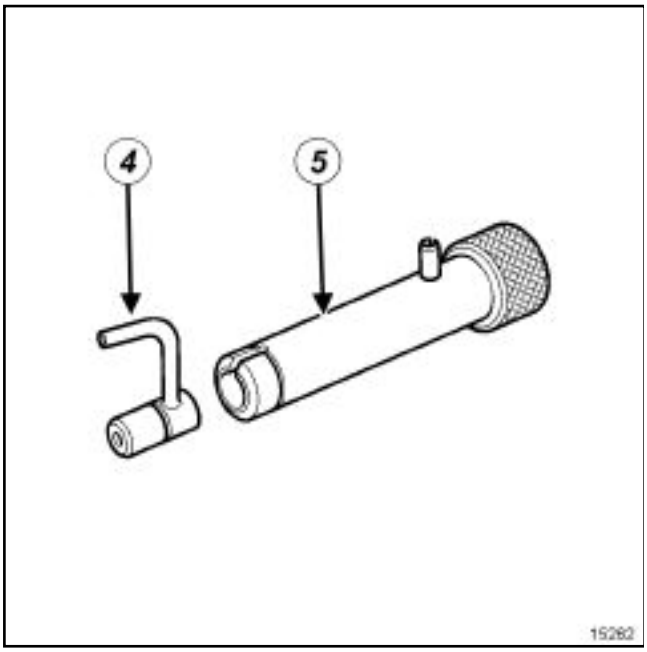


15262

Insert the jet (**4**) into the pushrod (**5**) .

Using a hammer, tap the pushrod down until the pushrod collar ***(5)*** is touching the plate ***(1)*** .

Remove the **(Mot. 1494)** from the cylinder block.

Special tooling required	
Mot. 1493-01	Crankshaft bearing centring tool.
Mot. 1319-01	Gauge for measuring height of crankpins.
Mot. 1489	TDC locating pin.
Mot. 1319	Gauge for measuring height of crankpins.
Mot. 1492	Tool for fitting main bearing shells.
Mot. 1492-03	Tool for fitting main bearing shells.
Mot. 252-01	Dial gauge support thrust plate.
Mot. 251-01	Dial gauge support.

Tightening torques ▽	
the crankshaft bearing cap mounting bolts	**25 ± 2.5 Nm + 47° ± 6°**
the con rod cap mounting bolts	**20 ± 2 Nm + 45° ± 6°**

I - RECOMMENDATIONS FOR REPAIR

IMPORTANT
Wear protective gloves during every operation.

WARNING
The sealing surfaces must be clean, dry and free from grease (avoid finger marks).

Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.)

The con rod caps are positioned on the con rod body using the irregularities on the parting line.

Impacts or foreign bodies between the contact surfaces between the caps - con rod body could lead to a breakage of the con rod in the short term.

II - PARTS AND CONSUMABLES FOR THE REPAIR

Parts always to be replaced

- Con rod cap bolts,
- Crankshaft bearing cap bolts.

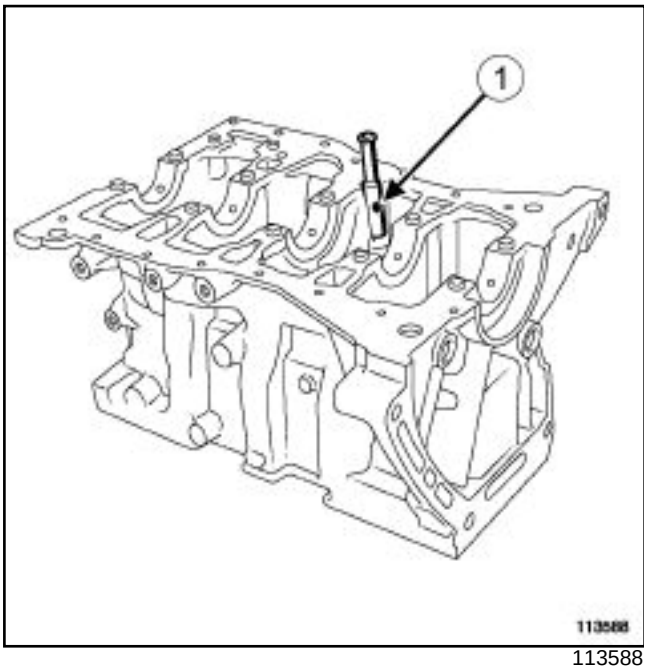
Consumables

- Loctite 518, part no. **77 01 421 162** ,
- Degreasing agent, part no. **77 11 224 559** .

III - EQUIPMENT REQUIRED

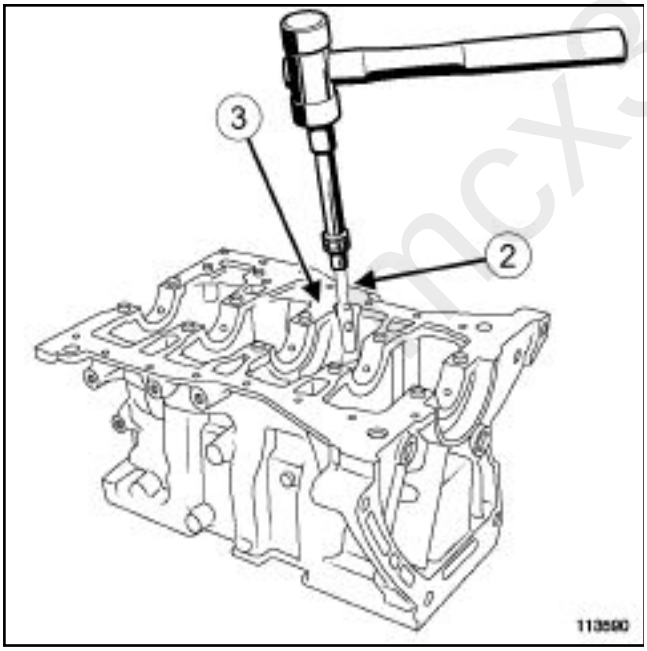
- Female torx socket.
- Allen key (**8 mm**),
- Oil can,
- Dial gauge,
- Flat-blade screwdriver,
- Indelible pencil,
- Piston ring compressor,
- Piston mounting ring,
- Torque/angle wrench,
- Torque wrench
- Cylinder head bolt tightening gauge (angular measuring type),
- Mallet,

IV - REFITTING THE ROTATING PARTS



113588

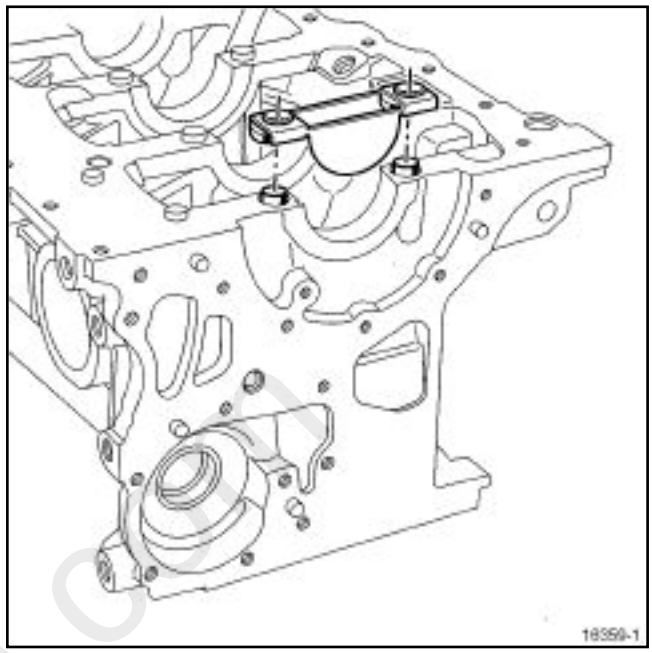
Replace the dipstick guide tube in the cylinder block (if the cylinder block is fitted with one), aligning the orifice (**1**) of the dipstick guide tube as indicated in the diagram.



113590

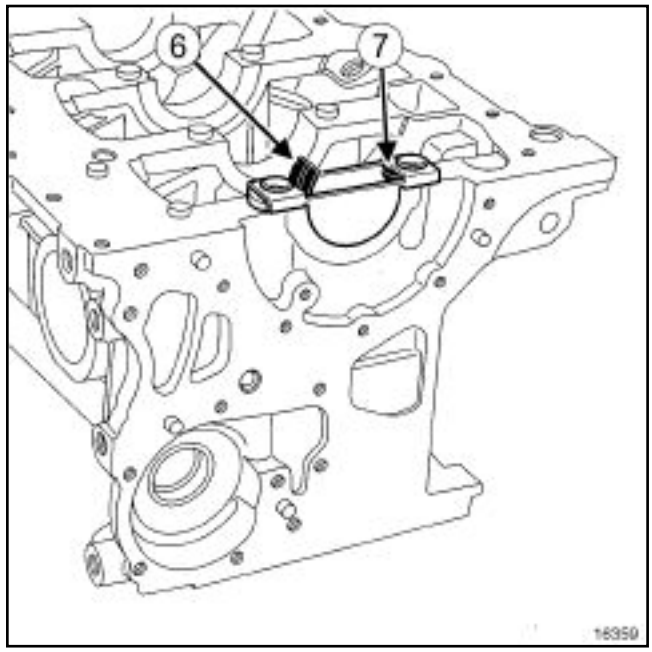
Insert the dipstick guide tube using an **8 mm** male Allen key, until the dipstick guide tube extends by **43 mm** (the end) (**2**) over the sealing surface (**3**) of the cylinder block.

Ensure that the crankshaft bearing journals are matched up with the crankshaft bearings on the cylinder block (see **10A**, **Engine and lower engine assembly**, **Engine peripherals: Specifications**, page **10A-36**) .



16359-1

Position the **(Mot. 1493-01)** on the cylinder block.

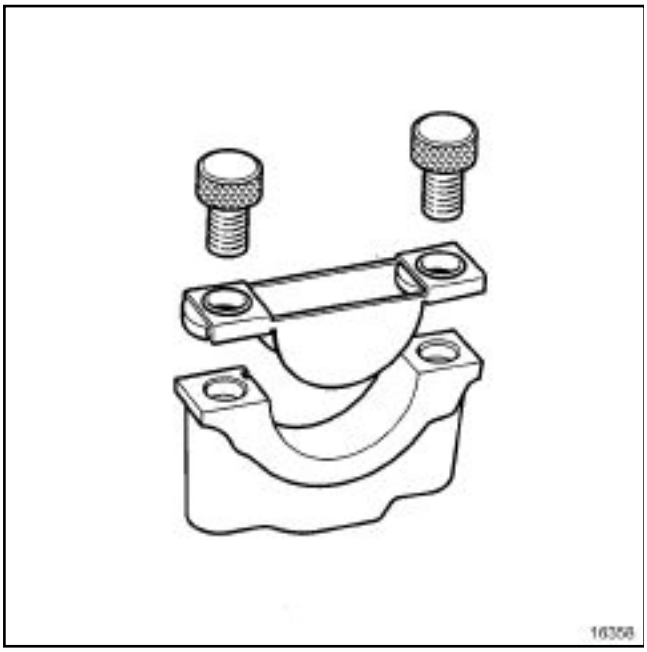


16359

Mount the bearing shell **(grooved)** (**6**) in the **(Mot. 1493-01)** .

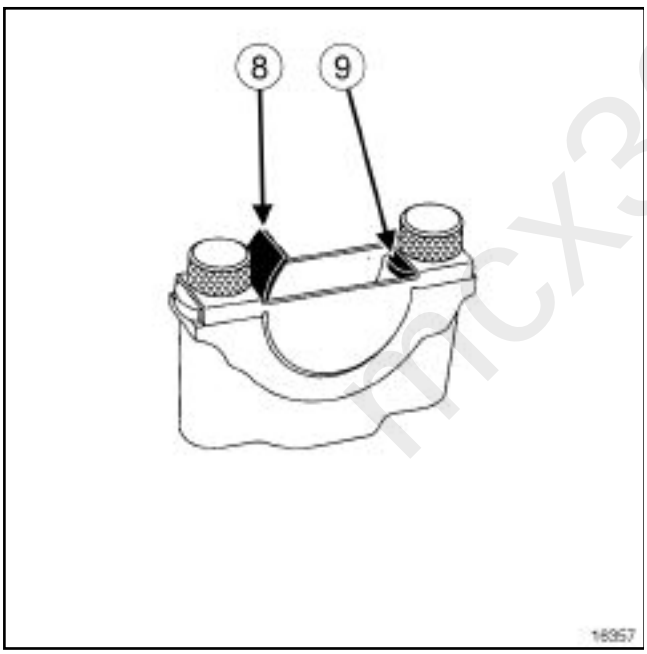
Push on the bearing until it is pressed against the stop (**7**) .

Repeat this process for other bearings.



16358

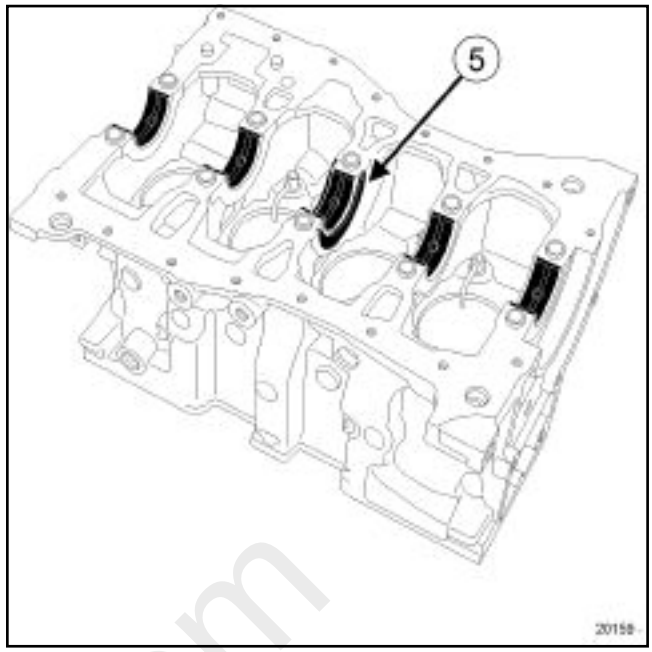
Position the **(Mot. 1493-01)** on the crankshaft bearing cap.



16357

Place the bearing shell **(non-grooved)** (**8**) in the **(Mot. 1493-01)** .

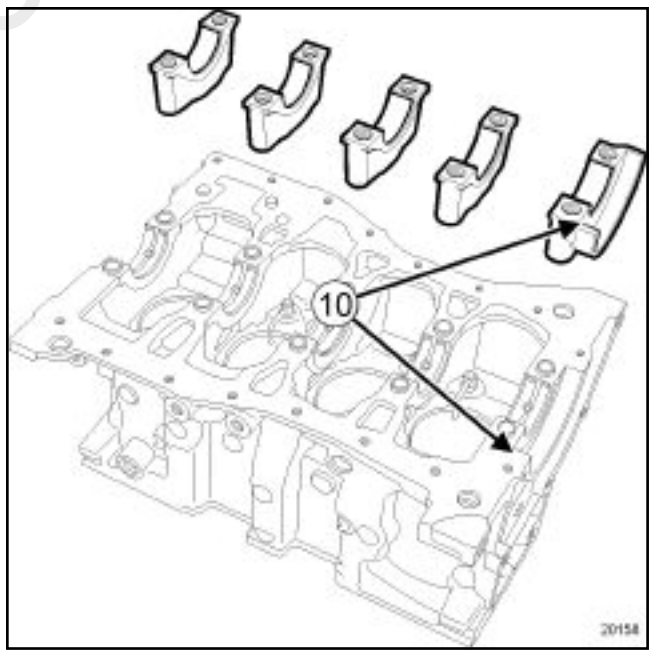
Push on the bearing until it is pressed against the stop (**9**) .



20159

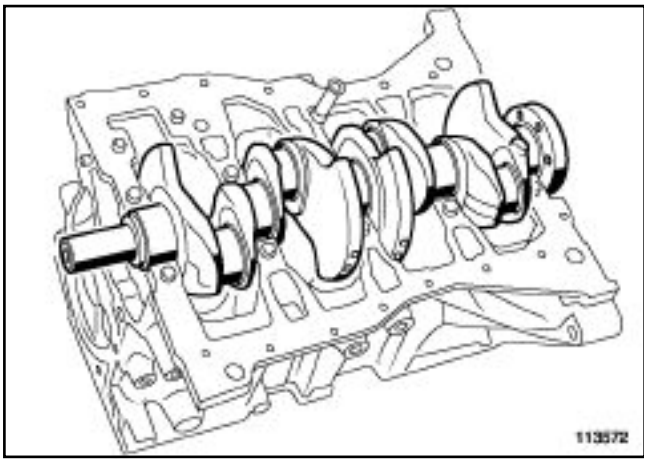
Refit the crankshaft thrust washers **positioning the grooves of the shims at crankshaft end** .

Oil the crankshaft bearing shells with engine oil (only the side of the bearing shell that comes in contact with the crankshaft).



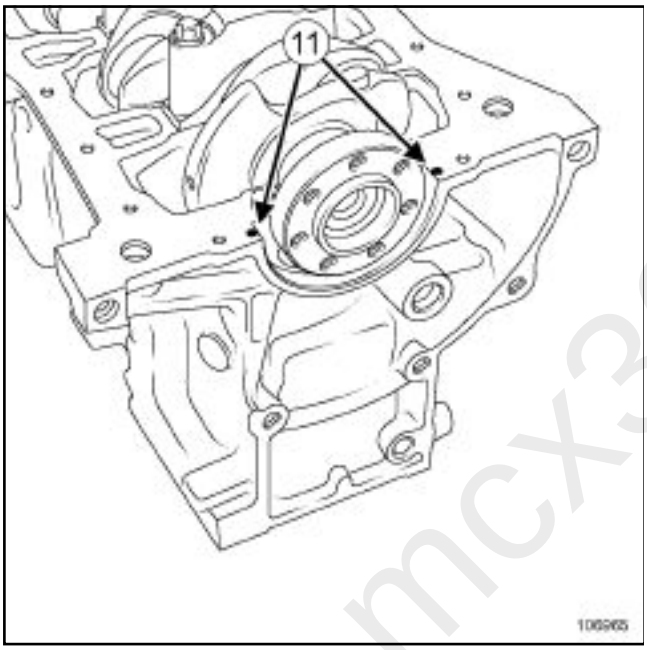
20158

Degrease the surfaces of the seals (**10**) of the cylinder block and the crankshaft bearing cap No. 1 using degreaser.



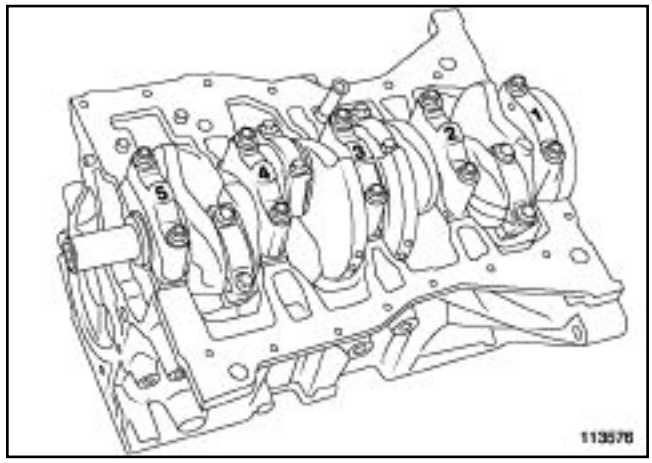
113572

Refit the crankshaft.



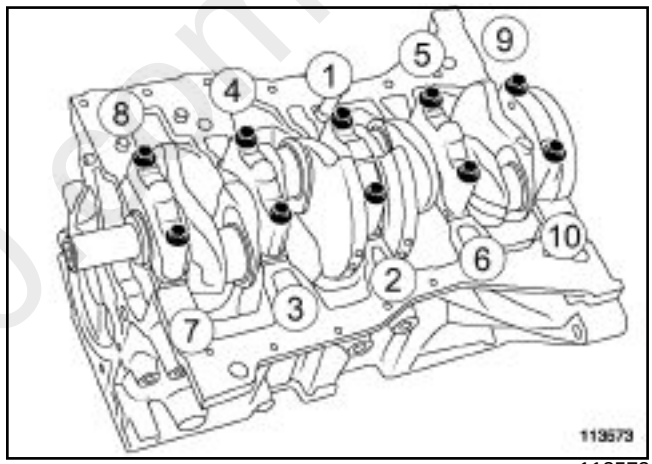
106965

Apply two drops (**11**) of **LOCTITE 518** of a diameter of **4 mm** to camshaft bearing no. 1.



113576

Refit the crankshaft bearing caps, ensuring that they are correctly positioned.



113573

Refit the new crankshaft bearing cap mounting bolts.

Tighten to torque in order and to angle **the crankshaft bearing cap mounting bolts (25 ± 2.5 Nm + 47° ± 6°)** .

Check that the crankshaft turns freely, with no resistance.

Note:

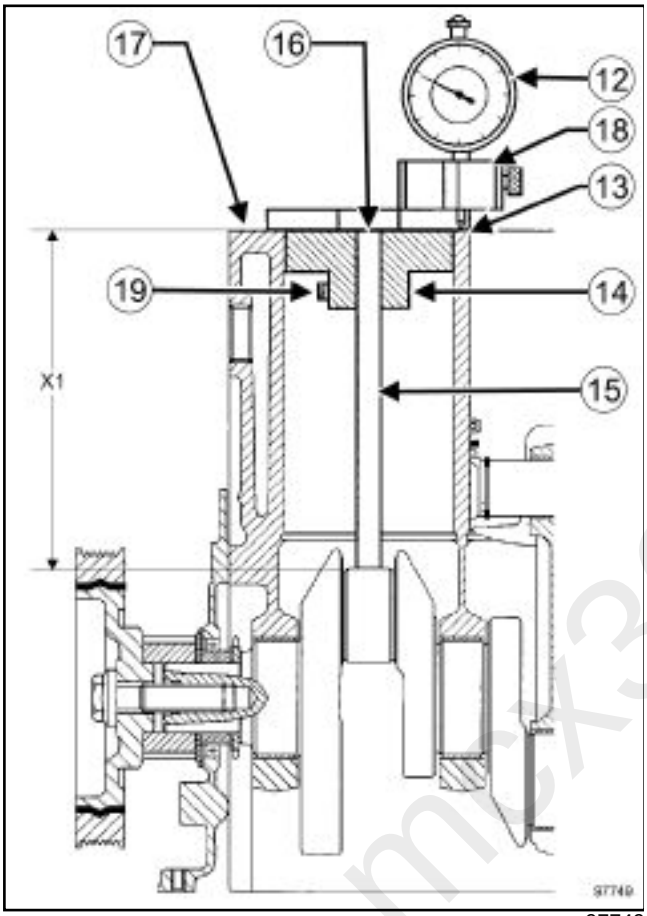
If replacing the con rods, the Parts Department will only supply con rods with a small end diameter of **26 mm** .

It is therefore essential to check that the gudgeon pin is **26 mm** in diameter.

It is essential to determine the height of the crankpin ***(X1)*** in the event of having to replace the con rods, crankshaft, cylinder block.

The height ***(X1)*** represents the distance between the crankpin at TDC and the surface of the seal on the combustion face of the cylinder block.

This measurement enables the piston class to be determined.



97749

Measuring the crankpin height for cylinders 1 and 4:

Insert the appropriate depth gauge of tool **(Mot. 1319-01)** (**15**) in the dummy piston (**14**) of the tool, **(Mot. 1319-01)** lining up the light of the depth gauge opposite the locking bolt (**19**) .

Tighten the locking bolt (**19**) .

Check that the depth gauge slides freely in the dummy piston.

Set the crankshaft at Top Dead Centre using the **(Mot. 1489)** .

Position the dummy piston ***(14)*** of the the **(Mot. 1319-01)** fitted with the depth gauge in cylinder No. 1.

Position the depth gauge ***(15)*** of the tool, **(Mot. 1319-01)** pressing on the crankshaft crankpin.

Place the dial gauge holder ***(18)*** of the **(Mot. 1319)** with dial gauge in place on the dummy piston ***(14)*** .

Calibrate the dial gauge ***(12)*** on the cylinder block, setting the mid-point between points ***(13)*** and ***(17)*** .

Slide the dial gauge holder to the centre ***(16)*** of the depth gauge ***(15)*** .

Measure the protrusion or recess of the depth gauge.

Note the value.

Carry out the same procedure for cylinder No. 4.

Measuring the crankpin height for cylinders 2 and 3:

Position approximately the crankpin for crankshaft No. 2 at Top Dead Centre.

Place the dummy piston-depth gauge assembly into cylinder No. 2.

Place the dial gauge holder, with dial gauge in place, in the centre of the depth gauge.

Gently turn the crankshaft to determine the crankpin top dead centre.

Calibrate the dial gauge ***(12)*** on the cylinder block, setting the mid-point between points ***(13)*** and ***(17)*** .

Slide the dial gauge holder to the centre ***(16)*** of the depth gauge ***(15)*** .

Measure the protrusion or recess of the depth gauge.

Note the value.

Carry out the same procedure for cylinder No. 3.

Determine the class of piston

Add or subtract the values obtained of the length of the depth gauge in order to determine the dimension ***(X1)*** .

For example:

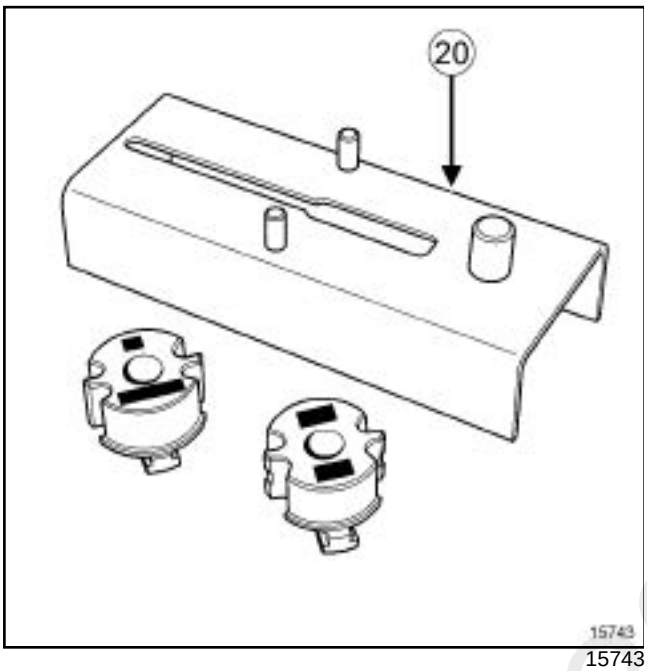
- length of depth gauge = **153.989 mm** ,
- measured protrusion (of the length of the depth gauge beyond the cylinder block) = **0.65 mm** ,
- the dimension ***(X1)*** = **153.989** - **0.65** = **153.339 mm** (in the event of a recess, the figures must be added).

Determine **the height of the gudgeon pin** using the following formulae:

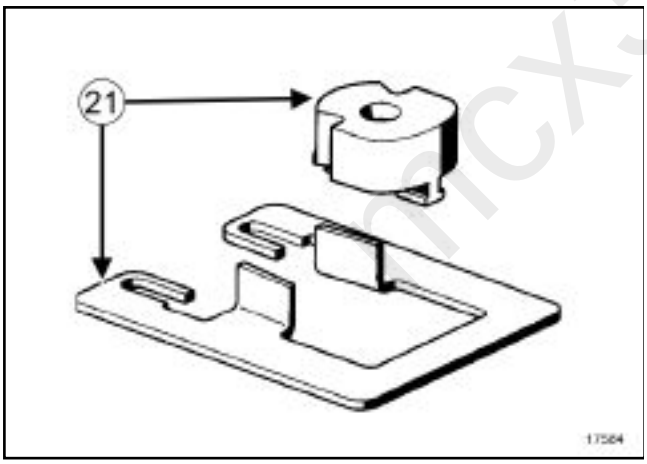
- For engines fitted with a gudgeon pin of diameter **25 mm** use formula (***(X1)*** - **111.535** = the height of the gudgeon pin),

- For engines fitted with a gudgeon pin of diameter **26 mm** use formula (***(X1)*** - **111.576** = the height of the gudgeon pin),

Refer to the height classes table for the gudgeon pins in order to choose the correct piston class (see **10A**, **Engine and lower engine assembly**, **Engine peripherals: Specifications**, page **10A-36**) .



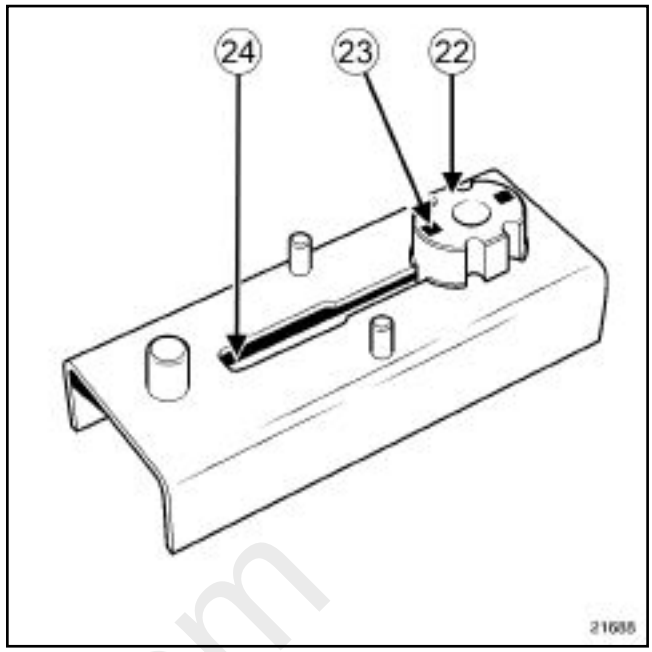
15743



17584

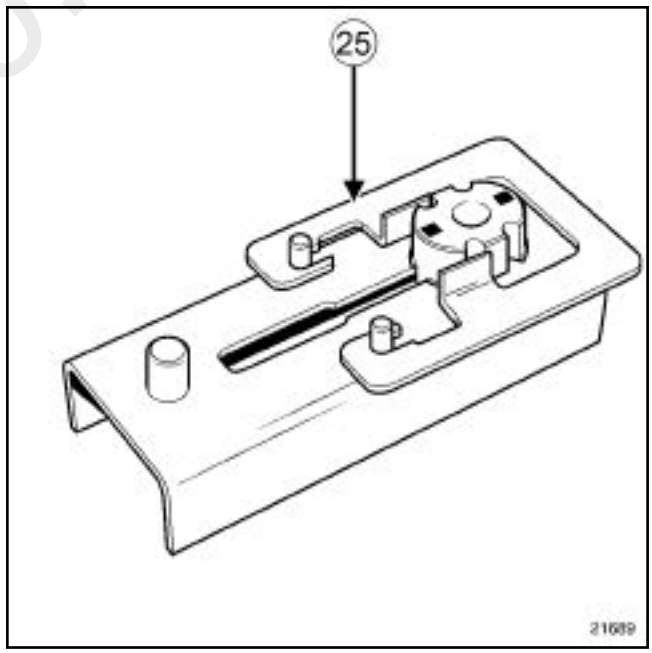
Fit the con rod bearings using the **(Mot. 1492)** (**20**) and **(Mot. 1492-03)** (**21**) .

Refitting the con rod bearings on the con rod body.



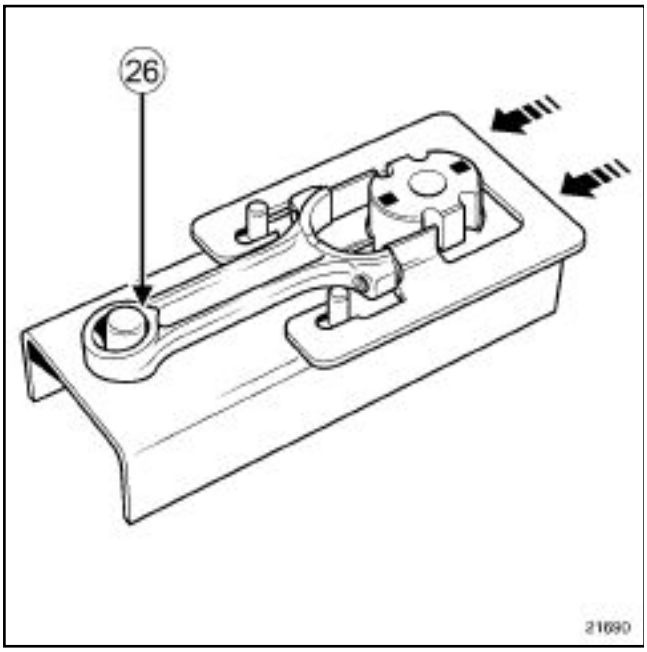
21688

Slide the bearing support (**22**) (positioning the marking "A" (**23**) as indicated in the diagram) of the tool **(Mot. 1492-03)** in the groove (**24**) of the tool base **(Mot. 1492)** .



21689

Place the rail (**25**) of the tool **(Mot. 1492-03)** on the base.

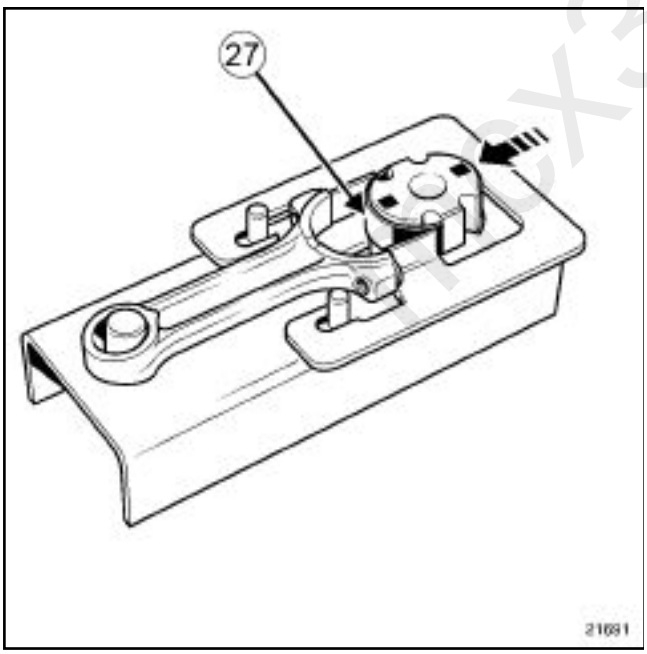


21690

Mount the con rod body on the base.

Check that the lower part (**26**) of the small end is in contact with the centring pin.

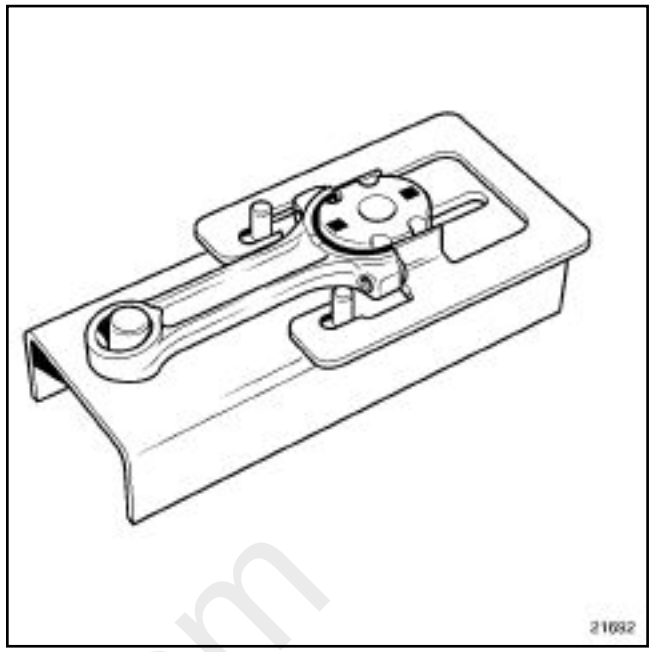
Push the rail (in the direction shown by the arrow) until the rail presses against the con rod end.



21691

Mount the bearing shell (**27**) (with a width of **20.625 mm** on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



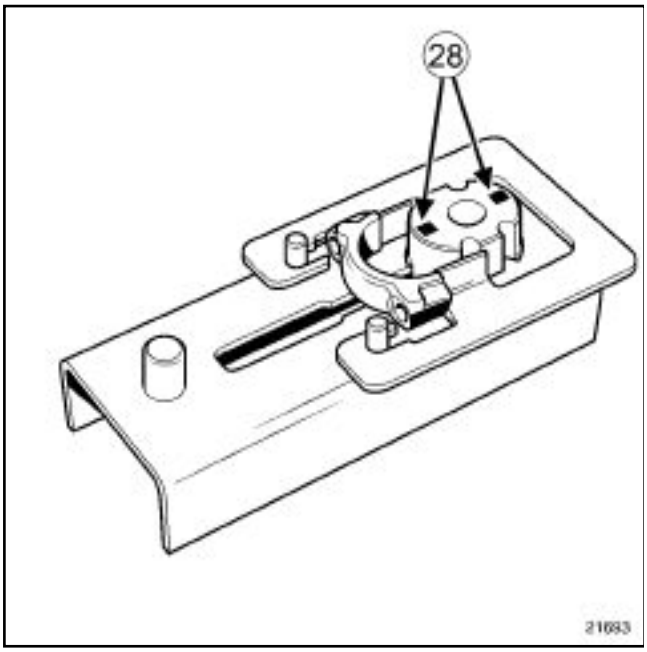
21692

Bring the bearing shell support to the end of the con rod body base.

Remove the support shell from the con rod body.

Repeat the operation for the other con rod bodies.

Refitting the con rod bearings on the con rod cap.

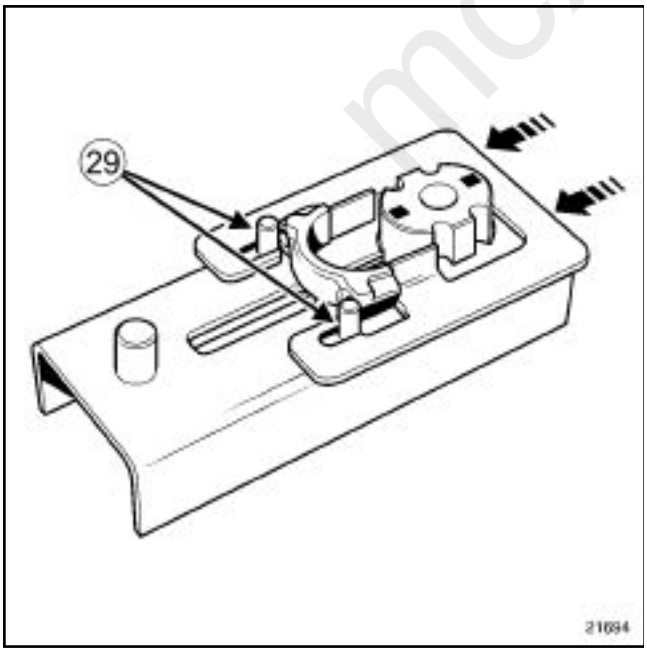


21693

Position the bearing shell support, aligning the marking "A" or "B" (**28**) on the side of the cap as follows:

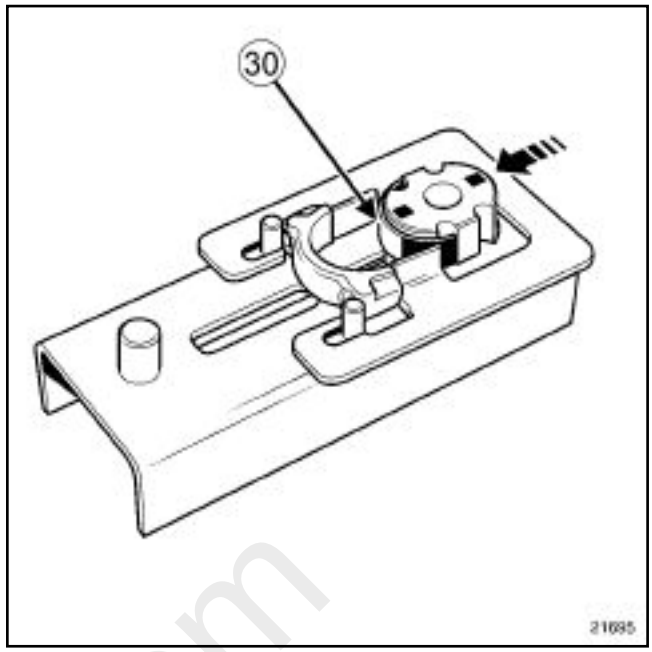
- a bearing shell width of **20.625 mm** corresponds to "A",
- a bearing shell width of **17.625 mm** corresponds to "B",

Mount the con rod cap on the base.



21694

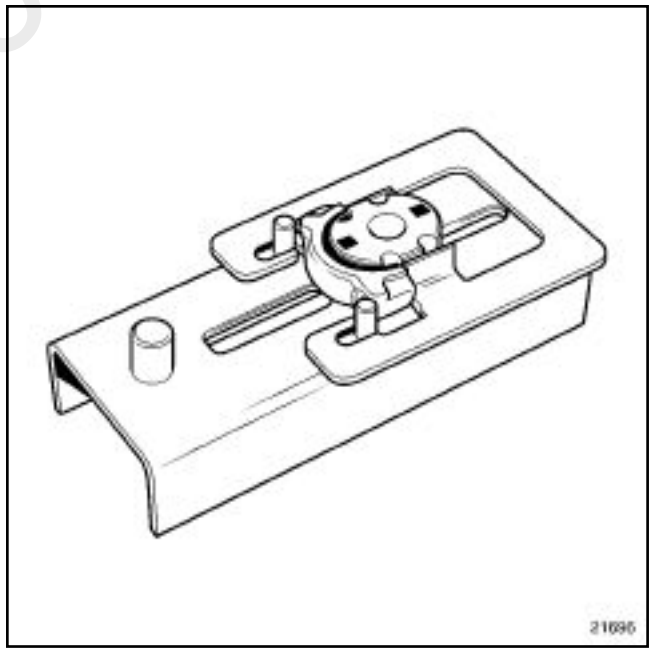
Push the rail in the direction shown by the arrow until the con rod cap presses against the pins (**29**) on the base.



21695

Mount the bearing shell (**30**) on the bearing shell support.

Push the bearing shell support in the direction shown by the arrow.



21696

Bring the bearing shell support to the end of the con rod cap base.

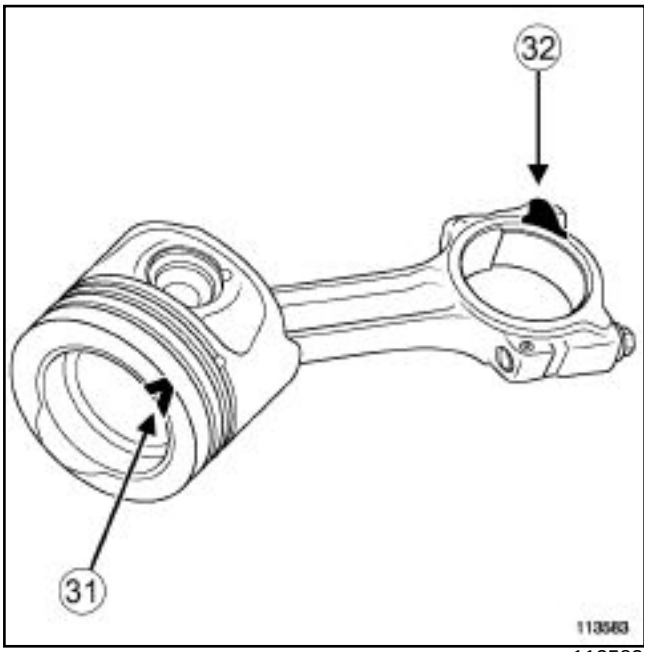
Remove the bearing shell from the con rod cap.

Repeat the operation for the other con rod caps.

Using an indelible pencil, mark the gudgeon pin position in relation to the piston.

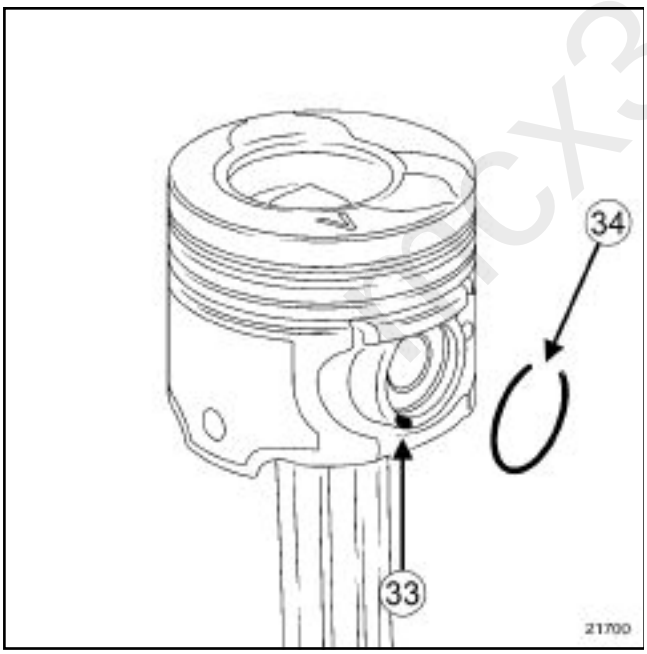
Lubricate gudgeon pin with engine oil.

Check that the gudgeon pin slides and turns freely in the piston.



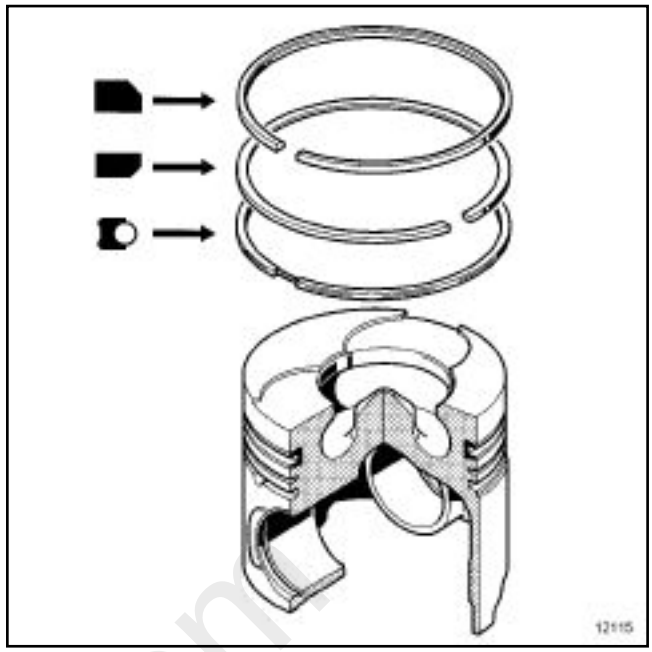
113583

Position the mark **"V"** (**31**) of the piston and the flat surface (**32**) of the con rod cap as indicated in the illustration.



21700

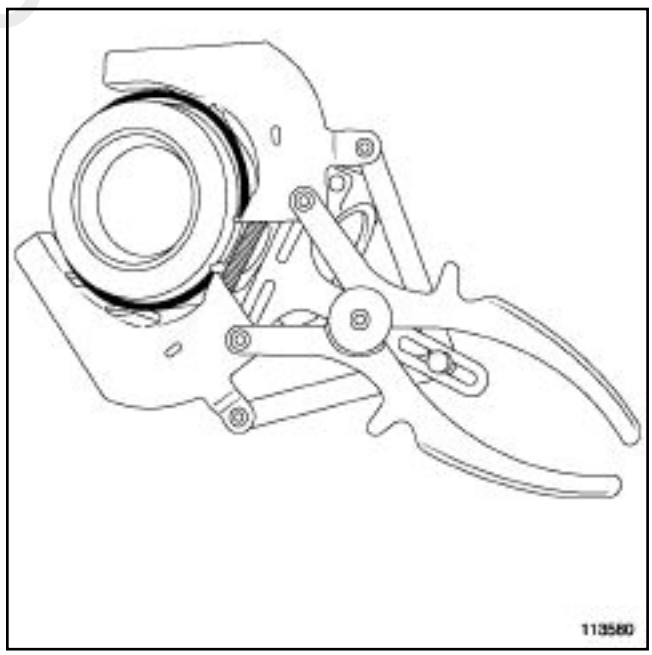
Refit the circlip of the gudgeon pin, positioning the opening (**34**) of the circlip opposite the notch (**33**) .



12115

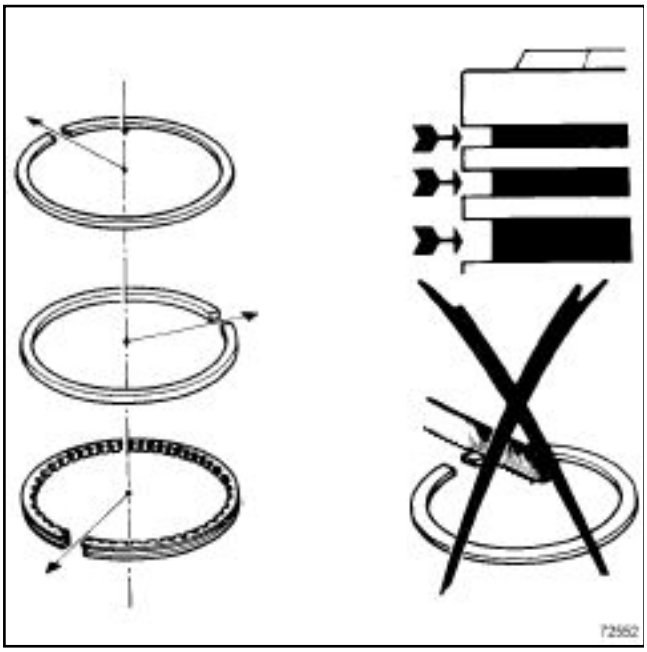
Note:

Ensure the rings are fitted the right way round, with the word **TOP** pointing upwards.

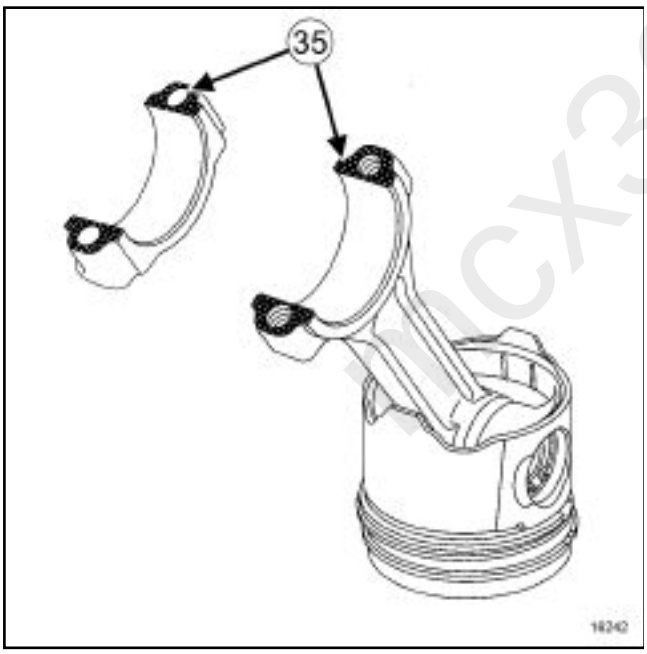


113580

Refit the piston rings using a piston ring compressor.


72552

Fit the shoes such that the gaps are equally spaced around the piston.



16242

Using degreasing agent, degrease the contact surfaces (**35**) between the cap and body of the con rod.

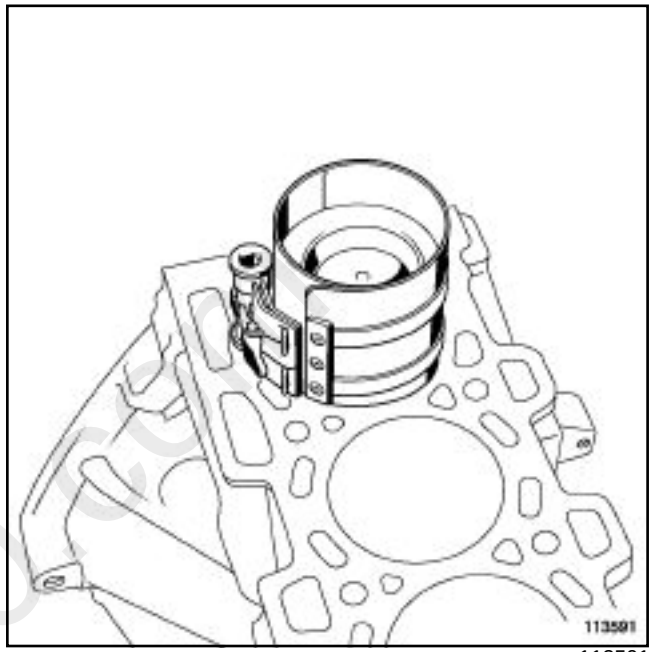
Lubricate with engine oil:

- the cylinder block barrels,
- the piston rings,
- the piston skirts,
- the crankshaft crankpins.

Note:

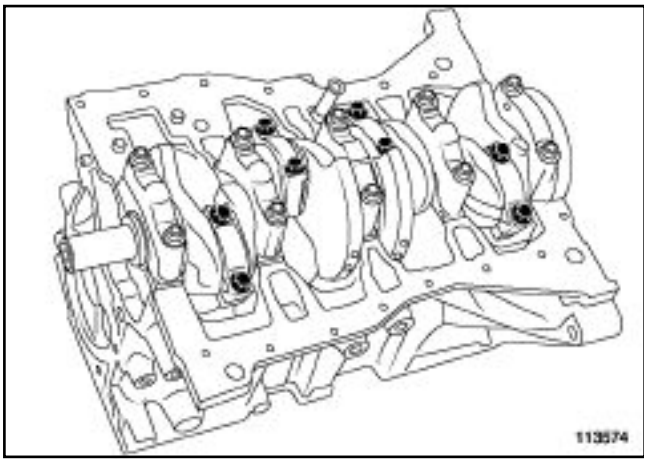
Ensure that the piston matches the cylinder block barrel (No.1 at flywheel end) .

Ensure the correct con rod-piston orientation, positioning the "V" engraved on the piston crown towards the flywheel .


113591

Refit the con rod-piston assembly using a piston assembly ring.

Mount the con rod heads on the crankshaft crankpins.



113574

Refit:

- the con rod caps, ensuring correct matching,

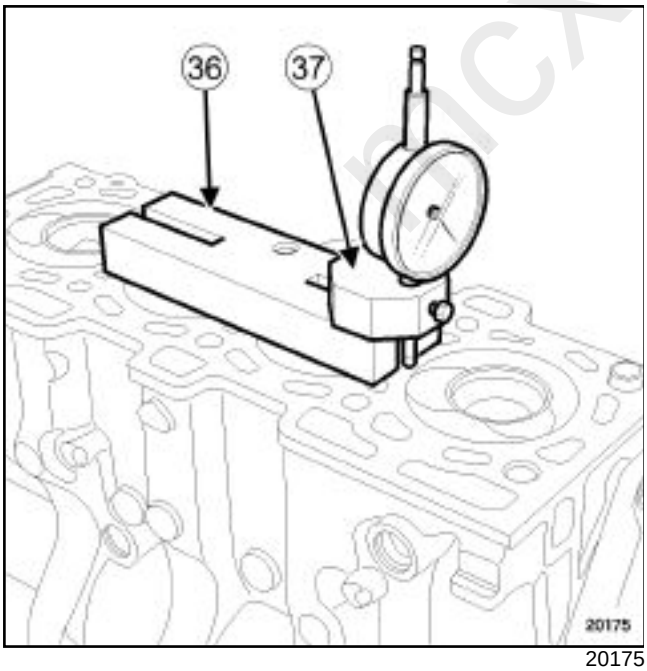
- the new con rod cap mounting bolts.

Torque and angle tighten **the con rod cap mounting bolts (20 ± 2 Nm + 45° ± 6°)** .

Check that the running gear turns freely, with no resistance.

Clean the piston crowns.

Set the crankshaft at Top Dead Centre.



20175

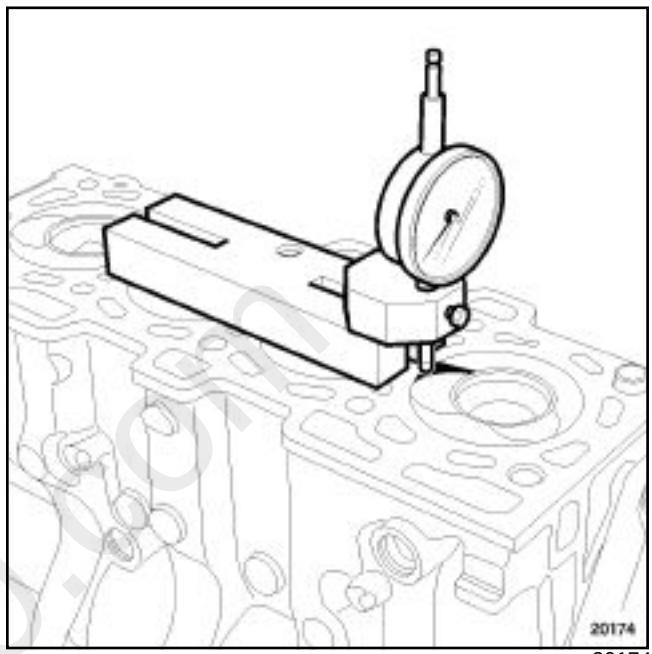
Mount the contact plate of the **(Mot. 252-01)** (**36**) on the cylinder block.

Mount the dial gauge support **(Mot. 251-01)** (**37**) , with a dial gauge, on the pressure plate.

Note:

The measurement is taken along the longitudinal axis of the crankshaft to eliminate play due to the movement of the piston .

Calibrate the dial gauge on the cylinder block.



20174

Measure the recess **(the sensor of the dial gauge should not be in a valve gap)** of the piston which should be:

- For engines **K9K 260-700-702-704-710-722 fitted with a gudgeon pin 25 mm in diameter** the recess is **0.192 ± 0.093 mm** ,

- For engines **K9K 260-270-272-700-702-704-706-710-722-750-752-790 fitted with a gudgeon pin 26 mm in diameter** the recess is **0.154 ± 0.130 mm** ,

- For engines **K9K 274-276-712-714-716-718-724-728-729-732-760-766-768-792-762-764 fitted with a gudgeon pin 26 mm in diameter** the recess is **0.159 ± 0.129 mm** ,

For cylinders No. 2 and No. 3, it is essential to find the Top Dead Centre of the piston before taking the recess measurement.