

Service Instructions for Zündapp KS 600/601

Note: To the best of our knowledge, this was only available in German. James Marshall paid a lot of money to a professional technical translator (Lone-Kathrin Rennpferdt) to translate this to English. We think it was worth it and hopefully it will be a great value to the Zundapp community.

Many thanks to Leo for generously supplying higher quality scanned photos for this manual. His site has this manual in French (and German?) at zundapp.jimdo.com.

Many, many thanks to Darrel Spinosi of Columbus, Ohio, for the donation of his personal time to proof read this material and make the necessary corrections and additions to make it better reading and more easily understood by the American mind. It is a better document for his effort.

First of all wash the machine thoroughly. Cleanliness is required when working on engines. Drain the engine and gearbox oil. Then remove the saddle, tank, exhaust pipe and, if existing, roll bar. Pull the throttle cables with the slides out of the carburetors, wrap them with a cloth and lash them up at the frame. Hang the clutch cable up on the gearbox. In the case of engines with manual spark advance, remove the cover of the generator and hang up the linkage on the contact breaker cover. Loosen the clamps of the carburetor intake tubes with a screw driver. Unscrew the screw on the filter case with a 14mm socket wrench (1) and remove the case with filter and suction line. Put all the individual and small parts into an empty can with a note so that they do not get lost. Now press down the kick starter and fix it to the frame so that the battery can be removed. Loosen the nuts at the carburetor flange on both sides with a 14mm socket wrench; change sides every 1/8th of a turn.

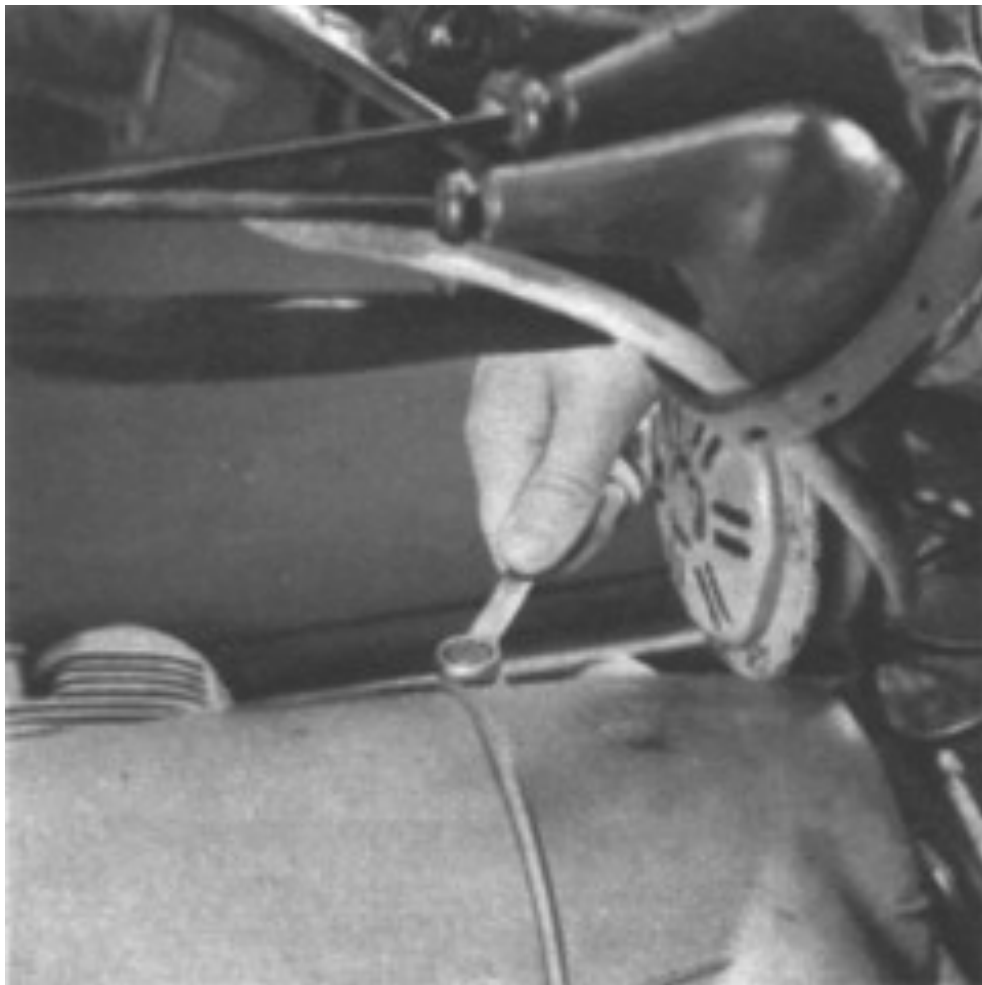


Figure 1

Loosening them one-sided would warp the flange (false air). Remove the carburetor and screw the nuts back onto the dowel pins. To be able to access the contacts of the generator, remove the top of the cowling (2) and press the rubber filler piece across the governor cover. Loosen the grub screws of the generator contacts with a screw driver and remove the individual wires. Do not forget to mark the wires. The best way to mark them is to write "right, center or left generator contact" on a piece of paper (3) and put it around the wire; bend the wire around the contact so that it cannot fall off. When all wires are marked, put them all together to the upper frame tube.

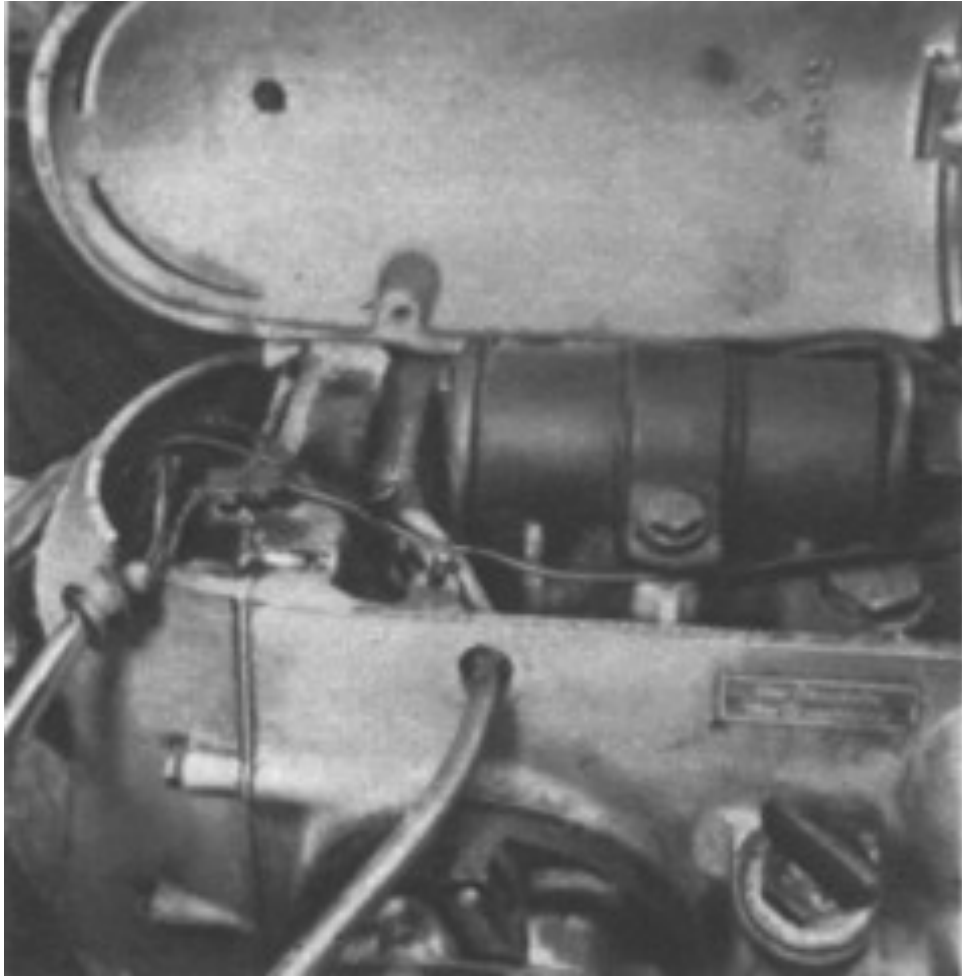


Figure 2

The engine is still connected to the frame at three points. Open the strap of the big rubber drive shaft cover at the gearbox with a small screw driver or a blunt nail, then jack up the machine so that the fork springs are relieved.

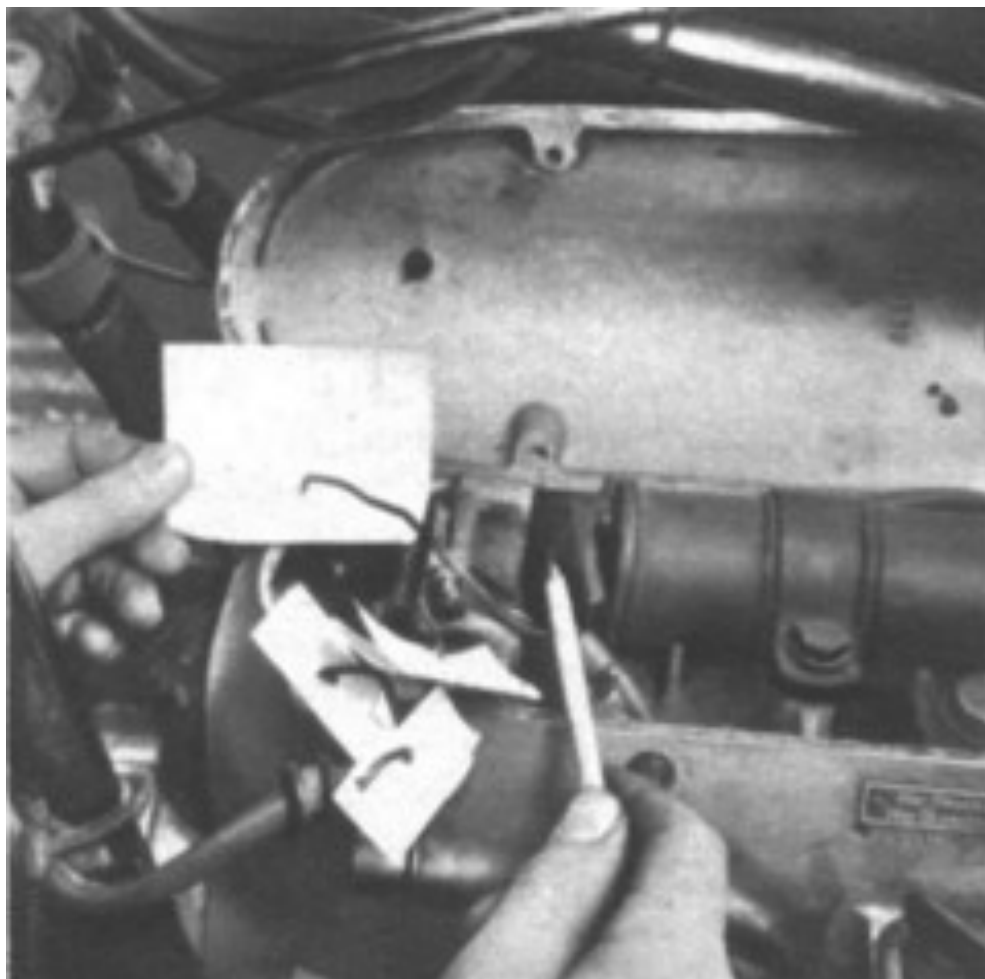


Figure 3



Figure 4

Now remove the two round-neck nuts (4), which attach the gearbox at the frame, with a 19mm box nut. Put the nuts and the respective clamping and rubber plates together with a note into a can. Put bricks under the oil sump so that it seats solidly. Then remove the engine mounting nut on the right side (5) with a 22mm socket wrench and pull out the bolt. It could be that the bolt has to be forced out with a mandrel or a big hammer because water and dirt might have gotten into the bolt tube. The engine is freed now and can be moved forward until the cardan shaft of the gearbox falls down. Now pull the engine back a little and lift it at the kick starter and put a piece of wood under the oil sump at the oil-drain plug. Now push the back of the gearbox so that the engine tilts over the piece of wood and has its front side up. Now put wood under the front of the oil sump. Repeat this procedure, wood under the back then under the front, and the engine can be freed without it being stuck under the frame.



Figure 5

Get some more people to lift the engine up onto the workbench. *But with enough force and sweat you could do that alone.* (This move is NOT recommended!)

To make the engine more manageable remove the gearbox: Remove the eight cover screws with an 11mm socket wrench and the three nuts of the dowel pins on the right. Put the screws, plates and nuts into a can with a note. The gearbox can now be put aside. Check that the pressure piece comes out of the clutch (6). If it does not, put a bit of grease on the end of a screw driver and use this to get it out.

For easily detaching the spark coil remove the spark plug covers with a screw driver, push the ignition cable through the rubber piece back into the crank case and screw the spark plug covers back on. Loosen the retaining nut of the spark coil with a 14mm socket wrench and remove the latter. Tie pin, plate and spacer tube with a cord or annealed wire to the spark coil.

Now have a look at the generator and notice that there are two types. The 60W machine with manual spark advance (7) which was built since 1935 almost unchanged and used until 1952 as well as in combinations, and the 90 W-machine (8) with automatic spark advance which was mass

produced since 1953. You can recognize the old machine not only by the spark advance but also by its two contact brushes. The new machine is equipped with four of them. Before dismantling press the small springs on the contact brushes to the side with a screw driver, pull the brushes up and support the springs with the side of the brushes. Now the generator casing can easily be installed and removed without damaging the brushes at the armature.



Figure 6

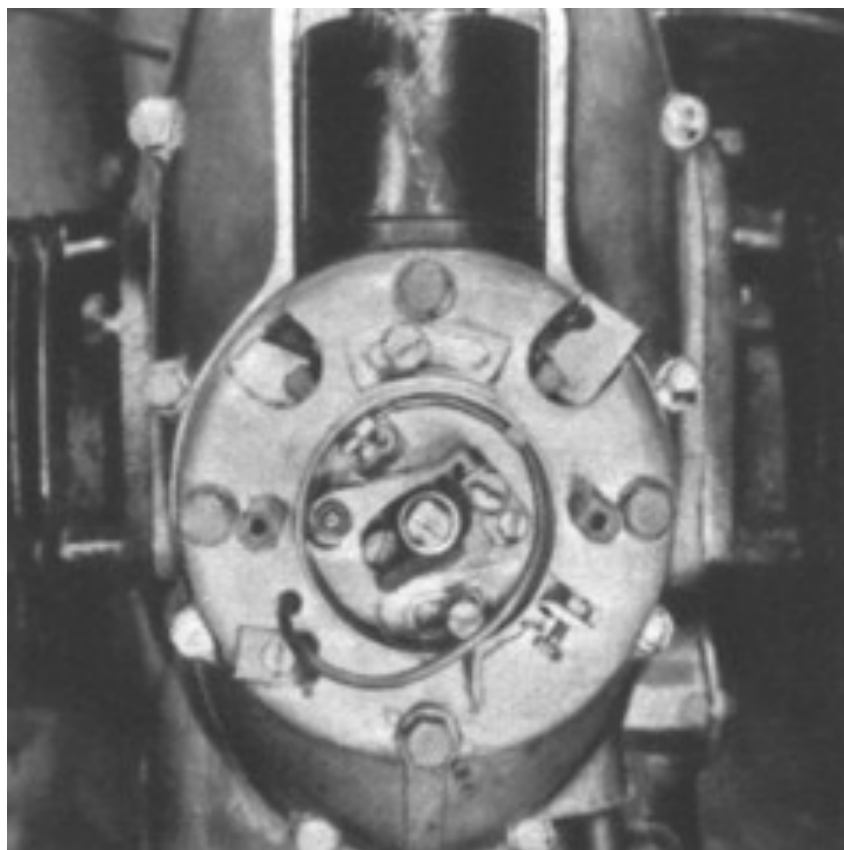


Figure 7

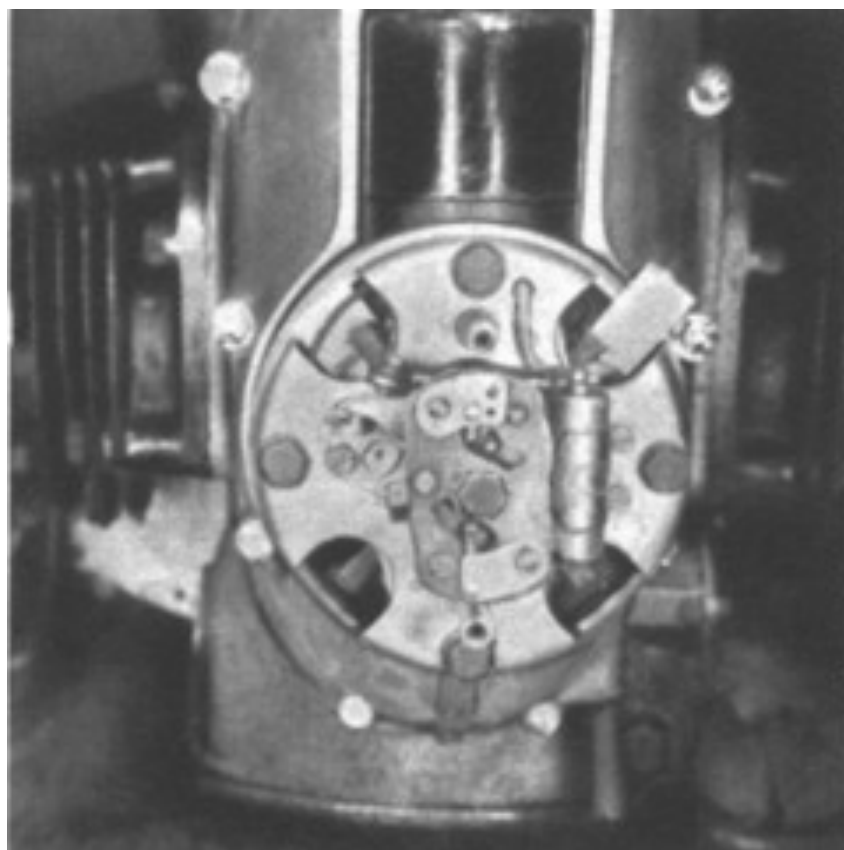


Figure 8

To remove the ignition advance mechanism loosen the anchor screw with an 11mm socket wrench and pull it out. Put it into a box in which we also put all parts of the generator with the respective screws. Loosen the four case screws, again with the 11mm socket wrench, and remove the generator case. Take out the paper seal ring and clean the milled ventilation hole (condensation water!!). The ignition capacitor of the old generator is located inside the case (9) whereas the new generator has the capacitor wisely on the outside.

Get a 110mm long, fully threaded M8 screw (10) for the big armature. Grind down the thread to a length of 50mm, so that the M8 nut can easily be slid over it.

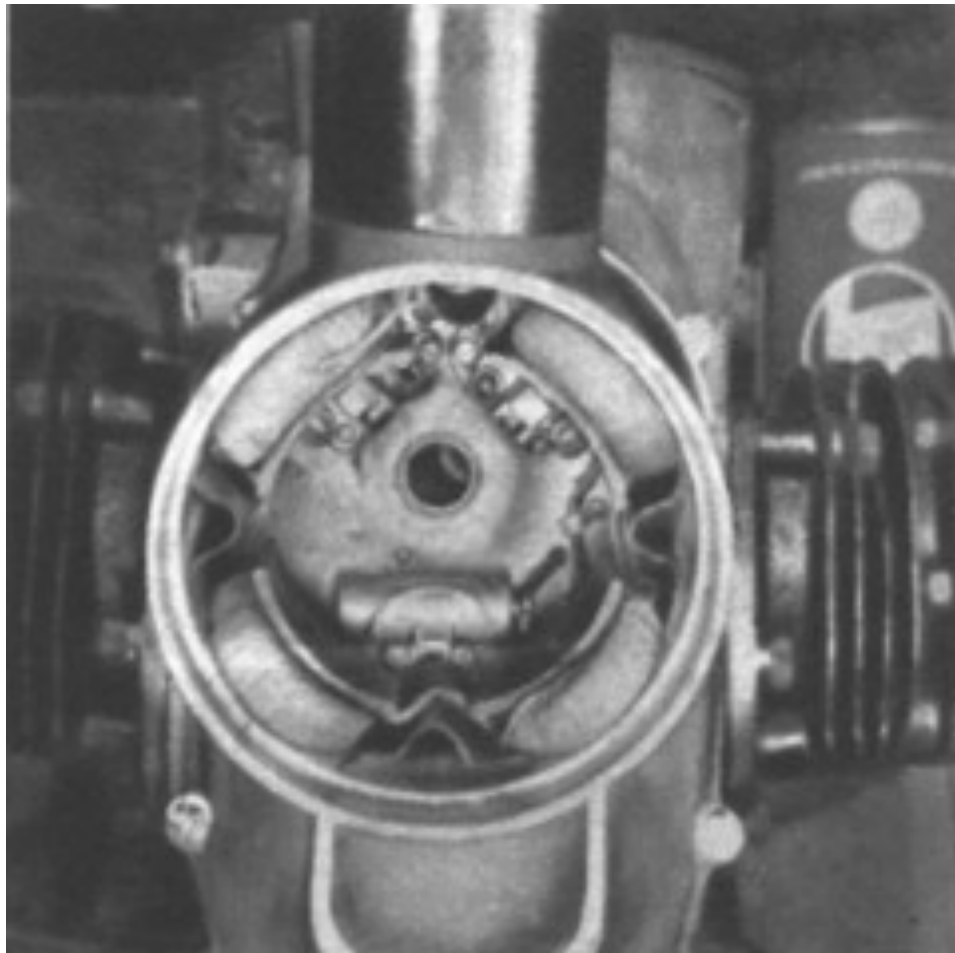


Figure 9

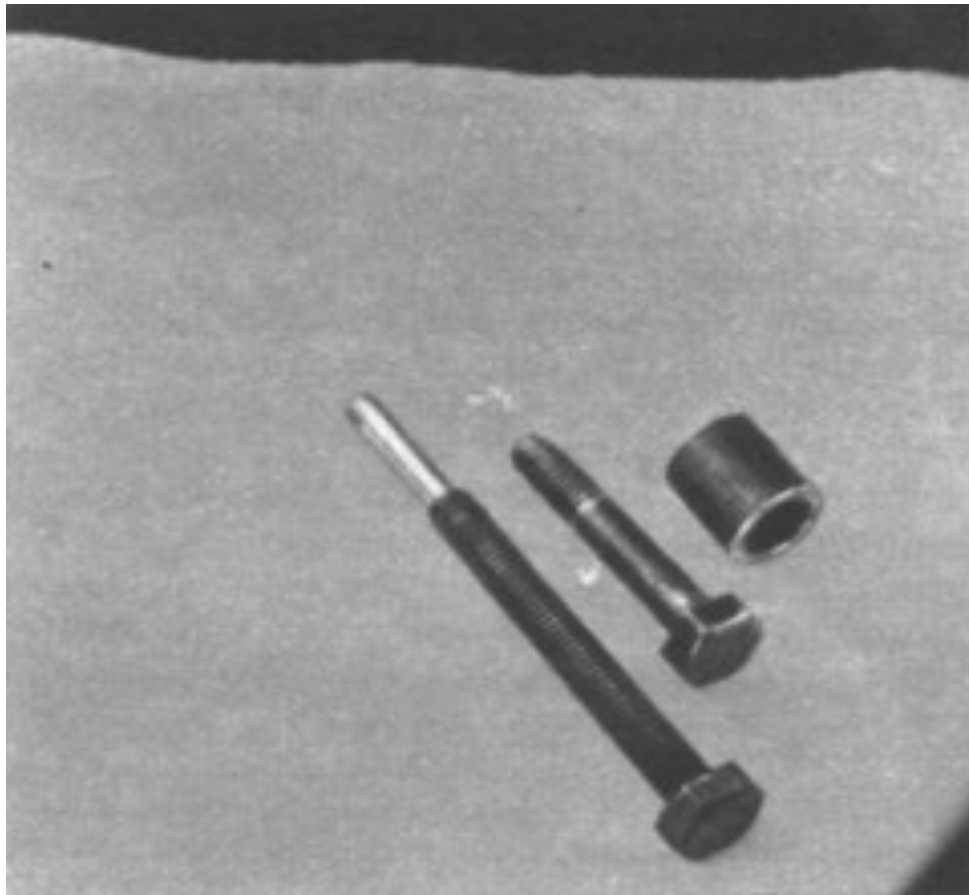


Figure 10

Screw the jacking screw into the armature with a 14mm socket wrench and tighten it. Should the armature not come off on its own, hit the head of the screw with a hammer. If this does not work apply the 14mm socket wrench again and hit it forcefully with a hammer. This will definitely work. The small armature should be practically no problem. The 9mm socket wrench is applied at the square end of the anchor screw, one hit should be enough to loosen the screw and another one to loosen the armature. Now unscrew the anchor screw from the crankshaft. It will slowly disappear into the armature (1 left- and 1 right-hand thread). Use the flat pliers to remove the fitting key (wedge) (11). In the case of big generators a threaded part is screwed into the crankshaft which we will leave alone (arrow).

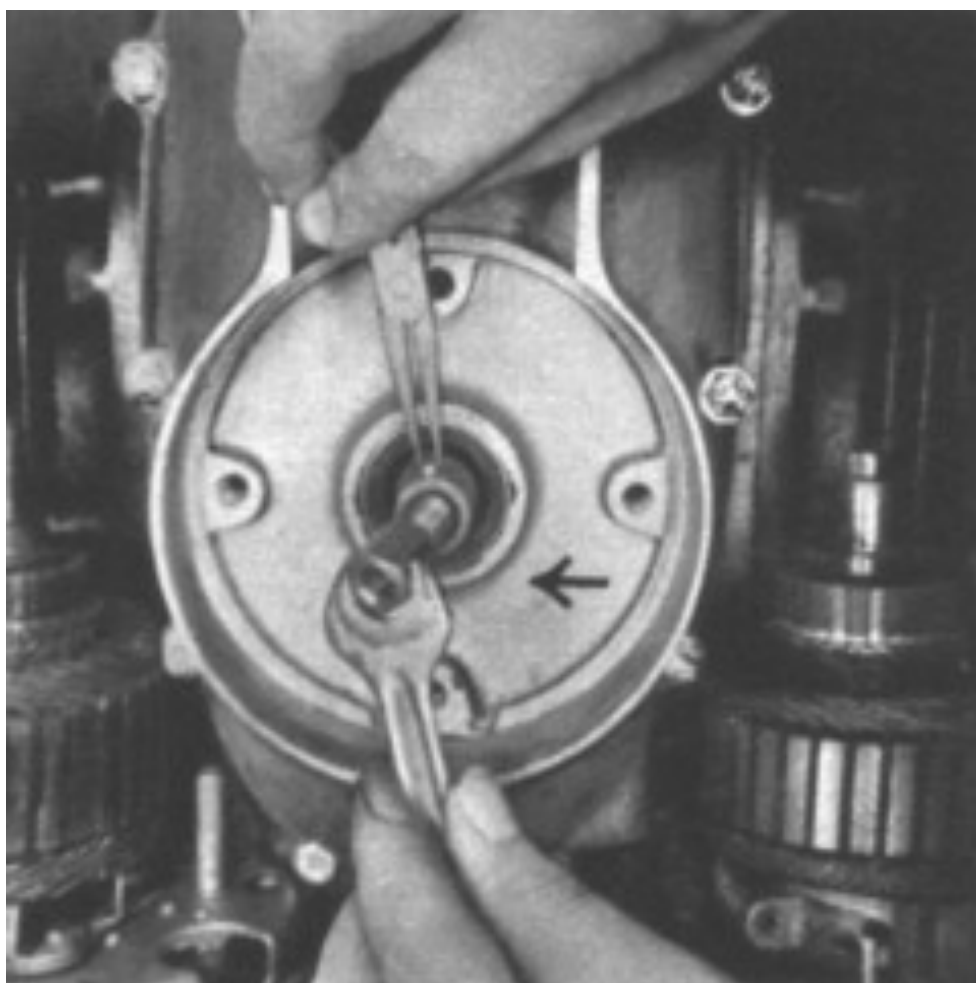


Figure 11

Now turn to the heads and remove the spark plugs first. Loosen the nuts of the caps with a 10mm socket wrench. Put a can under them before doing that. Remove the caps and drain the oil which has to be in them. The cylinder head has to be loosened at 5 points before it can be removed. The collar nut which, is hidden above the plug hole (12), has to be paid special attention to. Loosen it with a 17mm socket wrench. Loosen the remaining four cylinder-head nuts with a 17mm open end wrench. It goes without saying that the nuts have to be loosened crosswise.



Figure 12

After removing the head pull the push rods out of the cylinder (13). The five base nuts have to be loosened crosswise with a 17mm open end wrench to remove the cylinders. Before removing the cylinder completely put a cloth in the emerging gap between cylinder base and cylinder block to keep the connecting rod shank from damaging the cover sealing surface.

Remove the pistons after the cylinders by pulling the pin retainer out of the piston using needle-nosed pliers. Heat up the piston with a blow torch because all KS 601 piston pins have wringing fits. The pin has to be pushed halfway out of the hot piston with an appropriate wooden mandrel; but only so far that the piston can be removed from the connecting rod. Scrape the top of the piston clean with a piece of hardwood and notice different numbers (e.g. dimension of piston 8/100mm smaller than cylinder bore) and the labeling "top". Mark the piston with a pencil (left or right).

(Note from the Zundapp Fool: "wringing fits" I know that to remove a piston on a 601 I have to remove the wire circlip from one or the other end and heat up the piston. Once done the pin almost floats out with barely a tap, well maybe a few taps then. I think maybe wringing fits might imply a pressed fit as it says to not remove the pin, but merely remove it just enough to clear the rod.)

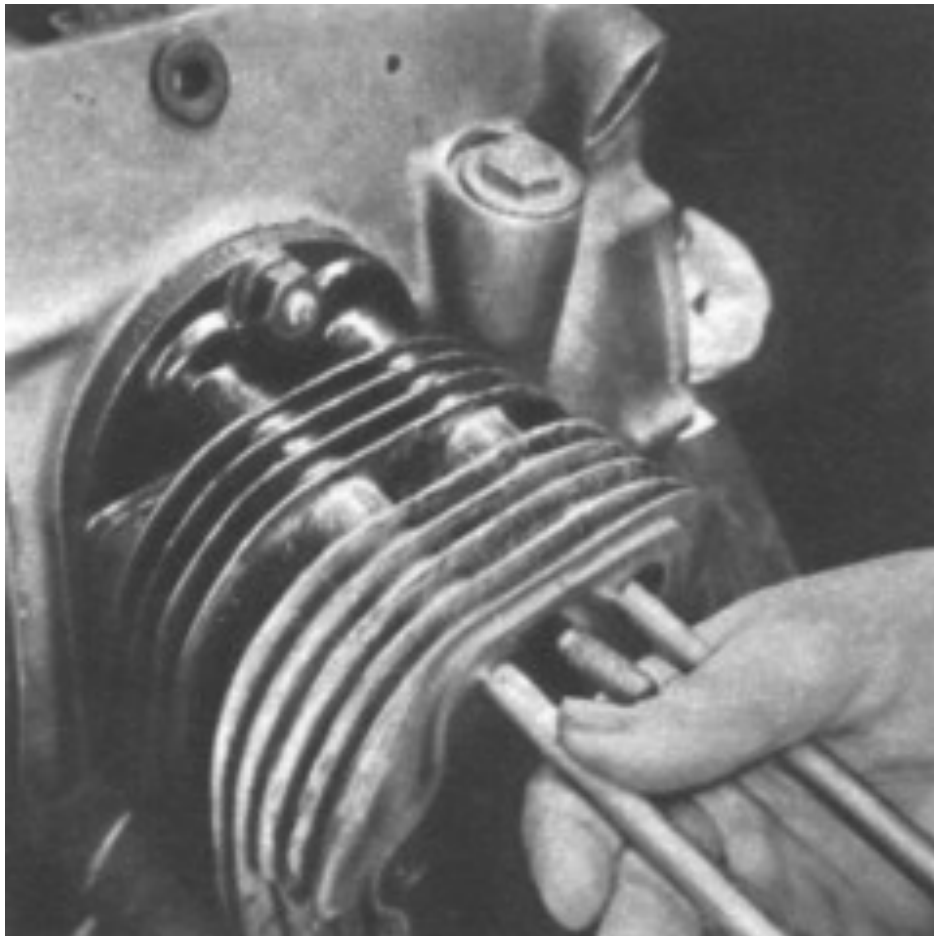


Figure 13

To remove the clutch a 45mm long M8 screw and a piece of a tube of 3/8 or 1/4", that is filed down to 17mm, are necessary. Slide the tube over the screw, insert both into the clutch (14) and tighten forcefully with a 14mm box nut after the screw has engaged with the thread of the crankshaft until the friction disk is loose, i. e. the clutch is disengaged. Remove the circlip with pliers (15) and then take out the clutch cover plate. To avoid a mix-up mark the now visible clutch disk with chalk, take it out and put it to the cover plate (16). (Depending on the manufacturer there are friction disks with or without grooves in the lining). Remove the spring ring either with compasses, a nail or something similar so that the clutch plate can be removed. When the plate is removed do also mark the clutch disk below it. Note that the toothed center plate is not the same on both sides, ie. it has a narrow thick, and a wide thin side. Mark with chalk. Now loosen the M8 screw and take it out it to remove the clutch pressure plate. The 8 to 12 pressure springs below the pressure plate can now be removed, too.

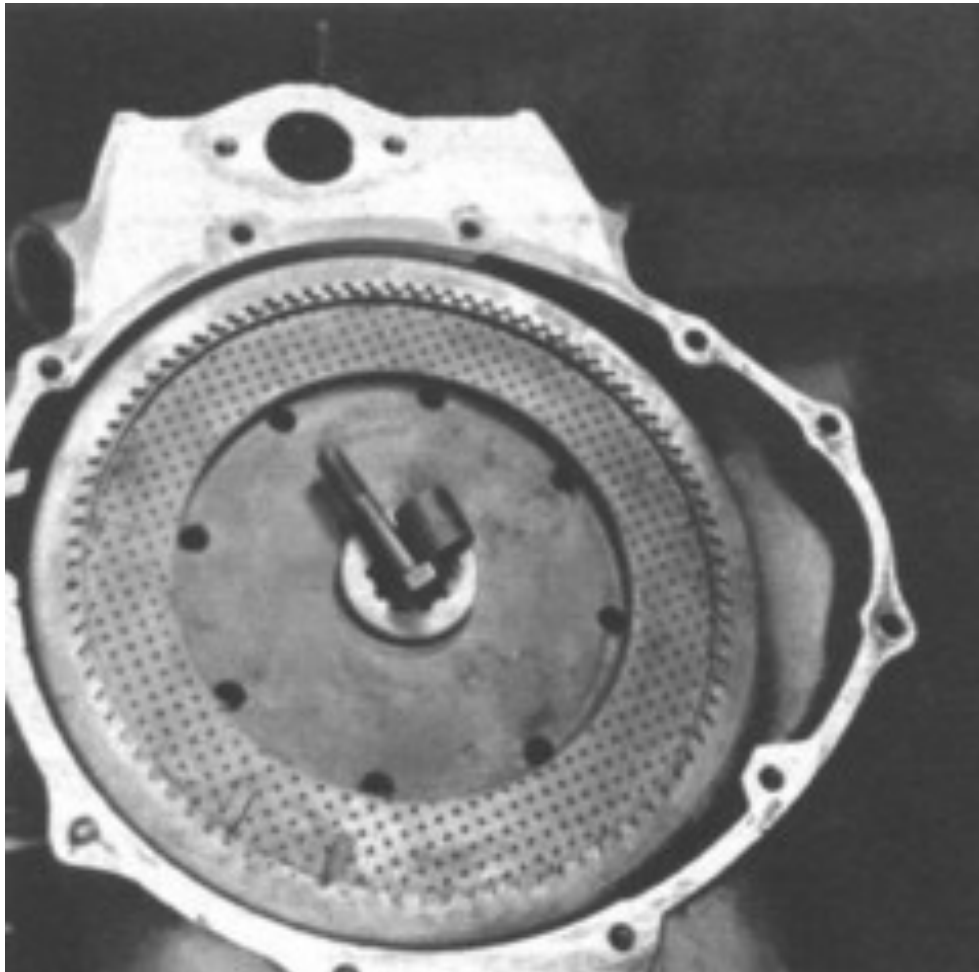


Figure 14

For solo or small sidecars 8 springs are sufficient. For bigger sidecars and racing 12 springs have to be installed. The clutch basket, which at the same time is the flywheel, has to be removed now; so ensure a secure footing of the engine. Set up the engine on edge and remove the oil sump by screwing out the 14 oil sump screws with a 10mm socket wrench and put them in a can with a note together with their shims and lock washers. Put a cloth under the cover to that the workbench does not get stained by leaking oil. Replace the sump gasket for a clean engine. At the now visible oil filter bend the tongue of the retaining washer back with a screw driver and remove banjo screw with a 19mm socket wrench. After removing the filter two borings are visible, the smaller of which is blind (17/1. top of filter, 2. banjo screw, 3. spacer sleeve) and is not part of the oil circuit. The boring was created due to construction.

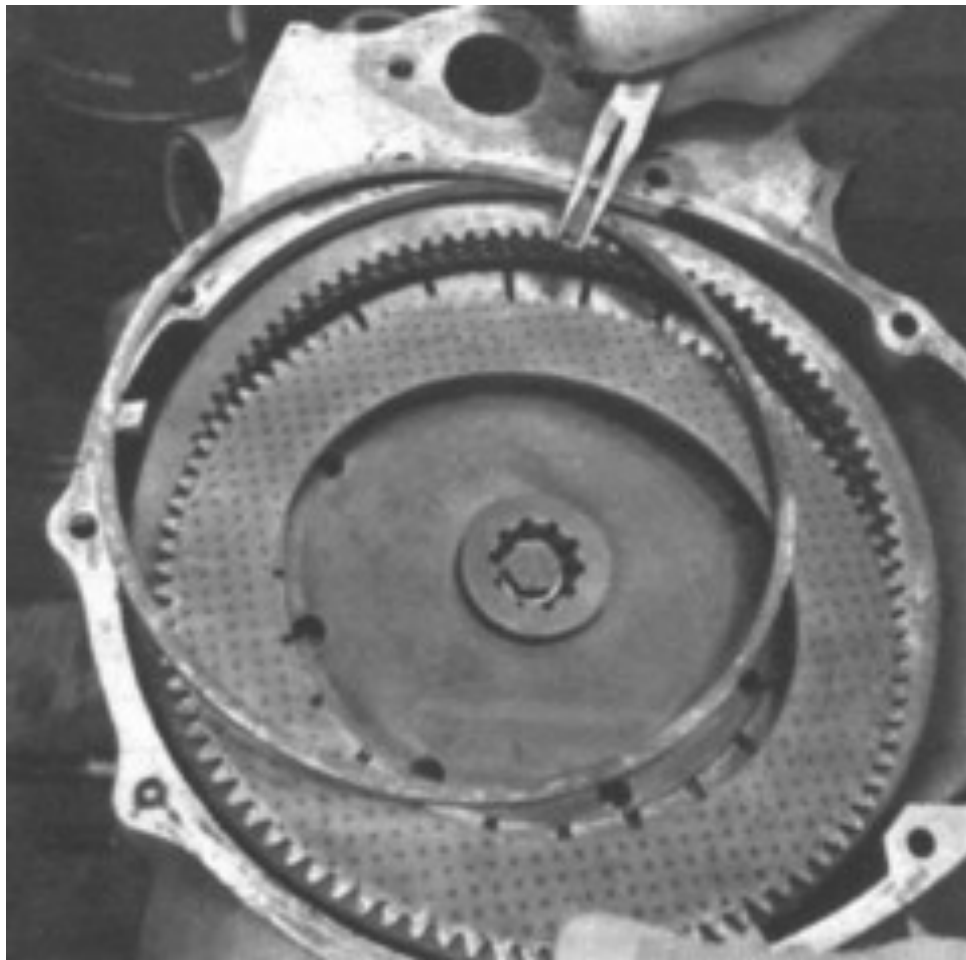


Figure 15

The oil filter should be replaced every 10 000 km (work data), because long service life of bearings partly depend on proper oil filtration.

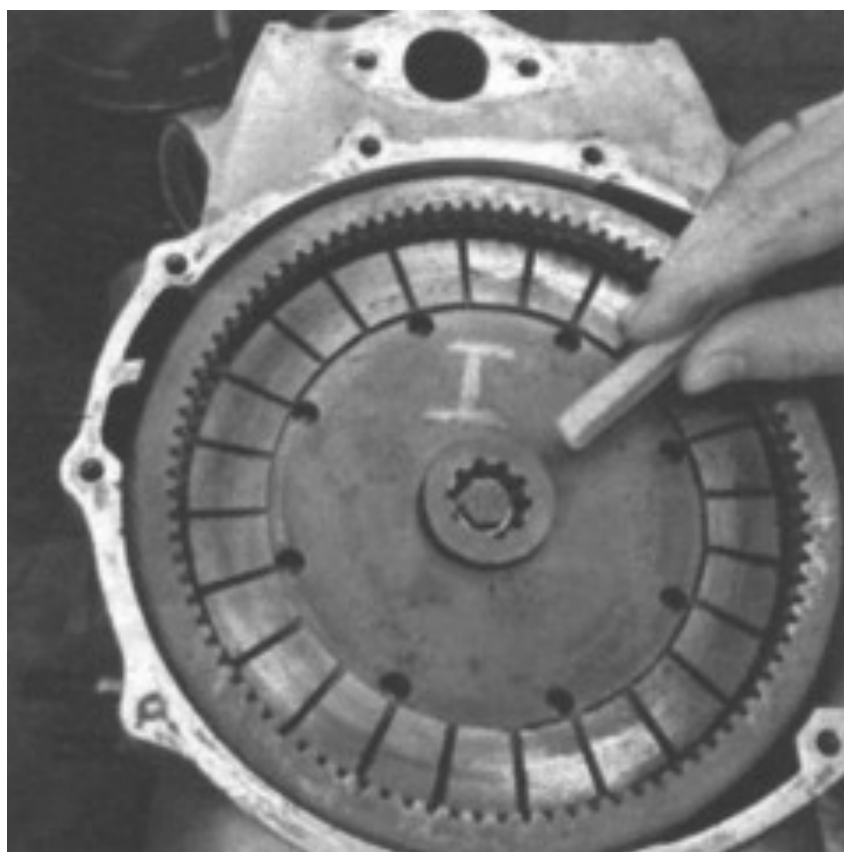


Figure 16

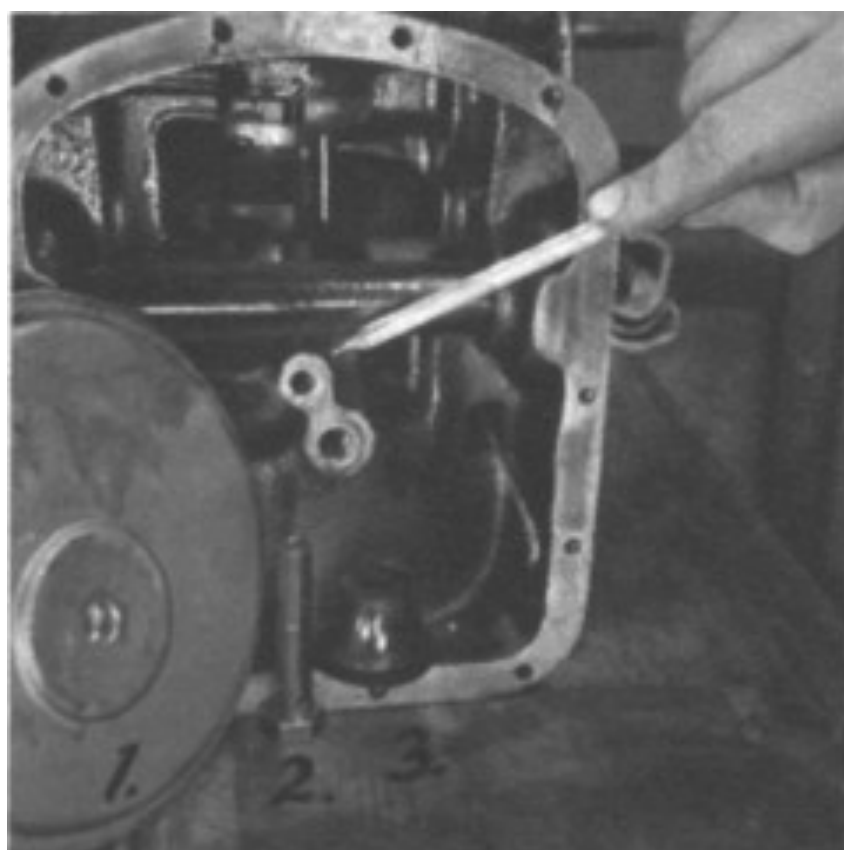


Figure 17

It is proven, that a contaminated hose interior, i. e. of the connection, advances to the outside until it is completely contaminated only and only the open end of the hose draws in oil (unfiltered). New oil filters are available at Familie Bernhard for 95 deutschmark. It consists of three pieces: the banjo screw, the distance sleeve and the large-area filter screen. Later on it is only possible to purchase the filter screen.

Clamp the engine to the workbench with a long vise. (Note that the vise always has to be clamped at the twist-off side, i. e. when twisting off right of the nut and when twisting on left of the nut). (19) Jam the crankshaft with a mandrel or a piece of hard wood (20) wrapped in a cloth which we push across the crankcase. The mandrel has to sit on the ledge of the opposing case barrier and not on the oil lines in the center of the case. Now turn to the flywheel. Bend the locking plate behind the nut back with a screw driver to be able to loosen the flywheel nut with a 36mm socket wrench, mandrel and possibly a pipe extension.



Figure 18

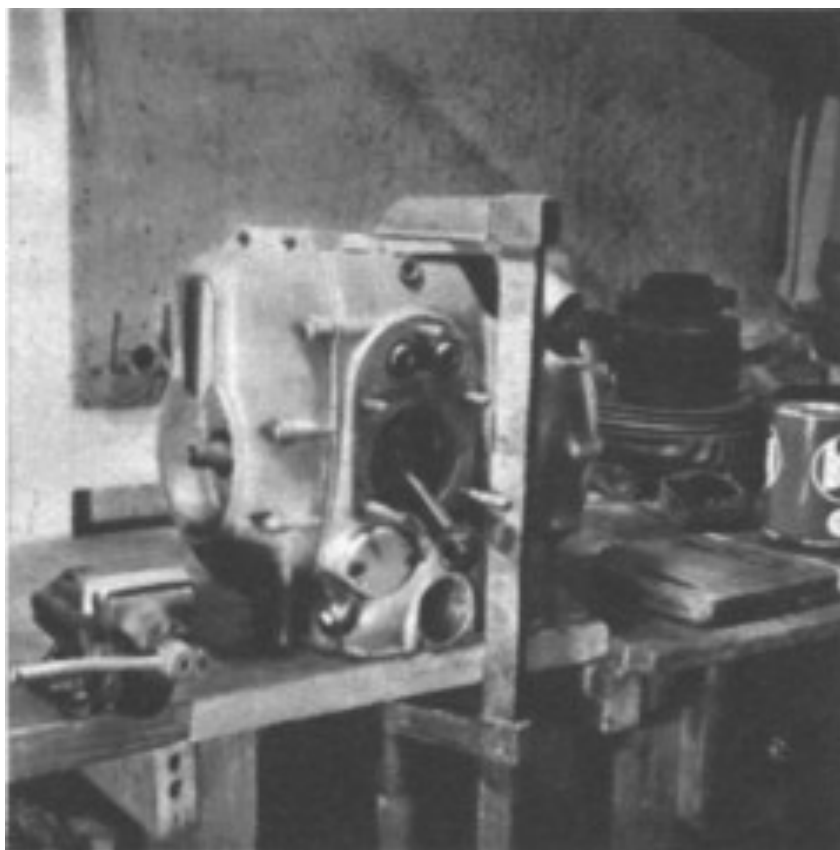


Figure 19



Figure 20

How to remove the flywheel: Locate the key slot and put it to the top. Before that we have removed the mandrel which has jammed the crankshaft, then hit with a wooden or rubber hammer forcefully against the flywheel (21) at an angle of 90° off to the key slot. The flywheel will come off.

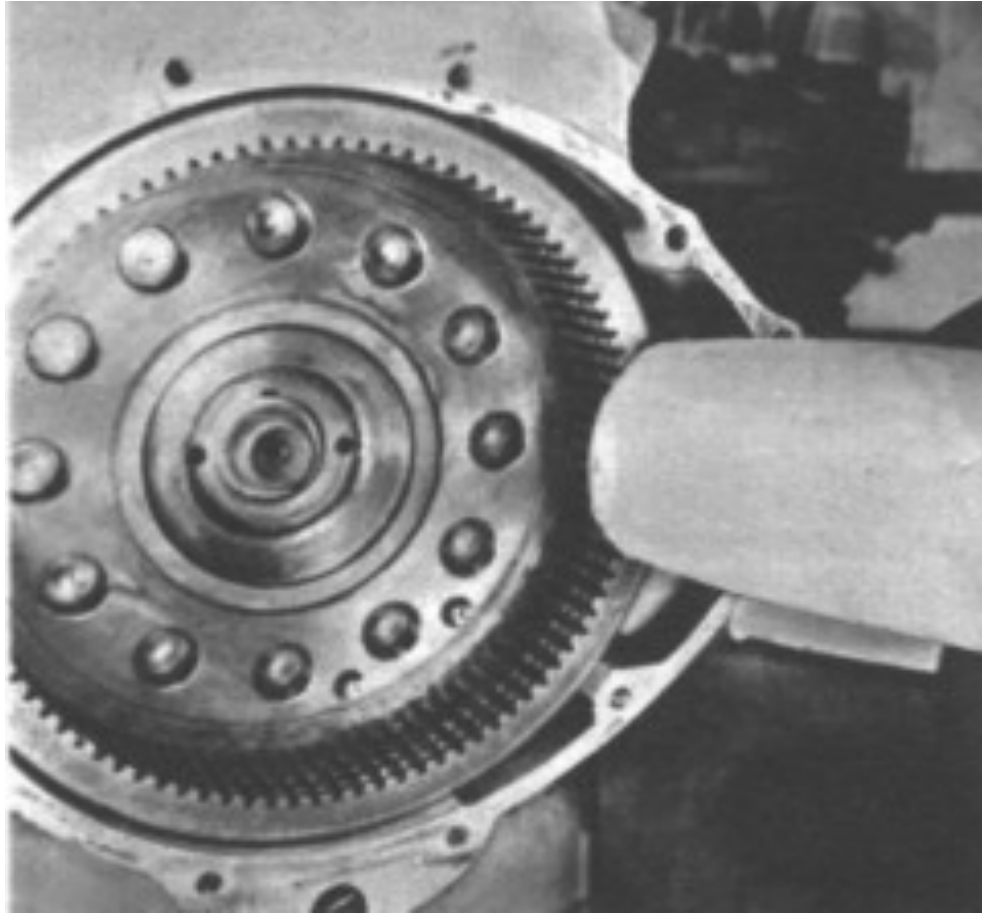


Figure 21

Now turn to the connection rods where we will need to build a holding tool from a soft steel for assistance (22). Twist the two-piece bearing cage until the gap is located at the center of the connection rod shank. Then insert the holding tool into the block and attach it to the right upper (omm) stud on the right. (23, here the opposite rod is fixed). Loosen the nuts of the rod with a 14mm box nut (24) after fixing the rod and remove them together with their shims (washers). Hit the rod screws back with an iron mandrel until the connecting rod can be pulled out. Write the number of the rod with a pencil onto the casing and remember that every KS connecting rod is numbered and the rods always have to be installed with the number to the top. This is a good time to write about adjusting the connecting rod bearings: Required is a surface plate or a piece of shop-window glass with a minimum of 5mm thickness. Find out if adjustment is necessary at all, which means if the bearings are loose, by rotating the shaft to the TDC and gently shaking it at the rod shank in the

direction BDC to TDC without tilting the rod to the side. If you here a rattling noise during shaking the connecting rod bearing has to be adjusted.

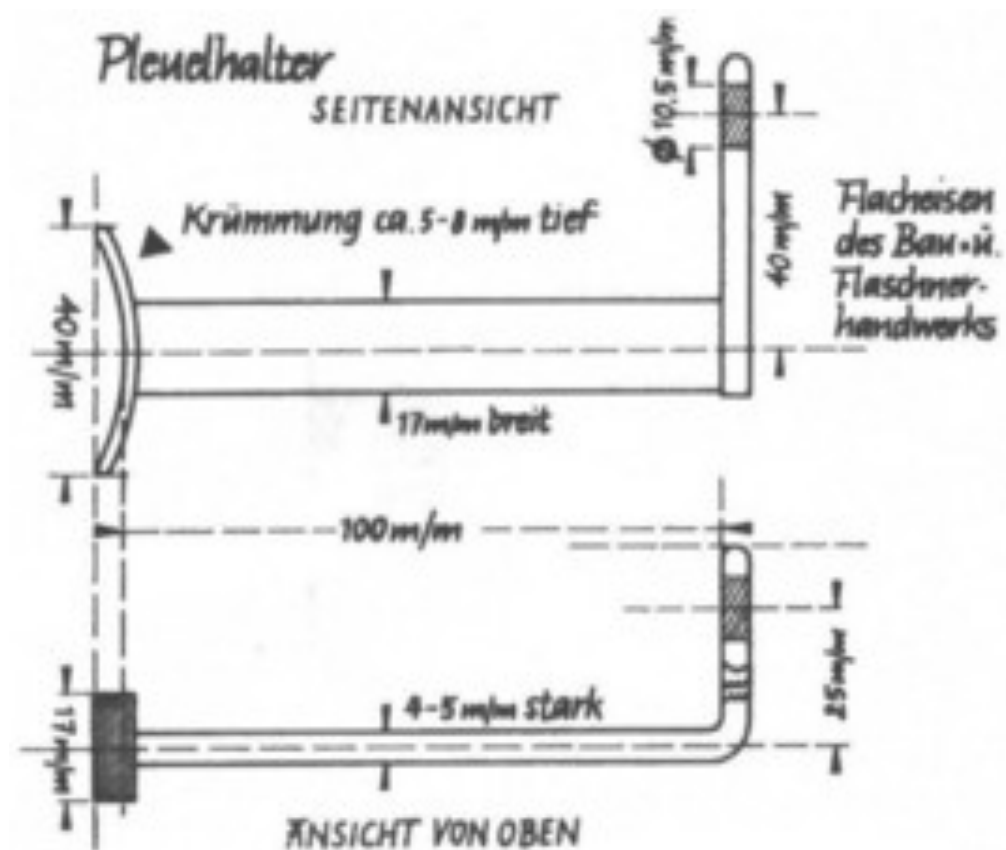


Figure 22

Pleuelhalter = rod relay, Seitenansicht = side view,

Krümmung ca. = bending approx. 5-8 mm deep

17mm breit = wide

4-5mm stark = thick

Ansicht von oben = top view

Flacheisen des Bauhandwerks = flat bar of the building craft

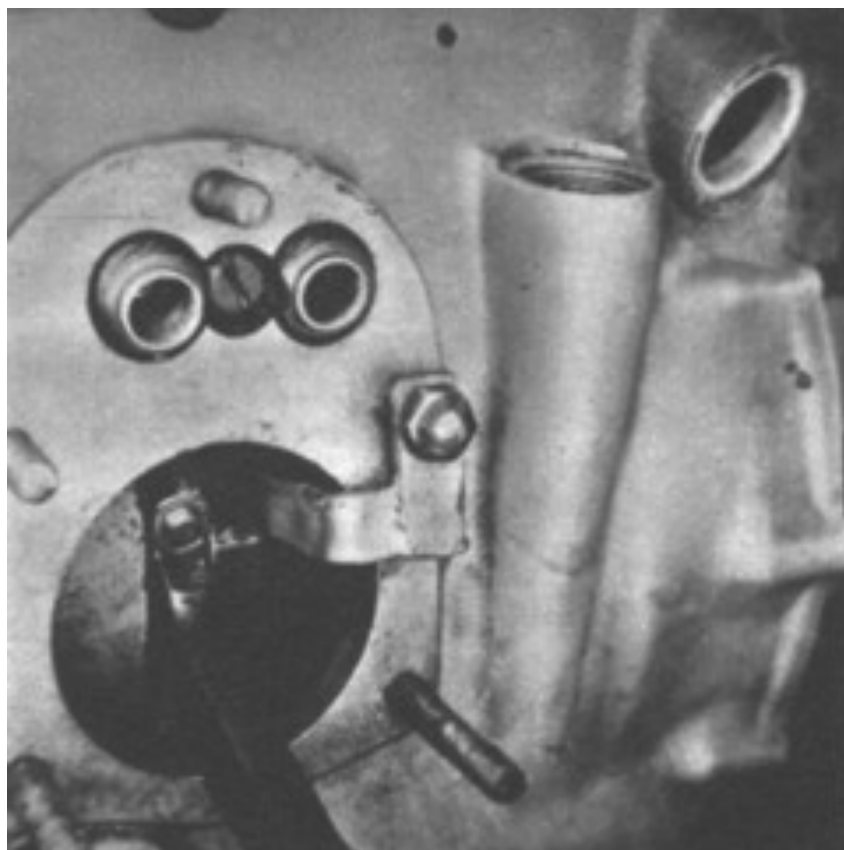


Figure 23

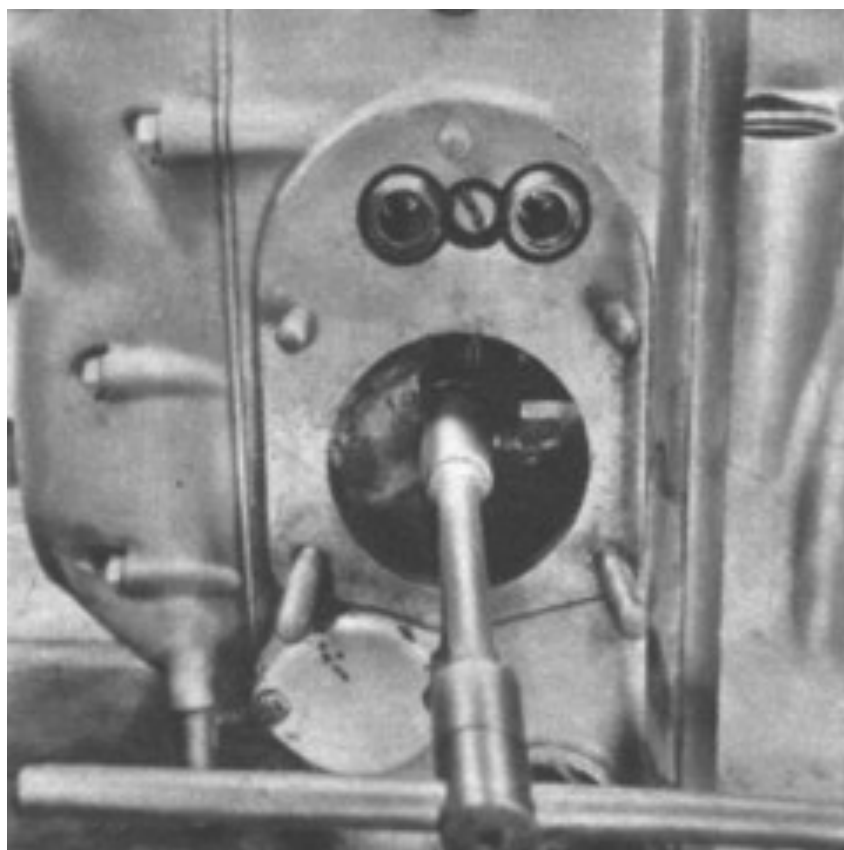


Figure 24

For the adjustment remove the connecting rod as specified. Put a piece of polishing cloth on the surface plate and on that whet the joints of the big ends one after another (25). One face has to be on the polishing cloth and one on the blank plate (25). Count every stroke to get even abrasion on both sides. Recommended are 20 strokes on each side before reinstalling the connecting rods.



Figure 25

The nuts (in older connecting rods versions the Allen screws) have to be tightened with 8 meter-kilograms (mkg, old measurement for torque). After reinstalling the connecting rod remove the holding tool and check again if the bearing is still loose. If this is not the case after just 20 strokes you are very lucky. In most cases this procedure has to be done 4 to 5 times to achieve an optimal fit.

The KS connecting rods have to drop when installed and never have be lifted during crankshaft rotation. This is seen best when rotating the crankshaft. At the same time check if the connecting rod can be wiggled sideways through the entire rotation. It can be wiggled more at the TDC and the BDC then in-between both. This is the critical

point in adjusting. Rods that are badly worn shall merely be adjusted so much that the rod can be wiggled only at a minimal level. It goes without saying that when removing the connecting rods again the bearing cages have to be aligned as specified and then have to be fixed with the holding tool. It is important to remove the connecting rod from the crankshaft together with needles and cages after achieving optimal fit, so that you do not get trouble with the bearings afterwards. It is recommended to mark both halves on one side of the gap before removing them so that the bearings are not inverted afterwards. In the case of new cages it is easy to see how they have to be installed because there are numbers engraved at the sides. Unfortunately these numbers will wear off during operation. That is why they have to be marked.

Now assemble the connecting rod without the insides and tighten the rod screws. For this, clamp the connecting rod in a vise with copper chuck. Tighten the screws just a little and align the bearing tracks by gently hitting them with a hammer shaft. Now tighten the screws completely. If a smooth passage between the tracks just cannot be created at the faces, the protruding edges have to be ground with a 20mm hardwood mandrel that is wrapped in a piece of polishing cloth.

The edges have to be ground because during operation the bars of the cages would hit the edges and break off. (The myth of the unreliable KS-connecting rods).

The hardwood mandrel has to be clamped to the chuck of a lathe. Run the lathe at a high speed, put the track faces of the connecting rod on it and grind them until no edges are palpable (26, showing the principle). The protruding edge has to be introduced to the mandrel in a way that does not hit or tear the polishing cloth.



Figure 26

It is absolutely impossible to grind a KS crankshaft because its outer hardening layer is only 0.05mm thick. The only possibility to repair connecting rod bearings is adjusting and potentially grinding the rods. If the crankpins are so much out of center that the crankshaft cannot be used anymore, a new one has to be installed (1959 for the cost of 98 deutschmark) and the old connecting rods, if still good, have to be fitted and ground.

When we get the new crankshaft with old connecting rods, new cages and new needles back from the grinding shop, check everything as specified above (connecting rods have to drop etc.).

The old connecting rods aligned by the grinding shop might come back with dull bearing surfaces. To achieve long service life of the bearings, polish the surfaces until they gleam with a cloth and polishing compound (28). If too much material is ground off the big end when adjusting, attach 1.5mm wide tinfoil strips to these parts of the connecting rod (27) as a chuck. Cigarette tinfoil is about 0.01mm thick. Tinfoil may under no circumstances extend into the bearing tracks or protrude at the sides.



Figure 27 (here tinfoil)



Figure 28 (1. ground, 2. hand polished)

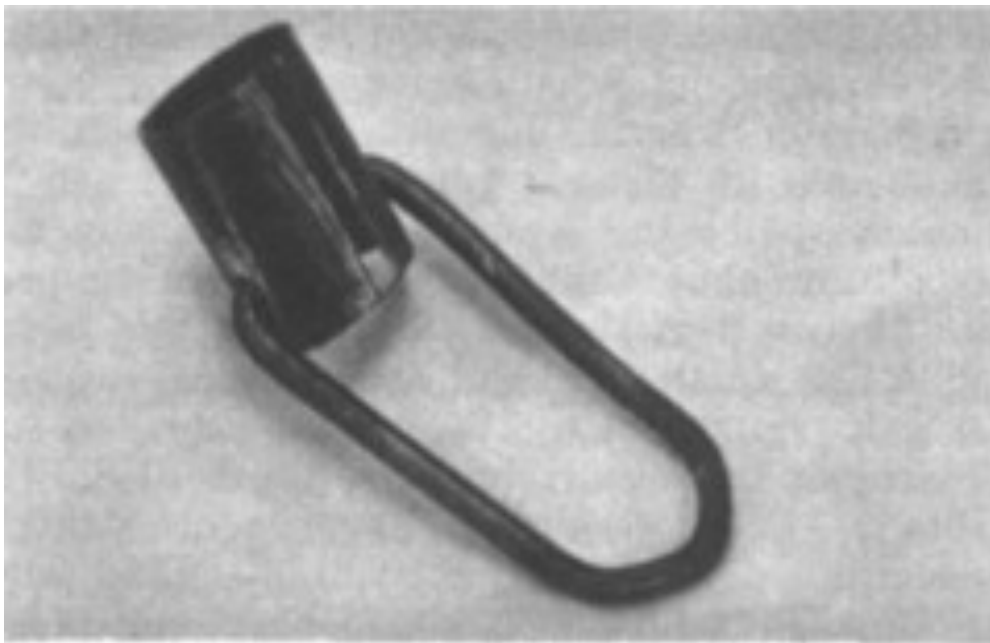


Figure 29

Normally there is little wear at valve tappets and guides. But if a guide has to be replaced because the tappet inside is worn off, get a piece of threaded socket from steel tube D 21mm, saw it open lengthwise and attach a thick iron wire bracket to it (29). To be able to pull out the guide remove the hexagon slotted screw (more recent years of construction have dowel pins and nuts), which secures both guides, with a screw driver, then screw the self-made tool onto the thread of the guide. Now you can see that the slit in the tube is necessary because the thread of the tube has the same pitch as the guide but not the same diameter. Put a pinvice into the tube so that it does not slip off the guide when pulling. Insert a long mandrel into the wire bracket, heat up the casing with a blow torch and pull out the guide and the tappet (30).

Tappet and guide always have to be replaced together. That is to say when a tappet is worn off, the guide has always shrunk.

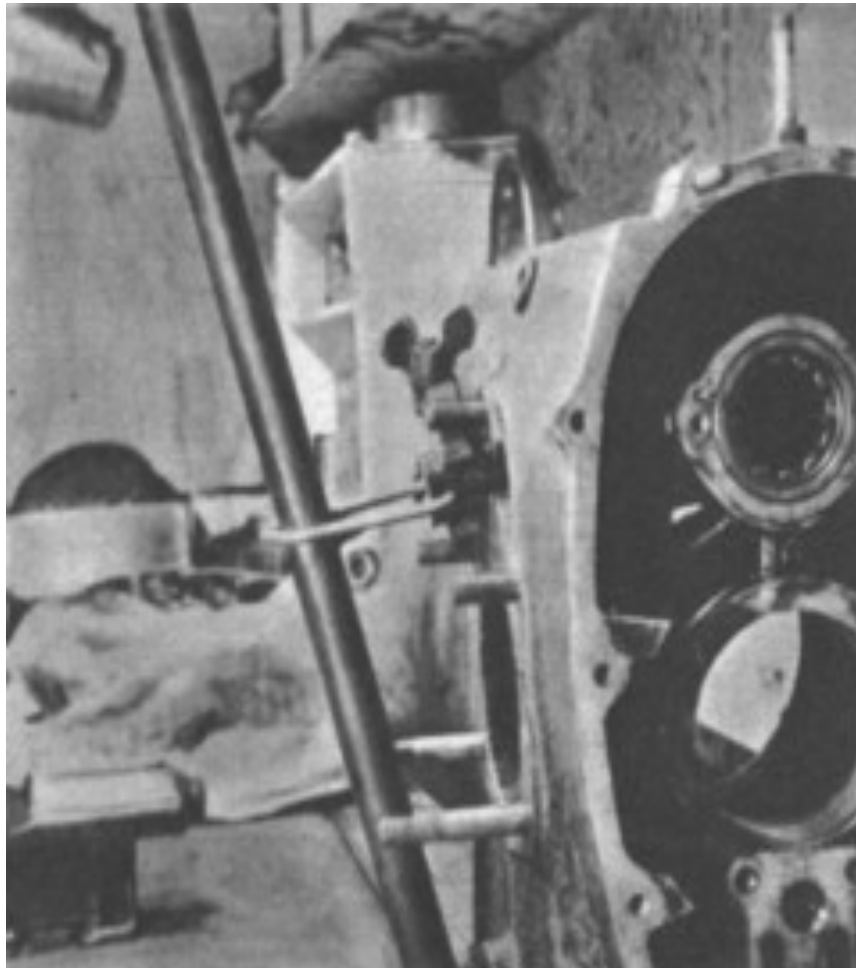


Figure 30

Take off the front casing cover after removing 2 nuts M6 and 4 screws M7x60mm and M7x40mm each.

Gently hit the edges of the cover with a rubber hammer and pull off the cover. Put the screws and nuts to the other eight cover screws M7x35mm and the three M7 nuts with which the transmission is flanged to the engine. Wash out the cover and check if the oil drilling for the rotary slide exhaust is free (Figure 31). Furthermore the front face of the exhaust has to have a drilling that is continuous and has a diameter of 3mm in $\frac{3}{4}$ of its length. The last quarter has a diameter of 1mm, if seen from the front face. This drilling does not exist in older types (approx. 1952 and older). That is why they might develop a scratching and whistling noise during operation, due to the missing drilling and the lack of oil that will occur.

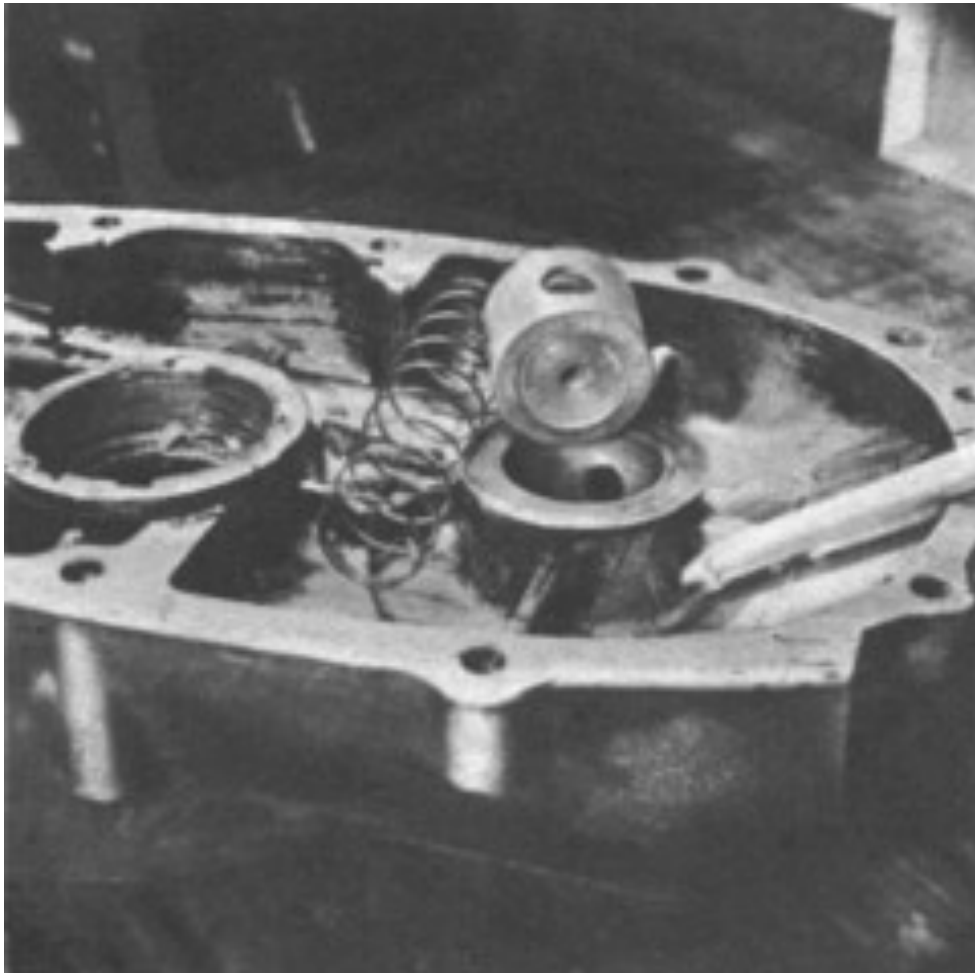


Figure 31

The exhaust spring should have a length of 80mm when relaxed. If this is not the case, pull the spring until it has a length of 80mm when relaxed. Should the exhaust shake in its drilling in the casing, it either has to get a new layer of copper until it can be turned in the drilling with suction or it has to be replaced. Strange to say but the exhaust drilling does not wear off, even at a high mileage. To pull the shaft sealing out of the cover, heat it up with a blow torch

or a gas flame. Then the sealing can be gently hit out from the inside to the outside with a fitting piece of tube.

(Denotation: 22x35x10 steel ring or 22x38x10.5 steel jacket.)



Figure 32

To remove the bearing race of the foremost crankshaft roller bearing inside the cover (N205.25x52x15), remove the material deposit with a threesquare scraper. Heat up the cover and put a lever with a wooden base (32) in the countersank cuts behind the race and lift it with pressure. Then turn around the cover, insert the lever again (33) and get the race out completely. Remove possible traces of the work carefully to ensure a perfect fit of the new bearing race. Unscrew the threaded part at front of the crankshaft with a 14mm socket wrench. Of course, the crankshaft has to be jammed when doing that (34). Loosen the round nut with a hooked socket wrench which has to be applied accurately (Attention: left-handed thread) by hitting the hooked socket wrench. Should there be a circlip in front of the round nut, remove it beforehand and throw it away because it proved to be useless.



Figure 33

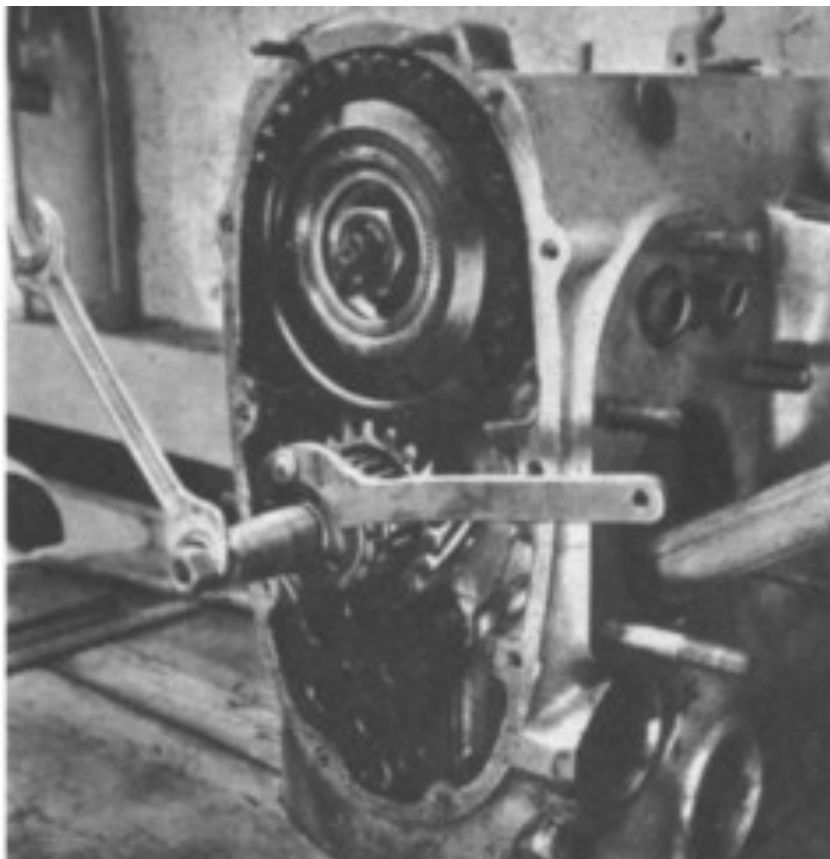


Figure 34

In the case of new crankshaft types (since approx.1953) the recess for the circlip is not provided anymore because it poses a certain risk of fracture when using a big generator. Loosen the three mounting screws of the oil pump and remove the latter. Should there be a cover disk between the foremost crankshaft bearing and the round nut, throw it away, too, because it was not built in by the works in the later years. Push the bearing (N205) and the pinion gear wheel off of the oil pump with a lever (35). To remove the Novotex gear wheel of the camshaft, bend back the lock washer at the nut with a screw driver. File an approx. 25mm thick slit into a round bar that is 7mm wide and 10mm deep. Heat up the round bar and bend it to approx. 90° (36).

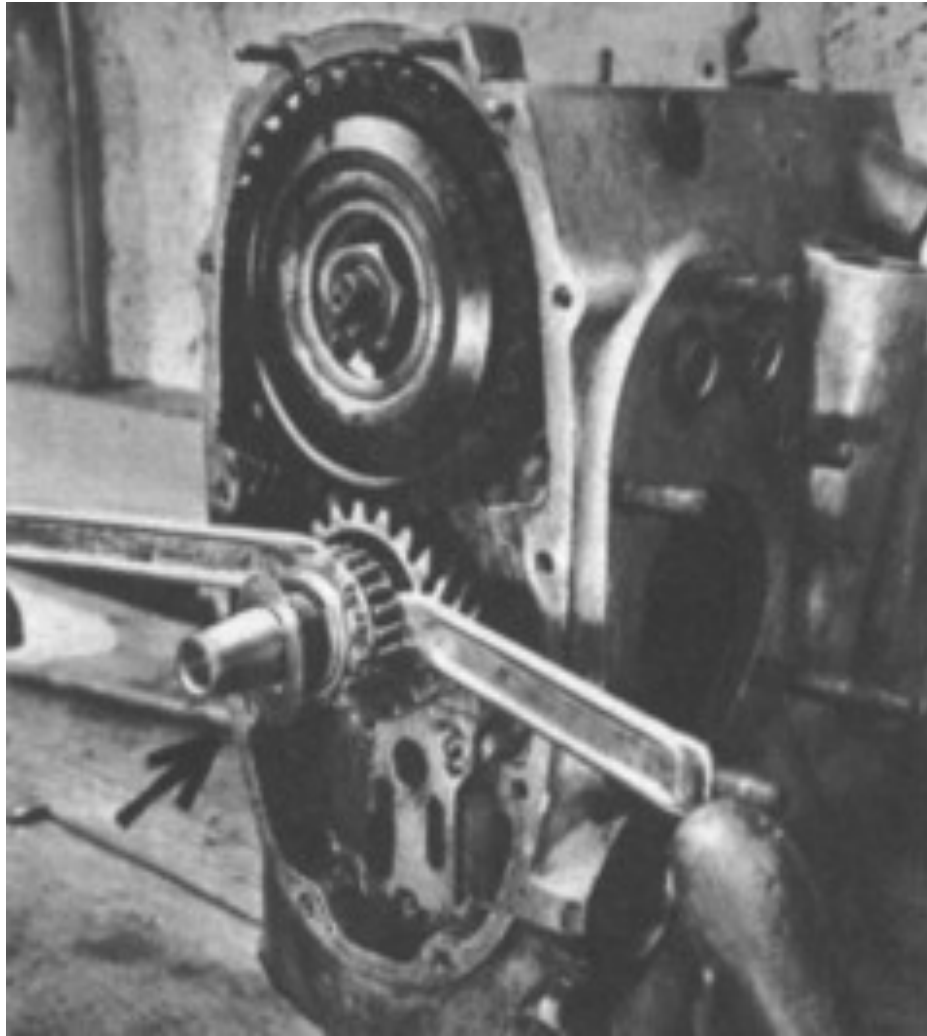


Figure 35

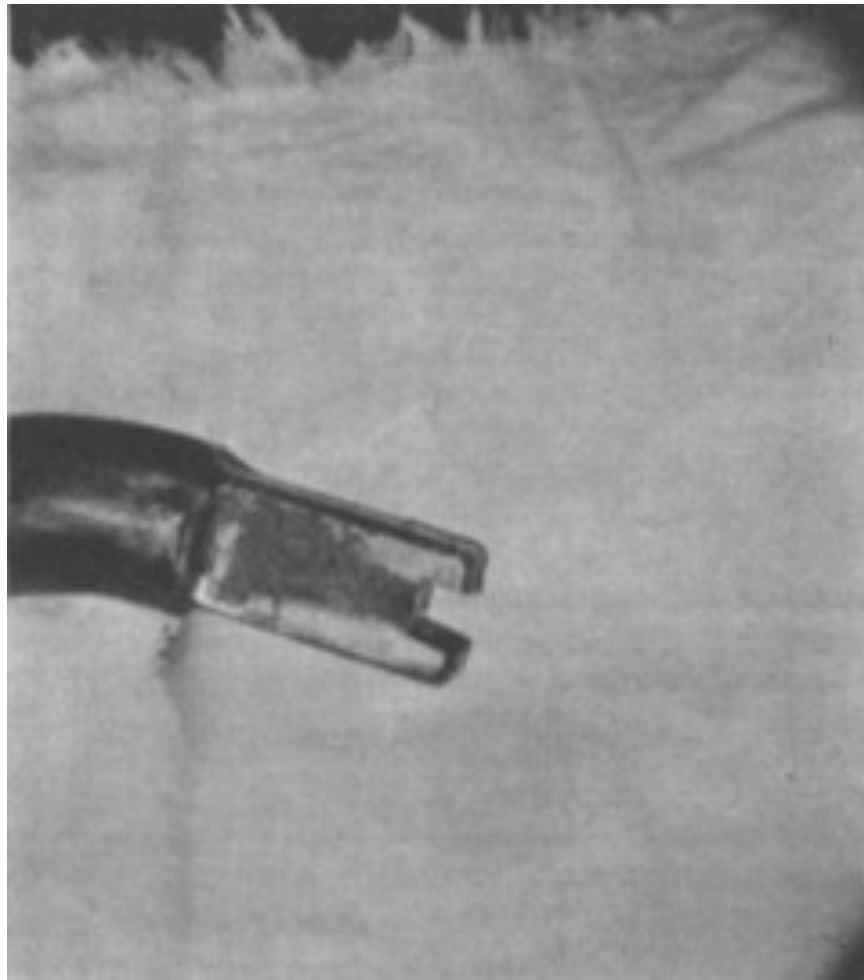


Figure 36

To loosen the nut of the Novotex gear wheel use a 30mm ring wrench that is bent at right angles. Apply the wrench to the nut, slide the round bar, which we use as fastener for the camshaft, on the flat end of the camshaft (37), and loosen the nut of the Novotex gear wheel (right-handed thread). This nut is usually very tight. It is understood that the casing has to be fixed on a workbench with a huge vise. It is even better, if a camshaft fastener shown in figure (38) could be made. With this fastener the nut can be loosened without the help of a second person (39). Is the nut removed, pull the fine toothed driving bushing of the Novotex gear wheel from the camshaft and then the gear wheel itself. Now the retainer plate of the camshaft, which is mounted to the casing with two hexagon head screws and lock washers, is visible. Loosen the two screws with a 10mm socket wrench, remove the retainer plate and put everything together with a note into a can. Two oil drillings can be found on the retainer plate. Only one of them will carry oil because just on one side in the casing is a pressure oil tube. So it does not matter which way the retainer plate is installed because one of the oil drillings will be connected to the oil tube of the casing. Front and reverse of the plate cannot be mixed up because the reverse is absolutely even and the front clearly shows the sliding surface of the Novotex gear wheel.

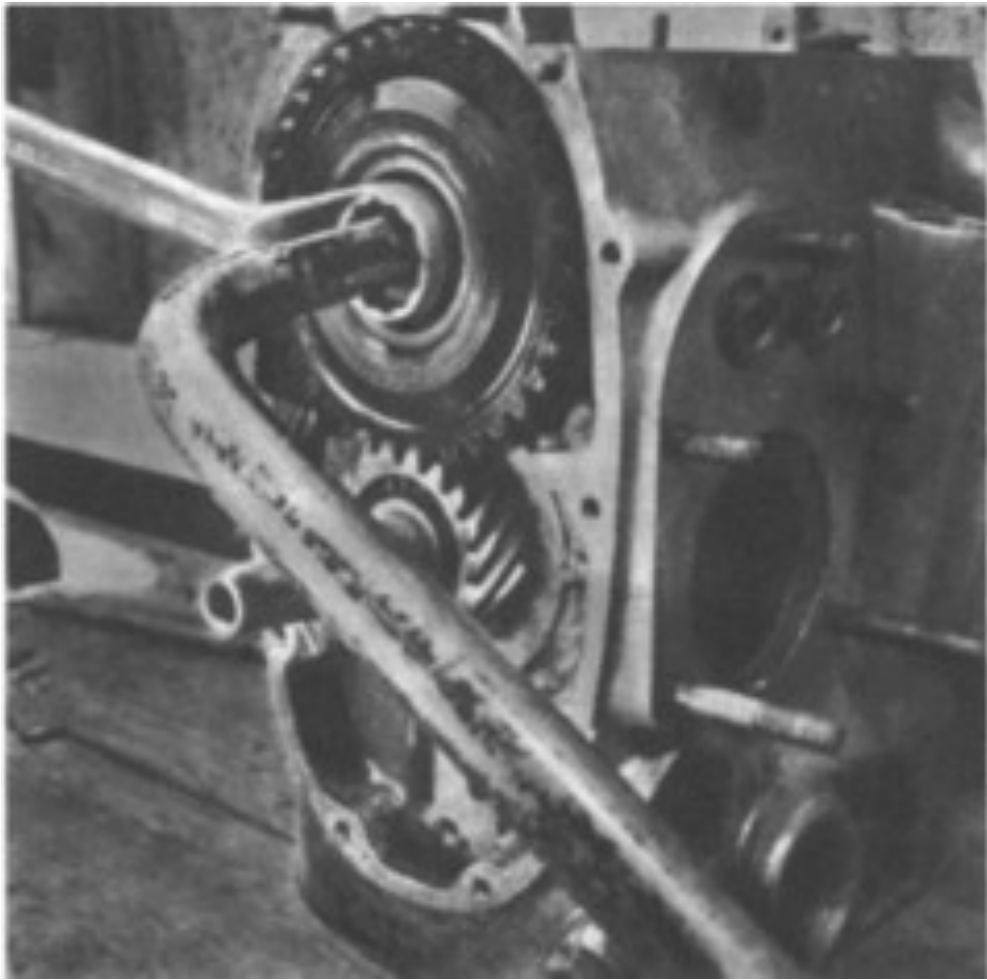


Figure 37

The camshaft can now be pulled out of the casing off-hand. There are three types of camshafts for KS engines. There is the aggregate shaft with 27mm, the regular 28-HP-shaft with 28mm and the sport shaft with 28.4mm total cam height. The total cam height is defined as the biggest measurable diameter of the cam. The individual camshafts of the postwar production have engraved numbers at the front and back face for better distinction, like 17 for aggregate, 12 for the regular and 25 for the sport engine (39).

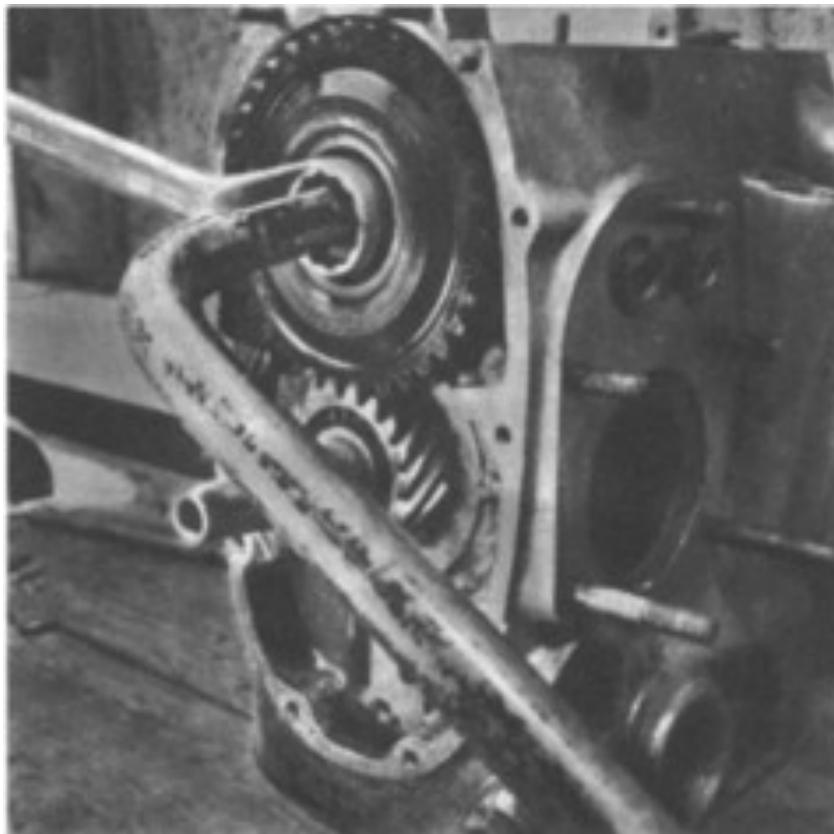


Figure 38

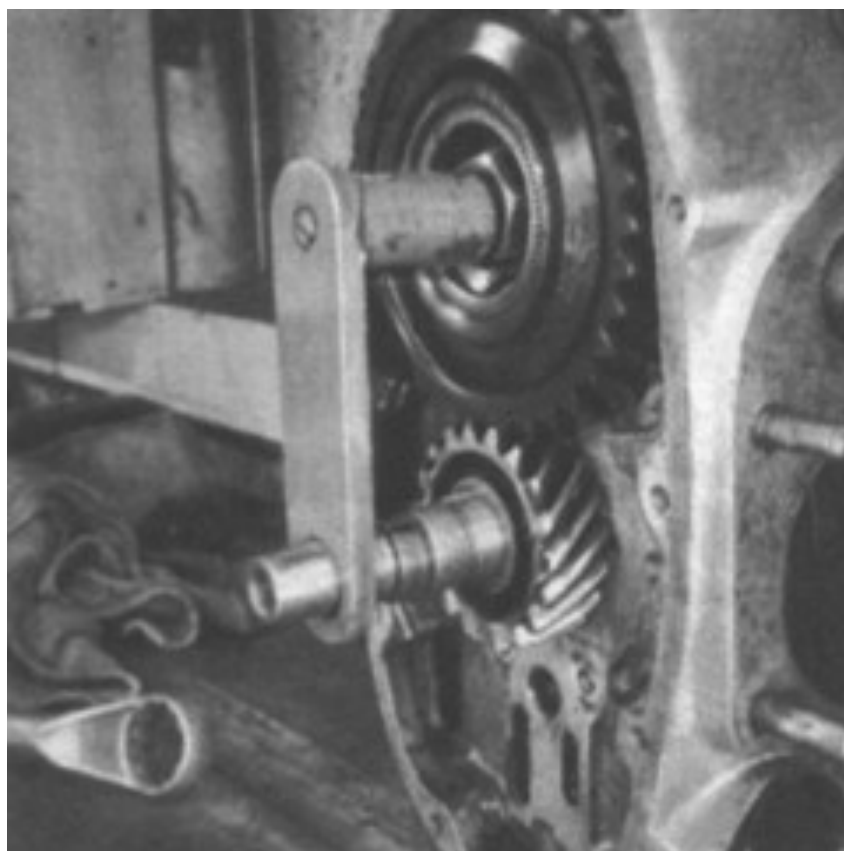


Figure 39

The big pinion gear wheel of the crankshaft can be handled with a hand-made puller (41a and 41b). Take the flat steel plate and slide it on the crankshaft, then insert two M6 screws into the two small holes in the plate and screw them into the pinion gear wheel. The two threads in the gear wheel are not completely cut through. That is why the wheel cannot be pushed off with just two screws.

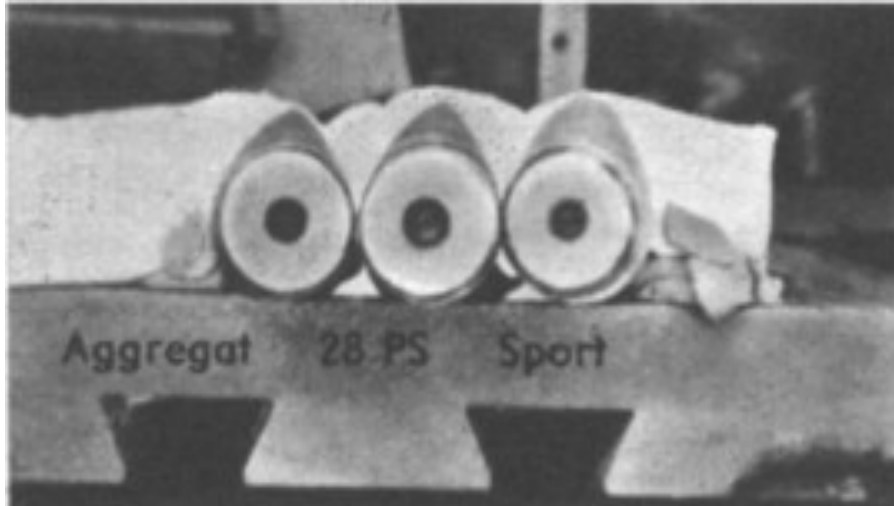


Figure 40
Aggregate 28 HP Sport

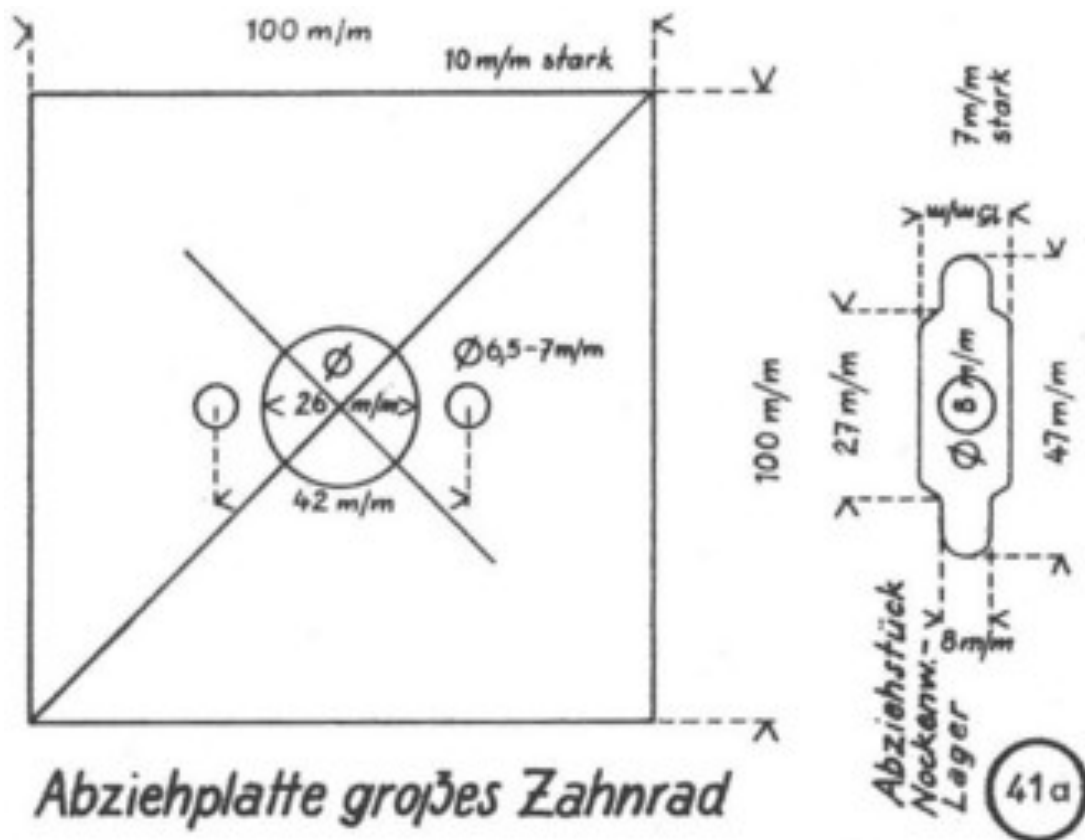


Figure 41a

10mm stark = thick

Abziehplatte großes Zahnrad = puller plate big gear wheel

Side:

Abziehstück = puller piece

Nockenwellenlager = camshaft bearing

7mm stark = thick

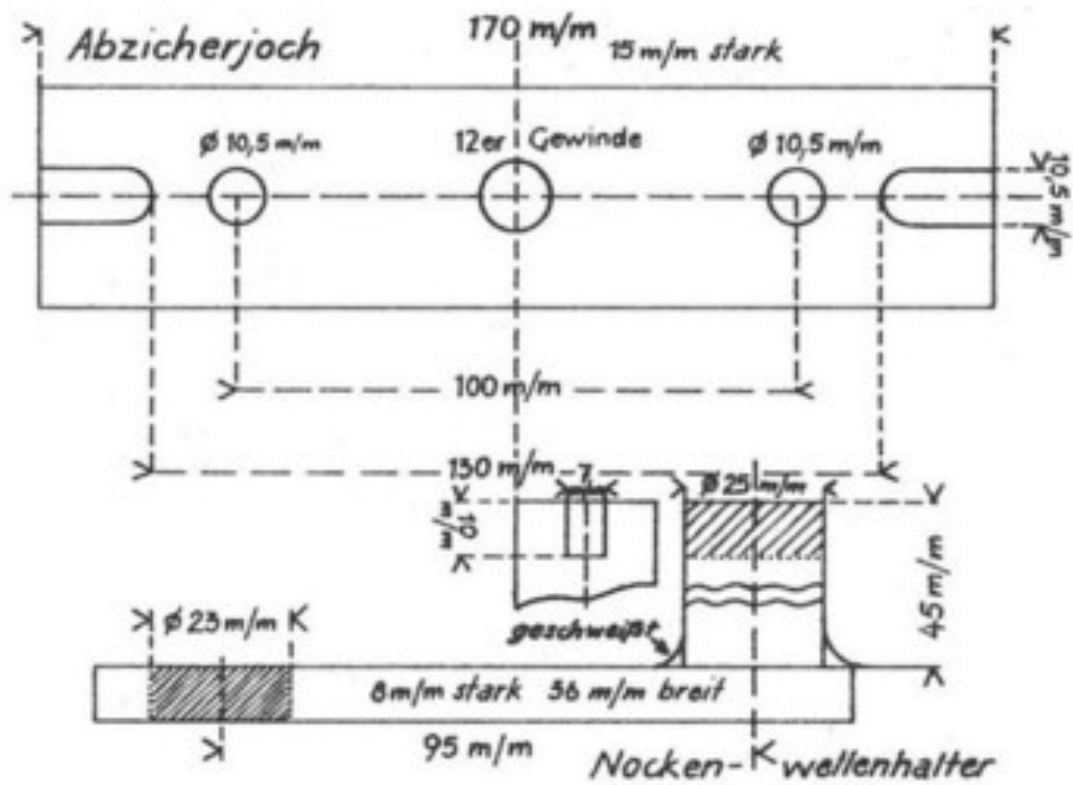


Figure 41b

Abzieherjoch = puller yoke

15mm stark = thick

12er Gewinde = 12mm thread

Geschweißt = welded

19mm stark = thick

36mm breit = wide

Nockenwellenhalter = camshaft fastener

Insert the two puller claws made out of screws into the puller yoke and loosen both nuts. The claws have to be of the same length. Regulate the length with the nuts. Put a washer under the pressure disk so that the cone point of the screw does not damage the thread of the crankshaft. Tighten the pressure screw with a 19mm socket wrench and hit its head with a hammer. Then tighten it more what will press the big gear wheel off (42). The small and the big metal wheels should, especially if the Novotex gear wheel is worn, be brushed in a metal polishing shop. The brushing will lead to a dull metal shine at the surface of the gear wheels and give us the best operating characteristics. Brushed wheels often lead to longer service lives of the Novotex gear wheels for oil pump and crankshaft as compared to new ones. (Provided that the Novotex gear wheel is new!)

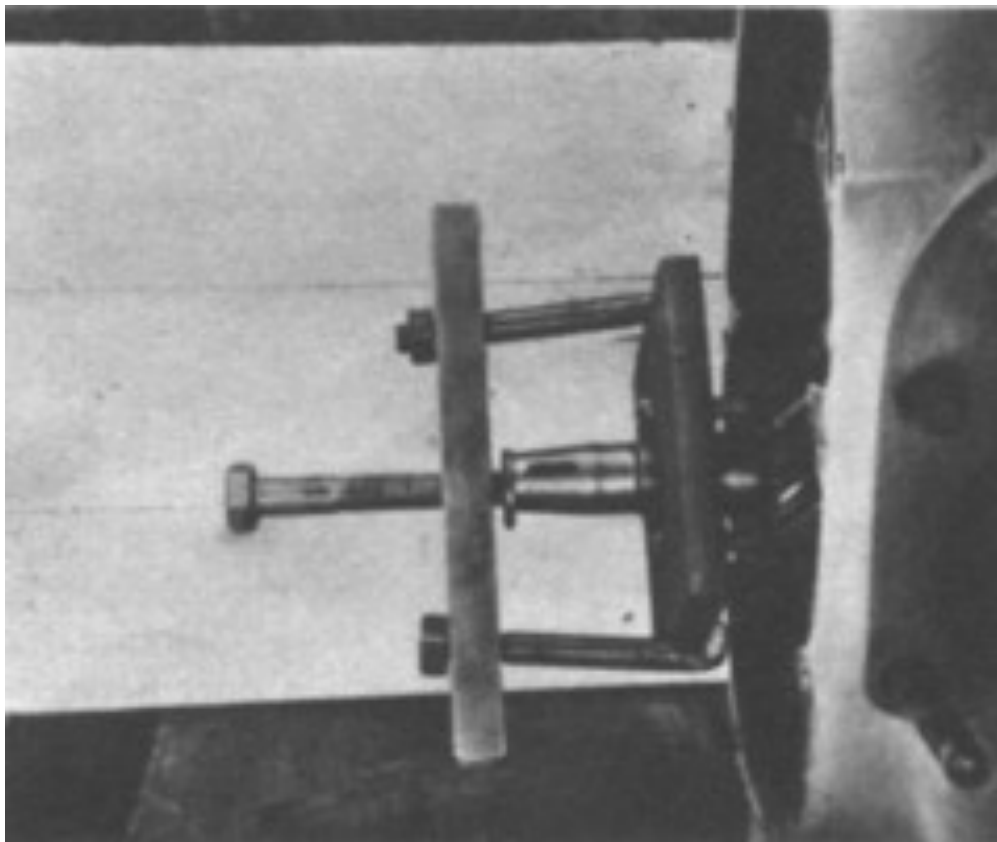


Figure 42

To remove the crankshaft from the casing, bend the lock washers on the 11 nuts of the studs open with a screw driver. (43, here still a pre-war bearing cover with just 6 studs). Loosen all 11 nuts with a 14mm box nut and remove them together with their corresponding circlips and spring rings.



Figure 43

Put the crankcase on its back and hit the crankshaft out of the case with a wooden hammer, putting an additional piece of hardwood on the crankshaft end. Heat the case up with a blow torch beforehand. There are two types of KS crankshafts. There is the 80th shaft built from 1937 to 1953 and the 100th shaft of the sport engine built from 1953 on. The expressions 80th and 100th come from the middle panel of the shaft. It is either 80mm or 100mm wide (44). All other measurements stayed the same. The figure shows the oil drilling (arrow) on the bearing cover, which supplies the rear connecting rod bearing and the rear crankshaft bearing with oil. Clean it!! The bearing covers built after 1953 have 2 oil drillings, one at the top right for the casing of the old type and one at the bottom middle for the casing of the new type.

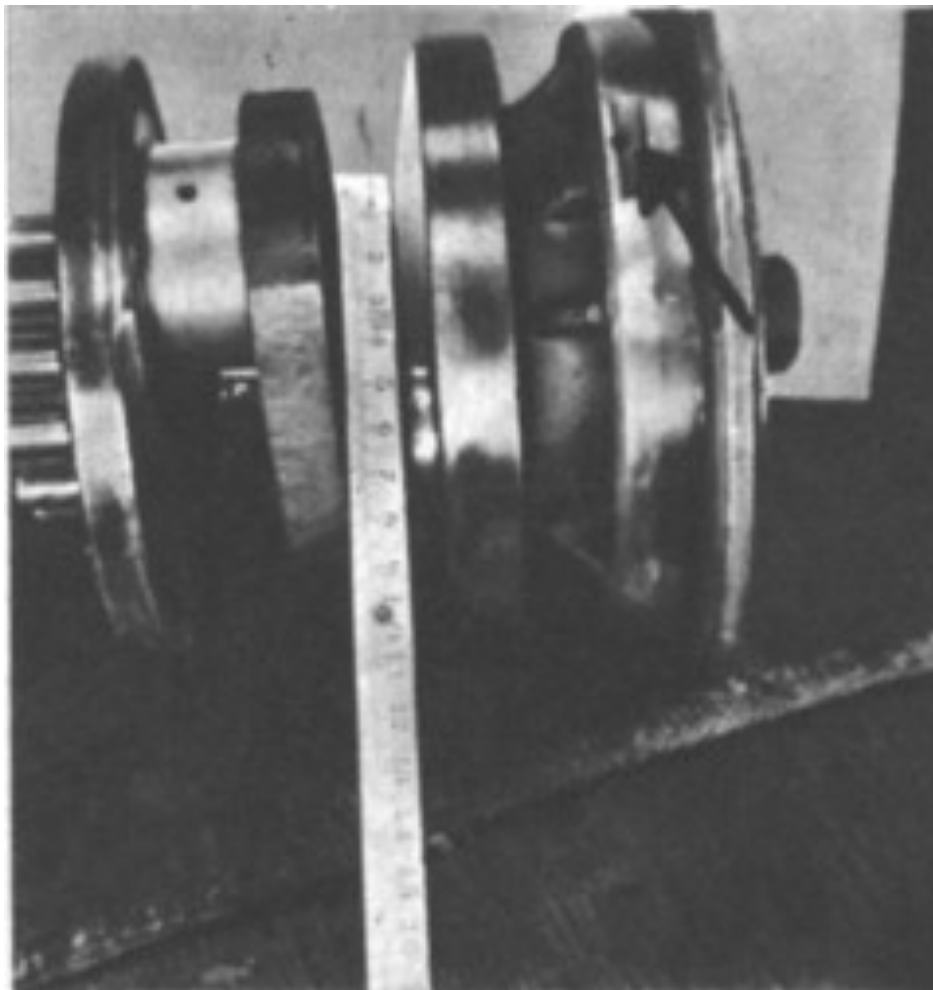


Figure 44

Remove the circlip of the two-piece retaining ring to pull the bearing cover with the bearing off the crankshaft. Do this with a screw driver and pliers. Insert the screw driver in the gap of the ring, lift the circlip and pull it out with the pliers. Push the retaining ring apart at the gaps with two small screw drivers, get both screw drivers under the same half and push it up. (45, here you can still see the circlip next to it). The shaft sealing will most definitely get damaged during this work, so get a new one. (Seal: 50 x 72 x 12 steel jacket). The other half of the two-piece ring is pushed up the same way. Take the big locking ring out with pliers. Pull the bearing cover from the shaft with the puller, in which this time the claws are hinged in the outer slots and the washer is put back between crankshaft and pressure screw. (Tighten pressure screw with a 19mm socket wrench, hit the screw head with a hammer, then tighten pressure screw more until the bearing cover comes off the shaft).

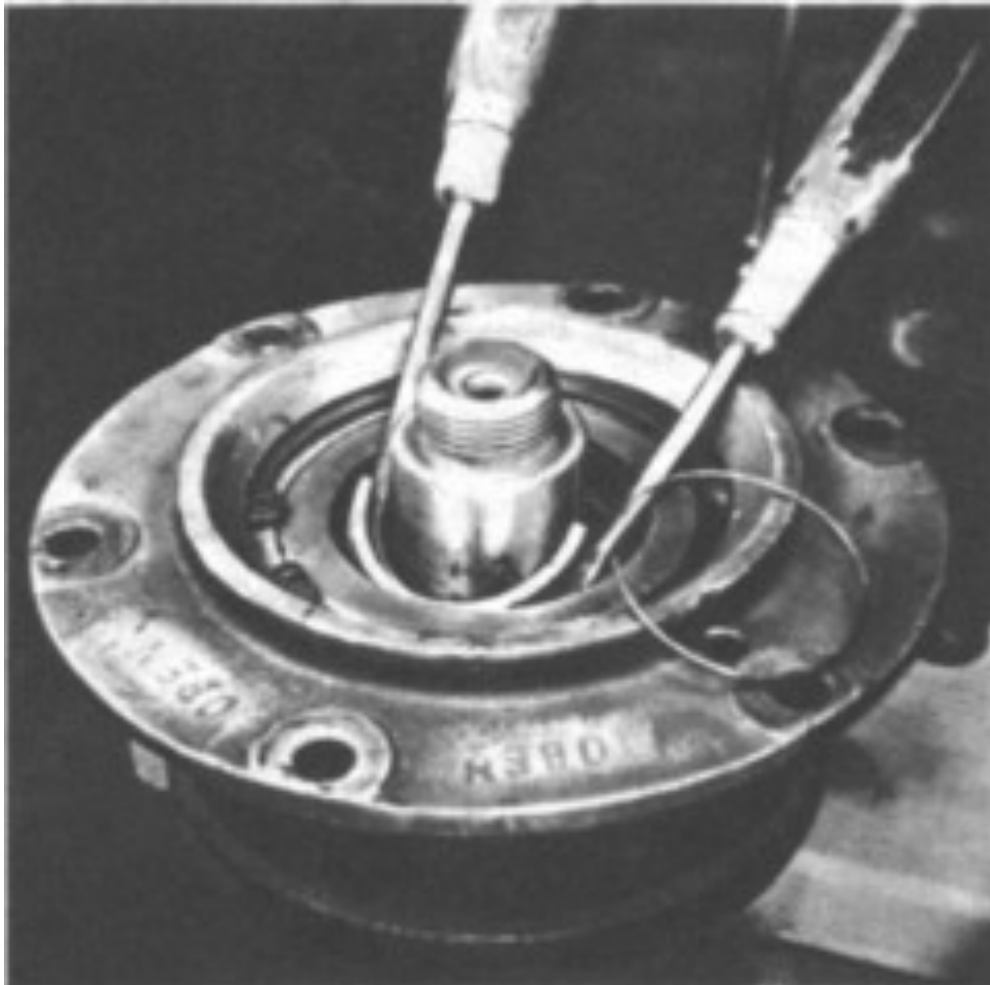


Figure 45

It is helpful for the following steps to fix a board, which can be inserted between the crank cheeks of the shaft, to the workbench with a vise so that the shaft is secured. Because there is no special puller for the shaft sealing and its bearing race, pull out the rubber like stuffing of the shaft sealing with pliers and cut open the sheet metal of the ring with an edge cutter until it can be removed. This way the shaft sealing can be removed even when the crankshaft with the bearing cover is still in the casing and only the sealing has to be replaced, for example because it got leaky. The new shaft sealing can simply be hit into its bearing cover with a piece of hardwood and a hammer. Turn the bearing cover around, take it in your hand and hit with a hammer on the inner race of the bearing (46).



Figure 46

By this you will get the bearing (6208 ZR 40x80x18) out of the cover. It goes without saying that just a faulty bearing should be hit out of the cover like that, because it would not make any sense to do that with a perfectly fine bearing.

Put the crankshaft onto the workbench to take the front crankshaft bearing off and prevent it from rolling back and forth with wood or something similar (old denomination cylindrical roller bearing 31 26

78). This bearing is not available anymore. Instead use a cylindrical roller bearing NU 207E.TVP2 plastic cage 35x72x17. Take out the rollers and trim the outer bearing race to 16mm in width. Furthermore insert spacer rings of 3mm thickness each on both sides of the inner bearing race, so that the original measurement of 23mm is reached. The spacer ring between crankshaft and inner race should have a smaller external diameter, so that when disassembling at a later point, the puller has a better grip.

Apply the flat chisel, which has to be held with thumb and index finger (the other three fingers hold the crankshaft) between bearing and crankshaft, and hit it with a hammer until the bearing slides forward on the shaft. Note that the gap between bearing and crank cheek may not get that big that the chisel will touch the crankshaft end and hits a dent in it. Let the gap only get so big that two levers can be applied (47).

Again put the shaft on the fixed board and press evenly on both levers. This causes the bearing to slide up on the shaft end. If the lever travel is used up, put two thick washers and later two nuts under the levers until the bearing comes off the crankshaft end.

Same situation here: only remove the bearings if they are faulty. The works supply a puller for these bearings which has to be applied at the cage and when pulling destroys the bearing.

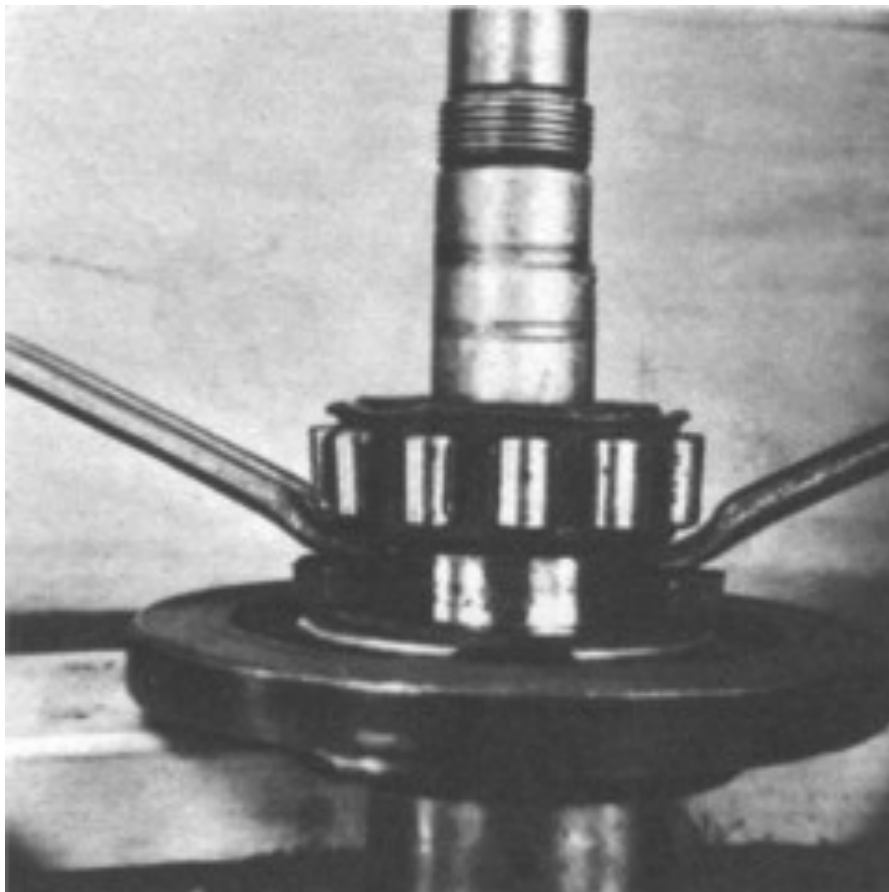


Figure 47

This as a proof that the bearing only has to be removed if it is worn out. The outer bearing race remaining in the case of the foremost crankshaft bearing can be taken out, too. First remove the two inner spring rings (48) in front and behind the race, then heat up the case at in this area with a blow torch and hit out the race with a hammer (49). Put a fitting piece of hardwood between it! To get the foremost camshaft bearing (NU 205 32x52x15) out of the case get a flat bar and a 75mm long M8 screw. Drill a hole into the flat bar and file it to the dimensions of figure (41). Slide the flat bar onto the screw head and weld them together. Apply the tool behind the foremost camshaft bearing. Insert the screw part of the tool into the center hole of the puller yoke. The yoke lies on the casing. Fasten it with washer and nut (50). Heat up the part of the engine around the camshaft bearing with a blow torch and then pull the bearing out by screwing the nut in with a 14mm socket wrench. Behind the bearing seat there is either an all around, two-piece collar (old casings) or a lock ring (new casings) visible. Collar or lock ring prevent the bearing from sliding into the casing.

Leave lock ring inside!

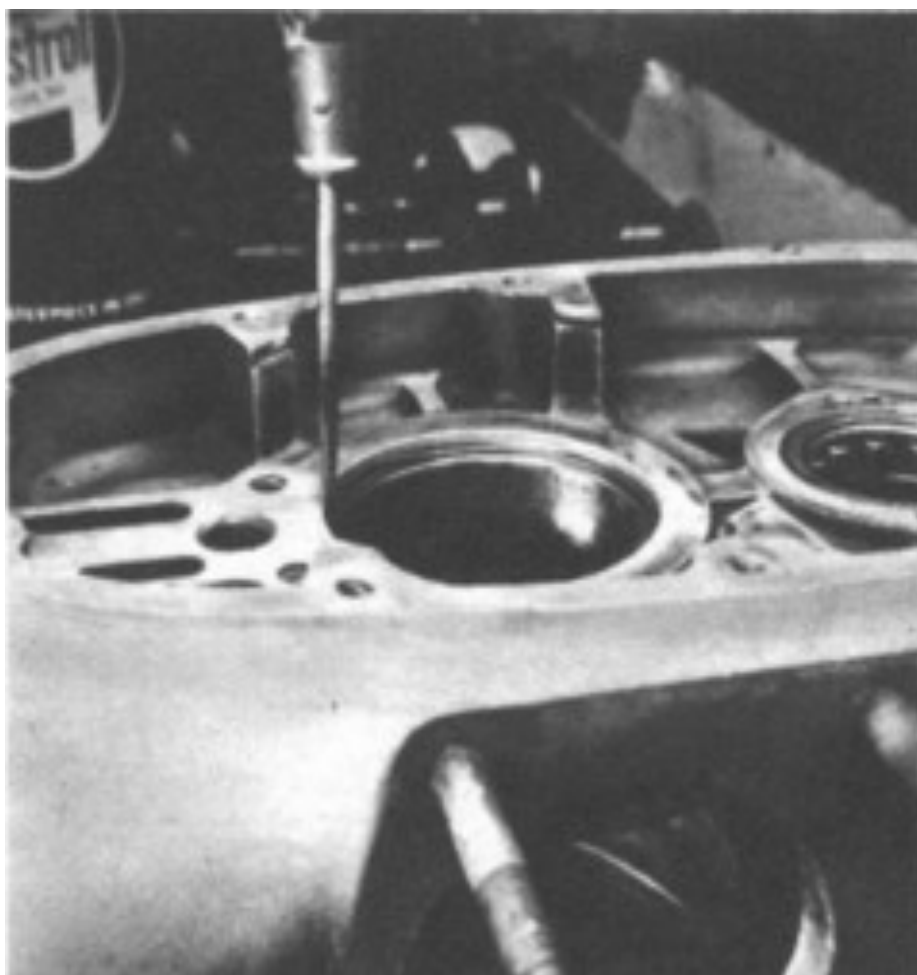


Figure 48



Figure 49

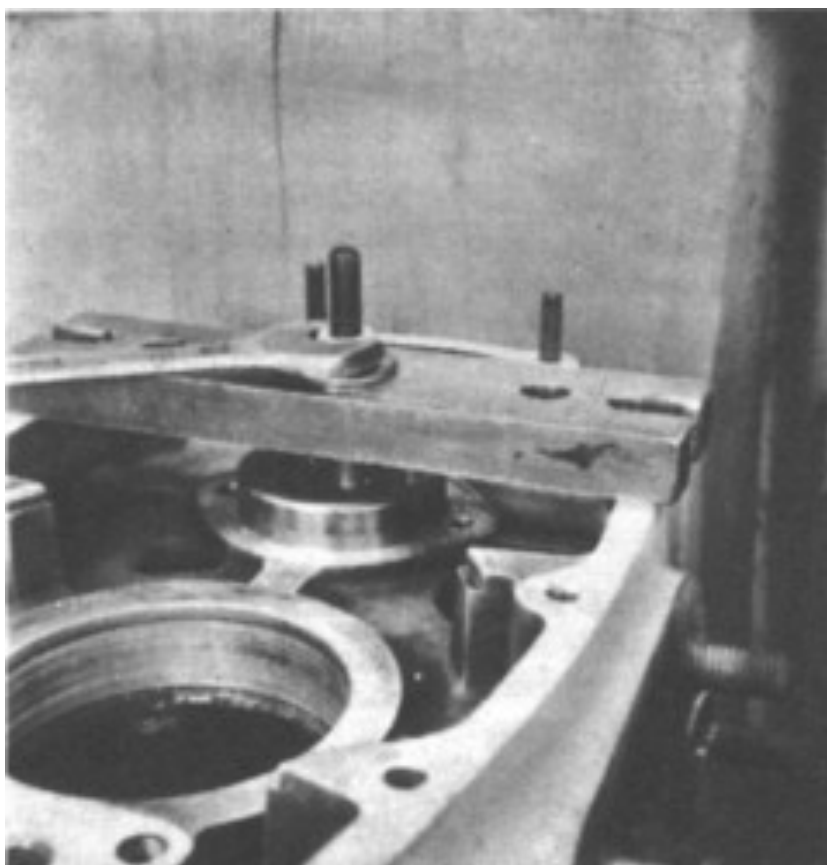


Figure 50

If the rear camshaft bearing (RNU 2202 19,3x35x14) is faulty and has to be removed, take out the lock ring in front of the bearing with pliers (long lock ring pliers or a metal compasses). Insert the two levers into the bearing in a way that the bent ends of the levers point outwards to the bearing. Then clamp the end of the levers together with a pin-vice and heat up the case around the rear camshaft bearing with a blow torch. Insert a mandrel into the pin-vice. Under the mandrel has to be wood so that it does not damage the casing. Slide a piece of tube over the mandrel and use it as a lever to pull out the bearing (51).

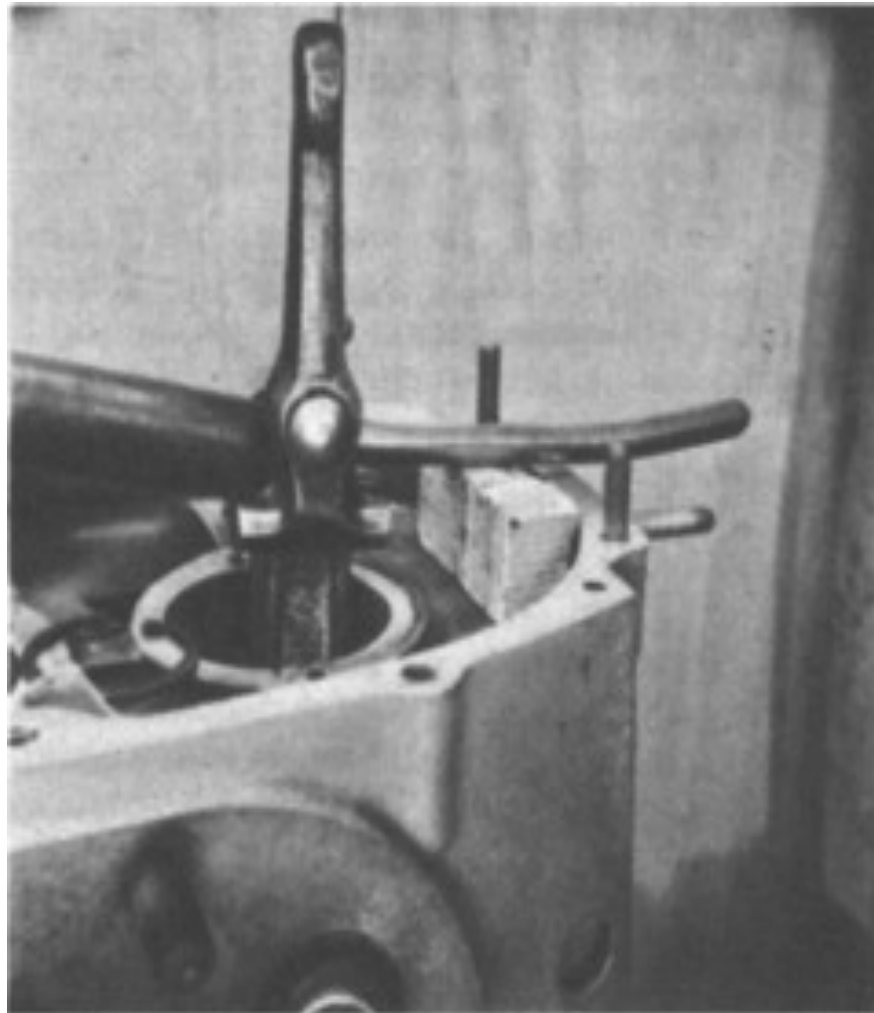


Figure 51

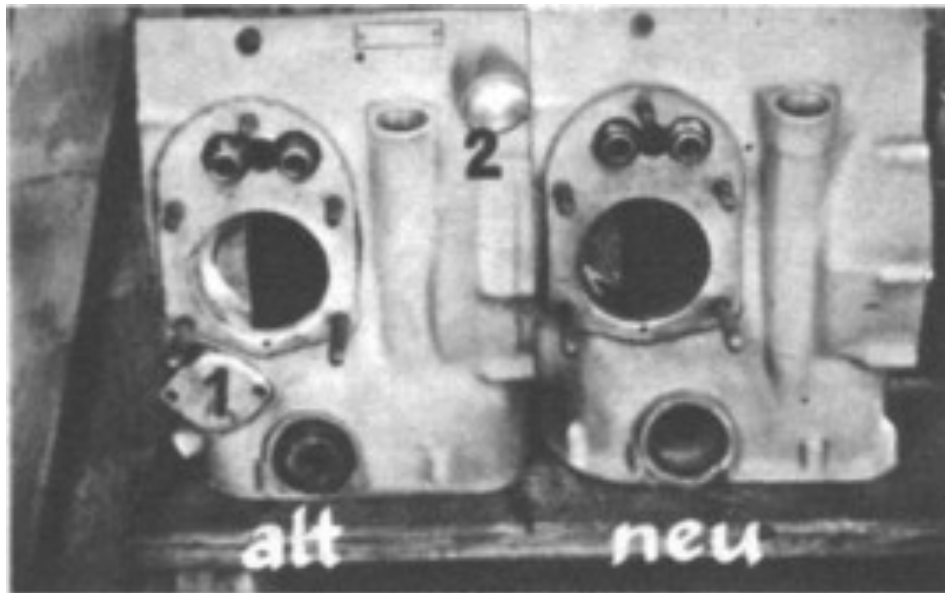
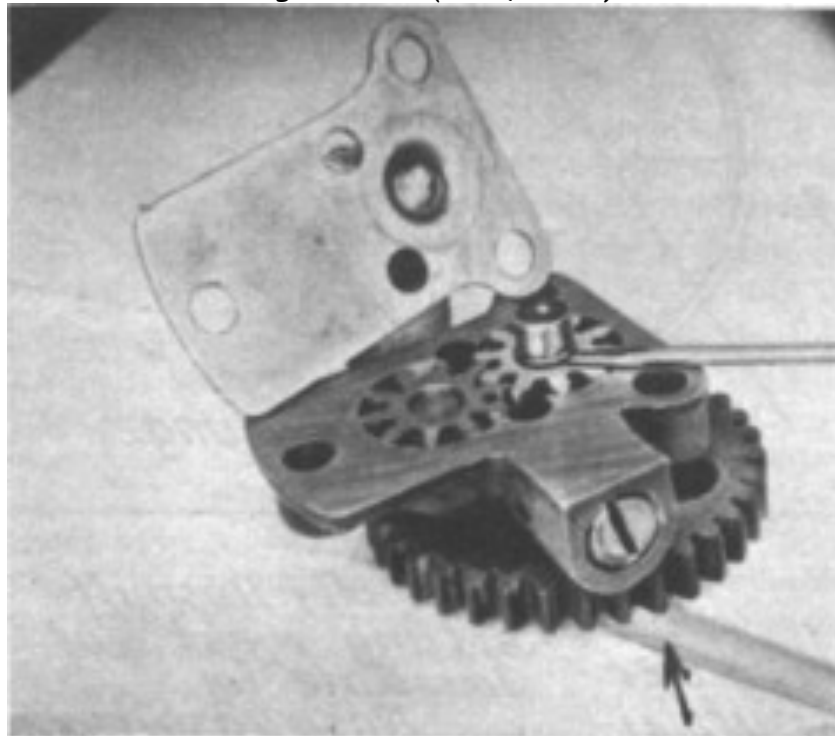


Figure 52 (Old, New)



To define the terms "old" and "new" casing, compare the two (52). Externally the old casing (left) differs from the new one by the cover plate which is under the left cylinder on the left (1). In the pre-war period was a disk filter of the oil cycle behind this cover. It was not satisfying so it is not used anymore. The visible connections (2) are remains of the single carburetor engine, the carburetor of which was located in the middle of the rear casing and supplied both cylinders with fuel-air mixture via these connections and the intake manifold. The old casting with the connections was used until the development of the sport engine. The connections were simply closed with screw plugs. On the top of the casing are the two locking screws of the oil pocket. This was intended to be a cooling

equipment for the oil of the single carburetor engine. The new casings do not have all these characteristics because the oil cycle was drastically simplified. In the old casings the oil from the oil sump is sucked into the oil pump. The oil gets out on the pressure side of the pump, arrives in the little chamber that is closed with the cover, rises on and runs to the oil pocket in the back, passes through it and then spreads out. One part flows down into the bearing cover and from there to the rear connecting rod and crankshaft bearings. The rest of the oil flows on the top of the casing to the front and greases the sliding surfaces of the Novotex gear wheel. The camshaft bearing, camshaft, valve tappets, rocker arms and valves as well as the piston tracks are supplied by lubrication splash.

The oil cycle in the new casing: The oil is sucked from the oil sump to the oil pump. The oil gets out on the pressure side where the line splits up. A part of the pressure oil is lead horizontally through the casing and flows into it back at the bearing cover. From here the connecting rod and crankshaft bearings are lubricated. The other part of the oil rises to the top, gets out at the height of the foremost bearing and feeds the front connecting rod and crankshaft bearings. The rest rises to the very top, to the sliding surface of the Novotex gear wheel. All other moved parts of the engine are lubricated by the oil splash, as in the old casing.

Before we go on, wash the engine casing thoroughly. Especially clean the oil pocket (top) in the old casings, and the opening under the left cylinder closed with the cover plate. Pierce all oil lines with wire and blow them out with compressed air.

To provide proper lubrication of the engine take a look at the oil pump. If the pump wheels between case and cover can be slid back and forth; they have some wear. To get rid off this play, which lowers the delivery pressure, disassemble the pump. Remove the cover and take out the circlip on the oil pump axle with a small screw driver (52). Now the axle can be pushed out of the case. The wheels remain in the case.

The pump seals (between engine casing and cover and between cover and pump case) have to be replaced. Remove the pressure control screw at the side of the pump with a screw driver and then remove the pressure control spring with its steel ball (10mm). Remember how deep the screw was screwed in to achieve the same position when reassembling the pump. Put a piece of sandpaper with medium grain size on the surface plate or window glass and grind the oil pump case and the wheels until an even grinding pattern is achieved. Now take out the wheels, turn them around and put them back onto the case. Grind it until the grinding pattern is even again. Take the pump wheels out of the case and grind the latter again with 5 circular movements. It has to be circular because simply grinding back and forth will not generate an even surface. It is recommended to completely assemble the pump, put in with both seals and install it in the casing. (Attention: check, if the seal between cover and pump case

is not duplicate. This happens when punching the seals and has devastating effects on the engine – loss of pressure.) Check, if the oil pump wheel can easily be rotated without axial play. Now reinstall the oil pump.

Heat up the bearing cover with a blow torch or a gas flame. Push the bearing 6208ZR into the hot bearing cover. The cover plate has to point to the back, in the direction of the flywheel (53). Should the bearing not slide into the cover on its own, it has to be hit in with a hardwood block and a hammer. Before that, work on the hardwood block with a rasp so that just the outsides of the block touch the outer bearing race when hitting. Fix the board, which fits between the crank cheeks, to the workbench again and slide the crankshaft on. Put the bearing cover on the crankshaft end. Press the bearing with bearing cover on the shaft by putting a piece of tube (1 ½" in diameter, 11cm long) on the inner bearing race and hitting it with a hammer.

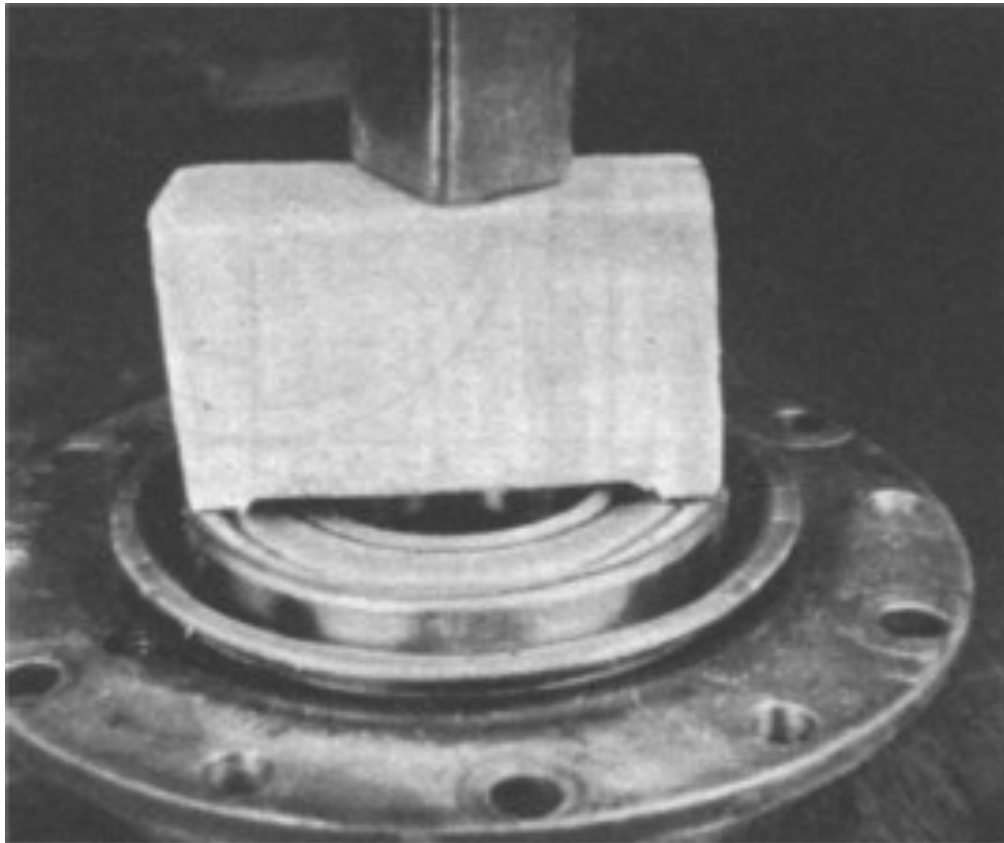


Figure 53

Press the two-piece retaining ring into the groove of the shaft end (54). The ring will under no circumstances go into the groove easily, but has to pose resistance to the fingers until it has found its seat. If the ring sits loosely in the groove, the bearing and cover have to be taken off the shaft with the puller to put compensation washers of the required size (Zündapp No 130z216) between the crank cheek and the inner nearing race. This does not damage the bearing because its impact toughness is greater than the applied puller pressure.

After that press the bearing and the cover back on the shaft and check the fit of the ring again.



Figure 54

Slide the circlip of the two-piece retaining ring into its groove with the help of the two small screw drivers (55), and check that the open part of the circlip is twisted at right angles to the gaps of the retaining ring. Put the shaft seal into the bearing cover. Press the seal (50x72x12) with a wooden block into the heated steel ring until seal and ring align. The sealing lip with its sharp edge has to point downwards. Hit seal and ring with a sawed piece of wood and a hit them into the bearing cover (56) until steel ring and outer bearing race fit. The sharp edge of the sealing lip points inwards! Last put the big circlip into the groove of the bearing cover.

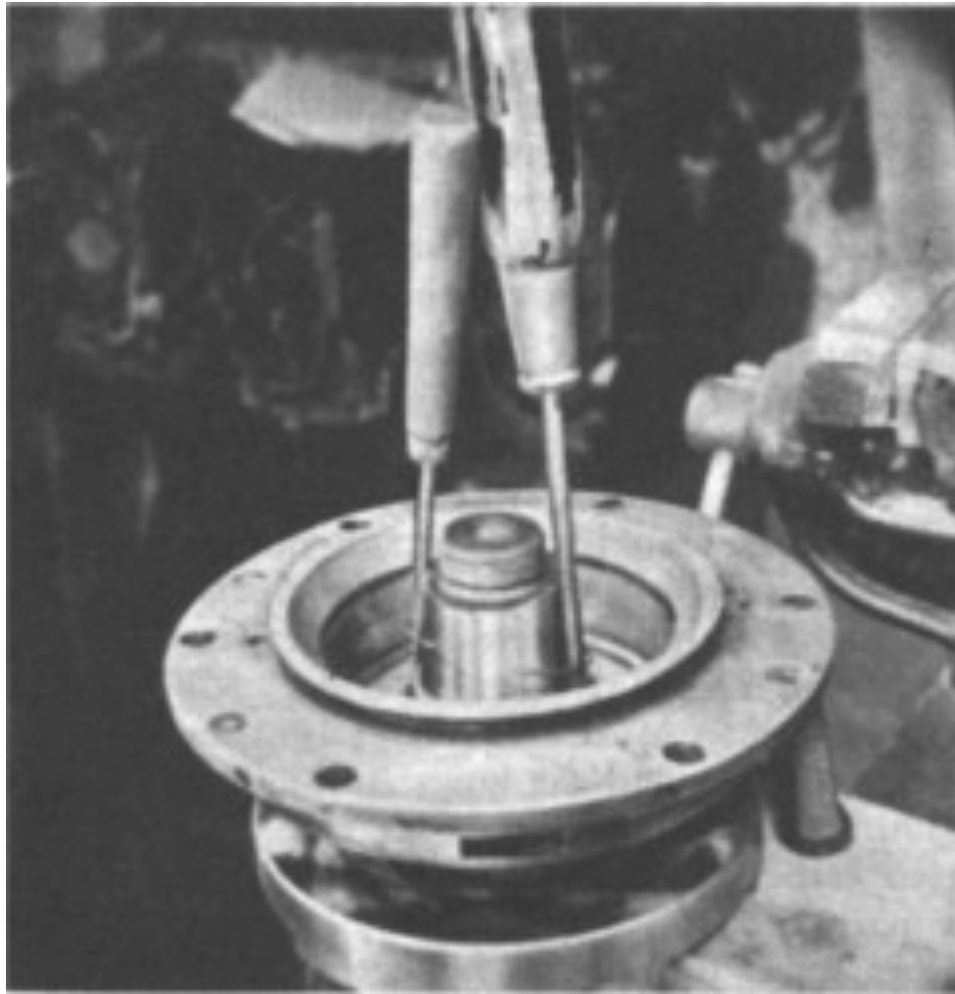


Figure 55

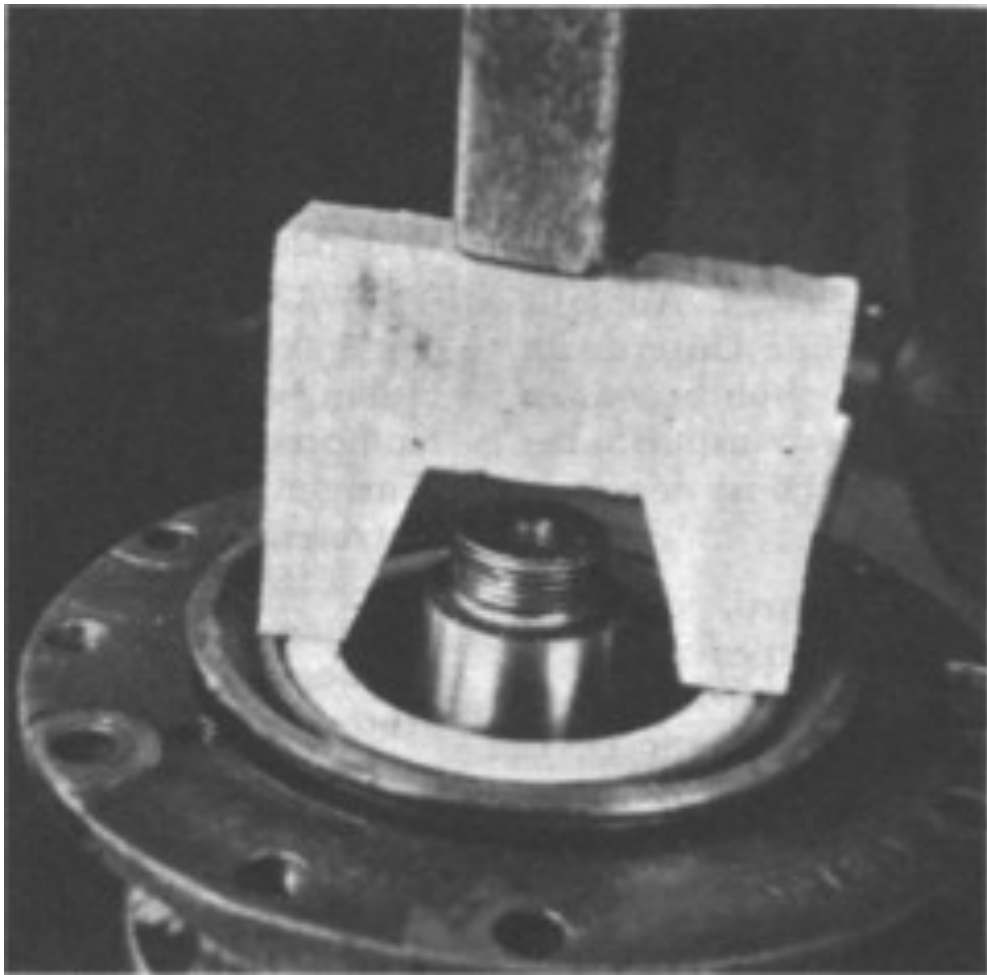


Figure 56

Hit the big roller bearing at the front onto the shaft with a piece of tube ($1\frac{1}{2}$ "x11cm) slid onto the inner race of the bearing and a hammer (57). The small diameter of the bearing cage has to point to the crank cheek (puller has a better grip).

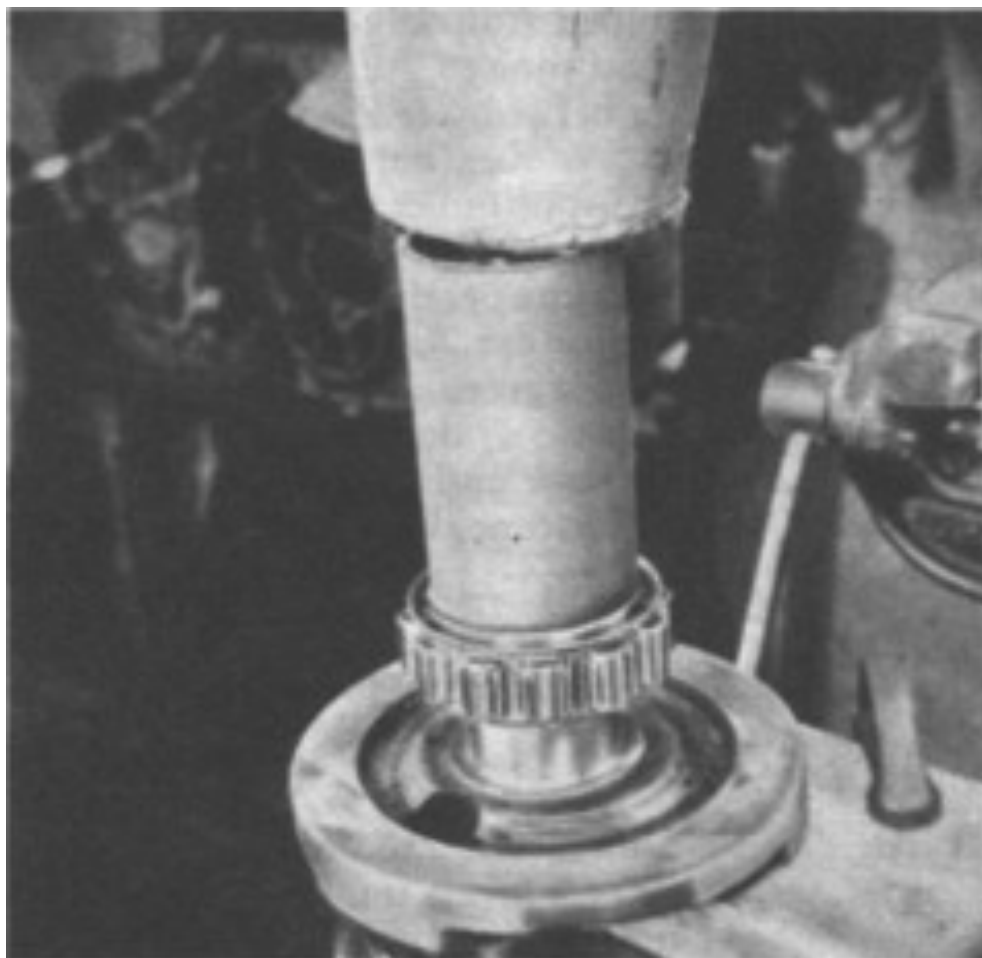


Figure 57

To install the outer race of the big roller bearing in the casing, insert the inner spring ring, which has to point into the casing, into its groove and heat up the casing with a blow torch. Put the bearing race onto the casing with the conical side of the roller track down (58) and hit it in with a wooden block and a hammer. When the race is seated, insert the first (outside) spring ring into its groove.

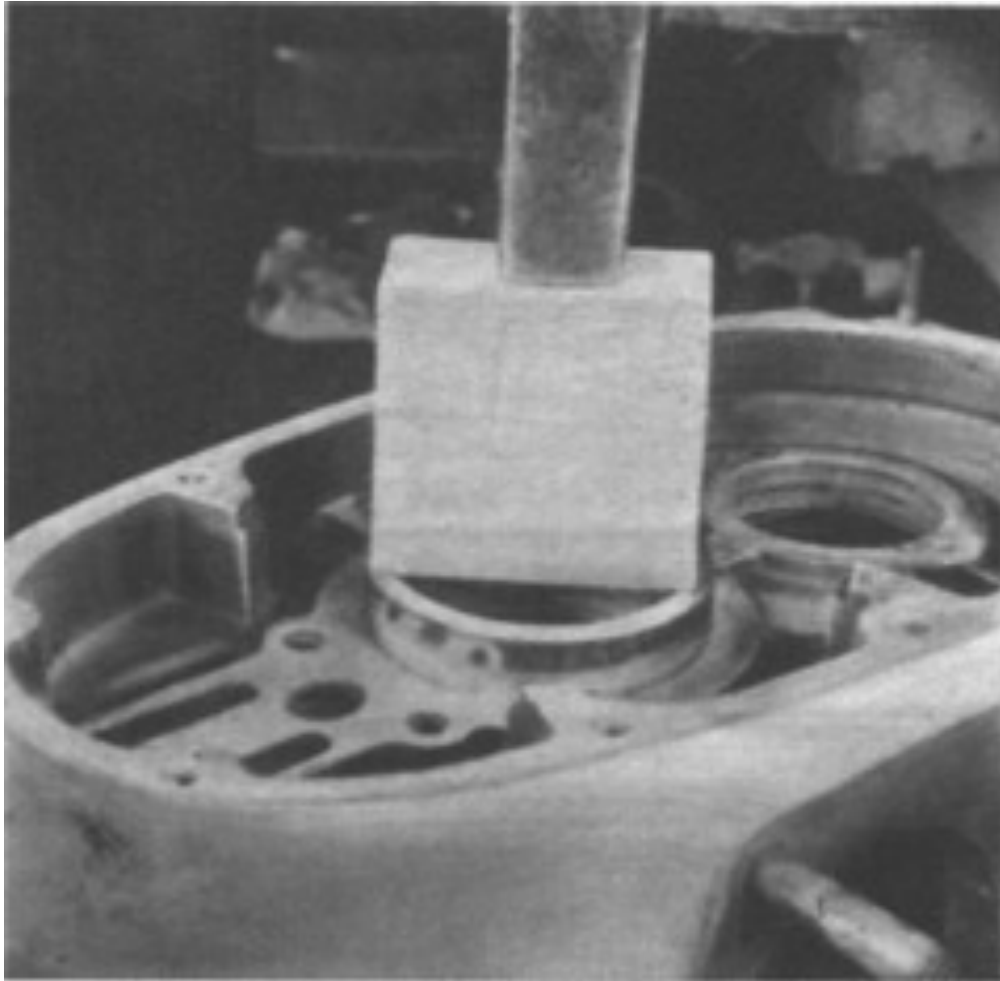


Figure 58

Use a piece of tube (1" in diameter, 15cm long) to install the rear camshaft bearing. Put the bearing into the heated casing (59), apply the tube and hit it in with a hammer. Put the circlip into the groove in front of the bearing with pliers or metal compasses. In the case of bearings with sheet metal cages, the small diameter of the cage has to point backwards to prevent the camshaft from touching the cage. This does only apply when installing the original bearing.

The original bearing RNU 2202 is not available anymore. Alternative: INA carrier roller RNA 2202-2xRS and inner race 17x20x20.

For these the rear pin of the camshaft has to be ground down to 17.01mm.

Put the front camshaft bearing (NU 205) on the heated casing with the bigger cage diameter down (60). Hit it in with a wooden brick and a hammer until the edge of the outer race forms a line with the surface of the casing.

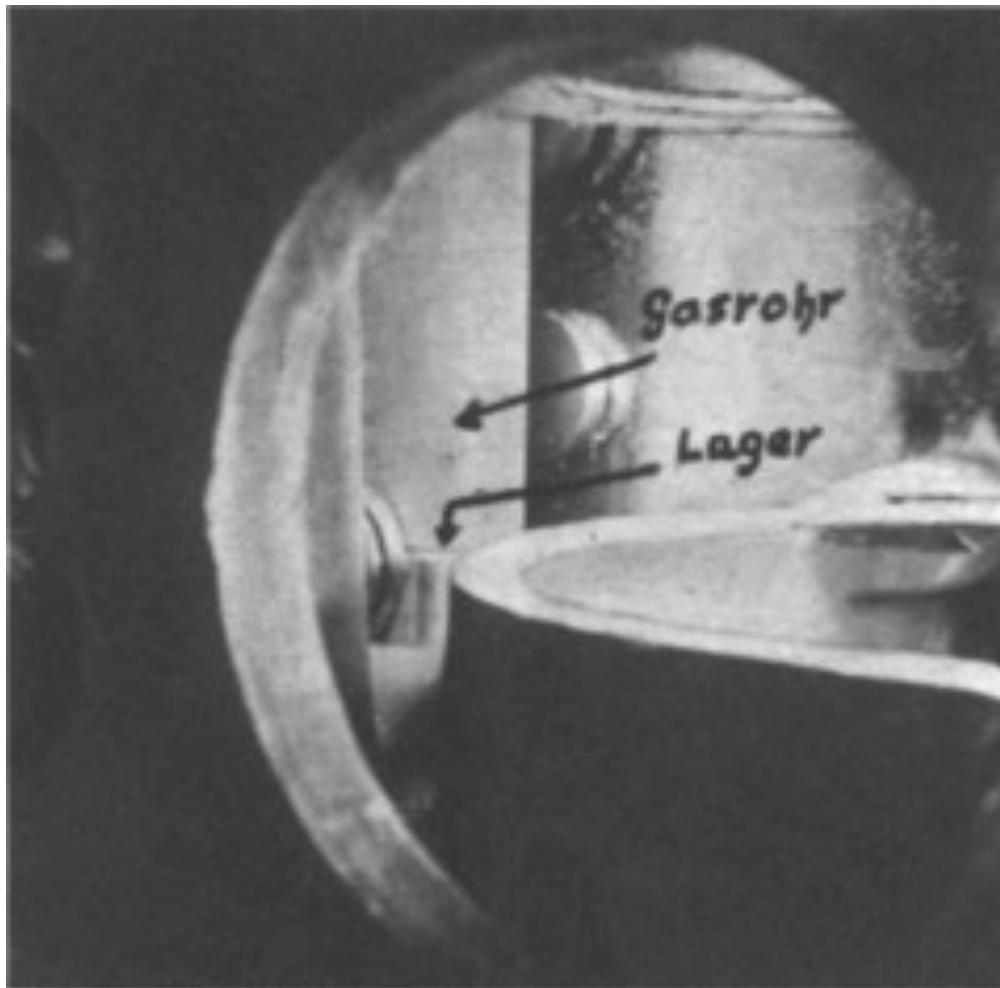


Figure 59 Gas pipe, Bearing

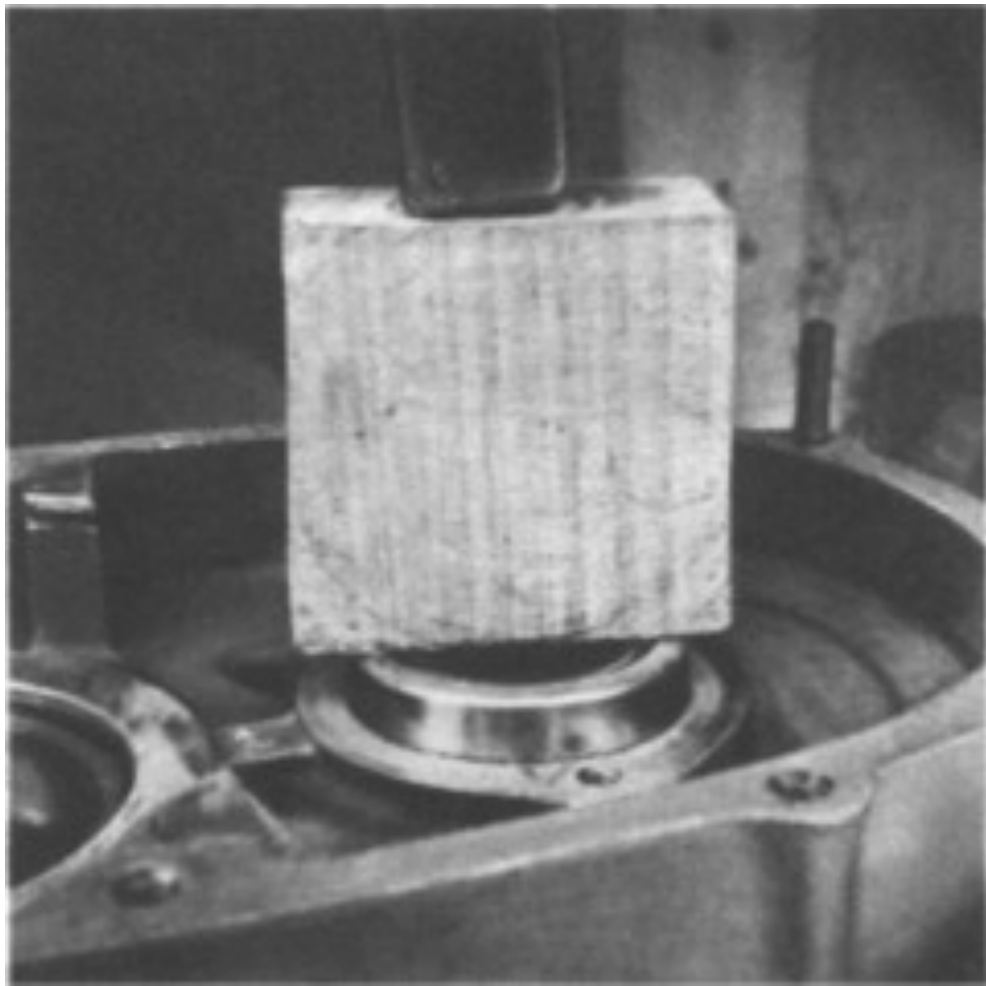


Figure 60

Turn the casing around and support it with 11cm high wood. Heat up the area around the 11 dowel pins with a blow torch. Put the bearing cover seal on the casing with the graphited side down (61). The side that is not graphited will adhere to the bearing cover during operation and can easily be scraped off when disassembling.

Insert the shaft into the hot casing. (Mind the front crankshaft bearing!). Hit the bearing cover with a wooden block and a hammer. In doing so the shaft will move into the casing.

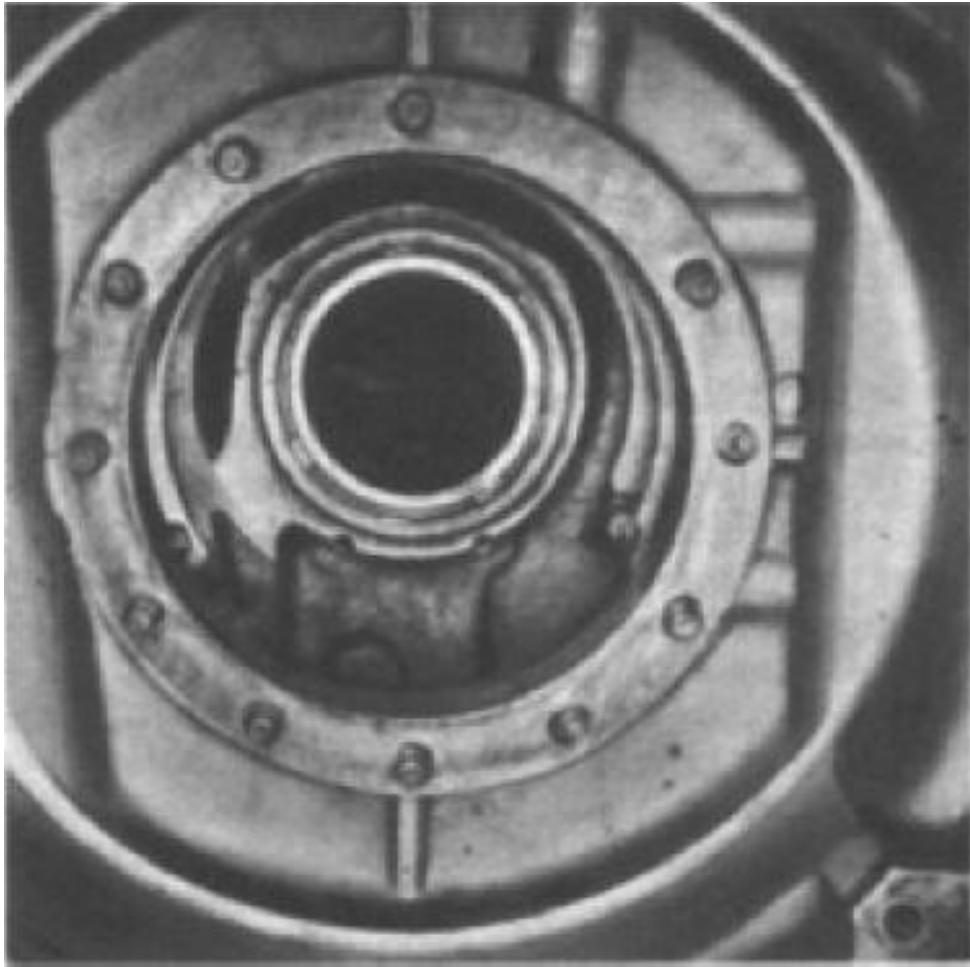


Figure 61

Put the 11 lock washers and then the 11 spring washers onto the studs. Tighten the nuts with a 14mm socket wrench. Put the casing bottom down on the workbench, clamp it with the vise and ultimately tighten the 11 nuts crosswise. Bend the locking plates at the nuts up with a screw driver while the projecting part of the locking plates at the bearing cover have to be bent and hit towards the casing. In the case of pre-war types it is recommended to change the number of studs from 6 to 11.

If the big fitting key (wedge) was removed during disassembly, put it back into its groove and pat it with a screw driver shaft (62).

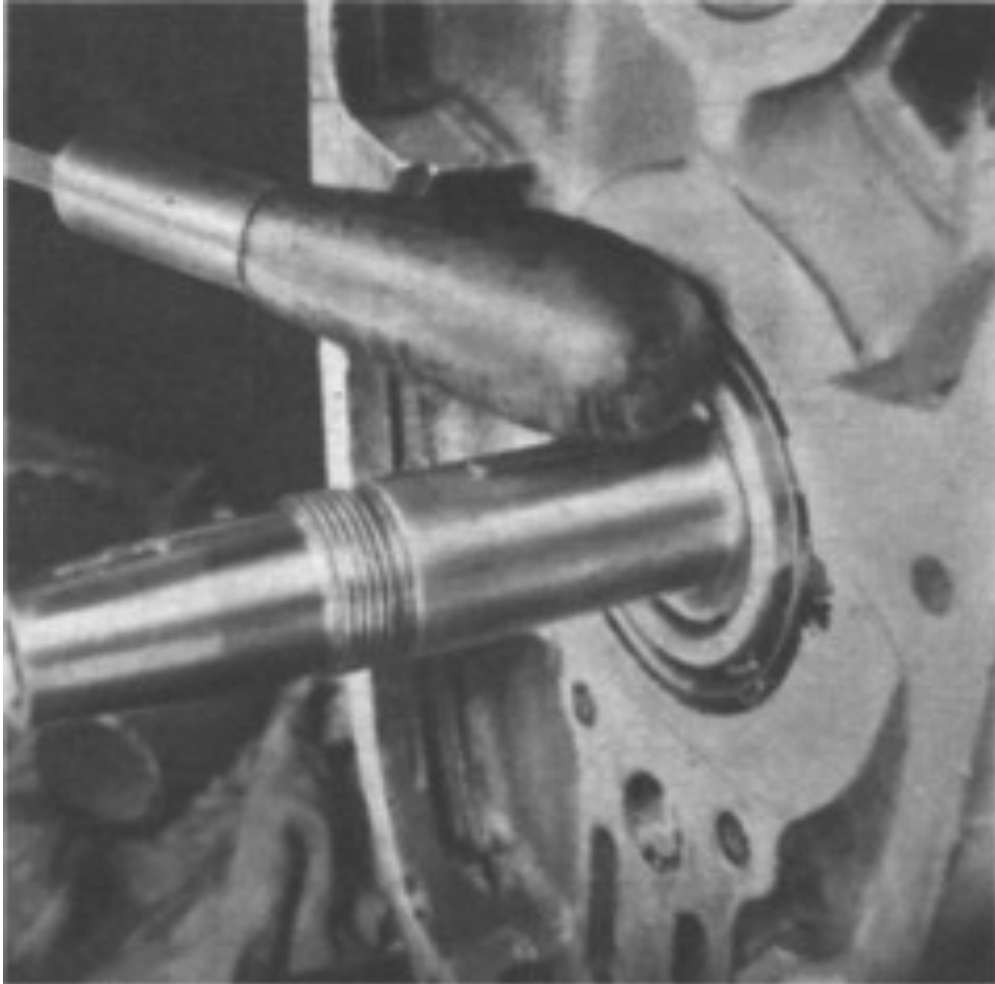


Figure 62

A piece of tube (1" in diameter, 10cm long), a 100mm long M8 screw and a nut, and a sufficiently long washer or flat bar are required to push the big and the small metal gears onto the crankshaft (63). Screw the threaded part, (external thread 12x1x15, internal thread M8, 14mm hexagonal) used for mounting the big generator armature onto the crankshaft, to the front of the crankshaft. For engines with small generators, which do not have the threaded parts, it is necessary to get one. It is used as a fastener for the tight fitting equipment.

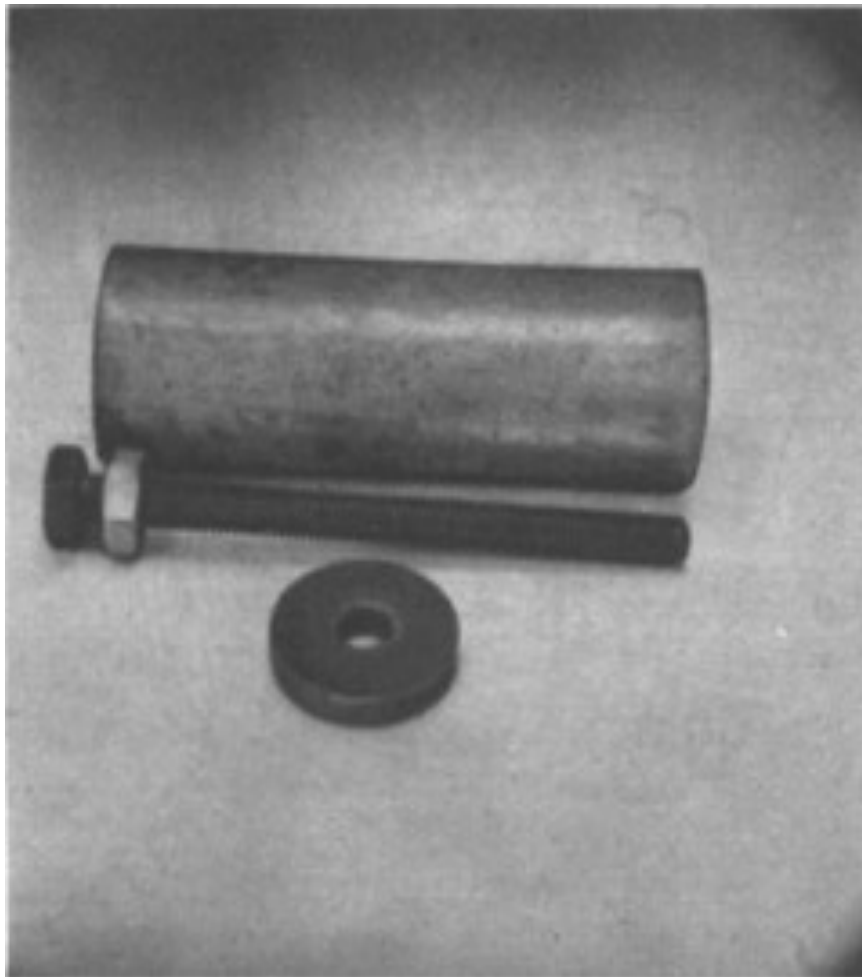


Figure 63

Attach a piece of wire to the large gear and place it into a pot with boiling water and heat it up. Take it out when it is hot, shake it off and push it onto the shaft with the keyway pointing to the wedge. Slide the tube onto the shaft and (64) and twist the bolt with nut and washer into the threaded part on the crankshaft. Tighten the screw with a 14mm socket wrench and hold the nut with a second wrench. In doing this the big gear is pushed into its place on the crankshaft by means of washer and tube. Push the gear so far that it rests against the inner race of the big roller bearing.

Same as the big one, the small gear is heated up and pushed in with the fitting equipment. The beveled side of the teeth has to point to the big gear wheel. (So the teeth do not get damaged when removed).

Don not heat up the foremost bearing (N205 25x52x15), but press it into place the same way (The small diameter of the cage has to point to the small gear wheel). (65, this is the hexagonal threaded part on the crankshaft, arrow.)

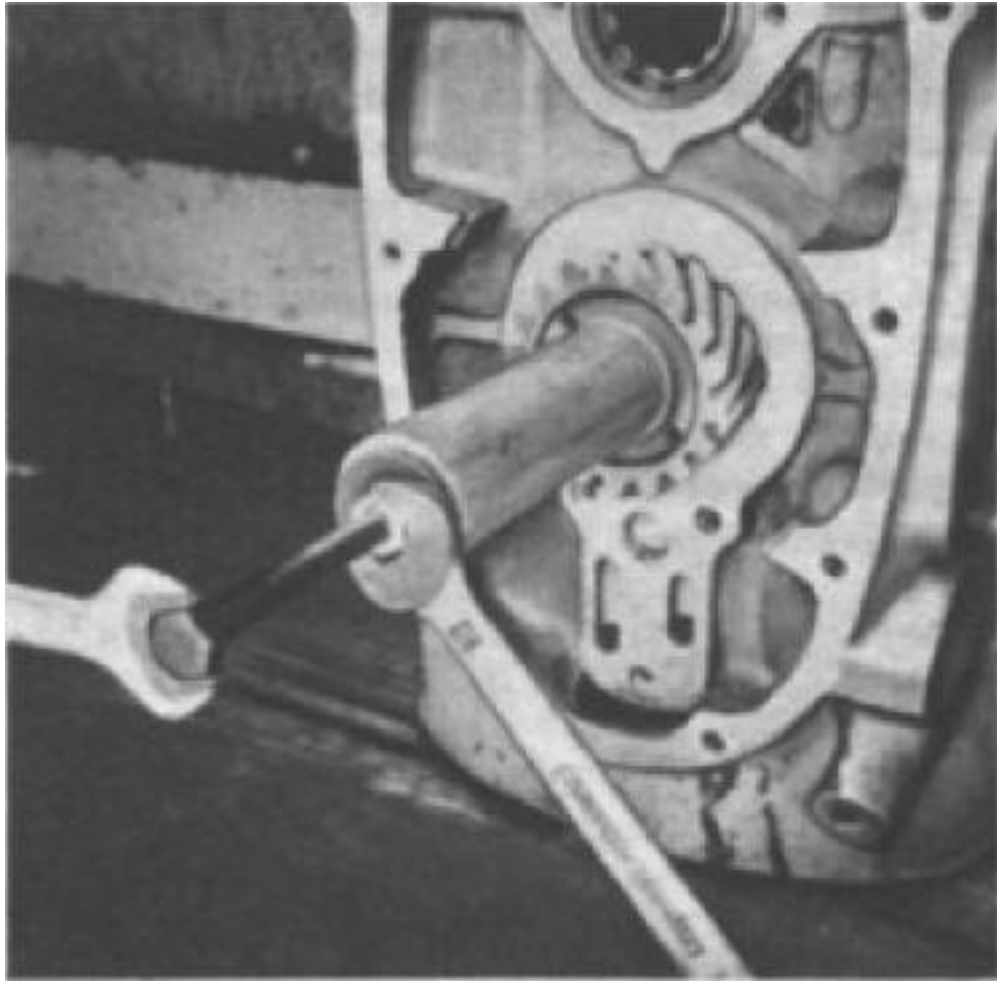


Figure 64

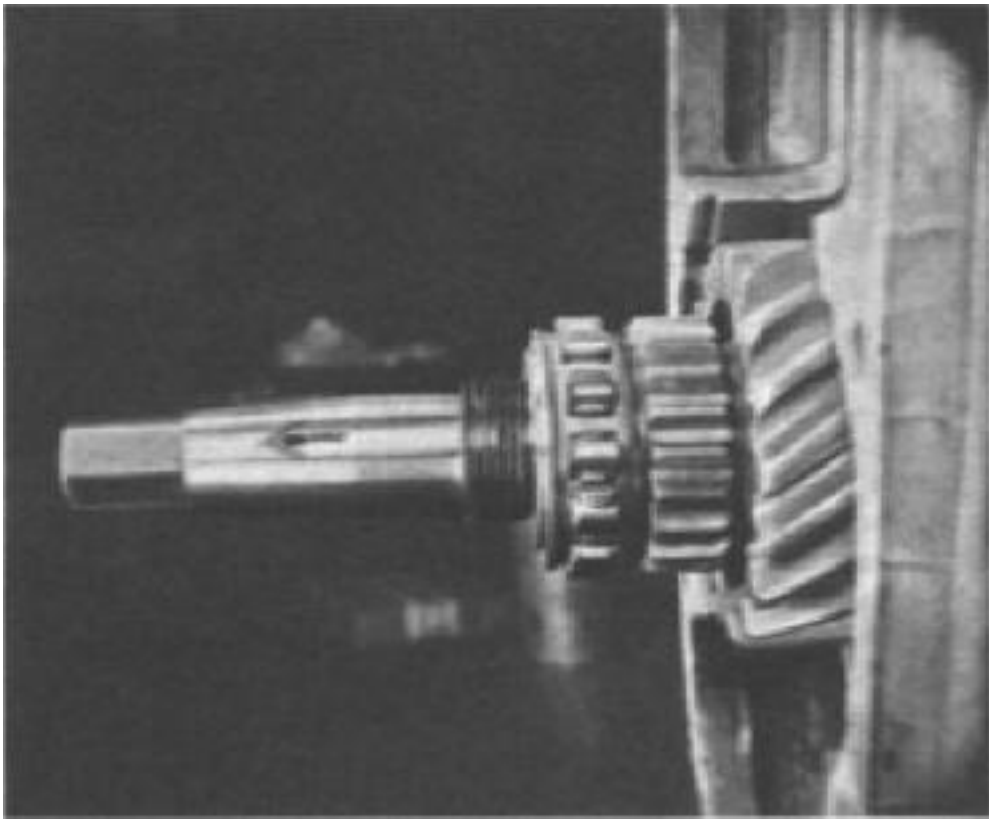


Figure 65

Jam the crankshaft with a mandrel wrapped in cloth and push it across the crankcase for tightening the round nut (Attention: left-handed thread) with a hooked socket wrench (66). Then hit the hooked socket wrench with a hammer to secure a tight fit of the nut. Take out the mandrel. Install the assembled oil pump by putting the casing on its back. Insert the three mounting screws of the oil pump and tighten them with a screw driver. Put a spring ring under each screw. The rings for the upper two screws have to be put onto the drillings first because they do not fit through the holes of the pump wheel. Heat up the front case cover with a gas flame or a blow torch. Hit the shaft sealing **22 x 35 x 10 steel ring** or 22 x 38 x 10.5 steel jacket into the hot cover with a hammer and a wooden block. Turn the cover around and hit the outer race of the bearing NL 25 into place. Scrape away material with a flat chisel (Chisel 2mm away from the seating edge, 3 points of impact in a triangular configuration) (67) so that the bearing ring does not slide out of position.

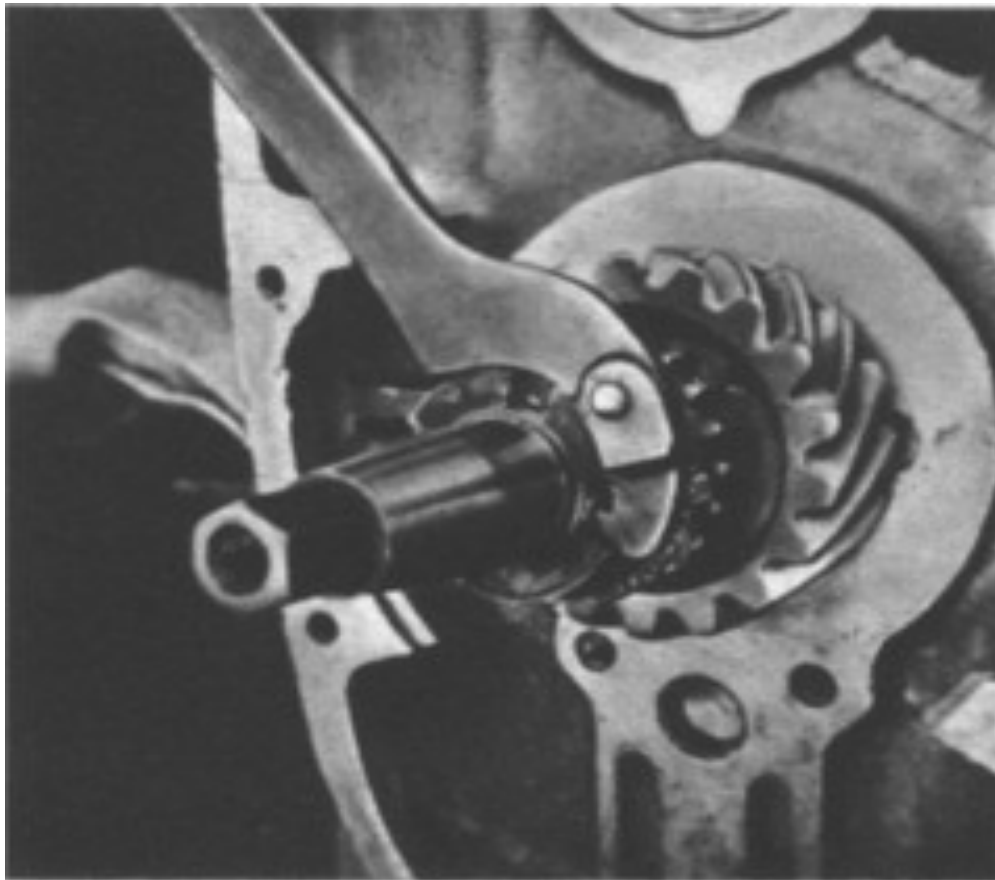


Figure 66

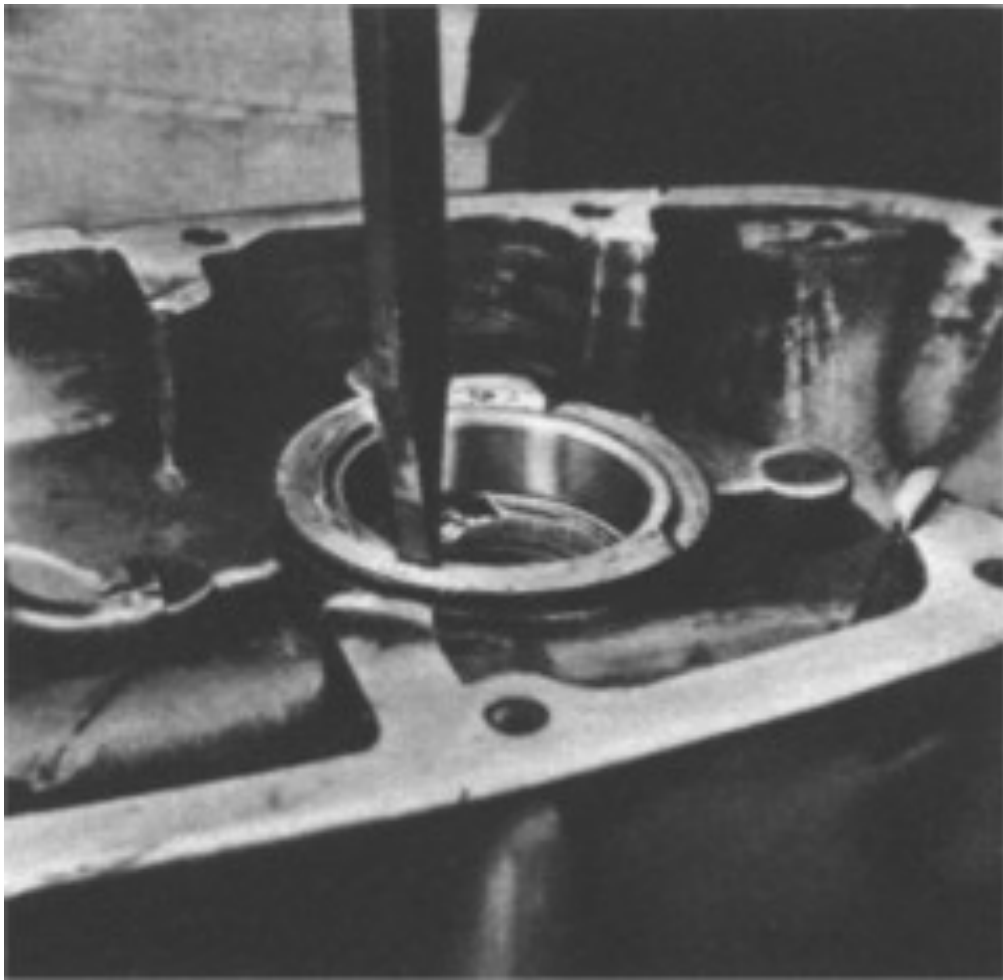


Figure 67

Insert the camshaft rubbed in oil into the casing. Slide on the securing plate of the camshaft and tighten then two M6 screws, which are provided with lock washers, with a 10mm socket wrench (68).



Figure 68

Set the casing upright and fix it with a vise. Put the crescent-shaped wedge into the groove of the crankshaft. Slide on the flywheel (Mind the wedge and the groove). Slide on the retaining washer with the two tines. The tines have to go into the holes in the flywheel (69). Jam the shaft again with mandrel and cloth. Tighten the union nut with a 36mm socket wrench, mandrel and applied tube extension. Bend the retaining washer up at the recesses of the nut with a screw driver. The mandrel with the cloth can be removed for good now.



Figure 69

Installing the connecting rod

Now the connecting rods can be installed. It is possible to relate the connecting rods to the cylinders because the numbers of the connecting rod are marked on the casing and all rods were kept separately with their needles and cages.

First fill one half of the cage with 14 oiled needles. (The oil is for the adhesion of the needles in the cage). Apply the cage half to the crankshaft journal. The shaft has to be in the TDC position. Turn the journal up (70). Important: **Mind marks or engraved numbers on the cage!** (Mark to mark or number to number on the same side).

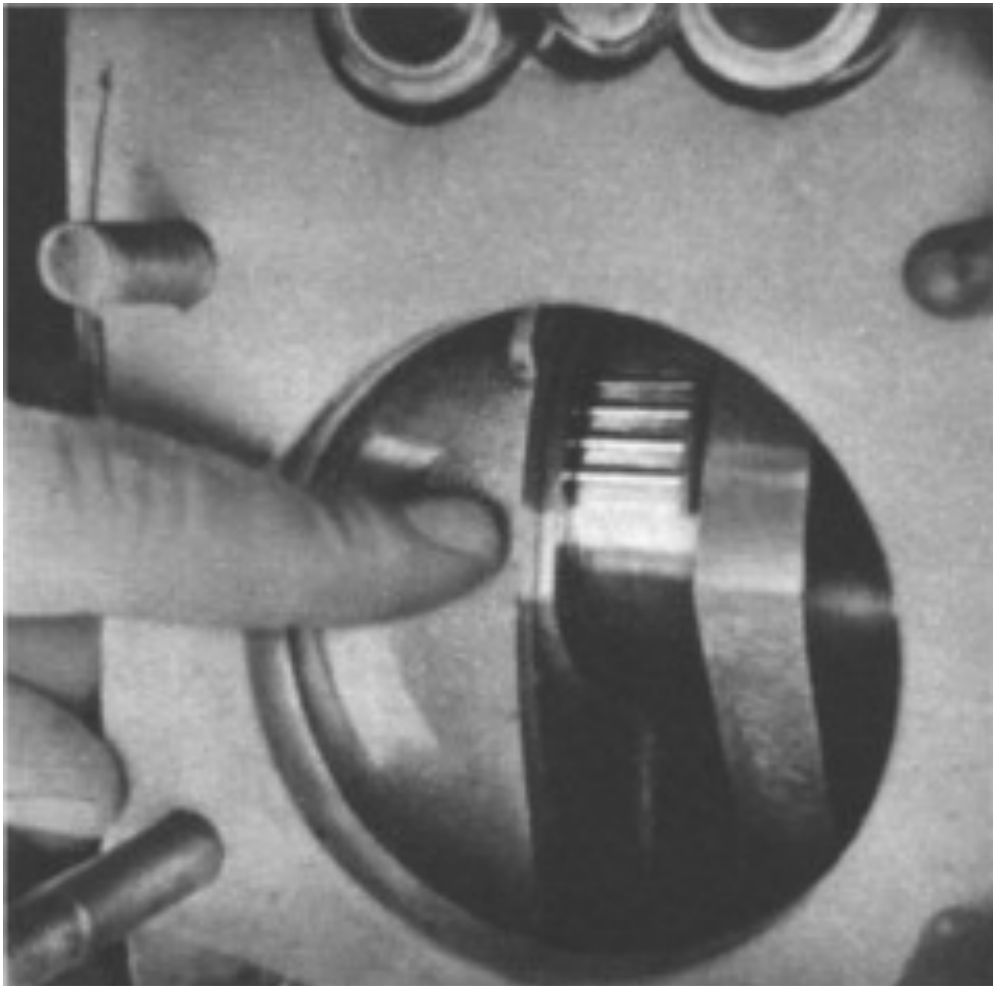


Figure 70

Fill the second half of the cage with 16 oiled needles and apply it to the journal (71). The gap between the cage halves has to be in a horizontal position to the casing. Hold the cage at the journal with the fingers until the bottom part of the connecting rod is inserted from the other side of the casing and put in place (**Number facing up**). Insert the connecting rod bolts before or after the bottom part is inserted.

Insert the rods (Number facing up) and then screw in the rod nuts with the steel washers. Tighten the nuts evenly at the same time with the 14mm socket wrench. (Effort = 8mkg, shank length at the nut 1m, 8kg effort or shank length 50cm 16kg effort). Now piston, cylinder and the right cylinder head can be installed. A tip: Check the proper fit of the piston pin retainers after snapping by inserting a tip of a nail or similar into the ear of the circlip and moving it to the opposite ear. If the ring rotates it is a proper fit.

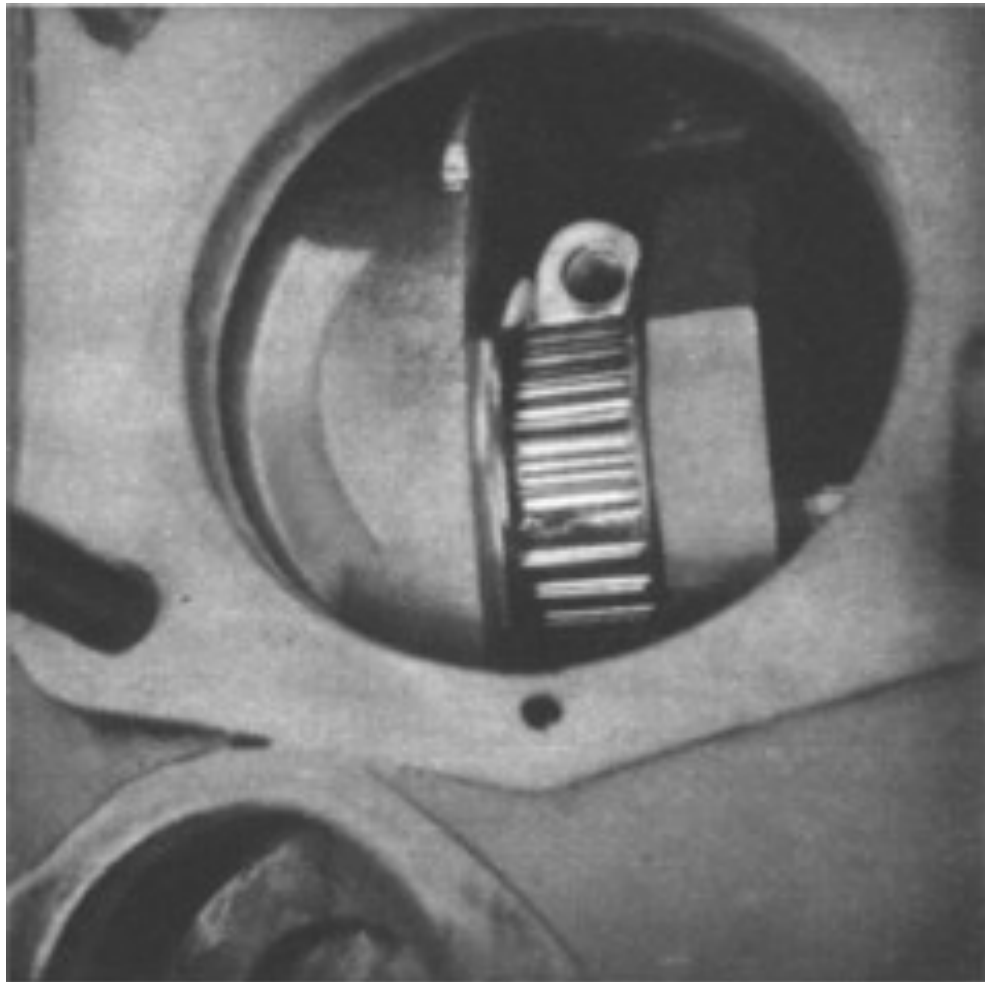


Figure 71

Adjusting the camshaft

Loosen the adjusting screws for the rocker arms as much as possible. Insert the two push rods of the left cylinder and press them down with 2 fingers. Rotate the camshaft until the push rods are directly on the crossover point, which means they move. (Outlet closes, inlet opens). Both valves of the right cylinder get an even play of 1.4 to 1.6mm. Turn the camshaft (direction does not matter) until it snaps into a fixed position. Now try to pull the camshaft back and forth in axial direction. Is this only possible with force, give 0.1mm more play to the valves, but in total not more than 1.6mm, until the camshaft can be pushed back and forth in the bearings. (Of course, for increasing the play the camshaft has to be rotated back and the push rods of the left cylinder have to be at the crossover point). Turn the camshaft again until it snaps into a fixed position. **Now, under no circumstances, turn or pull at the camshaft.**

A flat steel angle, shank length 35mm with a drilling of 10mm in diameter (72), is required to determine the DTC. Fasten a degree plate at the camshaft. The indicator to the degree plate should be made of wide hose ribbon (73). The ribbon should be cut to a tip at the indicator end. Attach the indicator at the crankcase, in a way, that does not impede installing of the Novotex gear wheel.

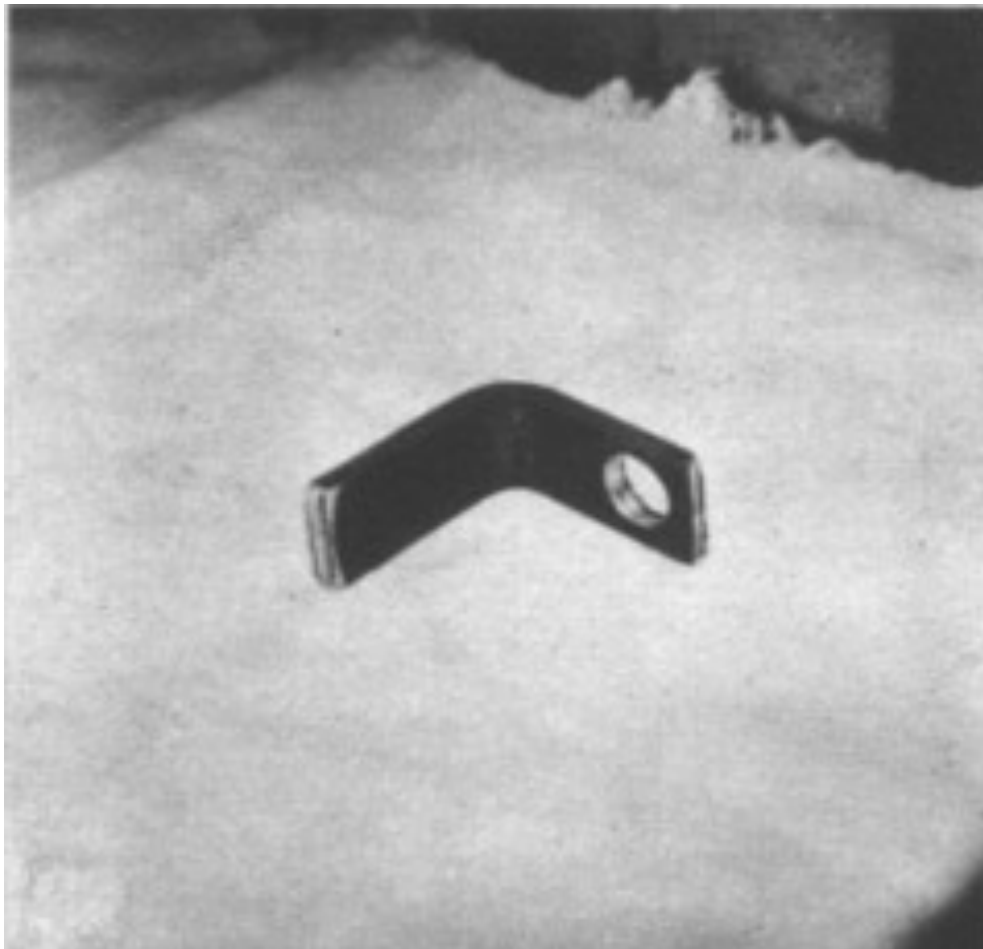


Figure 72

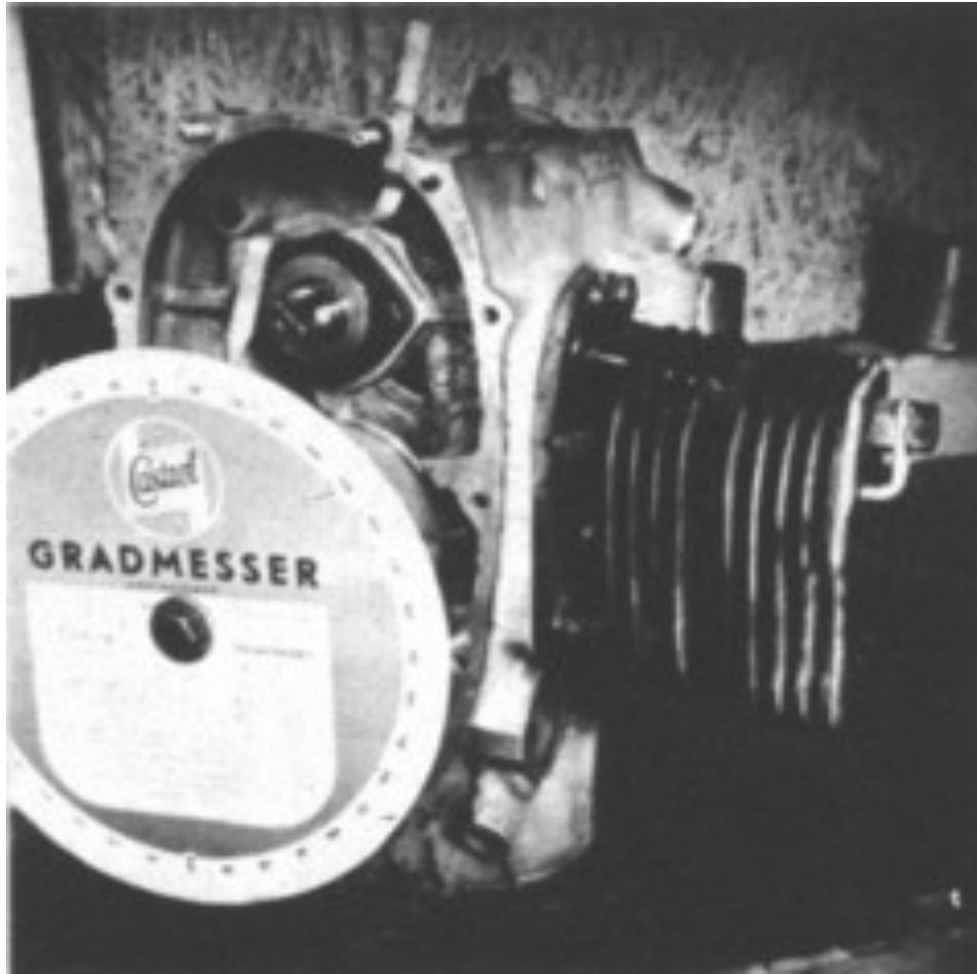


Figure 73

Attach the flat steel angle to a stud of the left cylinder. One shank of the angle has to protrude into the cylinder. Rotate the crankshaft until the left piston touches the angle. Mark the position of the indicator on the degree plate. Rotate the camshaft the opposite way until the left piston touches the angle again. Mark the second indicator position, too. Count the number of degrees between the marks that the indicator did not run over. Half of the degree value between the marks shows the position of the TDC on the degree plate (mark it!). Remove the angle. Rotate the crankshaft until the indicator hits the mark for the TDC and then set the crankshaft to $2\frac{1}{2}^{\circ}$ before TDC. Do this by rotating the crankshaft $2\frac{1}{2}^{\circ}$ in the direction of the right cylinder head. **Now do not rotate the crankshaft or the degree plate.** Put the Novotex gear wheel onto the camshaft (74) in any tooth position. Take the fine toothed driver and check if its outer teeth fit into the teeth of the Novotex gear wheel **easily**. If not, try to insert it shifted at 180° . If this does not work, the Novotex gear wheel has to be moved on the crankshaft gear wheel one tooth forward. Now try again. If this still does not give a result, repeat the procedure until the fine toothed driver can be inserted into the Novotex gear wheel easily.

During these attempts neither the camshaft nor the crankshaft may be rotated.

Slide on the retaining washer and tighten the nut with a 30mm offset box end wrench. Use the round bar again to counter-hold the camshaft. Bend the retaining washer up on the nut with a screw driver. Remove degree plate and indicator.



Figure 74

Installing the housing cover

Put crankcase with spring (75) into the housing cover and put the seal on the cover. The groove in the ventilator has to point to the flat end of the camshaft; press the cover onto the housing. Fasten the cover to the housing with the two M6 nuts and the 4 M7 x 40- and 4 M7 x 60- screws together with their washers.

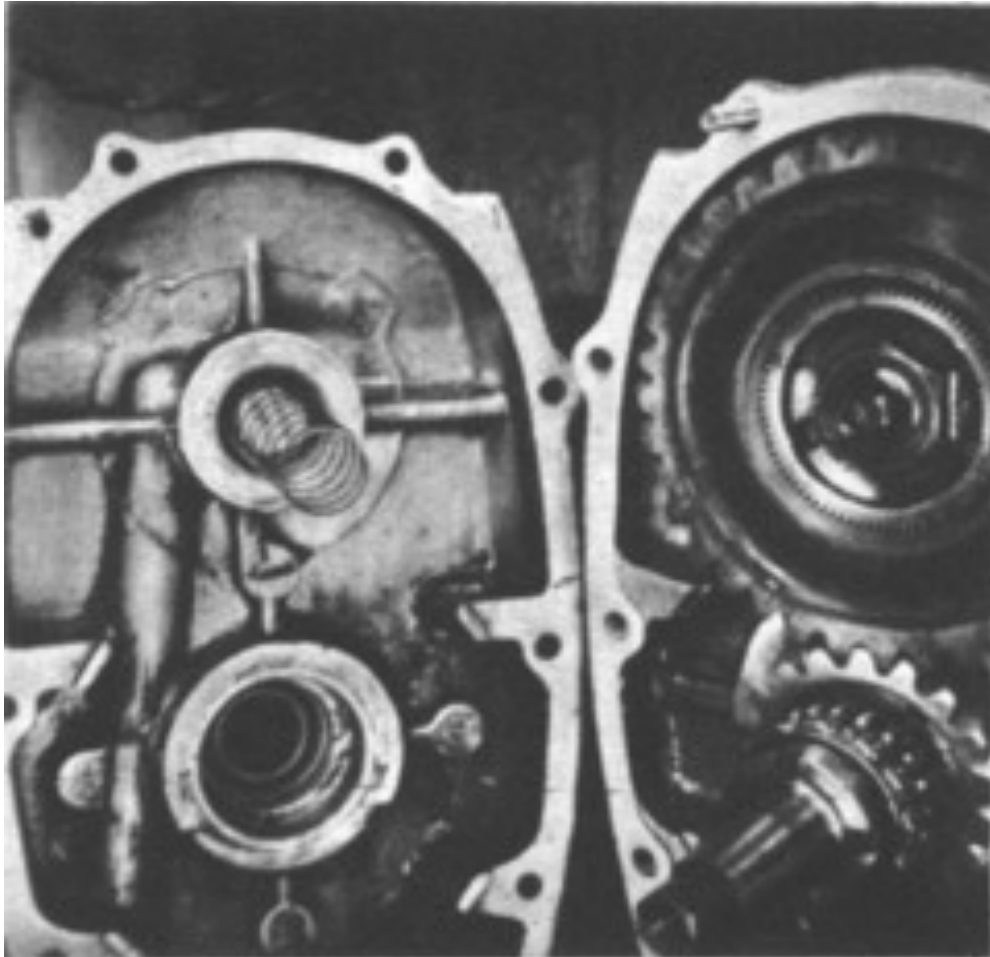


Figure 75

Installing the oil filter

Now install the oil filter with the intermediate bushing and the banjo screw. Do not forget to bend the locking plate of the filter up on the banjo screw. Screw on oil sump.

Generator, adjusting the ignition

The armature and the generator can be installed. (Do not forget the wedge on the crankshaft for the armature). To adjust the ignition timing, check the contact breaker point gap. The gap between contact lever and fixed contact has to be 0.3 – 0.4mm at the biggest cam lift. The maximum spark advance is 10mm before TDC or 40° before TDC. First rotate the piston the TDC and measure the distance between the top of the piston and the cylinder sealing surface with the inside micrometer of the caliber. Set this dimension **plus 10mm** on the caliber. Set out the flyballs of the governor (in the case of manual ignition completely). Insert a piece of cigarette paper into the contact breaker. This paper has to be able to be pulled out straightly when the piston touches the inside micrometer, which means when it is 10mm off the TDC.

The ignition timing can also be adjusted with the degree plate. Attach the steel angle again to the left cylinder, determine the TDC by rotating the shaft as done before and mark it on the degree plate. The maximum spark advance is 40° before the TDC.

Back to the generator: When replacing the contact brush it is important only to get Norris brushes for Noris generators and Bosch brushes for Bosch generators. If the wrong brush is installed it could either wear rapidly or the collector will get scarred.

If there are ongoing spark failures during high speeds, besides many other reasons, the foremost crankshaft bearing (cylindrical bearing NL 25) could be worn out. The shaft could bend elastically because of this, which causes the armature with the contact breaker cams to wobble. In serious cases the armature touches the coil and gets defective.

Valve play

Install the left cylinder head and adjust the valve play on both heads. (Inlet 0.2mm, Outlet 0.25mm when the engine is cold). To adjust the valves of the right cylinder head, the valves of the left cylinder head just have to cross and the other way around. **Adjust valve play no later than every 2000km!**

Carburetor

The thick insulating flanges with the carburetor installed may not protrude into the vacuum channel (which is usually the case); so enlarge the bolt holes on the flanges until the vacuum channel is cleared.

Take out of the carburetor the nozzle fitting and the mixing chamber insert (76), and search for a fitting round wood (wooden shaft, approx. 24.5mm in diameter). Slide seal, flange and carburetor onto the studs and insert the round wood through the carburetor into the intake duct. The flange is now aligned. Tighten carburetor and remove the round wood.

Instead of the 7gramme floaters 11gramme ones can be used for racing engines. They prevent the engine from choking when accelerating quickly. Bigger main nozzles can only be testes when driving. But one rule has to be followed: The right cylinder always gets a bigger main nozzle than the left one (e.g. 110 right, 105 left, or 115 right, 110 left). Now we only have to install the clutch and the engine is done.

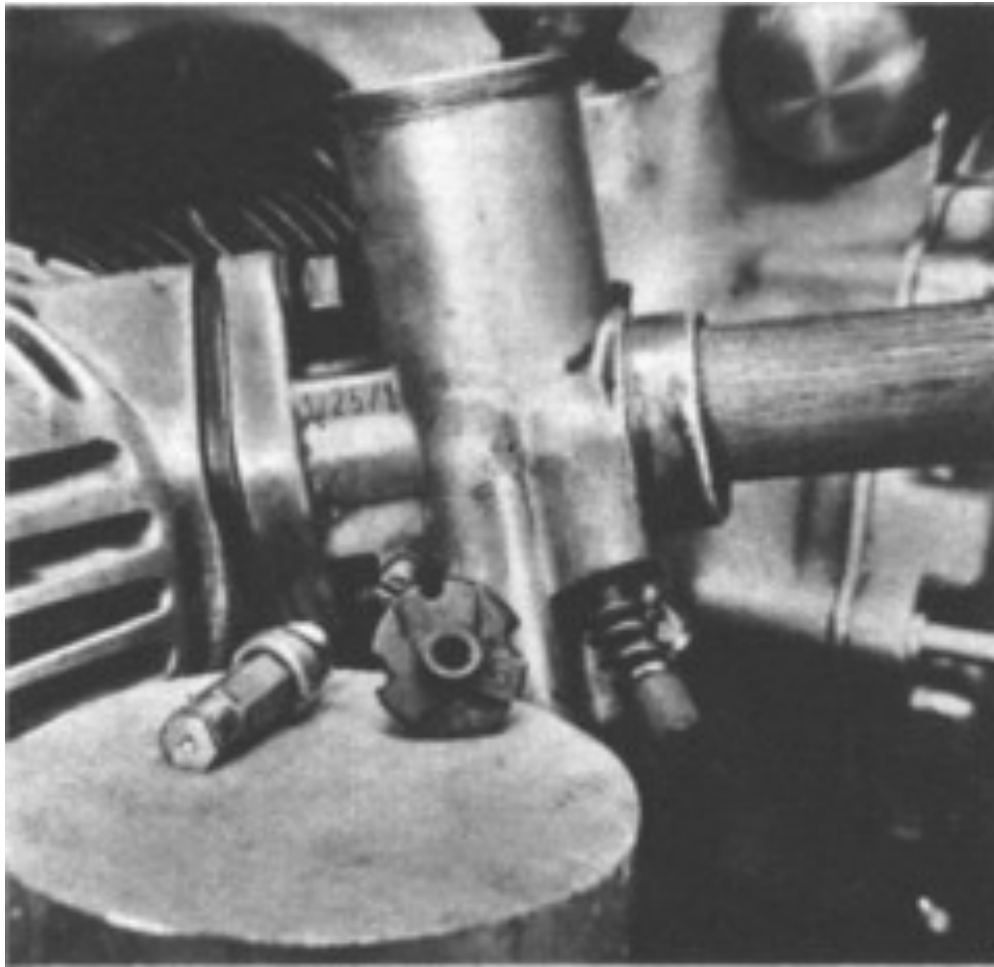


Figure 76

Installing the clutch

Insert the 8 or 12 pressure springs into the holes in the flywheel. Insert the clutch pressure plate and tighten it with the 3/8" tube and the M8 screw. Then insert the friction disk with the mark II on it and the clutch plate. Press the spring washer into the rear groove of the flywheel with pliers. Now insert the friction disk marked with an I and the clutch cover plate. Put the big circlip into the outer groove of the flywheel (77). Align the toothed center plate of the

friction disk with a thin screw driver and after that remove the M8 screw and the 3/8" tube. When you have the time you can make or let somebody make a tool for this work (78). For this it is important that the round bar with an 8mm hole and guide bar can be replaced by a regular M8 screw, in comparison to the pressure screw with a movable toggle.

The new oil filling of the engine should be 2 1/2 liters (in the case of an oil change 2 liters). In the case of old casings fill the oil pocket and the opening with the cap under the left cylinder, so that there is oil in the bearings from the beginning on.

The oil pump pressure is measured with the engine running at medium speeds (2000 - 3000 rpm). Use a manometer with a measuring range of 14 - 71psi. In the case of new casings apply the manometer at the drilling in front of the right cylinder, while in old casings the measurement should be made at the sealing plug of the oil pocket.

A good oil pump will have a pressure of 21.7 26.1psi at medium speeds. 36.2-43.5 are absolutely safe and are coped with without any problems.

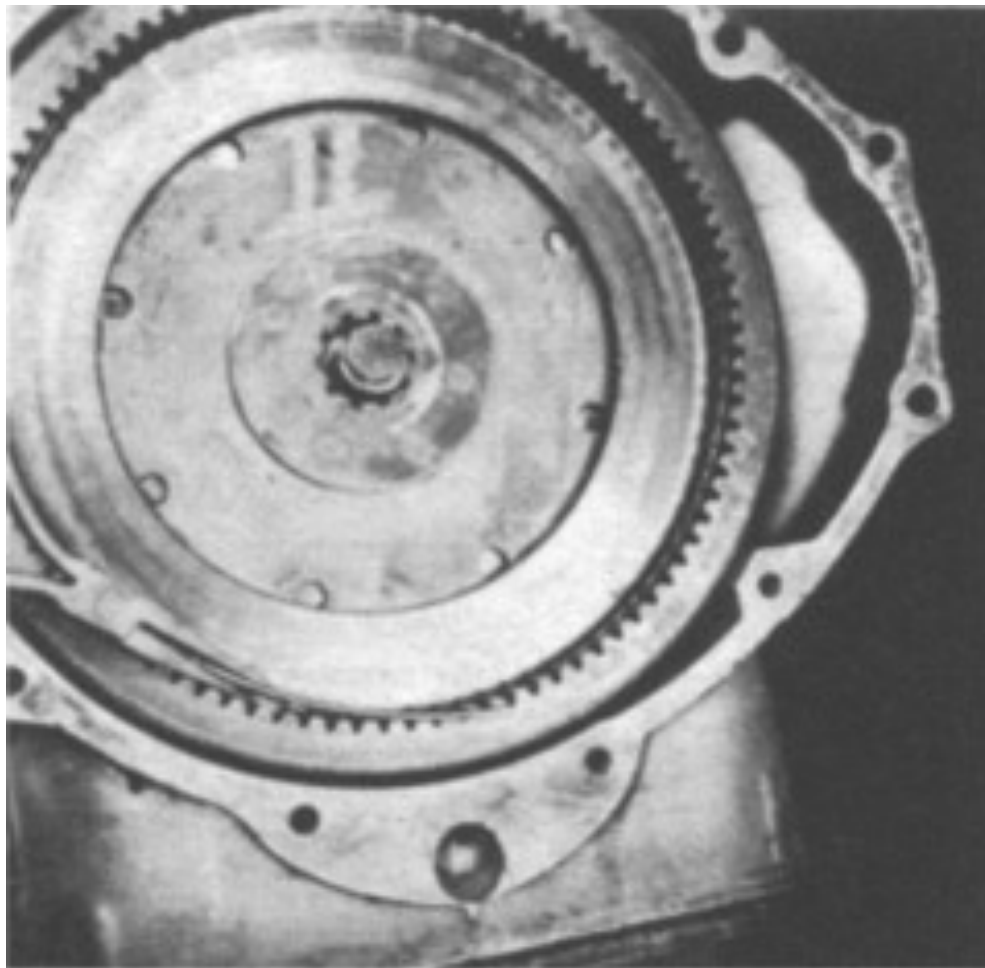


Figure 77

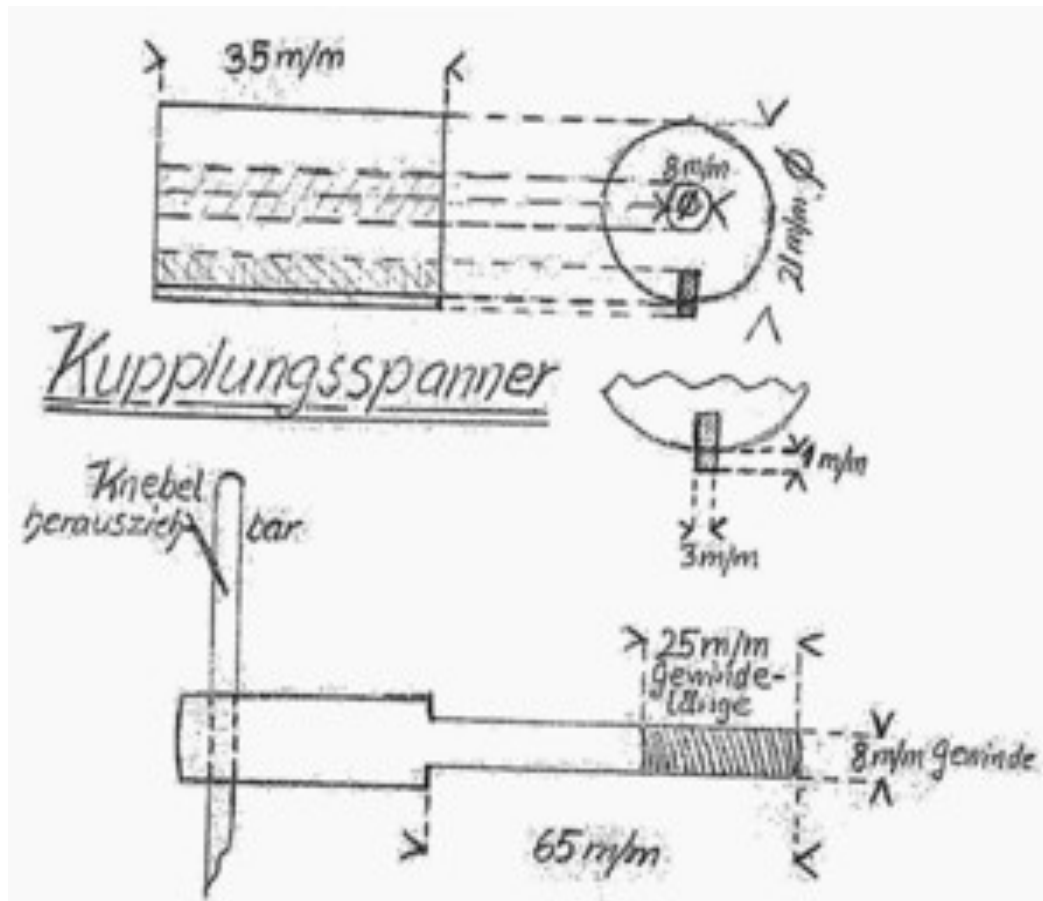


Figure 78

Kupplungsspanner = clutch spanner
 Knebel herausziehbar = toggle extricable
 Gewindelänge = thread length
 Gewindedurchmesser = thread diameter

Transmission

Shift into idle between 1st and 2nd gear before disassembling the transmission. Remove the gear shift by pulling out the pin at the rear bolt. Remove the latter, too. **By the way: The foot fitting position of the foot shift lever can be adjusted at the shift rod with its two forks!**

Screw out the four hexagon screws M7x35 and remove the gear shift carefully so that the sealing does not get damaged. There may only be one seal, namely between transmission housing and intermediate cover (steel cover) of the gear shift. Should there be a hexagon screw instead of a Allen-countersink at the top front of the apparatus, file a 6mm Allen key down to 5.5mm or loosen the screw with a ground copy. It is better to replace the Allen screw by a M7 slotted-head countersink of the same length. The bore in the cover could also be replaced with a flush-fitting so a hexagon screw M7x30 with washers could be used.

Before disassembling mark the top sides of the individual parts of the gear shift with paint (79). Mark the apparatus cover and the intermediate cover, the left shifting fork (3rd and 4th gear) at its spring cap, and the shifting cam (roller). Do not mark the shifting shaft because the groove for the locking bolt is always pointing down. Remove the locking bolt to pull the gear lever from the shifting shaft. Loosen the nut of the bolt a bit, apply a mandrel at the nut and hit it with a hammer. This loosens the bolt without any damage to the thread or its feed pipe. Now pull off the cover. Be careful not to damage the sealing in the cover at the edges of the shaft. In the cover is the pressure spring with two 12mm balls (80, arrow 1), which pushes the shifting shaft back into the 0 position after shifting. This happens via the guide plate (arrow 2) with retaining stud in the intermediate cover.



Figure 79

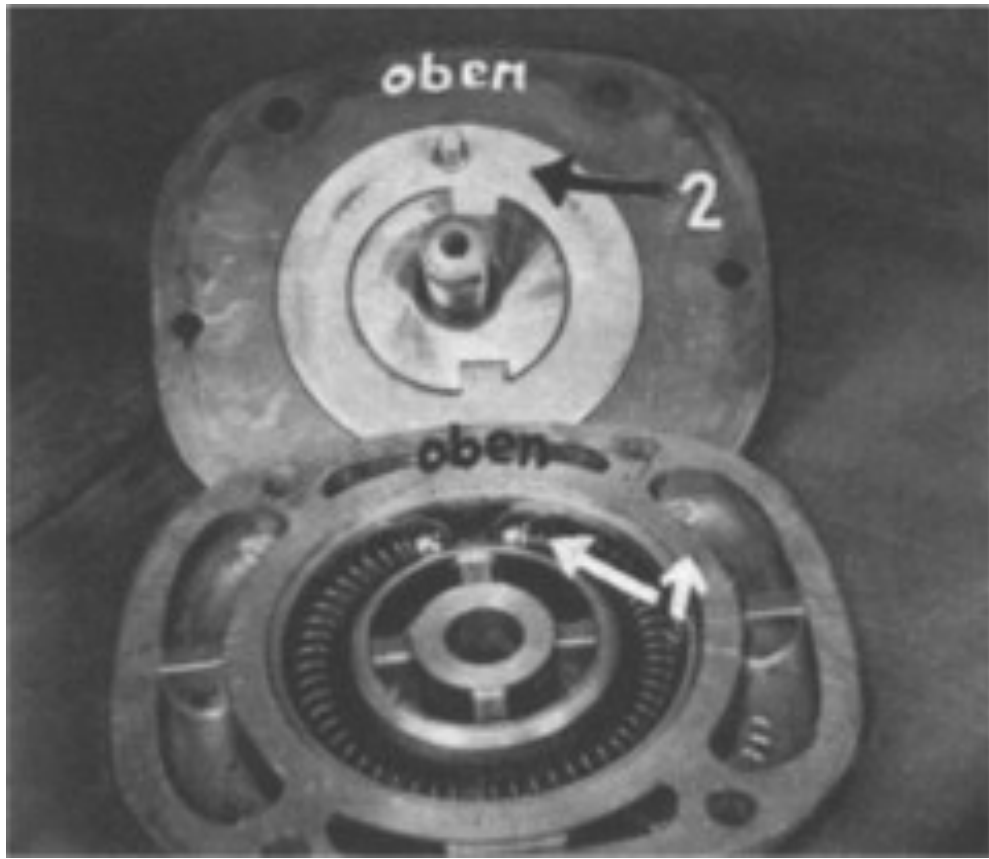


Figure 80 Top, Top

Damages by wear at these parts are unknown. Remove the shifting forks after pressing out the mounting bolts with a fitting mandrel (8mm). The shifting forks basically consist of 2 parts, which are the fork and the guiding arm. Both parts are connected with a hollow shaft (81).

1 = fork, 2 = guiding arm, 3 = spring. The spring also sits on the hollow shaft and causes the shifting fork to slide back onto the guiding arm seat when shifting. The hollow shaft is flanged on both sides. Fork, guiding arm, hollow shaft and spring create a component part and cannot be ordered separately.

4 = striker with pressure spring (glides on the track of the trip cam), 5 = retaining bolt with compensation washer. These parts have to be kept together when disassembled. Clamp the shifting shaft in a vise with copper chuck to remove the trip cam from the intermediate cover. Bend the retaining washer up at the trepanned mounting screw (1) and screw out the latter with a 14mm socket wrench. Now remove the retaining washer (2) and the flat-ended guide plate (3) (82). Remove the intermediate cover from the vise and attend not to drop the shifting shaft (83). 1 = intermediate cover, 2 = shifting shaft, 3 = pin with pressure spring (are inside the shaft), 4 = trip cam (roller).

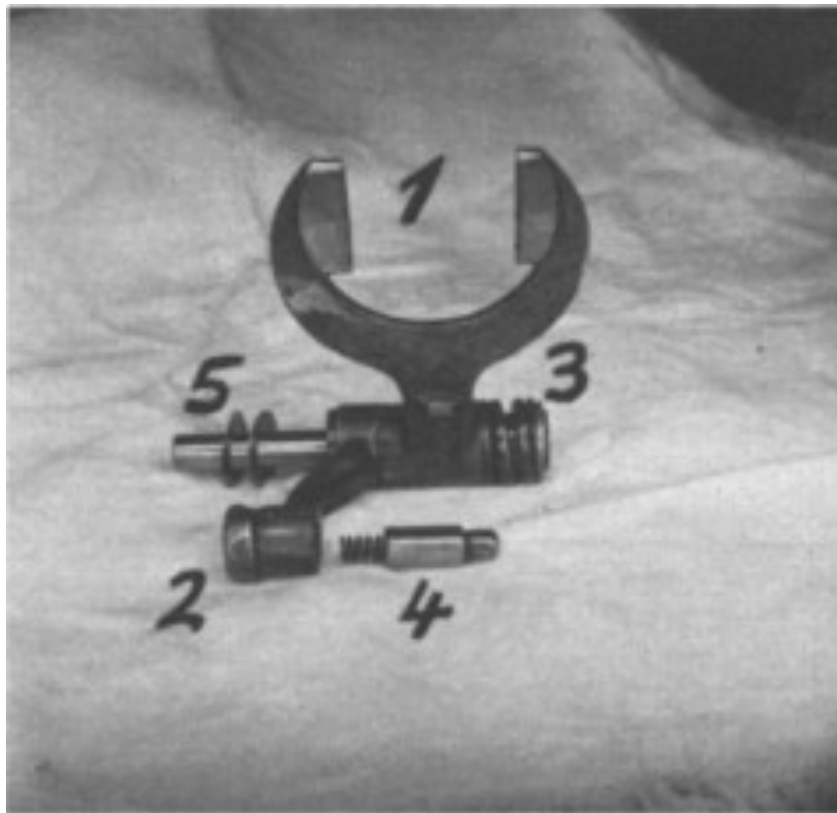


Figure 81

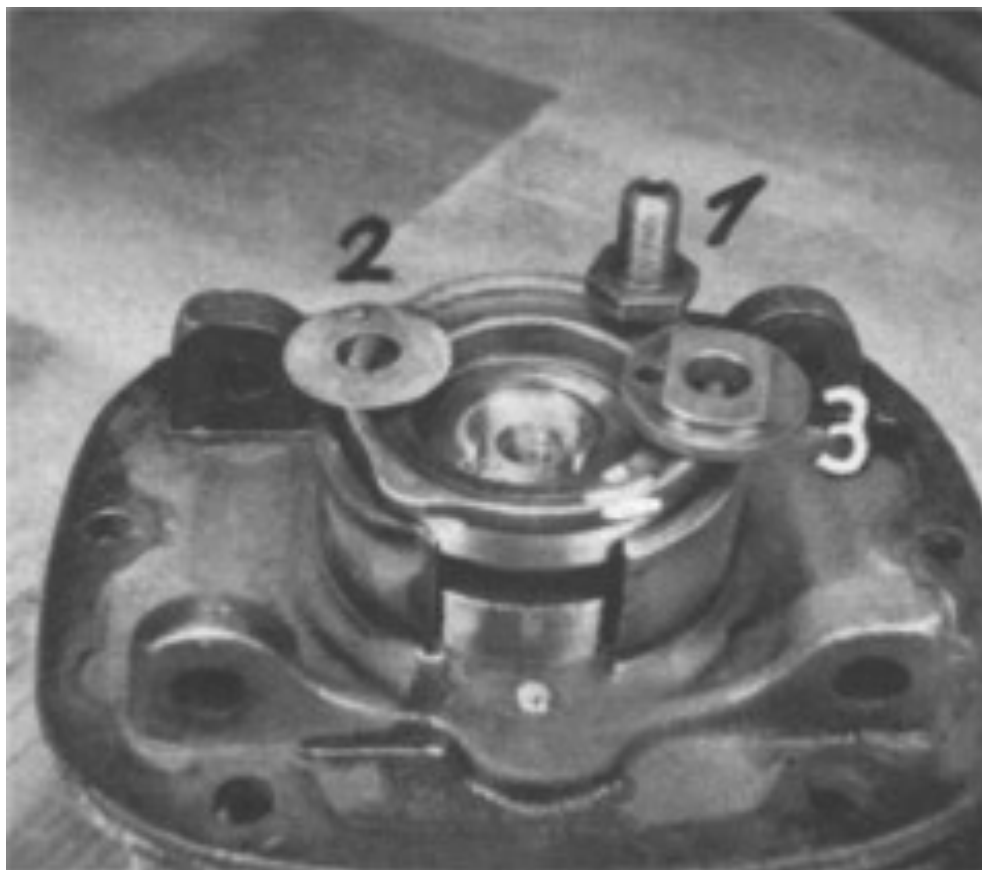


Figure 82

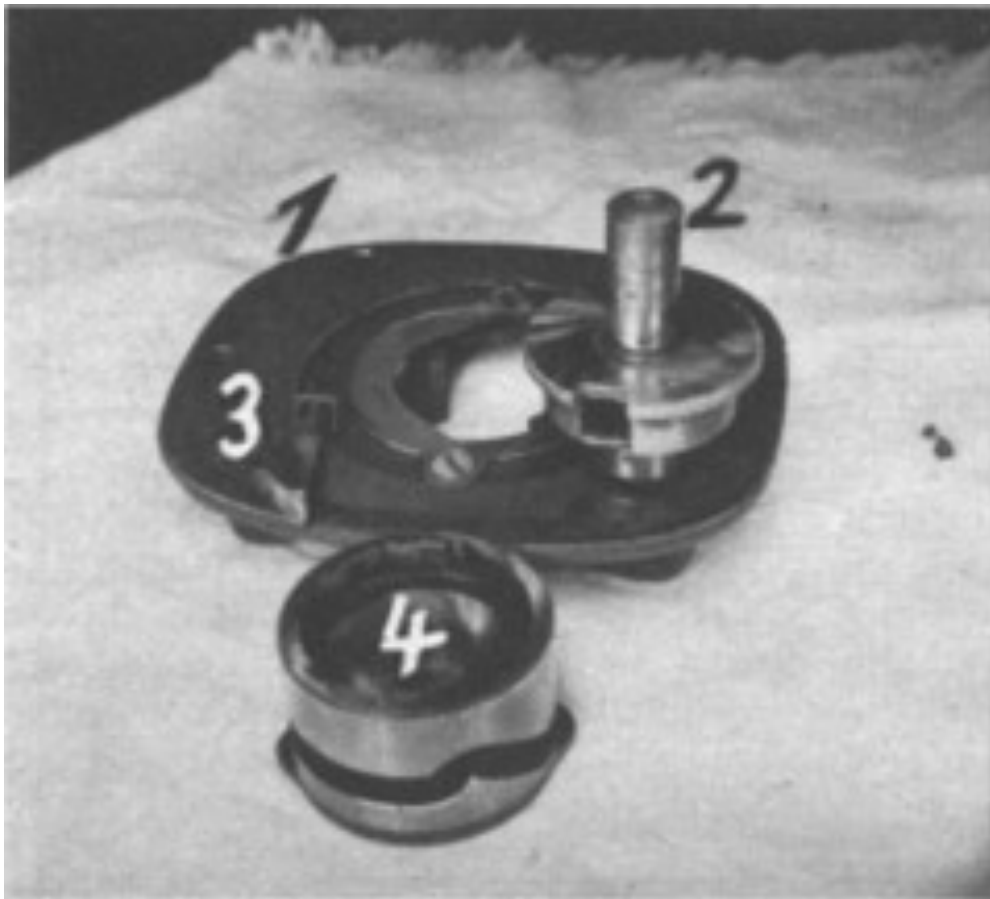


Figure 83

Now reassemble the gear shift right away. Push the pins and the pressure springs into the shifting shaft and the latter into the intermediate cover with the groove (arrow) pointing down and the pins with their even side to the left. Push the trip pin into the intermediate cover from the other side, put the flat-ended guide plate into the shifting shaft, put on the retaining washer and tighten the trepanned mounting screw by hand. Clamp the shifting gear back in the vise with copper chuck, tighten the mounting screw with a 14mm socket wrench and bend the retaining washer up at the mounting screw with a screw driver. Assemble apparatus cover and intermediate cover. Be careful no to damage the sealing in the apparatus cover with the groove for the locking bolt in the shaft. Attach the small gear lever to the shifting shaft and tighten locking bolt and nut. The last parts to the install are the shifting forks: Push the control pin with its spring into the guiding arm of the fork, insert it into the cam track and then put the fork between the two lugs of the intermediate cover (84). Push the spacer disks between guiding arm and intermediate cover log (arrow 1). Press the guiding arm of the fork in the direction of the trip cam to insert the mounting bolt (arrow 2). When both forks are installed, set up the gear shift on edge on the workbench and shift up and down a few times.

Shifting positions: 1st gear – right fork moves to the right, left fork rests. Idle – right fork moves to half left, left fork rests. 2nd gear – right fork moves to the left, left fork rests. 3rd gear – right fork moves to half right (idle), left fork moves to the right. 4th gear – left fork moves to the left, right fork rest. When shifting back the fork moves in reverse order.

Now to the **kick starter**. There are two types of kick starter levers. They only differ in the way they are sealed at the kick starter shaft (to the outside) and the shape outside of the housing. So it is possible to install an older type (KS 600 and KS 601 until approx. 1952) into a transmission of the new type because the dimensions are the same (85).

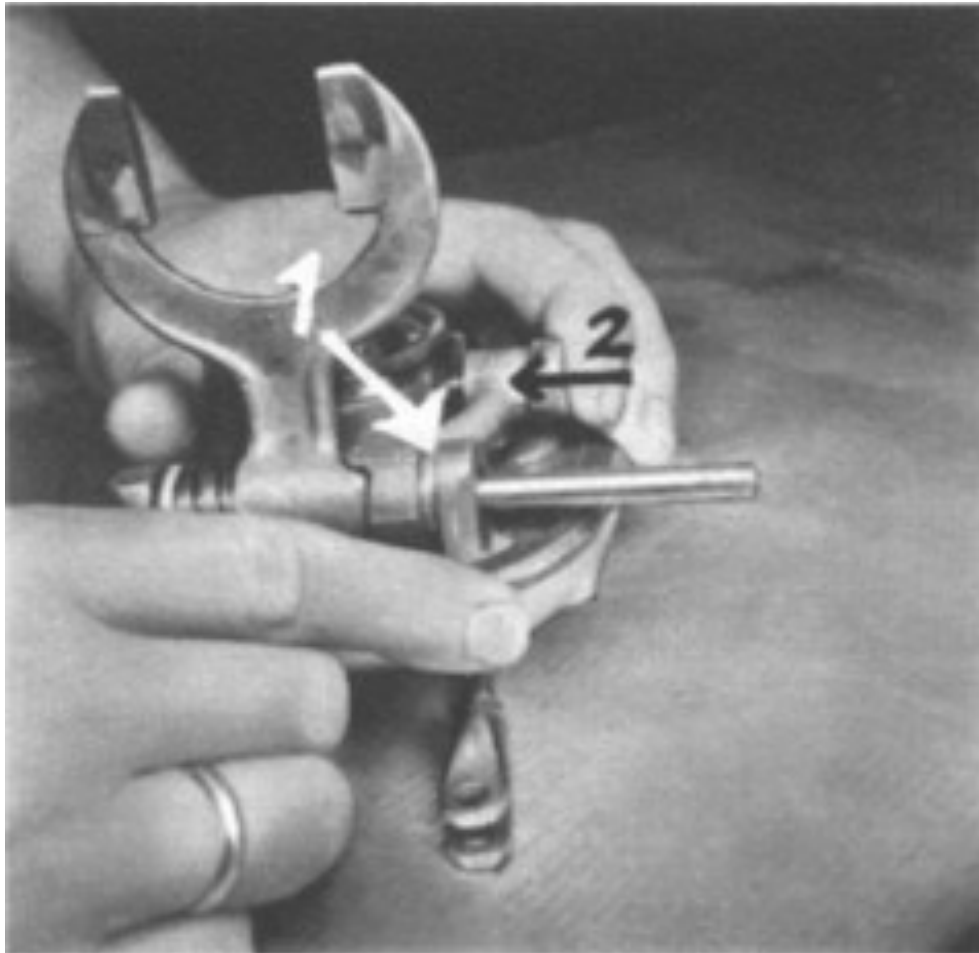


Figure 84

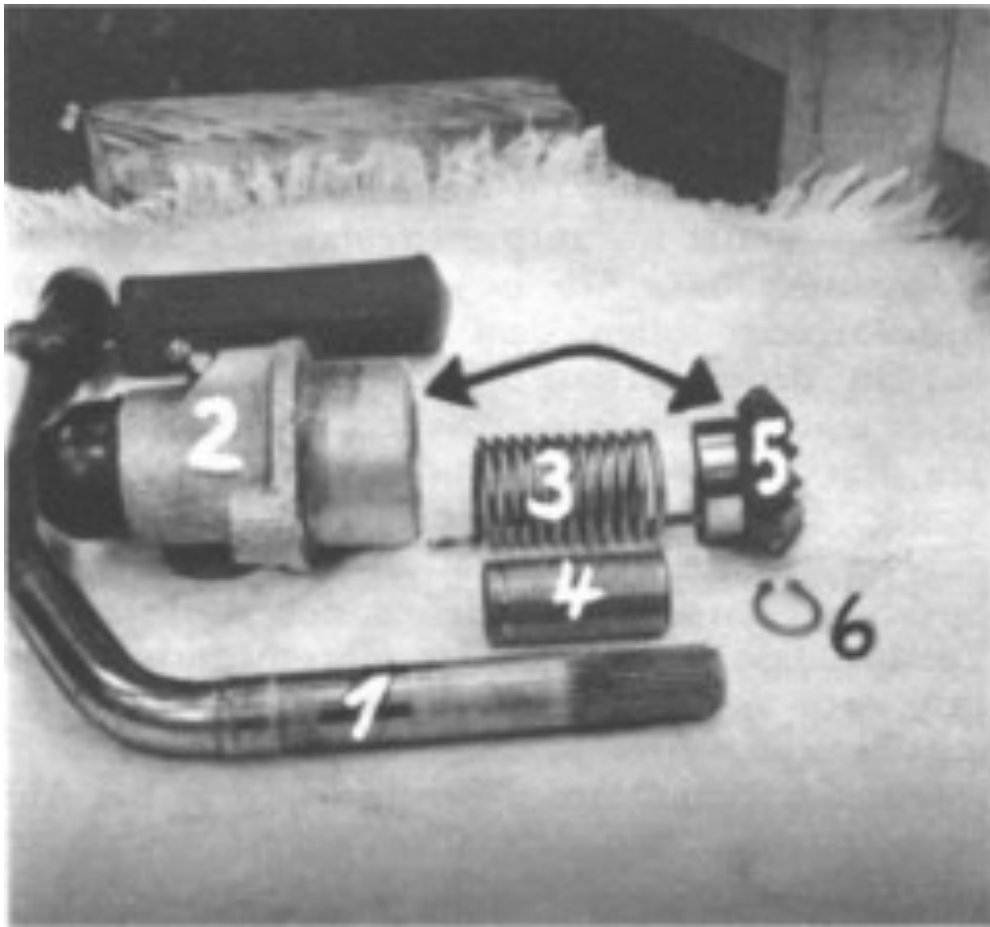


Figure 85

- 1 = kick starter lever and -shaft
- 2 = kick starter housing
- 3 = spring (in the housing)
- 4 = intermediate bushing (on the shaft in the spring)
- 5 = bevel gear (on shaft)
- 6 = circlip (infront of bevel gear on shaft)

Spacer disks can be inserted between the kick starter housing and the bevel gear (arrow). Reassemble the kick starter right away. Loosen the four hexagon screws (M7x55) (86) at the thrust bearing cover of the clutch with an 11mm socket wrench. Go into the cover from the side and remove it together with the kick starter gear that is in it. (Mind spacer disks). Pull the clutch push rod and the thrust bearing out of the hollow main shaft (87).

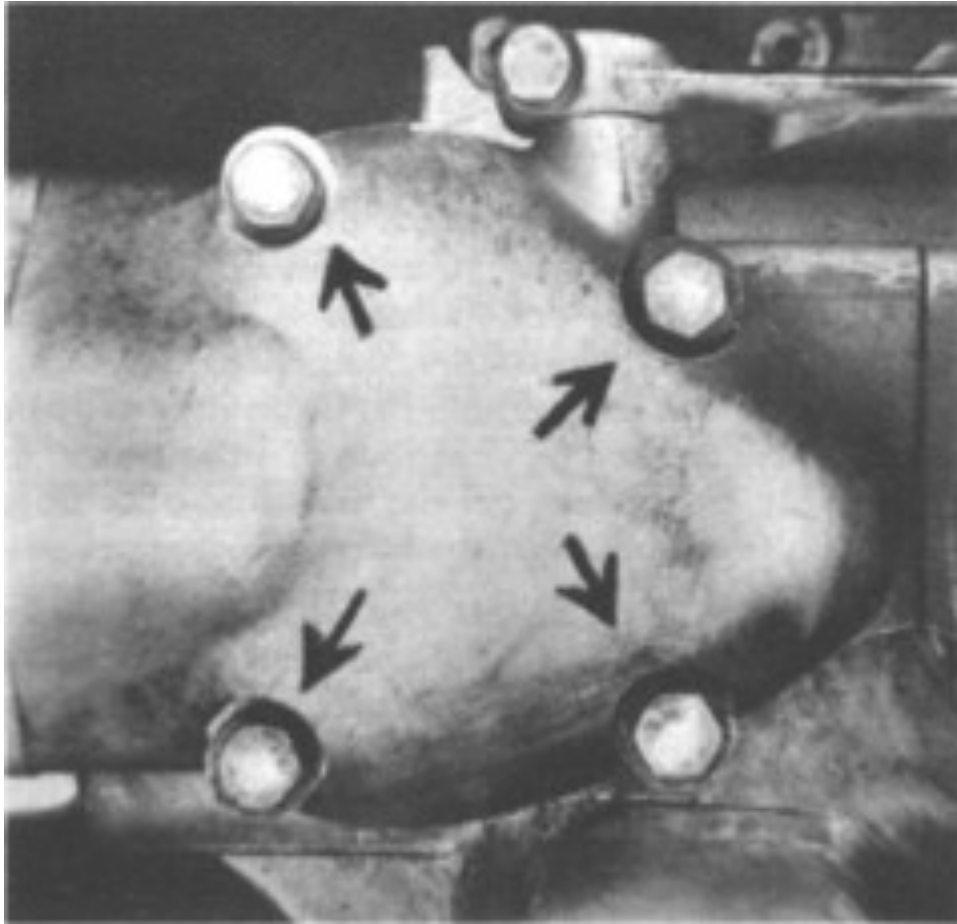


Figure 86

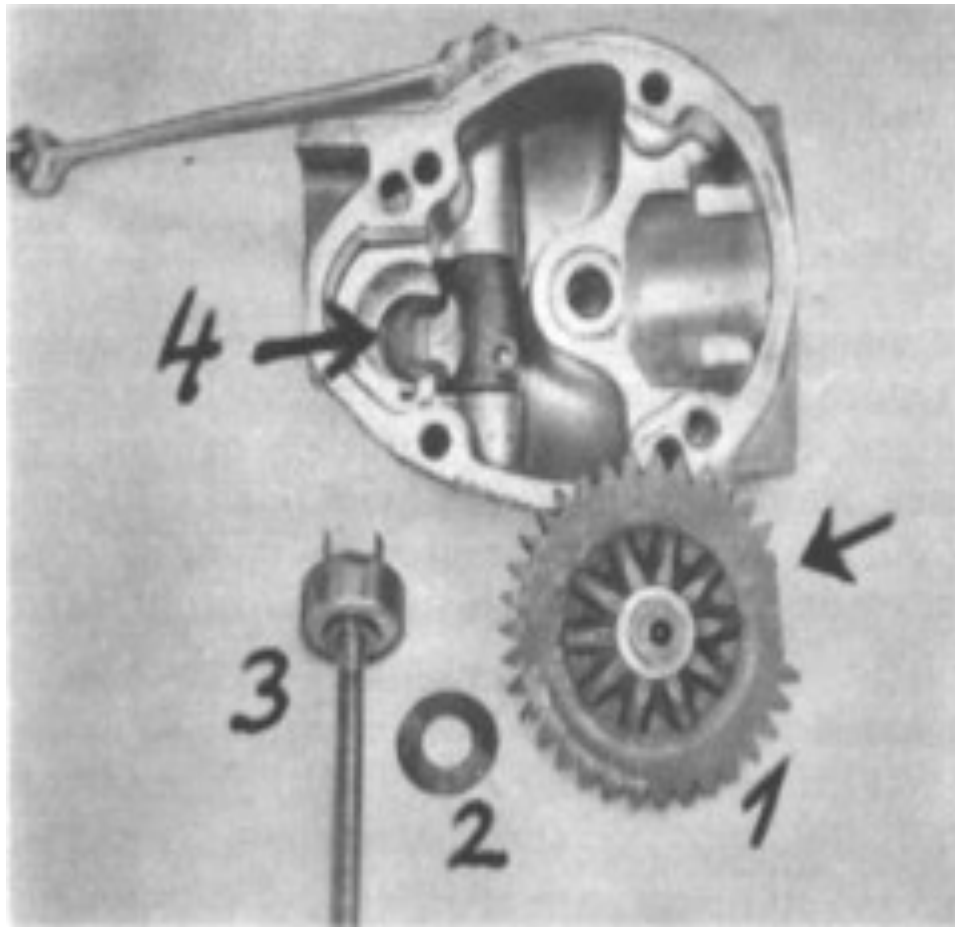


Figure 87

1 = kick starter gear with shaft and bevel gear. The first tooth (arrow) is only half as long as the others when new.

2 = spacer disk between bevel gear and transmission housing.

3 = clutch push rod with thrust bearing.

4 = clutch operator.

Can be removed after removing the grooved taper pin.

Remove the **cardan cover** after screwing out the three hexagon screws (M7x30) with an 11mm socket wrench (88). There could be spacer disks between cover and the outer bearing race in the transmission housing. Remove them carefully and keep them. Remove the circlip on the layshaft (arrow). If there are traces of oil on the cardan cover replace the sealing ring (35 x 47 x 10). This is not completely necessary because the loss of oil at this part is minimal. Loosen the four hexagon screws (M6x15) of the transmission cover on the side of the transmission that faces the engine. Take out the felt ring that is in the main shaft of the transmission (arrow). Replace it if it is badly scrunched or damaged because a damaged felt ring will let oil from hollow main shaft get into the clutch.

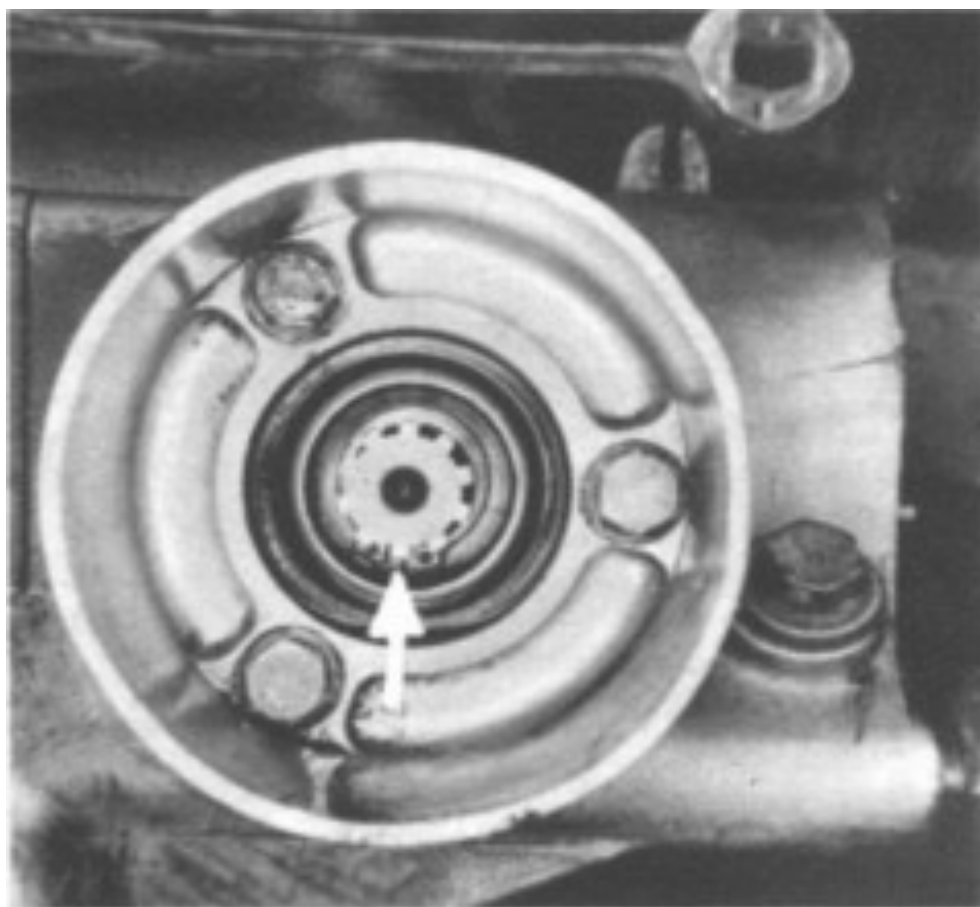


Figure 88

Turn around the transmission and heat up the area around the main shaft (arrows) (89) with a blow torch. Hit both shafts evenly and at the same time out of the housing with a rubber hammer. When doing that, mind the 2 balls (3.5mm in diameter) that are inside the intermediate bushing. Remove them afterwards and put them in a can with a note. The shafts are still stuck to the housing cover (90). Put wire around the chains. Pull the wires only through on mounting link of the upper link line of a chain each, so that the chain can be put on the wheel in the old running direction when reassembling. Put a folded paper or piece of cardboard on the wires and write the respective gear on it. If spacer disks fell down when pulling the transmission apart or lie on the main shaft, they belong between the outer race of the rear (arrow) main shaft bearing (grooved bearing 6303) and the housing. Mark and keep them. If there are no disks, the measurements of shaft and bearing do randomly suit the housing measurement.

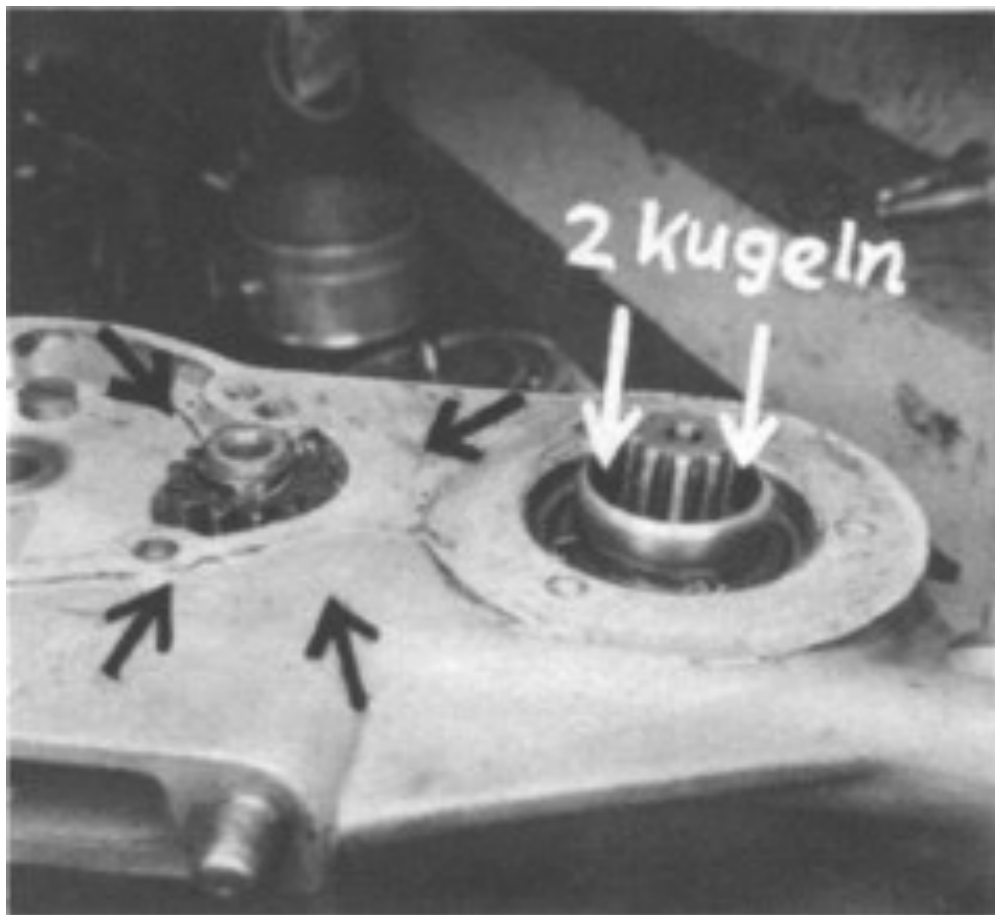


Figure 89



Figure 90

Gently hit the cover off the shafts, (I = main shaft, II = layshaft) hold the shafts with the left hand while hitting the cover alternately on both sides. Use a rubber hammer only, so the bearings do not get damaged unless they were faulty anyway. The shaft might come off the cover together with the bearings. If that is the case, check if spacer disks of the size of the outer race are behind the bearing of the layshaft (91) (1. grooved bearing 6303).

If yes, put them back into place. To get the bearing (2. grooved bearing 6205 Z), that is potentially stuck on the main shaft, off, lift the shafts at the bearing with the hand and hit the bearing with a rubber hammer. Press this bearing back into the cover, the side with the fixed cover disk in the direction of the clutch (arrow). The removable cover disks with the three dots drawn as a triangle (3) belong to the side pointing to the transmission center.

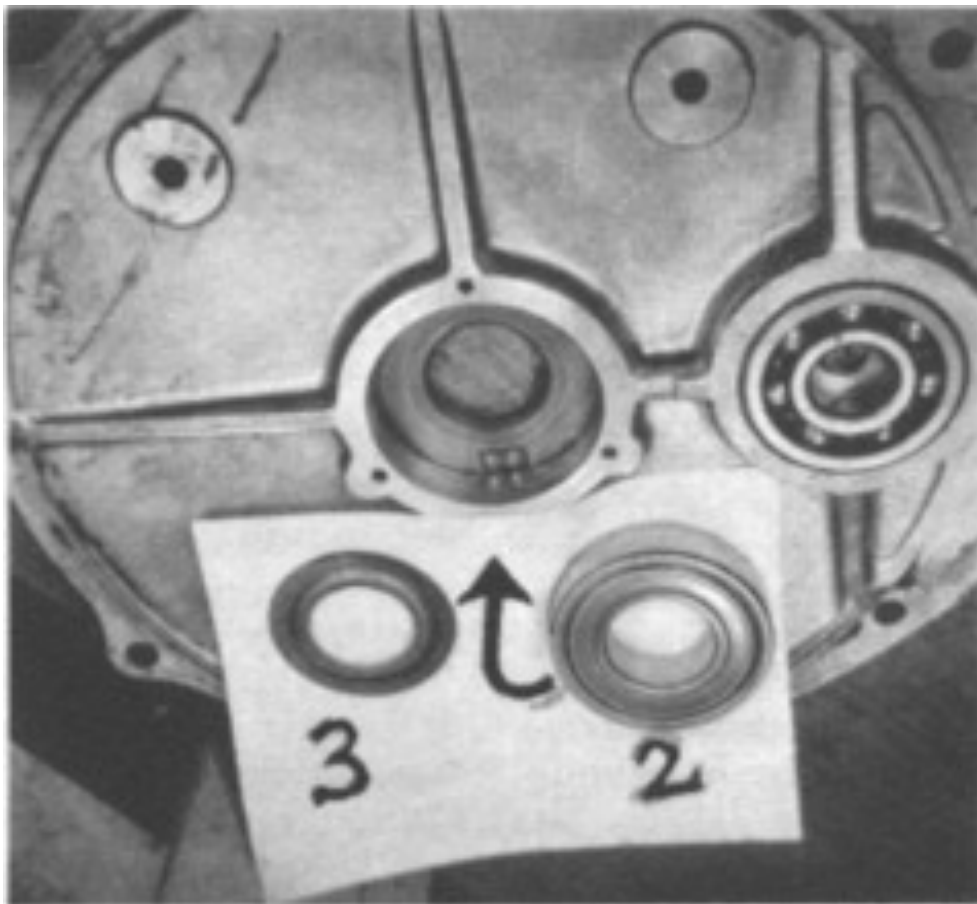


Figure 91

Remove the chains by grabbing the shafts at the cardan side of the layshaft. Grab the main shaft at the clutch side and jockey it out of the chains in the direction of 4th gear. Remove chains. If the front layshaft bearing is still on the shaft, grab the 1st gear sprocket and hit the shaft. The sprocket will press the bearing from the shaft. Put the sprocket back onto the shaft. Before turning to the shafts again, have a look at the inside transmission housing (92).

This bearing can be pressed out of the heated housing after removing the big circlip and the blue cover disk. Just do that if it is faulty. This is to measure how many spacer disks have to go between outer bearing race and the flange of the cover disk.

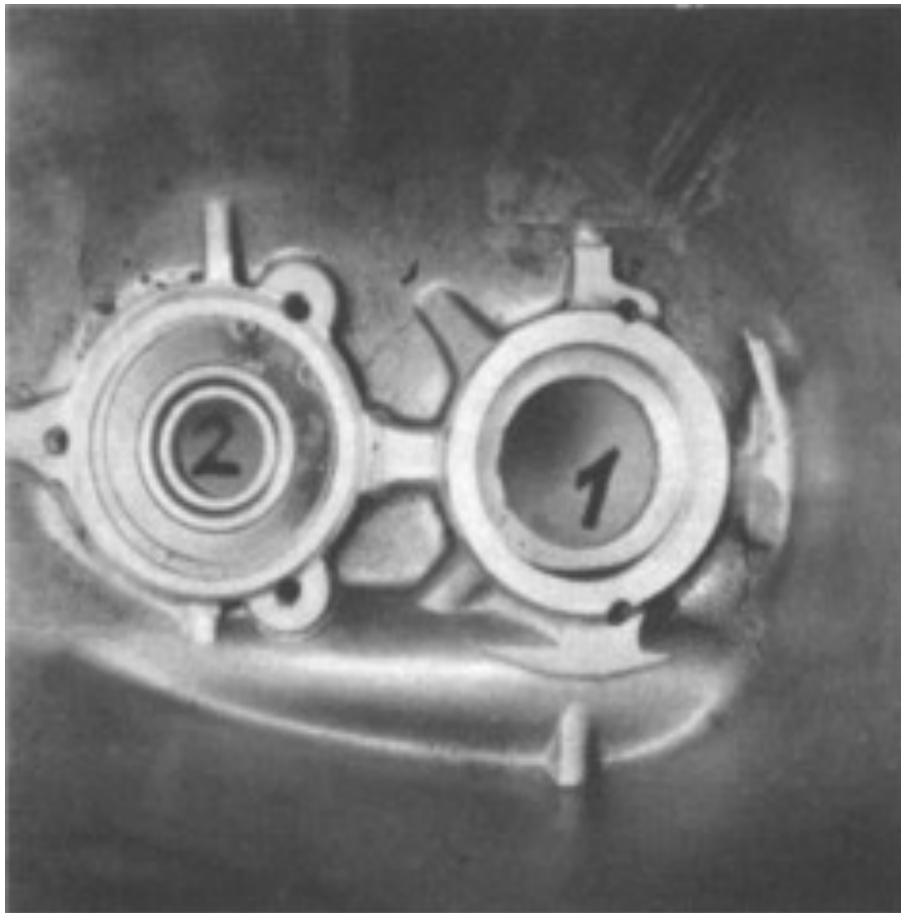


Figure 92

**1 = bearing seat of the rear main shaft bearing
(grooved bearing 6303 DIN 625)**

2 = rear layshaft bearing (grooved bearing 6204 DIN 625)

All sprockets of the layshaft and the main shaft are removable except for the 1st and 2nd sprockets of the main shaft. They are milled out.

Disassemble the layshaft into its individual parts (94). On the cardan side pull off the thrust ring which hid the circlip in its groove (1). The circlip (2) can be removed with the help of two screw drivers. Pull off the sprocket of 4th gear (3). Mind the disk (5) between the bushing of the wheel and the shaft step. It serves to reduce the lateral friction between bushing and step. Remove the jaw clutch (4). On the other side pull off the wheel of 1st gear (6). Again there is a disk (5) between bushing and step which has the same job as the other. The jaw clutch (shifting dog) (4) on this side can be removed. The jaw clutches (shifting dogs) are both the same, they can be interchanged and do not have to be marked. Now check if the edges of the sprocket grooves are worn off (beveled) (arrows), also check the driving pins at the jaw clutch (for beveling). It depends on your possibilities if you want to replace the parts with worn edges.



Figure 93

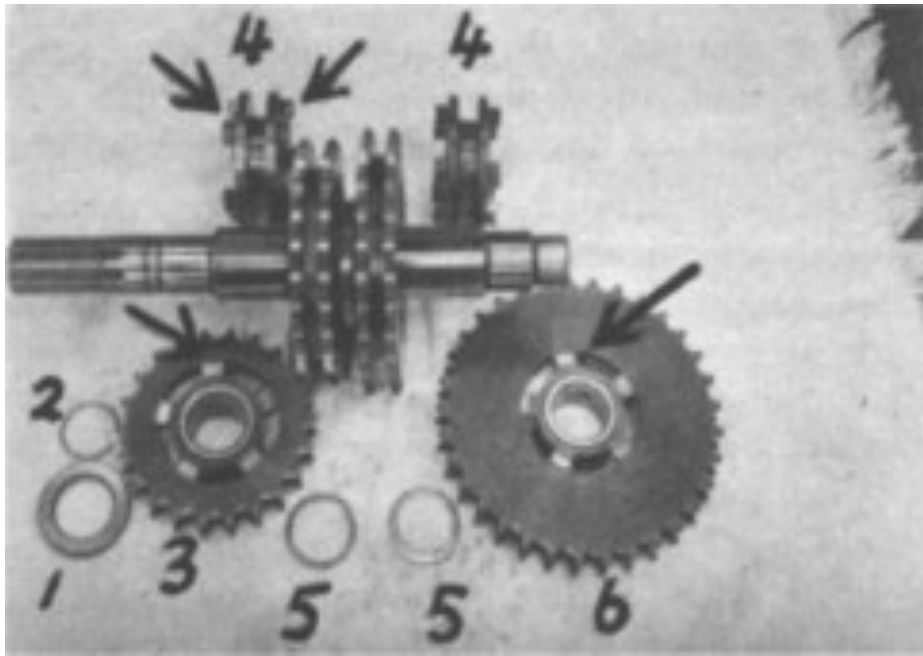


Figure 94

To get the remaining two wheels off of the shaft, put it on the workbench. Split the tension ring at the joint of the two-piece connection ring between 2nd and 3rd gear wheel with a flat chisel that has a blade width of maximal 4mm. Here you can see the remaining individual parts (95) and the layshaft: 1 = layshaft, 2 = 3rd gear wheel, 3 = split tension ring, 4 = two-piece connection ring, 5 = chain wheel 2nd gear. With a close look small pins are visible on the joint of the ring. They prevent the ring from getting scrunched by the tension ring and the chain wheels from shutting. This is why a flat chisel with a 4mm blade is necessary. A bigger blade width could cause one of the pins to be cut off.

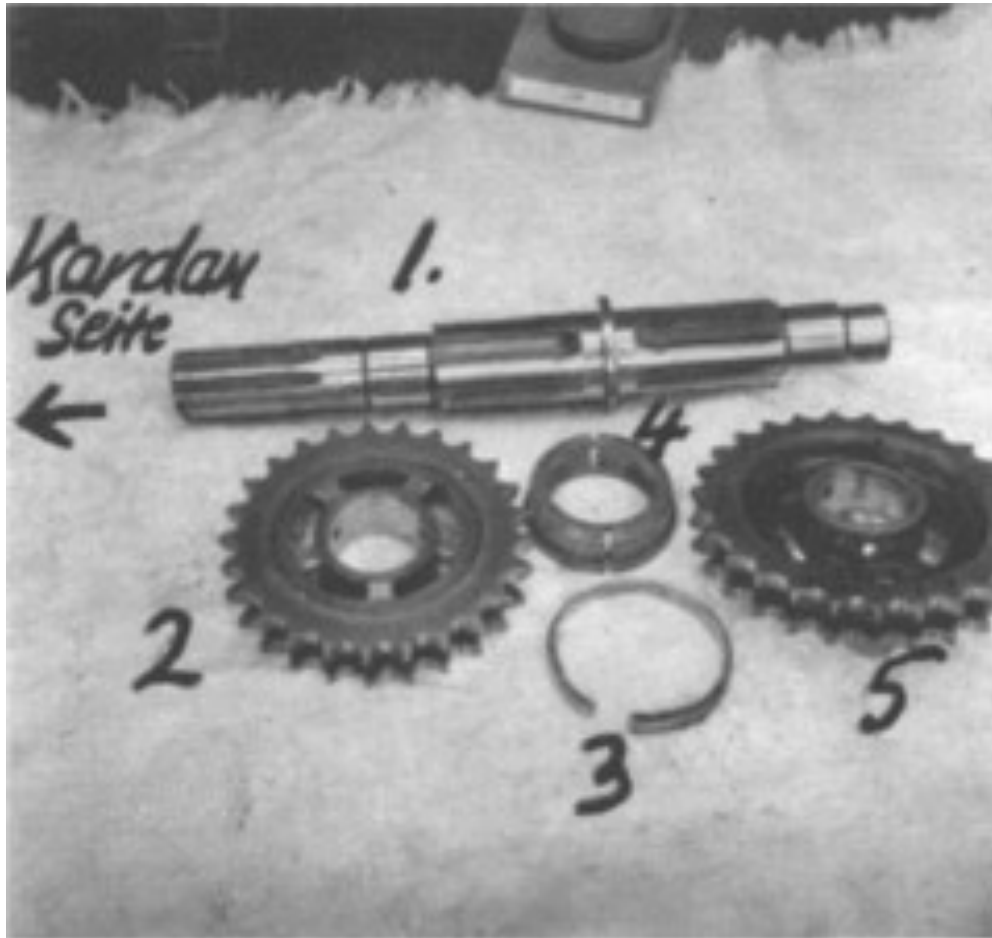


Figure 95
Cardan side

To reassemble the shaft, push the chain wheel of 2nd gear on the shaft with groove in the wheel pointing to the shaft center. Put the shaft into the vise and put the split connection ring with the collar down into the wheel. Put the tension ring, which has to be a new one because the old one is split, with the thin side on the connection ring and insert the chain of 3rd gear from the top (the groove pointing down, to the shaft center).

Now close the two-piece connection ring, hold it together with a wire sling so that we can press the new tension ring on top (96). Work with a mandrel (filed down nail) and gentle hammer hits only. As you will notice, when hitting too hard, the tension ring will jump off the connection ring immediately. Hit crosswise. Now hit the thin side of the tension ring into the outer groove of the two-piece ring (locking device) on four points with a flat chisel. How the remaining parts have to sit on the layshaft will not be explained because this was specified in the text above.

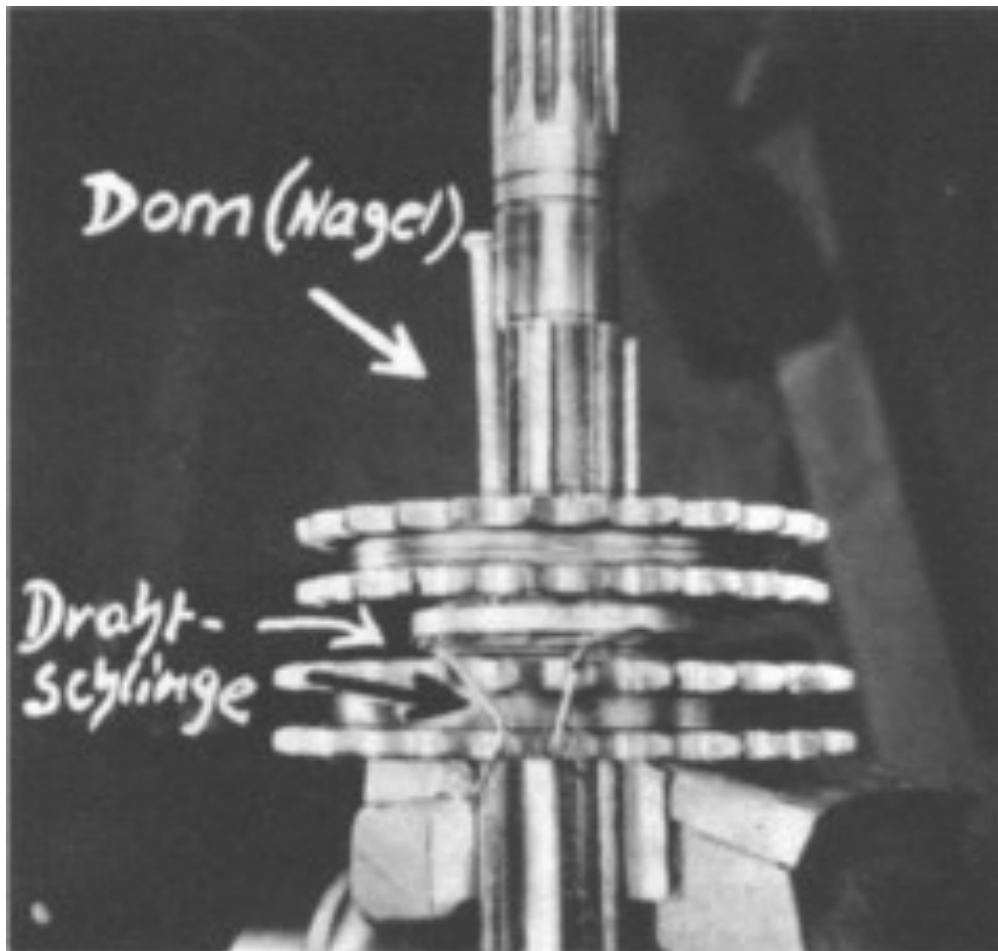


Figure 96
Mandrel (nail), Wire sling

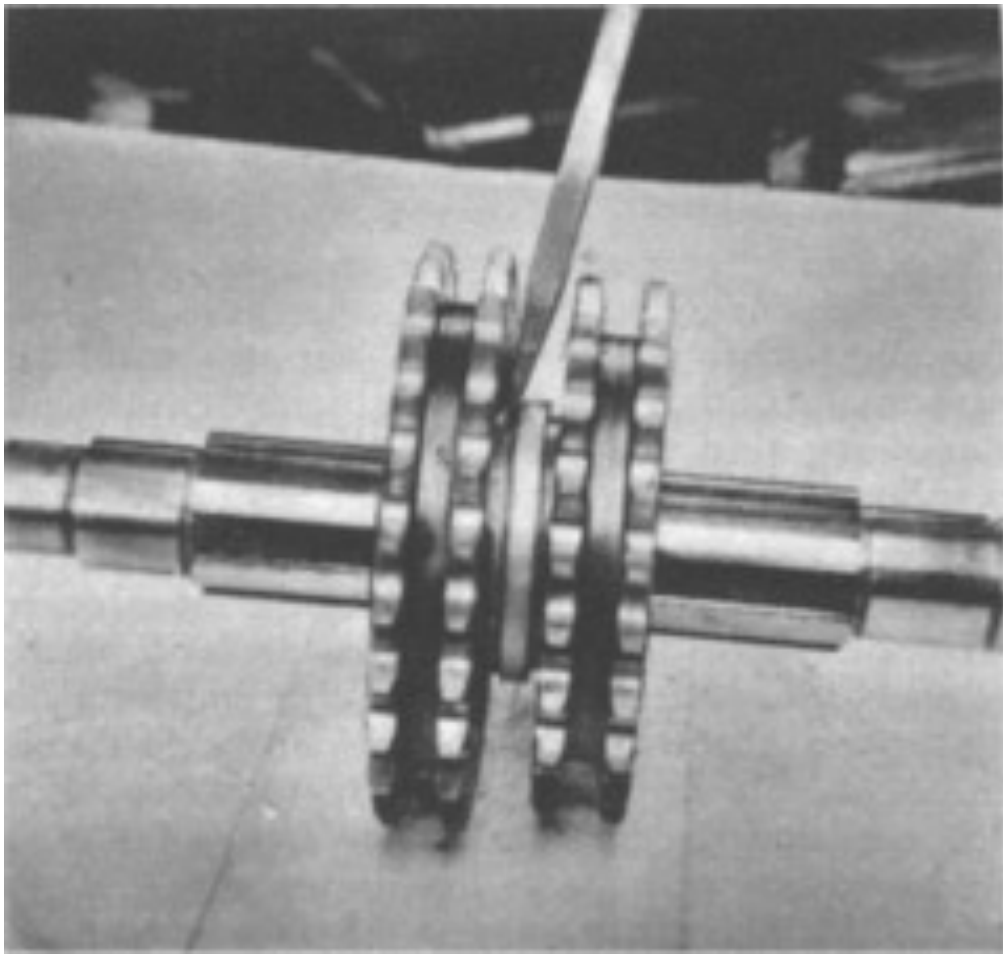


Figure 97

Now turn to the main shaft (98) and remove the circlip (1) at the kick starter side which fastens the disk (2), the pressure spring (3) and the driving gear wheel (4) on the shaft. The teeth at the outer side or the frontal side (arrows) of the driving gear wheel (4) could be worn. This is not critical as long as the oil level is high enough. (Oil filling 750ccm = $\frac{3}{4}$ liters). If oil is lacking the driving gear wheel could seize on the shaft. This mainly happens when starting and causes the engine to stall.

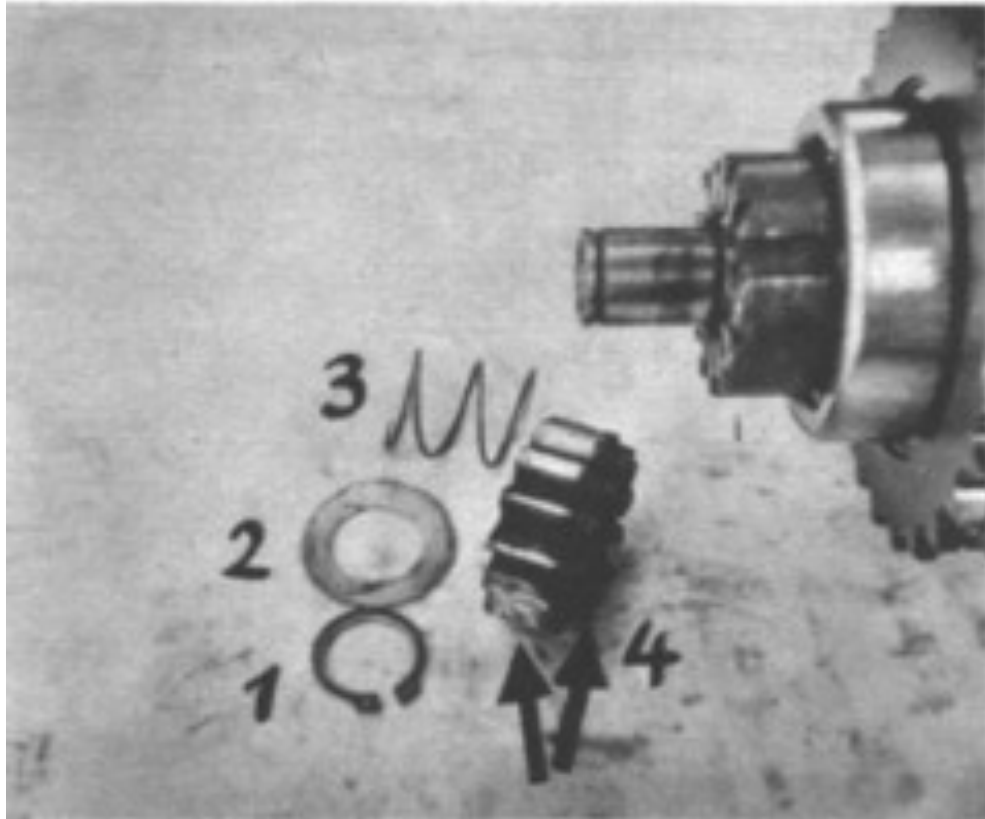


Figure 98

Feed the jaws of a big vise (99) with two fir wood boards, insert the main shaft and tighten it until the teeth of the chain wheels of 3rd and 4th gear bite into the wood. Loosen the round nut with a hooked socket wrench. (Attention: left-handed thread). Apply the hooked socket wrench as shown, hold it tightly and hit the haft of the wrench forcefully with an 800 gramme hammer.

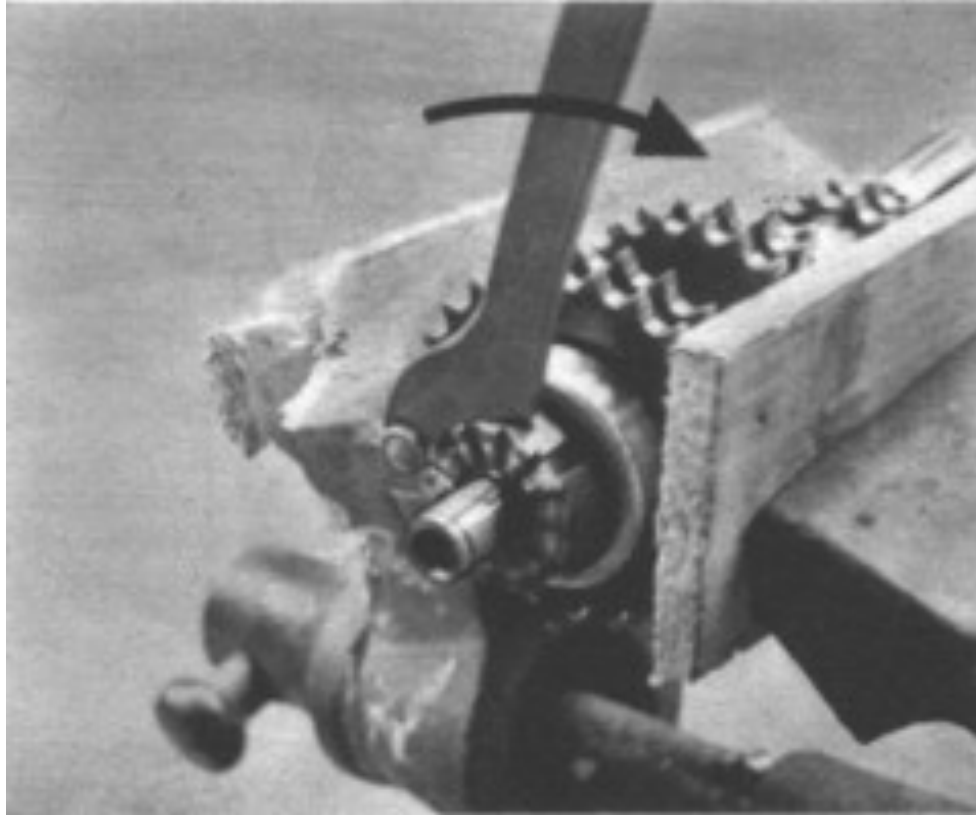


Figure 99

Hit the shaft end with the shank of the hammer and the shaft out of the bearing, the chain wheels and the spacing pipe. Assembling order: (100) 1 = main shaft with the 1st and 2nd gear wheels milled from the solid. 1 a = short spacing pipe between shaft step and chain wheel of 3rd gear. 2 = chain wheel 3rd gear (visible side points to 2nd gear on shaft). 3 = long spacing pipe (between 3rd and 4th gear). 4 = chain wheel 4th gear (visible side points to bearing). 5 = spacer ring (between chain wheel of 4th gear and grooved bearing). 6 = grooved bearing (6303 DIN 625). 7 = driving nut (left-handed thread).

During assembling check that the tiered side of the spacer ring points to the chain wheel of 4th gear. Only this ensures the proper fit of the chain wheels after tightening the driving nut. If the ring is installed the wrong way the driving nut will press the spacer ring via the inner bearing race onto the shaft step and not onto the chain wheel. This causes an axial play of the chain wheels of approx. 2mm and has respective consequences. Put the grooved bearing onto the shaft and press it on by tightening the driving nut. Clamp the shaft into the fir wood fed vise. Tighten the driving nut with a hooked socket wrench. It is very important to put the wrench onto the nut

over and over again and to secure a tight fit of the nut with hammer hits.

A short description of what will definitely happen after the 3rd or 4th starting of the engine if the driving nut is not tightened good enough: Shortly after start up, with the foot still on the kick starter (a matter of seconds), the driving gear wheel crashes with its face teeth against the nut teeth. This loosens the nut and it comes back. The kick starter is completely pushed down and the big kick starter gear wheel crackingly loses some teeth and wedges with the driving nut. The copper driving gear wheel is pushed back and onto the clutch thrust bearing whereupon circlip, disk and spring are scrapped. Then the engine stops because the main shaft is jammed. When servicing, the transmission has to be disassembled and the damaged parts have to be replaced.

An oil level that is too low can have the same effect. The only difference is that the copper driving gear wheel will abruptly seize on the shaft and damage the kick starter gear wheel and the kick starter itself.

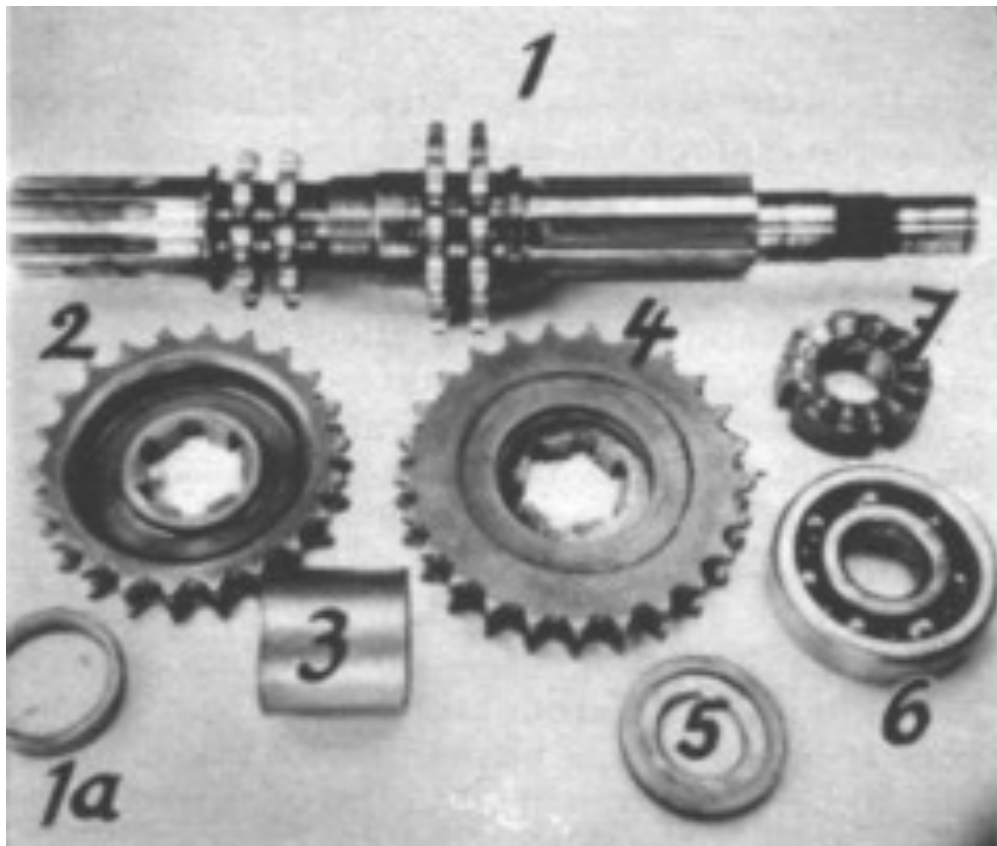


Figure 100

Now turn to **assembling the transmission**. Put the marked chains in their old directions on the wheels of the layshaft (101). The sides of the chains with the wire all have to face left. Insert the main shaft from the left into the chains and put the whole thing on the

workbench. Put the spacer disks on the rear side of the layshaft and after that the cardan cover rubbed in sealing compound. Insert the three hexagon screws M7x30 and tighten them with an 11mm socket wrench (102). The two balls (3.5mm in diameter) are rubbed with grease for adhesion and put into the holes in the guide bushing. Insert the shafts into the heated housing supported with wood. Before this, put the spacer disks that might have been installed into the seat of the rear main shaft bearing. Hit the shafts with a rubber hammer into the housing and at the same time let the wheels of 1st gear align (103). Slide the circlip into its groove at the cardan side of the layshaft. Check the fit as you did for the piston pins.

Retainers: Insert the scriber into an ear of the ring and pull it to the other. If the ring rotates during this is a proper fit. Now put in the circlip and then the spacer ring that might have been there to compensate the axial play of the cardan shaft. But usually the play has already been compensated by striker pins (mushroom) in the bevel gear shaft end with varying strength. It is important that the cardan shaft has approx. 1mm axial play when horizontal. Without this play the angular contact ball bearing at the bevel gear will shortly conk out.

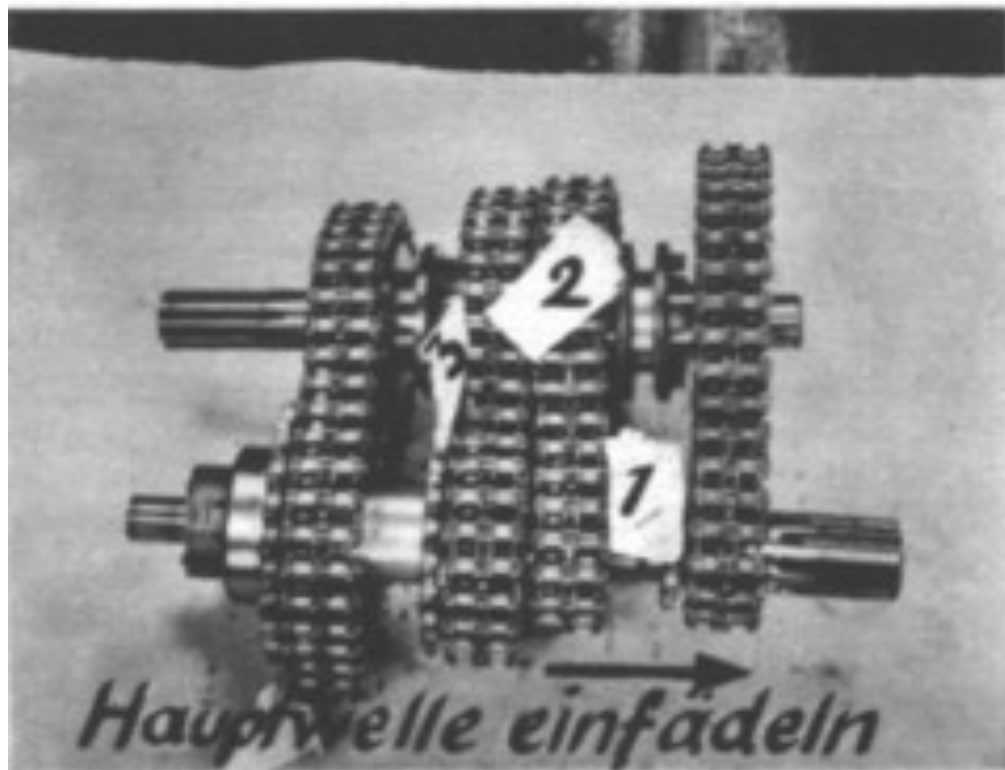


Figure 101
Insert main shaft

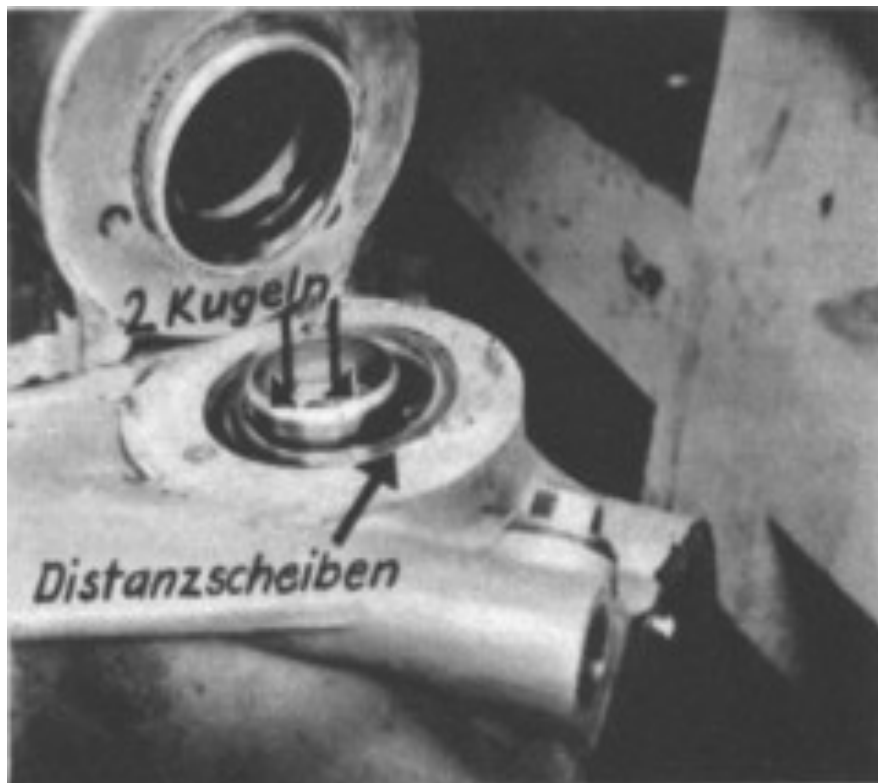


Figure 102
2 balls, Spacer disks

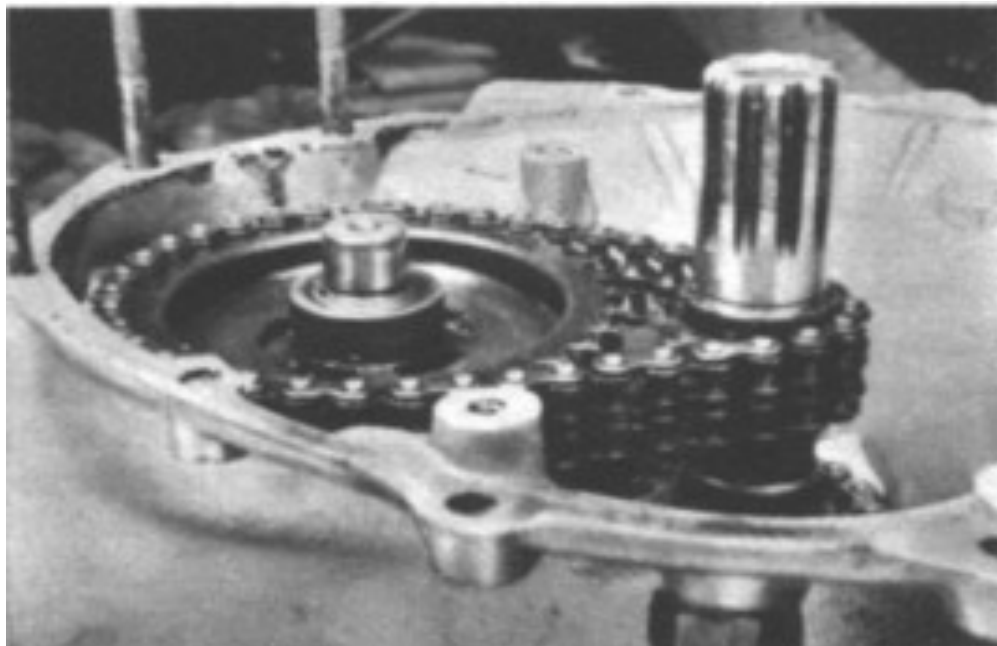


Figure 103

Put on the transmission cover with the bearings that are in it (104). Before doing this remove the locking screw (arrow). Grease the sealing surface of the cover with sealing compound to ensure a clean casing. Tighten the four hexagon screws (M6x15) together with the spring rings with a 10mm socket wrench. Now test the running of the shafts. They might not run easily at first because the chains are not yet aligned. The layshaft fits because of the rear bearing which is fixed thanks of the circlip and the cardan cover. To be sure, hit the shaft with hammer and mandrel through the screw hole in the cover. After that, bring the jaw clutch to rest. The shaft has to run easily taken the friction of the oil seal of the bushing to account.

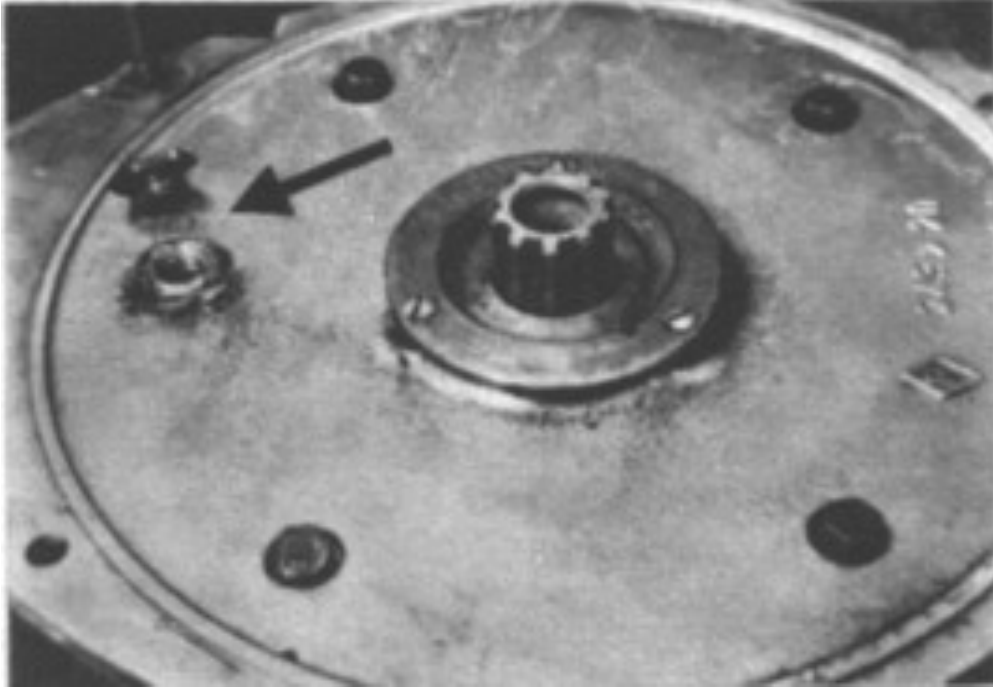


Figure 104

The main shaft has a lateral play of approx 1/2mm and is hit on with a rubber hammer until both shafts run easily in an engaged gear. Install the big kick starter gear wheel after putting the spacer disk onto the shaft bushing (105). Driving gear wheel, spring and disk are fastened with the small circlip. Now slide the clutch push rod into the main shaft.

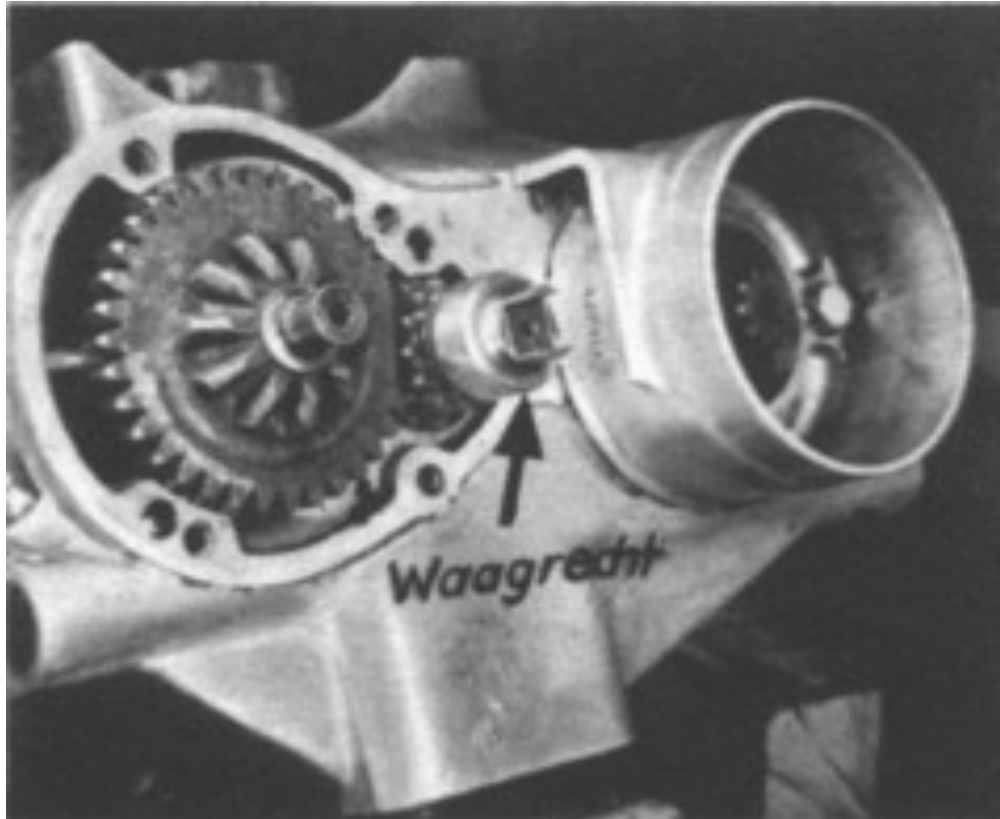


Figure 105

Grease the sealing surfaces of the kick starter cover with sealing compound, put it on and tighten the four respective hexagon screws (M7x55) with an 11mm socket wrench (105). The wide groove at the thrust bearing (arrow) has to be horizontal when mounting the cover.

Tauten the kick starter spring by holding on to the kick starter case and once rotating the lever clockwise (106). Put the kick starter case into the transmission housing and tighten with both hexagon screws (M10x35). The flattened side of the kick starter case points to the front, in the direction of the big kick starter gear wheel. The flattening prevents the gear wheel from touching the case.

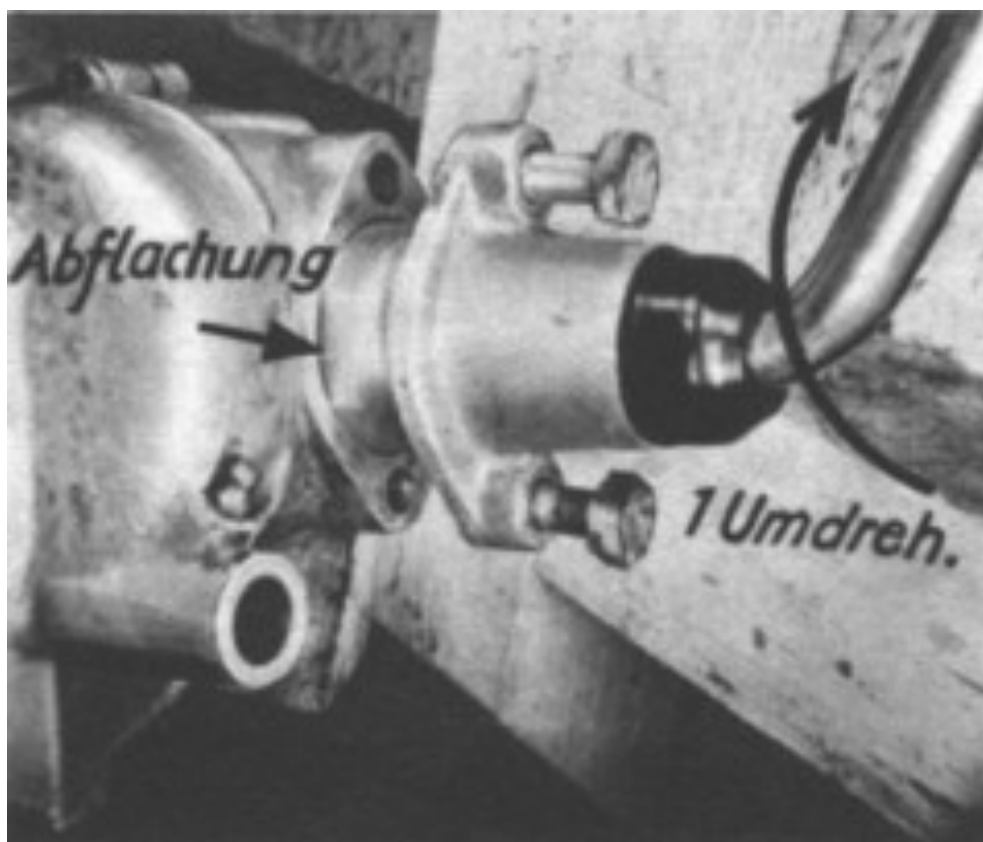


Figure 106
Flattening, One Revolution

Set the gear shift to idle, pull the jaw clutch to the middle between the chain wheels and then install the apparatus (107). Attention! There must be only one gasket between the transmission housing and the intermediate cover.



Figure 107

Mount the transmission to the engine (108). Before that press the felt ring (1) into the main shaft and place the greased pressure piece (2) onto the square end of the push rod. There is no need for explaining the mounting of the engine to the frame, attaching the ignition coil and so on because they are common jobs.

But one thing is important:

The cardan shaft has to have a play of approx. 1/2 - 1mm in the horizontal position, which means when the layshaft end and the bevel gear shaft end are in one plain. If that is not the case the rear wheel gear wheel be destroyed shortly.

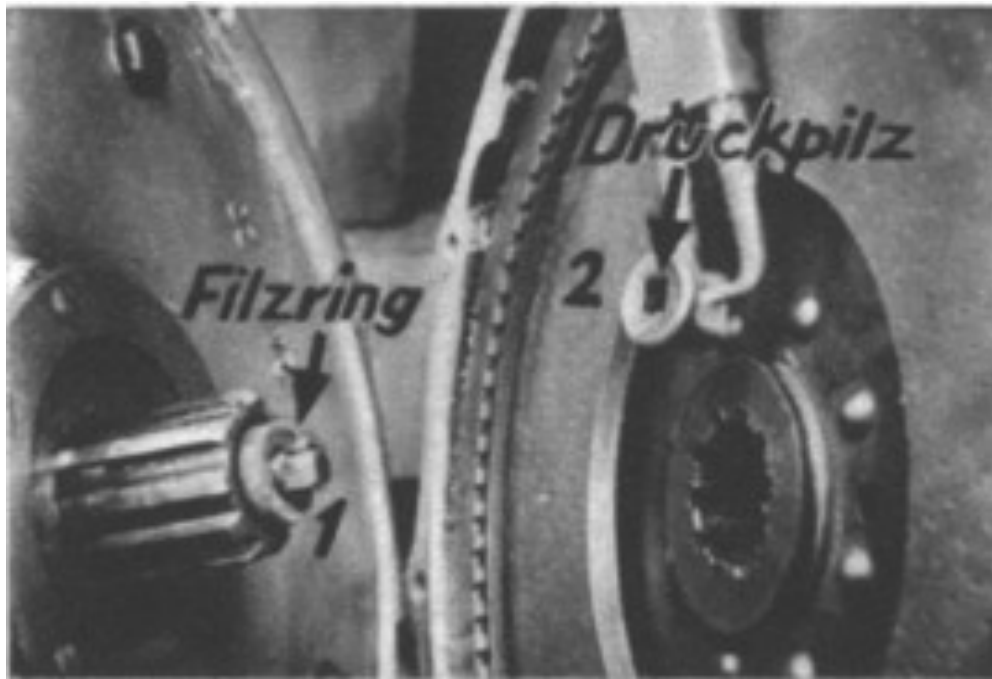


Figure 108
1 Felt ring, 2 Pressure piece

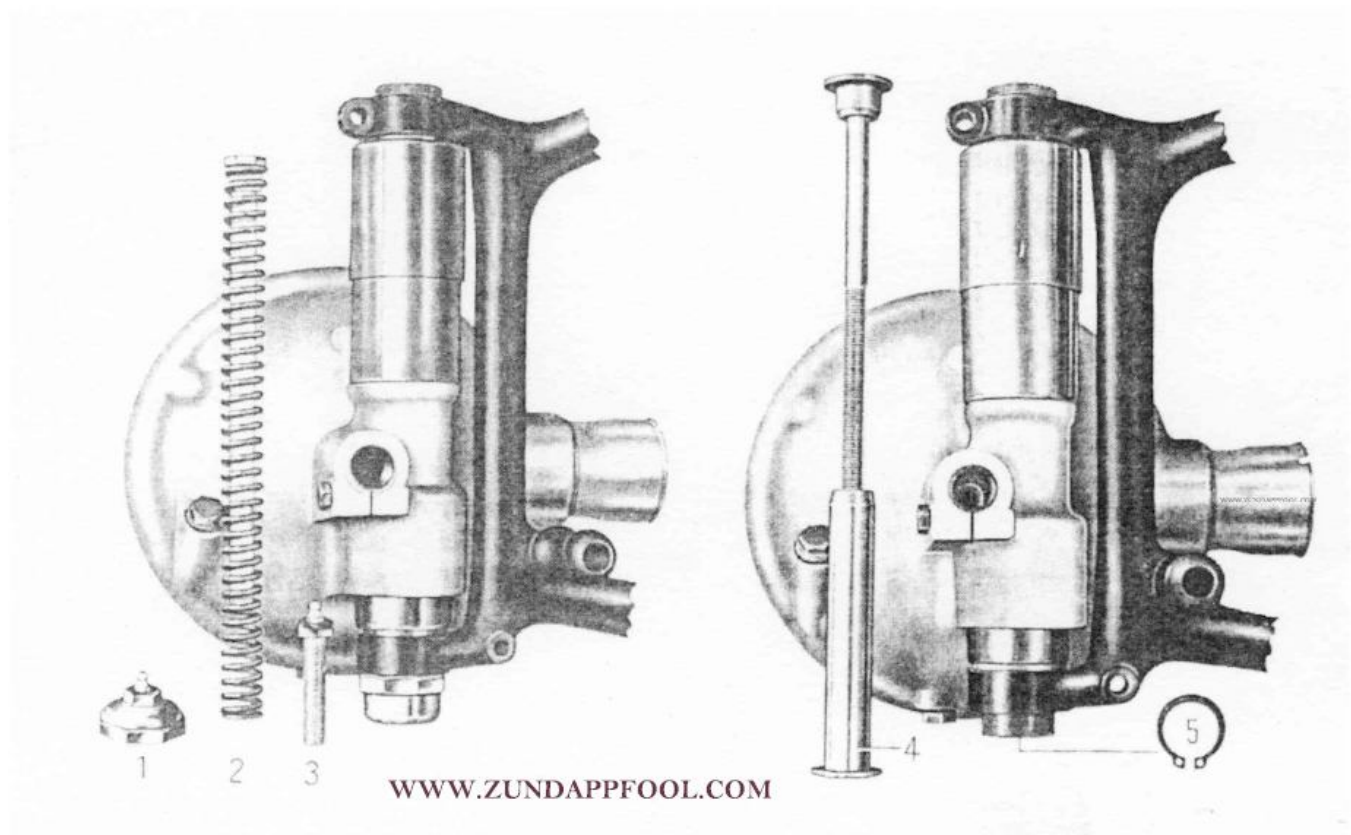
Adjusting the rear wheel gear KS 601

To give the Zündapp Works the possibility to conduct service of the rear wheel gear of the mark KS 601 in their one work shop, the following illustrated manual shows the right performance of the necessary work.

Removal of the rear wheel drive

Unscrew upper and lower locking nut of the rear wheel suspension. Remove auxiliary spring with bracket (2) as well as the inner circlip (5) the auxiliary spring rests on. Insert specialty tool ZWN 779 (4) into the rear wheel suspension and tighten it until it is possible to remove it from the frame.

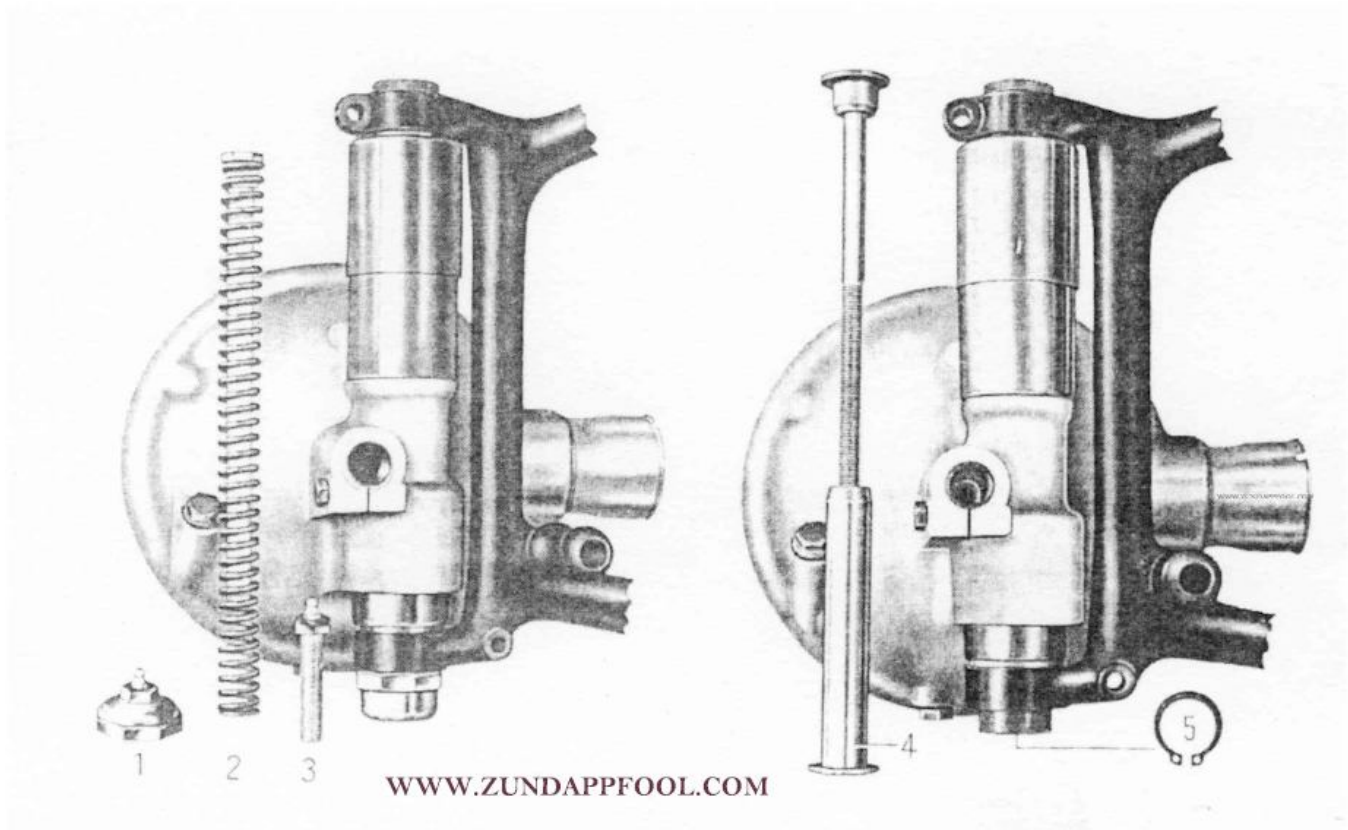
Attention! Omit the auxiliary spring and the bracket (2) for a softer suspension in solo and sidecar operation.



Disassembling the rear wheel drive

All locking nuts and screws for fastening the case cover (6) have to be removed.

Insert auxiliary tool into hub shell (16) and axle bushing (11) to press out the case cover (6) by screwing the clamping bushing (9) into the hub shell (16). The auxiliary tool (8) can be self-made according to the specified measurement. Press hub shell (16) out of the ball bearing in the case cover (6). Unscrew sleeve (7) and the underlying clamping nut. Remove the shaft pinion (13) with its ball bearing.



Adjustment

We use spiral toothed bevel gear sets from our own range for our rear wheel gears. It is very important that the adjusting dimensions engraved in the gear sets are followed.

Each crown wheel has three different numbers

e.g. 91.5 – 26.3 – 14

These numbers are variable. This is why we name them A, B, C in the following text.

A is the gap between crown wheel center and the rear side of the spiral teeth of the shaft pinion.

B is the dimension between the rear side of the crown wheel and the centerline of the shaft pinion.

C is the set number which is also put down on the shaft pinion.

1. Calibration of the shaft pinion

To save installing the shaft pinion, put the cover disk (10) for the double-rowed angular contact ball bearing instead of the latter into the rear wheel gear case, because the rear side of the spiral teeth of the shaft pinion have the same measuring point as the front side of the cover disk (10). The centerline of the crown wheel (2. measuring point of dimension A) is at the same time the center of the axle bushing (11). Because this center is not defined, but the outer diameter of the axial bushing (11) is, the following result is given:

$$A1 = A - 25$$

$$A1 = 91.6 - 12.5$$

$$A1 = 79.1$$

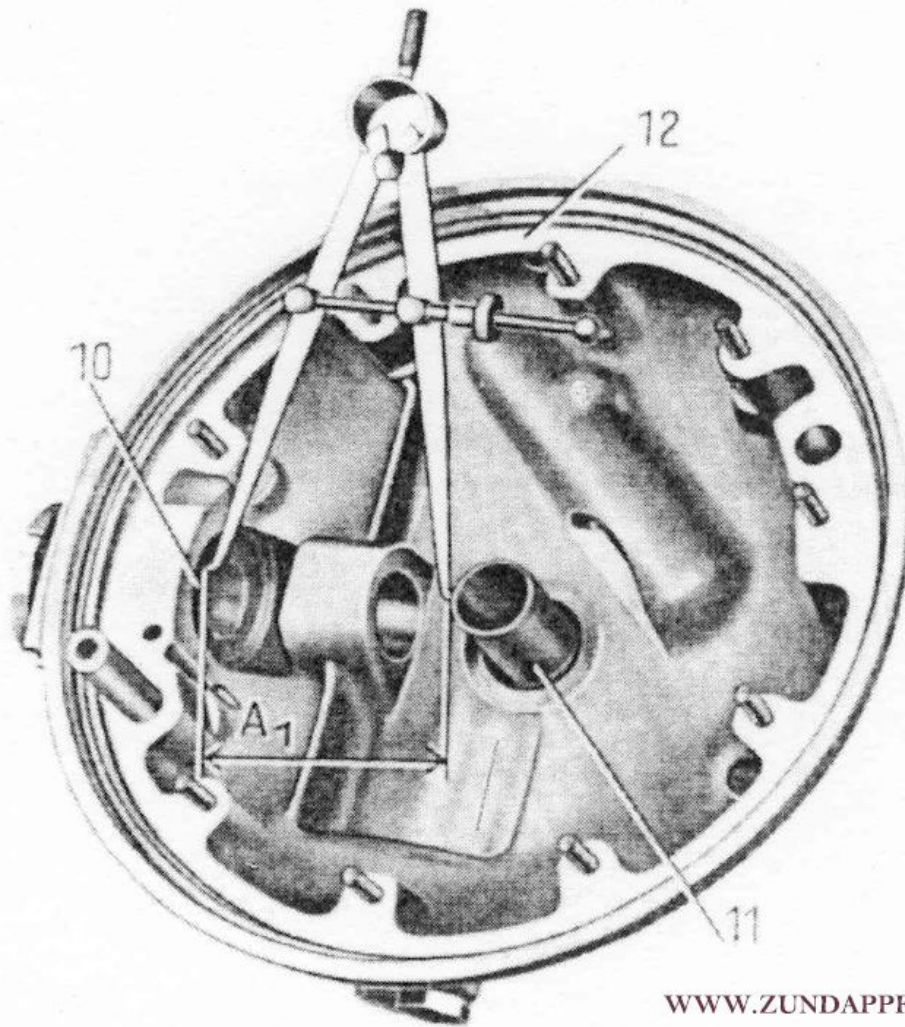
Measure the dimension between the cover disk (10) and the outer diameter of the axial bushing (11) with inside compasses. In our example the resulting dimension is 78.1mm. This dimension is 1.0mm smaller than the dimension M1, i.e. before inserting the double-rowed angular contact ball bearing, compensation disks

1301 z 398 0.3mm thick

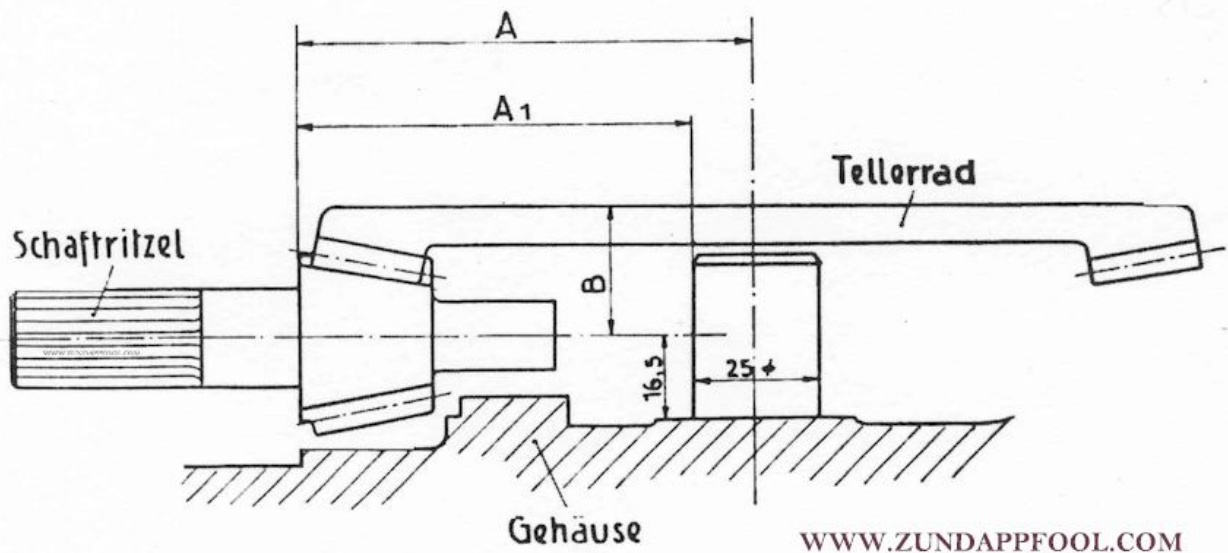
1301 z 399 0.2mm thick

1301 z 400 0.1mm thick

with a height of 1.0mm including the cover disk (10) have to be inserted. Furthermore the lateral play between face side of the spiral teeth of the shaft pinion and the bearing bushing (14) has to be determined before inserting the angular contact ball bearing. This is done as follows:



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- put bearing bushing (14) into bronze bushing,
- put the determined compensation disks and the cover disk (10) into the case,
- insert shaft pinion (13) in bearing bushing (14),
- Press pressure disk with felt ring against the pinion head and the inserted disks so that the felt ring points at the pressing fingers,
- in this position, determine the lateral play between the face side of the spiral teeth at the pinion and the bearing bushing (14) with a feeler gauge. It has to be around 0.1mm. Potentially necessary compensation disks

1301 z 421 0.1mm thick

1301 z 422 0.3mm thick

1301 z 423 0.5mm thick

have to be put under the collar of the bronze bushing which has to be pulled out for that.

After this the shaft pinion (13) can be installed for good.

2. Calibration of the crown wheel

The dimension B can practically not be measured.

When the fixed dimension 16.5 from the center of the shaft pinion to the support of the ball bearing for the hub shell (16) in the casing (12) is known, the following results:

$$B + 16.5 = B1$$

$$26.3 + 16.5 = 42.8\text{mm}$$

Put the hub shell (16) with the ball bearing pressed in onto a surface plate and measure the dimension B1 from the rear side of the crown wheel (15) to the surface plate. In our example the resulting dimension is 42.3mm. This dimension is 0.5mm smaller than the dimension B1. i. e. before pressing in the hub shell (16) with the crown wheel (15) into the case (12), the difference has to be inserted as compensation disks

1301 z 393 0.1mm thick
1301 z 394 0.3mm thick
1301 z 395 0.5mm thick.

3. Calibration of the case cover

Put a ruler over the rear wheel drive case and determine the dimension d to the sealing of the case cover (6) as well as the dimension d1 to the support surface of the ball bearing at the hub shell (16):

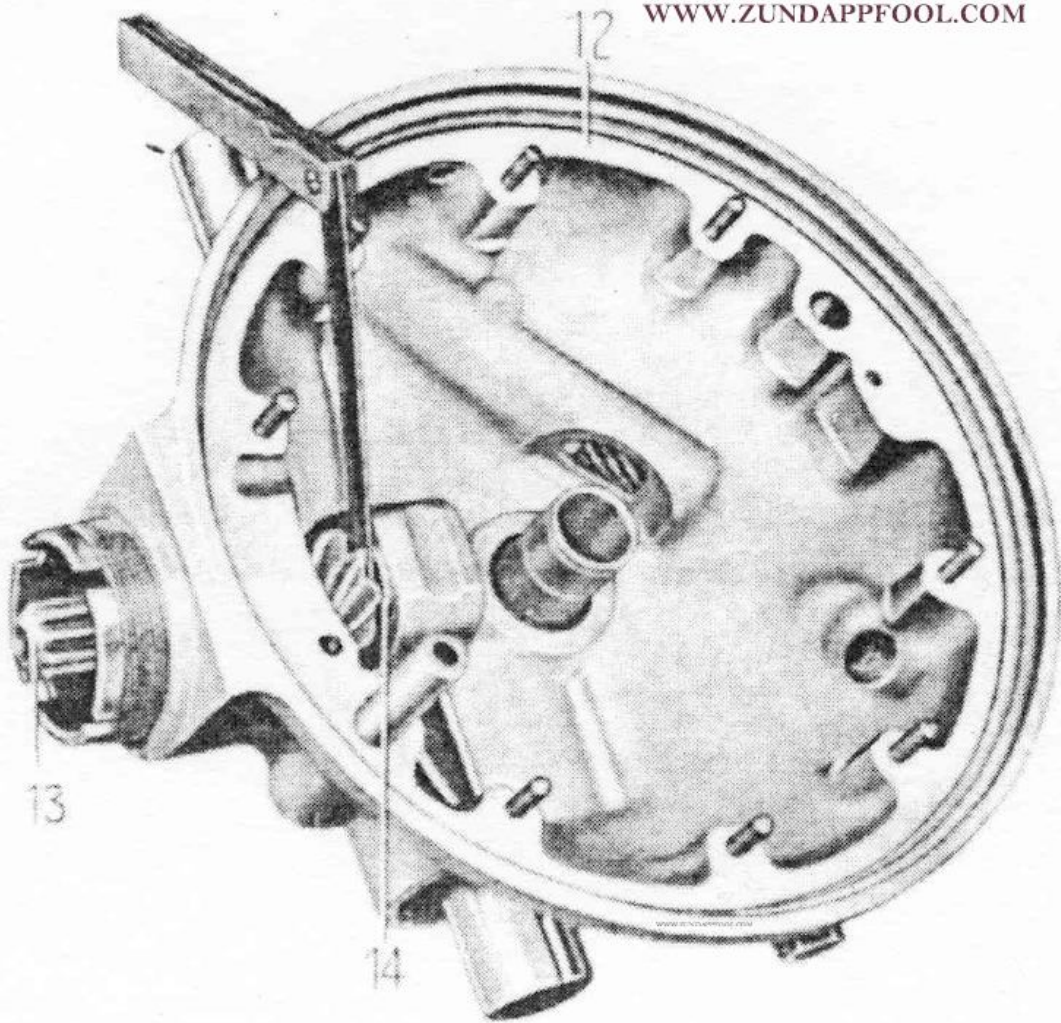
$$d-d1 = D$$

In our example the resulting dimension D is 8.2mm.

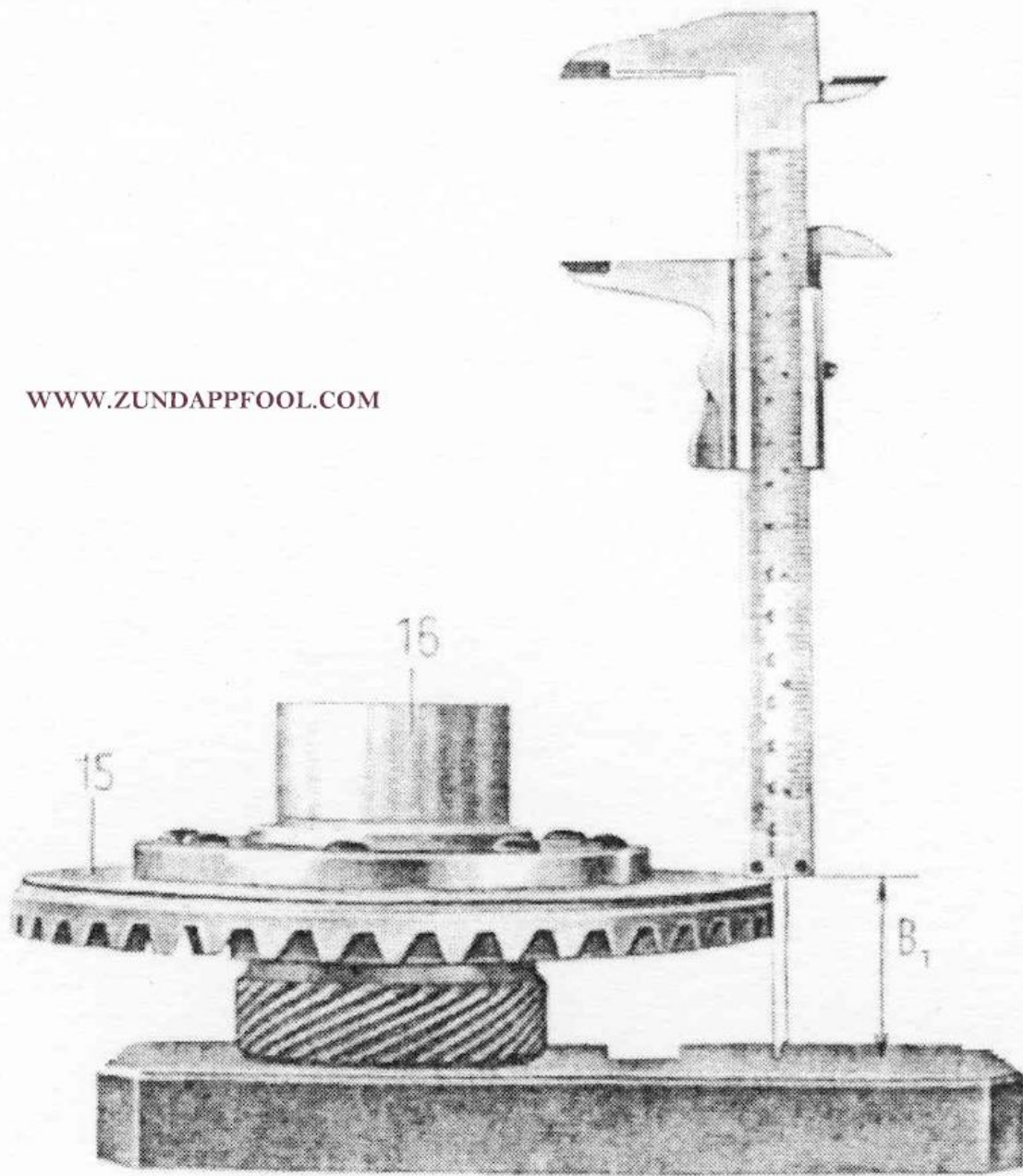
Put a ruler over the case cover (6) and determine the dimension e to the ball bearing (17) in the case cover (6) as well as the dimension e1 to the sealing surface of the case cover (6):

$$e-e1 = E$$

In our example the resulting dimension E is 9.0mm.



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Because the dimension E is 0.8mm bigger than the dimension B, the difference has to be compensated with disks

1301 z 413 0.1mm thick

1301 z 414 0.3mm thick

1301 z 415 0.5mm thick

between the hub shell (16) and the ball bearing (17), so that approx. 0.2mm of lateral play are left (in our case insert compensation disks with a total height of 0.6mm).

After this work the case cover (6) can be screwed on. Be careful not to damage the sealing ring in the case cover (6).

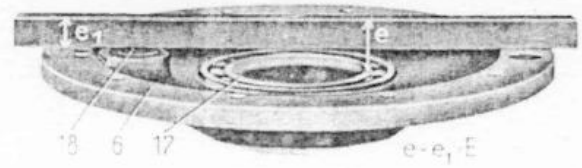
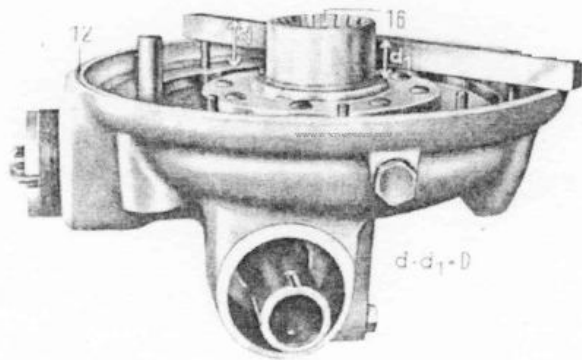
Screw in the screw (19) for the supporting piece (18) so far that it seats. Now screw it out a 1/8 – 1/6 revolution, tighten the nut and secure it. It is recommended to use a sealing agent for this screw (19).

In the case of casing covers (6) which have 2 threaded holes M8 at the sides for pressing off the cover, close the holes with grub screws dipped in a sealing agent. Now the case cover (6) cannot be pressed off but oil can still drain.

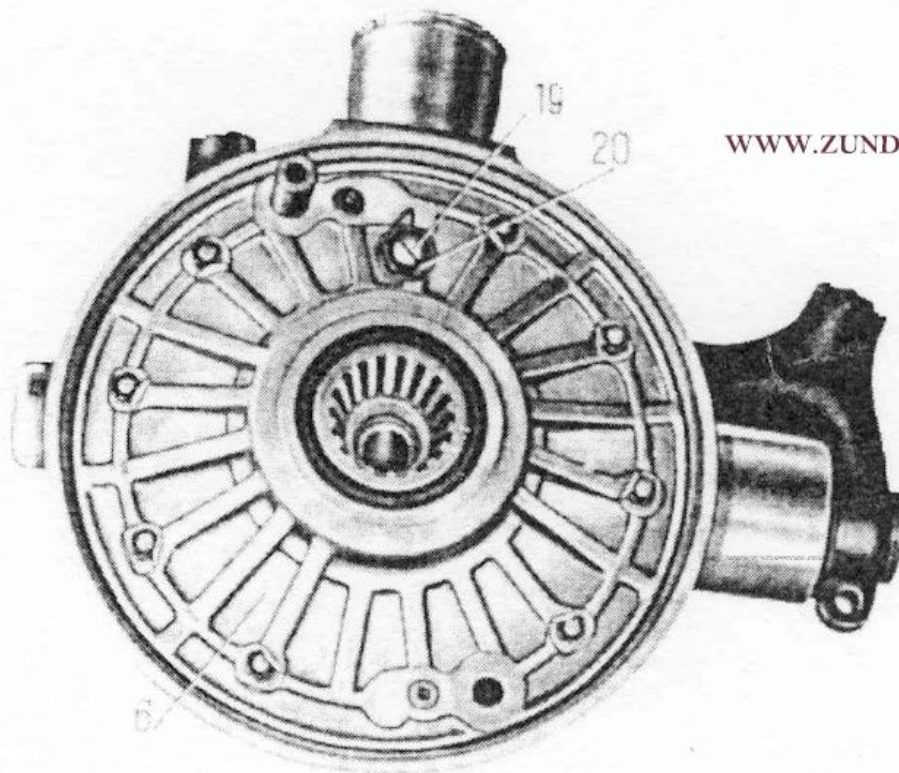
4. Oil filling

Fill the rear wheel drive with 180ccm Mobilöl CW = SAE 90. Do not use Hypoid oil because this hardens the sealing rings and causes oil losses.

We hope that we eliminated all doubts about adjusting the rear wheel drive with our specifications given above.



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Adjusting the rear wheel gear - KS 600

Adjustment on final drive:

In order to give the Zundapp repair shops the possibility to achieve the repairs on the final drive of our driveshaft models, we issued the following instructions for the correct procedures.

For our final drives we use spiral cut beveled gear sets from our own production as well as models from the companies Hurth and ZF. It is extremely important, to comply with the acid edged adjustment numbers on this sets.

Notice that every set has 3 different numbers

(fi) 78.3 - 23.1 - 4
(fi = for instance)

Which means:

The bigger number (fi) A = 78.3, the distance from the center of the plate to back the spiral cut gear on the shaft sprocket (Roller bearing), on Hurth and ZF models to the face of the splined input shaft = a.

The middle number, (fi) B = 23.1, the distance from the centerline of the shaft sprocket to the end of the resting area on the plate (Wheel bearing on lid of driveshaft housing), on Hurth and ZF to the space between hub and the inside of the spiral cut gear on the plate = b.

The smallest number on both of the parts is the set number, since only sets, matching numbers, can be used to install.

The needle bearing on the input shaft on KS 660 is not used any longer!!!

ADJUSTMENT

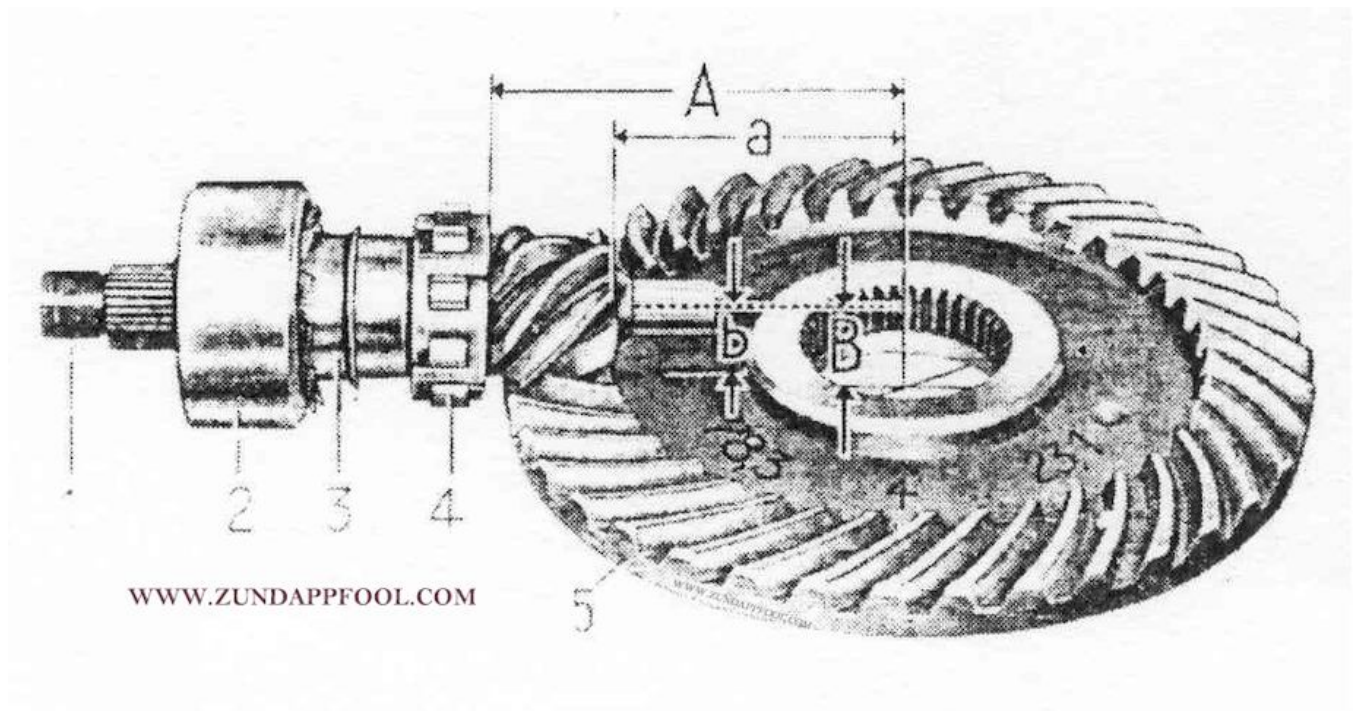
1. Driveshaft housing

Press outer roller bearing ring (9) and big spacer tube (8) into driveshaft housing (11). Press double lined wheel bearing (2) into flange base (6), set flange base (6) onto driveshaft housing (11) and screw it down; check if you can see light -space- between flange base and driveshaft housing.

Should this not be the case, install between double lined wheel bearing (2) and big space tube (8) as many spacer discs (7)

1301 z 061 0.2 mm thick
1301 z 062 0.3 mm thick
1301 z 063 0.5 mm thick

as you need, until you can see light.



1301 z134 0.3 mm thick
1301 z135 0.5 mm thick

on all other models (except KS 601 and KS 750)

1301 z04 0.2 mm thick
1301 z05 0.3 mm thick
1301 z07 0.5 mm thick

as needed to balance out the difference. If the established distance D is smaller, you have to install on the outer rim of the driveshaft housing lid (15) as many paper gaskets (17) in the amount

468 z 09 0.1 mm thick
468 z 010 0.2 mm thick

of the dimension difference.

In order to get the correct measurement, make sure that the wheel bearing (18) is completely pressed in.

After tightening and securing the nut (22) for the ring gear (5) adjust the setscrew for the support stud (20) to achieve a distance between it and the ring gear of 0.1 - 0.2 mm. Tighten and secure the counter nut for the setscrew.

Screw driveshaft and driveshaft housing lid together. Press wheel bearing (12) into driveshaft housing.

Establish dimension E between gasket base (23) on the final drive housing (11) for the sidecar connection lid (24) to the outer ring of the wheel bearing (12). If the height F of the flange on the sidecar connection lid (24) is lower than the dimension E, add adjustment discs (25)

On KS600

1301 z132 0.1 mm thick
1301 z133 0.2 mm thick
1301 z134 0.3 mm thick
1301 z135 0.5 mm thick

On all other models (except KS 601 and KS 750)

1301 z8 0.1 mm thick
1301 z09 0.2 mm thick
1301 t010 0.3 mm thick

between outer rim of wheel bearing (12) and flange of the sidecar connection lid (24) to achieve the dimension difference.

If the flange is taller than the previously established dimension E, add on the outer ring of the sidecar connection lid (24) paper gaskets,

on KS 600 1238 z3

on all other models (except KS 601 and KS 750) 1238 z02

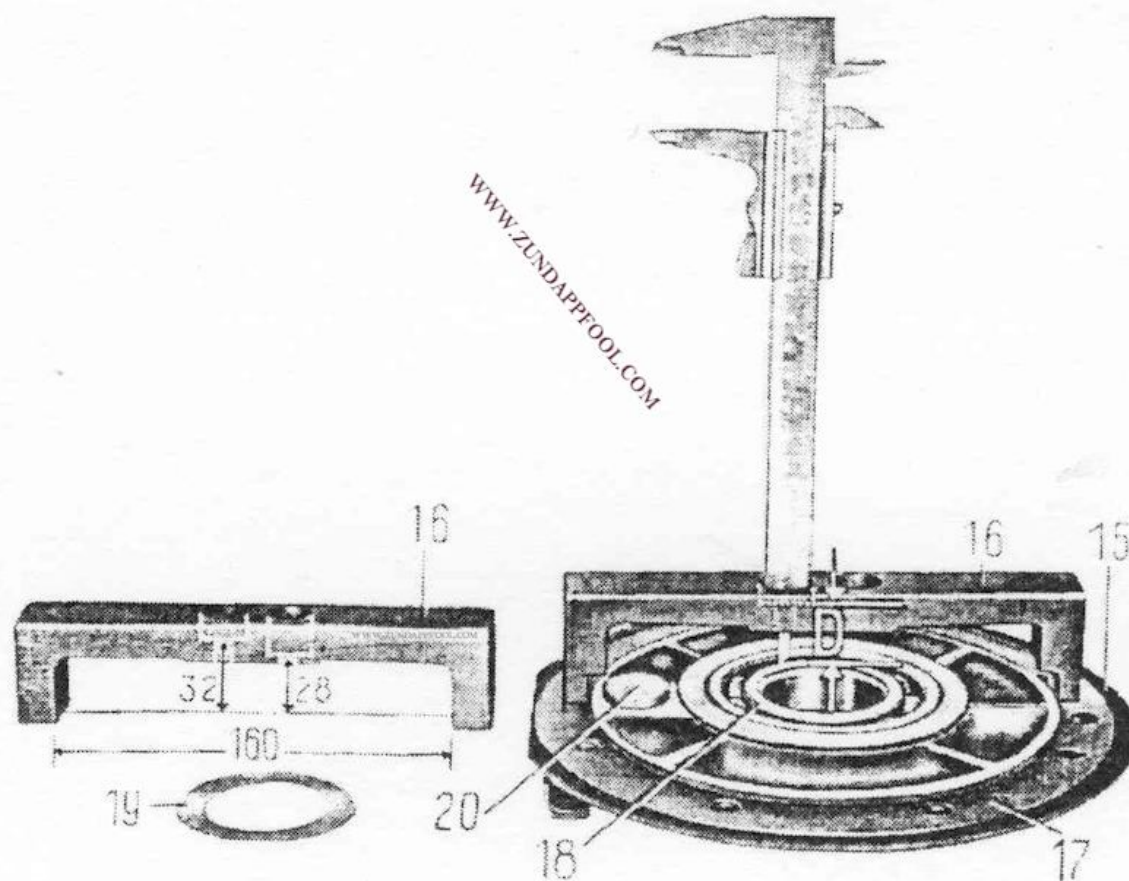
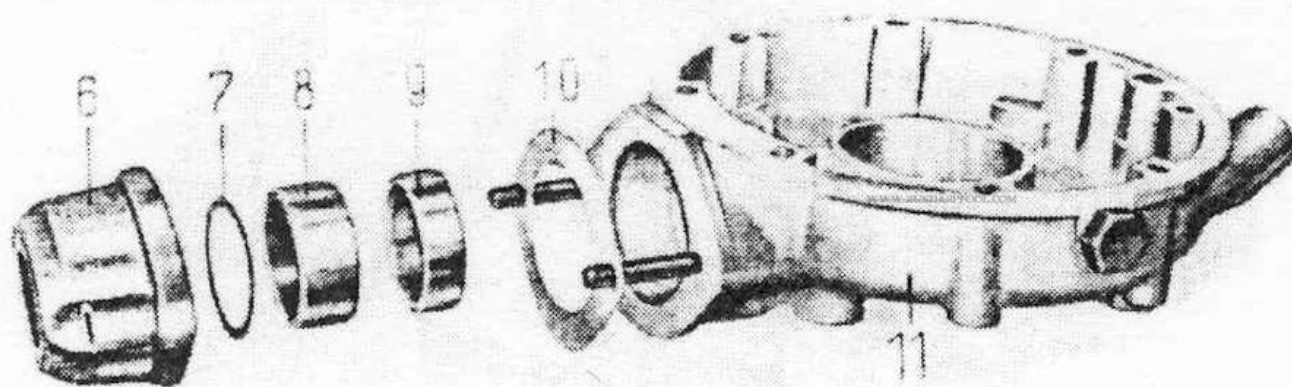
until you balance the difference of the dimension E and F. The sidecar mounting ball (26) have to be on the bottom on the installed drive.

Fill the final drive (driveshaft housing) with 180 ccm with Shell - Ambroleum liquid.

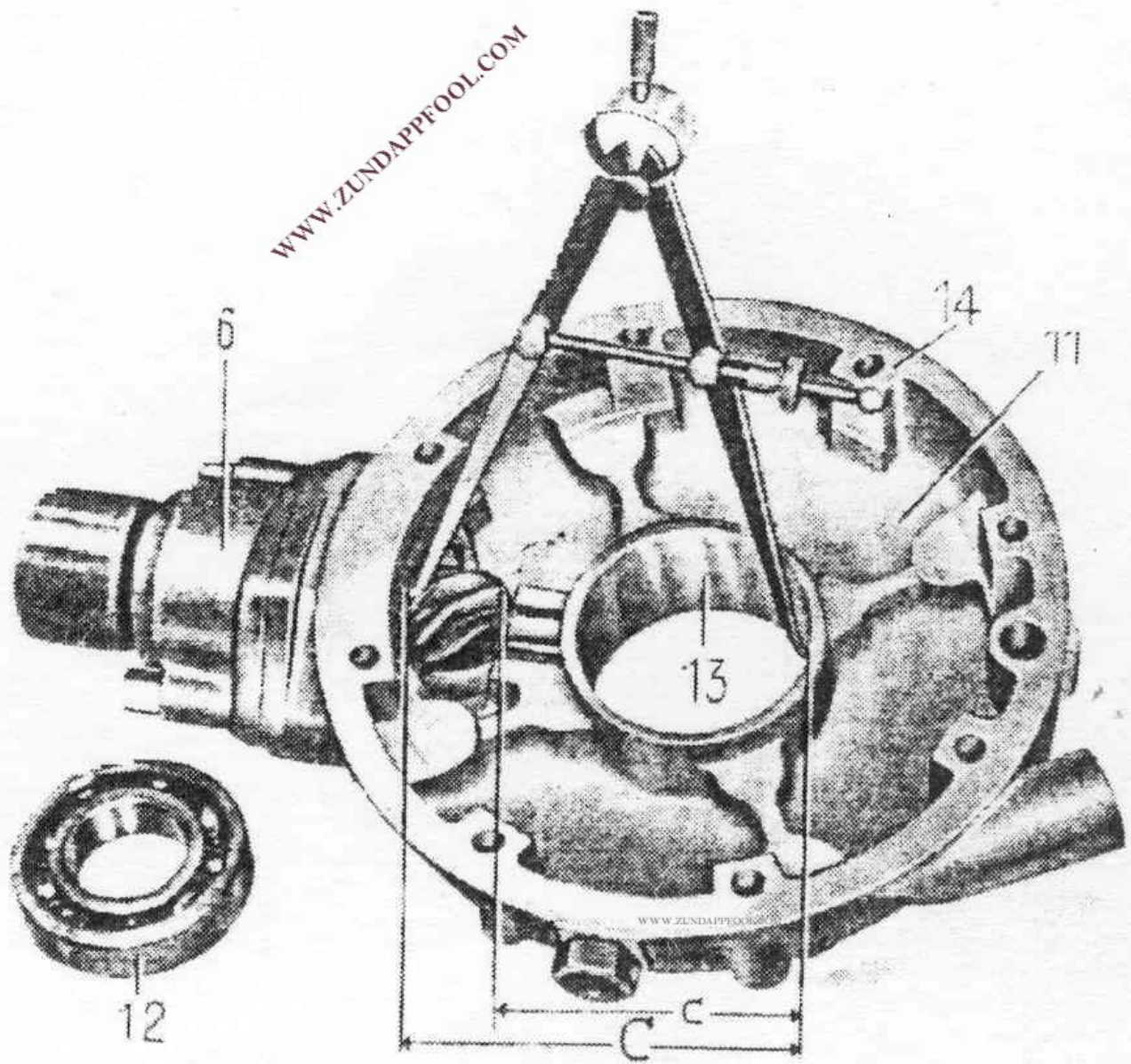
For a better achievement for the ventilation, install on KS 600 on top of the final drive housing, a ventilation screw 1550 z20. The M10 thread has to be installed in the way that the ventilation screw is in the turn direction of the ring gear immediately behind a rip at the outer edge of the driveshaft housing. To lower the pressure, mill off the base of the seat of the needle bearing up to the fourth stiffening rip.

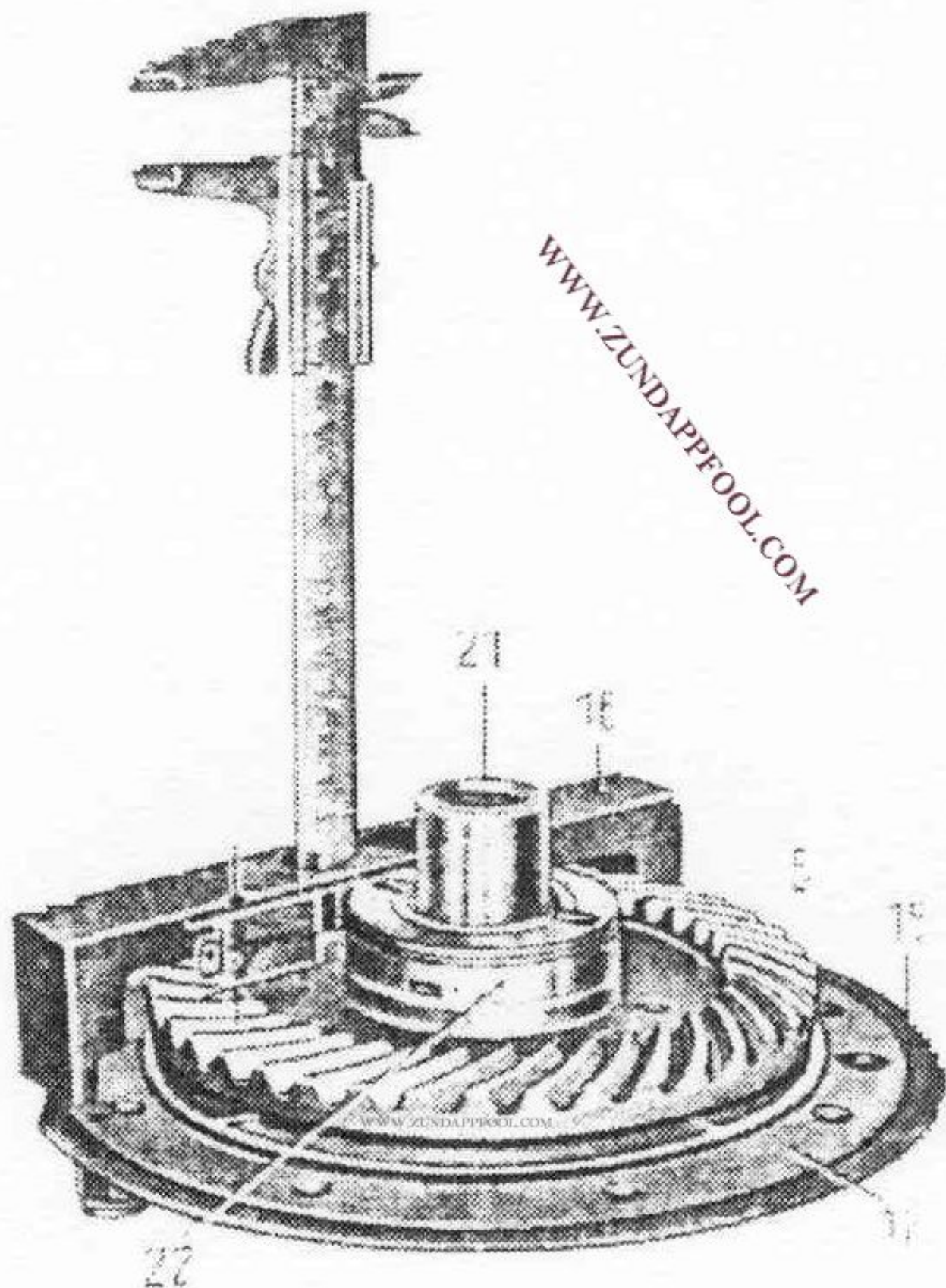
We hope, that the above explanations removed any doubt you had, and help you to install and adjust the final drive.

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1301 z134 0.3 mm thick
1301 z135 0.5 mm thick

On all other models (except KS 601 and KS 750)

1301 z04 0.2 mm thick
1301 z05 0.3 mm thick
1301 z07 0.5 mm thick

as needed to balance out the difference. If the established distance D is smaller, you have to install on the outer rim of the driveshaft housing lid (15) as many paper gaskets (17) in the amount

468 z09 0.1 mm thick
468 z010 0.2 mm thick

of the dimension difference.

In order to get the correct measurement, make sure that the wheel bearing (18) is completely pressed in.

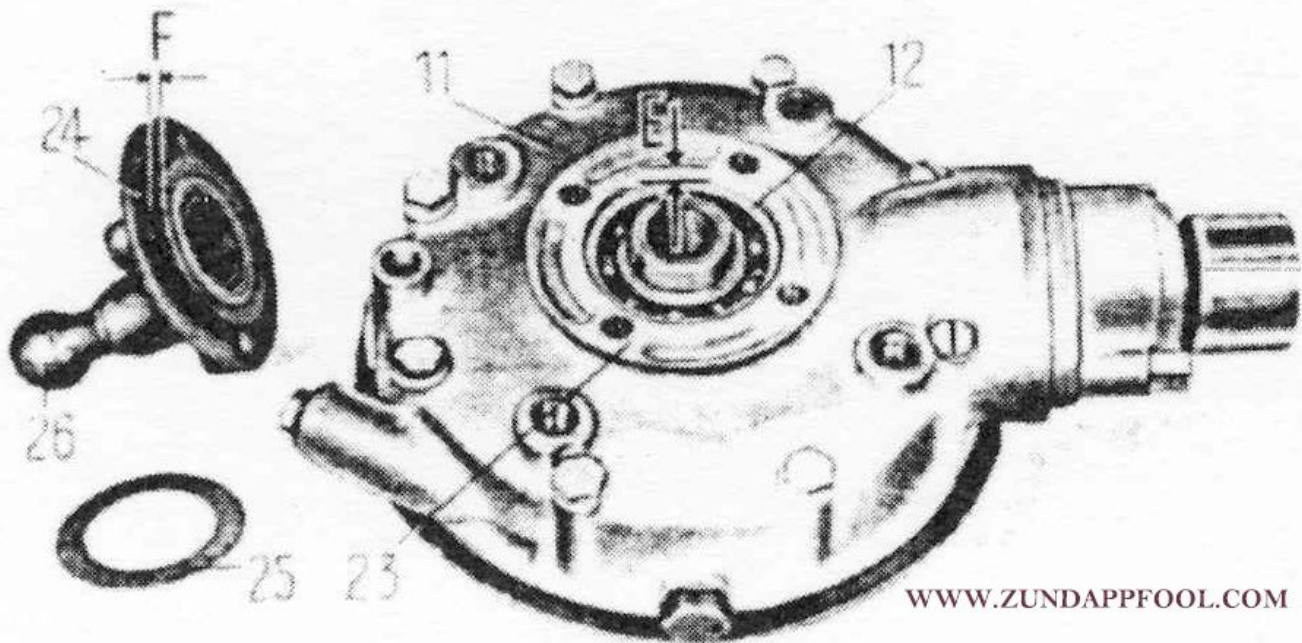
After tighten and securing the nut (22) for the ring gear (5) adjust the setscrew for the support stud (20) to achieve a distance between it and the ring gear of 0.1 - 0.2 mm.

Tighten and secure the counter nut for the setscrew. Screw driveshaft and driveshaft housing lid together. Press wheel bearing (12) into driveshaft housing.

Establish dimension E between gasket base (23) on the final drive housing (11) for the sidecar connection lid (24) to the outer ring of the wheel bearing (12). If the height F of the flange on the sidecar connection lid (24) is lower than the dimension E, add adjustment discs (25)

On KS600

1301 z132 0.1 mm thick
1301 z133 0.2 mm thick
1301 z134 0.3 mm thick
1301 z135 0.5 mm thick



On all other models (except KS 601 and KS 750)

1301 z8 0.1 mm thick

1301 z09 0.2 mm thick

1301 t010 0.3 mm thick

between outer rim of wheel bearing (12) and flange of the sidecar connection lid (24) to achieve the dimension difference.

If the flange is taller than the previous established dimension E, add on the outer ring of the sidecar connection lid (24) paper gaskets,

on KS 600 1238 z3

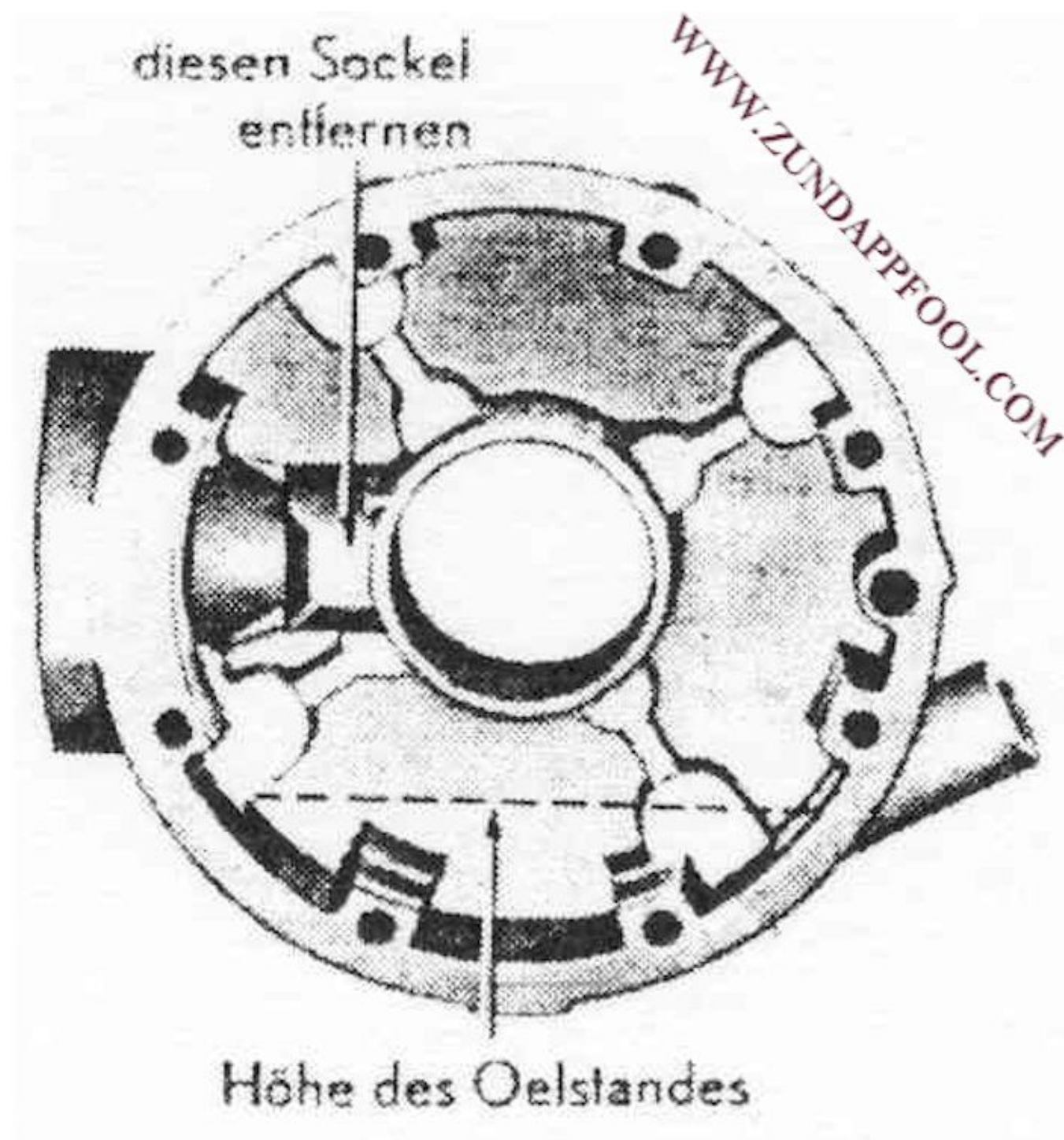
on all other models (except KS 601 and KS 750) 1238 z02

until you balance the difference of the dimension E and F. The sidecar mounting ball (26) have to be on the bottom on the installed drive.

Fill the final drive (driveshaft housing) with 180ccm with Shell - Ambroleum liquid.

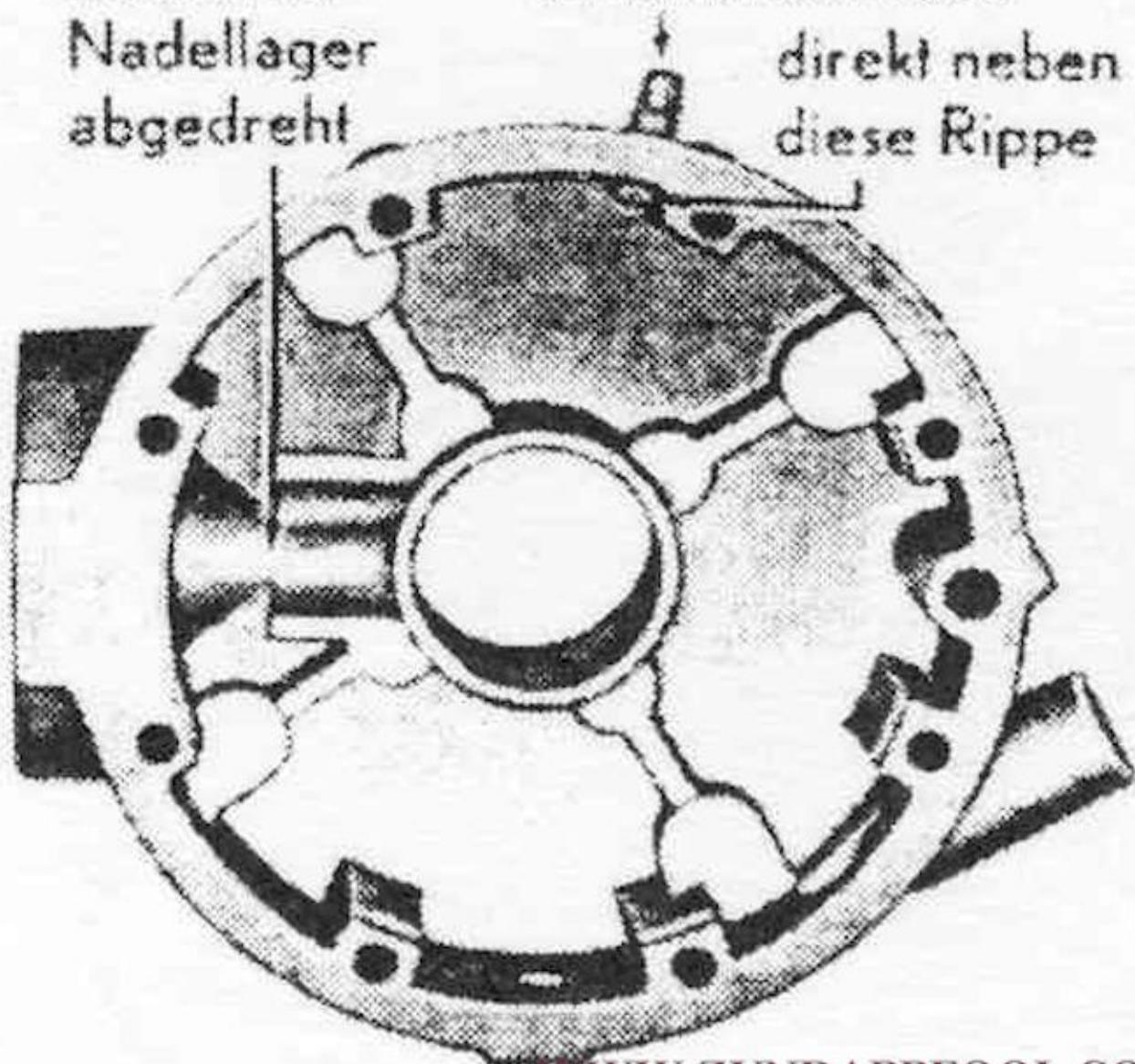
For a better achievement for the ventilation, install on KS 600 on top of the final drive housing, a ventilation screw 1550 z20. The M10 thread has to be installed in the way that the ventilation screw is in the turn direction of the ring gear immediately behind a rip at the outer edge of the driveshaft housing. To lower the pressure, mill off the base of the seat of the needle bearing up to the fourth stiffening rip.

We hope, that the above explanations removed any doubt you had, and help you to install and adjust the final drive.



Sockel für
Nadellager
abgedreht

Entlüfterschraube
direkt neben
diese Rippe



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