Chapter 9
VW 084 & 020 gearboxes

Contents

Specifications

General

Type	Four or five-speed (all synchromesh) and reverse. Drive to the front wheels by double CV jointed driveshafts
Designation	084 (4-speed) and 020 (4-speed or 5-speed)

Lubrication

Capacity:	
084 gearbox:	
All models up to 1992	2.2 litres (3.9 pints)
All models from 1992	3.1 litres (5.6 pints)
020 gearbox:	
4-speed	1.5 litres (2.6 pints)
5-speed	2.0 litres (3.5 pints)
Lubricant type/specification	See *Recommended lubricants and fluids*

Ratios (typical)

	4-speed	3+E	5-speed	MG 1600
Maestro				
1st	3.45 : 1	3.45 : 1	3.45 : 1	3.45 : 1
2nd	1.94 : 1	1.75 : 1	1.94 : 1	2.12 : 1
3rd	1.29 : 1	1.06 : 1	1.29 : 1	1.44 : 1
4th	0.91 : 1	0.70 : 1	0.91 : 1	1.13 : 1
5th	-	-	0.71 : 1	0.91 : 1
Reverse	3.17 : 1	3.17 : 1	3.17 : 1	3.17 : 1
Final drive	4.17 : 1	4.17 : 1	3.89 : 1	3.65 : 1

	4-speed	5-speed
Montego		
1st	3.45 : 1	3.45 : 1
2nd	1.94 : 1	1.94 : 1
3rd	1.29 : 1	1.29 : 1
4th	0.91 : 1	0.91 : 1
5th	-	0.71 : 1
Reverse	3.17 : 1	3.17 : 1
Final drive	4.25 : 1	3.94 : 1

Golf and Jetta 1974 to 1984	
1st	3.45 : 1
2nd	1.94 : 1
3rd	1.29 : 1
4th	0.97 : 1
5th	0.71 : 1
Reverse	3.17 : 1
Final drive	3.89 : 1

	084	020 (4-speed)	020 (5-speed)
Golf and Jetta 1984 to 1992			
1st	3.45 : 1	3.45 : 1	3.45 : 1
2nd	1.95 : 1	1.94 : 1	2.11 : 1
3rd	1.25 : 1	1.28 : 1	1.44 : 1
4th	0.89 : 1	0.90 : 1	1.12 : 1
5th	-	-	0.89 : 1
Reverse	3.38 : 1	3.16 : 1	3.16 : 1
Final drive	4.06 : 1	3.66 : 1	3.66 : 1

Golf and Vento from 1992	
1st	3.45 : 1
2nd	1.84 : 1
3rd	1.13 : 1
4th	0.81 : 1
Reverse	3.38 : 1
Final drive	4.06 : 1

	1.1	1.3
Polo 1982 to 1990		
1st	3.45 : 1	3.45 : 1
2nd	1.95 : 1	1.77 : 1
3rd	1.25 : 1	1.04 : 1
4th	0.89 : 1	0.80 : 1
Reverse	3.38 : 1	3.38 : 1
Final drive	4.27 : 1	4.06 : 1

Scirocco 1974 to 1982	
1st	3.45 : 1
2nd	1.94 : 1
3rd	1.29 : 1
4th	0.97 : 1
5th	0.71 : 1
Reverse	3.17 : 1
Final drive	3.89 : 1

	4-speed & 4+E	5-speed
Scirocco 1982 to 1990		
1st	3.45 : 1	3.45 : 1
2nd	1.94 : 1	2.12 : 1
3rd	1.29 : 1	1.44 : 1
4th	0.91 : 1	1.13 : 1
5th	0.71 : 1	0.91 : 1
Reverse	3.17 : 1	3.17 : 1
Final drive	3.89 : 1	3.67 : 1

Wear limits

084 gearbox	
Synchro ring gap clearance	0.5 mm (0.020 in)
Input and output shaft maximum endfloat	0.5 mm (0.020 in)
020 gearbox	
Synchro ring gap clearance	0.5 mm (0.020 in)
Input shaft preload	0.2 mm (0.008 in)
Input shaft preload shims	0.65 mm (0.026 in)
	0.70 mm (0.028 in)
	0.75 mm (0.030 in)
	0.80 mm (0.032 in)
	0.85 mm (0.033 in)
	0.90 mm (0.035 in)
	0.95 mm (0.037 in)
	1.00 mm (0.039 in)
	1.05 mm (0.041 in)
	1.10 mm (0.043 in)
	1.15 mm (0.045 in)
	1.20 mm (0.047 in)
	1.25 mm (0.049 in)
	1.30 mm (0.051 in)
	1.35 mm (0.053 in)
	1.40 mm (0.055 in)
Input shaft turning torque:	
New bearings	50 to 150 Ncm
Used bearings	At least 30 Ncm
1st gear axial play circlips available:	**Thickness**
Brown	2.5 mm (0.099 in)
Black	2.6 mm (0.102 in)
Bright	2.7 mm (0.106 in)
Copper	2.8 mm (0.110 in)
Brass	2.9 mm (0.114 in)
Blue	3.0 mm (0.118 in)

Torque wrench settings

	Nm	lbf ft
084 gearbox		
Bracket to engine	45	33
Clutch guide sleeve to gearbox	15	11
Clutch housing-to-gearbox bolts	25	18
Drive flange bolt	25	18
Driveshaft to gearbox	45	33
Gear lever stop plate nuts	10	7
Gearbox housing cover bolts	25	18
Gearbox mountings	60	44
Gearbox to engine:		
M12	75	55
M10	45	33
Gearshift housing bolts	15	11
Oil drain plug	25	18
Oil filler plug	25	18
Relay lever bolt	35	26
Selector finger (to inner shift lever)	25	18
Shift rod clip nut	20	15
Shift rod mounting coupling screw (new)	20	15
020 4-speed gearbox		
Driveshafts to flange	45	33
Gearbox to clutch housing	25	18
Gearbox to engine (M12)	75	55
Input shaft bearing clamp screw nut	15	11
Left console to gearbox	35	26
Left console to subframe	60	44
Output shaft bearing plate bolts	40	30
Plug bolt for selector shaft	20	15
Rear right console to engine	25	18

Torque wrench settings	Nm	lbf ft
020 4-speed gearbox (continued)		
Selector shaft end cap	50	37
Starter motor to gearbox/engine	60	44
Reverse shaft set screw:		
Hex head type	20	15
Torx head type	30	22
020 5-speed gearbox		
Bearing plate bolts	40	30
First gear synchroniser screw	150	111
Gear lever retaining plate nuts	10	7
Gearbox housing cover bolts	25	18
Gearbox-to-clutch housing bolts	25	18
Oil filler plug	25	18
Reverse shaft securing bolt	20	15
Selector shaft end cap	50	37
Selector shaft lever nut	15	11
Selector shaft securing bolt	20	15

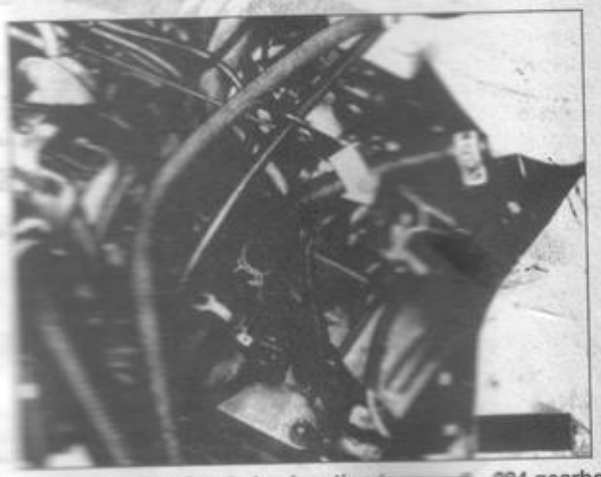
1 General description

This gearbox is type 084 or 020, according to model. It incorporates four or five forward speeds and one reverse speed, with synchromesh engagement on all forward gears. The clutch withdrawal mechanism comprises a release arm and lever located at the outer end of the gearbox and a pushrod located in the input shaft.

Gearshift is by means of a floor-mounted lever connected by a remote control housing and shift rod to the gearbox selector shaft and relay lever.

The differential (final drive) unit is integral with the main gearbox and is located between the main casing and the bearing housing.

Drain and filler/level plugs are screwed into the main gearbox casing **(see illustrations)**.

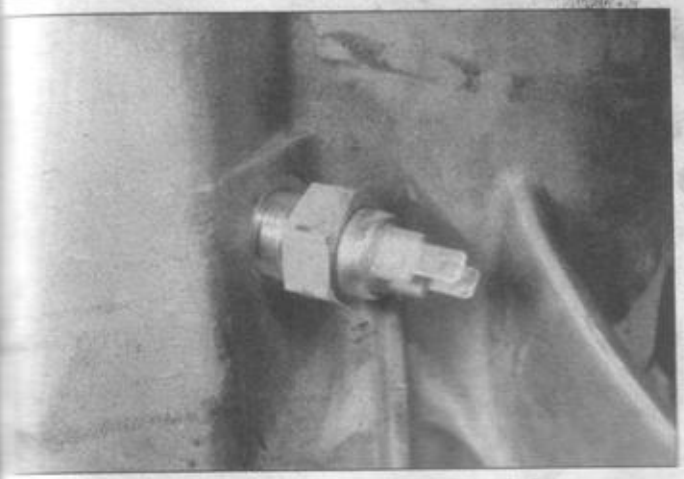


1.4a Gearbox filler/level plug location (arrowed) - 084 gearbox

1.4b Gearbox drain plug - 084 gearbox

1.4c Using a key to remove the gearbox filler/level plug - 020 gearbox

1.4d Gearbox drain plug - 020 gearbox



2.3 Removing the reversing light switch

2.4a Remove the retaining bolt . . .

2 Dismantling into assemblies - 084 gearbox

1 Unscrew the drain and filler plug using a hexagon key and drain the remaining oil into a suitable container. Refit and tighten the plugs.

2 Remove the clutch release bearing and shaft.

3 Unscrew and remove the reversing light switch **(see illustration)**.

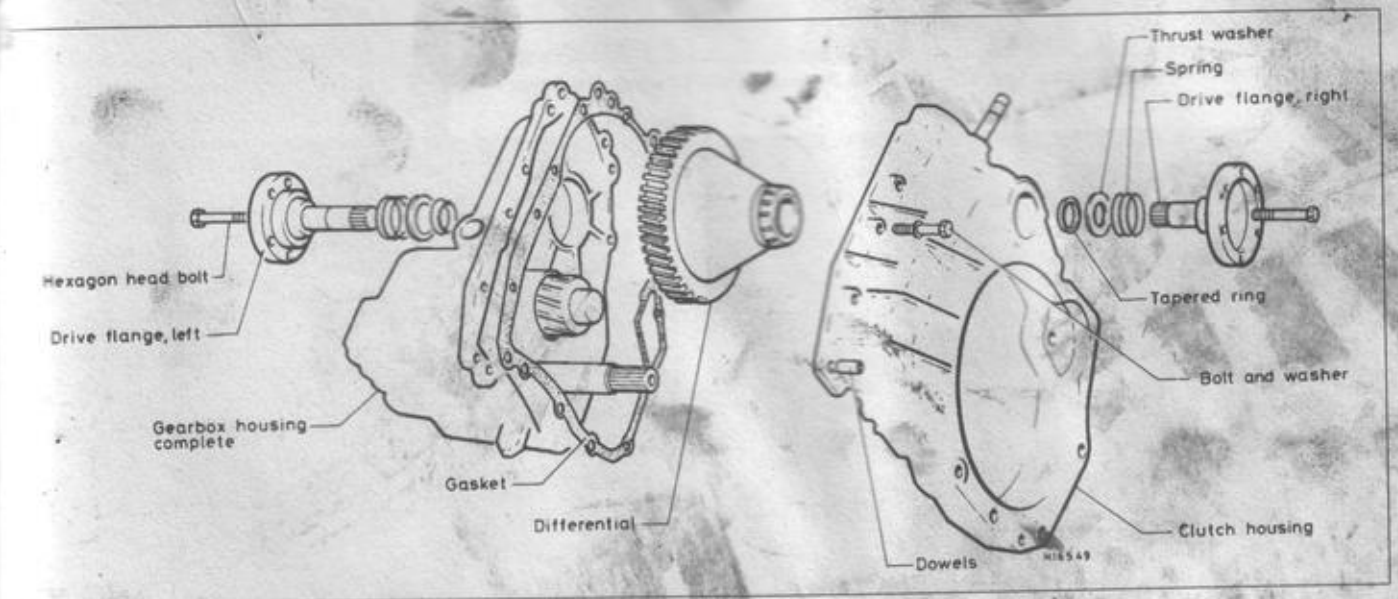
4 Temporarily screw two bolts into each drive flange, and, using a bar to hold the flange stationary, unscrew each retaining bolt. Identify each flange left and right, then pull them from the differential **(see illustrations)**. Extract the coil spring thrustwasher and taper ring from the drive flange location in the differential housing and keep them with their respective drive flanges **(see illustration)**.

5 The drive flange oil seals may be levered out and renewed, if necessary, either at this stage or later when servicing the differential unit. This job can also be done with the gearbox in situ once the drive flanges are removed, but note that the right and left-hand seals are dimensionally different.

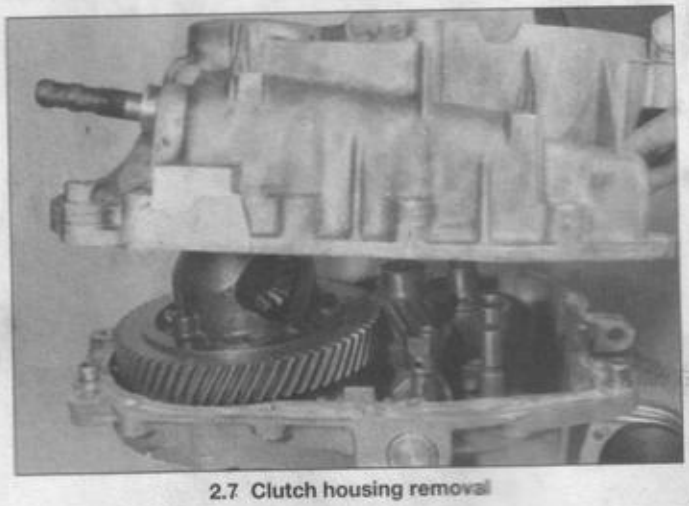
6 Unscrew and remove the bolts securing the clutch housing to the gearbox housing. Make sure that all the bolts are removed from inside the clutch housing.

7 Support the gearbox with the clutch housing uppermost and, using a wooden mallet, tap the clutch housing from the gearbox housing and remove it **(see**

2.4b . . . and withdraw the drive flange



2.4c Gearbox, clutch housing and associated components - 084 gearbox



2.7 Clutch housing removal

2.8 Remove the magnetic swarf collector

illustration). If it is difficult to free the housing from the dowels, tap out the dowels first using a soft metal drift.

8 Remove the gasket, if applicable, and take the magnetic swarf collector from the slot in the bottom of the gearbox housing **(see illustration)**.

9 Lift the differential from the gearbox housing **(see illustration)**.

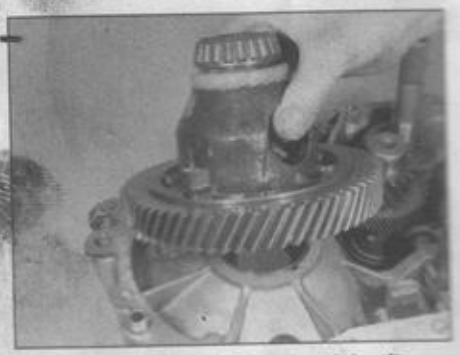
10 Support the gearbox housing with the end cover uppermost.

11 Unscrew and remove the bolts and remove the bearing end cover **(see illustration)**. Identify the input and output bearing shims then remove them **(see illustration)**. Do not interchange the shims otherwise the shaft endfloats will need adjusting on reassembly. Remove the gasket.

12 Using circlip pliers, extract the circlip from the end of the input shaft and remove the small shim.

13 Check that the selector rods are in the neutral position then, using an Allen key, unscrew the gear detent plugs with their washers, and extract the sleeves, springs and plungers **(see illustrations)**.

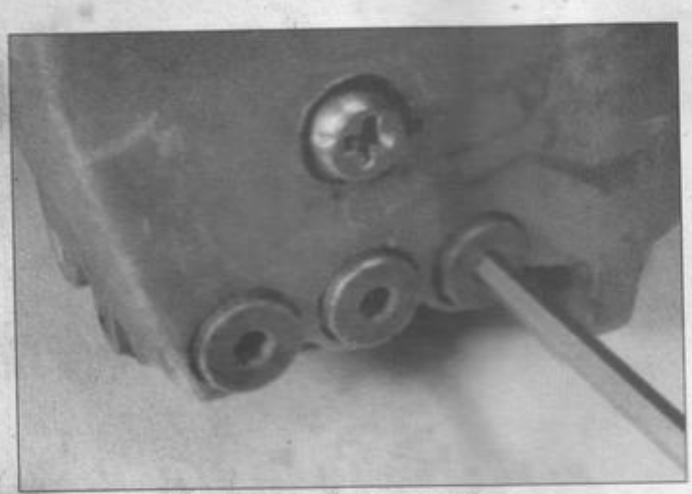
14 Unscrew the reverse relay cross-head bolt



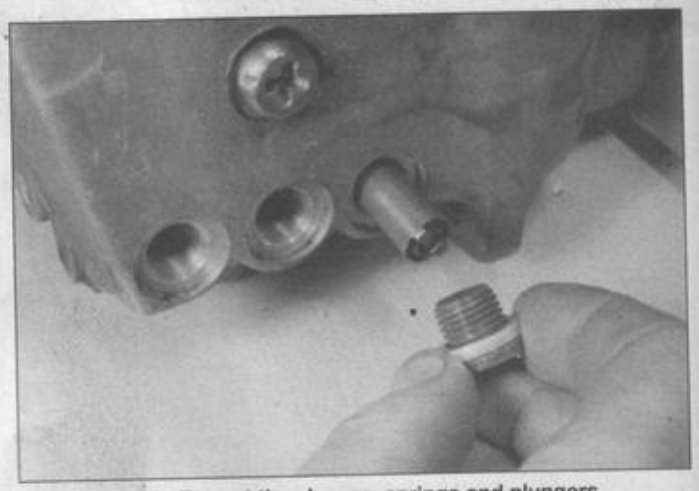
2.9 Withdraw the differential unit

2.11a Removing the bearing end cover . . .

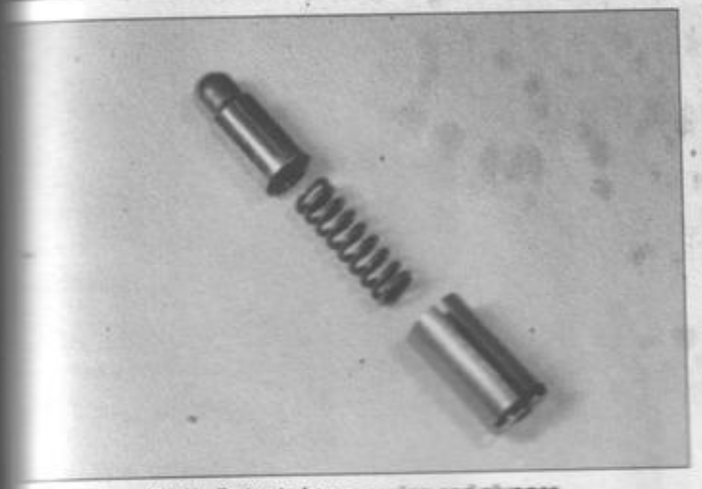
2.11b . . . and output bearing shim



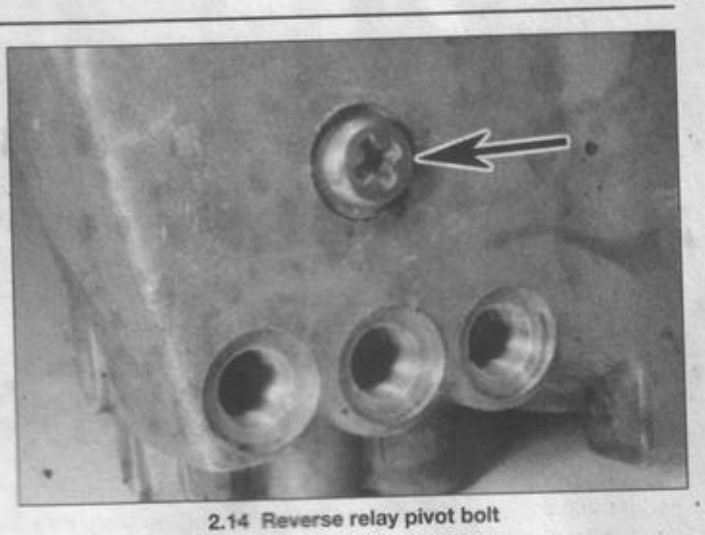
2.13a Unscrew the gear detent plugs



2.13b Extract the sleeves, springs and plungers



2.13c Detent sleeve, spring and plunger



2.14 Reverse relay pivot bolt

...xt to the detent holes (see illustration). ...e bolt is very tight and an impact driver ...l be required or, if not available, a cold ...sel.

...5 Invert the gearbox housing and remove ...e reverse selector rod and relay lever (see ...ustration). The relay lever has slotted ends ...o engage the pin on the selector rod and the ...erse gear.

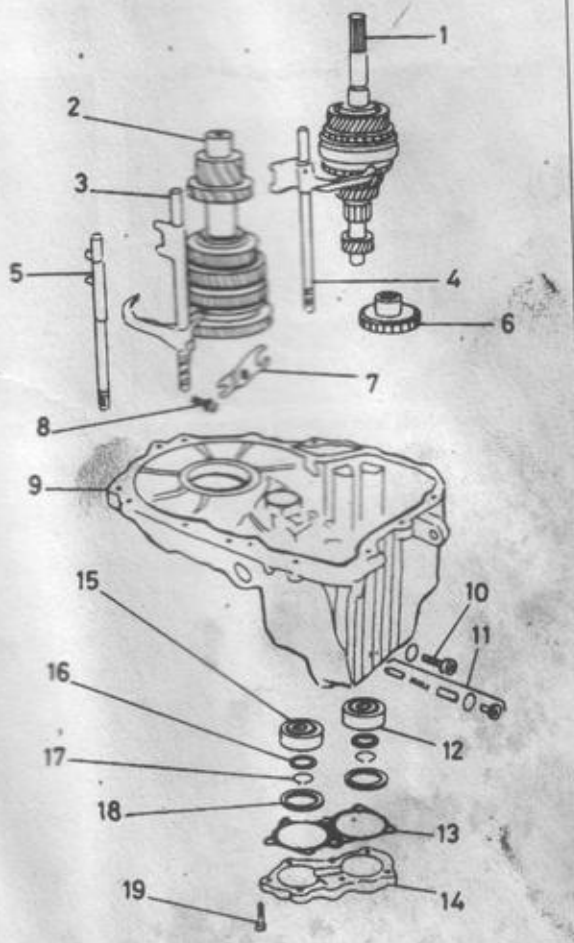
...6 The next stage is the removal of the input ...nd output shafts, and the use of a bearing ...uller is described in the following paragraphs (see illustrations). However, it is possible, with some difficulty, to remove the shafts simultaneously by tapping them through the end bearings without the use of a puller. This method is not recommended since damage to the housing may occur and also the synchromesh units can easily come apart causing further damage.

17 Make up a support plate and bolt it to the housing, together with packing washers, to

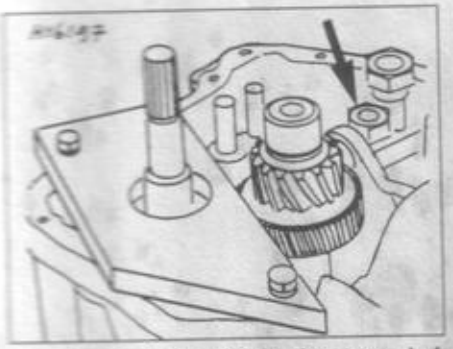
2.15 Remove the reverse selector rod

2.16a Suitable puller for removing the input shaft bearing

1 Input shaft
2 Output shaft
3 Selector rod and fork, 1st and 2nd gears
4 Selector rod and fork, 3rd and 4th gears
5 Selector rod, reverse gear
6 Reverse gear
7 Relay lever
8 Pin for relay lever
9 Gearbox housing
10 Bolt - relay lever
11 Gear detent
12 Input shaft bearing
13 Gasket
14 Bearing cover
15 Output shaft bearing
16 Small shim
17 Circlip
18 Large shim
19 Hexagon bolt



2.16b Input and output shafts and selector rod locations in the gearbox housing - 084 gearbox



2.17 Support plate location for removal of the input shaft bearing. Jam gearshift shaft with M16 hexagonal nut (arrowed)

2.18a Fit the puller to the input shaft bearing . . .

2.18b . . . and withdraw the bearing

hold the input shaft stationary **(see illustration)**. Locate an M16 hexagonal nut (arrowed) between the gearshift shaft and housing to jam the shaft.

18 Support the gearbox with the end bearings uppermost, then using a puller remove the input shaft bearing from the housing **(see illustrations)**.

19 Remove the support plate.

20 Using a large nut, or piece of wire, retain the selector relay shaft against the spring tension.

21 Move the input shaft away from the output shaft then lift it from the gearbox housing, together with the 3rd/4th selector rod and fork **(see illustration)**. Lift the reverse gear slightly to allow the input shaft 1st gear to pass.

22 Remove the M16 nut or piece of wire used to jam the selector relay shaft.

23 Using circlip pliers, extract the circlip from the end of the output shaft and remove the small shim **(see illustrations)**.

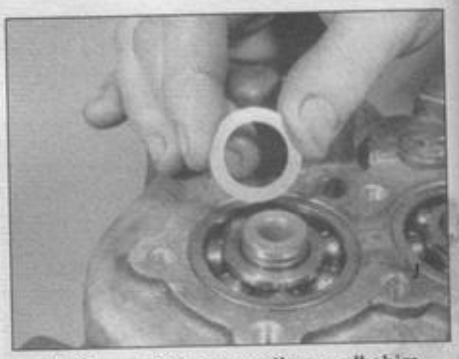
24 Using the puller, press the output shaft from the end bearing and, at the same time, remove the 1st/2nd selector rod and fork, and the reverse gear **(see illustrations)**. Make sure that the selector rod and reverse gear do not become jammed.

25 Extract the interlock plungers from the gearbox housing.

26 Using a soft metal drift, drive the output shaft bearing from the gearbox housing. Keep both input and output shaft bearings identified.

2.21 Input shaft and 3rd/4th selector rod removal

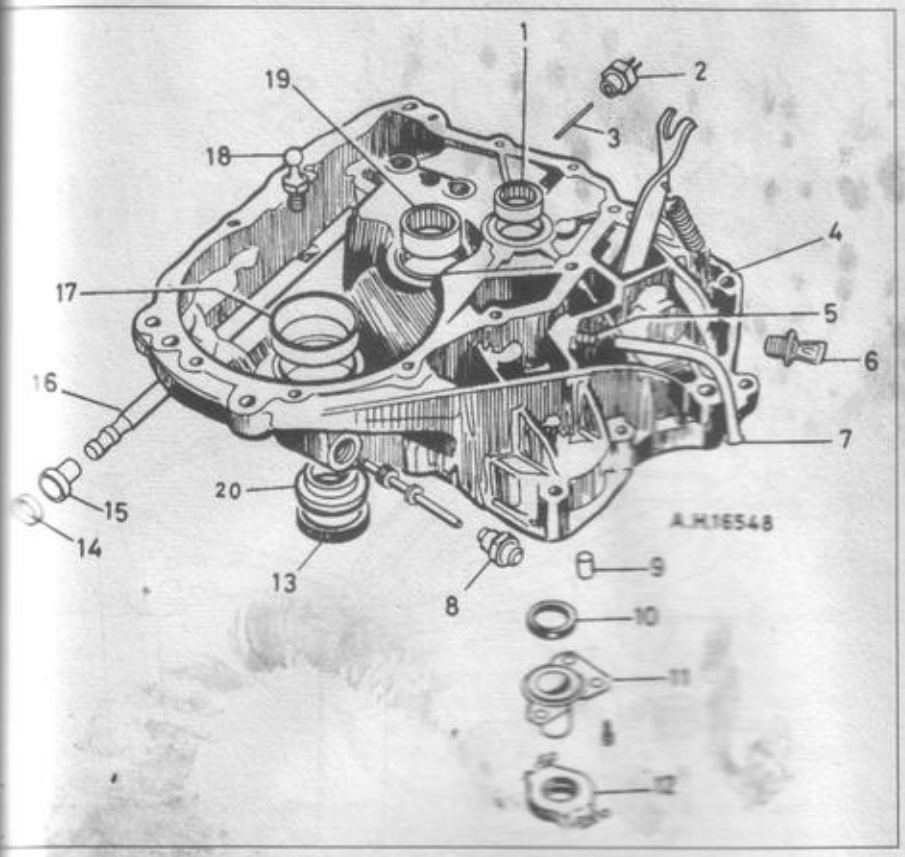
2.23a Extract the circlip from the output shaft . . .



2.23b . . . and remove the small shim

2.24a Pressing the output shaft from the bearing with a puller

2.24b Removing the output shaft and 1st/2nd selector rod



3.1 Exploded view of the clutch housing - 084 gearbox

1 *Needle bearing*
2 *Switch*
3 *Extension pin*
4 *Clutch housing*
5 *Breather connection*
6 *Plug*
7 *Breather pipe*
8 *Input shaft pinion*
9 *Starter bush*
10 *Input shaft seal*
11 *Guide sleeve*
12 *Release bearing*
13 *Driveshaft oil seal*
14 *Seal*
15 *Bush*
16 *Inner shift lever*
17 *Outer race taper roller bearing*
18 *Selector finger*
19 *Needle bearing*
20 *Seal sleeve*

3 Clutch housing (084 gearbox) - dismantling and reassembly

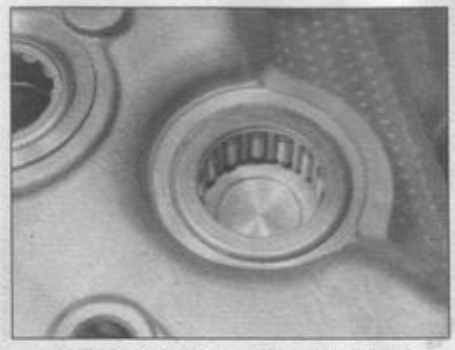
Clean the housing and examine it for damage or cracks **(see illustration)**. If evident it will have to be renewed, but note that this will necessitate readjustment of the differential unit, as described in Section 7.

Prise the seal from the inner shift lever. If the lever is not being removed smear the lip of the new seal with grease then drive it squarely into the housing until flush with the rim of the bush. To remove the lever, unscrew and remove the finger then slide out the lever **(see illustrations)**. Using a soft metal drift drive out the lever bush from the housing. Drive the new bush into position then smear the lever action surfaces with molybdenum disulphide grease, slide it into the housing, fit the finger and tighten it to the specified torque. Fit the new seal as previously described.

Unscrew the speedometer pinion bush and withdraw the pinion. Examine the components for wear and renew them if necessary. Insert the pinion then tighten the bush.

4 Check the starter bush in the housing. If necessary remove it with VW tools 228 b and 204 b, then drive in the new bush with a soft metal drift. Do not grease the bush.

5 Check the output shaft needle roller bearing and if necessary remove it with a puller.



3.5 Output shaft needle roller bearing location in the clutch housing

3.2a Inner shift lever oil seal location

3.2b Inner shift lever location in the clutch housing

Support the housing and drive in the new bearing, making sure that the end face with the lettering faces inside the gearbox **(see illustration)**.

6 Check the input shaft needle roller bearing. To remove it, prise out the oil seal then use a soft metal drive from the outside of the gearbox to drive it out. Support the housing and drive in the new bearing flush, making sure that the end face with the lettering faces inside the gearbox **(see illustrations)**. Smear the lip of the new seal with grease then use a metal tube to drive it squarely into the housing as far as it will go. The fitted position of the seal is approximately 2.5 mm (0.099 in) below the housing surface.

3.6a Input shaft seal and bearing viewed from the engine side of the clutch housing

4.1b Input shaft bearing viewed from inside of clutch housing

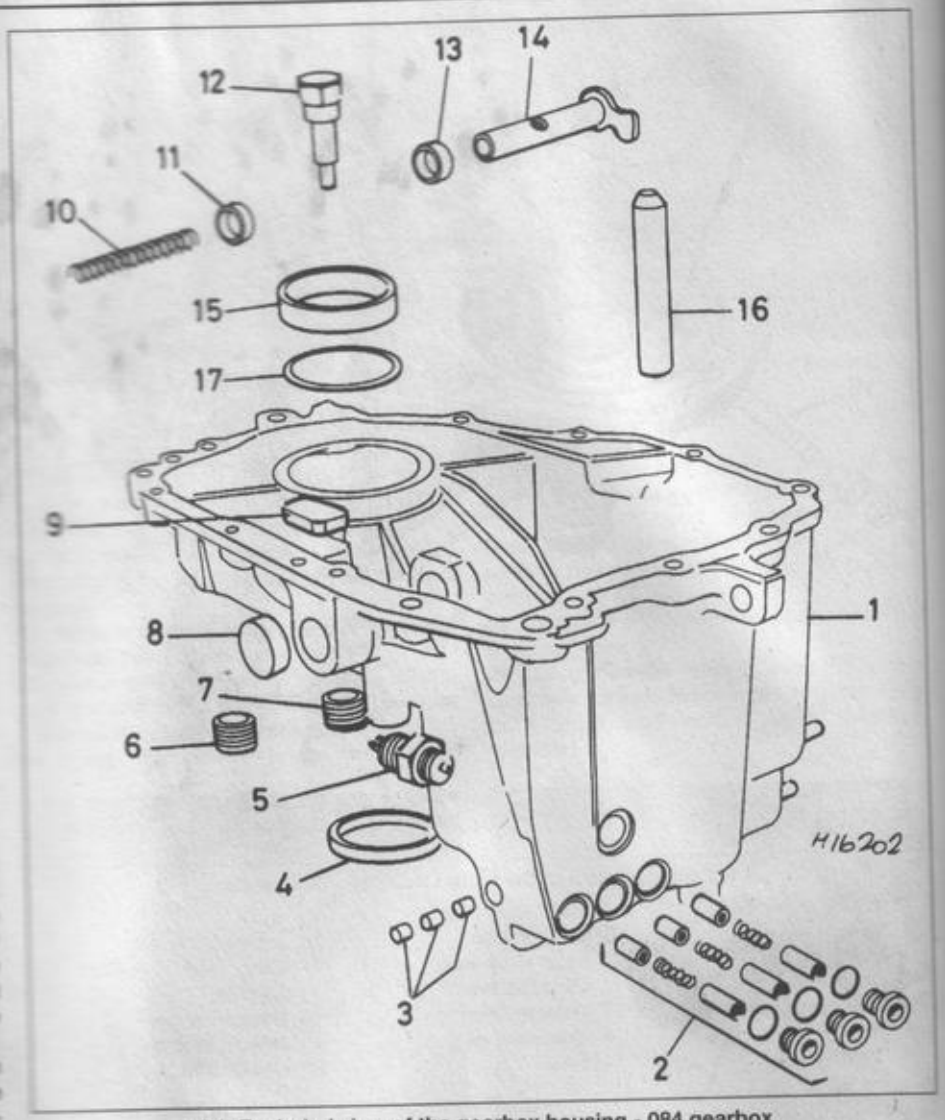
4 Gearbox housing (084 gearbox) - dismantling and reassembly

1 Clean the housing and examine it for damage or cracks **(see illustration)**. If evident the housing will have to be renewed, and will necessitate readjustment of the differential, and input and output shafts (Sections 7 and 8 respectively).

2 Check the selector relay shaft for excessive play in the bushes **(see illustration)**. If evident unscrew the relay lever and withdraw the shaft from inside the housing. Remove the spring and use a soft metal drift to drive out the cap. Also use a drift to drive out the bushes. Note that they are of different lengths, the outer one being 9.5 mm long, the inner one 12 mm long. Drive in the new bushes flush then fit the shaft, insert the relay lever, and tighten it to the specified torque. Insert the spring and drive in the retaining cap.

3 Check the reverse gear shaft and if worn excessively use a soft metal drift to drive the shaft from the housing **(see illustration)** - heat the surrounding housing with a blowlamp if difficulty is experienced. Apply a liquid locking agent to the contact end of the shaft then heat up the housing and drive in the shaft from the outside until the inner end is 83.3 mm (3.280 in) from the mating face of the housing (see illustration).

4 Check the input and output shaft bearings

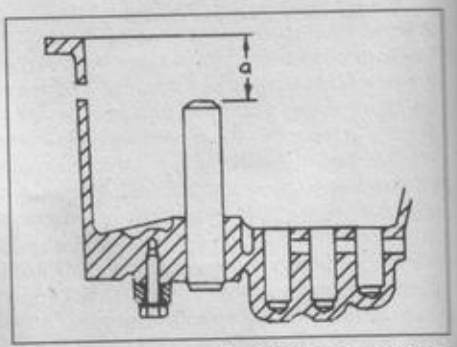


4.1 Exploded view of the gearbox housing - 084 gearbox

1 *Gearbox housing*
2 *Gear detents*
3 *Interlock plungers*
4 *Oil seal (left-hand drive flange)*
5 *Reversing light switch*
6 *Oil drain plug*
7 *Oil filler plug*
8 *Cap*
9 *Magnet*
10 *Spring*
11 *Outer bush for selector shaft*
12 *Relay lever*
13 *Inner bush for selector shaft*
14 *Selector shaft*
15 *Outer race taper roller bearing*
16 *Reverse gear shaft*
17 *Shim*

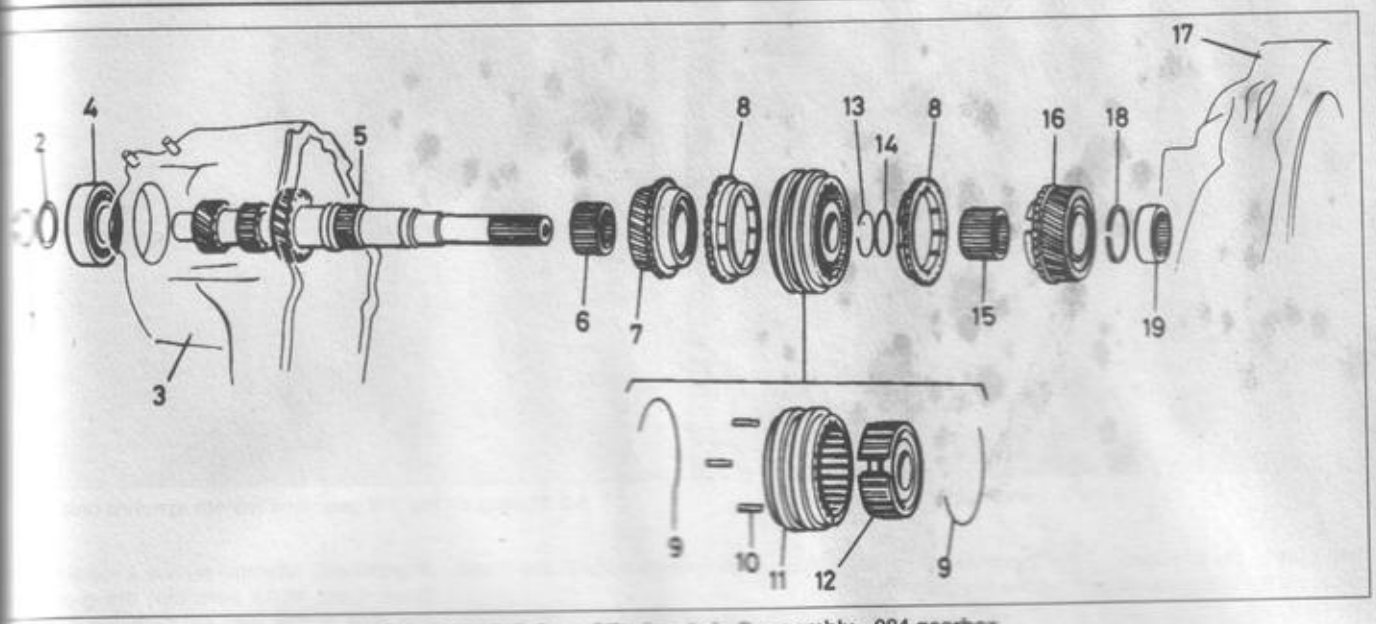
4.2 Selector relay shaft location in the gearbox housing

4.3a Reverse gear shaft location in the gearbox housing



4.3b Reverse gear shaft fitting dimension

a = 83.3 mm (3.280 in)



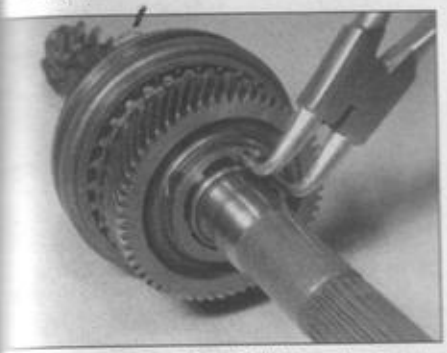
5.1a Exploded view of the input shaft assembly - 084 gearbox

1 Circlip
2 Shim
3 Gearbox housing
4 Grooved ball-bearing
5 Input shaft
6 Needle bearing for 3rd gear
7 3rd speed gear
8 Synchro rings for 3rd and 4th gears
9 Spring
10 Key
11 Sleeve
12 Synchro-hub
13 Circlip
14 Thrust washer
15 Needle bearing for 4th gear
16 4th gear
17 Clutch housing
18 Circlip
19 Needle bearing

wear by spinning them, and renew them if here is excessive play or any roughness dent. Also examine the end cover for ndition.

5 Examine the selector rods and forks for damage and check the reverse gear for bore wear and chipping or pitting of the teeth. Renew the components as necessary.

5 Input and output shafts (084 gearbox) - dismantling and reassembly



5.1b Extracting the circlip from the input shaft

5.2a Remove the 4th gear . . .

Input shaft

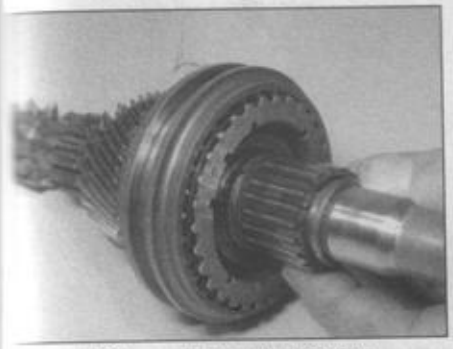
1 Using circlip pliers extract the circlip from the splined end of the input shaft **(see illustrations)**.

2 Withdraw the 4th gear and needle bearing **(see illustrations)**.

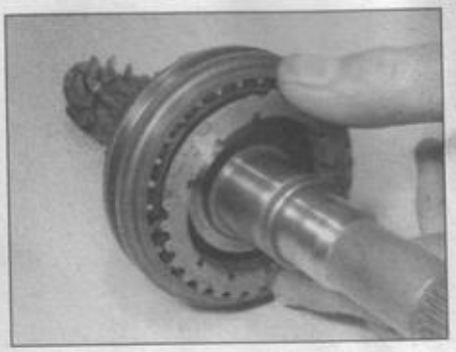
3 Remove the 4th synchro ring **(see illustration)**.

4 Remove the thrustwasher **(see illustration)** then, using circlip pliers, remove the circlip from the 3rd/4th synchro unit **(see illustration)**. Do not overstretch the circlip.

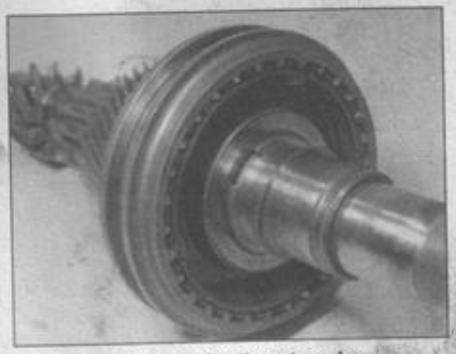
5 Using a puller beneath the 3rd gear, pull off the gear, together with the 3rd/4th synchro



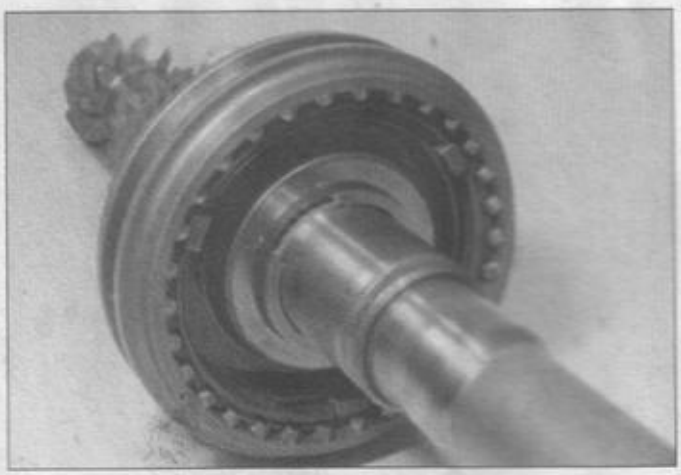
5.2b . . . and needle bearing



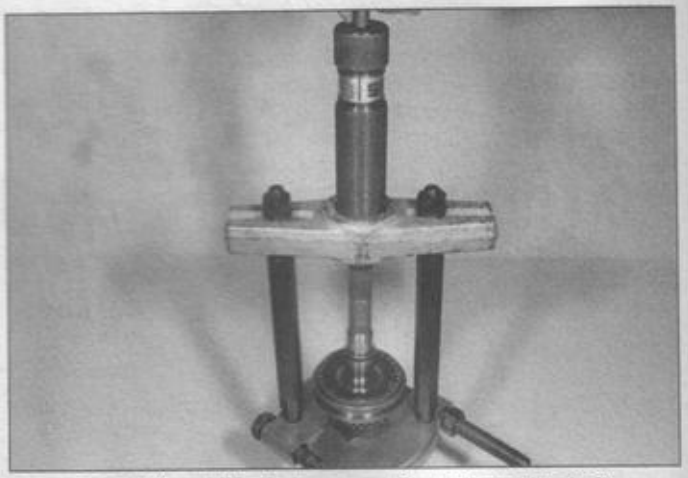
5.3 Removing the 4th synchro ring



5.4a Remove the thrustwasher . . .



5.4b . . . and circlip



5.5 Pulling off the 3rd gear and 3rd/4th synchro unit

unit **(see illustration)**. When removed, separate the components and remove the 3rd synchro ring.

6 Remove the 3rd gear needle bearing **(see illustrations)**.

7 Clean the components in paraffin and examine them for wear and damage. Check the gearteeth for pitting, and similarly check the needle rollers. Renew the components as necessary.

8 Servicing of the synchro units is described in Section 6.

9 Commence reassembly by locating the 3rd gear needle bearing on the input shaft. Lubricate it with gear oil.

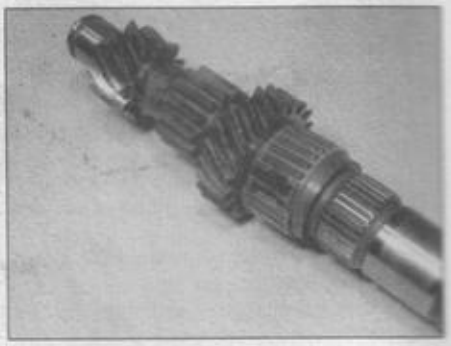
10 Fit the 3rd gear **(see illustration)**.

11 Locate the 3rd synchro ring on the 3rd/4th synchro unit with the cut-outs engaged with the keys. Then, using a puller, press the synchro unit onto the splines **(see illustration)**. Alternatively use a metal tube to drive it on. Make sure that the groove on the side of the hub will face the 4th gear position.

12 Fit the circlip in the groove followed by the thrustwasher.

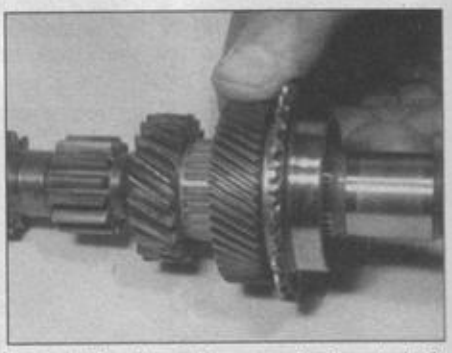
13 Locate the 4th synchro ring on the 3rd/4th synchro unit with the cut-outs engaged with the keys.

14 Locate the 4th gear needle bearing on the

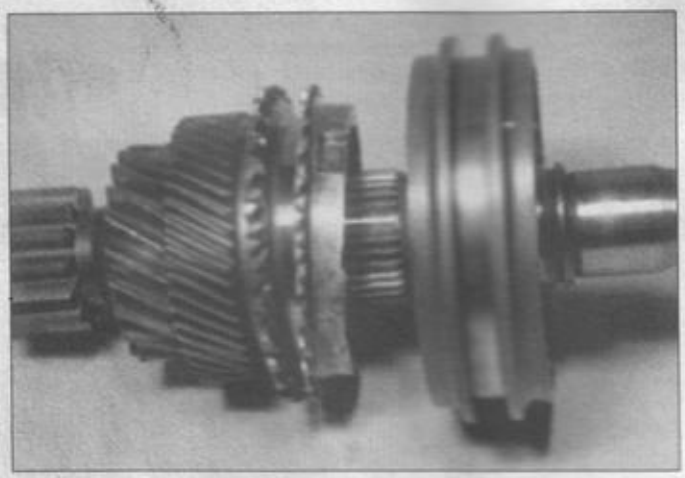


5.6a 3rd gear needle bearing location

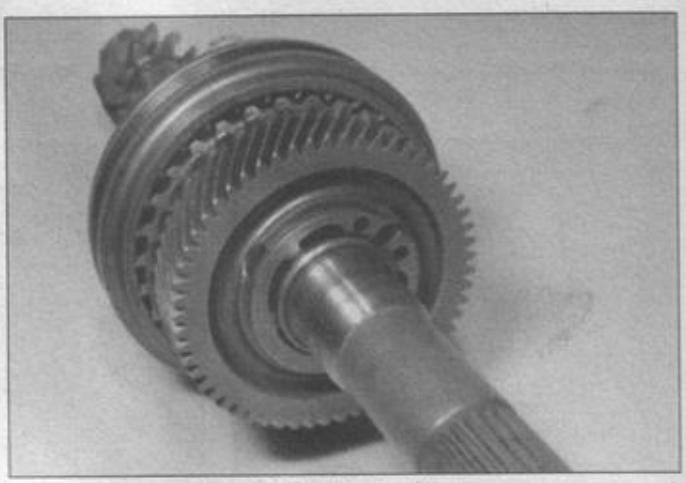
5.6b Input shaft with gears removed



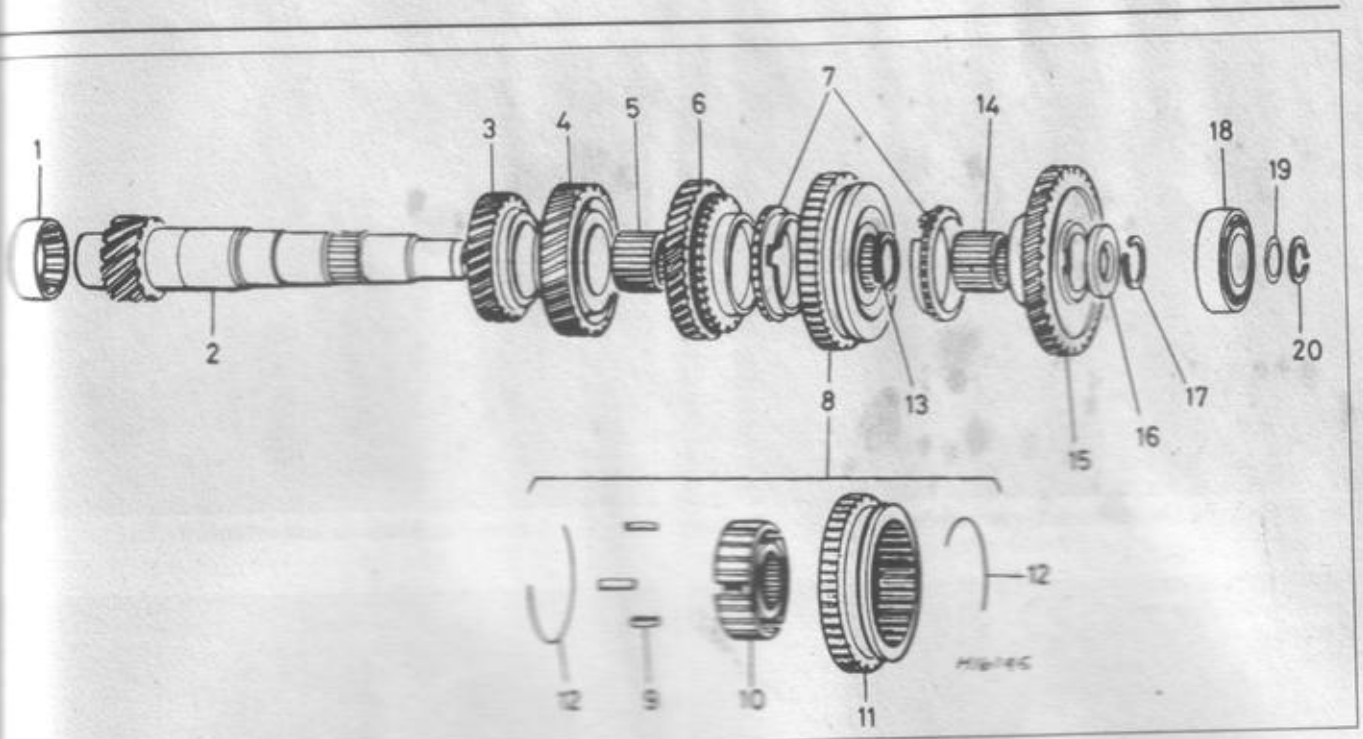
5.10 Fitting the 3rd gear on the input shaft



5.11 Fitting the 3rd gear synchro ring and 3rd/4th synchro unit to the input shaft



5.15 Circlip fitted to 4th gear



5.16a Exploded view of the output shaft assembly - 084 gearbox

1 Needle bearing
2 Output shaft
3 4th gear
4 3rd gear
5 Needle bearing for 2nd gear
6 2nd gear
7 Synchro ring for 1st and 2nd gears
8 Synchro unit for 1st and 2nd gears
9 Key
10 Hub
11 Sleeve
12 Spring
13 Circlip
14 Needle bearing for 1st gear
15 1st gear
16 Thrust washer
17 Circlip
18 Grooved ball-bearing
19 Shim
20 Circlip

shaft and lubricate it with gear oil, then fit the 1st gear.

15 Fit the circlip in the groove, making sure that it is correctly seated **(see illustration)**.

Output shaft

16 Using circlip pliers, extract the circlip from the end of the output shaft, and remove the thrustwasher **(see illustrations)**. Note that the circlip must be renewed on reassembly.

17 Remove the 1st gear and needle roller bearing **(see illustrations)**.

18 Remove the 1st synchro ring **(see illustration)**.

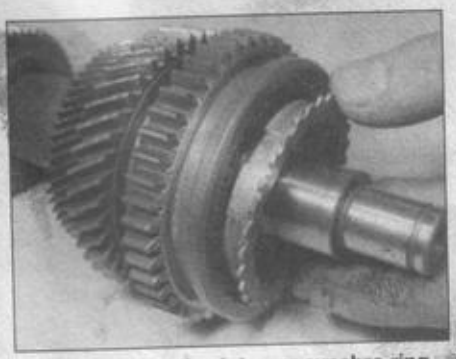
19 Remove the thrustwasher then, using circlip pliers, remove the circlip from

5.16b Remove the circlip

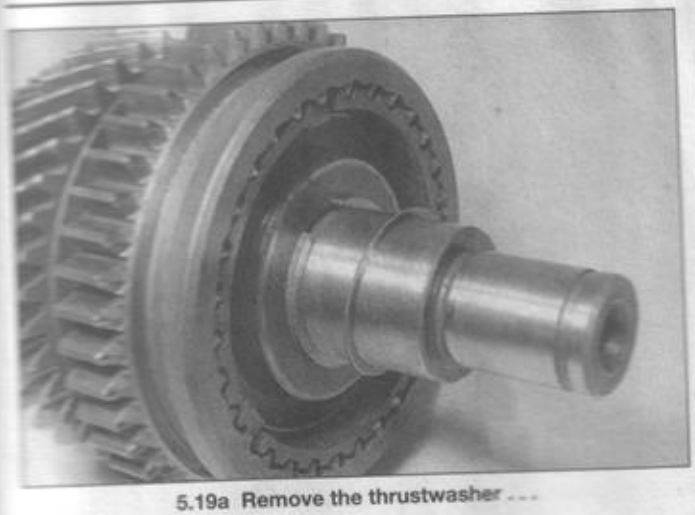
5.16c . . . and thrustwasher from the output shaft

5.17a Remove 1st gear . . .

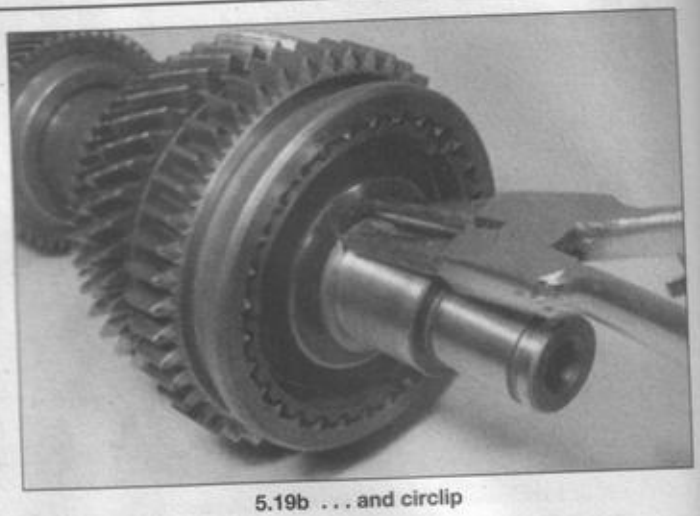
5.17b . . . and needle roller bearing



5.18 Remove the 1st gear synchro ring



5.19a Remove the thrustwasher . . .



5.19b . . . and circlip

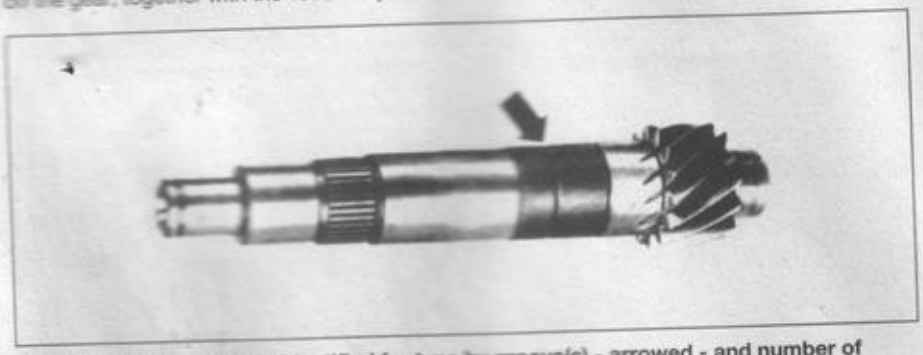
5.21a Remove the 2nd gear needle bearing

5.21b Output shaft with gears removed

the 1st/2nd synchro unit **(see illustrations)**. Renew this circlip when reassembling.

20 Using a puller beneath the 2nd gear, pull off the gear, together with the 1st/2nd synchro unit. When removed, separate the components and remove the 2nd synchro ring.

21 Remove the 2nd gear needle bearing **(see illustrations)**.



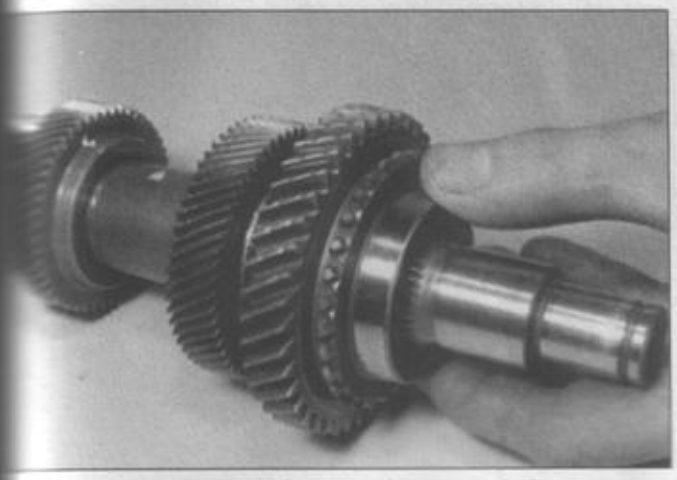
5.22 Output shaft is identified for type by groove(s) - arrowed - and number of final drive teeth

Ratio	Identification
4.27 (64 : 15)	*No groove*
3.88 (6 2: 16)	*One groove*
4.06 (65 : 16)	*Three grooves*

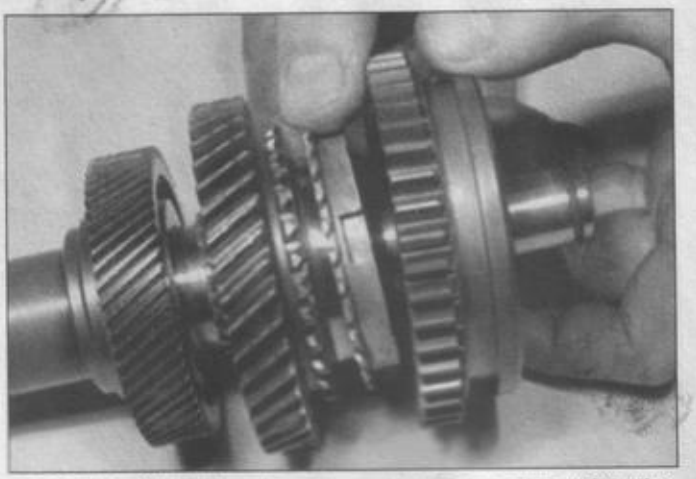
22 Clean the components in paraffin and examine them for wear and damage. Check the gearteeth for pitting, and similarly check the needle rollers. Renew the components as necessary. If the 3rd and/or 4th gears require renewal a press is necessary and the new gears must be heated to 120°C (248°F) before fitting. Note that the shoulders on the two gears are adjacent. The gear on the output shaft and the final drive crownwheel are not matched so, if necessary, the output shaft can be renewed separately, but it will be necessary to check and possibly adjust the output shaft endfloat adjustment, as described in Section 8. In addition, when fitting a new output shaft, ensure that the replacement has the correct number of final drive gearteeth by comparing with the old shaft **(see illustration)**.

23 Check the synchro rings and synchro units with reference to Section 6, paragraphs 3 and 4; however, there are no grooves or dot.

24 Commence reassembly by locating the 2nd gear needle bearing on the output shaft. Lubricate it with gear oil.



5.25 Fitting 2nd gear on the output shaft



5.26 Fitting the 2nd synchro ring and 1st/2nd synchro unit to the output shaft

Using a puller to press on the 1st/2nd synchro unit

Fit the 2nd gear **(see illustration)**.
Locate the 2nd synchro ring on the 2nd synchro unit with the cut-outs engaged with the keys. The ring must be fitted to the reverse gear teeth end of the unit **(see illustration)**.
Using a puller, press the synchro unit onto the splines **(see illustration)**. Alternatively use a metal tube to drive it on. When fitted the selector groove must be on the 1st gear end of the unit.
Fit the **new** circlip in the groove, followed by the thrustwasher.
Locate the 1st synchro ring on the 1st/2nd synchro unit with the cut-outs engaged with the keys.
Locate the 1st gear needle bearing on the shaft and lubricate it with gear oil, then fit the 1st gear.
Fit the thrustwasher and a **new** circlip, making sure that it is correctly seated.

6 Synchro units (084 gearbox) - dismantling and reassembly

1 Unless the gearbox is the victim of neglect or misuse, or has covered very high mileages, the synchro-hub assemblies do not normally need renewing. If they do, they must be renewed as a complete assembly. It is not practical to fit an inner hub or outer sleeve alone - even if you could buy one.

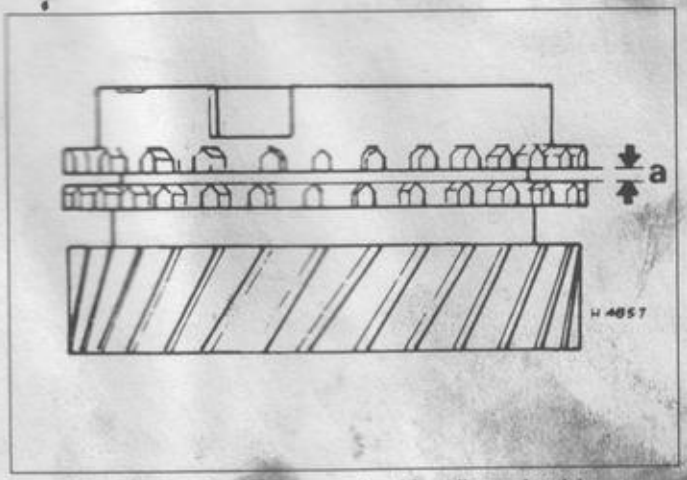
2 When synchro baulk rings are being renewed, it is advisable to fit new sliding keys (blocker bars) and retaining springs in the hubs, as this will ensure that full advantage is taken of the new, unworn cut-outs in the rings.

3 Check the synchro rings by assembling them on their respective gears and using a feeler gauge to measure the gap between the dogs. If it is less than 0.5 mm (0.02 in), renew the rings **(see illustrations)**.

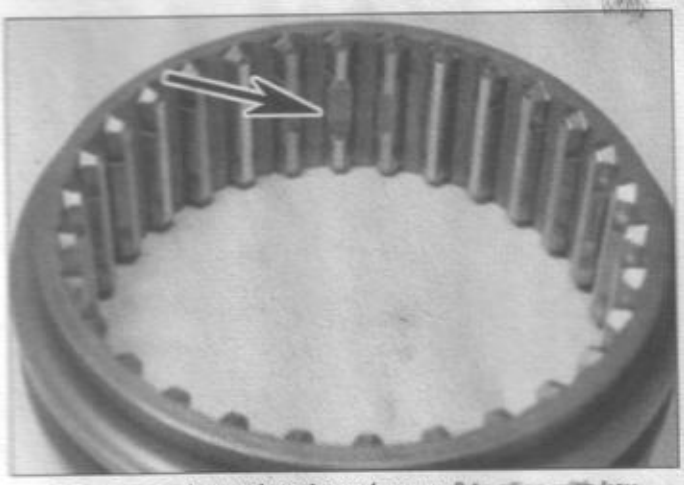
4 To dismantle the synchro unit, first mark the hub and sleeve in relation to each other, then press the hub out of the sleeve and remove the keys and springs.

5 Check the components then slide the sleeve onto the hub so that the marks are aligned. Note that the recesses in the inside of the sleeve must be aligned with the key grooves in the hub, and the dot on the sleeve applied during manufacture (where applicable) must face the same way as the

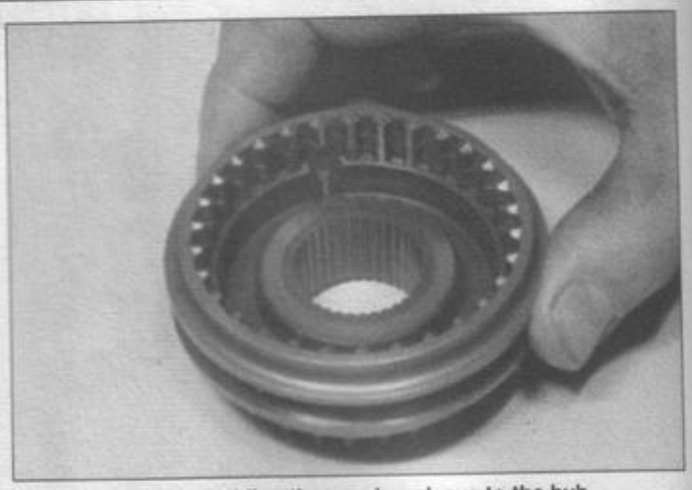
6.3a Checking the synchro rings for wear



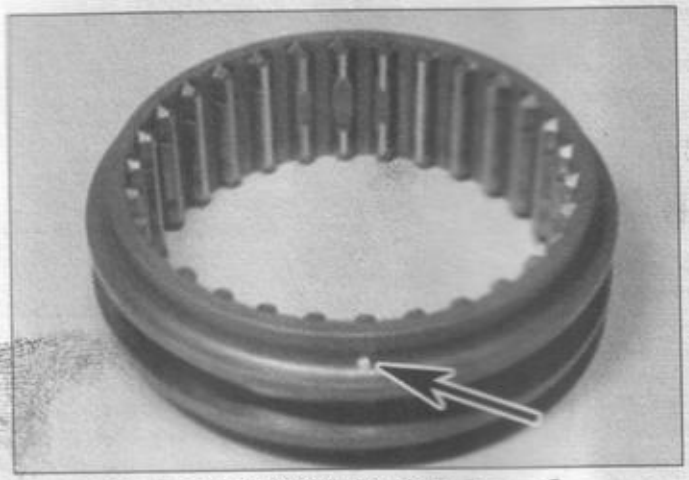
6.3b Synchro ring wear checking dimension (a)



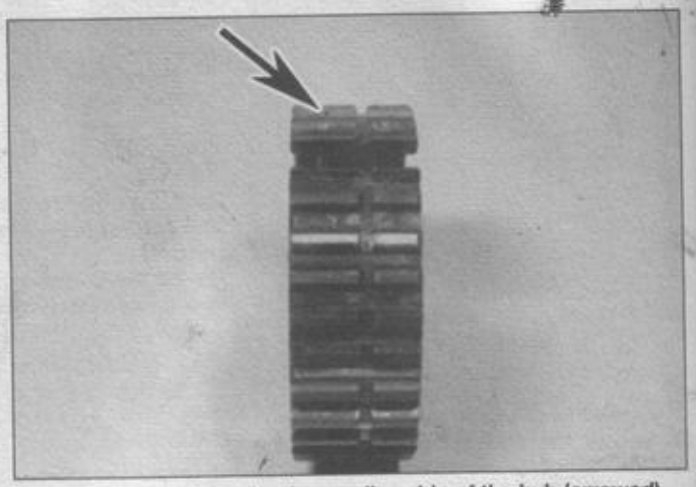
6.5a Recess in synchro sleeve (arrowed) to align with key



6.5b Assembling the synchro sleeve to the hub

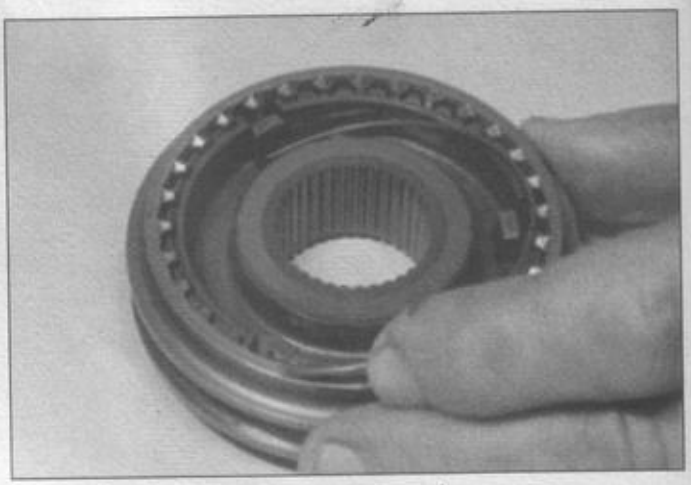


6.5c The dot on the synchro sleeve (arrowed) . . .

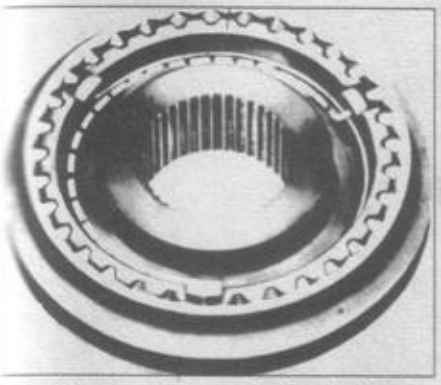


6.5d . . . must be on the long spline side of the hub (arrowed)

6.5e Insert the keys . . .



6.5f . . . and fit the springs



5.5g Synchro sleeve and hub unit showing correct fitting positions for keys and spring

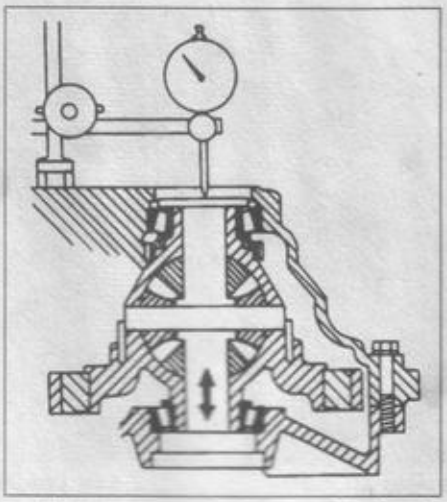
groove on the side of the hub. The groove is on the same side as the longer splines on the hub. Insert the keys and fit the springs with the angled ends located in the keys. Note that the springs point in opposite directions with the angled ends 120° apart **(see illustrations)**.

7 Differential unit (084 gearbox) - dismantling and reassembly

1 Overhaul of the differential unit should not be attempted as special instrumentation is required; including the use of thermo pencils to obtain extremely accurate temperatures. However, if the gearbox or clutch housings are renewed, the differential bearing preload must be adjusted, and this procedure is included in the following paragraphs for the renewal of the differential taper bearings.

2 Examine the taper bearing rollers and races for pitting and scoring, and if evident renew the bearings as follows. Note that the bearings and races are matched so the new bearings must be fitted with their corresponding races.

3 Using a puller, pull the inner races and rollers from each side of the differential.



7.10 Cross-section diagram showing method of checking differential bearing endfloat

4 Wipe clean the bearing surfaces on the differential then heat the new inner races and bearings in boiling water and immediately drive them onto the differential using a metal tube on the races only. Make sure that the narrow diameter of the rollers faces away from the differential.

5 Using a metal tube, drive the outer races from the clutch and gearbox housings after prising out the oil seals. Drive them out from the outside of the housings then remove the shims. Keep the shim from the gearbox housing. This shim is 1 mm (0.04 in) thick and must be fitted to the gearbox housing during assessment of the bearing preload and when refitting the bearing on final reassembly.

6 Clean the recesses in the housings. If necessary, the seal sleeve in the clutch housing can be removed by levering out with a suitable screwdriver, but take care not to damage the housing. Once removed, a new seal sleeve must be refitted and this can be pressed in using a suitable tube drift.

7 Fit the 1 mm (0.04 in) shim into the gearbox housing and drive the new outer bearing race into position whilst supporting the housing on a block of wood.

8 Similarly drive the new outer race into the clutch housing without a shim.

9 Locate the differential in the gearbox housing then clean the mating faces and fit the clutch housing (together with a new gasket if applicable). Insert the bolts and tighten them to the specified torque in diagonal sequence.

10 Attach a dial gauge to the gearbox and, without turning the differential, measure the endfloat by pushing the differential in and out - dimension A **(see illustration)**.

11 The bearing preload is 0.30 mm (0.0118 in) - dimension B. Add dimension A to dimension B to obtain the thickness of the shim to fit in the clutch housing.

Example

Dimension A	1.50 mm (0.0591 in)
Dimension B	0.30 mm (0.0118 in)
Shim thickness	1.80 mm (0.0709 in)

12 Remove the clutch housing, drive out the outer race, then fit the correct shim and drive in the outer race.

13 Allow any water to dry from the taper roller bearings before the gearbox is reassembled, and fit new oil seals as described in Section 3.

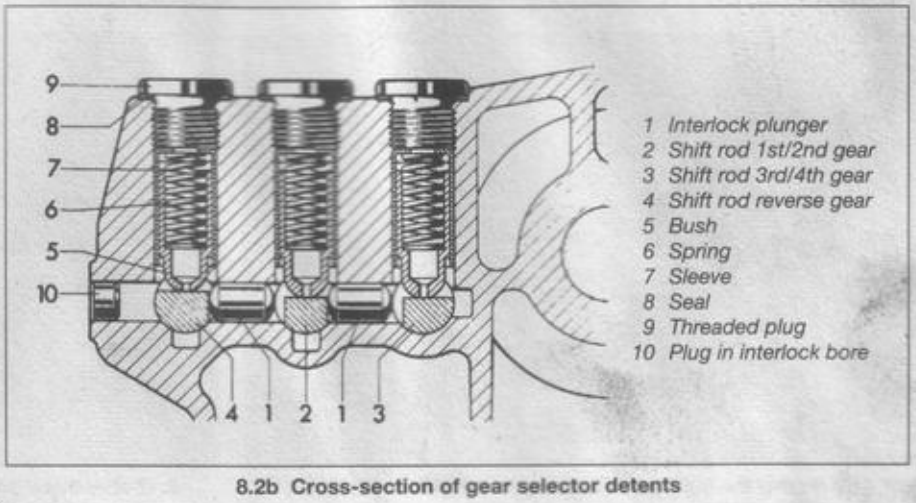
8 Reassembly - 084 gearbox

Note: *Make sure that all components are clean and, during reassembly, lubricate all bearings and bearing surfaces with gear oil.*

1 Using a metal tube, drive the output shaft bearing into the gearbox housing with the closed side of the bearing facing in the gearbox.

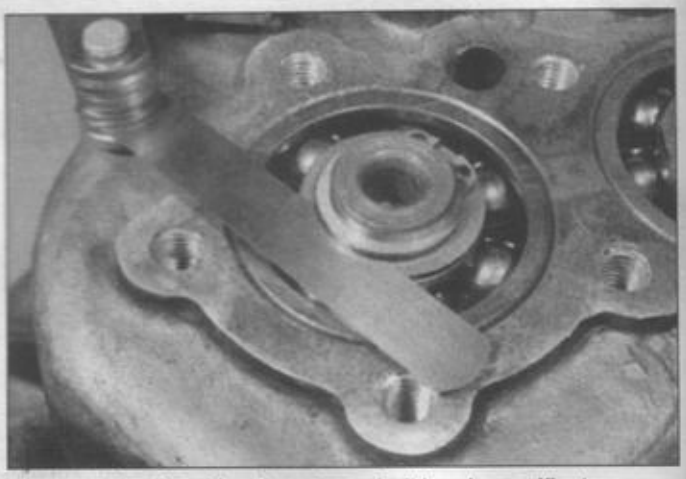
2 Grease the interlock plungers and locate them in the housing - use a pen magnet if necessary **(see illustrations)**.

8.2a Using a pen magnet to insert the interlock plungers

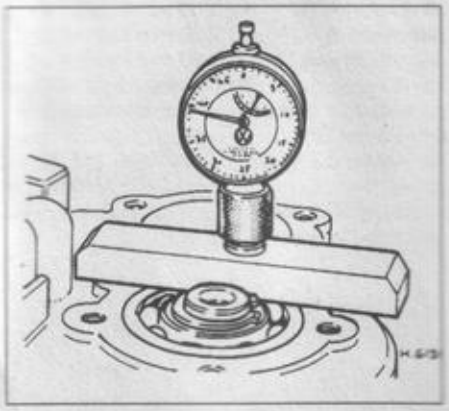


8.2b Cross-section of gear selector detents

8.3 Use a large nut to hold the selector relay shaft against the spring tension



8.8a Checking the output shaft bearing endfloat



8.8b Using a dial gauge to determine the bearing preload shim thickness

3 Using a large nut or piece of wire, retain the selector relay shaft against the spring tension **(see illustration)**.

4 Locate the 1st/2nd selector rod and fork in the groove of the synchro unit on the output shaft.

5 Locate the reverse gear on its shaft, but retain it in a slightly raised position with a piece of wire.

6 Lower the output shaft and selector rod into the gearbox housing and at the same time feed the reverse gear in after the 1st gear.

7 With the output shaft entered fully in its bearing, check that the selector rod is in neutral and the reverse gear is free to move.

8 If a new gearbox housing, bearing or output shaft has been fitted, determine and fit the bearing preload shims as follows. Fit the circlip and using a feeler gauge determine the clearance between the circlip and bearing inner race **(see illustration)**. Select a small shim to set the clearance to between 0 and 0.05 mm (0 and 0.002 in) then fit the shim beneath the circlip. Using a dial gauge, or straight-edge and feeler gauge, determine the clearance between the housing face (without gasket) and bearing outer race **(see illustration)**. Add 0.27 to 0.31 mm (0.011 to 0.012 in) to the clearance for the thickness of the large shim to fit against the outer race. When assessing the large shim requirement, ensure that the bearing is fully seated in its housing and, if a dial gauge is used, it should be zeroed with a 2 mm (0.079 in) preload.

9 Locate the 3rd/4th selector rod and fork in the groove of the synchro unit on the input shaft.

10 Lower the input shaft and selector rod into the gearbox housing and mesh the gears with those on the output shaft. Lift the reverse gear slightly to allow the input shaft 1st gear to pass.

11 Support the output shaft using the plate described in Section 2 then remove the wire from the reverse gear.

12 Using a metal tube, drive the input shaft bearing into the gearbox housing and onto the shaft. The closed side of the bearing must face into the gearbox **(see illustration)**.

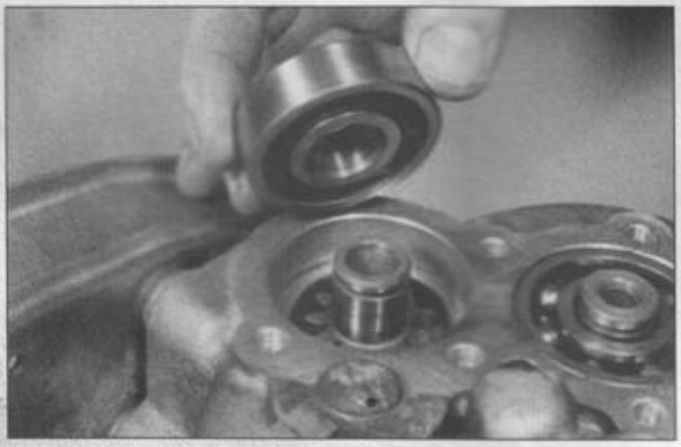
13 Refer to paragraph 8, and if necessary determine and fit the small and large shims to the end of the input shaft.

14 Remove the input shaft support plate.

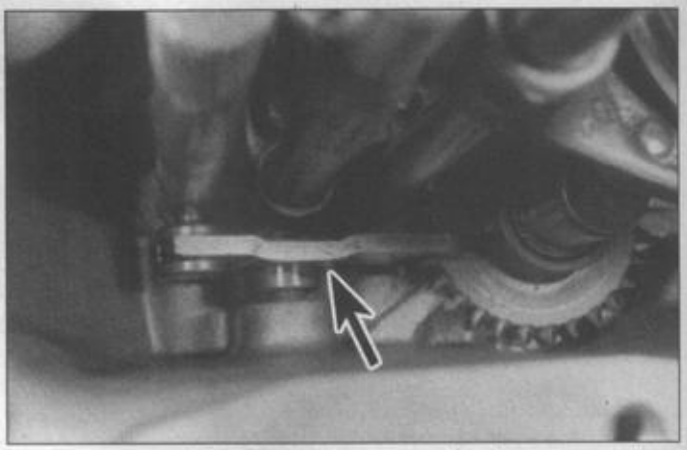
15 Remove the nut or wire from the selector relay shaft.

16 Locate the relay lever on the reverse selector rod then lower them into the housing and engage the lever with the reverse gear. It will be necessary to lift the gears slightly.

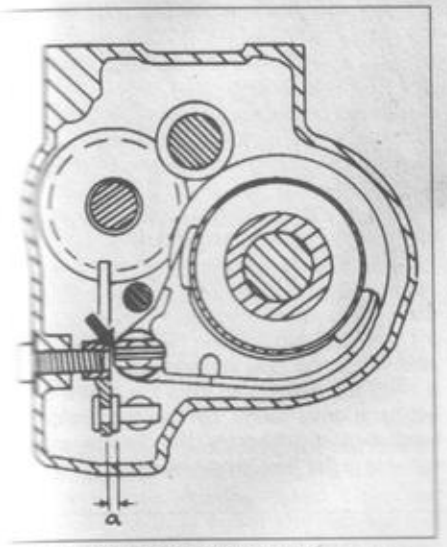
17 Position the relay lever approximately 2.0 mm (0.08 in) away from the 1st/2nd selector rod. Make sure that the roll pin on the selector rod is flush with the fork **(see illustration)**.



8.12 Fitting the input shaft bearing to the gearbox housing

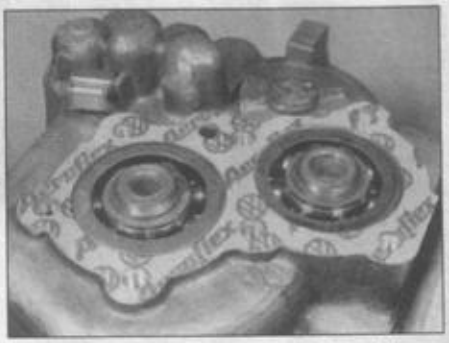


8.17 The fitted position of the reverse relay lever - arrowed



8.18 **Showing clearance between the reverse relay lever and the 1st/2nd selector rod - arrow shows roll pin flush**

a = 1.3 to 2.8 mm (0.051 to 0.110 in)



8.21a **Bearing end cover gasket and large shims located on the bearings**

18 Screw in the cross-head bolt and washer, and tighten it to the specified torque. Check that the clearance between the relay lever and selector rod is 1.3 to 2.8 mm (0.051 to 0.110 in) **(see illustration)**.

19 Insert the detent plungers, springs and sleeves in the housing apertures followed by the plugs and their washers. Tighten the plugs with an Allen key.

20 Move the relay shaft lever and check that each gear can be engaged easily. Also check that it is not possible to move two adjacent selector rods at the same time.

21 Locate the correct large shims on the input and output shaft bearings then fit the end cover, together with a new gasket **(see illustration)**. Apply a liquid locking agent to the bolt thread then insert the bolts and tighten them to the specified torque in diagonal sequence **(see illustrations)**.

22 Invert the gearbox and fit the differential unit into position in it **(see illustration)**.

23 Clean the mating faces of the gearbox and clutch housings. If applicable fit a new gasket, otherwise apply sealing compound to the faces.

24 Locate the magnetic swarf collector in the gearbox housing slot.

25 Check that the selector rods are in neutral, then lower the clutch housing onto the gearbox housing, making sure that the shift lever engages the relay shaft lever.

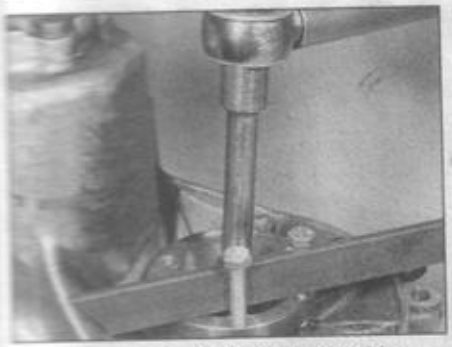
26 Tap in the dowels, then insert the bolts and tighten them evenly to the specified torque in diagonal sequence **(see illustration)**.

8.21b **Apply a liquid locking agent to the bolt threads . . .**

8.21c **. . . then insert and tighten the bolts**

8.22 **Differential located in the gearbox housing**

8.26 **Tightening the clutch housing-to-gearbox housing bolts**



8.27 Method of tightening the drive flange bolts

27 Insert the drive flanges into the differential, together with the taper ring, thrustwasher and spring. Insert the bolts and tighten them to the specified torque. Hold the flanges stationary with a bar between two bolts into adjacent holes **(see illustration)**. Note that the left and right flanges are different.

28 Insert and tighten the reversing light switch.

29 Refit the clutch release shaft and bearing.

30 Refill the gearbox with oil after fitting it to the engine.

9 Dismantling into major assemblies - 020, 4-speed gearbox

1 Proceed as described in paragraphs 1 and 2 of Section 2.

2 Prise free and remove the release shaft circlips.

3 Undo and remove the selector shaft peg bolt **(see illustration)**.

4 Remove the switch unit from the gearbox.

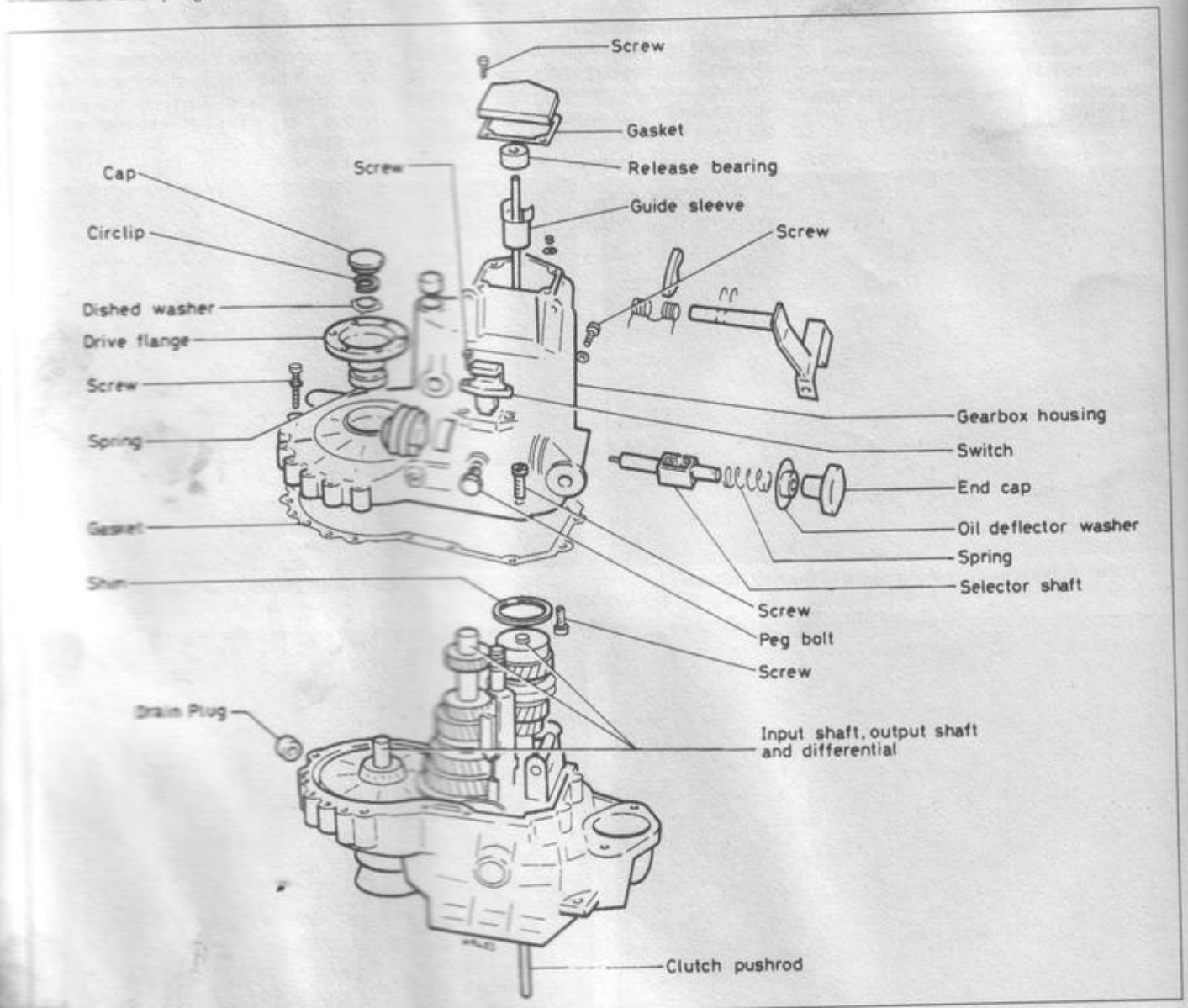
5 Remove the clutch release shaft, clutch lever, return spring and release bearing and guide sleeve.

6 Prise free the plugs then undo and remove the three nuts **(see illustration)**.

7 Using a spark plug spanner, unscrew and remove the selector shaft end cap. Engage neutral and pull out the selector shaft.

8 Undo and remove the reverse gear shaft retaining screw **(see illustration)**.

9 Prise the plastic cap from the centre of the left-hand drive flange, remove the circlip and washer and withdraw the flange with a suitable puller **(see illustrations)**.



9.3 Exploded view of the 020, 4-speed gearbox