

CHAPTER 6

MANUAL TRANSMISSION

- 6:1 Description**
- 6:2 Routine maintenance**
- 6:3 Gearlever removal and refitting**
- 6:4 Speedometer drive pinion**

- 6:5 Gearbox removal and refitting**
- 6:6 Oil seal renewal**
- 6:7 Fault diagnosis**

6:1 Description

The four-speed gearbox has synchromesh on all forward speeds and is operated by a centrally mounted remote control gearlever. The transmission casing is in three main parts, the clutch bellhousing, the gearbox case and the rear cover. All gears are of helical tooth formation except those in the reverse train which are straight-toothed spur gears.

The rear end of the input shaft and main drive pinion unit runs in a ballbearing in the gearbox front cover, while its front end engages in the pilot bearing in the rear of the engine crankshaft.

The mainshaft is supported at the front end by needle rollers in the main drive pinion, and by a ballbearing in the rear cover. The mainshaft gears run directly on the shaft journals.

Those maintenance and repair operations which can be carried out by a reasonably competent owner/mechanic are detailed in this chapter, but it is not recommended that any attempt be made to dismantle the gearbox and remove internal components. Special tools and hydraulic press equipment are needed to remove and install bearings and gear assemblies, and accurately

calibrated heating equipment is necessary to heat certain components so that the correct degree of thermal expansion is obtained. For these reasons, it is recommended that all repair and overhaul procedures involving partial or complete dismantling of the gearbox be entrusted to a fully equipped BMW service station.

6:2 Routine maintenance

Interim topping up procedures and periodic changing of the transmission oil should be carried out at the intervals specified in the manufacturer's service schedule. The transmission oil filler and level plug on the side of the unit and the drain plug beneath the unit must be turned with an Allen key of the correct size. When checking the oil level, clean away all dirt from the filler and level plug before removing it. The oil level should be at the bottom of the threaded hole. Add an approved grade of gearbox oil if necessary, then allow excess oil to drain away fully before refitting and tightening the plug. To change the oil, remove the drain plug and allow the old oil to drain into a suitable container. Refit and firmly tighten the drain plug, then fill the gearbox to the correct level as described previously.

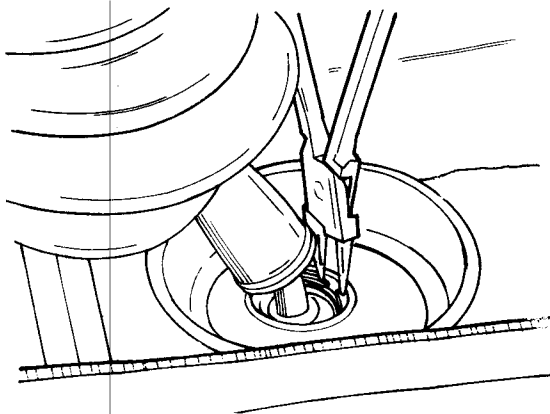


FIG 6:1 Removing gearlever retaining circlip

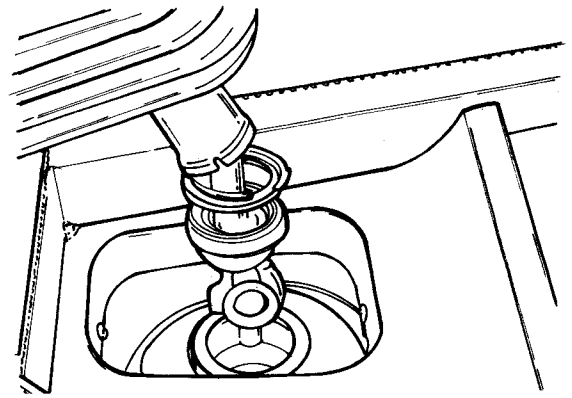


FIG 6:4 Gearlever removal, Getrag gearbox

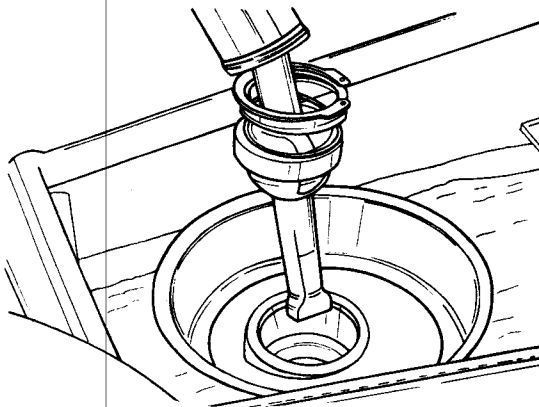


FIG 6:2 Gearlever removal, ZF gearbox

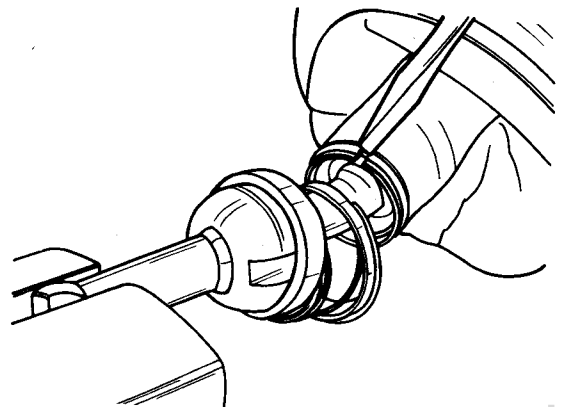


FIG 6:5 Dismantling gearlever components

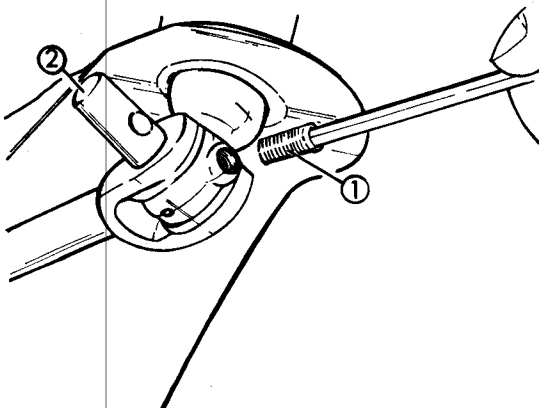


FIG 6:3 Disconnecting linkage, Getrag gearbox

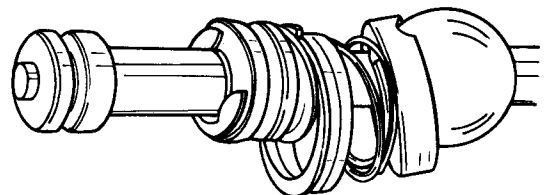


FIG 6:6 Removing gearlever rubber rings

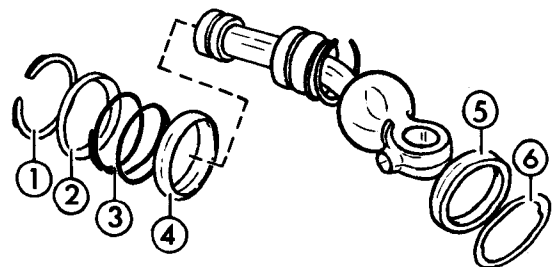


FIG 6:7 Gearlever ball cup renewal

6:3 Gearlever removal and refitting

ZF gearbox:

Push up the rubber gaiter with foam insert and remove the circlip as shown in **FIG 6:1**, then lift out the gearlever assembly as shown in **FIG 6:2**. Refit in the reverse order of removal, lubricating the gearlever ball with Longterm 2 grease.

Getrag gearbox:

Push up the bellows with foam insert and remove the circlip as shown in **FIG 6:1**, then refer to **FIG 6:3** and unscrew setscrew 1 and press out pivot pin 2. Pull out the gearlever assembly as shown in **FIG 6:4**. Refit in the reverse order of removal, making sure that the pivot pin 2 is secured in its bore by means of setscrew 1 (see **FIG 6:3**). Lubricate the gearlever ball with Longterm 2 grease.

Renewing gearlever rubber rings:

Remove the gearlever as described previously, then refer to **FIG 6:5** and detach the wire circlip to release the gearlever. Refer to **FIG 6:6**. Pull off the rubber ring and remove the circlip, then remove the rubber rings. Refit in the reverse order of removal, using new rubber rings.

Renewing gearlever ball cups:

Dismantle the gearlever as described previously, then refer to **FIG 6:7** and remove circlip 1, spacer 2, pressure spring 3, ball cups 4 and 5 and washer 6. Reassemble in the reverse order of dismantling, using new ball cups. Lubricate the ball cups with Longterm 2 grease.

6:4 Speedometer drive pinion

If the car is raised for better access to the underside, support safely on floor stands. Disconnect the speedometer cable from the pinion housing, then remove the bolt shown in **FIG 6:8** and detach the drive pinion assembly from the gearbox. Check the seal fitted to the assembly and renew if not in perfect condition. Refitting is a reversal of the removal procedure.

6:5 Gearbox removal and refitting

Removal:

Remove the gearlever as described in **Section 6:3**. Disconnect the exhaust pipes at the exhaust manifolds, noting that the mounting studs must be smeared with Molykote paste G when the pipes are refitted and gaskets renewed.

Refer to **FIG 6:9** and detach the exhaust bracket from the gearbox. When the bracket is refitted, note that the pipe clip must be tightened first, followed by the exhaust bracket to gearbox mounting nuts. Refer to **Chapter 8** and detach the propeller shaft rubber coupling from the transmission flange and the centre bearing support from the underbody. Pull the propeller shaft from the transmission. Note that the centre bearing support must be properly tensioned when the propeller shaft is refitted.

Disconnect the speedometer cable from the gearbox and pull the cable from the reversing light switch. Refer to **FIG 6:10** and disconnect the gearbox from the clutch bellhousing. Use a suitable jack to support the engine

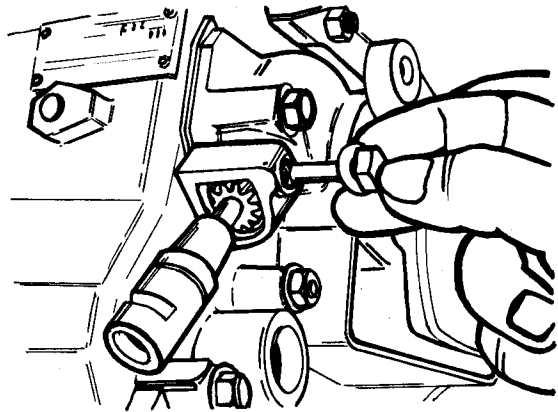


FIG 6:8 Removing speedometer drive pinion

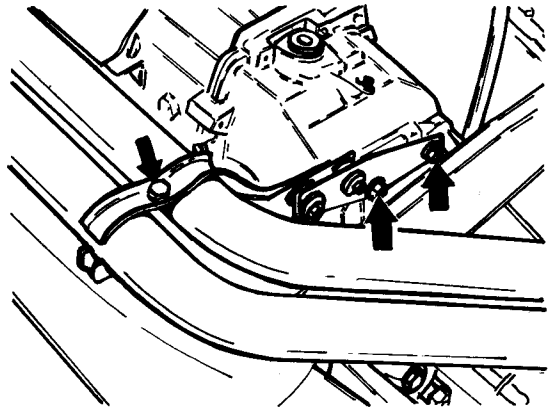


FIG 6:9 Detaching exhaust bracket

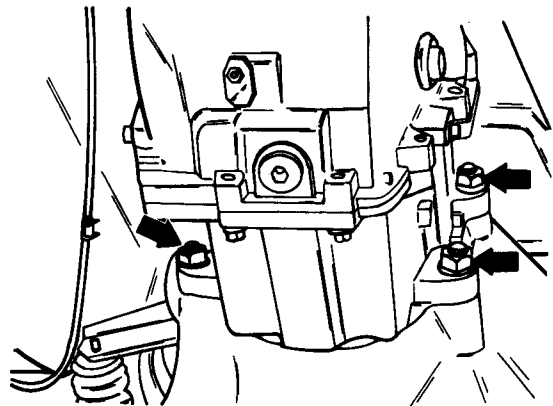


FIG 6:10 Disconnecting gearbox from bellhousing

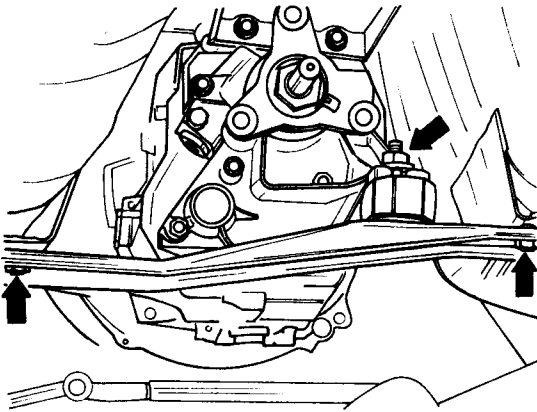


FIG 6:11 Detaching gearbox crossmember

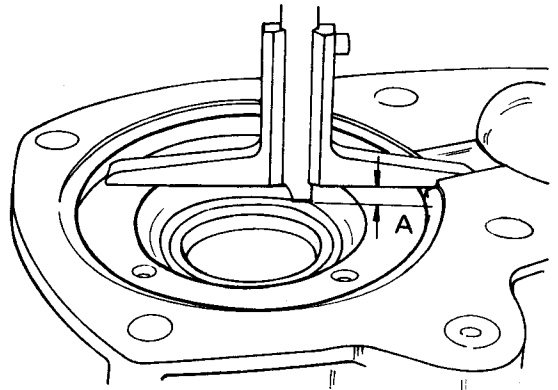


FIG 6:14 Guide flange seal installation

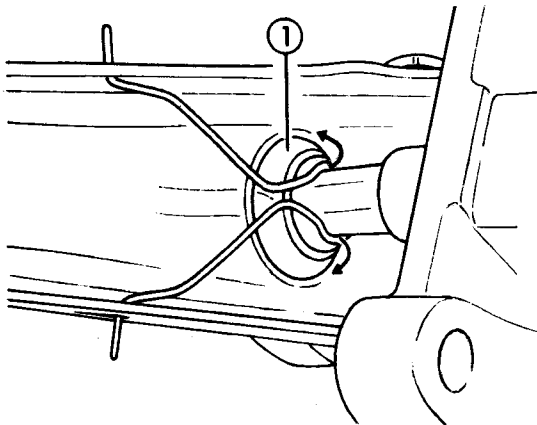


FIG 6:12 Angle seal 1 and retaining spring

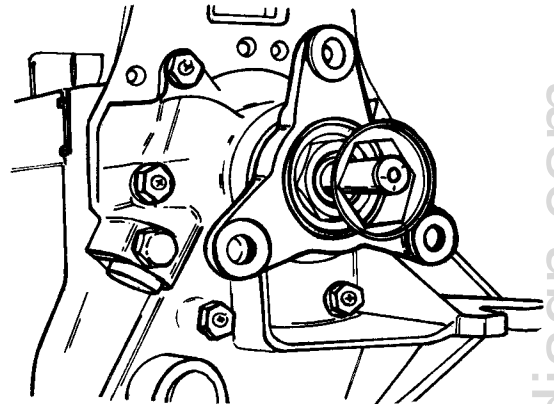


FIG 6:15 Drive flange removal

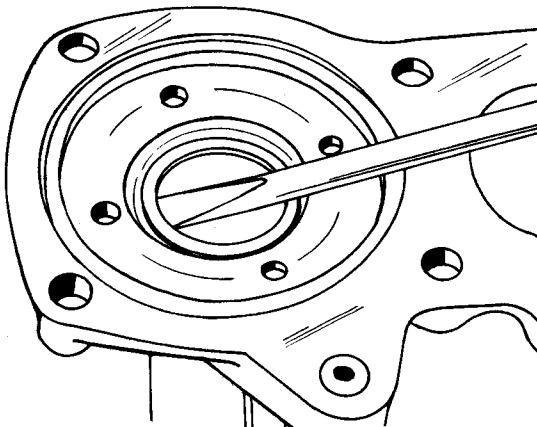


FIG 6:13 Guide flange seal removal

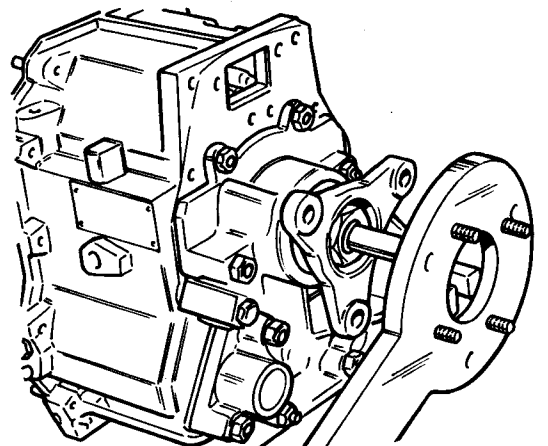


FIG 6:16 Output flange retaining tool

between the front axle brackets. Refer to **FIG 6:11**. Slacken the rubber mountings at the gearbox and detach the crossmember. Using a suitable jack or with the help of an assistant, carefully move the gearbox rearward. Lift the spring over the ballpin flange as shown in **FIG 6:12**. Note that the angle seal 1 must be between the ballpin and clutch release lever when refitting. The transmission must be carefully removed rearwards until the splined shaft is clear of the clutch hub, then the assembly removed from beneath the car. **Do not allow the weight of the gearbox to rest on the splined shaft while it is still in the clutch hub, otherwise severe damage to clutch components may occur.**

Refitting:

This is a reversal of the removal procedure. Check the condition of gearbox rubber mountings and renew if damaged or perished. When tightening the mounting and crossmember fixings, make sure that the rubber components are not twisted or distorted. On completion, check and if necessary top up gearbox oil as described in **Section 6:2**.

6:6 Oil seal renewal

Input shaft seal:

Remove the gearbox as described in **Section 6:5**. Remove the guide flange from the front of the gearbox, noting the shims fitted between guide flange and transmission ballbearings. These shims must be installed in their original positions during reassembly. Carefully prise out the seal from the guide flange as shown in **FIG 6:13**. Carefully clean the seal bore, then install the new seal, open side towards the gearbox, until the fitted depth **A** shown in **FIG 6:14** is 4.5mm (0.177in). Refit the guide flange to the gearbox, using a new gasket if the original is not in good condition. Refit the transmission as described in **Section 6:5**.

Output shaft seal:

Disconnect the propeller shaft from the gearbox output shaft flange as described in **Chapter 8**. Release the staking and remove the locking plate from the flange retaining nut as shown in **FIG 6:15**. It is recommended that the locking plate is always discarded and a new one used during reassembly.

Lock the output flange against rotation using tool 604 as shown in **FIG 6:16** or by other suitable means, then remove the retaining nut and pull the flange from the shaft. Carefully lever out the old seal and discard.

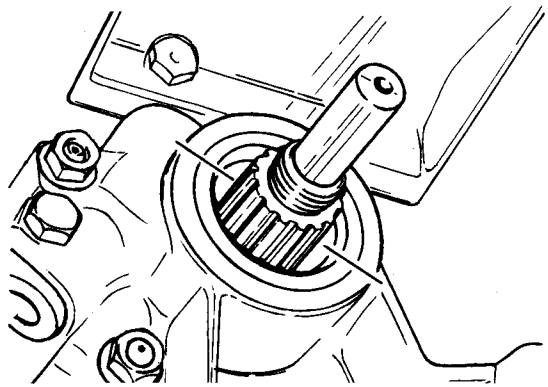


FIG 6:17 Output shaft seal installation

Carefully clean the bore, then install the new seal and drive squarely into place until it is flush with the housing as shown in **FIG 6:17**.

Refit the remaining components in the reverse order of removal. When the output flange securing nut has been tightened to the specified torque, fit the locking plate and use a suitable punch to drive the outer ring of the locking plate into the groove provided in the housing.

6:7 Fault diagnosis

(a) Jumping out of gear

- 1 Weak or broken detent plunger spring
- 2 Worn synchromesh unit
- 3 Loose or worn selector fork
- 4 Excessively worn selector shaft

(b) Noisy gearbox

- 1 Insufficient or dirty oil
- 2 Incorrect clearances between internal components
- 3 Worn or damaged bearings
- 4 Worn or damaged gear teeth

(c) Difficulty in engaging gear

- 1 Clutch not releasing properly
- 2 Worn synchromesh unit
- 3 Worn selector shafts or forks
- 4 Worn gearlever mechanism

(d) Oil leaks

- 1 Faulty gaskets
- 2 Leaking oil filler or drain plug
- 3 Worn or damaged oil seals
- 4 Faulty joint faces on gearbox case components

NOTES