

Grinding of Camshaft

Change: Section B on page 05-38/2 and 3

Job No.
05-38

A. OM 636

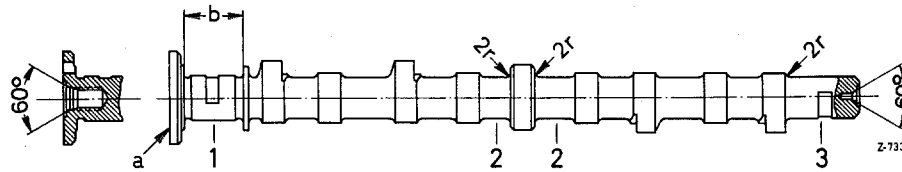


Figure 05-38/1

Camshaft OM 636

- 1 Journal of the 1st camshaft bearing (lapped bearing)
- 2 Journal of the 2nd camshaft bearing (center)
- 3 Journal of the 3rd camshaft bearing
- a Contact surface on flange of camshaft timing gear
- b Thrust surfaces for the 1st camshaft bearing (lapped bearing)

The camshaft bearing pins can once be re-ground to the specified repair size and the respective bearings with smaller bores be supplied ready for installation (see the following table and Job No. 05-39).

Diameters of the Camshaft Journals 1, 2 and 3.

Standard size	27.960 to 27.939 mm
Repair size	27.710 to 27.689 mm

The true running of the camshaft must be checked before the grinding operation. If the camshaft is pivoted at the journals (1) and (3) the eccentricity of the center journal (2) must not be more than 0.025 mm. If this eccentricity is exceeded, the camshaft must be realigned. During this operation carefully deflect the camshaft by **applying pressure, do not hammer**. The camshaft is a casting and can therefore break easily during the aligning operation (see Figure 05-38/1).

After the camshaft has been realigned check the center in the front and rear end and if necessary recondition on centering grinder or lathe. The machining of the center is done as follows:

1. Clamp the flange of the crankshaft timing gear in jaw chuck; use a protecting ring for this purpose. Align the crankshaft by supporting the journal (3) in the backrest and re-cut the center at an angle of 60 deg (see Figure 05-38/1).
2. Then clamp the journal (3) with a protecting sleeve in the jaw chuck, support the flange of the camshaft timing gear in the brackrest and also re-cut the front center.

The contact surface (a) on the flange of the camshaft timing gear must also be trimmed (machined lightly). The axial deflection of the contact surface (a) should not be more than **0.005 mm**.

In order to obtain the specified radial clearance of the camshaft the bores of the camshaft bearings to be installed must first be measured. By subtracting the bearing clearance determine the tolerance range to which the journals have to be ground. The camshaft bearings must be driven into the base bores of the crankcase, so that the bearing bores can be measured correctly.

Bearing Clearances of Camshaft in mm

Radial	Axial
0.04 to 0.08	0.08 to 0.144

When re-grinding the 1st camshaft journal (1) the thrust surfaces (b) are generally only ground so much that a proper thrust surface is obtained (see Fig. 05-38/1).

The camshaft bearing (lapped bearing) of the 1st camshaft journal, however, is wider by 0.25 mm for the overhaul stage. If the width of the overhaul stage is not reached during the grinding of the 1st camshaft journal, the lapped bearing of the overhaul stage must

be adapted by machining, so that the specified axial clearance for the camshaft of 0.08 to 0.144 mm will be obtained.

After the grinding of the camshaft journals check the camshaft for cracks and test the hardness of the individual bearing points.

Hardness of Camshaft

	Rockwell hardness Rc	Scleroscope hardness SKL
Bearing journal and cam base	45 to 60	58 to 73
cam lobe	at least 50 to 60	at least 63 to 73

B. OM 621

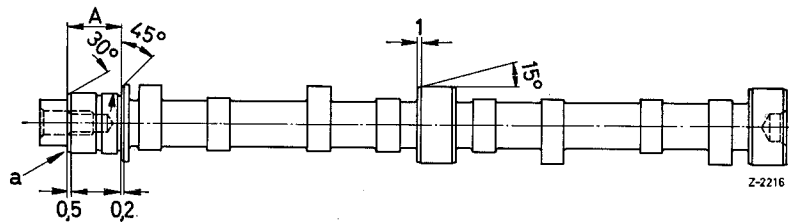


Figure 05-38/2
Camshaft OM 621 for external lubrication
with annular groove on 1st camshaft bearing journal.

The camshaft of the OM 621 is supported in three bearing brackets.

The camshaft bearing pins can once be re-ground to the specified repair size and the respective bearing brackets with smaller bores be supplied ready for installation (see the following table and Job No. 05-39, Section B, item 2).

Table of diameters for the camshaft bearing pins

Camshaft with identification No.	Camshaft bearing pin for	1st bearing (opposite flywheel side)	2nd bearing	3rd bearing (flywheel side)
01	Standard size	34.975	44.975	45.975
		34.959	44.959	45.959
	Intermediate size	34.875	44.875	45.875
		34.859	44.859	45.859
	Repair size I	34.725	44.725	45.725
		34.709	44.709	45.709
02	Standard size	34.975	45.975	45.975
		34.959	44.959	45.959
	Intermediate size	34.875	45.875	45.875
		34.859	44.859	45.859
12 ¹⁾	Standard size	34.975	46.475	46.475
		34.959	46.459	46.459
	Intermediate size	34.875	46.375	46.375
		34.859	46.359	46.359
	Repair size I	34.725	46.225	46.225
		34.709	46.209	46.209

¹⁾ Solid shaft for external lubrication of camshaft.

Before regrinding the camshaft, check camshaft accurately for true running. When supporting the shaft in the outer bearings 1 and 3, the maximum out-of-true of the centre bearing, the basic cam circles and the camshaft sprocket seat must not exceed 0.025 mm. If the centre is damaged front or rear or on both sides, re-grind the centre on a centering grinding machine or on a lathe. For camshaft with centre hole remove the cover for sealing the centre hole, or oil duct, at the rear end.

In order to keep to the specified radial clearance of the camshaft, first measure the bores of the camshaft bearings to be installed. On the basis of the bearing clearance, ascertain within which tolerance range the pins have to be re-ground.

Bearing clearances of the camshaft

Radial	Axial
0.025-0.066	0.050-0.128

When regrinding the 1st bearing pin, do not regrind more than 0.1 mm from the lateral butting surface of the collar "b" (see Figure 05-38/2). The same amount of stock removal on collar "b" must also be ground off from surface "a" so that the measure 34.000 to 34.039 is adhered to. Otherwise the axial clearance of the camshaft and consequently the chain misalignment is too large. The lateral out-of-true on the surface "a" must not exceed 0.01 mm. After grinding of the camshaft

bearing pins, check the camshaft for cracks and check the hardness of the individual bearing seats.

After grinding, thoroughly clean the oil bores and blow. Then close the opening at the back side of the camshaft with a new locking cover.

Hardness of the camshaft

	Brinell hardness HB in kg/mm ²	Scleroscope hardness
Bearing pins and basic cam circle	217-248	36-40
Cam lobe and lift	min. 500	min. 64