

C. Reconditioning and Re-bushing of Connecting Rods

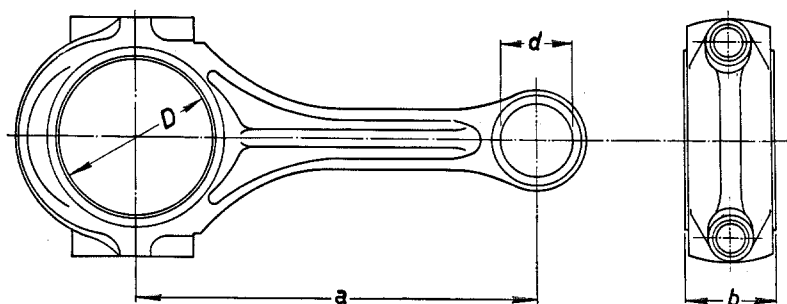


Fig. 03 — 5/7

Dimensions of Connecting Rod

in mm

Distance a	Base bore D	Base bore d	Width b
$\frac{153.95}{154.04}$	$\frac{55.600}{55.619}$	$\frac{28.000}{28.021}$	$\frac{31.880}{31.841}$

1. General

- The connecting rods must be so selected that the difference in weight between the complete connecting rod assemblies does not exceed 5 g in any one engine.
- The etched numbers (1—4) on the connecting rods must correspond to those etched on the bearing caps (Fig. 03 — 5/8).
The figure 1 refers to Cylinder No. 1, the figure 2, to Cylinder No. 2 and so on.
- The connecting rod with bushing, the piston and the piston pin must have the same color coding so that the crush and the end play values are kept to the specified amounts.
Pistons must be so selected as to ensure that the difference in the weight of the pistons does not exceed 4 g in any one engine.



Fig. 03 — 5/8

2. Fitting of Bearing Shell Halves

Bearing Play Values for Connecting Rod

in mm

Radial*	End play	Crush of bearing shell halves
0.045-0.065	New 0.120-0.259 After repair up to 0.5	+ 0.01

*) The radial play shown in the table is an average play which in practice must be strictly adhered to.

The bearing shell halves for the connecting rods are supplied ready for installation exactly as in the case of the crankshaft. The upper bearing shell halves (with oil hole) are identical and if the bearing shell halves are new, they may be interchanged. The lower bearing shell halves (without oil hole) are also identical and may be interchanged. Procedure for fitting the bearings is the same as that already described for the bedding of the crankshaft.

The diameter of the base bore is 55.600—55.619 mm; with bearing shells installed, the standard dimension is 51.99—52.02 mm and at 1st, 2nd, 3rd and 4th overhaul stages, 0.25 mm less each time.

Re-grinding of the sides of the crankshaft bearing surfaces and honing of the connecting rods increases the end play. An increase of end play of up to 0.5 mm is quite permissible.

3. Replacement of Piston Pin Bushing

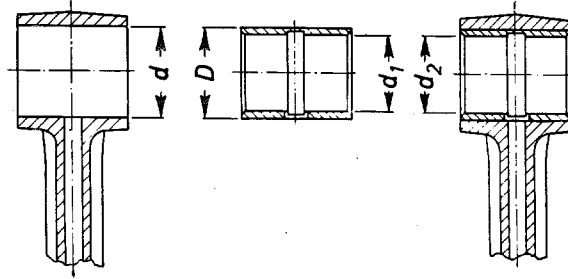


Fig. 03 — 5/9

Dimensions of the Piston Pin Bushing

in mm

	Base bore d	External diameter D	Internal diameter	
			Rough-turning dimension d ₁	Final dimension * (bushing pressed into place) d ₂
Standard size	$\frac{28.030}{28.021}$	$\frac{28.048}{28.035}$	$\frac{24.600}{24.730}$	$\frac{25.007}{25.013}$
With larger external diameter (repair only)	$\frac{28.500}{28.521}$	$\frac{28.548}{28.535}$	$\frac{24.600}{24.730}$	$\frac{25.007}{25.013}$

* See next Table for tolerances of final-turned piston pin bushing.

Worn piston pin bushings must be replaced. The crush fit dimension of the piston pin bushing in the bore must be at least 0.030 mm. When pressing in the piston pin bushing, care must be taken to ensure that the oil hole is opposite the oil passage in the connecting rod. After pressing in the piston pin bushing, the connecting rod must be unstressed for half an hour at 160°—180° C. Then the bore should be machined to fit.

If the base bore in the connecting rod is worn, it should be honed out to 28.500—28.521 mm and a bushing, 0.5 mm greater in external diameter should be pressed in.

The piston pin play is 0.010—0.016 mm. To maintain the specified play, the connecting rod with bushing and the piston pin must be matched according to their color coding (see Table below). The piston must also bear the same color coding.

Color Coding for Matched Connecting Rods, Piston Pins and Pistons

Measurements in mm

Color	Piston pin bushing bore	Piston pin diameter	Running play	Piston boss diameter
black	$\frac{25.007}{25.010}$	$\frac{24.997}{24.994}$	0.010 - 0.016	$\frac{24.994}{24.997}$
white	$\frac{25.010}{25.013}$	$\frac{25.000}{24.997}$	0.010 - 0.016	$\frac{24.997}{25.000}$

4. Tightening Connecting Rod Cap Bolts

The connecting rod cap bolts are without lock washers and are tightened to a stretch of 0.1 mm (Fig. 03 — 5/10).

The stretch must be measured with a dial gage or a micrometer and corresponds to a tightening torque of 3.75—3.80 mkg. If the nut is released, the cap bolt must return to its original length. Small variations of up to 0.01 mm, after the nut has been released, are permissible. If the discrepancy is greater, the cap bolt has been tightened too much, i. e. it has been overstretched. In this case a new connecting rod cap bolt and nut must be used.

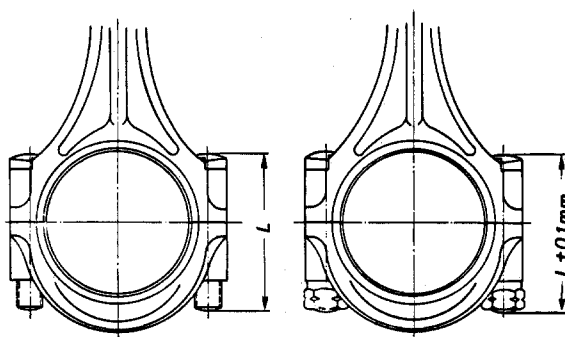


Fig. 03 — 5/10

It is possible, as an exceptional measure, to tighten the nut with a torque wrench. If a torque wrench is used, the thread of the connecting rod cap bolt and the contact surface of the nut must first be liberally smeared with graphite oil.

The head of the connecting rod cap bolt must not project beyond the edge of the connecting rod and it must be properly seated in the recess. The cap bolt itself must be a tight fit in the bore of the connecting rod. For this reason, two stages of tolerance are specified for the shaft diameter (plain, 10.001—10.008, white, 10.009—10.016 mm). The thicker connecting rod cap bolt (10.009—10.016) is marked at the head with white paint.

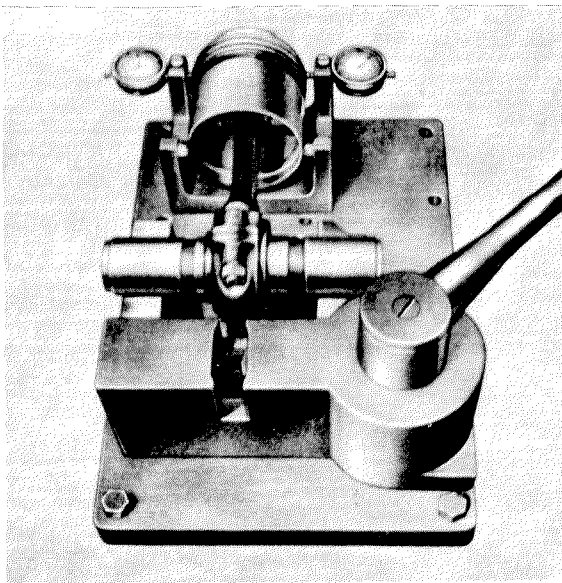


Fig. 03 — 5/11

5. Squaring of Connecting Rod

After reconditioning and before being installed in the engine, each connecting rod must be checked with a suitable testing instrument to ensure that the bores are correctly aligned (Fig. 03 — 5/11).

The permissible deviation from axial parallelity is 0.03 mm and the permissible longitudinal distortion is 0.1 mm. In both cases the permissible deviation is calculated with reference to a length of 100 mm.