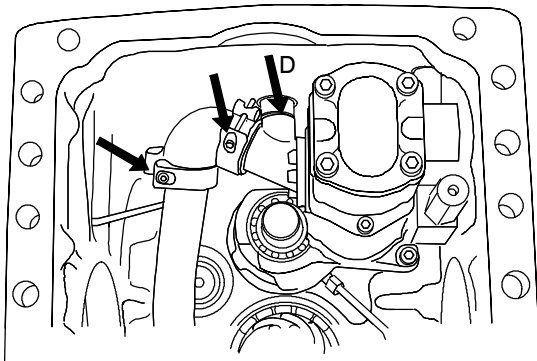


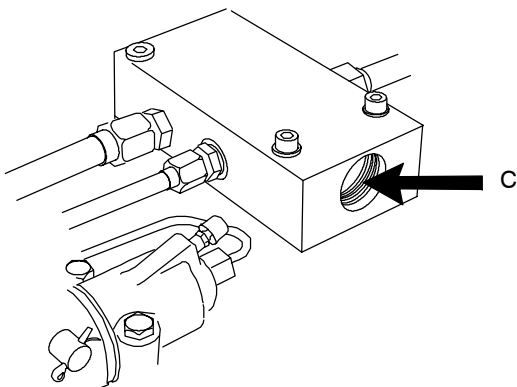
1. Set all gears to neutral position. Unscrew the side cover bolts and remove. At the same time selector fork rail locking pins are released.

Removing hydraulic pump

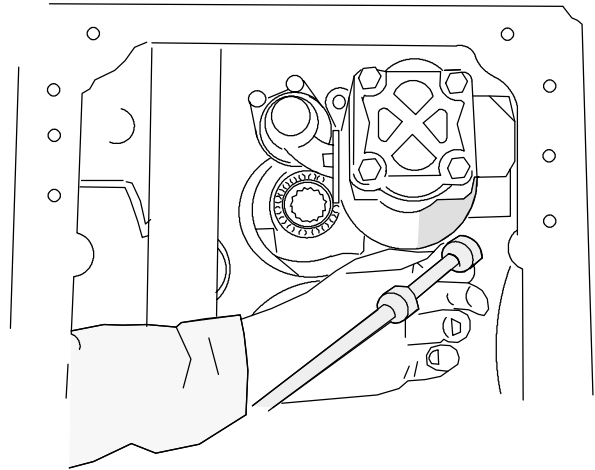
Note! The pump can also be detached from the tractor after removing the PTO unit (see section 90. Hydraulics).



1. Open the two pump suction pipe clip and make sure that suction are is disconnected.
2. Open the plug on the rearside of the lubrication plate and push by the screwdriver lubrication pressure valve (C) so deep a you can lift up the connecting tube in inlet tube.



Note! The differential can be in place because it does not prevent removal of the pump.

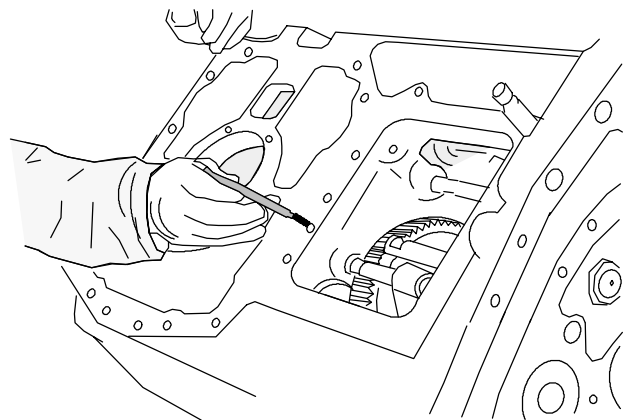


4. Unscrew pump fixing bolts and remove the pump.

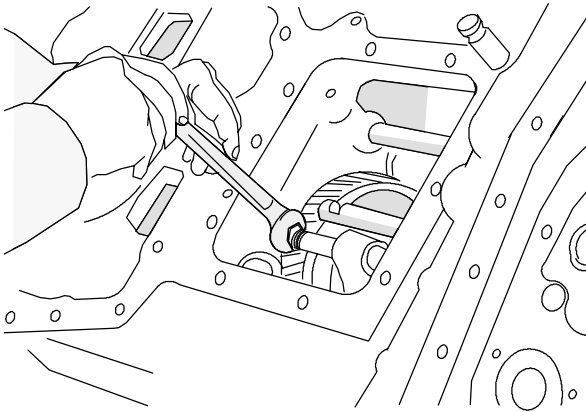
Removing selector forks

Note! If only selector forks have to be removed, then split the tractor between the gearbox and fuel tank and remove the reverse shuttle housing. Now the selector fork rails can be removed forwards and the forks can be removed through the side opening (see instr. on page 421).

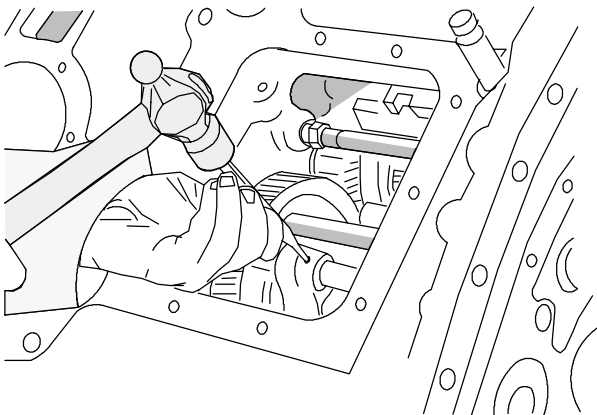
1. Remove the selector fork rails as follows:



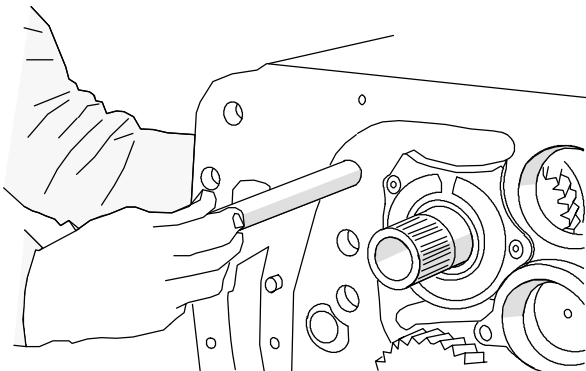
– remove pins, springs and balls (3 pcs) from their locations.



– loosen the rail locking nuts



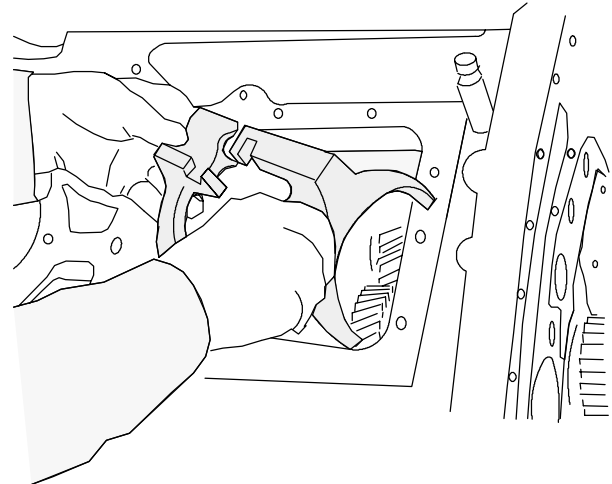
– engage gear 1. Tap out the locking pins for the forks for gears 1-2, 3-4 and M-H.



– unscrew the rails from their adjusting pieces at the rear ends and pull out the rails forwards.

2. Remove the circlip on the rail for gears AVO/LL (ground speed PTO/LL-range). Open the nut at the front end of the rail and remove the rail by turning it.

Note! Take care of the released balls and springs.

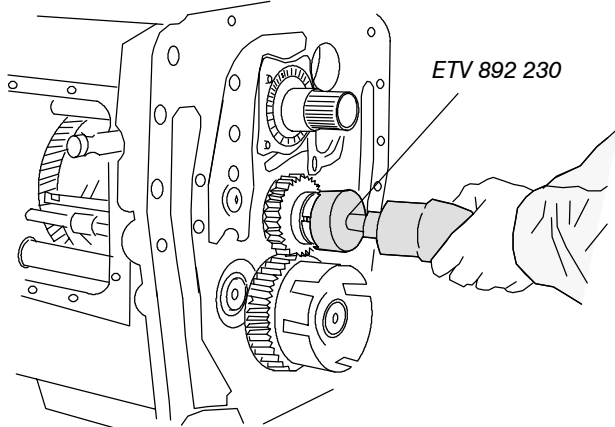


3. Remove the forks for gears 1-2 and 3-4 on the input shaft and remove also the sliding pieces.

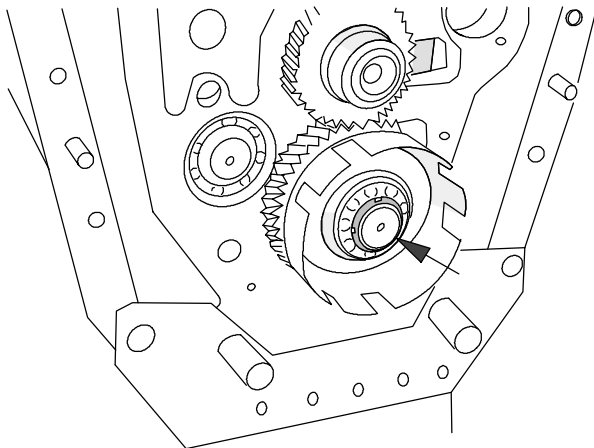
4. Remove the forks for gears M-H, AVO and LL on the bevel pinion shaft. Remove also the sliding pieces on the M-H fork. Also the latest AVO and LL forks have sliding pieces.

Removing shafts

Removing AVO–shaft, bevel pinion shaft, transmission shaft and input shaft

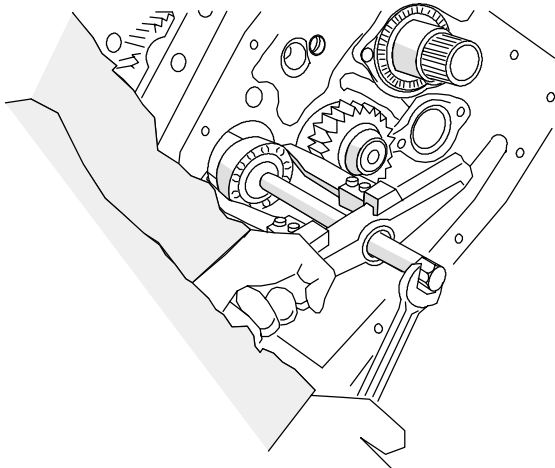


1. Bend aside the tab washer and unscrew the bevel pinion shaft nuts with ETV 892230. Remove the 4WD output gear at the front end of the bevel pinion shaft.

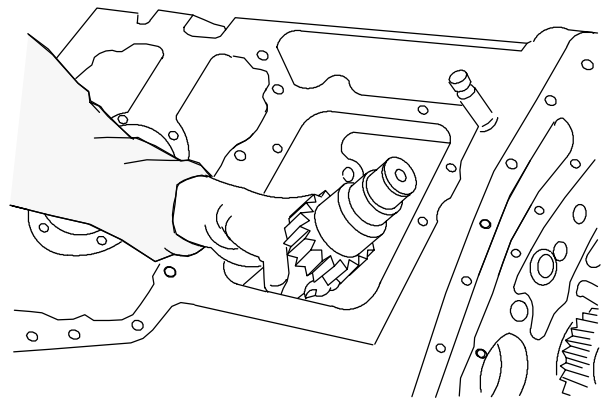


2. Unscrew the 4WD clutch drum nut with ETV 894190 and remove the drum.

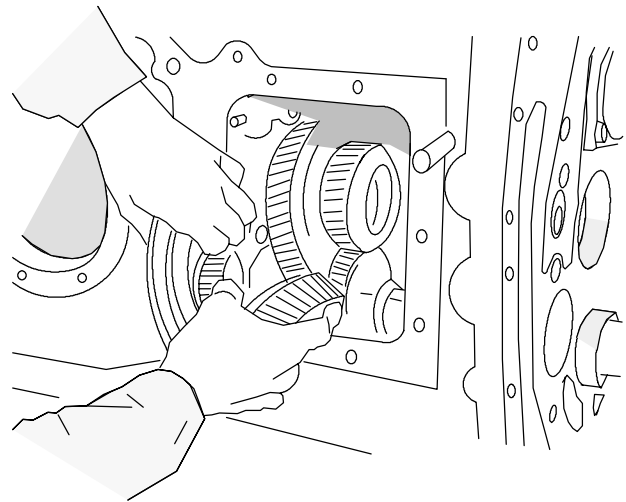
3. Remove the circlip on the AVO–shaft (ground speed PTO shaft, option).



4. Tap the AVO–shaft forwards and remove the front bearing with a puller. Remove the rear bearing with a suitable drift.



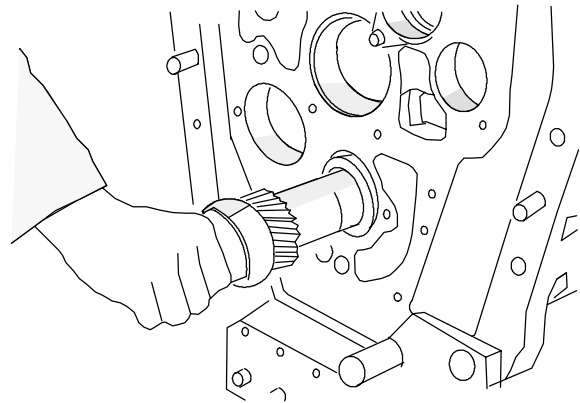
5. Remove the AVO–shaft through the side opening.



6. Remove the bevel pinion shaft rearwards. Remove the gears and synchronizing units through the side opening. Remove the bearings.

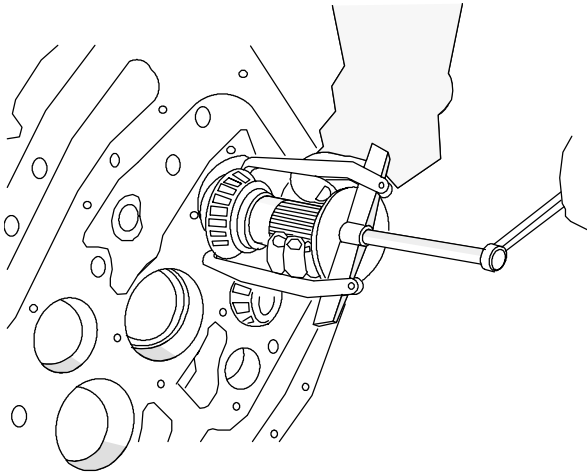
7. Remove the rear circlip on the transmission shaft and tap at the shaft rear end until the shaft loosens from its bearings.

8. Release the gear wheel circlip through the side opening.

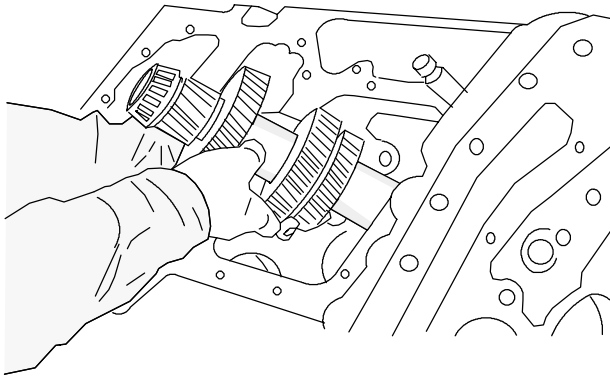


– pull out the transmission shaft forwards.
– remove gears, circlips, spacer rings and needle bearings through the side opening.

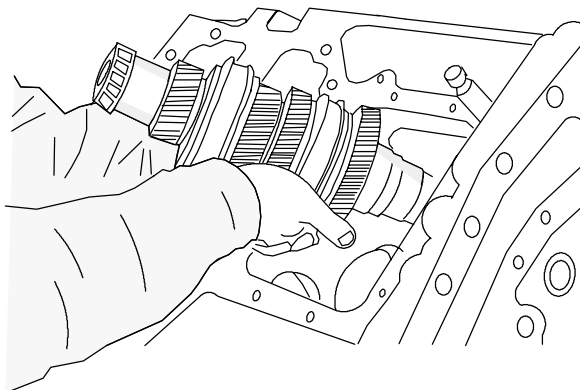
9. Remove front bearing covers at the front end of the layshaft and the input shaft. Pull the input shaft forwards until the front bearing outer race is detached.



10. Remove the input shaft front end bearing. Support the shaft so that it is kept horizontal.



11. Remove first the layshaft from the housing.



12. Then remove the input shaft.

Important! Before removing the layshaft and the input shaft, unscrew the lowest screw for the pump drive mechanism inside the gearbox housing. Also remove the servo valve block on the LH side of the gearbox, so that the S-shaped lubricating oil pipe is released.

13. Remove the pump drive mechanism, if needed. Fixing screws are inside the gearbox housing.

Note! Before detaching the pump drive mechanism, the suction strainer housing and the suction pipes have to be removed. Also the input shaft lubricating pipe must be removed.

14. Remove bearing outer races from their locations.

3. Checking disassembled gearbox

1. Check the condition of all gear wheels and bearings. Replace damaged parts with new ones. Lubricate all parts with oil.

2. Clean the gearbox housing and the lubricating pipes if necessary. Check the bearing locations.

3. Check the condition of the synchronizing units. The input shaft synchronizing units can be detached by removing the rear bearing with a puller.

Input shaft in transmission 650:

In transmission 650 there is a circlip behind the input shaft rearmost synchronizer. This circlip must be removed before removing the input shaft foremost parts (see picture 5 on page 420/7).

Also a spacer has been added between the input shaft gears Z31 and Z26, with which is adjusted the clearance between the circlip and the synchronizer hub to zero or as small as possible. The spacer has marking dots, which indicate the thickness of the spacer, see picture 5 on page 420/7.

Checking synchronizing ring wear

- Place the coupler gear on a flat surface (tapered part upwards).
- Place the synchronizing ring correctly on the tapered part of the coupler and measure the clearance between the ring and the gear (i.e. how deep the ring is pressed).

Correct clearances:

Input shaft (1–2, 3–4) synchronizing rings ($\varnothing 82$)

- new 1,750–1,850 mm (min allowable clearance 0,7 mm)

Pinion shaft synchronizing rings (M–H) ($\varnothing 90$ mm)

- new 1,700–2,250 mm (min allowable clearance 1,0 mm).

Assembling synchronizing units

- place the sliding coupler on a flat surface.
- put the springs and shoes onto the hub, press them inwards and place the hub into the sliding coupler so that the springs and shoes are kept in place.
- fit three balls (separately) onto the springs and press the ball inwards and push the parts inside the sliding coupler so that they are kept in place.
- when all three balls are in place, push the hub into the sliding coupler.

Note! The bevel pinion shaft and the crown wheel are replaced in pairs because they have been matched together.

Assembling gearbox

Note! In this instruction, assembling work is done in the correct working order. Before assembling, the lubricating oil pipes must be fitted.

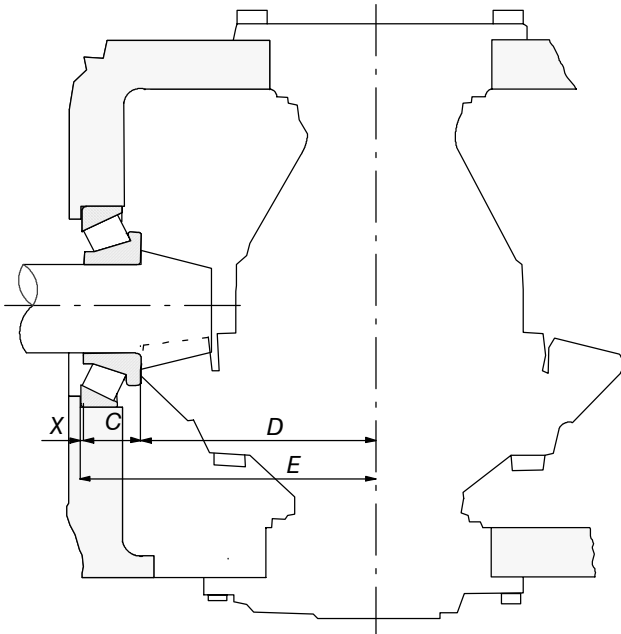
Fitting layshaft, input shaft, transmission shaft, bevel pinion shaft and AVO–shaft

Note! Lubricate all parts with oil before fitting.

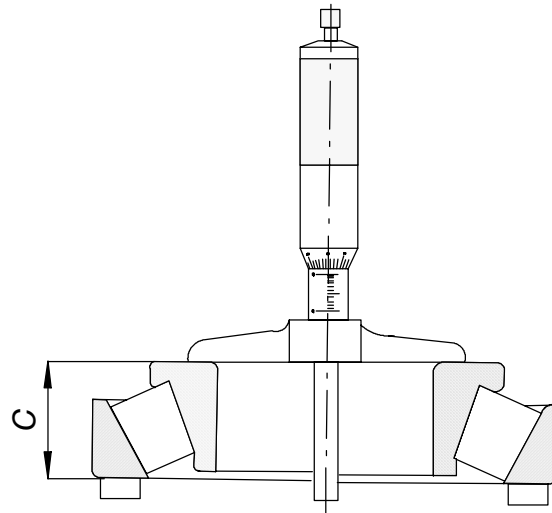
1. If the layshaft bearings are changed, warm up new bearings before fitting them onto the shaft or use a suitable fitting sleeve.
2. Fit the pump drive mechanism, if detached. Do not fit the lowest fixing screw. Fit the input shaft lubricating oil pipe.
3. Fit the layshaft rear bearing outer race into the location. Then fit the spacer ring (3 mm) and the circlip behind the race.
4. Fit the reverse shuttle selector lever (if removed) so that the round–shaped end points downwards. Grease the lever o–ring and fit it.

Adjusting position of bevel pinion shaft

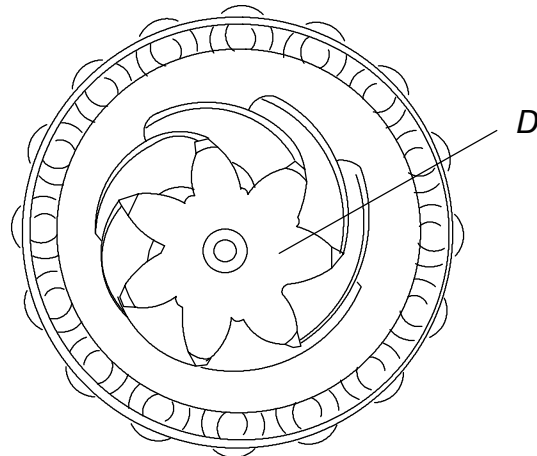
The purpose of this adjustment is to determine the number of shims under the rear bearing outer race



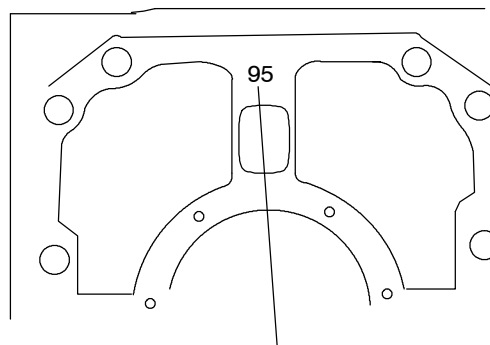
- X** = required shim thickness
 - C** = thickness of rear bearing
 - D** = measurement stamped into the end surface of the pinion shaft (the distance from the rear surface of the bearing to the centre of the differential bearing locations)
 - E** = the distance from the bottom of the rear pinion bearing location to the centre of the differential bearing locations.
- Note!** **E = 193 mm** + decimals stamped on the RH side of the gearbox housing (e.g. 95). However, if this decimals is between 0,00–0,20, then **E=194 mm**.



– Measure the thickness **C** of the rear bearing (e.g. 33,75) (rotate the bearing at least 20 times before measuring).



– Read value **D** stamped into the rear end of the pinion shaft (e.g. 159,70)

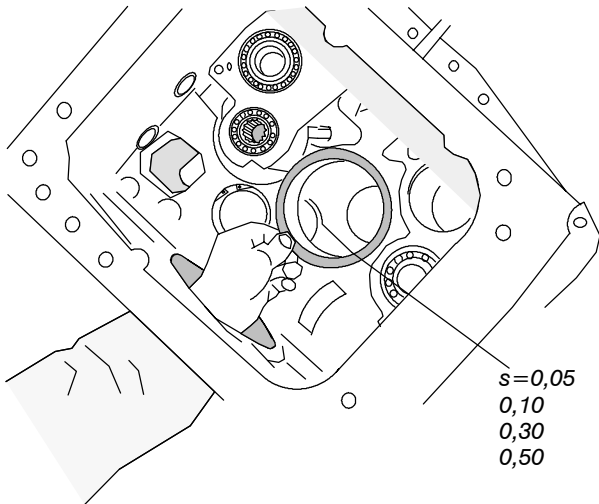


Decimal for value E

– Read decimals stamped on the RH side of the gearbox. The shims thickness can be determined by using the following formula:

$$X = E - (C + D)$$

E.G. $X = 193,95 - (33,75 + 159,70) = 0,5 \text{ mm}$

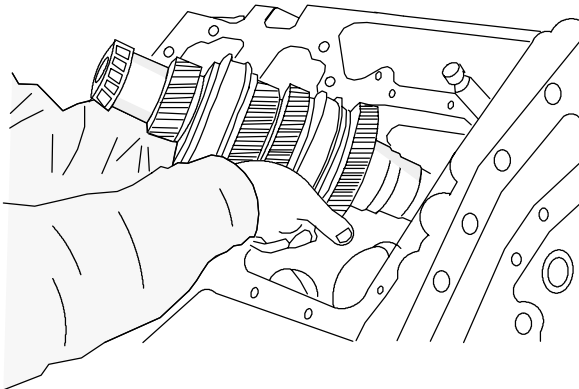


– Set the required thickness (X) of shims into the bearing location.

Note! First fit the shims with three lugs (0,30 mm, order no 30486400).

– drive in the outer bearing race against the shims using ETV 893340.

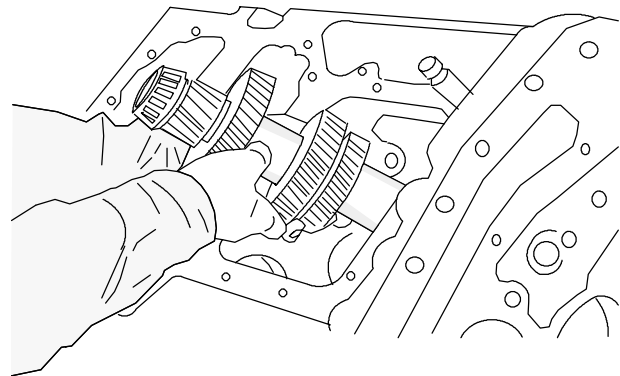
5. Fit the transmission shaft rear ball bearing with its circlip into its location.



6. Place the assembled input shaft into the gearbox through the side opening.

Note! The input shaft front bearing is fitted after the input shaft and the layshaft are in place.

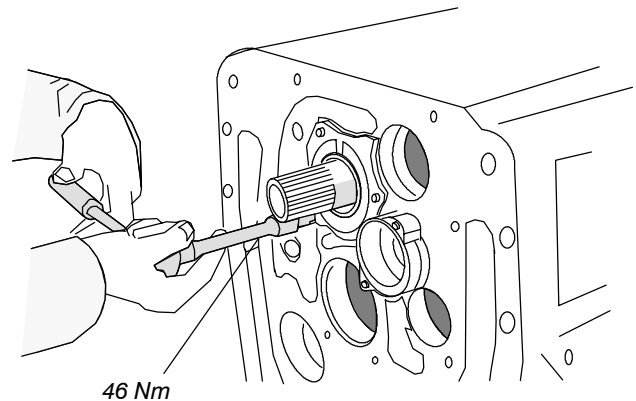
7. Fit the pump drive mechanism lowest bolt and tighten it to a correct torque. Fit the S-shaped lubricating oil pipe.



8. Fit the layshaft (the bearings are fitted on the shaft). Raise the input shaft for more space for layshaft.

9. Connect the S-shaped lubricating oil feed pipe to the distributor pipe on the bottom of the gearbox and connect the other end to the hole on the gearbox wall (note o-ring). Fit the servo valve block.

10. Fit the input shaft front bearing with ETV 892370. Fit the bearing outer race.



11. Fit shims in front of the input shaft front bearing (select shims so that the bearings have a definite clearance). Tighten the bearing cover.

Note! Try shims which were there before disassembling. Turn the input shaft 20–30 revolutions, in order to bed in the bearings.

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