

GEARBOX AND TRANSMISSION

The four forward speeds of the Borgward gearbox are fully synchronized.

Hill climbing, max. gradient in first gear: 44 %, second gear 23 %, third gear 14.5 %, top gear 10.4 %.

For mounting purposes the gearbox is held in a holding device, which is clamped to a vice to facilitate gearbox assemblies. A drawing of this holding device is shown on the reverse page. The propeller shaft inclusive joints is balanced and should be treated with care. Avoid rough handling, shafts must not be dropped.

Make	Borgward
Gears	4 forward, 1 reverse
Synchronized speeds	all forward speeds synchronized

Gearbox up to chassis No. 731 745

Gear ratios	1st gear 1 : 4.18
	2nd gear 1 : 2.23
	3rd gear 1 : 1.47
	4th gear 1 : 1.0
	Reverse gear 1 : 4.4

Gearbox from chassis No. 731 746

Gear ratios	1st gear 1 : 3.86
	2nd gear 1 : 2.15
	3rd gear 1 : 1.36
	4th gear 1 : 1
	Reverse gear 1 : 4.06

Transmission

Propellershaft:

Installation length	1300 mm or appr. 51 3/16"
Length pushed together	1278 mm or appr. 50 5/16"
Maximum unbalance (at 5000 r.p.m.)	21 cm/g

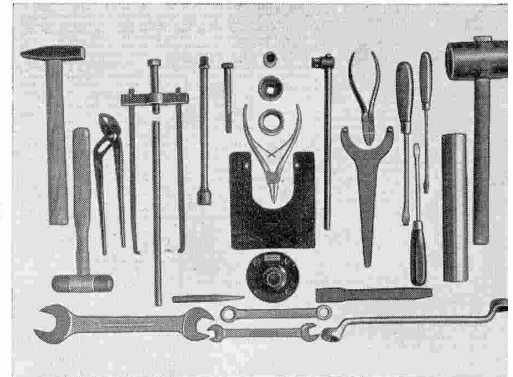
G. GEARBOX

G 3. Gearbox, disassembling and reassembling

Gearbox is dismantled and flanged off.

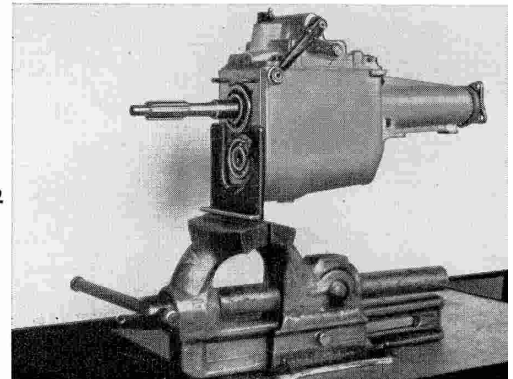
Tools: Ring spanner 14, 17, 22 mm, socket spanner 14, 30 mm, screwdriver 6.2 x 12 mm, gland nut pliers, plastic head mallet, hammer, punch, chisel, circlip pattern pliers, side cutting nippers, long punch, rubber head mallet, large tube, small tube, pin spanner WK 112, extractor WK 56, WK 145, bolt L = 120, 14 x 1.5, gearbox holding device BW 11.

Figure 1



1. Clamp gearbox with holding device in vice. (Holding device BW 11)

Figure 2



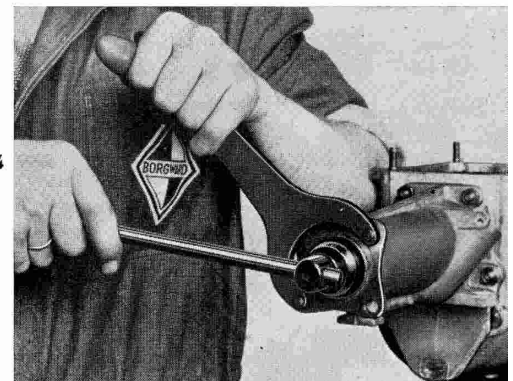
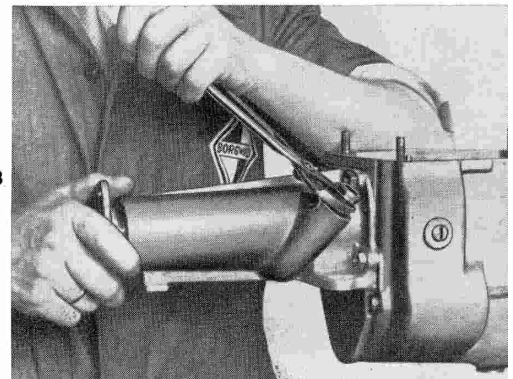
2. Undo drain plug and drain gearbox oil. (Ring spanner 17 mm)
3. Remove gearbox cover. (4 nuts, socket spanner 14 mm)
4. Tap cover slightly with plastic head hammer to loosen same and lift up. Do not use screwdriver or similar tools. (Plastic hammer)
5. Undo grub screw for speedometer drive. (Screwdriver 6 mm)

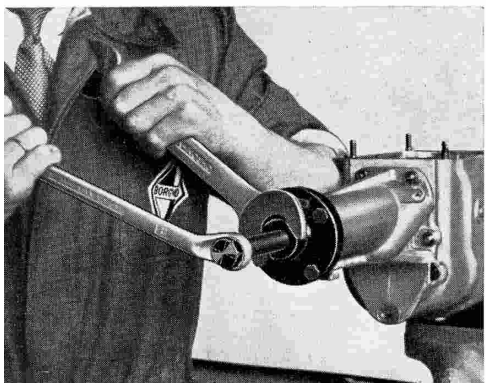
Caution: Secure this screw with punch blow when reassembling.

6. Pull out speedometer cable of gearbox drive flange by permanent turning. (Gland nut pliers, applied to bearing)

Figure 3

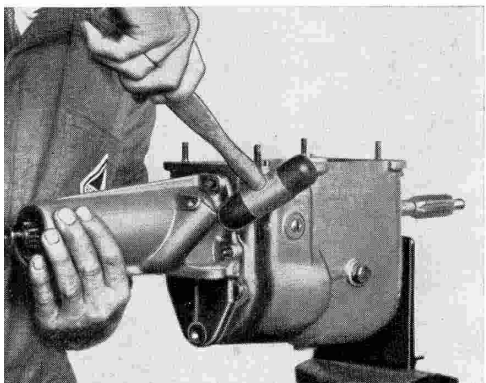
7. Bend up locking plate for screw on gearbox drive flange, (Hammer and chisel)
8. Unscrew gearbox drive flange. (Socket spanner 30 mm, pin spanner WK 112)





9. Pull off gearbox drive flange.
(Extractor WK 56, spanner 30 mm, ring spanner 22 mm)

Figure 5



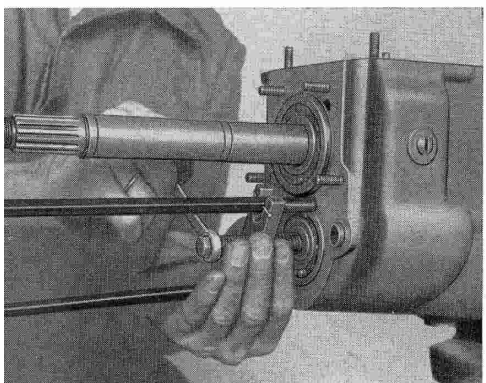
Caution: Pull off flange with extractor only, do not remove by blows to avoid distortion which will result in an unbalanced shaft.

10. Undo fastening screw of speedometer housing.
(4 nuts, 1 slotted screw, socket spanner 14 mm, ring spanner 14 mm for engine top R.H., screwdriver 12 mm)

Caution: When reassembling, insert slotted screw, seal with woolen thread and secure by punchblows.

11. Loosen speedometer housing with plastic head hammer and pull off.
(Plastic head mallet)

Figure 6



12. Pull off small ballbearing on shaft with extractor WK 17.

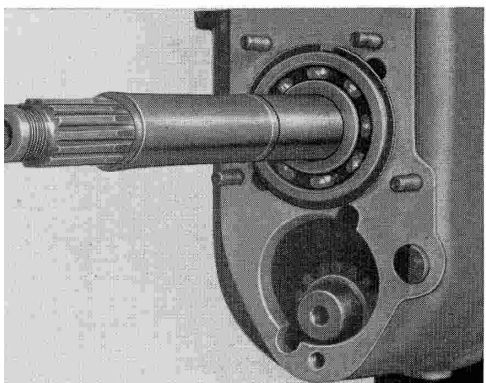
13. Remove circlip "Seeger" in front of worm wheel for speedometer drive.
(Circlip pattern pliers)

14. Drive off worm wheel of speedometer drive.
(Plastic head hammer)

15. Remove worm wheel key.
(Side cutting nipper)

16. Pull off bearings for countershaft pinions on both sides of gearbox.
(Extractor WK 145, ring spanner 22 mm)

Figure 7



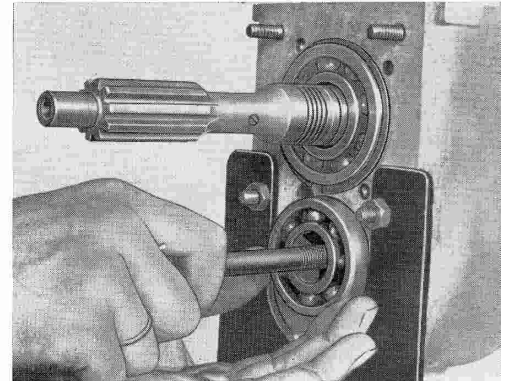
17. Let countershaft pinions downwards into gearbox case so that mainshaft can be pulled out upwards.

Figure 8

Caution: Fit rear bearing first when reassembling. Lift up and guide shaft and front bearing with bolt L = 120 14 x 1.5. Drive in and counter support with plastic head hammer. Place suitable tube.

Figure 9

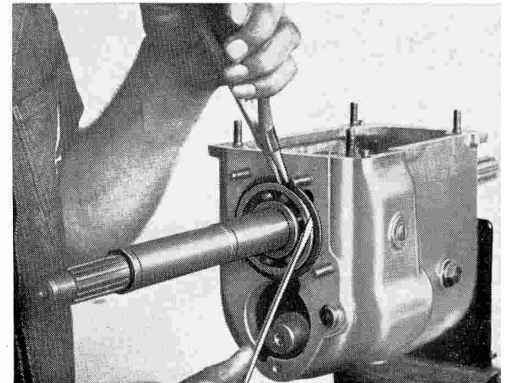
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18. Lift and remove spring rings of ball bearing on mainshaft drive side.
(Circlip pattern pliers, screwdriver)

Figure 10

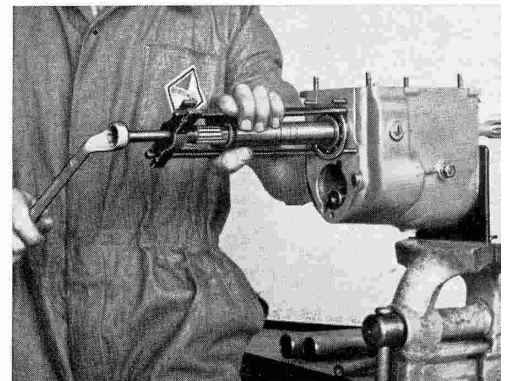
10



19. Pull off ball bearing from mainshaft on drive side.
(Extractor WK 145, ring spanner 22 mm)

Figure 11

11



Caution: Drive this ball bearing home with tube. Attention must be paid that the bearing fits flush in housing, counter support if necessary with tube or piece of wood.

Figure 12

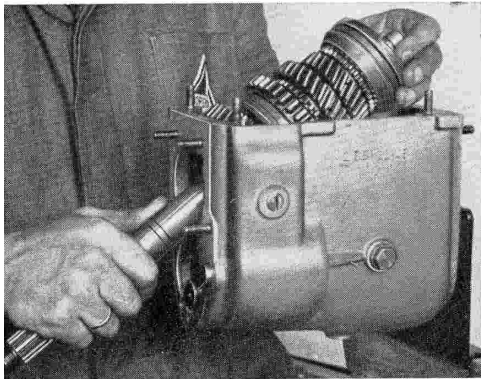
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20. Pull out drive shaft with bearings from casing.

Caution: Drive bearing from inside slightly with piece of wood outwards and remove with 2 strong screwdrivers or tyre levers.

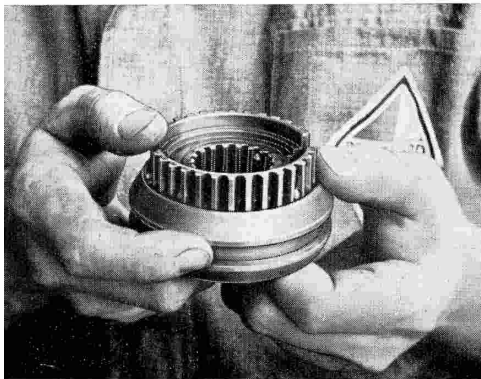
Caution: When reassembling fit greased needle cage to drive shaft. Place counter- and mainshaft in case and press in drive shaft bearing to casing.



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- 21. Lift up complete mainshaft in front and pull out upwards from inside.

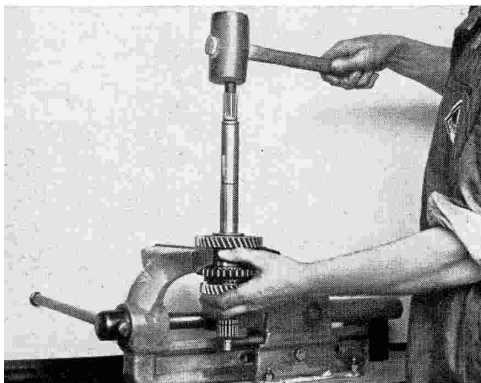
Figure 13



14

- 22. Lift out countershaft gears.
- 23. Drive out reverse bolt (shaft for reverse gear) from inside.
(Long punch, hammer)
- Caution: When reassembling, place bolt in correct position on account of the locking pin.
- 24. Lift out reverse gear.
- 25. Lift out double lever for reverse gear with shifting plates.
- 26. Clamp mainshaft vertical in vice and dismantle.
 - a) Take out upper synchro ring of 4th gear.
 - b) Lift upwards sliding sleeve together with baulking ring.
 - c) When separating sliding sleeve and baulking ring pay attention to 6 balls and 4 springs. Short springs belong between 2 balls, long springs in blind holes.

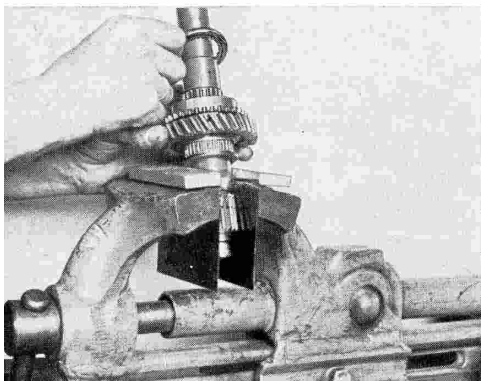
Figure 14



15

- d) Take out synchro ring.
- Caution: When reassembling take care that the lugs of the synchro rings engage with the cut away portions of the sliding sleeves. Insert long side of sliding sleeves downwards, i. e. to the drive side.
- e) Take off "Seeger" circlip. (Circlip pattern pliers)
- f) Take out 3rd gear and stop washer.
- g) Remove needle cage.
- h) Clamp shaft and fit 1st gear.
- i) Drive off 1st gear and stop washer from mainshaft (Rubber mallet)
Catch mainshaft by hand.

Figure 15



16

- k) Clamp bottom of mainshaft, take off roller cage.
- l) Remove reverse gear with stopwasher and synchro ring.
- Caution: The reverse gear has again a sliding sleeve. Pay attention to balls and springs as explained under 26d. When assembling place lock washer oil groove on top.
- m) Remove "Seeger" circlip. (Circlip pattern pliers)
- n) Take out 2nd gear with synchro ring and stop washer.
- Caution: When reassembling place stop washer oil groove on bottom.

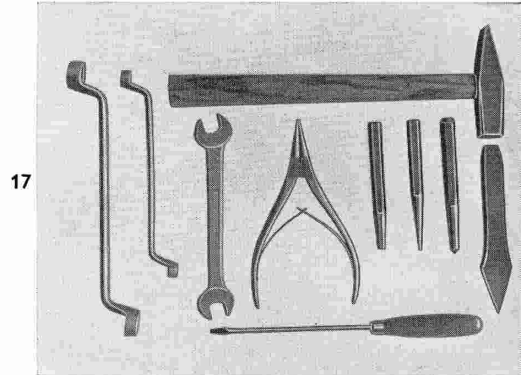
Figure 16

- o) Remove needle cage.
- Assembly in reversed sequence.

G 4. Gearbox casing cover
dismantling, reassembling and gearshift adjustment
(Cover removed)

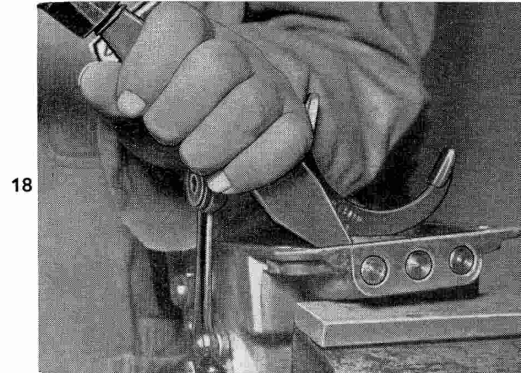
Tools: Chisel, hammer, thick punch, thin punch, screw driver, spanner 14 mm, ring spanner 10, 14 mm, circlip pattern "Seeger" pliers, center punch (prick).

Figure 17



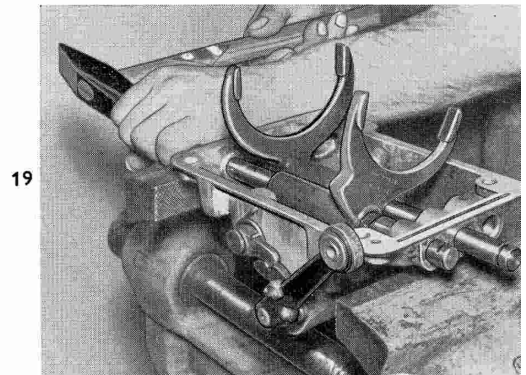
1. Remove locking plate of shifter shaft.
(Chisel, hammer)

Figure 18



2. Drive out shifter shaft with punch. Watch balls and springs in striking fork and spacer tubes.
(Hammer, punch)

Figure 19



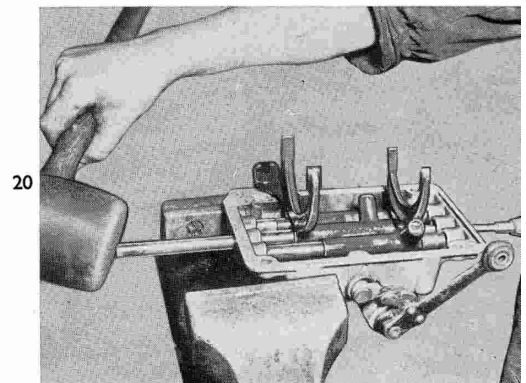
Caution: When reassembling take care that locking grooves are on top. Press down springs and balls with screwdriver and drive in shifter shafts.
(Screwdriver)

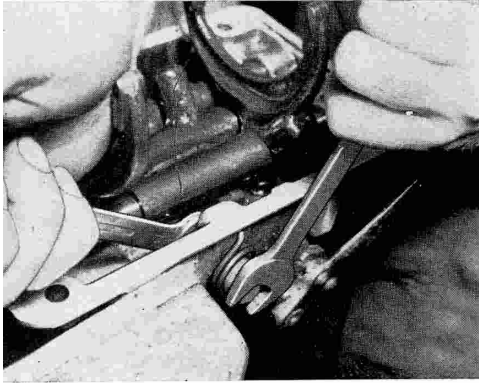
Figure 20

Caution: Short spacer tube front for 3rd and 4th gear, medium length, front, for reverse gear, long spacer tube, rear, for reverse gear.

3. Remove locking slide.
(Ring spanner 10 mm)

Caution: When installing locking slide, use high tensile bolt and shake proof washer. Bolt must be securely tightened. Fix spacer tube. Slide must be easily moveable.

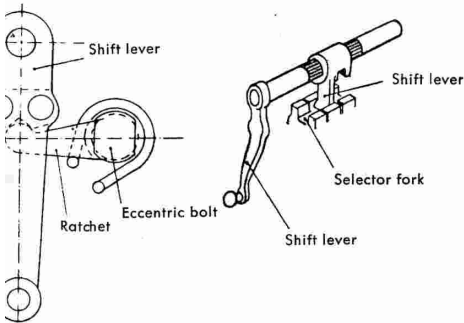




21

Caution: When reassembling align shift lever inside by turning the eccentric ratchet bolt exactly into position between the two blocks on locking slide. Tighten ratchet bolt counter nut when correct position is found.
(Spanner 14 mm, ring spanner 14 mm)

Figure 21



22

Caution: In this position the shift lever engages, when locking slide moves transversal into gear shift forks.

Figure 22

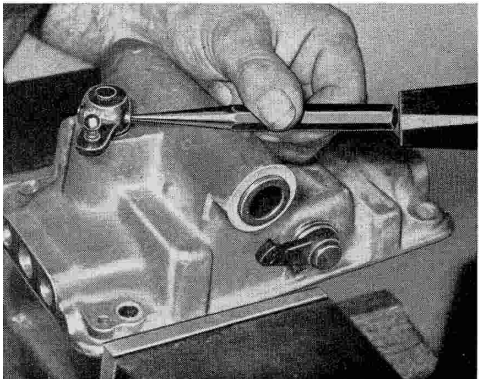


23

4. Remove shifter shaft circlip.
(Circlip pattern pliers)
5. Pull out shifter shaft to opposite side.

Caution: When fitting shifter shaft and shift lever pay attention that shift lever is exactly in vertical position when ratchet engages in outer shift lever.

Figure 23



24

6. Mark outer selector lever position with centre punch.
(Centre punch, hammer)
7. To remove outer and inner selector lever drive out dowel pin.
(Hammer, thin punch)

Figure 24

8. Remove ratchet with torsion spring.
(Ring spanner 14 mm, spanner 14 mm)

Reassembly in reversed sequence.