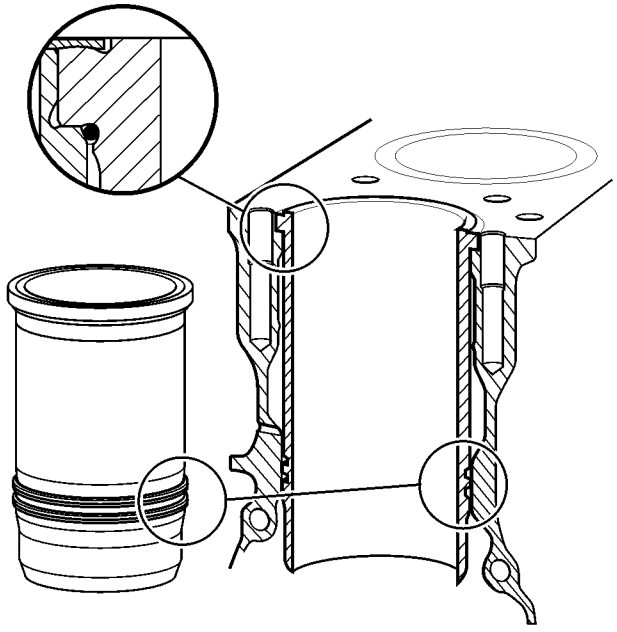
12
Measure the height between the cylinder liner and the engine block face.
Measure the height of the liner at two diagonally opposite locations.
Calculate the average of both the measurements.
For correct liner height above the block surface see *Specifications*, Group 20.
If the liner height above the block surface is outside the given tolerances, the liner seat in the cylinder block must be milled for the appropriate shims.

Note: Always measure at the highest point on the sealing surface.

Mark the liner's position on the cylinder block with a felt tip pen so that it will be put back in the same position during assembly.
Repeat the procedure for the remaining cylinder liners.

13
Remove the cylinder liner press tools (retainers).

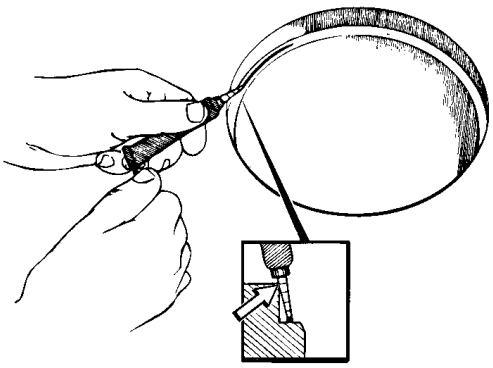
Pull the cylinder liner out of the block by hand.



T2019856

14
Install the cylinder liner seals onto the cylinder liner.
Place the cylinder liners in the same sequence as previously, together with any shims.

Note: Place the sealing rings in accordance with color coding: Small black ring on top of liner, large black ring on lower upper ring, large purple ring on lower ring.

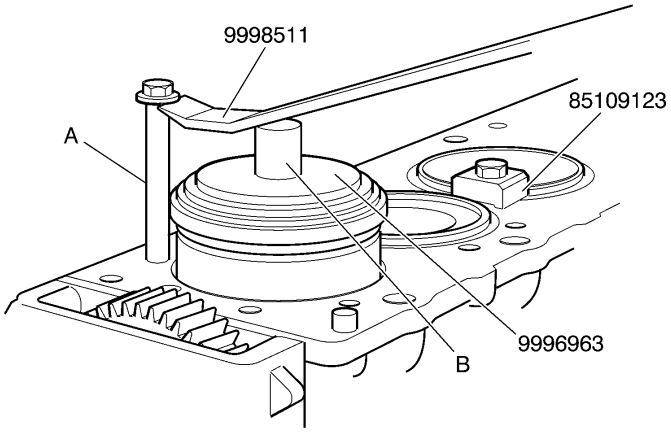


T2009013

15
Apply Volvo approved sealant on the cylinder block liner seat before the cylinder liner is inserted.

Note: If the liner **has** a shim, the sealant must be applied before the shim.
No sealant is to be used between the adjustment shim and the cylinder liner's collar.

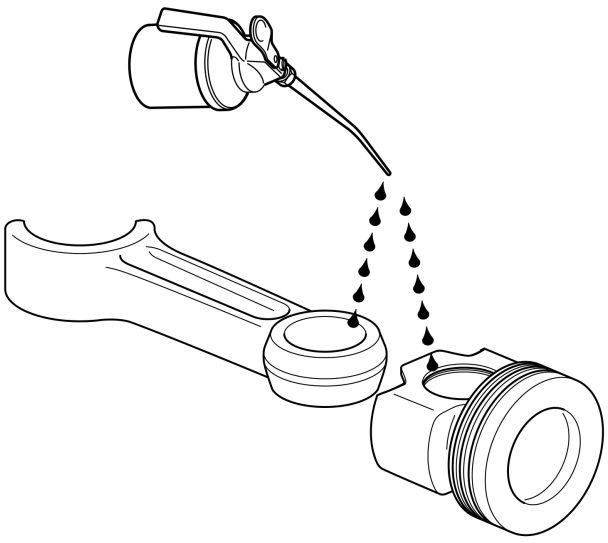
Note: Once the sealant has been applied, the liner must be inserted **within 20 minutes** and be pressed down into the engine block with two press tools.



W2006223

16
Install a cylinder head bolt (A) into a cylinder head bolt hole next to the cylinder liner to be installed. Place the cylinder liner driver 9996963 over the cylinder liner along with a suitable spacer (B). Using a pry bar 9998511, press the cylinder liner into place until fully seated. Install a press tool 9998511 on each side of the cylinder liner until the sealant has cured.

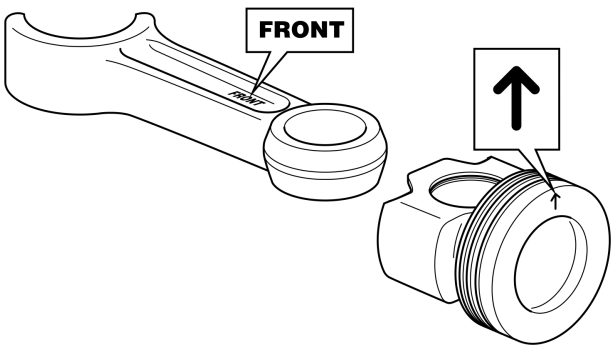
9996963, 9998511



T2022502

17
Lubricate the piston pin, piston pin bushing and connecting rod bushing with engine oil.

Note: Check the condition of the piston pin bushing in the connecting rod before assembly. Replace if necessary.



T2022504

18
Install the connecting rod in the piston with the marking “FRONT” on the connecting rod and the arrow on the piston facing the same direction.
Push in the piston pin.

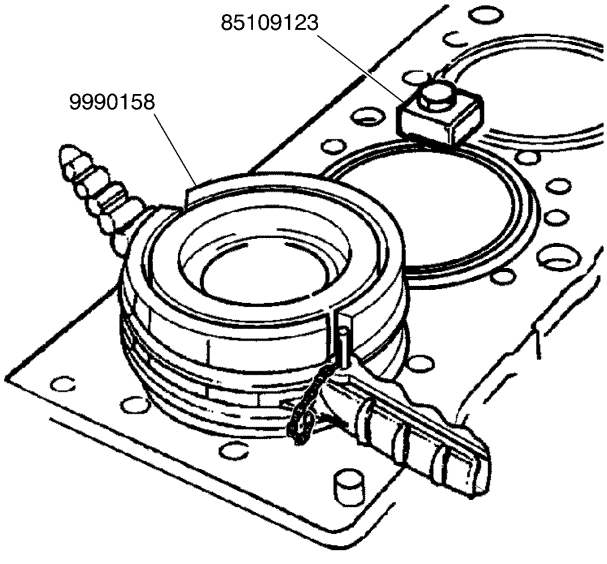
Note: The piston pin should go in when pushed without any great force. If the resistance is too great, the piston needs to be heated.
The connecting rod should rotate freely on the piston pin.

Install the snap ring.

19
If necessary, install the piston rings, using piston ring pliers.
Regarding the oil ring, the gap in the spring should be situated diametrically opposite the ring gap.

Note: All the piston rings (even the oil scraper) are marked with letters or punch marks. These marks should face **upwards**.

20
Lubricate the piston and the piston rings with engine oil. Check that the piston rings gaps are radically displaced. The piston ring gaps should be situated with equal spacing in relation to one another (60° apart).



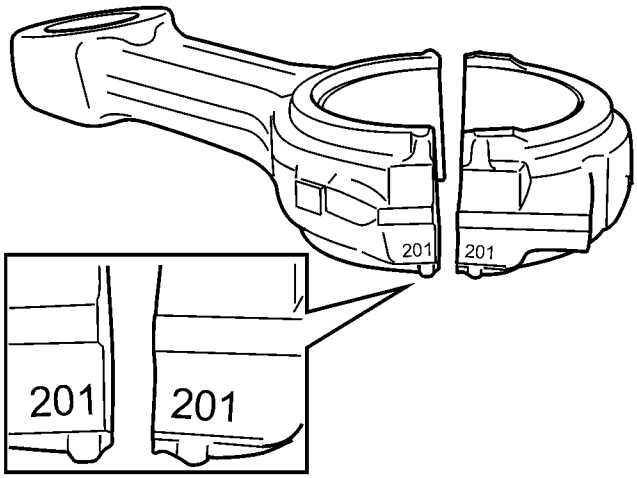
W2006230

21
Insert the piston with its connecting rod, using a piston ring compressor.

Temporarily remove the press tool when the piston is installed. Reinstall the press tools when the piston is in position.

85109123, 9990158

22
Lubricate the crankshaft bearing shells and crankshaft pin with engine oil. Install the connecting rod caps. Check that they sit correctly in the connecting rod and caps.



T2019085

23
Install the big end bearing caps according to their markings and tighten lubricated bolts to specification.

Note: Use compressed air to clean the mating surfaces of the bearing caps carefully before mounting.

Note: Nut runners may **not** be used for tightening bearing caps. They can cause damage to the contact surfaces.

24
Install all remaining piston and connecting rod assemblies, if applicable.

25
After the connecting rod bearing cap bolts have been tightened, check axial (side) clearance between the connecting rod and the crankshaft for each assembly being replaced. Maximum axial (side) clearance is 0.25 mm (0.0098 inch).

26
Clean the piston cooling nozzle and check that it is not damaged. Install the piston cooling nozzle with a **new** bolt.

Note: Clean the nozzle of any contamination before installation.

Note: Use only **new** bolts, pretreated with locking material.

Tighten according to *Specifications*, Group 20.

CAUTION

Do not bend the tube of the piston cooling nozzle; doing so will permanently damage the nozzle.

27
Install all remaining piston cooling nozzles in the same manner, if applicable.

28
Install the magnetic stand and dial indicator. Zero the dial indicator on the surface of the cylinder block.

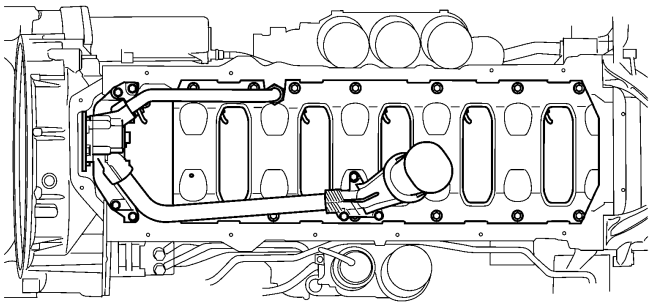
9989876, 9999696

29
With piston at Top Dead Center (TDC), use the dial indicator to measure the height of the piston above the surface of the cylinder block. The height (protrusion) should be within 0.15–0.65 mm (0.006–0.026 inch).

Note: It is not necessary to measure the piston height if the cylinder block deck surface has not been machined. If the cylinder block deck surface has been machined, measure height of all replaced pistons.

30
Remove cranking tool 88800014 and replace the plug.

88800014



W2006209

31
Install the reinforcement frame and tighten according to *Specifications*, Group 20.
Install the pressure pipe on the pump and tighten the union nut according to *Specifications*, Group 20.
Install the pipe and strainer on the reinforcement frame. Lock the bolts with thread lock and torque tighten according to *Specifications*, Group 20.