24. Insert the Woodruff keys (5) in the grooves of the crankshaft (see Figure 03–1/3).

25. Put the crankshaft timing gear on the crankshaft, so that the high collar of the crankshaft timing gear faces towards the crankshaft and that the marked teeth of the crankshaft and camshaft timing gear are engaged (see Figure 05–31/6).

    If necessary, force the crankshaft timing gear with the Punching Sleeve Part No. 136 589 08 39 (pipe), so that the gear is properly pressed against the collar of the crankshaft. On no account punch against the front of the teeth during installation of the crankshaft timing gear.

Note: Before the installation heat the crankshaft timing gear, possibly in oil or in water or on a heating plate, to well hand-warm.

26. Check with a feeler gauge or a strip of paper 0.03 to 0.04 mm thick the backlash between the camshaft timing gear and the crankshaft timing gear at several points.

    The backlash should be 0.03 to 0.04 mm.

    If necessary, the camshaft timing gear must be replaced.

    Turn the crankshaft and check by feeling the smooth running of the gears.

27. Depending on version and/or type put the spacer (6) (see Figure 03–1/3). or the oil deflector (2) (see Figure 03–1/4) on the crankshaft; watch out for the front Woodruff key (5).

28. Install the oil pump (see Job No. 18–11).

29. Clean the oil filter (see Job No. 18–9).

30. Fill in motor oil (4.5 or 7 lit. depending on the design of the oil pan see Capacities Page 0–1/11 through 0–1/31).

31. Take the engine out of the assembly trestle and on engines with fan bearing bracket install the support of the fan bearing bracket complete with fan bearing bracket belt pulley and fan (see Job No. 20–15).

    On engines with fan attached to the belt pulley of the water pump or to the pulley of the crankshaft, install the fan (see Job No. 20–12).

B. OM 621

Removal:

1. Remove the camshaft gear (see Job No. 01–3, Section B, items 3, 4, 9 and 10).

2. Dismount the counterweight (see Job No. 03–2).

3. Dismount the oil pan (see Job No. 01–21).

4. Dismount the oil pump (see Job No. 18–11).

5. Unscrew the connecting rod nuts. Using a plastic hammer, apply slight blows to knock the connecting rod bolts back; then loosen the caps and remove them.

    Dismount the main bearing caps accordingly.

Note: When disassembling, identify the sequence of the bearing shells and the bearing caps. On the left side (seen in driving direction), the connecting rod bearings are marked ex factory with the number of the respective cylinder or crank pin by a corresponding number of stroke marks. The embossed numbers, right (in driving direction) are destined for the production and identify appertaining bearing cap and connecting rod.

6. Use the puller part No. 187 589 07 33 to extract the lower pivot pin for the right guide rail (seen in driving direction).

Note: For extracting the guide rail pin, use the threaded insert M 6 of the puller part No. 187 589 07 33.

7. Remove the seal ring, the oil thrower ring and the spacer ring from the crankshaft (see Figure 03–2/1). Use the puller part No. 187 589 00 33 to extract the crankshaft sprocket (see Figure 03–5/9), lifting the double roller chain at the same time. Remove the Woodruff key and the spacer ring.

Note: The crankshaft sprocket need not be pulled, if the crankshaft had been dismounted to replace e.g. the fabric seal ring.

8. Lift out crankshaft incl. flywheel. Then remove the bearing shells from the cylinder crankcase and the bearing caps. Do not fail to identify the sequence and the position (top or bottom) of the bearing shells. The shells should only be marked at the steel back, preferrably using etching ink.

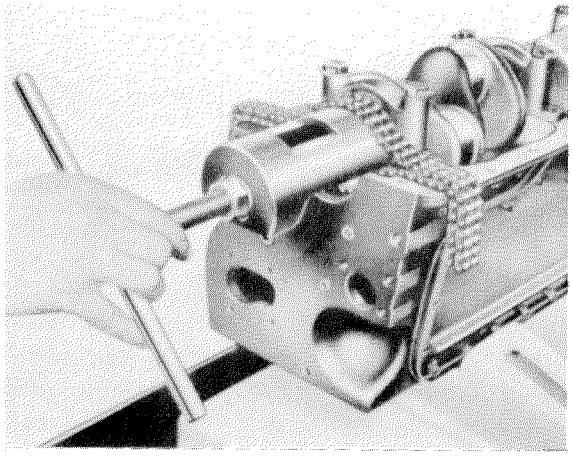

Figure 03–5/9

If necessary, remove the butting plate halves from the centre main bearing cap.

Installation:

9. Use a clean and soft leather to remove any dirt particles from the main bearing bores and the bearing shells. Then fit the shells into the basic bores (observe the marks).

   The upper and lower bearing shells are provided with a lug. When assembling see to it that the lug of the shell is first inserted into the provided groove of the basic bore; only then press it into the basic bore.

   Observe faultless seat of the shells in the basic bore (see Figure 03–5/2 and 03–5/3).

Note: Main bearing shells with groove and oil feed bore: upper half for 1st and 3rd bearing, as well as upper and lower half for centre bearing. Shells without groove: lower half (bearing cap) of the 1st und 3rd bearing.

10. Place the butting halves (3) on the centre main bearing cap (see Figure 03–5/10).

Note: The centre main bearing features a fitted bearing. In the place of bearing shells with flange, normal bearing shells are installed, the bearing cap is provided with one butting half (3) each on both sides (see Figure 03–5/10).

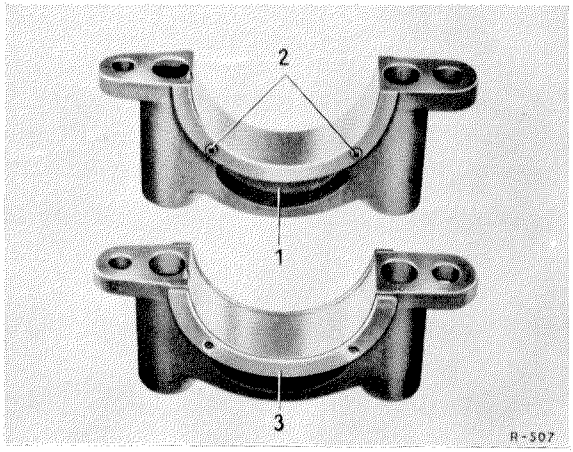

Figure 03–5/10

1 Main bearing cap
2 Tension pin
3 Butting half

The butting halves (3) are fixed to the bearing cap (1) by two tension pins (2) each, which should not project. With the butting halves removed, the tension pins should project from the bearing cap by 1.5±0.1 mm (see Figure 03–5/10 and 03–5/11).

In order to compensate the end clearance of the camshaft, the butting halves are available in different thicknesses, i. e.:

2 mm (standard), 2.05 mm, 2.10 mm, 2.15 mm, 2.20 mm, 2.25 mm, 2.30 mm and 2.35 mm thick.

The butting halves should be selected to ensure that the specified end clearance is obtained (For details see Job No. 03–9).

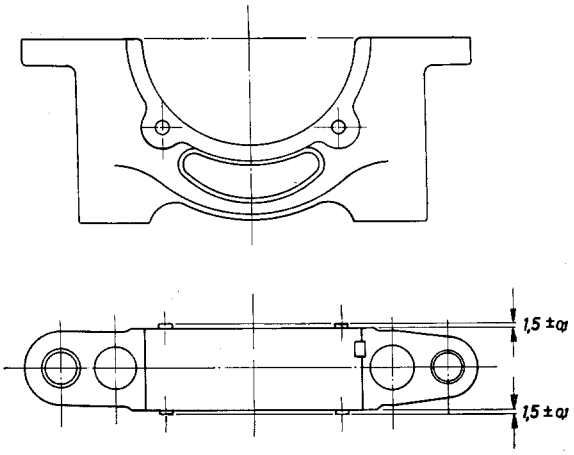

Figure 03–5/11

The OM 621 engine is now fitted with fitted collar bearing shell sections in the cylinder crankcase and the crankcase bearing cap. In the event of repairs be sure to install two fitted collar bearing shell sections (For details refer to Job No. 03–9).

11. Use a clean, soft leather to clean the fitted bearings shells and the journals and pins of the crankshaft; then apply graphited oil and fit the crankshaft.

12. Fit the main bearing caps. Then apply graphited oil to the main bearing bolts and spring washers, screw in and gradually tighten with the following torque:

    1st torque . . . . . 3 mkg
    2nd torque . . . . . 6 mkg
    3rd torque . . . . . 9 mkg
    4th torque (check) . . . . . 9 mkg

    The main bearing bolts are not secured by locks.

Note: The main bearing bolt with a higher head and an internal thread M 8 is destined for the right side of the front bearing. The internal thread serves for mounting the holder of the oil pump.

13. Turn crankshaft by hand check for free movement. Measure the end play of 0.040 to 0.094 mm at the fitted bearing by moving the crankshaft in longitudinal direction. The end play can be measured either with a dial gauge or with a feeler strap (see Figure 03–5/6).

    If the crankshaft moves hard, check bearing caps, and, if necessary, correct by slight blows with a plastic hammer. In order to ascertain which bearing moves hard, loosen one bearing after the other, turning the crankshaft until the fault is detected. Under circumstances, the bearing shells have to be replaced, if new bearing shells are involved.

14. Unscrew the main bearing caps again and remove crankshaft.

    Fit the fabric seal ring on the flywheel side into the cylinder crankcase only after having checked the crankshaft for free movement.

    Apply tallow, or in emergencies oil to the fabric seal ring and insert it into the cylinder crankcase.

    The fabric seal ring must not be pressed in too tightly.

Note: Take care that the locking ring for fixing the fabric seal ring does not break!

    Oil all sliding surfaces, insert crankshaft, re-fit the bearing caps and tighten with the **specified** tightening torque.

15. Screw on the oil pan with fitted fabric seal ring and check crankshaft for free movement. The fabric seal ring must not press excessively. Then unscrew oil pan again.

If the crankshaft moves hard, use a suitable round material to eliminate the pressure points on the fabric seal ring. Take care to damage the fabric seal ring!

16. Press the spacer ring and the crankshaft sprocket onto the pin of the crankshaft. Do not forget the Woodruff key!

17. Check the alignment of the crankshaft sprocket with respect to the drive gear of the injection pump. To do this, measure the distance from the front face of the cylinder crankcase to the injection pump drive gear and then to the crankshaft sprocket, using a depth gauge (see Figure 03–5/12). In order to eliminate the axial play, press the intermediate sprocket and the crankshaft rearwards. Further check whether the axial play of the injection pump drive shaft is not too big (axial play of the drive shaft = 0.06–0.07 mm).

Note: The permissible misalignment (difference of the two measured values) must not exceed 0.1 mm.

In case of larger deviations, replace the spacer ring behind the crankshaft sprocket.

The spacer rings are available in the following thicknesses:

5.45 mm, 5.60 mm, 5.75 mm, 5.90 mm and 6.05 mm.

With the final assembly of the crankshaft sprocket, do not forget the Woodruff key!

18. Accordingly turn the crankshaft to approach the connecting rods to the crankshaft journals. Insert the big end bearing shells (see Job No. 03–5, Section A, item 12, as well as Figure 03–5/2 and 01–5/3).

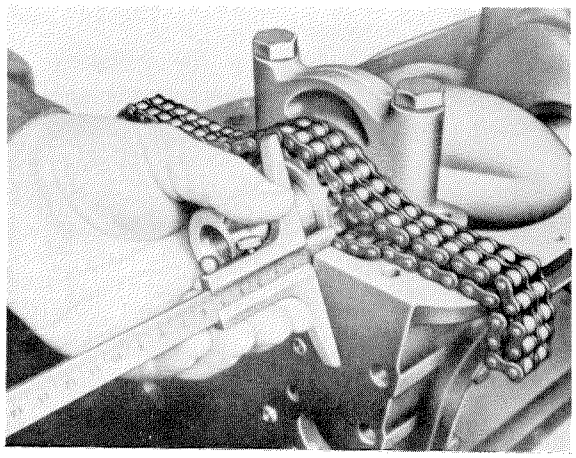

Figure 03–5/12

Regarding the OM 621 featuring connecting rods with oil bore to the small end bushing, do not fail to observe that the bore in the bearing shell coincides with the bore in the connecting rod. Then fit big end bearing caps in such a way that the numbers 1–4 correspond with the connecting rods and that the fixing lugs for the shells are on the opposite side of the camshaft (driving direction, left).

19. Screw on the hex. nuts (featuring a collar) for the big end bearing caps; only use faultless nuts.

The hex. nuts and/or the connecting rod bolts are tightened without a locking plate for an elongation of 0.1 mm, corresponding to a tightening torque of 3.75 to 3.80 mkg. Measure the elongation with the help of a dial gauge or a micrometer (see Figure 03–5/7).

Measure as follows:

First measure the length (L) of the connecting rod bolt without screwed on nut, then tighten the nut until the bolt has elongated by 0.1 mm (see Figure 03–5/8).

If you feel during tightening, that the bolt elongates excessively, then loosen the nut again. After loosening the nut the bolt should have its original length. Minor deviations of up to 0.01 mm are permissible.

If the deviation is exceeded, this is an indication that the bolt has been overstressed; such bolts are subject to replacement. In exceptional cases, the connecting rod bolts can also be tightened with the help of a torque wrench applying a torque of 3.75 to 3.80 mkg. To do this, use only a torque wrench of the range 0–6 mkg. The use of a larger size wrench results in incorrect tightening torques.

Note: If the removal and installation procedures of the injection pump for feed begin adjustment should be avoided, set the installed injection pump now to feed begin of the 1st cylinder.
After removing the cover at the front side of the engine, the injection pump drive shaft may be turned, allowing to adjust the feed begin. To do this, observe that the injection timing device is in rest position; the centrifugal weights should contact inwards. Now set the crankshaft to 26 deg BTDC. To do this lift the timing chain from the crankshaft and retain the injection pump drive shaft to ensure that the feed begin of the injection pump remains fixed. Then place the timing chain on the crankshaft, observing that the chain is tensioned and the feed begin of the injection pump remains fixed. Press in the lower bearing pin for the guide rail until the locking wire snaps in.

20. Press in the lower bearing pin (51 mm long) for the right guide rail until the locking wire of the guide rail snaps into the annular groove of the pin.

21. Slide the oil thrower ring, the seal ring and the spacer ring on the main bearing journal.

    In order to avoid damaging of the seal ring, use a suitable installing sleeve with pressure piece for assembly (see Figure 03–3/1).

Note: Before sliding on, fill hot bearing grease between the sealing lips of the seal ring.

22. Re-install the oil pump, the oil pan, the counterweight and the camshaft sprocket (see Job No. 18–11; 01–21, 03–2 and 01–3, Section B, items 20–25, 33 and 34).

23. Check the feed begin and, if necessary, adjust (see Job No. 00–6); to do this, remove and install the injection pump, if necessary (see Job No. 07–11).