

should be no roughness or scuffings on the rolling surfaces of the shaft front end.

Check the condition of needle rolling surface in the opening of the primary shaft.

Examine the intermediate shaft, no chipping or excessive wear of teeth is allowed.

The surface of the reverse gear shaft should be absolutely smooth, with no traces of jamming. The mounting gap between the shaft and the bush of the reverse idler gear should be 0.056-0.09 mm, the maximum permissible size is 0.15 mm. The clearance is checked by measuring the shaft diameter and the opening of the gear bush. On new parts the shaft diameter is equal to 19.079-19.094 mm, and the inner diameter of the press-fitted bush is 20.05-20.07 mm.

Insignificant surface roughness can be removed with fine sandpaper. In case of serious damages and deformations renew the shaft.

**Gears.** There should be no damages or excessive wear of teeth. Special attention should be paid to the condition of the teeth end faces on the synchro unit crown.

The bearing pattern between the gear teeth should cover the complete working area, which should be smooth with no signs of wear. Check the gear mesh clearance, the mounting gap should be 0.10 mm; maximum wear-gap - 0.20 mm.

The mounting gap between the bushes and the 1st/5th gears, and between the output shaft and the 2nd/3rd gears should be 0.05-0.10 mm; maximum wear-gap - 0.15 mm.

If wear exceeds permissible limits, renew the gears.

**Bearings.** Ball and roller bearings should be in perfect condition. Their radial gap should not exceed 0.05 mm.

Press the inner ring to the outer one with fingers, turn one of them in both directions, the rolling thus should be smooth. On the surface of balls and rollers and the rolling paths of the rings no damage is permissible. Renew damaged bearings. When replacing the input shaft front bearing use pusher A.40006 (see fig. 2-11); it is possible not to remove the flywheel.

**Rods and forks.** No deformation of gear shift forks is acceptable. The rods should freely slide in the borings without significant gaps.

Check the condition of rod collets, springs and detent balls. Parts having any traces of jamming or wear should be renewed.

**Hubs, sleeves and baulk rings.** Ensure the hubs have no damage, in particular on the sleeve sliding surface. Draw special attention to the condition of the sleeve spline face.

The synchro rings should show no sign of excessive wear. They should be renewed in case the end face is resting on the synchro unit sleeve. Roughness interfering free sliding, should be removed with a fine-cut file. Badly worn parts should be renewed.

## Transfer box

### Fault diagnosis

Diagnosis	Remedy
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#### *Vibration of the transfer box and body floor (in the area of front seats) when starting and accelerating to 80 km/h*

1. Transfer box not centralised against power unit	1. Centralise transfer box
2. Loose or damaged transfer box mountings, and power unit rear mount	2. Tighten securing nuts and bolts, renew if necessary
3. Hard turning or jamming of front or rear propeller shaft joints	3. Repair U-joints or renew shafts
4. Incomplete handbrake release	4. Adjust handbrake
5. Hard turning of layshaft CV-joint	5. Inspect boot and joint. Renew joint in case of damage

#### *Vibration of the transfer box and body floor (in the area of front seats) at a steady-state movement (most typical at speed of 80-90 km/h)*

1. Propeller shafts out-of-balance	1. Renew or repair propeller shafts
2. Interaxial differential out-of-balance	2. Renew or repair differential
3. Jammed propeller shaft U-joints	3. Repair joints or replace shafts
4. Jammed layshaft CV-joint	4. Inspect boot and joint. Renew joint in case of damage
5. Loose engine mounting nuts and bolts or damaged engine supports	5. Tighten mounting nuts and bolts or renew engine mounts
6. Bended bolts and layshaft flexible coupling flange	6. Renew bolts or layshaft

#### *Noise at cornering or wheel slip*

1. Hard rotation of differential pinions on shaft	1. Renew worn or damaged parts
2. Jammed axle drive gears in differential housing	2. Renew worn or damaged parts
3. Damaged differential pinion working surface	3. Renew worn or damaged parts
4. Large axial clearance of axle drive gears in differential housing	4. Use shims to adjust clearance to 0-0.10 mm

#### *Hard gear switching or differential lock up*

1. Jammed coupling on hub splines or on differential housing splines	1. Rectify burrs, dints, scores, renew bad parts
2. Dents on smaller crown teeth on top or lower gears, on clutch teeth and on splines of front axle drive shaft	2. Rectify burrs, scores, renew bad parts
3. Bended fork or rod	3. Straighten deformed parts
4. Deformed transfer box drive levers	4. Straighten levers, renew if necessary
5. Jammed drive levers on shafts	5. Remove levers, clean shafts and bushes. Renew bad parts

### **Spontaneous gear or differential lock disengagement**

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|--|--|
| 1. Worn teeth on gears and couplings   | 1. Renew worn parts  |
| 2. Weak detent spring or detent component wear   | 2. Renew springs or worn parts   |
| 3. Incomplete gear engagement and differential lock due to drive system component damage or due to dents on gears, clutches or splines | 3. Straighten deformed parts or renew, clean burrs and scores, replace bad parts |

### **Oil leak**

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|--|--|
| 1. Damaged sealings                            | 1. Renew gaskets                           |
| 2. Loose nuts and pins fixing covers to casing | 2. Tighten nuts and pins in places of leak |
| 3. Worn or damaged shaft seals                 | 3. Renew oil seals                         |
| 4. Worn transfer drive rod seals               | 4. Renew sealing ring                      |

## **Transfer box / car body floor vibration trouble-shooting (in the area of front seats)**

First of all note, at what speed does the transfer box vibration occur, then start with the diagnosis.

**Test 1.** Place the transfer- and gearbox levers in neutral position and start the engine. Set engine speed equal to vehicle speed at which vibration occurs.

If vibration still exists on a parked vehicle, it is necessary to check engine mounting and supports, as they are the reason of vibration.

**Test 2.** If during test 1 vibration was not diagnosed, place the transfer levers in neutral position, start the engine, engage direct gear and set engine speed equal to vehicle speed at which vibration occurs.

If vibration is observed on a parked vehicle at this engine speed, the reason should be looked for in the layshaft (out-of-balance, bended fastening bolts or flexible coupling flange, jammed CV-joint).

**Test 3.** If no vibrations was diagnosed during tests 1 and 2, go to test 3. Accelerate the vehicle to the speed, at which vibration occurs, and place the transfer- and gearbox levers in neutral position. If vibration persists, the reason should be looked for in the front or rear propeller shaft (out-of-balance, jammed joints) or interaxial differential is not balanced.

## **Transfer box - removal, refitting and centering**

**Removal.** Place the vehicle over an inspection pit or on a lift. Release the handbrake and place the gear- and transfer-box levers in neutral position. Undo the fastening screws of the gear lever surround and remove it. Remove the handles and gaiters from the levers. Undo the fastening screws and remove the cover cap and the bellows.

Disconnect the speedometer cable from the transfer box and the wires from the differential lock warning lamp sensor. Turn the driveshafts and disconnect the driveshaft flanges from the transfer box shafts, and the layshaft flange from the gearbox output shaft flange.

Unscrew nuts 3 (fig. 3-37) on the transfer box mounting bracket 1 fastening bolts and remove it together with brackets and shims 5, which are placed under the brackets, in assembly with the layshaft. Mark each shim so that to refit them in the same amount.

**Refitting and centering the transfer box** is done in the following order:

- ensure proper refitting of engine support pads in brackets (the centering washers of the engine front support pads should fit into the appropriate apertures in the side brackets) and perfect fit of transfer box supports to the car body bottom. If necessary, straighten the floor surface under the supports;

- place the transfer box on the vehicle, but do not tighten completely mounting bracket nuts 4 and 5 (fig. 3-38);

- by moving the transfer box in different directions, find such location, at which the flanges of the transfer box input shaft and the layshaft will be on one level, parallel and with minimum clearances between them; the transfer box shafts should be parallel with the car bottom;

- refit the earlier removed shims under the mounting brackets, fully tighten the fastening nuts;

- reconnect the front and rear propeller shafts to the transfer box shafts; attach the speedometer cable, and the wires to the differential lock warning lamp sensor.

When replacing the transfer box, and also at engine rear mount "settle down", resulting in vibration of the transfer box, renew and match shims 5 (see fig. 3-37) with those of proper thickness.

### **Matching the shim thickness:**

- ensure proper refitting of engine support pads (see subsection. "Engine removal and refitting");

- separate the flanges of the transfer box input shaft and the layshaft;

- slacken the nuts that are fixing the transfer box supports to the car body, remove the shims and, and by moving the transfer box in different directions, find such location, at which the separated flanges will be on one level, parallel and with minimum clearances between them; the transfer box shafts should be parallel with the car body bottom;

- the formed gap between the floor and the support should be filled with a sufficient amount of shims;

- align the large centering collars without tensioning the supports of the transfer box and the engine, and while keeping the transfer box in this place, tighten the earlier slackened support nuts;

- refit and tighten the flange fastening bolts on the transfer box and the layshaft; if the bolts fit perfectly in the apertures of the flanges, the centering is carried out correctly, otherwise the flanges should be re-aligned.

## Dismantle and reassembly

**Dismantle.** Wash the transfer box and drain oil.

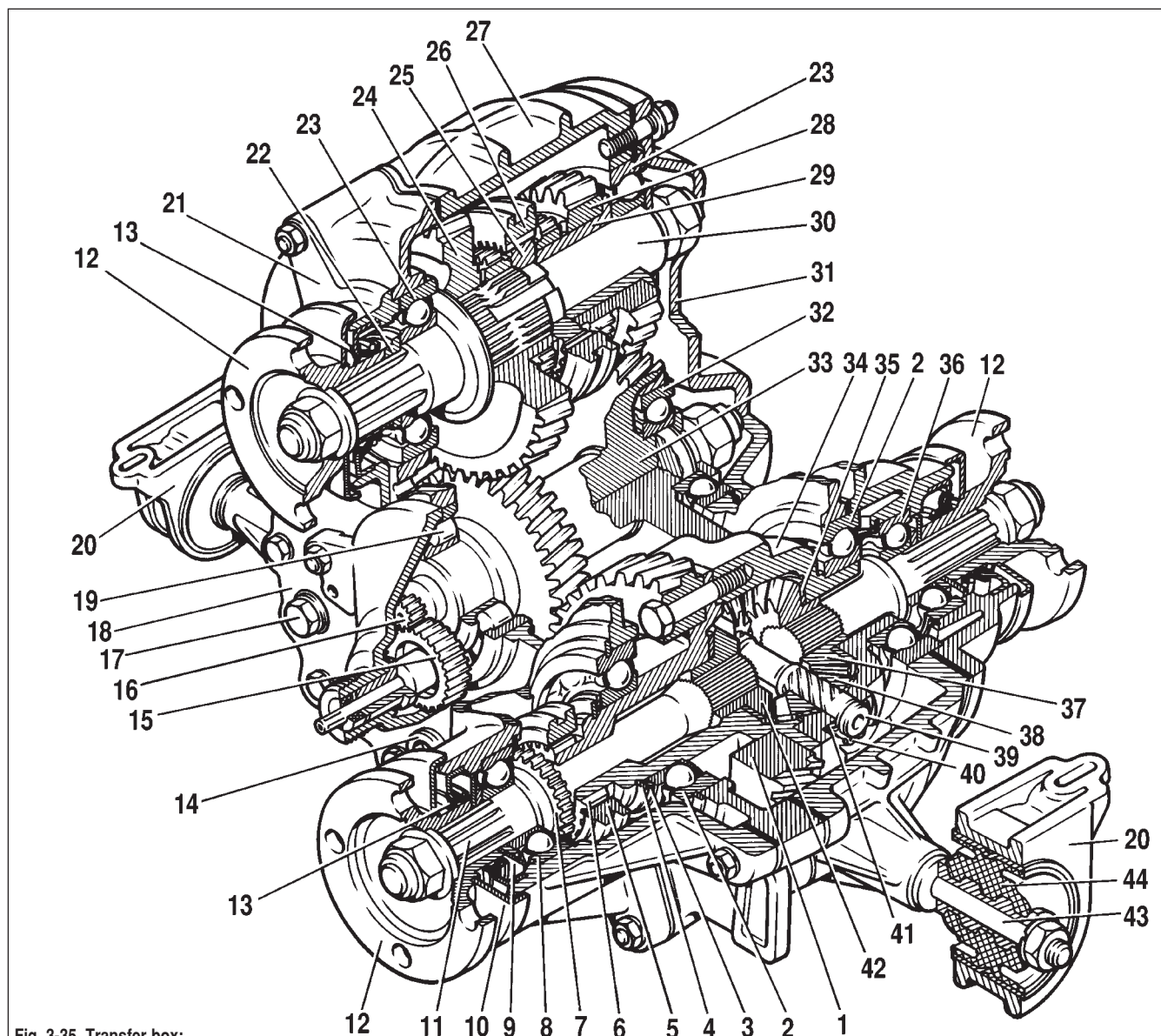
Place the transfer box on a bench for dismantle and slacken the flange fastening nuts on the input shaft and on the front and rear axle shafts.

Undo the fastening nuts and remove the front axle casing 1 (fig. 3-39) in assembly with cover 2, lever, fork, differential lock

coupling and the front axle shaft. Remove the speedometer drive unit housing 3 in assembly with the speedometer driven gear.

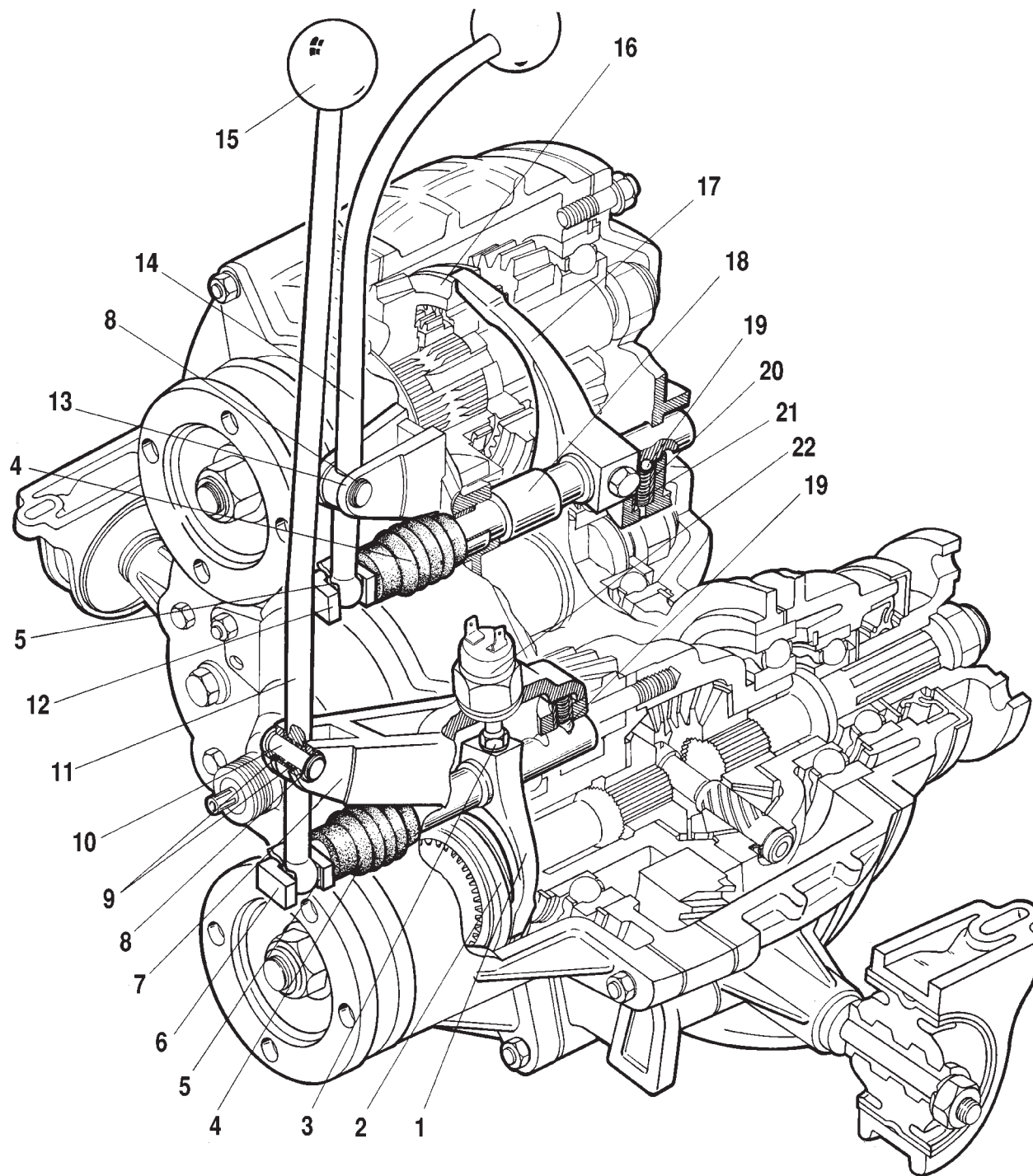
After removing lock washer 8 (see fig. 3-36) take out lever shaft 10 and remove differential locking lever 11. Then remove cover 7 from the front axle drive and take out the detent spring and ball 19. Undo clamping bolt 3 from the differential lock fork, take out rod 6, fork 1 and locking coupling 2.

Remove rear cover 31 (see fig. 3-35) in assembly with the rear axle drive shaft, taking care not to damage the sealing. Then remove flanges 12 from the input shaft and the drive shafts of the front and rear axles.



**Fig. 3-35. Transfer box:**

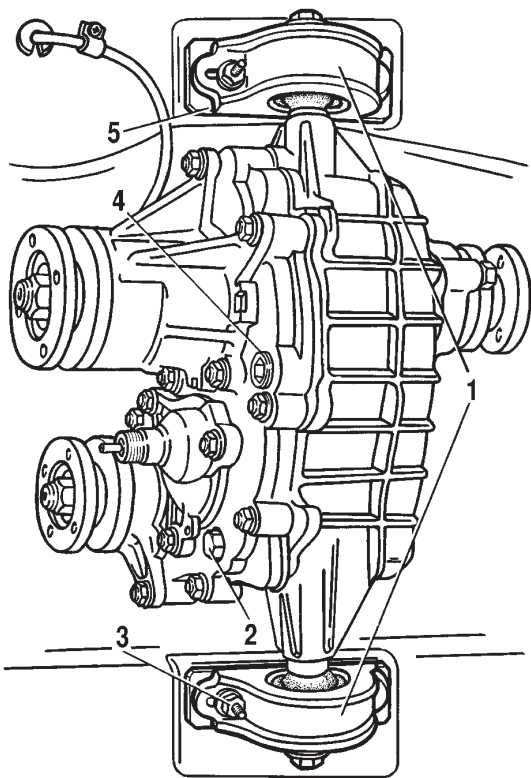
1 - driven gear; 2 - differential bearing; 3 - spring washer; 4 - circlip; 5 - differential locking coupling; 6 - differential housing crown; 7 - front axle drive shaft crown; 8 - front axle drive shaft bearing; 9 - oil screen; 10 - splash guard; 11 - front axle drive shaft; 12 - flange; 13 - oil seal; 14 - oil drain plug; 15 - speedometer driven gear; 16 - speedometer drive gear; 17 - plug for oil top-up and level check; 18 - transfer box front cover; 19 - layshaft roller bearing; 20 - mounting bracket; 21 - input shaft bearing cover; 22 - bearing thrust ring; 23 - input shaft bearing; 24 - top gear; 25 - gear shift clutch hub; 26 - gear shift clutch; 27 - transfer box casing; 28 - low gear; 29 - low gear bush; 30 - input shaft; 31 - rear cover; 32 - layshaft ball bearing; 33 - layshaft; 34 - differential housing; 35 - rear axle differential gear thrust washer; 36 - rear axle drive shaft bearing; 37 - rear axle differential gear; 38 - pinion; 39 - pinion shaft; 40 - pinion shaft circlip; 41 - spring washer; 42 - front axle differential gear; 43 - transfer box mounting shaft; 44 - mounting bracket rubber pad



**Fig. 3-36. Transfer box operating system:**

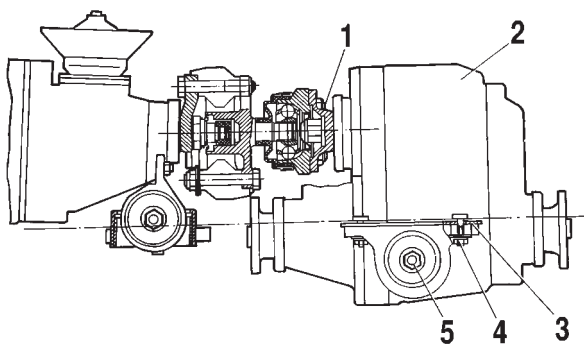
1 - differential locking clutch yoke; 2 - differential locking clutch; 3 - yoke stop bolt; 4 - boot; 5 - lever spring; 6 - differential locking fork rod; 7 - front axle case cover; 8 - lock washer; 9 - lever shaft bush; 10 - lever shaft; 11 - differential locking lever; 12 - gear shift fork rod; 13 - gearshift lever bracket; 14 - gear shift lever; 15 - knob; 16 - gear shift clutch; 17 - gear shift clutch fork; 18 - distance sleeve; 19 - detent ball; 20 - detent spring bush; 21 - detent spring; 22 - differential lock warning light switch





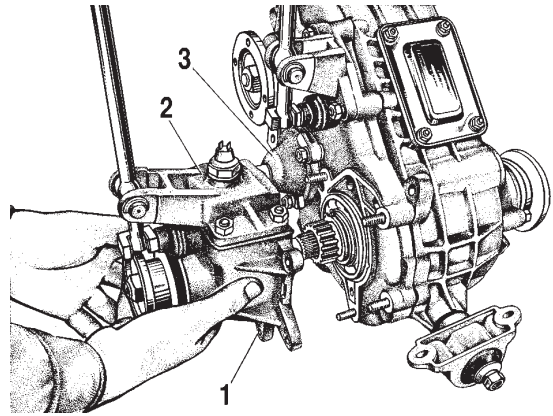
**Fig. 3-37. Transfer box mounting on vehicle:**

1 - transfer box mounting bracket; 2 - filler plug; 3 - bracket fastening nut; 4 - drain orifice plug; 5 - shims



**Fig. 3-38. Transfer box installation:**

1 - layshaft and drive shaft flange fastening pin; 2 - transfer box; 3 - shims; 4 - transfer box-to-car body fastening nuts; 5 - nuts fastening mounting brackets on shafts



**Fig. 3-39. Removing the front axle case:**

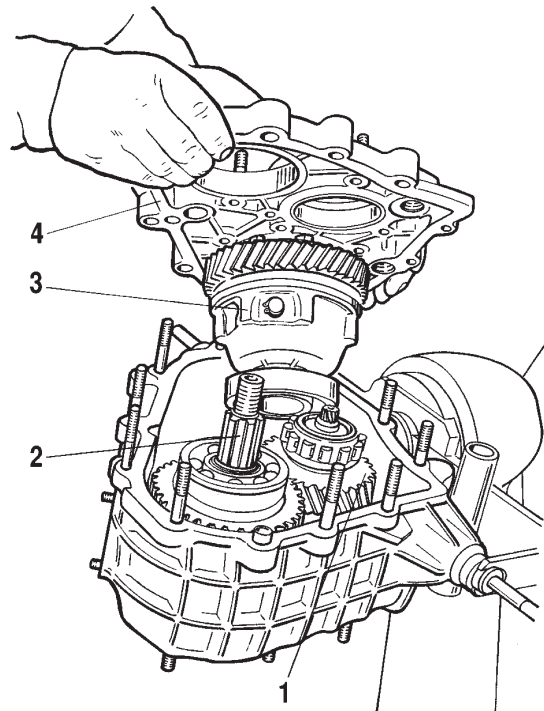
1 - front axle case; 2 - case cover; 3 - speedometer drive housing

Remove the bearing setting rings from the front and rear drive shafts. Take the front axle drive shaft 11 (see fig. 3-35) out from the casing together with bearing 8, thrust ring and oil deflector 9. Take the rear axle drive shaft out from the rear cover 31 together with bearing 36, thrust ring and oil deflector.

Remove cover 21 from the input shaft front bearing and the inspection hatch cover.

Remove the gear switch lever bracket 13 (see fig. 3-36) in assembly with the lever. After removing the lock washer, take out the shaft and remove lever 14.

Undo the locking bolt of the gear shift fork 17, close the detent socket with a finger and carefully take out rod 12 and the detent components.



**Fig. 3-40. Removing the transfer box front cover:**

1 - layshaft; 2 - drive shaft; 3 - differential; 4 - front cover