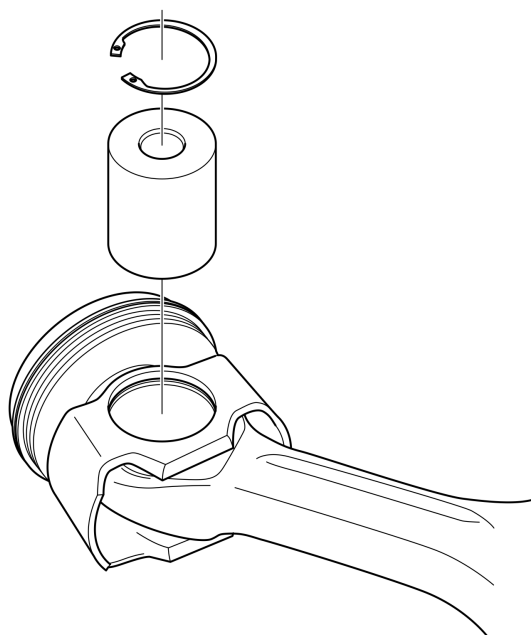


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Pistons and Liners, Replace  
D13F

## Pistons and Liners, Replace



T2022501

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- “Cylinder Liners and Pistons, Replacement (All)” 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.

## 2131-03-03-01

### Cylinder Liners and Pistons, Replacement (All)

Cylinder heads 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 O-rings are made of fluorocarbon 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.
- Splash in the eyes can result in corrosion sores.
- 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.

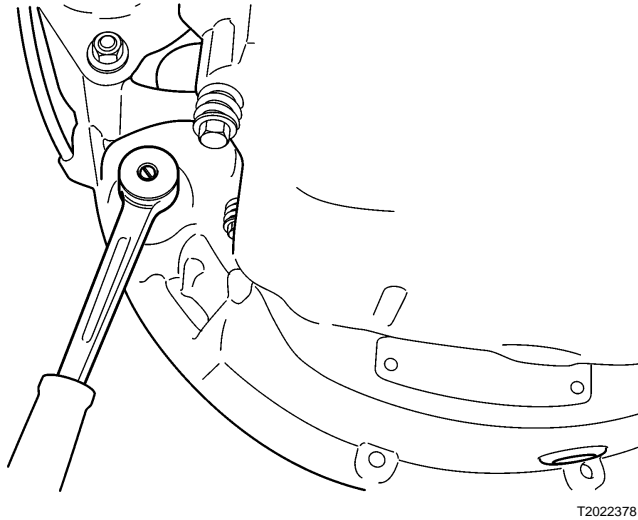
- Always use neoprene gloves (gloves approved for handling chemicals) and protective goggles.
- Handle removed O-rings in the same way as corrosive acids.
- Never blow clean using compressed air.  
All remnants, including ashes, can be highly corrosive.
- Place all remnants in plastic containers, to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

*Special tools: 9989876, 9990158, 9996394, 9996395, 9996599, 9996606, 9996645, 85109123, PT-6400-C, 9998511, 9992479, 8880014*

#### Remove

1

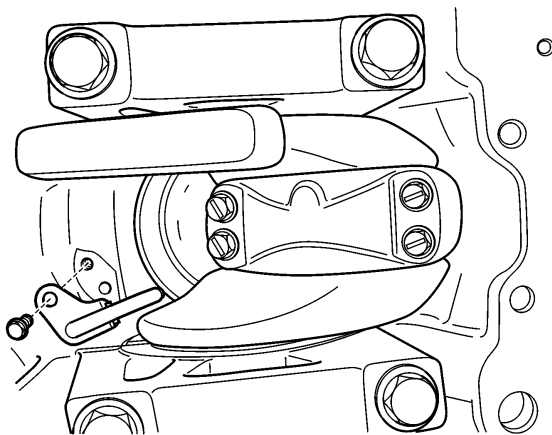
Remove the pipe and strainer from the reinforcing frame.  
Remove the pressure pipe from the pump.  
Remove the reinforcement frame.



**2**

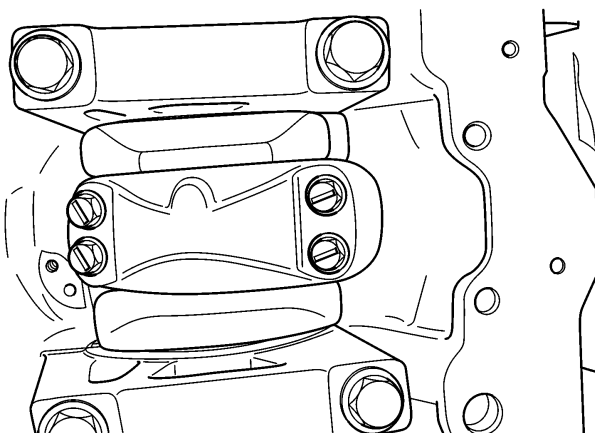
Remove the plug from the flywheel housing and install tool 88800014. Turn the crankshaft until it is possible to get at the screws on the connecting rod which is to be removed.

88800014



**3**

Remove the piston cooling jet.



**4**

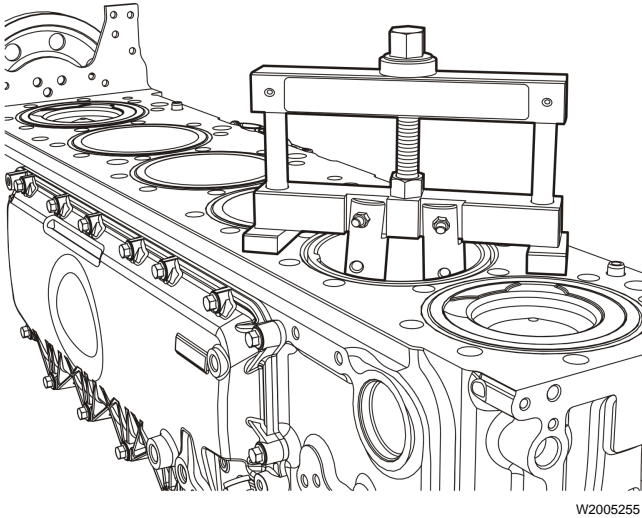
Remove main bearing cap and bearing shells.

**5**

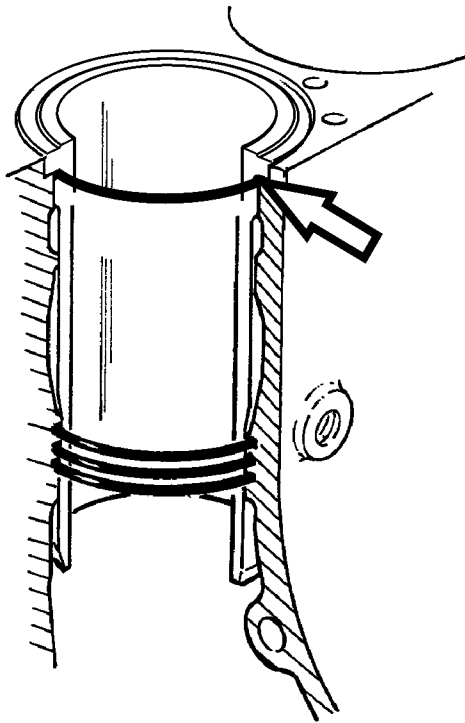
Remove the piston with the connecting rod.

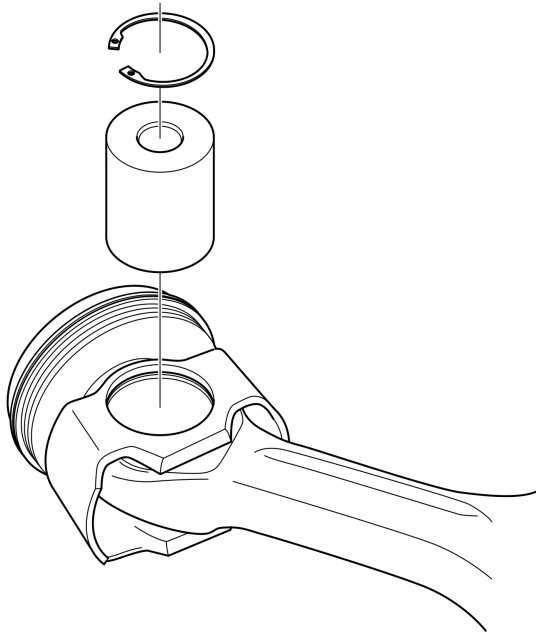
- 6**  
Pull the cylinder liner out of the block.

PT-6400-C



- 7**  
Remove the cylinder liner's sealing rings.





T2022501

**8**

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

**9**

Clean the sealing surfaces on the cylinder block and the groove for the sealing rings. Do not use scrapers or other tools which can damage the sealing surfaces.

### Installation

#### 10

Check the cylinder block's liner seat for damage. If it is necessary to mill the liner shelf, see service bulletin "Cylinder liner seat, milling (first)"<sup>1</sup>.

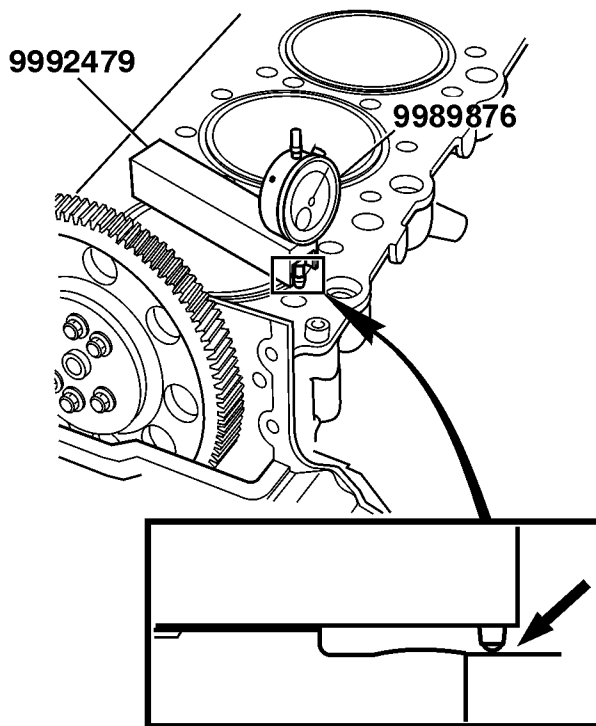
Install the cylinder liner, **without** the sealing ring. Fix the cylinder liner with **two** clamping tools.

85109123

#### 11

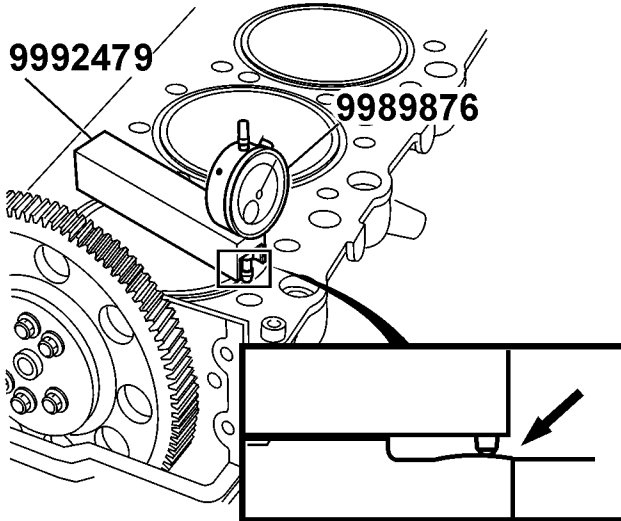
Mount dial gauge 9989876 in dial indicator holder 9992479. Place the holder with the dial gauge across the cylinder liner. Zero the dial gauge with a couple of millimeters' preload against the cylinder block's surface.

9989876, 9992479



T2019670

<sup>1</sup>IMPACT: Group 2139



T2019761

## 12

Measure the height between the cylinder liner and the cylinder block surface.

Measure the liner's height at two different diagonally opposite positions.

Calculate the average of both the measurements.

For correct liner height above the block surface see specifications, group 20.

If the height of the liner above the surface of the block is outside the specified tolerance, the liner seat on the cylinder block should be milled "Cylinder liner seat, milling (first)"<sup>2</sup>.

**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 on assembly.

Repeat the procedure for the remaining cylinder liners.

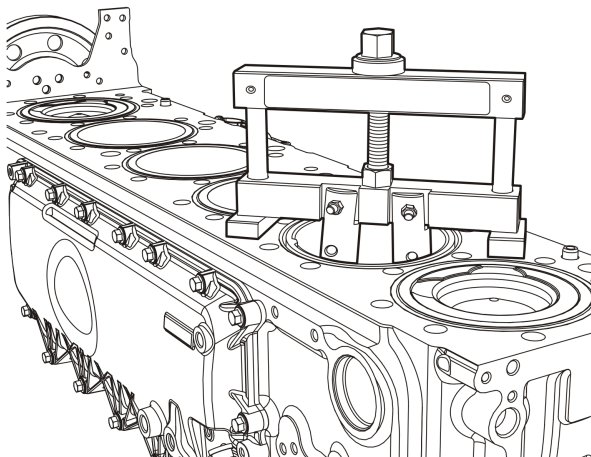
## 13

Remove the press tool.

Pull the cylinder liner out of the block.

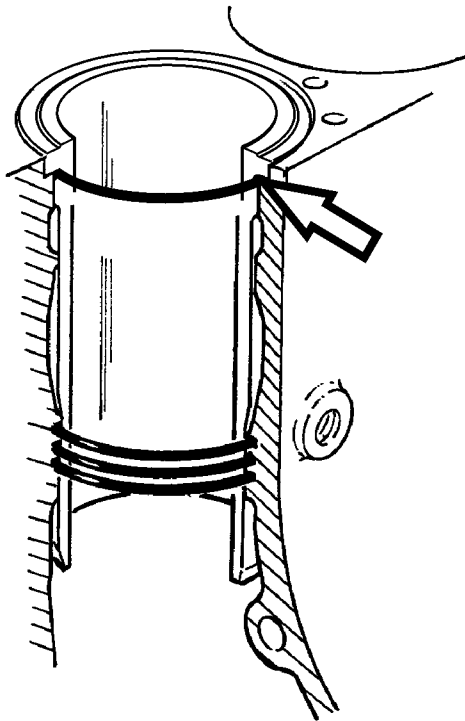
Place cylinder liners in the same sequence that they are installed, together with their adjustment spacers.

PT-6400-C



W2005255

<sup>2</sup>IMPACT: Group 2139

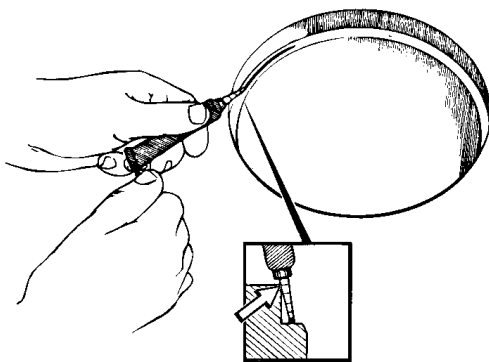


T2019854

#### 14

Install the liner sealing rings to the engine block.

**Note:** The purple sealing ring is installed furthest down.



T2009013

#### 15

If the liner is installed **with** a shim, a bead of sealing compound should be put on the engine block liner seat.

**Note:** No sealant is to be used between the adjustment spacer and the cylinder liner's collar.

**Note:** Once the sealing compound has been applied, the liner must be installed **within 20 minutes**.

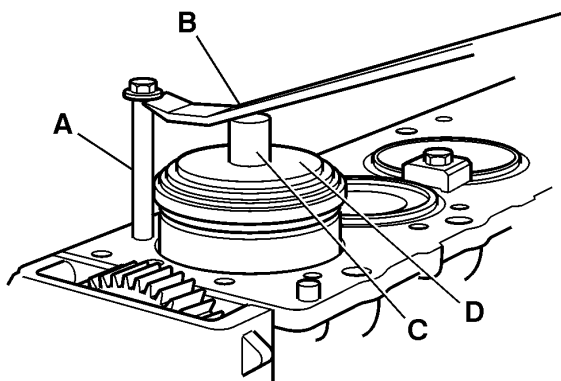
If the cylinder head **cannot** be installed and torque tightened within 20 minutes, the liner must be fixed in the engine block with two press tools.

85109123

#### 16

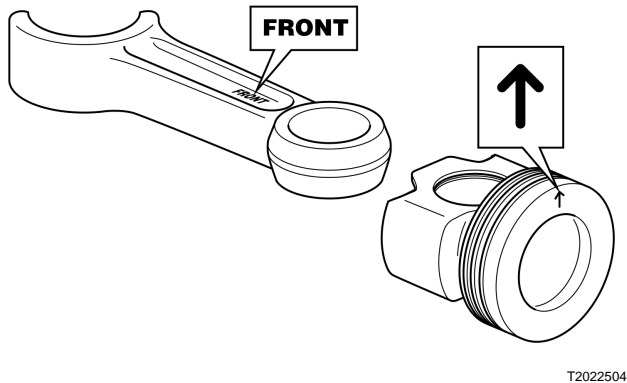
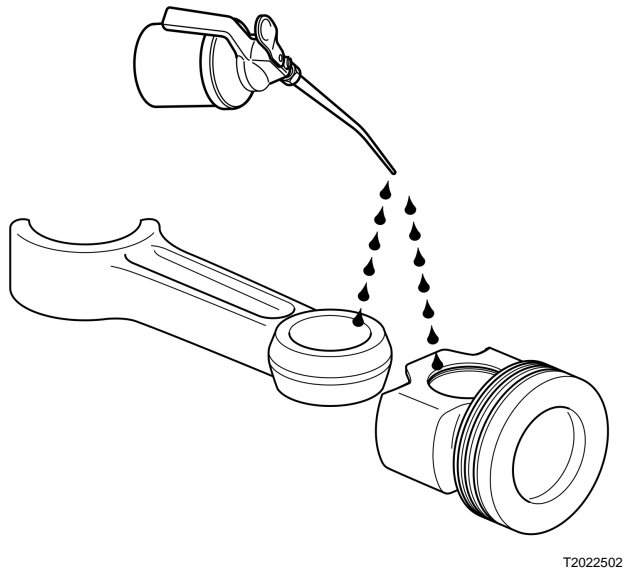
Install one of the cylinder head bolts (A). Position press tool (D) above the cylinder liner together with a suitable spacer (C) and press the cylinder liner down using lever (B).

9996599, 9996963, 9998511



T2019950





**17**

Lubricate the piston pin and the piston bushing with engine oil.

**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 the piston pin in.

**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**

Using piston ring pliers, install the piston rings. 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**

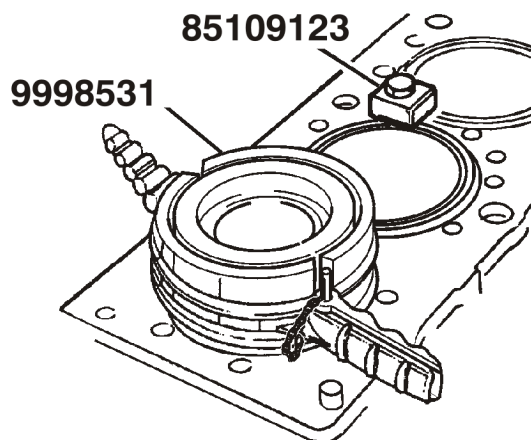
Lubricate the piston and the piston rings with engine oil. Check that the piston rings gaps are radically displaced. The piston ring gaps should be situated with the equal spacing in relation to one another 60°.

**21**

Use a piston ring compressor, insert the piston with its connecting rod.

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

9998531, 85109123



W2006211

**22**

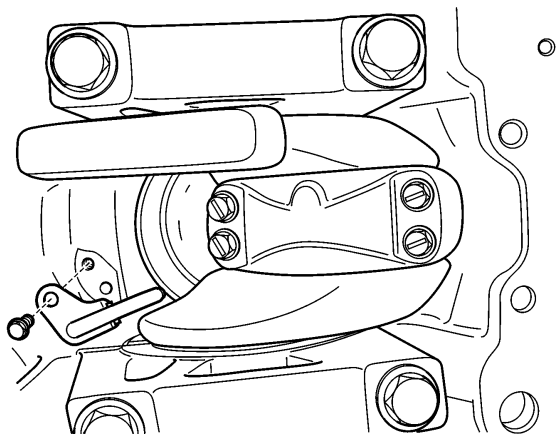
Lubricate the crankshaft bearing shells and crankshaft pin with engine oil. Install the connecting rod caps. Check that they sit correctly in the connecting rod and caps. Install the connecting rod cap according to the markings and torque tighten according to specifications, see group 20.

**23**

Clean the piston cooling jet and check that it is not damaged. Install the piston cooling jet with **new** bolts and O-ring.

**Note:** Use only **new** bolts, pre-treated with locking material.

Torque tighten as specified in "Specifications", see group 20.



T2022286

**24**

Remove cranking tool 88800014 and replace the plug.

88800014

**25**

Install the reinforcement frame and torque tighten according to Specifications, Group 20.

Install the pressure pipe on the pump and tighten according to Specifications, Group 20.

Install the pipe and strainer on the reinforcement frame.

Secure the bolts with thread lock and torque tighten according to Specifications, Group 20.