

Grinding Dimensions of Camshaft and Camshaft Bearing Measurements

| Model | Overhaul Stage | 1 st Bearing | | 2 nd Bearing | | 3 rd Bearing | |
|---------------------------------|--------------------------------|-------------------------|---------------|---|---------------|-------------------------|---------------|
| | | Shaft | Bearing | Shaft | Bearing | Shaft | Bearing |
| 180 a 180 b 190 SL | Standard size | <u>34.975</u> | <u>35.000</u> | <u>44.975</u> | <u>45.000</u> | <u>45.975</u> | <u>46.000</u> |
| | | 34.959 | 35.016 | 44.959 | 45.016 | 45.959 | 46.016 |
| | Intermediate Stage | <u>34.875</u> | <u>34.900</u> | <u>44.875</u> | <u>44.900</u> | <u>45.875</u> | <u>45.900</u> |
| | | 34.859 | 34.916 | 44.859 | 44.916 | 45.859 | 45.916 |
| | 1 st Overhaul Stage | <u>34.725</u> | <u>34.750</u> | <u>44.725</u> | <u>44.750</u> | <u>45.725</u> | <u>45.750</u> |
| | | 34.709 | 34.766 | 44.709 | 44.766 | 45.709 | 45.766 |
| 220 a 219 220 S 220 SE | Standard size | 1 st Bearing | | 2 nd and 3 rd Bearing | | 4 th Bearing | |
| | | <u>34.975</u> | <u>35.000</u> | <u>44.975</u> | <u>45.000</u> | <u>45.975</u> | <u>46.000</u> |
| | Intermediate Stage | 34.959 | 35.016 | 44.959 | 45.016 | 45.959 | 46.016 |
| | | <u>34.875</u> | <u>34.900</u> | <u>44.875</u> | <u>44.900</u> | <u>45.875</u> | <u>45.900</u> |
| | 1 st Overhaul Stage | 34.859 | 34.916 | 44.859 | 44.916 | 45.859 | 45.916 |
| | | <u>34.725</u> | <u>34.750</u> | <u>44.725</u> | <u>44.750</u> | <u>45.725</u> | <u>45.750</u> |
| | | 34.709 | 34.766 | 44.709 | 44.766 | 45.709 | 45.766 |

For Model 180 c, 190 c and 190 SL with further modified valve timing the 2nd and 3rd camshaft bearing have the same diameter (refer to following table). The 1st bearing has the same dia. as above.

| 180 c, 190 c 190 SL | | Standard Size | Intermediate Stage | 1 st Overhaul Stage |
|------------------------|------------|---------------|--------------------|--------------------------------|
| Diameter | of shaft | <u>48.975</u> | <u>48.875</u> | <u>48.725</u> |
| | | 48.959 | 48.859 | 48.709 |
| | of bearing | <u>49.000</u> | <u>48.900</u> | <u>48.750</u> |
| | | 49.016 | 48.916 | 48.766 |

The Brinell hardness HB or scleroscope hardness of bearing journals, cam base circle, cam nose and lifting flank are for models 180 a, 180 b, 180 c, 190 b, 190 SL, 220 a, 219, 220 S and 220 SE the same as for models 190.

| | Brinell hardness HB in kg/mm ² | Scleroscope hardness |
|-------------------------------------|--|----------------------|
| Bearing journal and cam base circle | 217–248 | 36–40 |
| Cam nose and lifting flank | minimum 500 | minimum 64 |

E. Re-Bedding of Camshaft

New camshaft bearing should be installed only with cylinder head in position, screwed-down with the prescribed tightening torque. The work can also be done easily with the engine mounted in vehicle. Procedure for models 180 a, 180 b, 180 c, 190 b, 190 SL, 220 a, 219, 220 S and 220 SE is the same as for model 190.

F. Testing of Chain Tensioner

Testing of the chain tensioner for models 180 a, 180 b, 180 c, 190 b, 190 SL, 220 a, 219, 220 S and 220 SE is the same as for model 190. Figs. 05-5/7 to 05-5/8 show the 1st, 2nd, 3rd und 4th version; the table below shows which version was installed for the individual models.

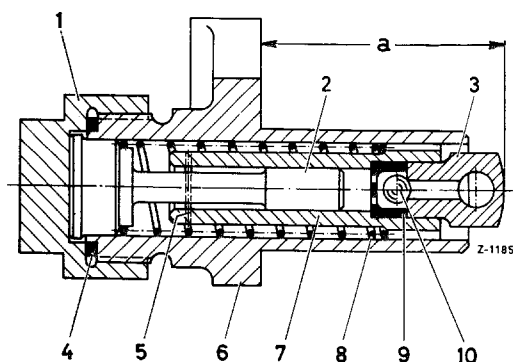


Fig. 05-5/7

1st Version

- | | | |
|----------------|---------------------------|-----------------|
| 1 Cover cap | 5 Dowel pin | 9 Ball retainer |
| 2 Pressure pin | 6 Chain tensioner housing | 10 Steel ball |
| 3 Head | 7 Pressure sleeve | |
| 4 Sealing ring | 8 Pressure spring | |

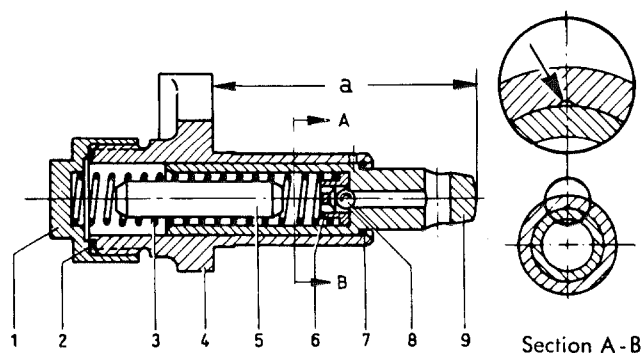


Fig. 05-5/8

2nd Version

- | | | |
|-------------------|-----------|----------------|
| 1 Cap nut | 4 Housing | 7 Snap ring |
| 2 Sealing ring | 5 Pin | 8 Ball |
| 3 Pressure spring | 6 Ball | 9 Pressure pin |

Chain Tensioner 1st Version

| Model | Part No. | Dimension "a" with disassembled chain tensioner |
|------------------------|---------------|---|
| 180 a 190 190 SL | 121 050 03 11 | 58 |
| 220 a 219 220 S | 180 050 03 11 | 52 |

Chain Tensioner 2nd Version

| Model | Part No. | Dimension "a" with disassembled chain tensioner |
|--------------------------------------|---------------|---|
| 180 a, 180 b 190, 190 b 190 SL | 621 050 00 11 | 58 |
| 219 220 S 220 SE | 180 050 05 11 | 52 |

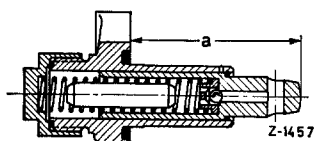


Fig. 05-5/8

3rd Version

1) The chain tensioner 3rd version is functionally similar to the 2nd version, however, the chain tensioner housing is provided with an annular groove and the seal between the chain tensioner and the cylinder crankcase is a rubber ring, which eliminates the former sealing shim (flange seal).

2) The chain tensioner 4th version (for 4-cyl. engines with further modified valve timing) differs from the 3rd version only by its stronger pressure spring. This chain tensioner is identified by a red dot on the cap nut.

Chain Tensioner 3rd Version

| Model | Installed as from Engine End No. | Part No. | Dimension "a" with disassembled chain tensioner (refer to illustration) |
|----------------------|----------------------------------|---------------|---|
| 180 b | 017 323 | 121 050 04 11 | 58 |
| 190 b | 015 336 | | |
| 190 SL | 018 423 | | |
| 220 SE CA and CpA | 001 059 000 240 | 180 050 06 11 | 52 |

Chain Tensioner 4th Version

| | | | |
|--------|---------|---------------|----|
| 180 c | 000 013 | 121 050 05 11 | 58 |
| 190 c | 000 341 | | |
| 190 SL | 000 007 | | |

Pressure Spring for Chain Tensioner

| Model | Pressure spring Part No. | External Diameter | Wire gage | Free Length | Length under load | | | |
|---|--------------------------|-------------------|-----------|-------------|-------------------|------|---------------------|----------|
| | | | | | depressed mm | kg | under final load mm | kg |
| 180 a ¹⁾ , 190 ²⁾ , 190 SL ³⁾ | 121 993 02 01 | 15.6 | 1.1 | 118 | 44 | 1.85 | 38 | 1.9-2.05 |
| 180 a ⁴⁾ , 190 ⁵⁾ , 190 SL ⁶⁾ 180 b, 190 b, 219 ⁷⁾ 220 S ⁸⁾ , 220 b, 220 Sb 220 SE, 220 SEb | 621 993 00 01 | 11.5 | 1.0 | 124 | 50 | 1.85 | 44 | 1.9-2.05 |
| 180 c, 190 c, 190 SL ¹¹⁾ | 621 993 02 01 | 11.3 | 1.3 | 91 | 50 | 4.2 | 44 | 4.5-5.3 |
| 219 ⁹⁾ , 220 S ¹⁰⁾ | 180 993 09 01 | 15.4 | 1.0 | 200 | 45 | 1.55 | 39 | 1.65-1.7 |

1) Installed on 180a up to engine end No. 85 02 800.

2) Installed on 190 up to engine end No. 85 03 700.

3) Installed on 190 SL up to engine end No. 85 00 900.

4) Installed on 180a as from engine end No. 85 02 801.

5) Installed on 190 as from engine end No. 85 03 701.

6) Installed on 190 SL as from engine end No. 85 00 901.

7) Installed on 219 as from engine end No. 85 01 851.

8) Installed on 220 S as from engine end No. 85 03 500.

9) Installed on 219 up to engine end No. 85 01 851.

10) Installed on 220 S up to engine end No. 85 03 500.

11) with further modified valve timing.

1st Version

Disassembly and reassembly of chain tensioner is the same as for the 1st version of model 190 (refer to Workshop Manual Model 190).

2nd, 3rd and 4th Version

Disassembly:

1. Unscrew cap nut (1) (Fig. 05-5/8).
2. Remove pressure spring (3), pin (5) ball retainer (6), ball (8) and pressure pin (9) from housing (4).
3. Clean all parts thoroughly and check for wear, replace if required. The radial play of the pressure pin (9) in housing (4) is 0.05–0.06 mm.

Reassembly:

4. Place pressure pin (9) into housing (4). Insert ball (8), ball retainer (6) as well as spring (3) with pin (5) into pressure pin (9). Screw-on cap nut (1) with sealing ring (2) and tighten, making sure that pressure spring presses on cap nut.
5. Fill chain tensioner with oil, bleed and test.

G. Repair of Tension Sprocket and Tension Bearing

This procedure for models 180 a, 180 b, 180 c, 190 b, 190 SL, 220 a, 219, 220 S and 220 SE is the same as for model 190. Dimensions and tolerances of the individual parts are also the same.

Model 220 SE has an additional guide sprocket (7) which is supported in cylinder head (Fig. 05-0/9).

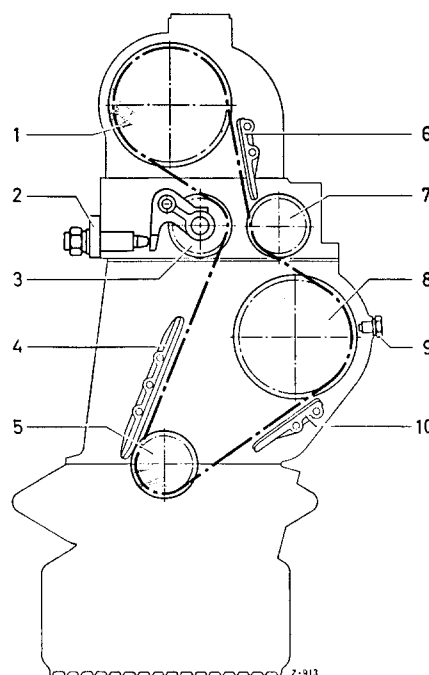


Fig. 05-5/9

Chain Drive for Model 220 SE

- 1 Camshaft timing gear
- 2 Chain tensioner
- 3 Tension sprocket
- 4 Long chain guide
- 5 Crankshaft timing gear
- 6 Short chain guide
- 7 Guide sprocket
- 8 Intermediate wheel
- 9 Lock screw
- 10 Short chain guide