

Installation of New Bearings for Crankshaft 03.1

Engine removed and disassembled

M 116, M 117

Bearing play

Crankshaft bearing play		Connecting rod bearing play	
radial ¹⁾	axial ²⁾ fitted bearing	radial ¹⁾	axial
0.035–0.075	0.10–0.22	0.035–0.065	0.22–0.38

1) For radial play, try for medium value

2) In the event of repairs, an axial play (end play) up to 0.30 is permitted.

Basic Bores

Basic bore	Crankshaft bearing	Connecting rod bearing
Basic bore dia. for crankshaft bearings in cylinder crankcase	<u>68.500</u> 68.519	—
Basic bore dia. for connecting rod bearings	—	<u>55.600</u> 55.619
Perm. runout of basic bore	0.1	
Perm. conicity of basic bore	0.1	

Crankshaft

Repair stages	Crankshaft bearing journals Diameter of journals	Width of journal on fitted bearing	Crankpins	
			Diameter of pins	Width of pins
Standard dimension	<u>63.965</u> 63.945	<u>27.000</u> 27.021	<u>51.965</u> 51.945	<u>50.000</u> 50.100
Repair stage 1	<u>63.715</u> 63.965	up to 27.500	<u>51.715</u> 51.695	up to 50.300
Repair stage 2	<u>63.465</u> 63.445		<u>51.465</u> 51.445	
Repair stage 3	<u>63.215</u> 63.195		<u>51.215</u> 51.195	
Repair stage 4	<u>62.965</u> 62.945		<u>50.965</u> 50.945	

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Wall Thickness of Main and Connecting Rod Bearings

Repair stages	Identification	Main Bearing	Connecting rod bearing
Standard dimension	blue	$\frac{2.242}{2.249}$	$\frac{1.800}{1.807}$
	red	$\frac{2.247}{2.254}$	$\frac{1.803}{1.810}$
Repair stage 1	blue	$\frac{2.367}{2.374}$	$\frac{1.920}{1.927}$
	red	$\frac{2.372}{2.379}$	$\frac{1.923}{1.930}$
Repair stage 2	blue	$\frac{2.492}{2.499}$	$\frac{2.045}{2.052}$
	red	$\frac{2.497}{2.504}$	$\frac{2.048}{2.055}$
Repair stage 3	blue	$\frac{2.617}{2.624}$	$\frac{2.170}{2.177}$
	red	$\frac{2.622}{2.629}$	$\frac{2.173}{2.180}$
Repair stage 4	blue	$\frac{2.742}{2.749}$	$\frac{2.295}{2.302}$
	red	$\frac{2.747}{2.754}$	$\frac{2.298}{2.305}$

Tightening Torques in kpm

Main bearing bolts (sequence in tightening diagram Fig. 3)	M 10	6.5
	M 12	10.0
Connecting rod bearing bolts	Initial tightening torque	4.0 + 1.0
	Angle of rotation torque	90° + 10°

Special Tools

Angle of rotation tightening tool	115 589 02 13 00
Internal measuring instrument	50–100 mm 000 589 04 19 00
Micrometer	0–25 mm 000 589 06 19 00
	50–75 mm 000 589 08 19 00
Dial gauge holder	136 589 04 21

Mounting of Main and Connecting Rod Bearing Caps

1 If no damage is found, mount main and connecting rod bearing caps without bearing shells. The recess of the main bearing cap (arrows in Fig. 1) is offset from center by 0.5 mm so that the bearing caps can be mounted in one position only.

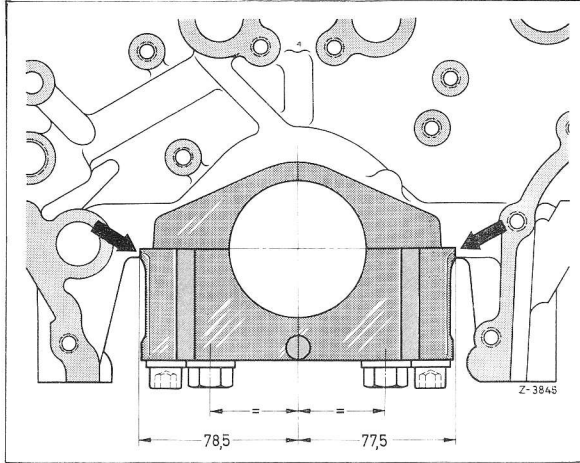


Fig. 1

In addition, the correct installation position of the bearing caps is shown by the numbers (Fig. 2).

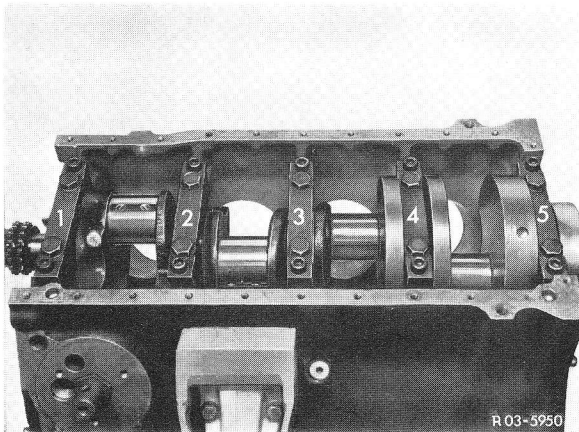


Fig. 2

2 Tighten main bearing bolts in the sequence of the tightening diagram to specified torque (Fig. 3).

Measure and correlate main and connecting rod bearings (03.0–318).

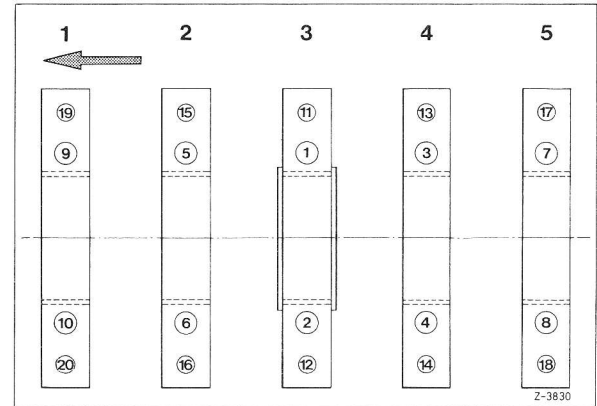


Fig. 3

Installation of Crankshaft

3 Unscrew closing plugs of main oil duct (Fig. 4 and 5). Carefully clean oil ducts and screw closing bolts back again coated with sealing compound.

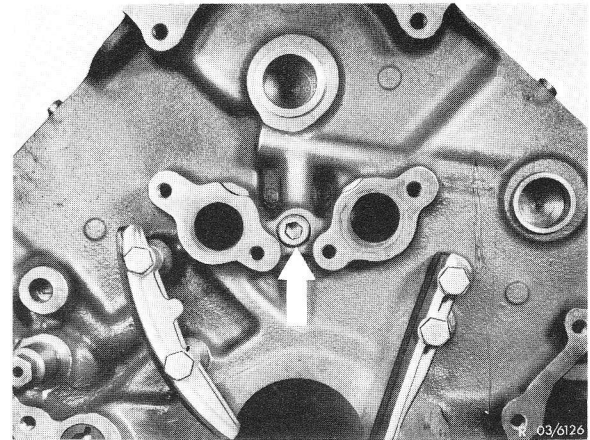


Fig. 4

Front closing plug

4 Carefully clean bearing shells and bearing points of crankshaft. Insert bearing shells acc. to diagram (Fig. 7) with lug first into the groove provided on basic bore and then push in. The bearing shell half should be perfectly seated in basic bore. Then moisten with SAE 30 oil and mount crankshaft. Position bearing caps with reference to their number (Fig. 2).

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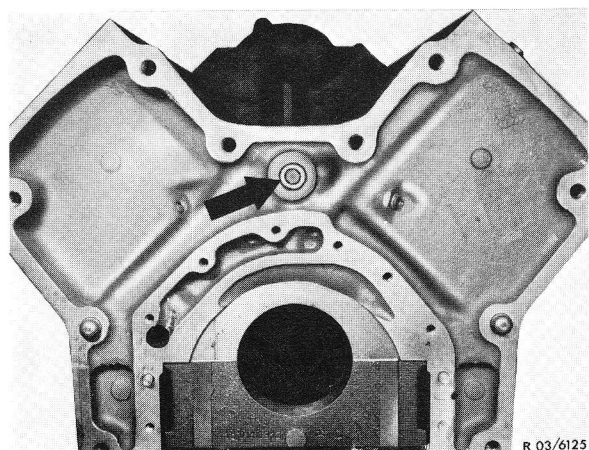


Fig. 5
Rear closing plug

5 Tighten main bearing bolts in specified sequence of tightening diagram (Fig. 3) and to specified torque.

6 Rotate crankshaft manually and check for unobstructed running. If crankshaft wipes against cylinder crankcase, refinish cylinder crankcase.

Note: When crankshaft is hard to move, try to make corrections by shifting the bearing caps, by light hammer blows against webs of crankshaft with plastic hammer. To determine at which bearing point

the crankshaft is still moving hard, loosen one bearing after the other while rotating the crankshaft until the fault or the rough spot is found. If required, refinish or replace pertinent bearing.

7 Measure end play by lateral shifting of crankshaft (Fig. 6).

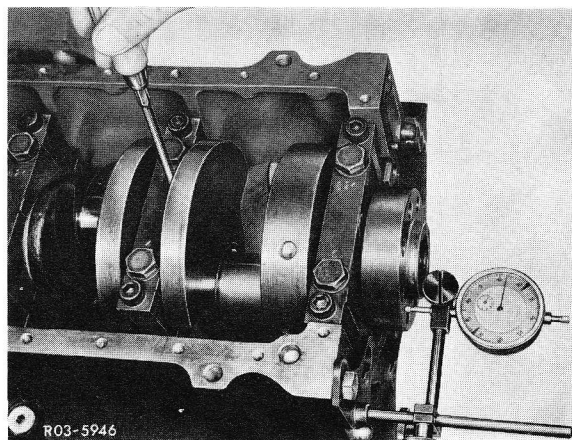


Fig. 6

8 Assemble engine. Check end play of connecting rods when installing pistons.

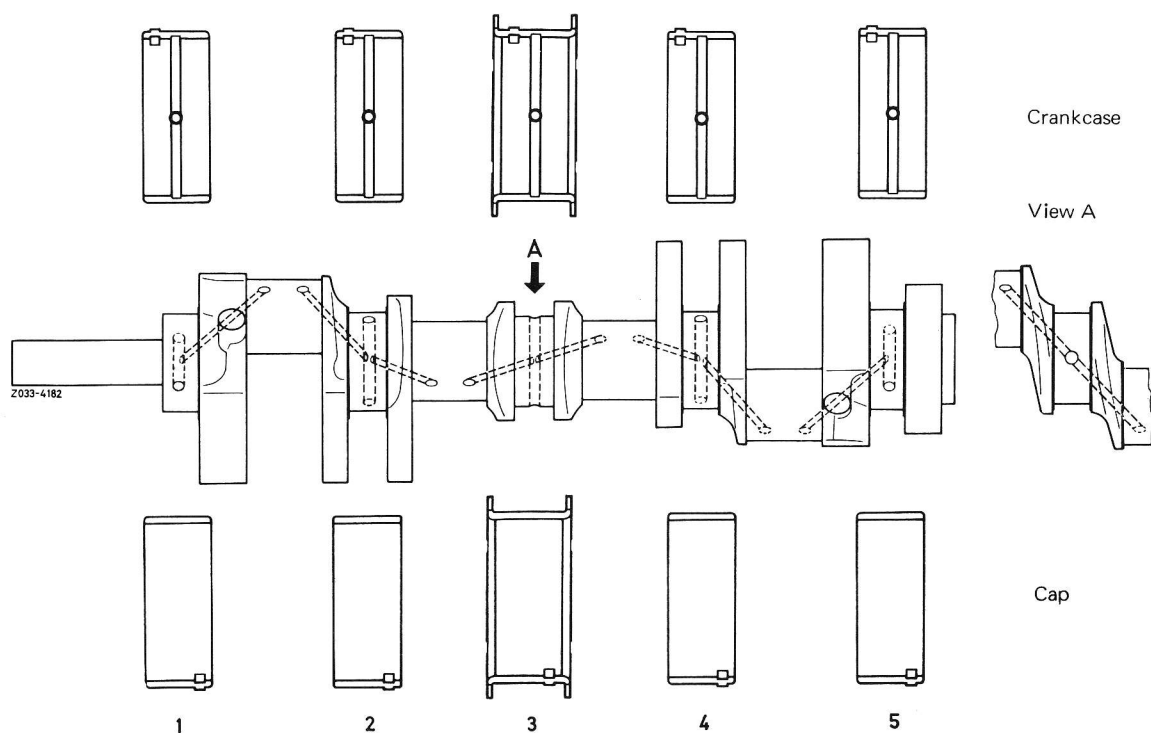


Fig. 7 Bearing diagram

Fitted bearing