

A. Grinding Crankshaft

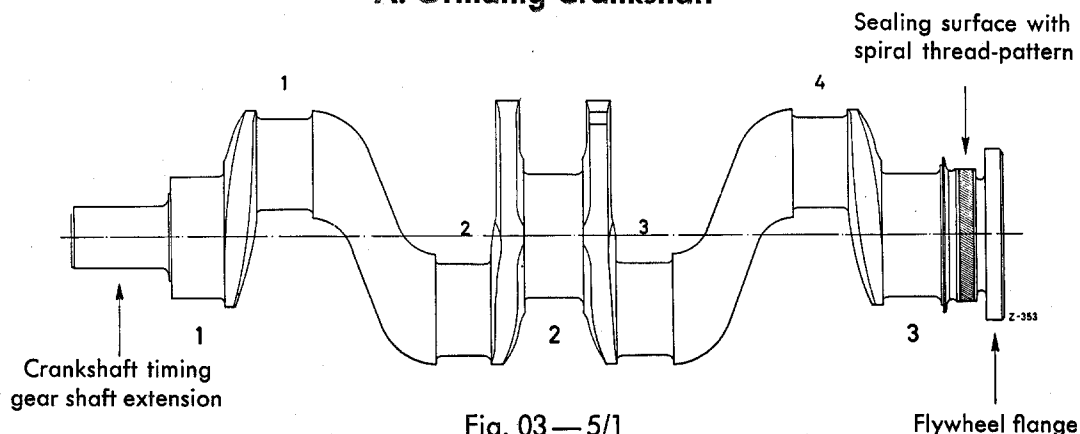


Fig. 03—5/1

After cleaning, the crankshaft must be examined for distortion and the bearing surfaces for out-of-roundness, hardness and cracks. If cracks are present, the crankshaft must be discarded. Distorted crankshafts must be straightened. Before grinding, the crankshafts must be recentered. Lathe holding points for checking and recentering are the crankshaft timing gear shaft extension at the front and the flywheel flange collar for attaching the flywheel (Fig. 03—5/1). Under no circumstances should re-finishing or turning be attempted at these points. The flywheel flange may only be honed at the side.

If the bearing surfaces are more than 0.03 mm out-of-round or if they are scored, they must be re-ground to the next overhaul stage dimensions.

Re-grinding of crankshaft and connecting rod bearing surfaces must be carried out strictly in accordance with the overhaul stage dimensions and tolerances set forth in the tables which follow. There must be no deviation from the values specified. After grinding, the bearing surfaces and the side contact surfaces must be lapped to an impeccable polish. This applies particularly to the locating bearing. When re-grinding the side contact surfaces of the locating bearing and the connecting rod bearing surfaces, remove as little stock as possible.

After grinding, the crankshaft must be dynamically balanced. The permissible unbalance is 15 cmg. Carry out the balancing operation with the flywheel and the front counterweight installed (see Fig. 03—5/18).

In order to maintain the specified radial play, the base bores of the crankshaft and connecting-rod bearings must first of all be measured after fitting the bearing shells, and then the appropriate tolerance to which the crankshaft must be ground is determined in accordance with the bearing play table on page 03—5/3. The maximum and minimum radial running clearances laid down in this table must be strictly adhered to and no departure may be made from the limits laid down.

The hardness of the crankshaft journals and crankpins is measured with a scleroscope and must be

68—74

or Rockwell hardness

HRc 55—61.

Localised areas of up to 3% below the specified degree of hardness may be disregarded.

If parts of the journals register less than the minimum degree of hardness, the crank-

shafts must be re-hardened. After being re-hardened, the crankshafts are unstressed for two hours at 180° C. They are then examined for cracks, straightened, centered and re-ground. If there are variations in hardness on one and the same journal, the journal must be normalised before being re-hardened. The journal is heated to 400° C and then allowed to cool off, the adjacent journals being chilled during the operation.

When re-grinding the crankshaft journals, special care must be taken to keep the width of the journals unchanged. This applies

particularly to the locating bearing and the crankpins.

The bearing surfaces and side contact surfaces must be lapped to an impeccable polish.

The fillet radii on the crankshaft journals and crankpins must be kept strictly to the specified 2.5 to 3 mm. They should be nearer to the 3 mm than the 2.5 mm limit. It is of particular importance to ensure that the fillet radii are free of scorings.

After grinding, remove all burrs on the oil bores.

Table of Crankshaft Grinding Overhaul Stages
Measurements in mm

Overhaul stage	Crankshaft Journals			Crankpins	
	Diameter of Journals 1—3	Width of Journal 2 (locating bearing)	Width of Journal 3	Diameter of Journals 1—4	Width of Journals 1—4
Standard size	$\frac{69.96}{69.94}$	$\frac{34.000}{34.025}$	$\frac{34.000}{34.100}$	$\frac{51.96}{51.94}$	$\frac{32.000}{32.100}$
1st Overhaul stage	$\frac{69.71}{69.69}$	to		$\frac{51.71}{51.69}$	32.000 to 32.300
2nd Overhaul stage	$\frac{69.46}{69.44}$			$\frac{51.46}{51.44}$	
3rd Overhaul stage	$\frac{69.21}{69.19}$			$\frac{51.21}{51.19}$	
4th Overhaul stage	$\frac{68.96}{68.94}$			$\frac{50.96}{50.94}$	

* In steps of 0.1 mm, according to the available check plates.

Permissible out-of-round of crankshaft journals and crankpins 0.005 mm

Permissible conicity of crankshaft journals and crankpins 0.01 mm

Permissible degree of misalignment of crankpins with respect to crankshaft journals expressed in terms of the length of the bearing 0.01 mm

Permissible run-out of crankshaft journal 2 at rest in crankshaft bearings 1 and 3 0.02 mm

Permissible lateral deflection of locating bearing journal 0.015 mm

Permissible radial deflection of fly-wheel flange related to three crankshaft journals 0.02 mm

Permissible lateral deflection of flywheel flange related to three crankshaft journals 0.01 mm