Removal and Installation of Timing Gears OM 636

Job No. 05–31

Changed and revised

The wear of the timing gears is generally so insignificant that replacing is normally only necessary during overhauling of the engine. To obtain optimally smooth running of the timing gears after their exchange special care has to be given to the specified backlash of these gears. The removal and installation of the timing gears is similar for all types.

Removal:

1. Remove the timing housing cover (see Job No. 01–15).

2. Unbend the locking plate (32) and unscrew the fixing screw (33) of the camshaft timing gear and the intermediate gear (right-hand thread) (see Figure 07–27/4).

3. Pull off the two wheels with the Extractor Part No. 136 589 01 33 (see Figure 05–31/1).

Note: With the engines of the types 636.917–022 and 636.917–023 also observe the following:

After removing the pulley (37) and the timing housing cover (3) remove the locking ring (42) from the lower intermediate gear (44) and then pull the intermediate gear (44) by hand. Then remove the bearing, the intermediate gear pin (40) with flange by unscrewing the 6 mounting screws (39) (see Figure 01–15/3).

Caution! Only then it is possible to unscrew the two countersunk screws which are covered by the flange. These two screws are mounted without toothed washer. After all mounting screws for the base plate (38) have been unscrewed, remove them!

Now, pull the intermediate piece (36) located before the crankshaft gear (35). Also, there is a spacer ring (31 a) installed between the camshaft gear (30) and the intermediate gear (31), as well as a long follower pin (34) and a long mounting screw (33) for these gears. Through the additional base plate (38) two longer dowel pins are inserted into the cylinder crankcase for centering the timing gear housing cover, also longer mounting screws are installed (see Figure on page 28 and Figure 01–15/3).

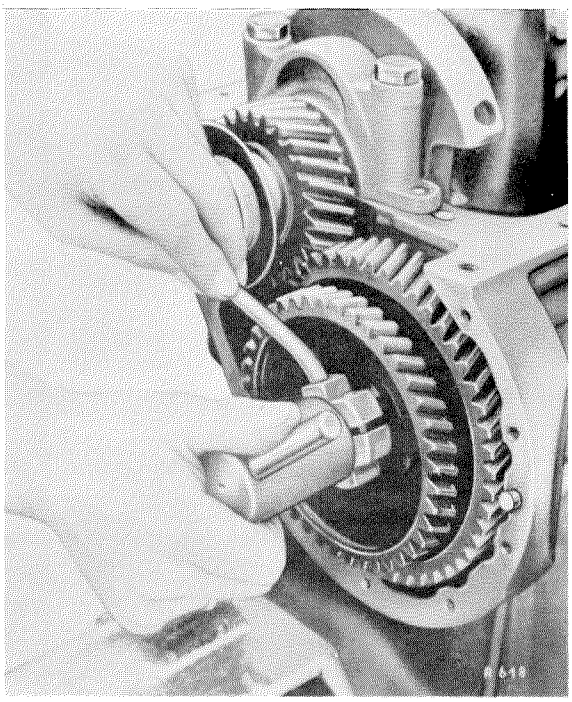


Figure 05–31/1

4. Pull off the crankshaft timing gear with the Extractor Part No. 136 589 08 33 (see Figure 05–31/2).

5. Measure the center distance between the crankshaft and the camshaft with the Measuring Device Part No. 136 589 05 21. The exact center distance is of importance for the selecting or ordering of a suitable camshaft timing gear.

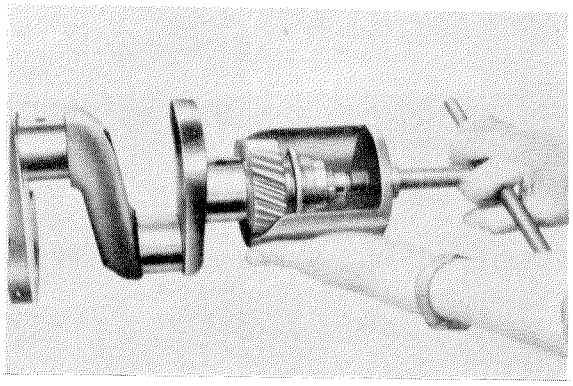
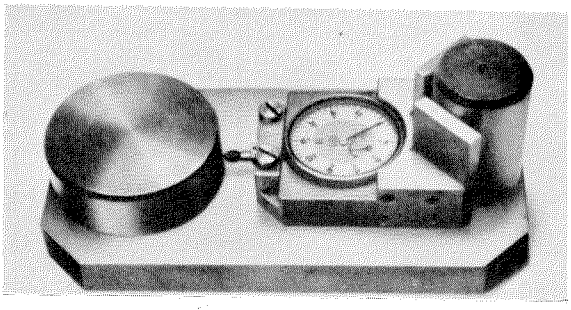


Figure 05–31/2

Before the measuring adjust the zero position of the dial gauge in holder with the adjusting device (see Figure 05–31/3).

The zero adjustment is 112.5 ± 0.01 mm
Figure 05–31/3



Set the angle support of the dial gauge holder to the tail shaft in such a way that the measuring pin of the dial gauge presses against the collar of the camshaft flange (see Figure 05–31/4). The tail shaft must be perfectly clean to eliminate measuring faults.

Turn the camshaft with the Crank Part No. 136 589 04 61 and measure the distance on at least 4 points.

The average value of the 4 measurements should be taken as a basis for the selecting (or ordering) of the camshaft timing gear.

If the determined value is higher than the zero adjustment, meaning the distance is greater than 112.5 + 0.01, a camshaft timing gear marked with a + must be installed.

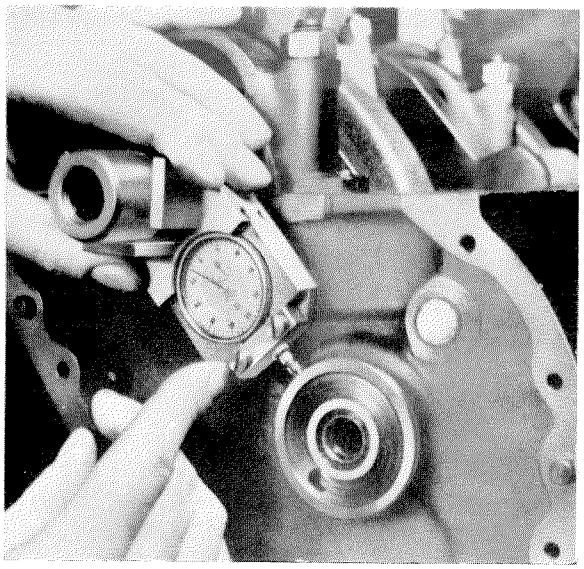


Figure 05–31/4

If the determined value is lower than the zero adjustment, meaning the distance is smaller than 112.5—0.01, a camshaft timing gear marked with a — must be installed.

The size of the wheel is engraved on the camshaft timing gear. The figure indicates the deviation in $^1/_{100}$ mm + or — in relation to the zero measure which already provides for a backlash of 0.03 to 0.04 mm.

The size of the crankshaft timing gear is always the same and has therefore no size designation.

The backlash between the crankshaft and the camshaft timing gear should be 0.03 to 0.04 mm.

Generally the prescribed backlash will be attained if a gear wheel is used which is similar to the center distance. The following examples will explain this fact:

1st Example: Measured center distance + 0.05 mm above zero measure. Therefore a gear wheel marked + 5 should be installed.

2nd Example:
Determined center distance +0.01 mm
Suitable camshaft timing gear +1.

3rd Example:
Determined center distance —0.03 mm
Suitable camshaft timing gear —3.
In individual cases, however, it can be possible that a larger or smaller gear wheel must be used to obtain the specified backlash.

Note: If the Measuring Device Part No. 136 589 05 21 is not available, the new camshaft timing gear must be chosen in the same size as engraved on the removed camshaft timing gear.

6. When deciding on the suitable wheel size of the pump drive gear refer to the removed pump drive gear, on which the wheel size is also engraved.

   However, if a new timing housing cover is installed, the old wheel size is no longer valid, because the center distance can be different within the range of the permissible tolerance. The average size of the pump drive wheels is in the vicinity of + 5 to + 8. It is advisable to try first a gear wheel of this size. The size designation of the pump drive gears is exactly the same as on camshaft timing gears.

   The size of the intermediate gear on the camshaft is always the same and has therefore no size designation, similar to the crankshaft timing gear.

7. Check with a scriber or a wire whether the splash hole in the front of the cylinder block is open to lubricate the timing gears (see Figure 05–31/5).

8. If the Woodruff keys (5) have been removed from the grooves in the crankshaft, reinstall them (see Figure 03–1/3).

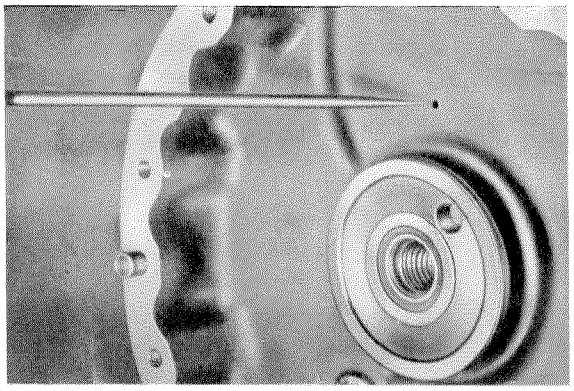


Figure 05–31/5

9. Put the crankshaft timing gear on the shaft, so that the high collar of the crankshaft gear faces the crankshaft. If necessary, use the Punching Sleeve Part No. 136 589 08 39 to drive home the crankshaft timing gear, so that the gear is properly pressed against the collar of the crankshaft. On no account, hammer against the front of the teeth of the crankshaft timing gear.

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

10. Install the camshaft timing gear and the intermediate gear (drive gear on the camshaft). The contact surfaces on the camshaft timing gear and the mounting flange must be perfectly clean.

    Set the crankshaft in such a way that the groove of the Woodruff key in the crankshaft faces downwards. In this position of the crankshaft the pistons of the 1st and 4th cylinder are in top dead center. Turn the camshaft, so that the marked teeth of the camshaft timing gear and the crankshaft timing gear are engaged after installation and the boreholes of the camshaft and intermediate gear coincide with the hole in the camshaft flange (see Figure 05–31/6). Then drive the carrier bolt into the boreholes of the camshaft and intermediate gear and the camshaft flange.

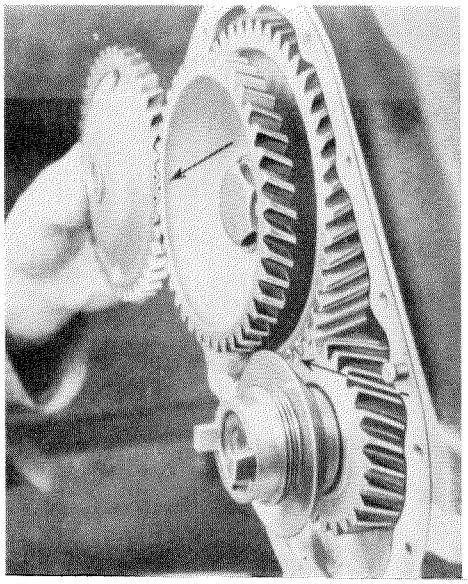


Figure 05–31/6

The inserting and/or driving-in of the carrier bolt must be handled with care and should not be done against strong resistance. If a shoulder is formed, there is the danger that the timing gears will waver.

The permissible lateral deflection of the timing gears is 0.02 to 0.03 mm.

Lately a spring washer B 18 DIN 137 is used instead of the formerly used lock plate.

11. Use a feeler gauge or a paper strip 0.03 to 0.04 mm thick to check 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, as well as possible by feeling, the smooth running of the gears. Then secure the fixing screw by bending the locking plate twice.

12. Install the spacer (6) (see Figure 03–1/3) or the oil deflector (2) (see Figure 03–1/4) on the crankshaft depending on the version and/or type; watch the front Woodruff key (5) during this operation.

13. Turn and/or set the crankshaft, so that the marked teeth of the camshaft and crankshaft timing gear are engaged (see Figure 05–31/6).

Note: Check the bearing of the pump drive shaft, replace if necessary (see Job No. 07–27, Paragraph 11 to 14 and 17 to 20).

The boreholes for the dowel pins and the dowel pins in the cylinder block must be checked. They should be in perfect condition; replace dowel pins if necessary.

Check alignment of oil pan and crankcase at the separating line. Misalignments can be adjusted after the removal of the oil pan (see Job No. 01–21).

The different versions of the timing housing covers have to be taken into consideration when installing a timing housing cover (see Job No. 01–15).

14. Mount the pump drive gear on the injection timing device. For this purpose use only original screws M 8 × 12 DIN 933 – 8 G (a long screw can come in contact with the centrifugal roller weights) (see Figure 07–27/4).

15. Install the timing housing cover (see Job No. 01–15, Paragraph 22 to 32).

16. Warm up the engine and check for leaks and smooth running of the timing gears.