Chapter 6 Manual gearbox

For modifications, and information applicable to later models, see Supplement at end of manual

Contents

Fault diagnosis – manual gearbox	14	Gearbox input shaft (A, B and C types) – dismantling and reassembly	6
Gearbox – removal and refitting (leaving engine in vehicle)	3	Gearbox input shaft (N type) – dismantling and reassembly	11
Gearbox (A, B and C types) – dismantling into major assemblies	4	Gearbox mainshaft (A, B and C types) – dismantling and reassembly	7
Gearbox (A, B and C types) – reassembly	8	Gearbox mainshaft (N type) – dismantling and reassembly	12
Gearbox (N type) – dismantlaing into major assemblies	9	General description	1
Gearbox (N type) – reassembly	13	Maintenance and inspection	2
Gearbox components (A, B and C types) – inspection	5		
Gearbox components (N type) – inspection	10		

Specifications

Type

Four forward speeds (A, B and C type gearboxes) or five forward speeds (N type gearbox) and reverse. Synchromesh on all forward speeds

Application

1.3 litre models	A1 and C types
1.6 litre models with Ford VV carburettor	A2, B, C and N types
1.6 litre models with Weber 2V carburettor	B, C and N types
1.8 litre models	B and N types
2.0 litre models	B and N types

Ratios

4-speed gearbox:

	A1	A2	B	C
1st	3.66:1	3.34:1	3.65:1	3.58:1
2nd	2.18:1	1.99:1	1.97:1	2.01:1
3rd	1.43:1	1.42:1	1.37:1	1.40:1
4th	1.00:1	1.00:1	1.00:1	1.00:1
Reverse	4.24:1	3.87:1	3.66:1	3.32:1

5-speed gearbox (N type):

	All models except P100	P100 models
1st	3.65:1	3.91:1
2nd	1.97:1	2.29:1
3rd	1.37:1	1.38:1
4th	1.00:1	1.00:1
5th	0.82:1	0.82:1
Reverse	3.66:1	3.66:1

Lubrication

Oil type/specification:	
4-speed gearbox	Gear oil, viscosity SAE 80EP, to Ford spec SQM-2C 9008-A (Duckhams Hypoid 80)
5-speed gearbox	Gear oil, viscosity SAE 80EP, to Ford spec ESD-M2C 175-A (Duckhams Hypoid 75W/90S)

Oil capacity

A1 and A2 types	0.98 litre (1.72 pints)
B type	1.46 litres (2.57 pints)
C type	1.25 litres (2.20 pints)
N type up to 1987	1.90 litres (3.34 pints)
N type from 1987	1.25 litres (2.20 pints)

Torque wrench settings

	Nm	lbf ft
Clutch housing-to-gearbox casing bolts	70 to 90	52 to 66
Clutch housing-to-engine bolts	40 to 50	30 to 37
Clutch release bearing guide sleeve bolts:		
All except C type	9 to 11	7 to 8
C type	21 to 25	15 to 18
Extension housing-to-gearbox casing bolts	45 to 49	33 to 36
Top cover bolts:		
All except C type	10 to 13	7 to 10
C type	21 to 25	15 to 18
Gearbox crossmember-to-underbody bolts	20 to 25	14 to 18
Gearbox crossmember-to-gearbox bolt	50 to 57	37 to 42
Reversing light switch	1 to 2	0.8 to 1.5
Oil filler/level plug	33 to 41	24 to 30
5th driving gear retaining nut (N type)	120 to 150	89 to 111
5th gear locking plate bolts (N type)	21 to 26	15 to 19
Gear lever-to-extension housing screws	21 to 26	15 to 19

1 General description

The manual gearbox may be of four or five-speed type, depending on model. Three different types of four-speed gearbox have been fitted to Sierra models, these being the A, B and C types. The A and B type gearboxes are similar, but all A type gearboxes have an integral clutch housing, whereas B type gearboxes may have either an integral or bolt-on clutch housing. The C type gearbox is substantially different to the A and B types, and procedures differ in detail. A five-speed N type gearbox is also available, with the fifth gear installed in the tailshaft housing of the gearbox on an extended gear cluster.

All gearboxes follow conventional rear-wheel-drive practice. Drive from the clutch is picked up by the input shaft, which runs in line with the mainshaft. The input shaft gear and mainshaft gears are in constant mesh with the countershaft gear cluster. Selection of gears is by sliding synchromesh hubs, which lock the appropriate mainshaft gear to the mainshaft.

Gear selection is by means of a floor-mounted lever which fits directly into the gearbox extension housing and operates the selector shaft. The selector shaft operates the selector forks which act on the synchroniser units.

When contemplating overhaul of a gearbox, due consideration should be given to the costs involved, since it is often more economical to obtain a service exchange or good secondhand gearbox rather than fit new parts to the existing unit.

2 Maintenance and inspection

1 Maintenance is limited to checking the oil level periodically, and checking for leaks if the level is low. Proceed as follows.

2 For improved access, jack up the vehicle and support on axle stands. Note that the vehicle must be level in order to carry out an accurate check.

3 If the transmission is hot due to the vehicle having been driven recently, allow it to cool for a few minutes. This is necessary because the oil can foam when hot, leading to a false level reading.

4 Wipe clean around the filler/level plug, which is located on the left-hand side of the gearbox. Unscrew the plug and remove it (photo).

5 Using a suitably marked piece of bent wire as a dipstick, check that the oil level is as follows, according to gearbox type:

Gearbox type	Oil level
All four-speed gearboxes	*0 to 5.0 mm (0 to 0.2 in) below lower edge of filler/level hole*
All five-speed gearboxes up to April 1984 (build code E6) except those subsequently fitted with a modified extension housing	*Level with bottom edge of filler/level hole*
All five-speed gearboxes from May 1984 (build code EC) to end of April 1985 (build code FP) and all vehicles built up to April 1984 (build code E6) subsequently fitted with a modified gearbox extension housing	*20.0 to 25.0 mm (0.79 to 0.99 in) below lower edge of filler/level hole*
All five-speed gearboxes from May 1985	*0 to 5.0 mm (0 to 0.2 in) below lower edge of filler/level hole*

Note that the vehicle build code appears as the twelfth and thirteenth characters of the VIN number on the plate in the engine compartment

6 Top up the level if necessary, using clean oil of the specified type. Do not overfill, as this can lead to leakage and difficult gear changing. Allow excess oil to drip out of the filler/level hole if necessary. Refit and tighten the filler/level plug on completion.

7 The frequent need for topping-up can only be due to leaks, which should be rectified. The most likely sources of leaks are the rear extension housing and input shaft oil seals. Oil seal renewal is described in Section 5 for all gearbox types.

8 No periodic oil changing is specified, and no drain plug is fitted.

3 Gearbox – removal and refitting (leaving engine in vehicle)

1 Removal of the engine and manual gearbox as an assembly is described in Chapter 1, Section 12.

2 Disconnect the battery negative lead.

3 Working in the engine compartment, unscrew and remove the four upper engine-to-gearbox bolts, noting the location of the earth lead.

4 Working inside the vehicle, unscrew the gear lever knob and remove the centre console as described in Chapter 12. Where a full length console is fitted, it is only necessary to remove the front tray.

5 Detach the outer gaiter from the retaining frame and withdraw it over the gear lever (photo).

6 Undo the securing screws on early models, or release the clips on later models, and remove the gaiter retaining frame and inner gaiter (photos).

7 Using a suitable Torx key, remove the screws securing the gear lever to the gearbox extension housing, and withdraw the gear lever. Note how the base of the gear lever locates over the selector shaft (photos).

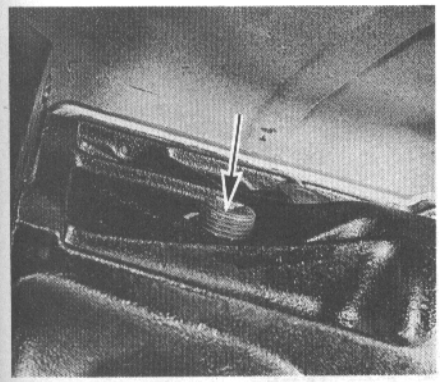
8 Jack up the vehicle and support on axle stands. Ensure that there is sufficient working room beneath the vehicle.

9 To improve access, disconnect the exhaust downpipe from the manifold and remove the exhaust system as described in Chapter 3.

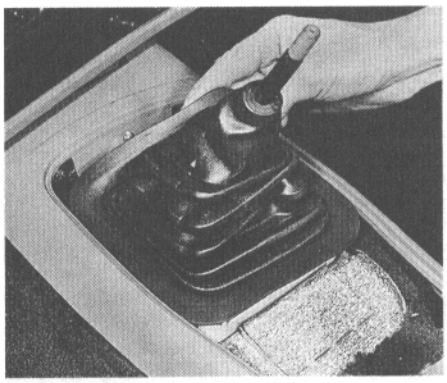
10 Remove the propeller shaft as described in Chapter 8.

11 Where applicable, bend back the locktabs, then unscrew the two bolts securing each of the two anti-roll bar U-clamps to the vehicle underbody. Lower the anti-roll bar as far as possible.

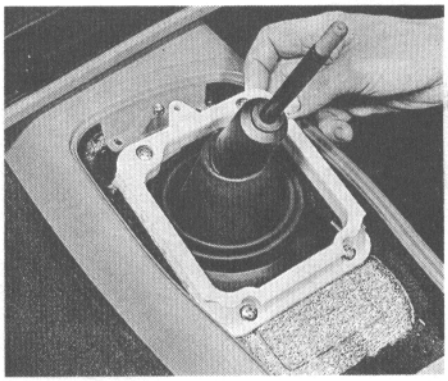
12 Disconnect the wiring from the starter motor and remove the starter motor with reference to Chapter 13 if necessary.



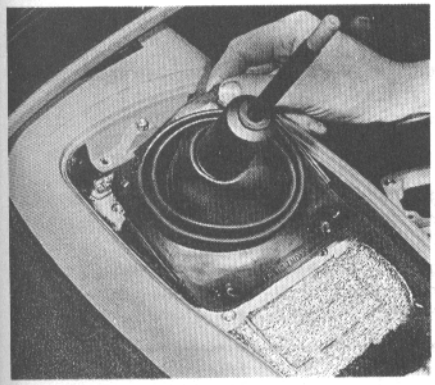
2.4 Gearbox filler/level plug location (arrowed) – N type gearbox



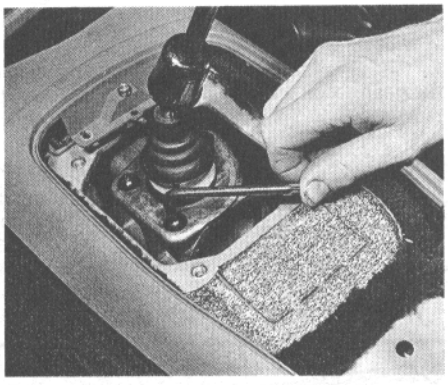
3.5 Detach the gear lever outer gaiter from the retaining frame



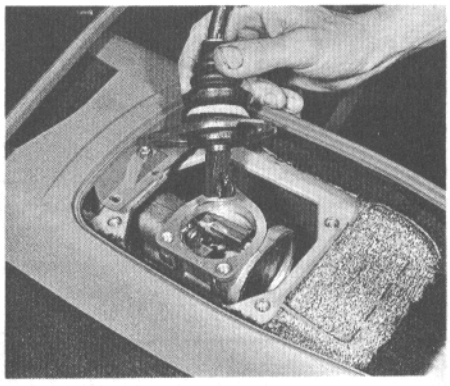
3.6A Remove the gaiter retaining frame ...



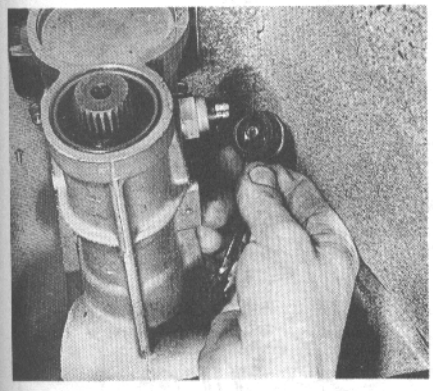
3.6B ... and the inner gaiter



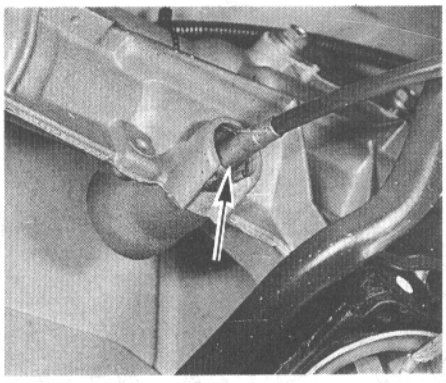
3.7A Remove the gear lever securing screws ...



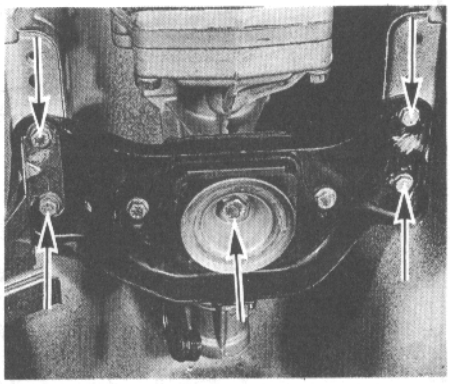
3.7B ... and withdraw the gear lever



3.13 Disconnect the wiring from the reversing lamp switch

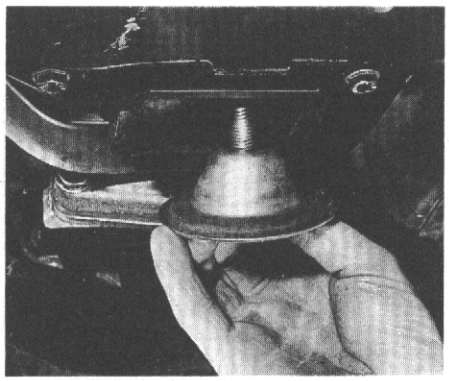


3.14 Remove the circlip (arrowed) and withdraw the speedometer cable – N type gearbox

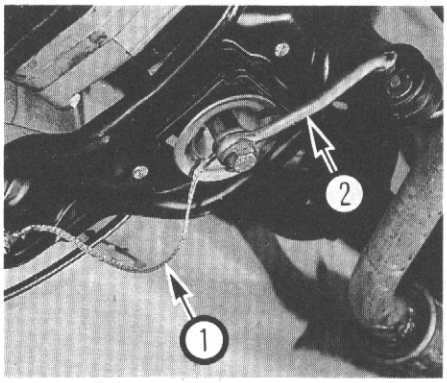


3.17A Unscrew the gearbox crossmember securing bolts (arrowed) ...

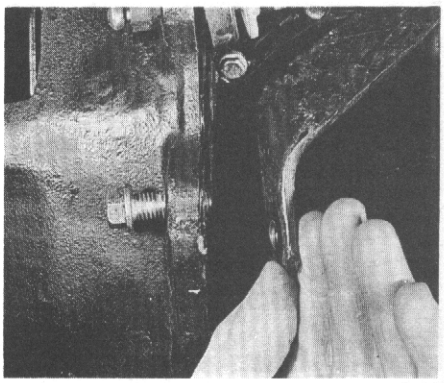
13 Disconnect the wiring from the reversing lamp switch (photo).
14 Remove the retaining circlip, and withdraw the speedometer cable from the gearbox extension housing (photo).
15 Disconnect the clutch cable from the release arm with reference to Chapter 5, Section 3.
16 Support the gearbox with a trolley jack, and an interposed block of wood to spread the load.
17 Unscrew the four bolts securing the gearbox crossmember to the vehicle underbody. Unscrew the central bolt securing the crossmember to the gearbox and remove the crossmember. Note the position of the earth strap, where applicable. Recover the mounting cup and where applicable the exhaust mounting bracket and heat shield (photos).
18 Unscrew and remove the remaining engine-to-gearbox bolts, noting the location of the engine/gearbox brace on the right-hand side of the gearbox on OHC models (photo).
19 With the help of an assistant, lift the gearbox from the engine, using the trolley jack to take the weight. Do not allow the weight of the gearbox to hang on the input shaft. It may be necessary to rock the transmission a little to release it from the engine.
20 With the gearbox removed, temporarily reconnect the anti-roll bar to the underbody if the vehicle is to be moved.
21 Refitting is a reversal of removal, taking note of the following points.
22 Before attempting to refit the gearbox, check that the clutch friction disc is centralised as described in Chapter 5, Section 7. This is necessary to ensure that the gearbox input shaft splines will pass through the splines in the centre of the friction disc.
23 Check that the clutch release arm and bearing are correctly fitted, and lightly grease the input shaft splines.
24 Check that the engine adapter plate is correctly positioned on its locating dowels.
25 Refit the propeller shaft as described in Chapter 8.



3.17B ... and recover the mounting cup



3.17C Gearbox crossmember earth strap (1) and exhaust mounting bracket (2) – 1.8 litre CVH model



3.18 Unscrew the engine/gearbox brace – OHC models

26 Refit the exhaust system as described in Chapter 3.
27 Reconnect the clutch cable to the release arm with reference to Chapter 5, Section 3.
28 On completion, check and if necessary top up the gearbox oil level as described in Section 2.

4 Gearbox (A, B and C types) – dismantling into major assemblies

1 Clean the exterior of the gearbox with paraffin and wipe dry.
2 Remove the clutch release bearing and arm with reference to Chapter 5.
3 Where applicable, unbolt the clutch housing from the front of the gearbox.
4 Working through the gear lever aperture, use a screwdriver or small drift to tap out the extension housing rear cover (photo).
5 Proceed as follows according to gearbox type.

A and B gearboxes

6 Unscrew the securing bolts and remove the top cover and gasket.
7 Invert the gearbox and allow the oil to drain, then turn it upright again.
8 Using a screwdriver, unscrew the selector locking mechanism plug, then extract the spring and locking pin. A pen magnet can be used to assist removal of the spring and locking pin (photo).

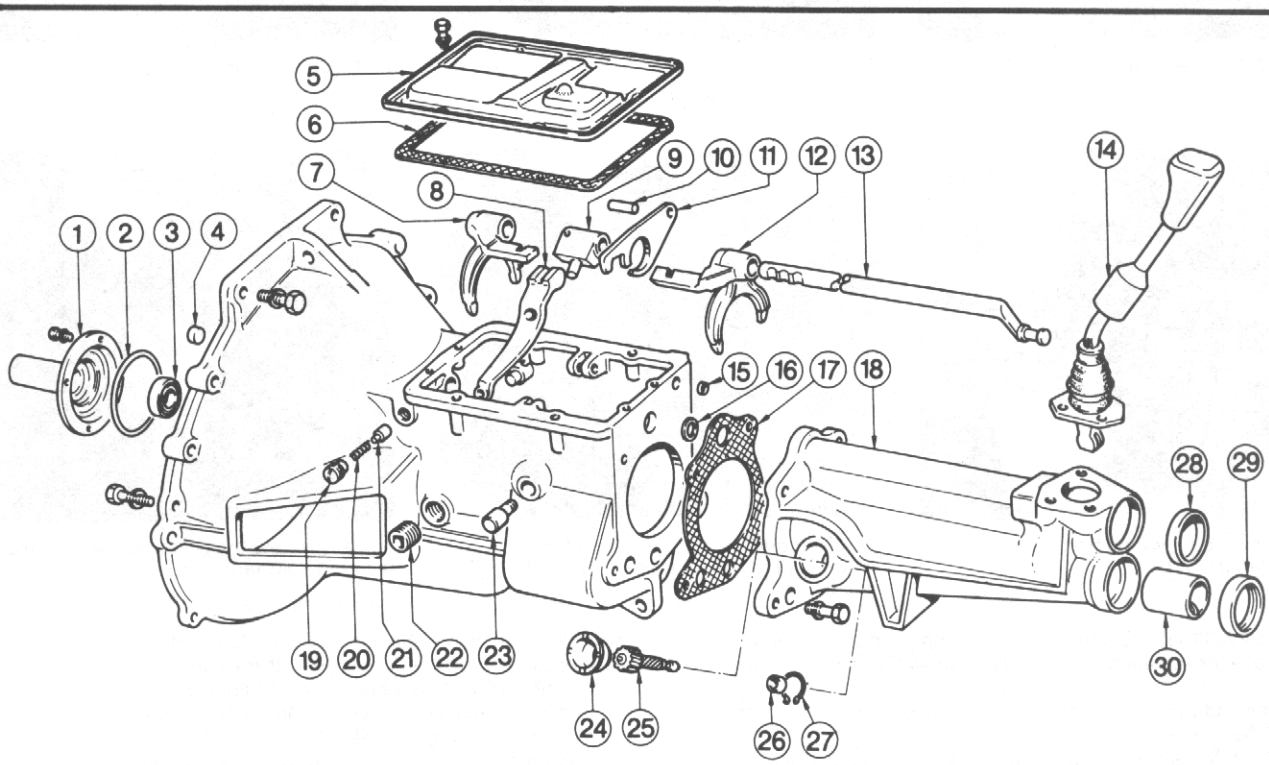


Fig 6.1 Exploded view of A and B type gearbox housings and selector mechanism (Sec 4)

1 *Guide sleeve*
2 *O-ring*
3 *Oil seal*
4 *Plug*
5 *Cover*
6 *Gasket*
7 *3rd/4th gear selector fork*
8 *Reverse gear relay lever*
9 *Selector boss*
10 *Roll pin*
11 *Selector locking plate*
12 *1st/2nd gear selector fork*
13 *Selector shaft*
14 *Gear lever assembly*
15 *Plug*
16 *Oil seal*
17 *Gasket*
18 *Extension housing*
19 *Threaded plug*
20 *Spring*
21 *Locking pin*
22 *Oil filler plug*
23 *Plug*
24 *Cap*
25 *Speedometer drive pinion*
26 *Oil seal*
27 *Circlip*
28 *Cover*
29 *Oil seal*
30 *Bush*

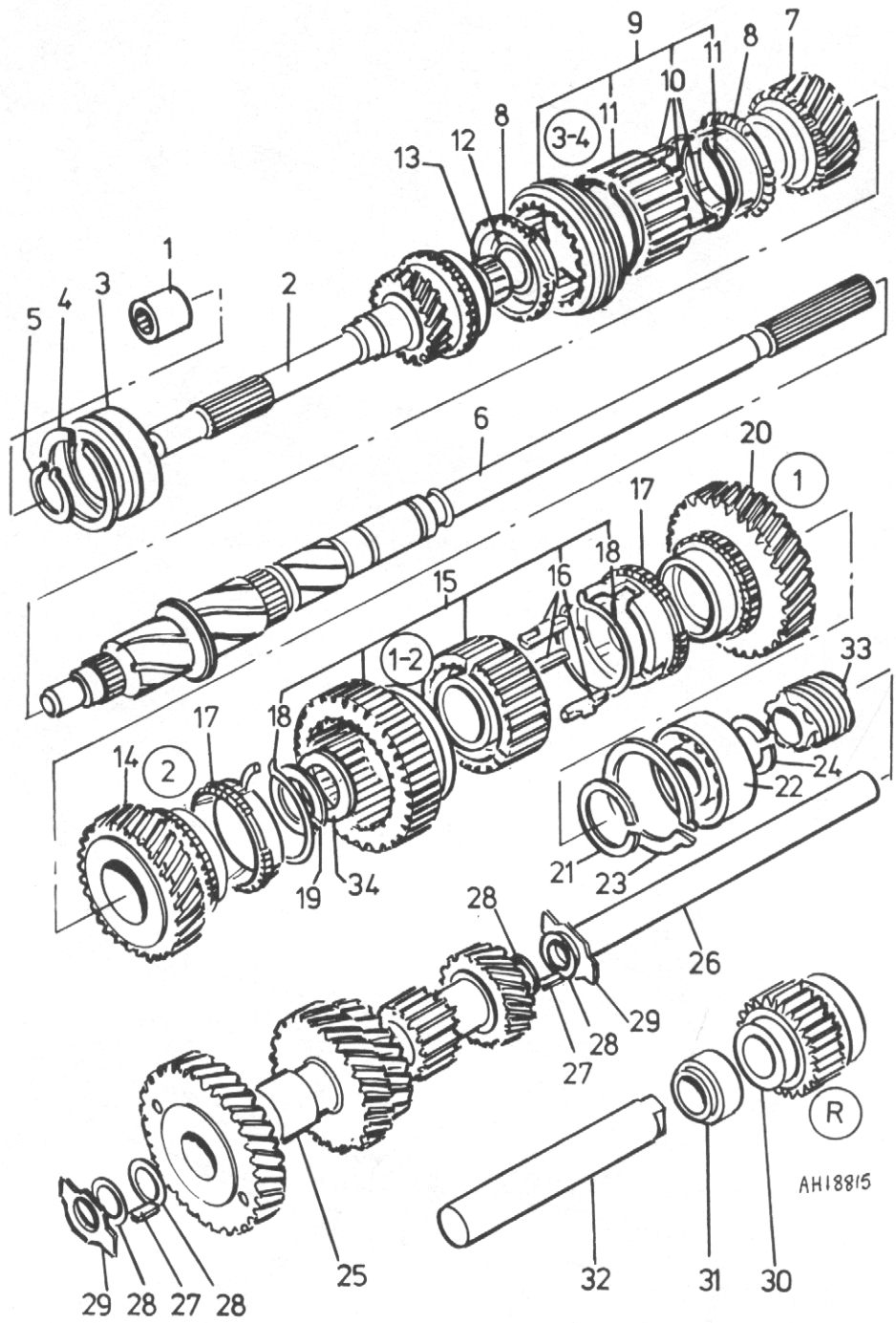


Fig 6.2 Exploded view of A type gearbox gear assemblies (Sec 4)

1 *Spigot bearing*
2 *Input shaft*
3 *Bearing*
4 *Large circlip*
5 *Small circlip*
6 *Mainshaft*
7 *3rd gear*
8 *3rd and 4th gear synchroniser rings*
9 *3rd/4th gear synchroniser unit*
10 *Blocker bars*
11 *Blocker bar springs*
12 *Circlip*
13 *Needle roller bearing*
14 *2nd gear*
15 *1st/2nd gear synchroniser unit*
16 *Blocker bars*
17 *1st and 2nd gear synchroniser rings*
18 *Blocker bar springs*
19 *Circlip*
20 *1st gear*
21 *Circlip*
22 *Mainshaft bearing*
23 *Circlip*
24 *Circlip*
25 *Countershaft gear cluster*
26 *Countershaft*
27 *Needle rollers*
28 *Spacers*
29 *Thrustplates*
30 *Reverse idler gear*
31 *Spacer*
32 *Reverse idler shaft*
33 *Speedometer drivegear*
34 *Thrustwasher*

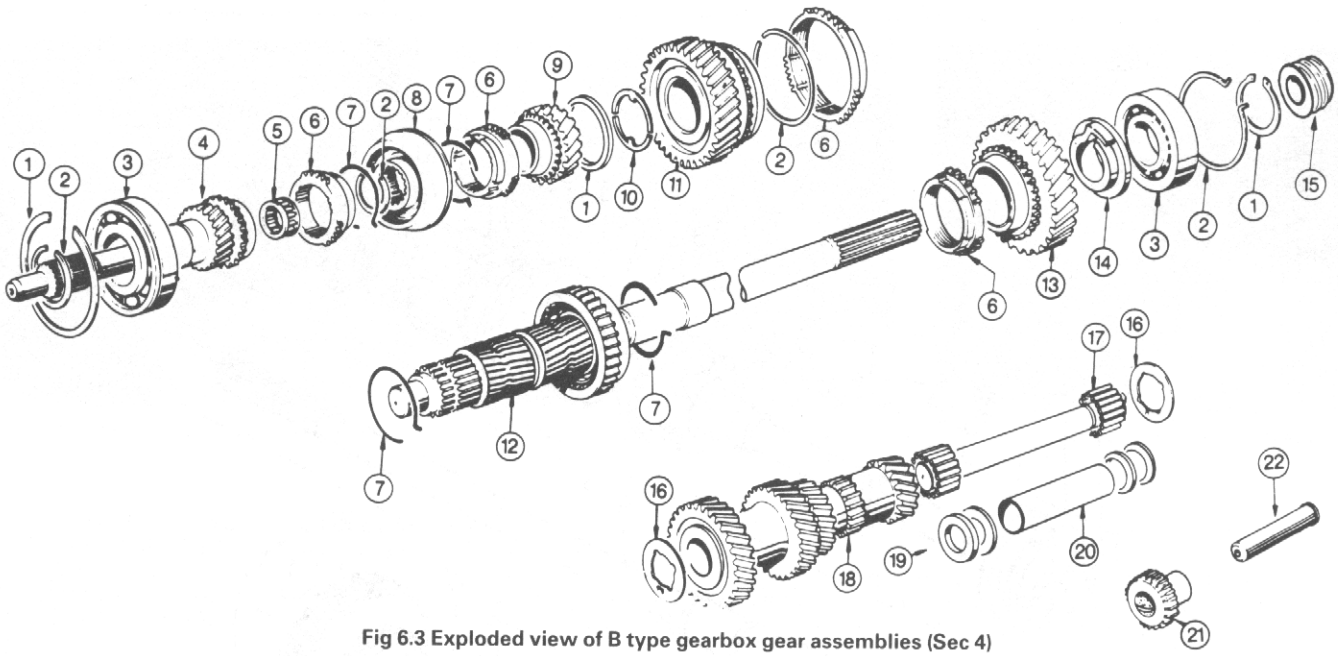


Fig 6.3 Exploded view of B type gearbox gear assemblies (Sec 4)

1 *Circlip*
2 *Circlip*
3 *Grooved ball bearing*
4 *Input shaft*
5 *Needle roller bearing*
6 *Synchroniser rings*
7 *Blocker bar springs*
8 *Synchroniser hub*
9 *3rd gear*
10 *Thrust half washers*
11 *2nd gear*
12 *Mainshaft with synchroniser unit*
13 *1st gear*
14 *Oil scoop ring*
15 *Speedometer drivegear*
16 *Thrustwasher*
17 *Needle rollers*
18 *Countershaft gear cluster*
19 *Spacers*
20 *Spacer tube*
21 *Reverse gear idler*
22 *Idler shaft*

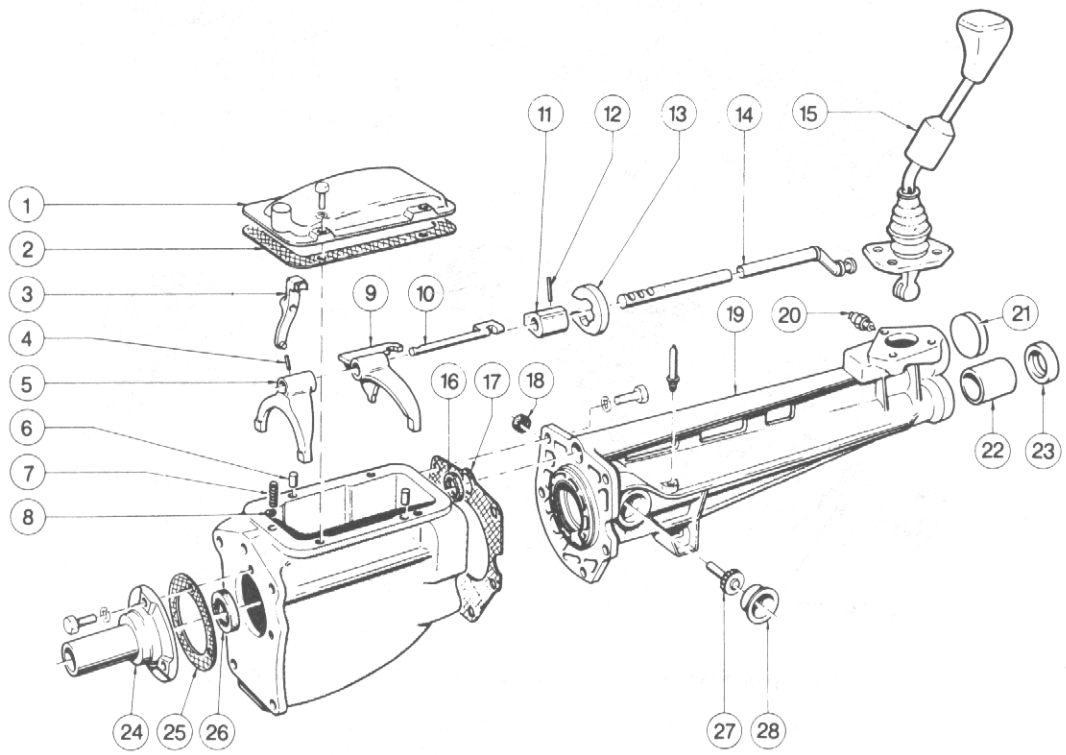
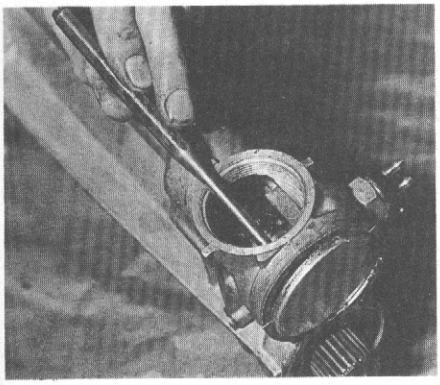
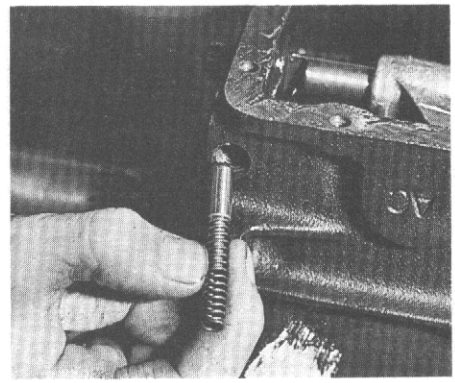


Fig 6.4 Exploded view of C type gearbox housings and selector mechanism (Sec 4)

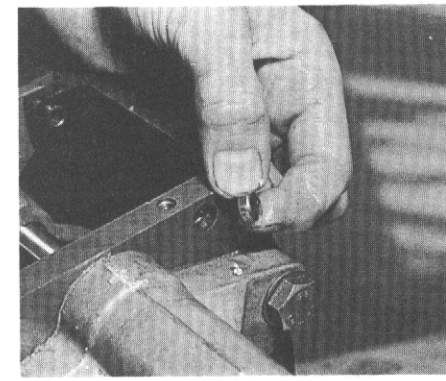
1 *Cover*
2 *Gasket*
3 *Reverse gear relay lever*
4 *Roll pin*
5 *3rd/4th gear selector fork*
6 *Centring pin*
7 *Spring*
8 *Locking ball*
9 *1st/2nd gear selector fork*
10 *Selector fork connecting shaft*
11 *Selector boss*
12 *Roll pin*
13 *Selector locking plate*
14 *Selector shaft*
15 *Gear lever assembly*
16 *Oil seal*
17 *Gasket*
18 *Oil seal*
19 *Extension housing*
20 *Reversing light switch*
21 *Cover*
22 *Bush*
23 *Oil seal*
24 *Guide sleeve*
25 *Gasket*
26 *Oil seal*
27 *Speedometer drive pinion*
28 *Cover*



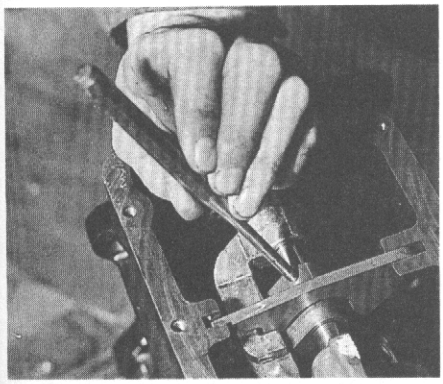
4.4 Tap out the extension housing rear cover



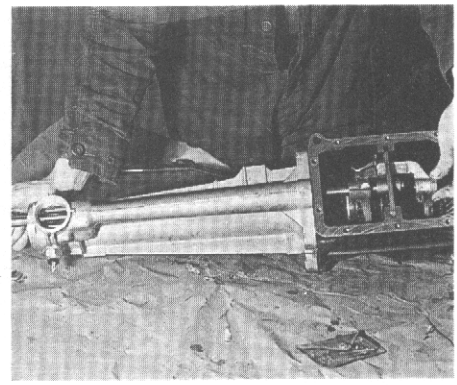
4.8 Extract the selector locking pin and spring



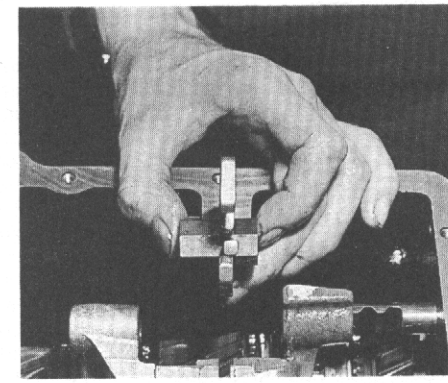
4.9 Extract the blanking plug from the rear of the gearbox casing



4.10A Drive the roll pin from the selector boss ...



4.10B ... and withdraw the selector shaft



4.11A Withdraw the selector locking plate and selector boss ...

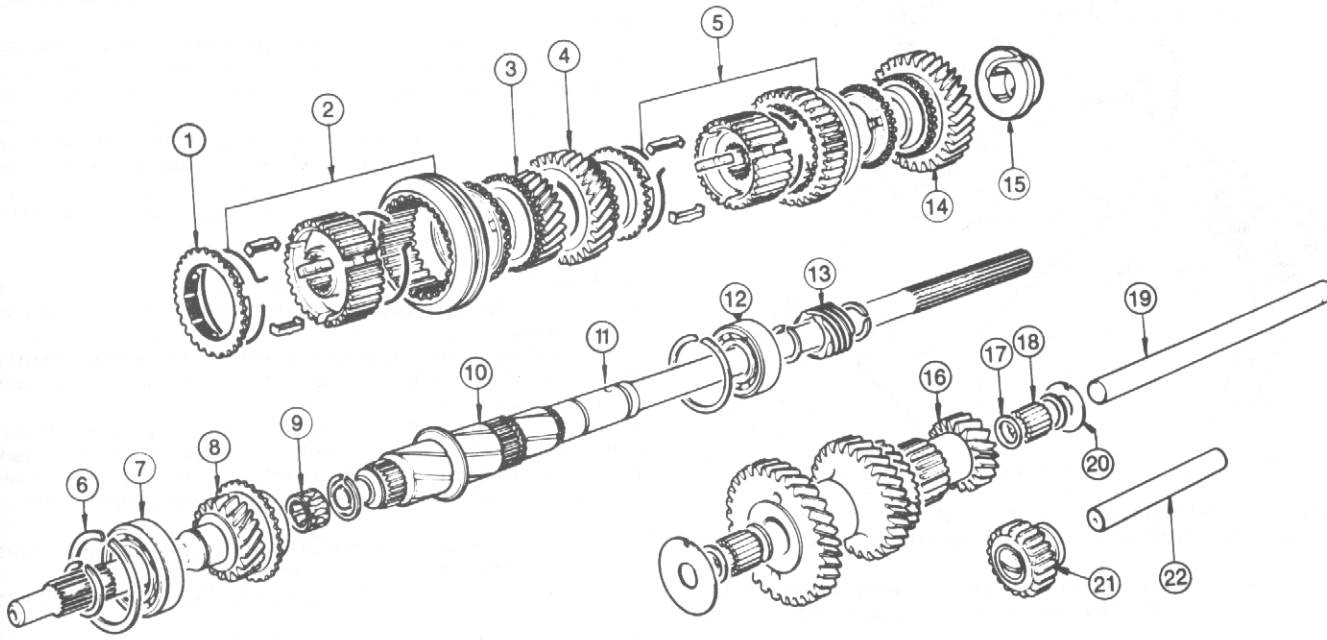
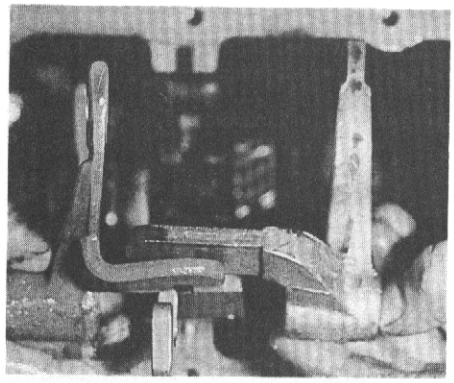
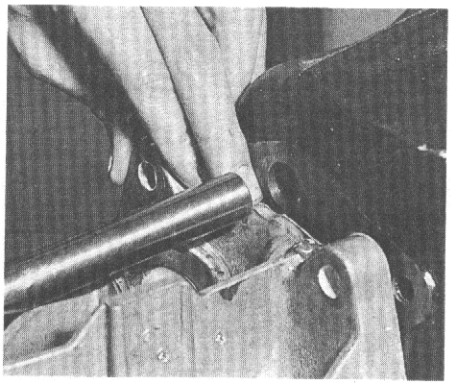


Fig 6.5 Exploded view of C type gearbox gear assemblies (Sec 4)

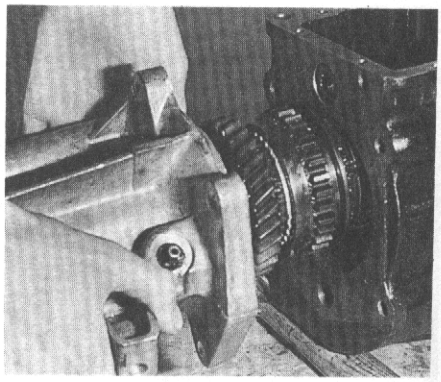
1 *Synchroniser ring*
2 *3rd/4th gear synchroniser unit*
3 *3rd gear*
4 *2nd gear*
5 *1st/2nd gear synchroniser unit*
6 *Circlip*
7 *Ball bearing*
8 *Input shaft*
9 *Needle roller bearing*
10 *Mainshaft*
11 *Locking ball*
12 *Ball bearing*
13 *Speedometer drivegear*
14 *1st gear*
15 *Oil scoop ring*
16 *Countershaft gear cluster*
17 *Spacer*
18 *Needle rollers*
19 *Countershaft*
20 *Thrustwasher*
21 *Reverse idler gear*
22 *Idler shaft*



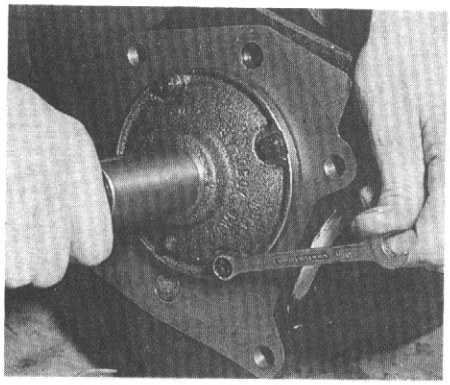
4.11B ... and the selector forks



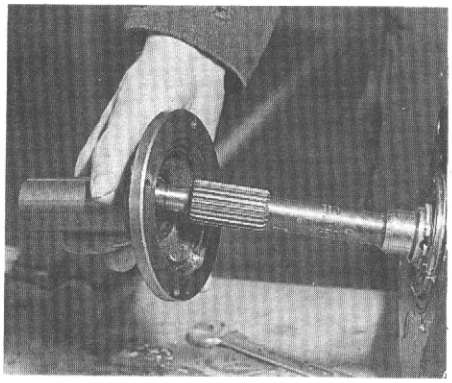
4.23 Remove the countershaft from the rear of the main casing



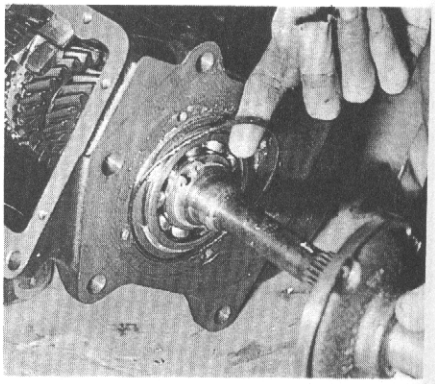
4.25 Withdraw the extension housing and mainshaft



4.27A Unscrew the bolts ...



4.27B ... and withdraw the clutch release bearing guide sleeve ...



4.27C ... and O-ring – B type gearbox

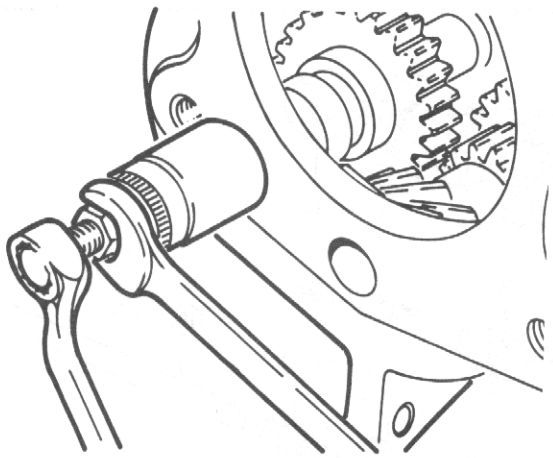


Fig 6.6 Method of removing the reverse gear idler shaft (Sec 4)

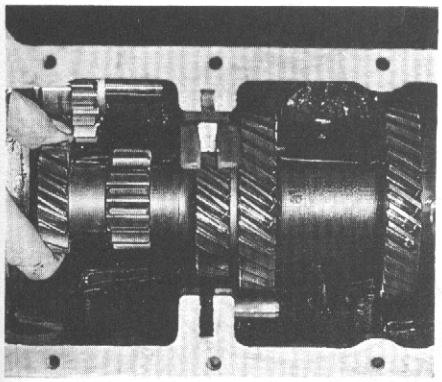
9 Extract the blanking plug from the rear of the gearbox casing and using a suitable drift through the hole, drive out the selector locking plate roll pin (photo).
10 Drive the roll pin from the selector boss then withdraw the selector shaft through the selector forks and out of the rear extension housing (photos).
11 Note the location of the components, then withdraw the selector locking plate and selector boss, and selector forks (photos).
12 Proceed to paragraph 21.

C type gearbox

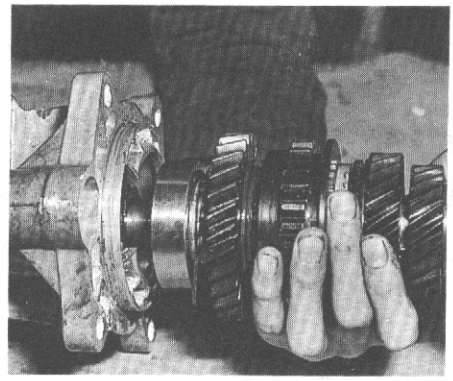
13 Unscrew the bolts and remove the top cover and gasket, taking care not to lose the selector locking spring located in the front of the cover.
14 Extract the selector locking ball with a pen magnet or greased screwdriver.
15 Invert the gearbox and allow the oil to drain, then turn it upright again.
16 Using a suitable drift, drive the roll pin from the selector boss, but first move the selector shaft forward to prevent damage to 1st gear.
17 Withdraw the selector shaft from the rear extension housing, and remove the selector boss and locking plate.
18 Engage 2nd gear and press the reverse gear relay lever to the rear.
19 Note the location of the selector forks, then remove them together with the connecting shaft.
20 Drive out the roll pin and remove the forks from the connecting shaft.

All gearbox types

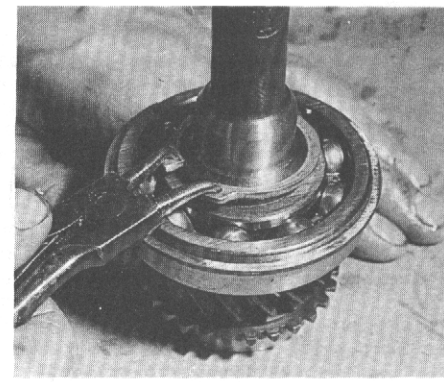
21 Unscrew the bolts securing the extension housing to the main gearbox casing.
22 Release the extension housing complete with mainshaft from the main casing, then turn the extension housing so that the cut-away reveals the countershaft.
23 Invert the gearbox and use a soft metal drift to tap the countershaft rearwards until it can be removed from the rear of the main casing (photo). Take care not to lose the needle roller bearings and spacers from inside the gear cluster, and the thrust washers at each end of the gear cluster.
24 Turn the gearbox upright and allow the countershaft gear cluster to move to the bottom of the main casing.
25 Withdraw the extension housing complete with mainshaft from the main casing (photo).
26 Remove the input shaft needle roller bearing from the end of the mainshaft or from the centre of the input shaft.
27 Unscrew the bolts and withdraw the clutch release bearing guide sleeve from the front of the main casing. Note that the cut-out on the sleeve faces to the bottom of the casing. Remove the O-ring (A and B type gearboxes) or gasket (type C gearbox) (photos).
28 Using a soft metal drift drive the input shaft and bearing from the casing. On A and B type gearboxes, drive the shaft forwards using the drift inside the casing. On the C type gearbox, extract the large circlip, then drive the assembly rearwards using the drift on the bearing outer race.



4.29 Remove the countershaft gear cluster



4.33 Withdraw the mainshaft from the extension housing



6.1 Extract the small circlip from the input shaft

29 Remove the countershaft gear cluster together with the thrust washers, keeping them identified for location (photo). Take care not to lose the needle roller bearings and spacers from inside the gear cluster.
30 Screw a suitable bolt into the end of the reverse gear idler shaft, and using a nut, washer and socket, pull out the idler shaft. Note the fitted position of the reverse idler gear, then remove it.
31 Extract the circlip, where applicable, and withdraw the reverse relay lever from the pivot pin. On the B type gearbox, also disengage the return spring.
32 Prise out the speedometer drivegear cover from the extension housing and withdraw the drive pinion.
33 Squeeze the ends of the mainshaft bearing circlip together and extract it from the extension housing. Using a soft-faced mallet, drive the mainshaft from the extension housing (photo).

5 Gearbox components (A, B and C types) – inspection

1 Thoroughly clean the interior of the gearbox, and check for dropped needle rollers and roll pins.
2 Carefully clean and then examine all the component parts for general wear, distortion, slackness of fit, and damage to machined faces and threads.
3 Examine the gears for excessive wear and chipping of the teeth. Renew them as necessary.
4 Examine the countershaft for signs of wear, where the needle rollers bear. If a small ridge can be felt at either end of the shaft, it will be necessary to renew it. Renew the thrustwashers at each end.
5 The four synchroniser rings should be renewed as a matter of course.
6 The needle roller bearing and cage, located between the nose of the mainshaft and the annulus in the rear of the input shaft, is also liable to wear, and should be renewed as a matter of course.
7 Examine the condition of the two ball bearing assemblies, one on the input shaft and one on the mainshaft. Check them for noisy operation, looseness between the inner and outer races, and for general wear. Normally they should be renewed on a gearbox that is being rebuilt.
8 If either of the synchroniser units is worn it will be necessary to buy a complete assembly, as the parts are not sold individually. Also check the blocker bars for wear.
9 Examine the ends of the selector forks where they rub against the channels in the periphery of the synchroniser units. If possible compare the selector forks with new units to help determine the wear that has occurred. Renew them if worn.
10 If the bearing bush in the extension housing is badly worn it is best to take the extension housing to your local Ford dealer to have the bearing pulled out and a new one fitted.
11 The oil seals in the extension housing and clutch release bearing guide sleeve should be renewed as a matter of course. Drive out the old seal with the aid of a drift or screwdriver. It will be found that the seal comes out quite easily. With a piece of wood or suitably sized tube to spread the load evenly, carefully tap a new seal into place, ensuring that it enters the bore squarely.

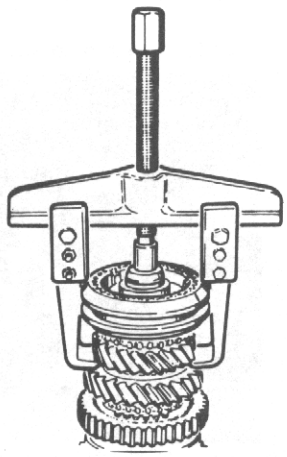


Fig 6.7 Using a two-legged puller to remove the 3rd gear and 3rd/4th gear synchroniser unit from the mainshaft (Sec 7)

6 Gearbox input shaft (A, B and C types) – dismantling and reassembly

1 Extract the small circlip from the input shaft (photo).
2 Locate the bearing outer track on top of an open vice, then using a soft-faced mallet, drive the input shaft down through the bearing.
3 Remove the bearing from the input shaft, noting that the circlip groove in the outer track is towards the front splined end of the shaft.
4 Place the input shaft on a block of wood and lightly grease the bearing location shoulder.
5 Locate the new bearing on the input shaft with the circlip groove facing the correct way, then using a metal tube on the inner track, drive the bearing fully home.
6 Refit the small circlip.

7 Gearbox mainshaft (A, B and C types) – dismantling and reassembly

Note: *A suitable puller will be required to pull the gears from the mainshaft*
1 Remove the 4th gear synchroniser ring from the 3rd/4th gear synchroniser unit.
2 Extract the circlip and slide the 3rd/4th gear synchroniser unit together with the 3rd gear from the front of the mainshaft, using a two-legged puller if necessary. Remove the 3rd gear synchroniser ring (photos).
3 Proceed as follows according to gearbox type.

A type gearbox

4 Extract the circlip retaining the mainshaft bearing, then using a suitable puller, remove the 1st gear complete with the mainshaft bearing and speedometer drivegear. Alternatively, support the 1st gear and press the mainshaft downwards.
5 Remove the 1st gear synchroniser ring from the 1st/2nd gear synchroniser unit.

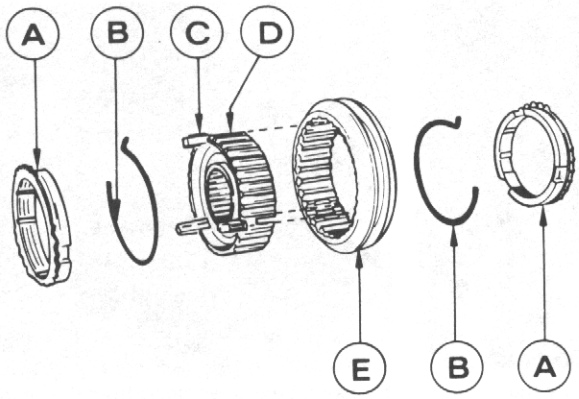


Fig 6.8 Exploded view of a synchroniser unit (Sec 7)

A Synchroniser ring
B Blocker bar springs
C Blocker bars
D Hub
E Sleeve

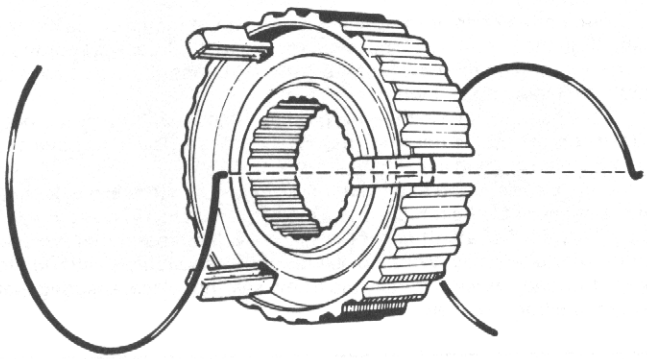


Fig 6.10 Correct orientation of synchroniser blocker bar springs (Sec 7)

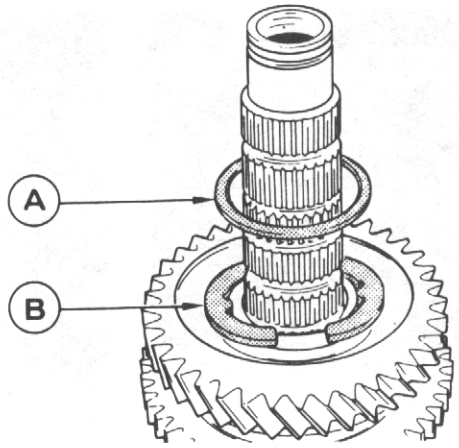


Fig 6.9 Thrustwasher retaining circlip (A) and thrustwasher halves (B) – B type gearbox (Sec 7)

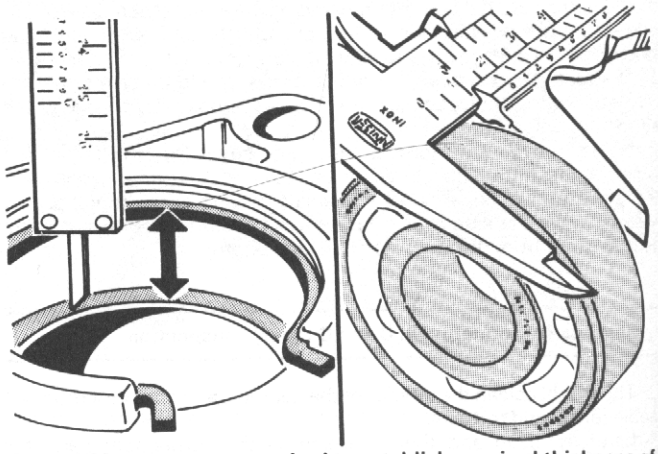
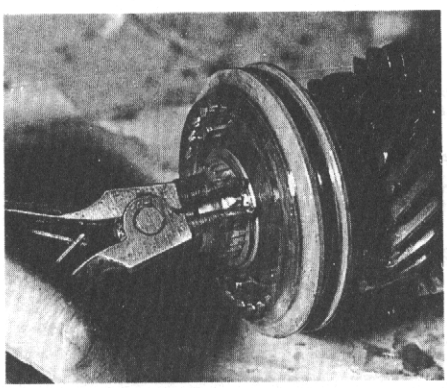


Fig 6.11 Measurements required to establish required thickness of mainshaft bearing retaining circlip (Sec 7)

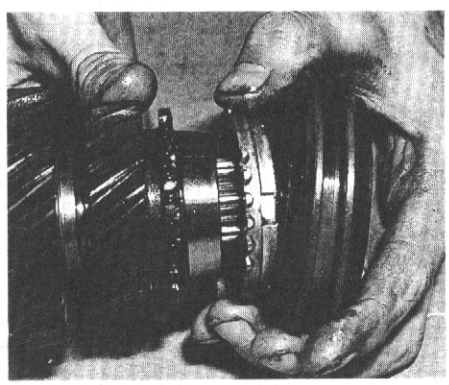
6 Extract the circlip and pull off the 1st/2nd gear synchroniser unit together with 2nd gear using a suitable puller.
7 Separate the 2nd gear from the 1st/2nd gear synchroniser unit and remove the 2nd gear synchroniser ring.
8 If necessary the synchroniser units may be dismantled, but first mark each hub and sleeve in relation to each other. Slide the sleeve from the hub and remove the blocker bars and springs.
9 Proceed to paragraph 23.

B type gearbox

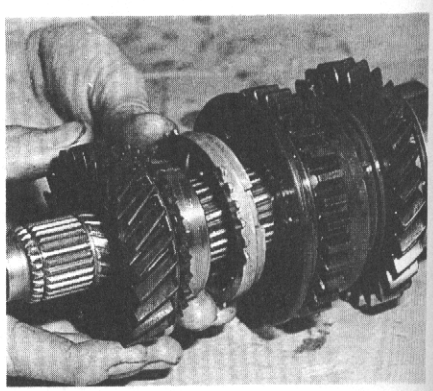
10 Extract the circlip retaining the 2nd gear, then extract the thrustwasher halves.
11 Slide the 2nd gear from the front of the mainshaft and remove the 2nd gear synchroniser ring and thrust ring where applicable (photo).
12 Mark the 1st/2nd gear synchroniser unit hub and sleeve in relation to each other and note the location of the selector fork groove. Slide the sleeve forward from the hub and remove the blocker bars and springs.
13 Extract the circlip retaining the mainshaft bearing, then using a suitable puller, remove 1st gear complete with the oil scoop ring, mainshaft bearing and speedometer drivegear (photo). Alternatively, support the 1st gear and press the mainshaft downwards.
14 Remove the 1st gear synchroniser ring.
15 If necessary the 3rd/4th gear synchroniser unit may be dismantled,



7.2A Extract the circlip ...



7.2B ... and remove the 3rd/4th gear synchroniser unit, 3rd gear synchroniser ring, and 3rd gear



7.11 Remove the 2nd gear and synchroniser ring

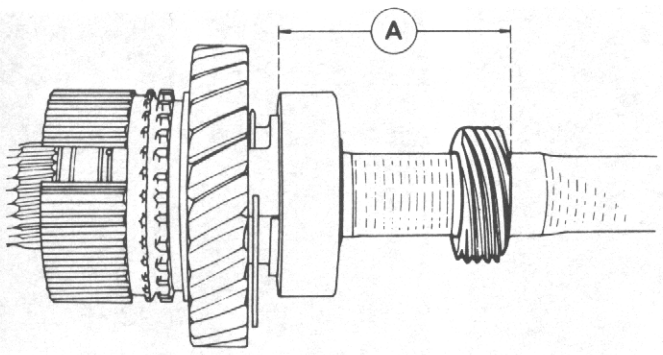


Fig 6.12 Speedometer drivegear fitting position (Sec 7)

A = 51.20 mm (2.02 in) for A type gearbox
A = 49.25 mm (1.94 in) for B type gearbox

but first mark the hub and sleeve in relation to each other. Slide the sleeve from the hub and remove the blocker bars and springs. Note that the 1st/2nd gear synchroniser hub cannot be removed from the mainshaft.
16 Proceed to paragraph 23.

C type gearbox

17 Extract the circlip and remove the speedometer drivegear and locking ball from the rear of the mainshaft.
18 Extract the circlip retaining the mainshaft bearing, then using a suitable puller remove the 1st gear complete with the oil scoop ring and mainshaft bearing. Alternatively, support the 1st gear and press the mainshaft downwards.
19 Remove the 1st gear synchroniser ring from the 1st/2nd gear synchroniser unit.
20 Extract the circlip and pull off the 1st/2nd gear synchroniser unit together with 2nd gear using a suitable puller.
21 Separate the 2nd gear from the 1st/2nd gear synchroniser unit and remove the 2nd gear synchroniser ring.
22 If necessary the synchroniser units may be dismantled, but first mark each hub and sleeve in relation to each other. Slide the sleeve from the hub and remove the blocker bars and springs.

All gearbox types

23 Clean all the components in paraffin, wipe dry and examine them for wear and damage. Obtain new components as necessary. During reassembly lubricate the components with the specified type of gearbox oil, and where new parts are being fitted, lightly grease the contact surfaces.
24 Commence reassembly by assembling the synchroniser units. Slide the sleeves on the hubs in their previously noted positions, then insert the blocker bars and fit the springs as shown in Fig. 6.10.
25 Continue reassembly as follows according to gearbox type.

A type gearbox

26 Slide the 2nd gear onto the rear of the mainshaft and locate the synchroniser ring on the gear cone. Fit the circlip and thrustwasher if applicable.
27 Locate the 1st/2nd gear synchroniser unit on the mainshaft splines with the selector fork groove to the rear. Tap the unit fully home using a metal tube, then fit the circlip if applicable.
28 Fit the 1st gear synchroniser ring to the 1st/2nd gear synchroniser unit with the blocker bars located in the slots.
29 Slide the 1st gear onto the mainshaft.
30 If a new mainshaft bearing or extension housing is being fitted, the required thickness of the bearing retaining circlip in the extension housing must be determined at this stage. Using vernier calipers, measure the width of the bearing outer track (B), then measure the total width of the bearing location in the extension housing (A) – the difference (ie A minus B) represents the required thickness of the retaining circlip. Dimension A can be obtained by fitting the existing circlip, and pushing it until it is flush with the upper shoulder of its groove in the extension housing. Measure the distance between the bottom shoulder of the bearing recess, and the upper face of the circlip – see Fig. 6.11. Obtain a circlip of the correct thickness from your local Ford dealer.
31 Fit the small circlip if applicable, then loosely locate the bearing retaining circlip as determined from paragraph 30 on the mainshaft.
32 Smear a little grease on the mainshaft, then fit the bearing and drive it fully home using a metal tube on the inner track. Fit the circlip.
33 Locate the speedometer drivegear on the mainshaft and use a metal tube to tap it into the position shown in Fig. 6.12.
34 Proceed to paragraph 49.

B type gearbox

35 Fit the 1st gear synchroniser ring to the 1st/2nd gear synchroniser unit with the blocker bars located in the slots.
36 Slide the 1st gear and oil scoop ring (with the oil groove towards 1st gear) onto the mainshaft.
37 If a new mainshaft bearing or extension housing is being fitted, determine the required thickness of the bearing retaining circlip, as described in paragraph 30, then locate it loosely on the mainshaft.
38 Smear a little grease on the mainshaft, then fit the bearing and drive it fully home using a metal tube on the inner track. Fit the circlip.
39 Locate the speedometer drivegear on the mainshaft and use a metal tube to tap it into the position shown in Fig. 6.12.
40 Fit the 2nd gear synchroniser ring to the 1st/2nd gear synchroniser unit with the blocker bars located in the slots. Fit the thrust ring where applicable.
41 Slide the 2nd gear onto the front of the mainshaft and retain with the thrustwasher halves and circlip.
42 Proceed to paragraph 49.

C type gearbox

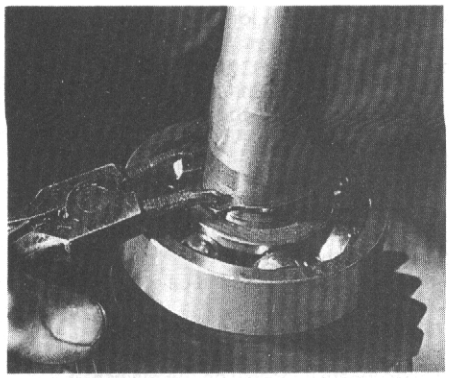
43 Slide the 2nd gear onto the rear of the mainshaft and locate the synchroniser ring on the gear cone.
44 Locate the 1st/2nd gear synchroniser unit on the mainshaft splines with the selector fork groove to the rear. Tap the unit fully home using a metal tube, then fit the circlip.
45 Fit the 1st gear synchroniser ring to the 1st/2nd gear synchroniser unit with the blocker bars located in the slots.
46 Slide the 1st gear and oil scoop ring (with the oil groove towards 1st gear) onto the mainshaft.
47 If a new mainshaft bearing or extension housing is being fitted, determine the required thickness of the bearing retaining circlip, as described in paragraph 30, then locate it loosely on the mainshaft.
48 Smear a little grease on the mainshaft, then fit the bearing and drive it fully home using a metal tube on the inner track. Fit the circlip.
49 Insert the locking ball in the mainshaft detent, then slide on the speedometer drivegear and secure with the circlip.

All gearbox types

50 Slide the 3rd gear onto the front of the mainshaft, then locate the synchroniser ring on the gear cone.
51 Locate the 3rd/4th gear synchroniser unit on the mainshaft splines with the long side of the hub facing the front. Tap the unit fully home using a metal tube, then fit the circlip. Make sure that the slots in the 3rd gear synchroniser ring are aligned with the blocker bars as the synchroniser unit is being fitted.
52 Fit the 4th gear synchroniser ring to the 3rd/4th gear synchroniser unit with the blocker bars located in the slots.

8 Gearbox (A, B and C types) – reassembly

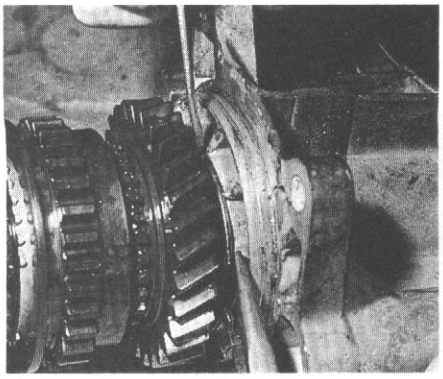
1 Immerse the extension housing in hot water for several minutes, then remove it, quickly insert the mainshaft, and push the bearing fully home. If necessary place the extension housing on the edge of the bench and use a soft-faced mallet to drive the mainshaft home (photo).
2 Using long nose pliers and a screwdriver, refit the bearing circlip (photo).
3 Apply a little grease to the extension housing mating face and fit a new gasket (photo).
4 Insert the speedometer drive pinion in the extension housing, smear a little sealer on the cover, then tap the cover into the housing.
5 Fit the reverse relay lever (and return spring on the B type gearbox) onto the pivot pin in the main casing, and, where applicable, fit the circlip.
6 Position the reverse idler gear in the main casing with the long shoulder facing the rear and engaged with the relay lever. Slide in the idler shaft and tap fully home with a soft-faced mallet.



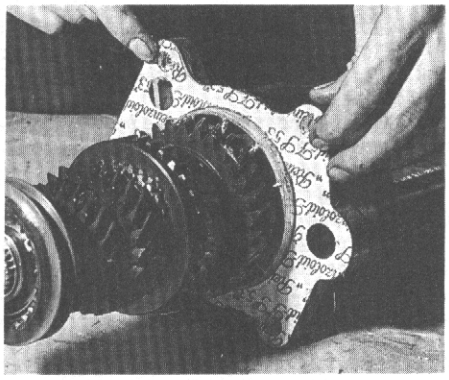
7.13 Extract the circlip retaining the mainshaft bearing



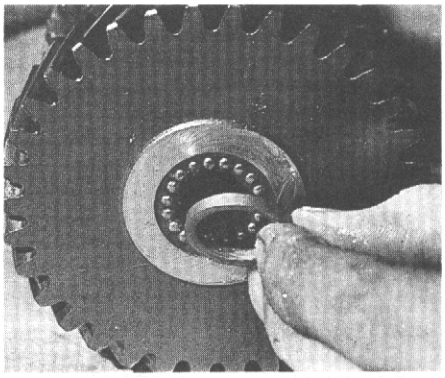
8.1 Drive the mainshaft home with a soft-faced mallet



8.2 Fit the bearing circlip using long nose pliers and a screwdriver



8.3 Fit a new gasket to the extension housing



8.7 Fit the outer spacer to the countershaft gear cluster needle rollers

7 Smear grease inside the ends of the countershaft gear cluster, then fit the spacers and needle roller bearings (photo). If the needle rollers are being renewed, make sure that all the rollers at any one end of the gear cluster come from the same pack. Do not mix old and new needle rollers, or rollers from different packs. On the type A gearbox there are 21 needle rollers at each end with identical spacers either side of the rollers. On the type B gearbox there is a central spacer tube with thin spacers either side followed by 19 needle rollers and thick spacers on each side. Note that the long needle rollers must be fitted to the rear of the gear cluster. On the type C gearbox there are 20 needle rollers at each end with identical spacers either side of the rollers. Make sure that there is sufficient grease to hold the needle rollers in position during the subsequent operation, and if available, fit a dummy shaft of a length slightly less than the gear cluster.

8 Stick the thrustwashers on the inner faces of the main casing with the location tabs correctly positioned.

9 Lower the gear cluster to the bottom of the main casing, keeping the thrustwashers in position.

10 Insert the input shaft fully into the main casing, using a soft metal drift if necessary. On the C type gearbox, refit the large circlip.

11 Fit the clutch release bearing guide sleeve together with a new O-ring (A and B type gearboxes) or gasket (C type gearbox). Check that the cut-out on the sleeve faces the bottom of the casing, then apply sealer to the bolt threads. Insert the bolts, and tighten to the specified torque in diagonal sequence.

12 Oil the needle roller bearing and locate it in the centre of the input shaft.

13 Insert the mainshaft together with the extension housing into the main casing, so that the front of the mainshaft enters the needle roller bearing in the centre of the input shaft. Turn the extension housing so that the cut-away reveals the countershaft bore.

14 While keeping the thrustwashers in place, invert the gearbox so that the countershaft gear cluster meshes with the mainshaft and input shaft.

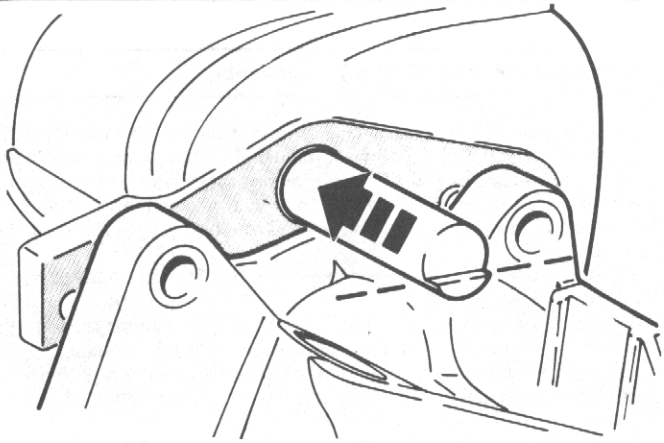


Fig 6.13 Countershaft flat alignment on A and B type gearboxes (Sec 8)

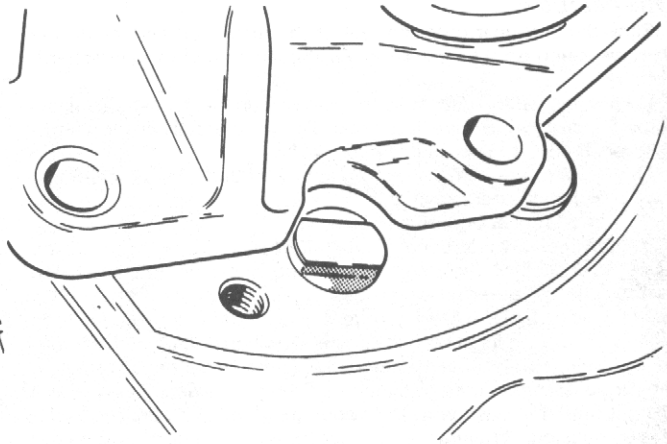


Fig 6.14 Countershaft flat alignment on C type gearbox (Sec 8)

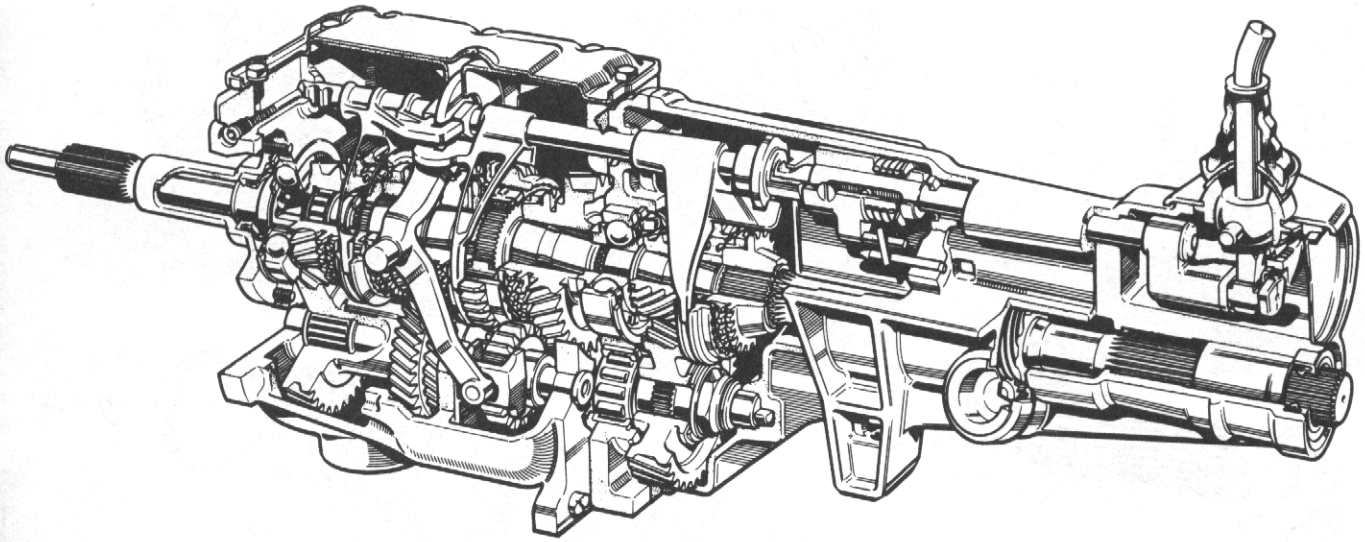


Fig 6.15 Cutaway view of N type gearbox (Sec 9)

15 Line up the thrustwashers and insert the countershaft from the rear of the main casing. Using a soft metal drift, drive the countershaft into the main casing until flush. The flat on the rear end of the countershaft must be horizontal (Figs. 6.13 and 6.14).
16 Fully insert the extension housing and make sure that the 4th gear synchroniser ring is correctly aligned with the synchroniser unit.
17 Apply sealer to the bolt threads, then insert the bolts and tighten to the specified torque in diagonal sequence.
18 Proceed as follows according to gearbox type.

A and B type gearboxes

19 Locate the selector locking plate in the main casing and retain with the roll pin.
20 Coat a new blanking plug with sealer and tap it into the rear of the casing.
21 Fit the selector forks and selector boss, then insert the selector shaft from the rear and guide it through the selector components.
22 Align the holes, then drive the roll pin into the selector boss and selector shaft.
23 Insert the selector locking pin and spring, apply sealer to the plug threads, then insert and tighten the plug.
24 Fit the gearbox top cover together with a new gasket, and tighten the bolts to the specified torque in diagonal sequence.
25 Proceed to paragraph 34.

C type gearbox

26 Assemble the selector forks to the connecting shaft, then align the holes and drive the roll pin into the 3rd/4th gear selector fork and shaft.
27 Engage 2nd gear and press the reverse gear relay lever to the rear.
28 Fit the selector forks to their respective synchroniser units.
29 Lightly grease the selector shaft, then insert it into the rear extension housing. Hold the selector boss and locking plate in position, and guide the selector shaft through the selector components. Note that the roll pin hole in the selector boss must face to the rear.
30 Align the holes, then drive the roll pin into the selector boss and selector shaft until it is about 1.0 mm (0.04 in) below the surface.
31 Insert the selector locking ball in the main casing.
32 Grease the selector locking spring and locate it in the top cover.
33 Fit the gearbox top cover together with a new gasket, and tighten the bolts to the specified torque in diagonal sequence.

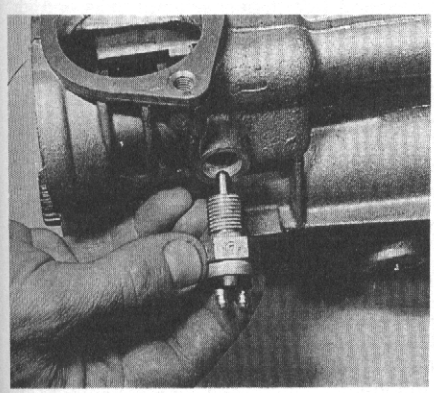
All gearbox types

34 Fit the extension housing rear cover using a little sealer, and stake it in several places to secure.
35 Where applicable fit the clutch housing to the front of the gearbox, apply sealer to the bolt threads, then insert the bolts and tighten them to the specified torque in diagonal sequence.
36 Fit the clutch release bearing and arm with reference to Chapter 5.

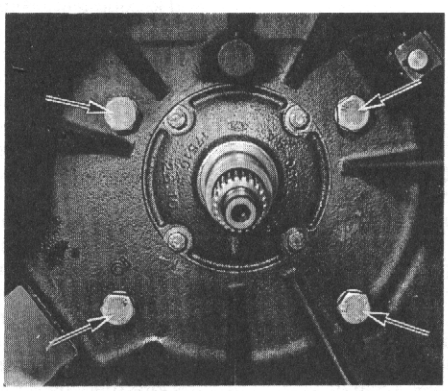
9 Gearbox (N type) – dismantling into major assemblies

Note: *A suitable puller and socket will be required to pull the 5th driving gear from the countershaft gear cluster*

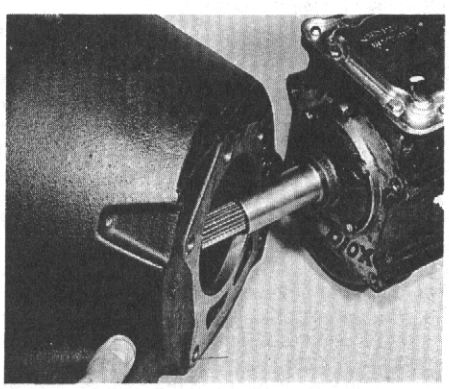
1 Clean the exterior of the gearbox with paraffin and wipe dry.
2 Remove the clutch release bearing and arm with reference to Chapter 5.
3 Unscrew and remove the reversing lamp switch (photo).
4 Unbolt the clutch housing from the front of the gearbox. Remove the gasket (photos).
5 Unscrew the bolts and withdraw the clutch release bearing guide sleeve and gasket from the front of the gearbox (photos).



9.3 Remove the reversing lamp switch



9.4A Unscrew the securing bolts (arrowed) ...



9.4B ... and remove the clutch bellhousing

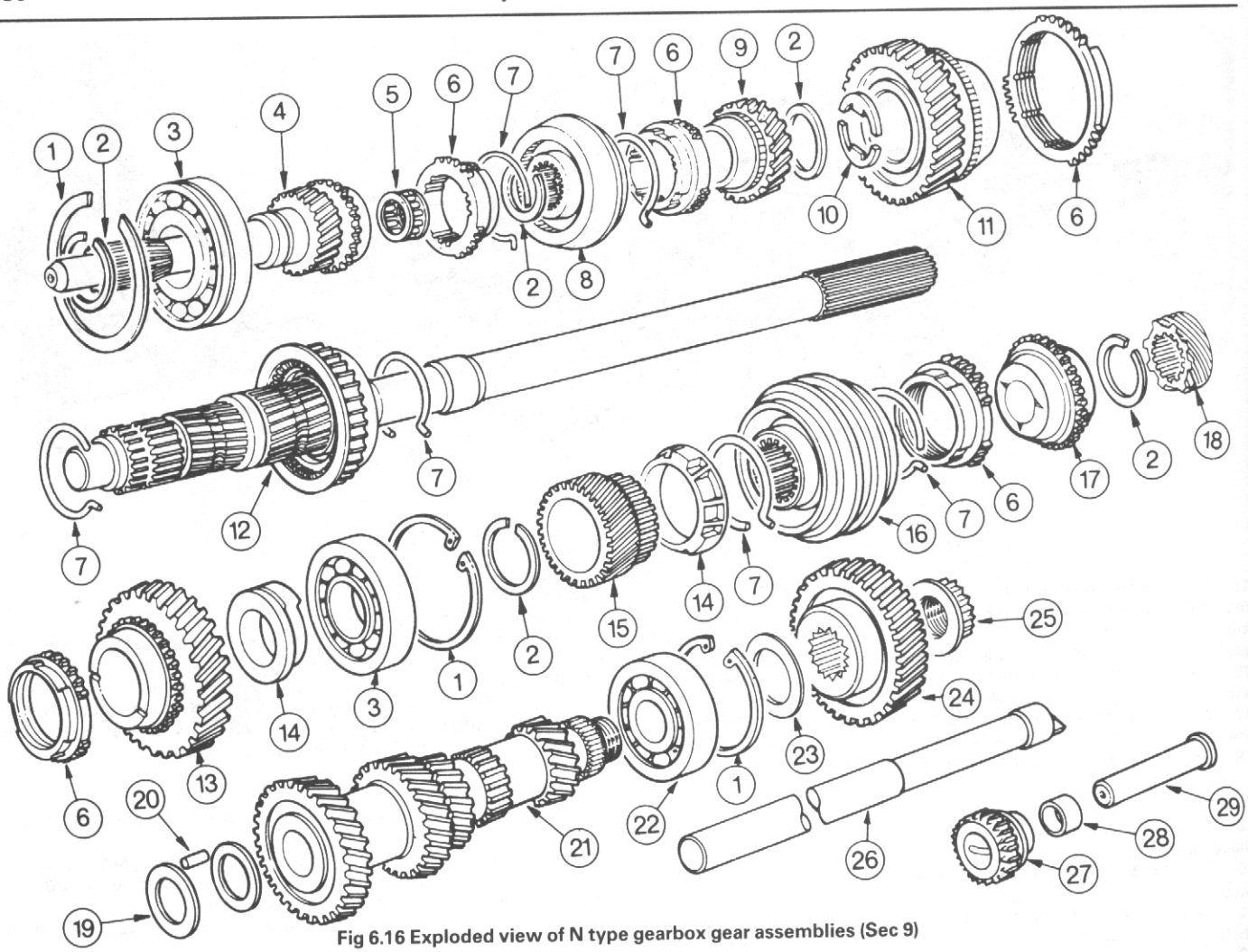
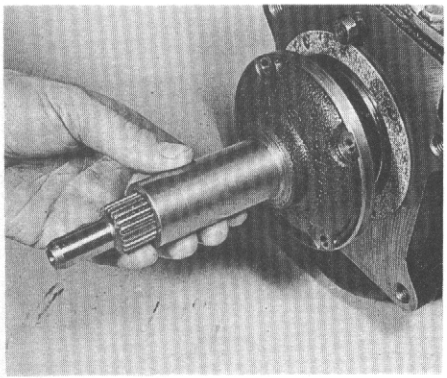


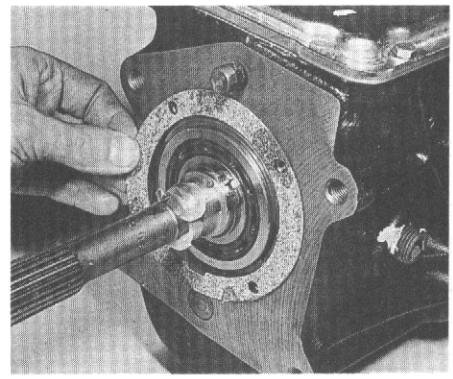
Fig 6.16 Exploded view of N type gearbox gear assemblies (Sec 9)

1 *Circlip*
2 *Circlip*
3 *Ball bearing*
4 *Input shaft*
5 *Needle roller bearing*
6 *Synchroniser rings*
7 *Blocker bar springs*
8 *3rd/4th gear synchroniser unit*
9 *3rd gear*
10 *Thrust half washer*
11 *2nd gear*
12 *Mainshaft with synchroniser unit*
13 *1st gear*
14 *Oil scoop ring*
15 *5th driven gear*
16 *5th gear synchroniser unit*
17 *5th gear synchroniser hub*
18 *Speedometer drivegear*
19 *Spacer*
20 *Needle rollers*
21 *Countershaft gear cluster*
22 *Roller bearing*
23 *Washer*
24 *5th driving gear*
25 *12 sided nut*
26 *Countershaft*
27 *Reverse idler gear*
28 *Bush*
29 *Idler shaft*

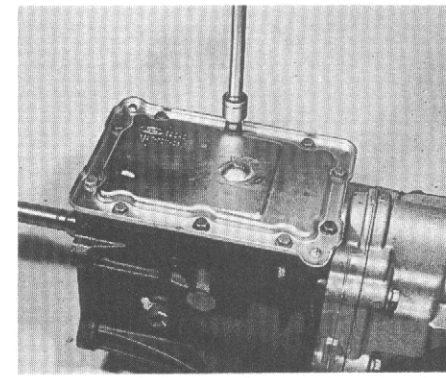
6 Unscrew the bolts and remove the top cover and gasket (photos).
7 Invert the gearbox and allow the oil to drain, then turn it upright again.
8 Unscrew the bolts and lift the 5th gear locking plate from the extension housing (photo).
9 Extract the 5th gear locking spring and pin from the extension housing, using a pen magnet if necessary (photos).
10 Working through the gear lever aperture, use a screwdriver or small drift to tap out the extension housing rear cover (photo).
11 Select reverse gear and pull the selector shaft fully to the rear. Support the shaft with a piece of wood, then drive out the roll pin and withdraw the connector from the rear of the shaft (photos).
12 Unbolt and remove the extension housing from the rear of the gearbox. If necessary, tap the housing with a soft-faced mallet to release it from the dowels. Remove the gasket (photos).
13 Prise the cover from the extension housing and withdraw the speedometer drivegear (photo).
14 Select neutral, then using an Allen key, unscrew the selector locking mechanism plug from the side of the main casing. Extract the spring and locking pin, if necessary using a pen magnet (photos).
15 Drive the roll pin from the selector boss and selector shaft.
16 If necessary, the selector shaft centralising spring and 5th gear locking control may be removed. Using a small screwdriver, push out the plug and pin and slide the control from the selector shaft (photos).
17 Note the location of the selector components, then withdraw the selector shaft from the rear of the gearbox and remove the selector boss and locking plate, 1st/2nd gear and 3rd/4th gear selector forks, and 5th gear interlock sleeve and selector fork. Note that the roll pin hole in the selector boss is towards the front (photos).
18 Extract the circlip and pull the 5th gear synchroniser unit from the main casing, leaving it loose on the mainshaft (photos).
19 Slide the 5th driven gear from the synchroniser unit hub (photo).
20 Select 3rd gear and either 1st or 2nd gear by pushing the respective synchroniser sleeves – this will lock the mainshaft and countershaft gear cluster.
21 Unscrew and remove the 5th driving gear retaining nut while an assistant holds the gearbox stationary (photo). The nut is tightened to a high torque setting, and an additional extension bar may be required.
22 Remove the washer and pull the 5th driving gear from the countershaft gear cluster using a two-legged puller and socket in contact with the cluster. Remove the spacer ring (photos). Select neutral.
23 Extract the circlip retaining the countershaft gear cluster bearing in the intermediate housing (photo).
24 Using a soft-faced mallet, tap the intermediate housing free of the



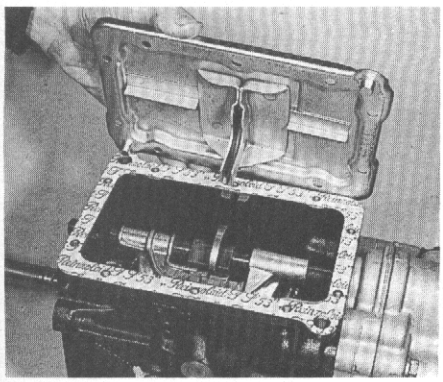
9.5A Withdraw the clutch release bearing guide sleeve ...



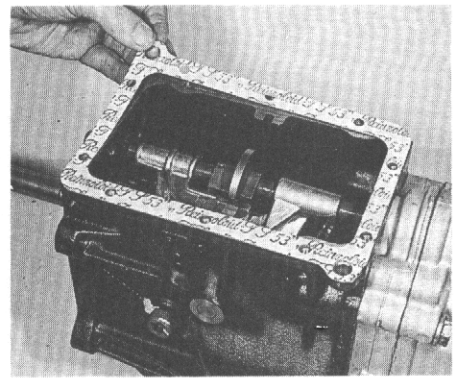
9.5B ... and gasket



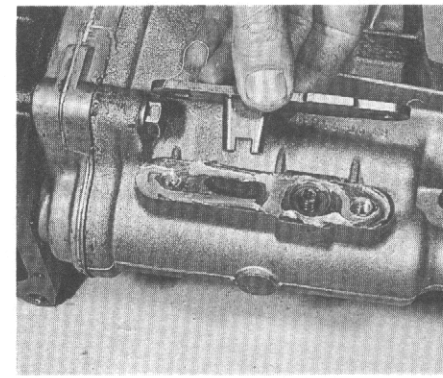
9.6A Unscrew the securing bolts ...



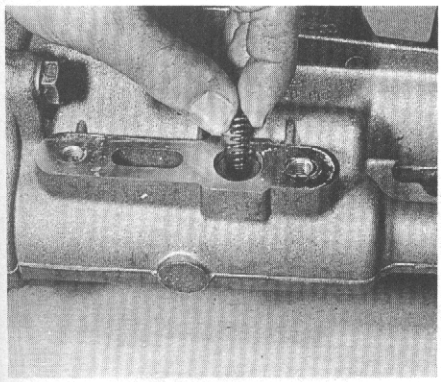
9.6B ... and remove the top cover ...



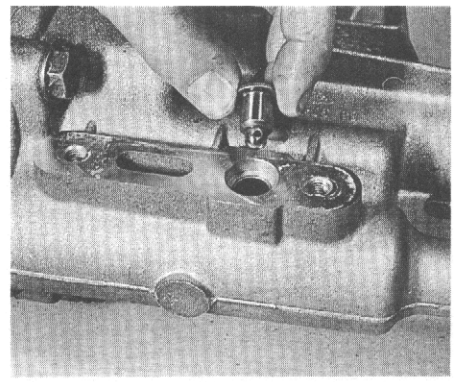
9.6C ... and gasket



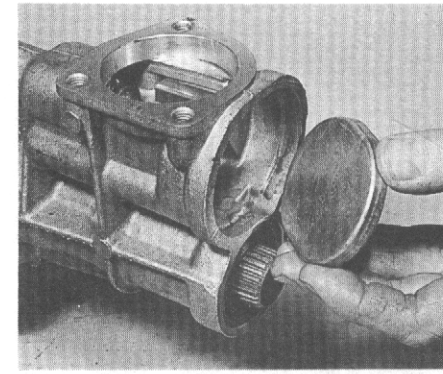
9.8 Lift the 5th gear locking plate from the extension housing



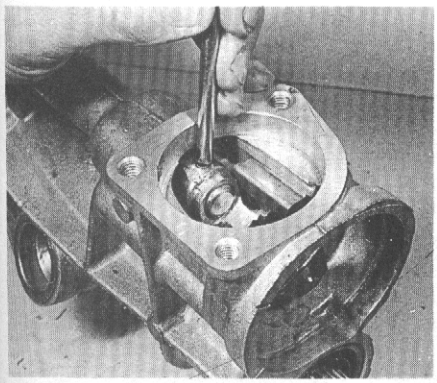
9.9A Extract the 5th gear locking spring ...



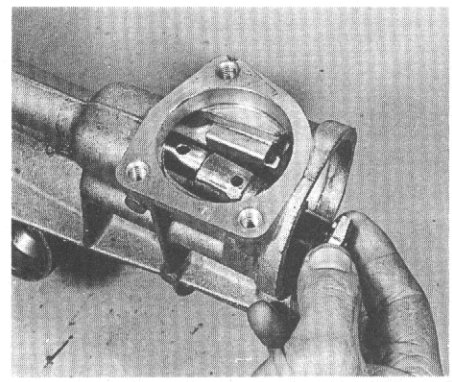
9.9B ... and pin



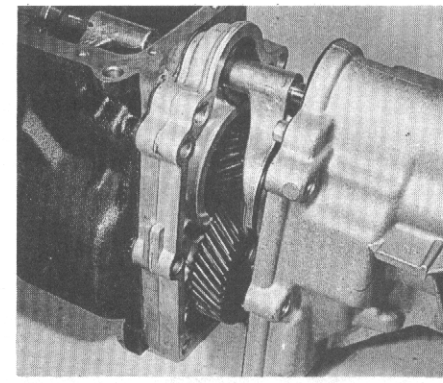
9.10 Tap out the extension housing rear cover



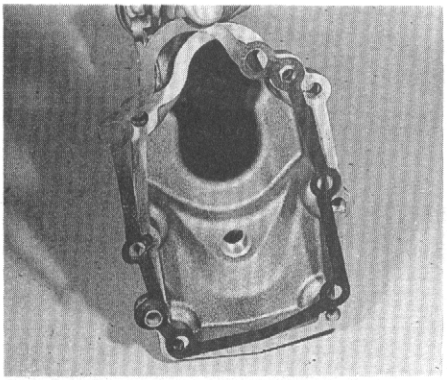
9.11A Drive out the roll pin ...

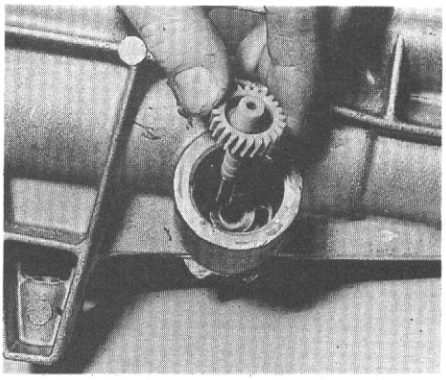


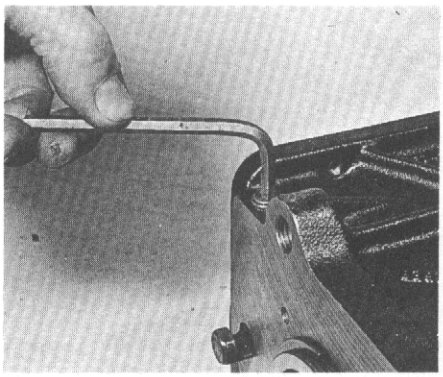
9.11B ... and withdraw the selector shaft connector

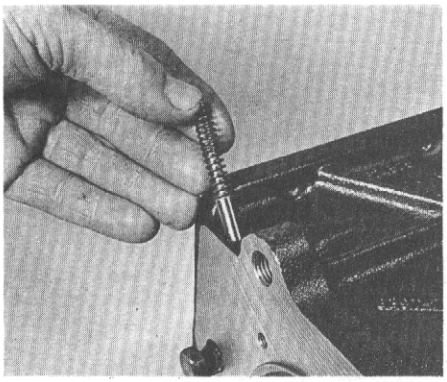


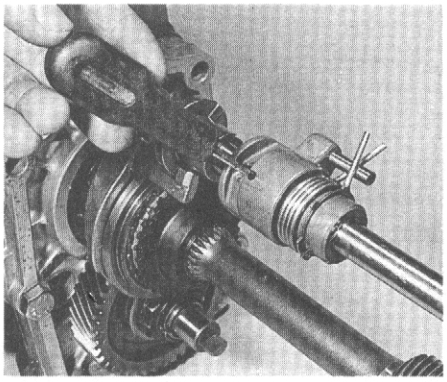
9.12A Remove the extension housing ...

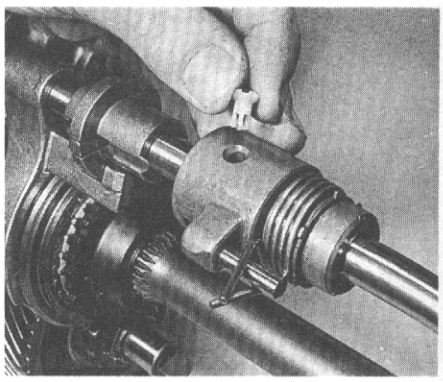

9.12B ... and gasket

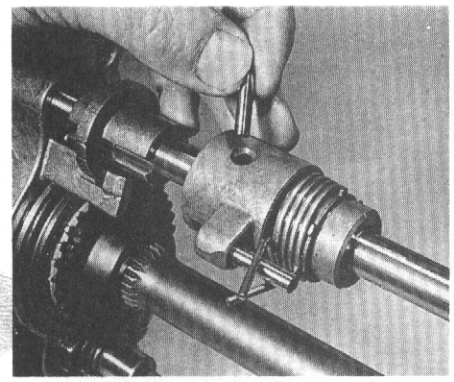

9.13 Withdraw the speedometer drivegear

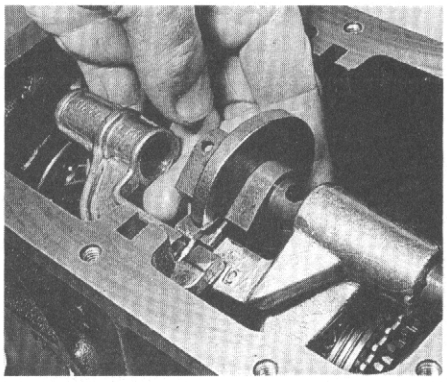

9.14A Unscrew the plug ...

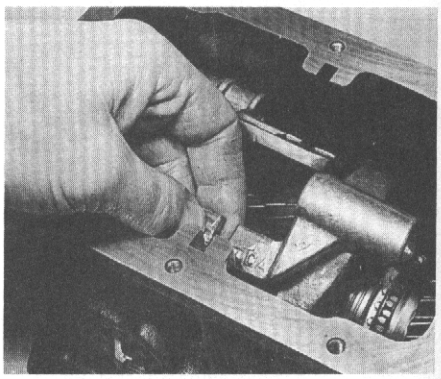

9.14B ... and extract the selector locking spring and pin

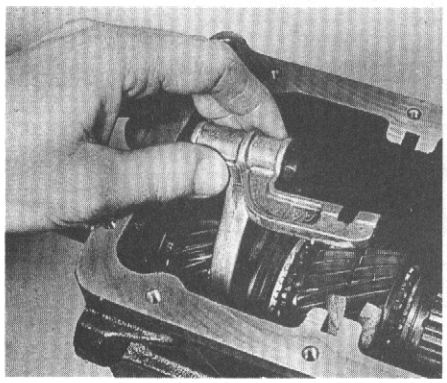

9.16A Use a screwdriver ...

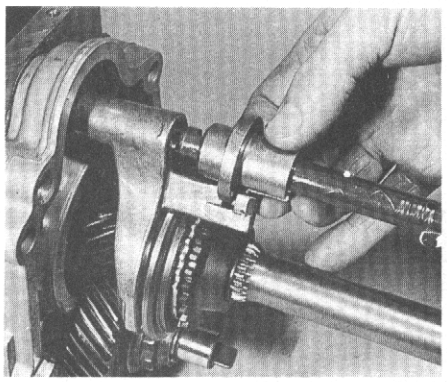

9.16B ... to push out the plug ...

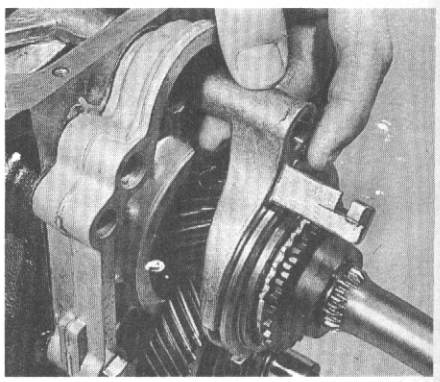

9.16C ... and pin

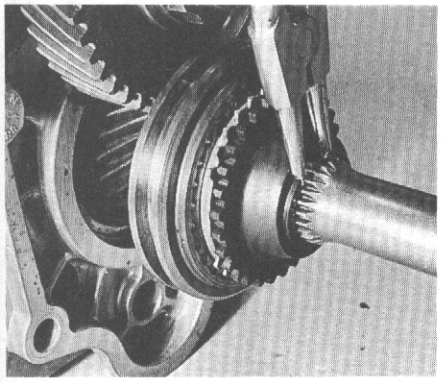

9.17A Remove the selector boss and locking plate ...


9.17B ... 1st/2nd gear selector fork ...

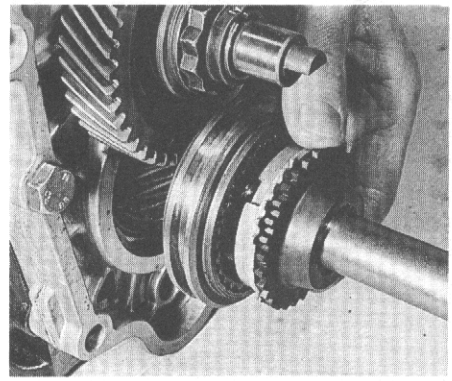

9.17C ... 3rd/4th gear selector fork ...


9.17D ... 5th gear interlock sleeve ...

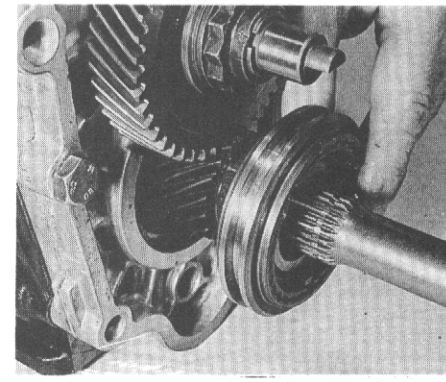

9.17E ... and 5th gear selector fork



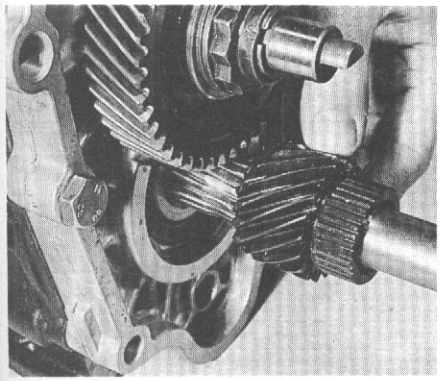
9.18A Extract the circlip ...



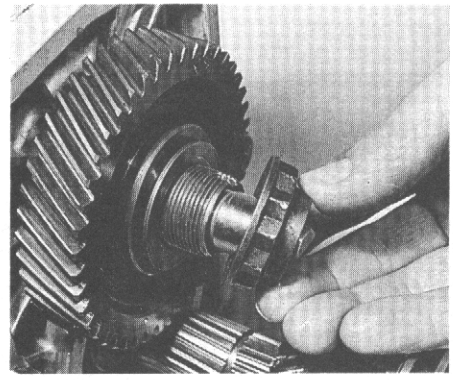
9.18B ... and remove the 5th gear synchroniser dog hub ...



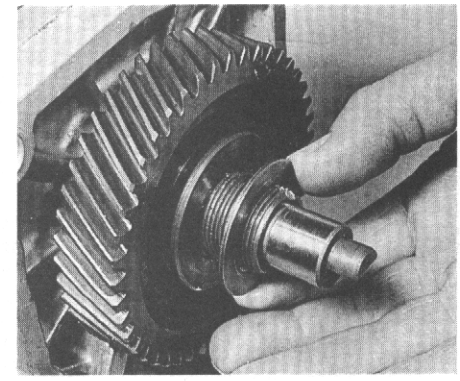
9.18C ... and 5th gear synchroniser unit



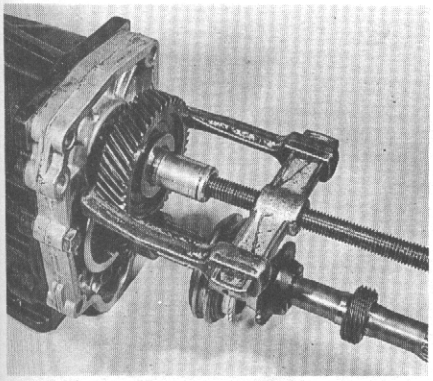
9.19 Slide the 5th driven gear from the synchroniser unit hub



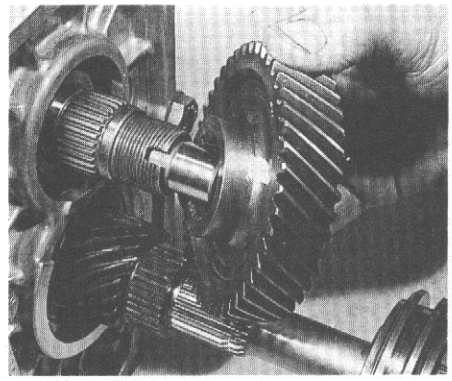
9.21 Remove the 5th driving gear retaining nut



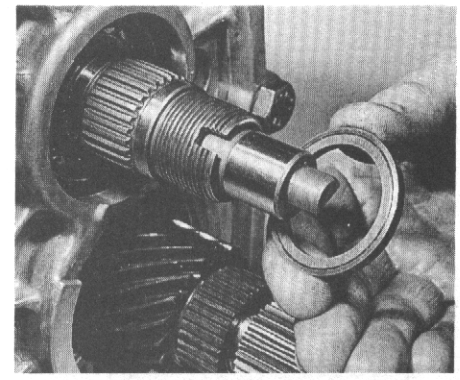
9.22A Remove the washer ...



9.22B ... and pull the 5th driving gear from the countershaft gear cluster



9.22C Remove the 5th driving gear ...



9.22D ... and the spacer ring

main casing, and pull the intermediate housing rearwards as far as possible. Using a screwdriver inserted between the intermediate housing and main casing, prise the bearing from the shoulder on the countershaft gear cluster and remove it from the intermediate housing (photo).

25 Using a soft metal drift from the front of the main casing, drive the countershaft rearwards sufficiently to allow the gear cluster to be lowered to the bottom of the casing. Take care not to lose the needle roller bearings and spacers from inside the gear cluster.

26 Ease the input shaft from the front of the casing, if necessary using a small drift inside the gearbox to move the bearing slightly forwards, then using levers beneath the large bearing circlip (photo).

27 Remove the 4th gear synchroniser ring. Remove the input shaft needle roller bearing from the end of the mainshaft, or from the centre of the input shaft (photos).

28 Remove the mainshaft and intermediate housing from the main casing. Remove the gasket (photos).

29 Withdraw the countershaft and gear cluster from the main casing (photo).

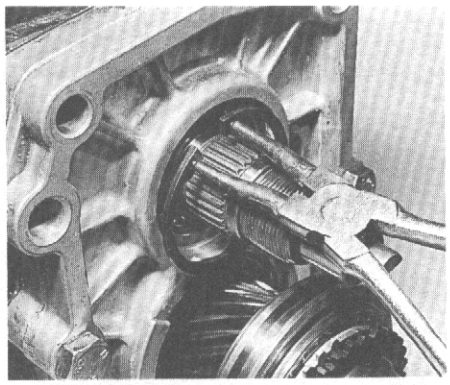
30 Insert a suitable bolt into the reverse gear idler shaft, and using a nut, washer and socket, pull out the idler shaft. Note the fitted position of the reverse idler gear, then remove it (photos).

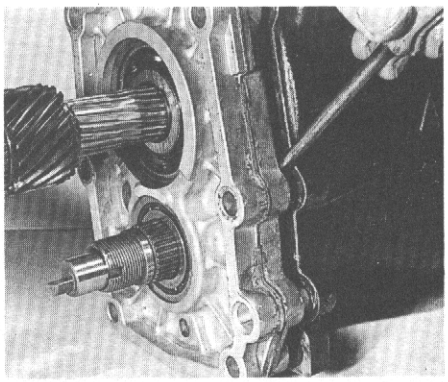
31 Remove the guide from the reverse relay lever, then extract the circlip and remove the relay lever from the pivot (photo).

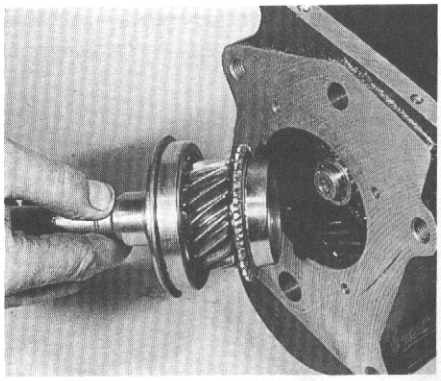
32 Remove the magnetic disc from the bottom of the main casing. Also remove any needle rollers which may have been displaced from the countershaft gear cluster (photo).

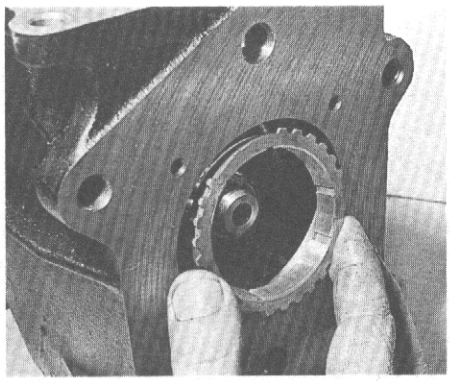
10 Gearbox components (N type) – inspection

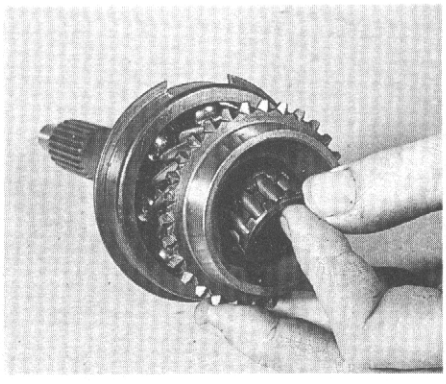
The procedure is basically as given in Section 5, however there are five synchroniser rings, no countershaft gear cluster thrustwashers, two ball bearings and one roller bearing.

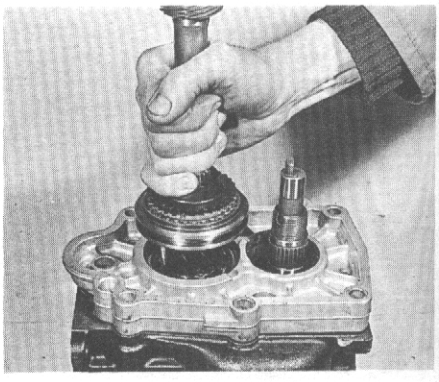

9.23 Extract the countershaft gear cluster retaining circlip

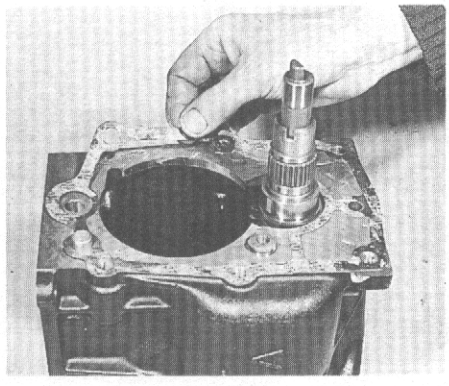

9.24 Prise the bearing from the shoulder on the countershaft gear cluster

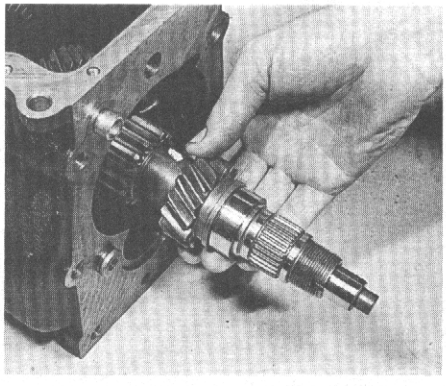

9.26 Remove the input shaft

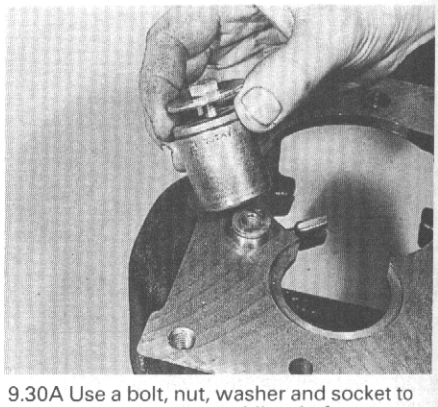

9.27A Remove the 4th gear synchroniser ring

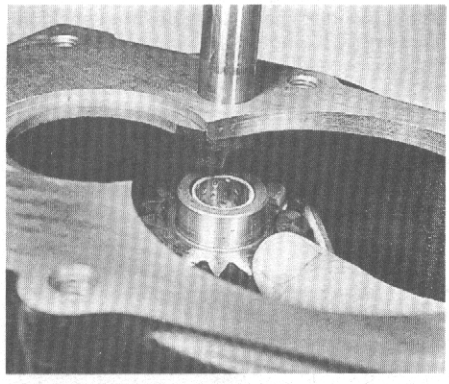

9.27B Remove the input shaft needle roller bearing

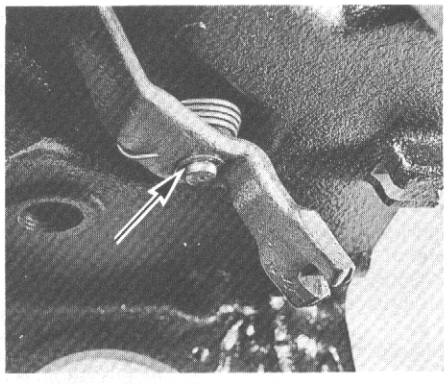

9.28A Remove the mainshaft and intermediate housing ...

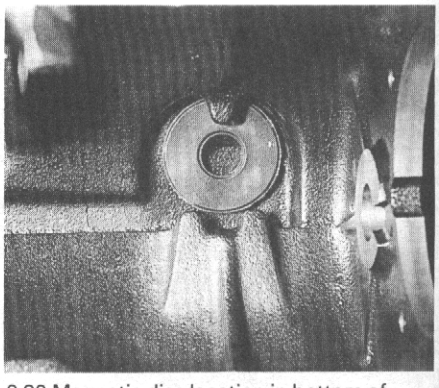

9.28B ... and the gasket

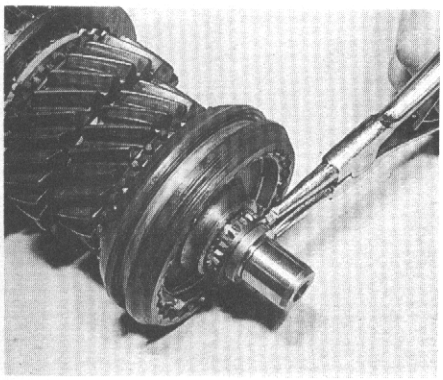

9.29 Withdraw the countershaft and gear cluster


9.30A Use a bolt, nut, washer and socket to pull out the reverse gear idler shaft

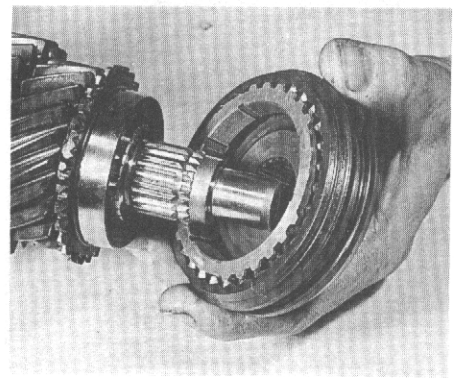

9.30B Remove the reverse idler gear


9.31 Extract the circlip (arrowed) and remove the reverse relay lever

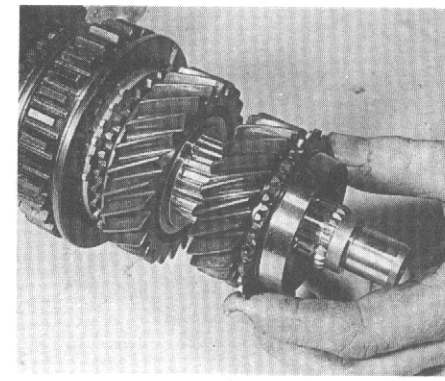

9.32 Magnetic disc location in bottom of main casing



12.1A Extract the circlip ...



12.1B ... and remove the 3rd/4th synchroniser unit and ring ...



12.1C ... and 3rd gear

11 Gearbox input shaft (N type) – dismantling and reassembly

The procedure is identical to that described in Section 6.

12 Gearbox mainshaft (N type) – dismantling and reassembly

Note: *A suitable puller will be required to pull the speedometer drivegear from the mainshaft*

1 Extract the circlip and slide the 3rd/4th gear synchroniser unit together with the 3rd gear from the front of the mainshaft, using a two-legged puller if necessary. Separate the gear and unit and remove the 3rd gear synchroniser ring (photos).

2 Remove the outer circlip from the 2nd gear, then extract the thrustwasher halves (photos).

3 Slide the 2nd gear from the front of the mainshaft and remove the 2nd gear synchroniser ring (photos).

4 Mark the 1st/2nd gear synchroniser unit hub and sleeve in relation to each other, and note the location of the selector fork groove, then slide the sleeve forward from the hub and remove the blocker bars and springs. Note that the synchroniser hub cannot be removed from the mainshaft (photos).

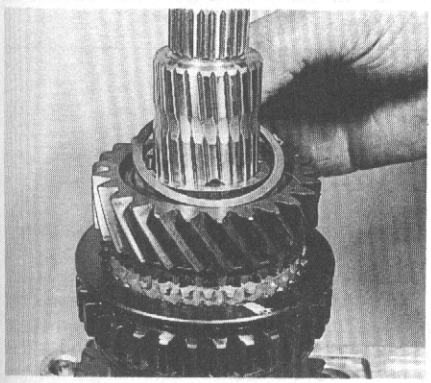
5 Using a suitable puller, pull the speedometer drivegear off the rear of the mainshaft (photo).

6 Extract the circlip, then remove the 5th gear synchroniser unit and 5th driven gear from the mainshaft.

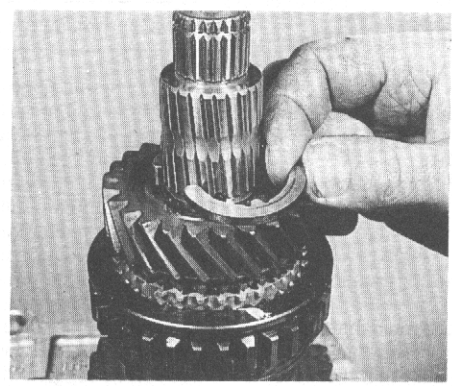
7 Extract the small circlip retaining the mainshaft bearing, then support the intermediate housing on blocks of wood and drive the mainshaft through the bearing with a soft-faced mallet (photos).

8 Remove the oil scoop ring, 1st gear, and 1st gear synchroniser ring (photo).

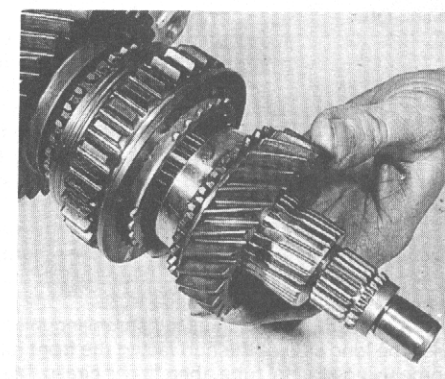
9 If required, extract the large retaining circlip and drive the ball bearing from the intermediate housing using a metal tube on the bearing outer track (photo). The synchroniser units may be dismantled,



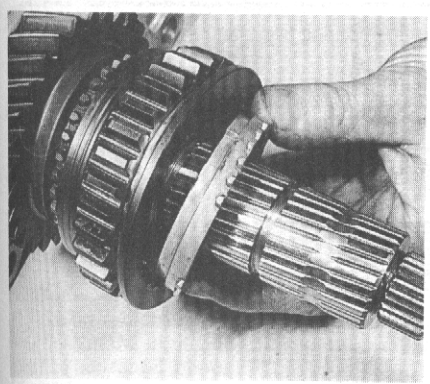
12.2A Remove the outer circlip ...



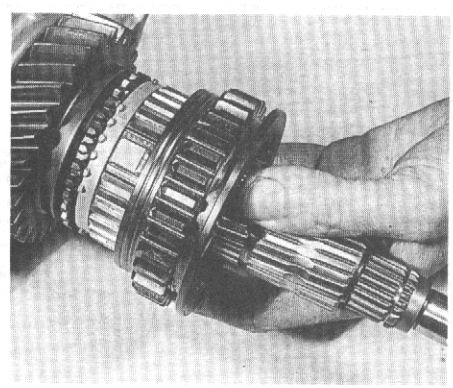
12.2B ... and extract the thrustwasher halves



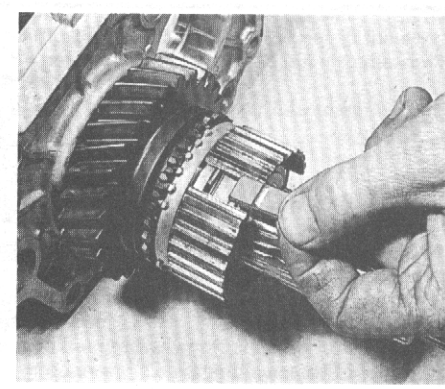
12.3A Remove the 2nd gear ...



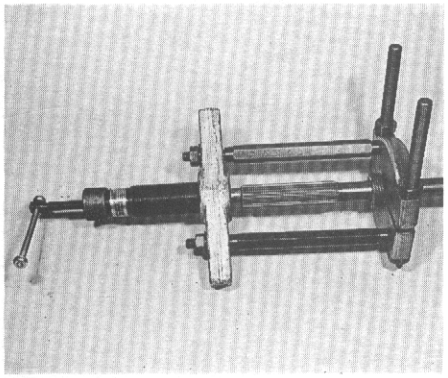
12.3B ... and synchroniser ring



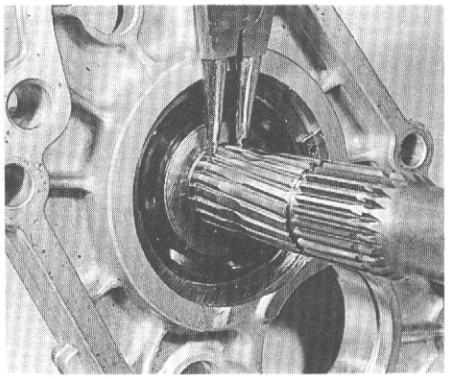
12.4A Remove the 1st/2nd gear synchroniser sleeve ...



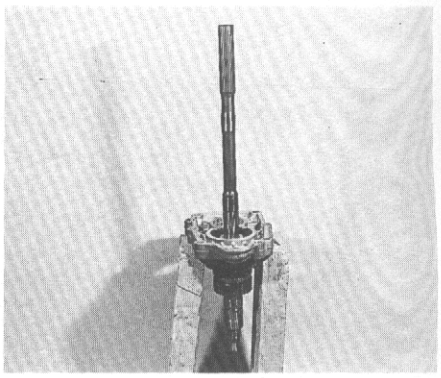
12.4B ... and blocker bars



12.5 Remove the speedometer drivegear using a puller



12.7A Extract the small circlip ...



12.7B ... then drive the mainshaft through the bearing

but first mark each hub and sleeve in relation to one another. Slide the sleeve from the hub and remove the blocker bars and springs.

10 Clean all the components in paraffin, wipe dry and examine them for wear and damage. Obtain new components as necessary. During reassembly lubricate the components with the specified type of gearbox oil and where new parts are being fitted lightly grease the contact surfaces.

11 Commence reassembly by assembling the synchroniser units. Slide the sleeves on the hubs in their previously noted positions, then insert the blocker bars and fit the springs as shown in Fig. 6.10.

12 Where applicable, support the intermediate housing, then, using a metal tube on the outer track, drive in the new bearing and fit the large retaining circlip.

13 Fit the blocker bar spring to the rear of the 1st/2nd gear synchroniser hub, followed by the 1st gear synchroniser ring (photo).

14 Slide the 1st gear and oil scoop ring (with the oil groove towards 1st gear) onto the mainshaft.

15 Using a metal tube on the mainshaft bearing inner track, drive the intermediate housing onto the mainshaft and fit the small circlip. Make sure that the large bearing retaining circlip is towards the rear of the mainshaft.

16 Locate the 5th driven gear and 5th gear synchroniser with circlip, loose on the mainshaft. Tap the speedometer drivegear lightly onto its shoulder – its final position will be determined later.

17 Fit the 1st/2nd gear synchroniser sleeve to the hub in its previously noted position, with the selector groove facing forward, then insert the blocker bars and fit the springs as shown in Fig. 6.10.

18 Fit the 2nd gear synchroniser ring to the 1st/2nd synchroniser unit with the blocker bars located in the slots.

19 Slide the 2nd gear onto the front of the mainshaft and retain with the thrustwasher halves and outer circlip (photo).

20 Slide the 3rd gear onto the front of the mainshaft, then locate the synchroniser ring on the gear cone.

21 Locate the 3rd/4th gear synchroniser unit on the mainshaft splines with the long side of the hub facing the front (photo). Tap the unit fully home using a metal tube, then fit the circlip. Make sure that the slots in the 3rd gear synchroniser ring are aligned with the blocker bars as the synchroniser unit is being fitted.

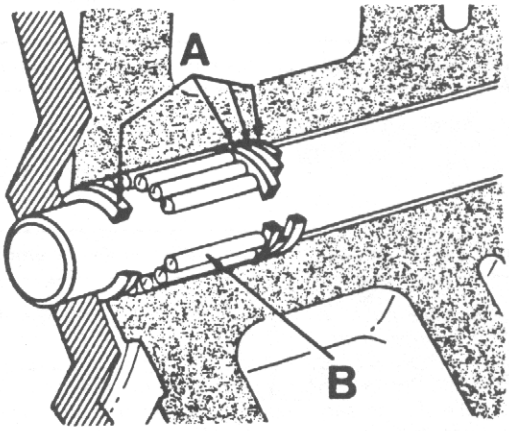


Fig 6.17 Needle roller (B) and spacer (A) arrangement when reassembling early N type gearbox (Sec 13)

13 Gearbox (N type) – reassembly

1 Locate the magnetic disc in the bottom of the main casing.

2 Fit the reverse relay lever onto the pivot and retain with the circlip. Fit the guide to the lever.

3 Position the reverse idler gear in the main casing with the long shoulder facing the rear and engaged with the relay lever. Slide in the idler shaft and tap fully home with a soft-faced mallet.

4 Smear grease inside the end of the countershaft gear cluster, then fit the spacers and needle roller bearings – there are 21 needle rollers. If the needle rollers are being renewed, make sure that all the rollers at any one end of the gear cluster come from the same pack. Do not mix old and new needle rollers, or rollers from different packs. On early models, the countershaft bearing bore was 33.0 mm long; on later models it is 27.75 mm long, and the needle rollers are correspondingly shorter. When rebuilding an early gearbox, use the newer shorter rollers, and insert two extra spacers behind them – see Fig. 6.17. Make sure that

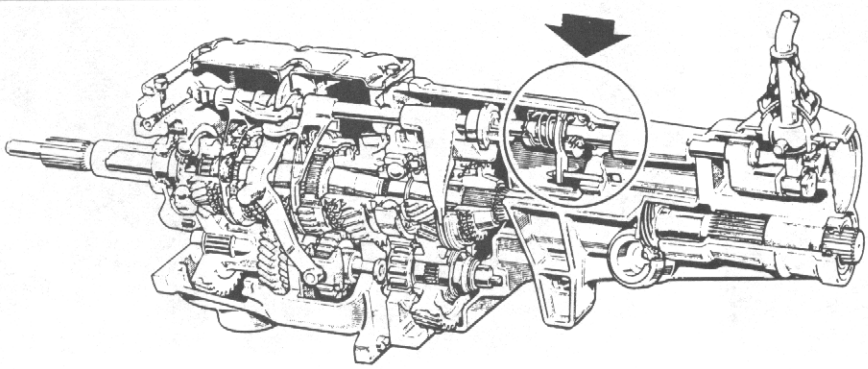
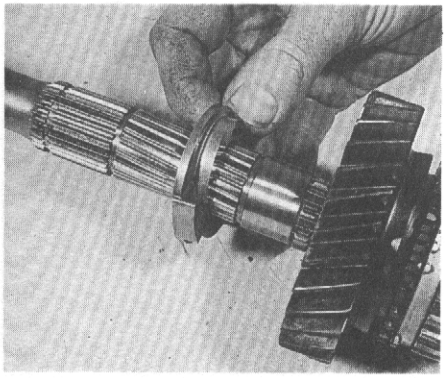
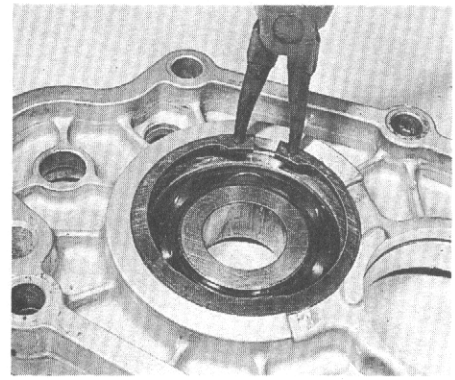


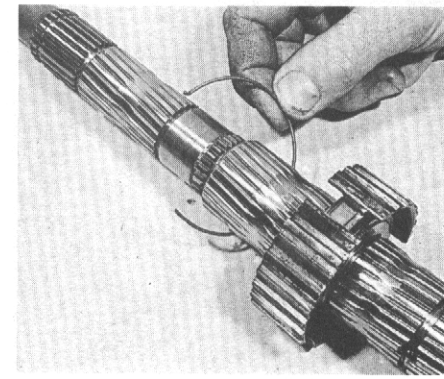
Fig 6.18 Modified selector locking control components (arrowed) – later N type gearbox (Sec 13)



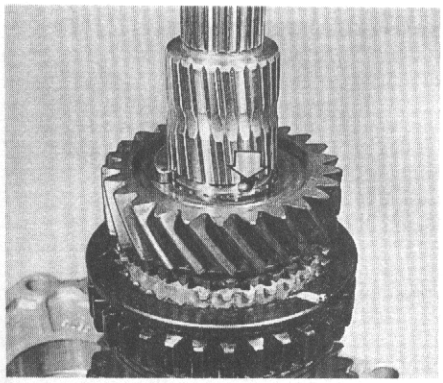
12.8 Remove the oil scoop ring



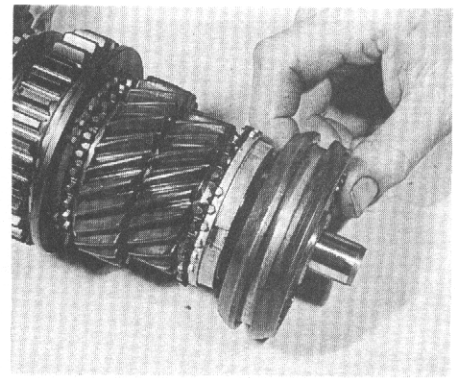
12.9 Extract the large bearing retaining circlip



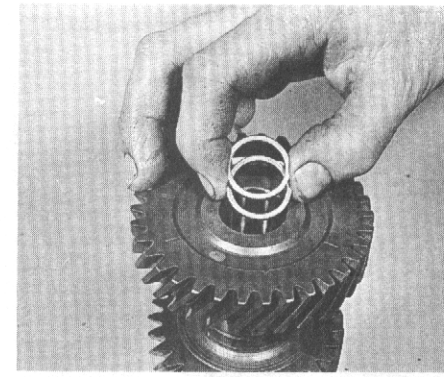
12.13 Fit the blocker bar spring to the rear of the 1st/2nd gear synchroniser hub



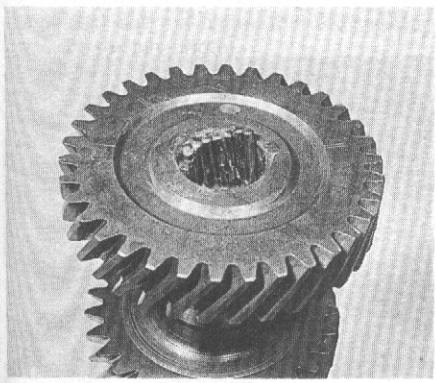
12.19 Locating hole (arrowed) for 2nd gear thrustwasher halves



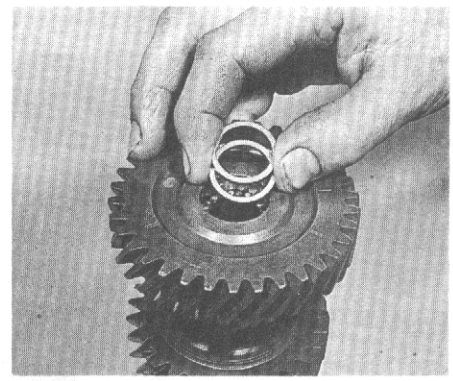
12.21 Locate the 3rd/4th gear synchroniser unit on the mainshaft splines



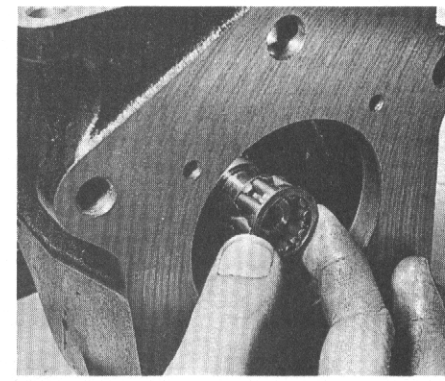
13.4A Insert the rear spacers in the countershaft gear cluster ...



13.4B ... followed by the needle rollers ...



13.4C ... and the front spacers



13.8 Fit the input shaft needle roller bearing

there is sufficient grease to hold the needle rollers in position during the subsequent operation (photos).

5 Insert the countershaft in the gear cluster until the front end is flush with the front gear on the cluster.

6 Locate the countershaft and gear cluster in the bottom of the main casing.

7 Position a new gasket on the main casing, then fit the mainshaft and intermediate housing, and temporarily secure with two bolts.

8 Fit the input shaft needle roller bearing to the end of the mainshaft, or in the centre of the input shaft (photo).

9 Fit the 4th gear synchroniser ring to the 3rd/4th gear synchroniser unit with the cut-outs over the blocker bars, then fit the input shaft assembly and tap the bearing fully into the casing up to the retaining circlip (photo).

10 Invert the gearbox so that the countershaft gear cluster meshes with the input shaft and mainshaft gears.

11 Using a soft metal drift, drive the countershaft into the main casing until flush at the front face – the flat on the rear end of the countershaft must be horizontal (photo).

12 Using a metal tube, tap the countershaft gear cluster bearing into the intermediate housing and secure with the circlip (photo).

13 Fit the spacer ring then, using a metal tube, tap the 5th driving gear onto the splines of the countershaft gear cluster.

14 Fit the thrustwasher and retaining nut. Select 3rd gear and either 1st or 2nd gear by pushing the respective synchroniser sleeves. While an assistant holds the gearbox stationary, tighten the nut to the specified torque, then lock it by peening the collar on the nut into the slot in the gear cluster (photos).

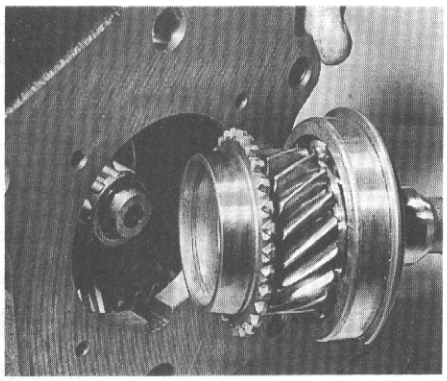
15 Select neutral, then slide the 5th driven gear into mesh with the driving gear.

16 Slide the 5th gear synchroniser unit complete with spacer onto the 5th driven gear. Using a metal tube, drive the dog hub and 5th gear synchroniser ring onto the mainshaft splines while guiding the synchroniser ring onto the blocker bars. Fit the circlip (photos).

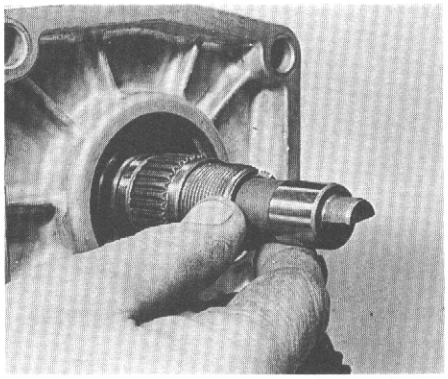
17 Tap the speedometer drivegear into its correct position on the mainshaft – the distance between the gear and the 5th gear dog hub circlip should be 123.0 to 124.0 mm (4.8 to 4.9 in) (photo).

18 Locate the 5th gear selector fork in its synchroniser sleeve and locate the interlock sleeve in the groove (short shoulder to front), then insert the selector shaft through the sleeve and selector fork into the main casing.

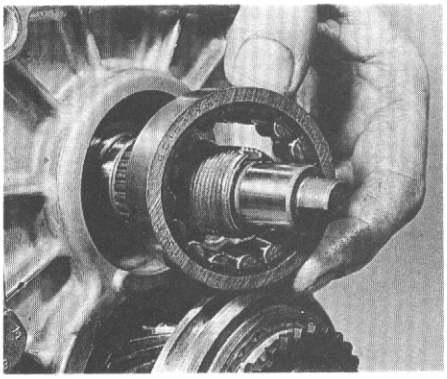
19 Locate the 1st/2nd gear and 3rd/4th gear selector forks in their



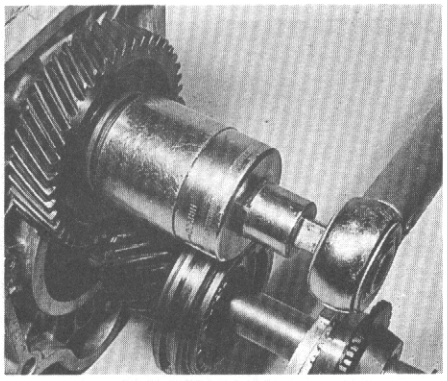
13.9 Fit the input shaft



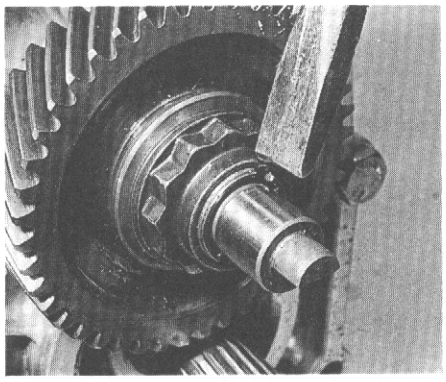
13.11 Flat on rear end of countershaft must be horizontal before driving into main casing



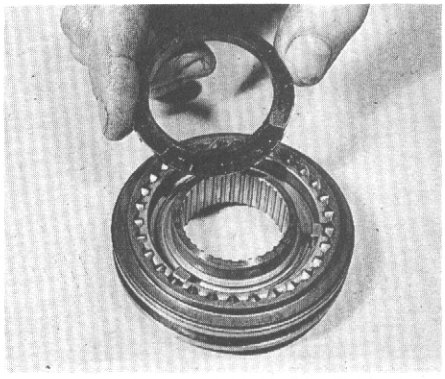
13.12 Fit the countershaft gear cluster bearing



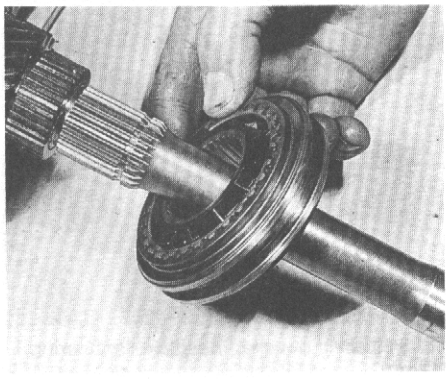
13.14A Tighten the 5th driving gear nut ...



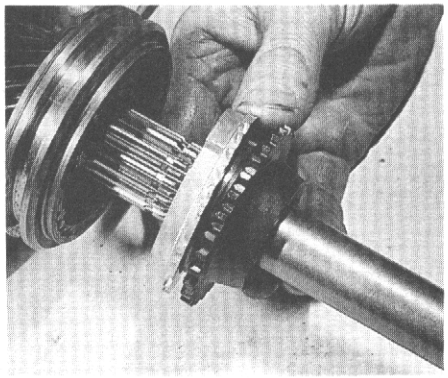
13.14B ... then peen the collar on the nut into the slot in the gear cluster



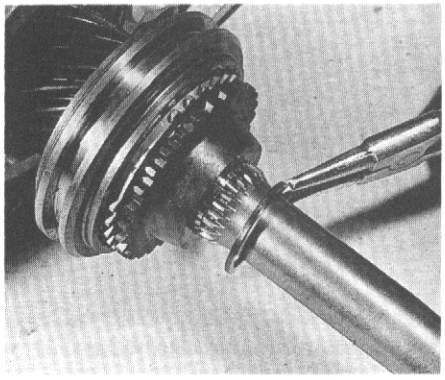
13.16A Fit the spacer to the 5th gear synchroniser unit



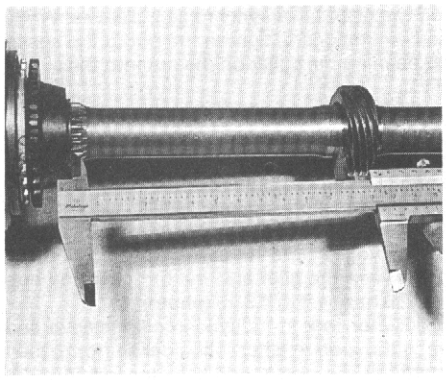
13.16B Fit the 5th gear synchroniser unit ...



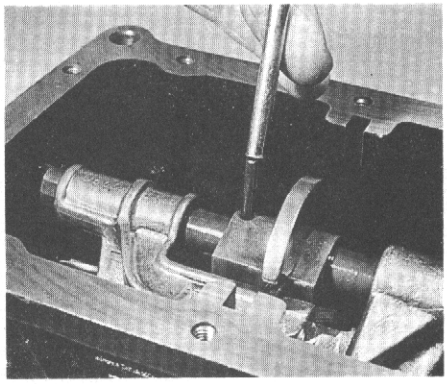
13.16C ... followed by the synchroniser ring and dog hub ...



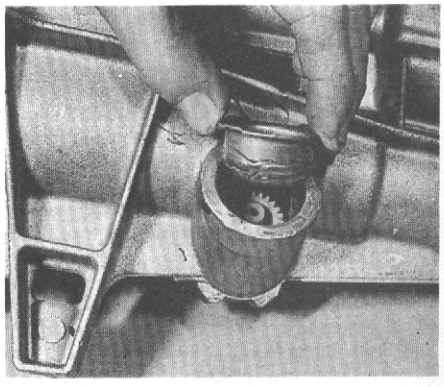
13.16D ... and the circlip



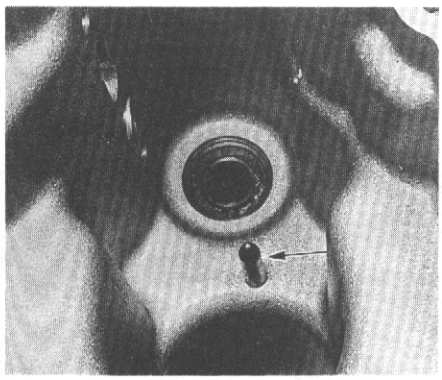
13.17 Check the distance between the circlip and the speedometer drivegear



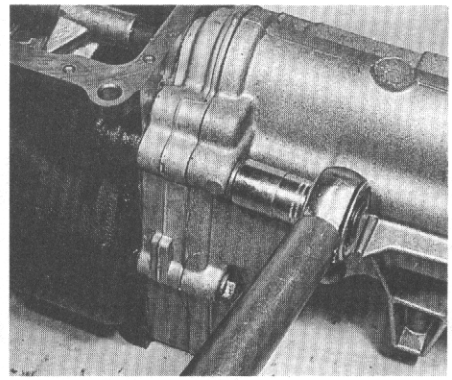
13.21 Drive the roll pin into the selector boss and selector shaft



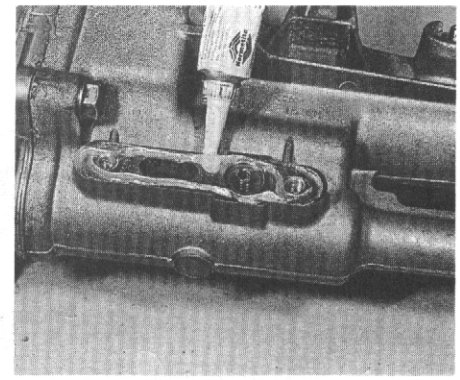
13.23 Fit the speedometer drivegear cover



13.25 Selector shaft centralising spring pin (arrowed)



13.26 Tighten the extension housing bolts



13.30 Apply sealer to the 5th gear locking plate location

respective synchroniser sleeves, position the selector boss and locking plate, and insert the selector shaft through the components into the front of the main casing. The roll pin hole in the selector boss must be towards the front.

20 If removed, refit the selector shaft centralising spring and 5th gear locking control by inserting the pin and plug. Note that during 1987, modifications were made to the locking control components, and the later components are not interchangeable with the earlier ones.

21 Align the holes, then drive the roll pin into the selector boss and selector shaft (photo).

22 Insert the selector locking pin and spring, apply sealer to the plug threads, then insert and tighten the plug using an Allen key.

23 Fit the speedometer drivegear to the rear extension housing. Apply a little sealer to the cover, then press it into the housing (photo).

24 Remove the temporarily fitted bolts from the intermediate housing, then select 4th gear.

25 Stick a new gasket to the extension housing with grease, and fit the housing to the intermediate housing. Take care not to damage the rear oil seal, and make sure that the selector shaft centralising spring locates on the pin (photo).

26 Insert the bolts and tighten them to the specified torque in diagonal sequence (photo). Before inserting the three bolts which go right through the main casing, apply sealer to their threads.

27 Select reverse gear and locate the connector on the rear of the selector shaft. Support the shaft with a piece of wood, then drive in the roll pin. Select neutral.

28 Press the rear cover into the extension housing.

29 Check that the 5th gear interlock sleeve is correctly aligned, then insert the 5th gear locking pin and spring.

30 Apply sealer to the 5th gear locking plate location on the extension housing, fit the locking plate, and insert and tighten the bolts to the specified torque (photo). When refitting the locking plate on later gearboxes with the modified locking control components (see paragraph 20), only tighten the bolts finger-tight at first. Check the engagement of all gears, changing the position of the plate slightly if necessary. Fully tighten the bolts when satisfied.

31 Fit the gearbox top cover, together with a new gasket, and tighten the bolts to the specified torque in diagonal sequence.

32 Fit the clutch release bearing guide sleeve (oil slot downwards), together with a new gasket, and tighten the bolts to the specified torque in diagonal sequence. If there is evidence of sealer on the bolt threads, re-coat them with fresh sealer before refitting.

33 Fit the clutch housing to the front of the gearbox together with a new gasket. Apply sealer to the bolt threads, then insert the bolts and tighten them to the specified torque in diagonal sequence.

34 Insert and tighten the reversing lamp switch in the extension housing.

35 Fit the clutch release bearing and arm with reference to Chapter 5.

36 After the gearbox has been refitted to the vehicle, fill it with the specified quantity and type of gear oil, and check the oil level as described in Section 2.

14 Fault diagnosis – manual gearbox

Symptom	Reason(s)
Gearbox noisy in neutral	Input shaft bearing worn Oil level low, or incorrect grade
Gearbox noisy when moving (in all gears)	Mainshaft bearing worn Oil level low, or incorrect grade
Gearbox noisy in only one gear	Worn, damaged or chipped gear teeth
Gearbox jumps out of gear	Worn synchroniser units Worn gears Worn selector components
Ineffective synchromesh	Worn synchroniser unit or ring
Difficulty in engaging gears	Worn selector components Seized input shaft pilot bearing (in flywheel) Clutch fault (see Chapter 5)

Note: *This Section is not intended as an exhaustive guide to fault diagnosis, but summarises the more common faults which may be encountered during a vehicle's life. Consult a dealer for more detailed advice.*