

## SECTION 14 . . DRUM ASSEMBLY

This section covers the overhaul of the drum assembly which comprises, the front and rear clutch units, the intermediate shaft, the oil delivery sleeve and the front and rear bands. Before this assembly can be removed, the gearbox must first be taken out of the car as described in Section 1 and then the following units removed.

- Fluid coupling, Section 2
- Side cover sump and filter, Section 3
- Control valve unit, Section 4
- Parking brake bracket and governor sleeve, Section 5
- Servo units, Section 6
- Rear pump and governor, Section 7
- Pressure control valve, Section 8
- Front pump, Section 9
- Reverse assembly, Section 13

### REMOVAL FROM GEARBOX

Bend back the tabs of the centre bearing cap lock-plate, unscrew the two retaining bolts and withdraw the cap (fig. 1). The drum assembly can now be lifted from the gearbox case, but care must be taken not to distort the bands as they are easily damaged. First lift the shaft sufficiently to allow the front band to be rotated so that both ends are accessible, then join them together with a suitable spring or piece of wire ; remove the assembly as shown in fig. 2 . This operation is best carried out with the aid of an assistant.

### DISMANTLING

Place the assembly on the holding stand (see Chapter 4) and with the spring ring pliers remove the spring

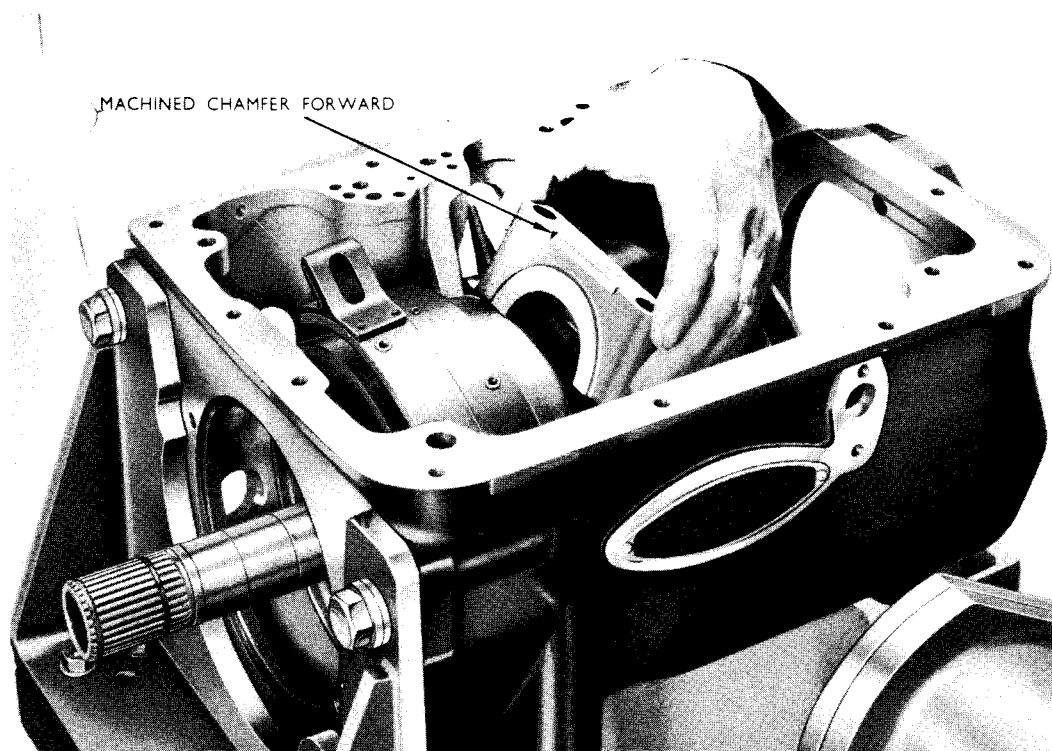


Fig. 1 Removing centre bearing cap

ring retaining the rear hub (fig. 3), then lift the rear drum assembly off the intermediate shaft.

Remove the thin steel thrust washer which is fitted between the spring ring retaining the oil delivery sleeve and the rear clutch hub. This washer is fitted only to drum assemblies having a modified rear clutch hub ; the hub being counterbored on the forward face to accommodate the washer.

Remove the spring ring retaining the oil delivery sleeve (fig. 4) and withdraw the sleeve.

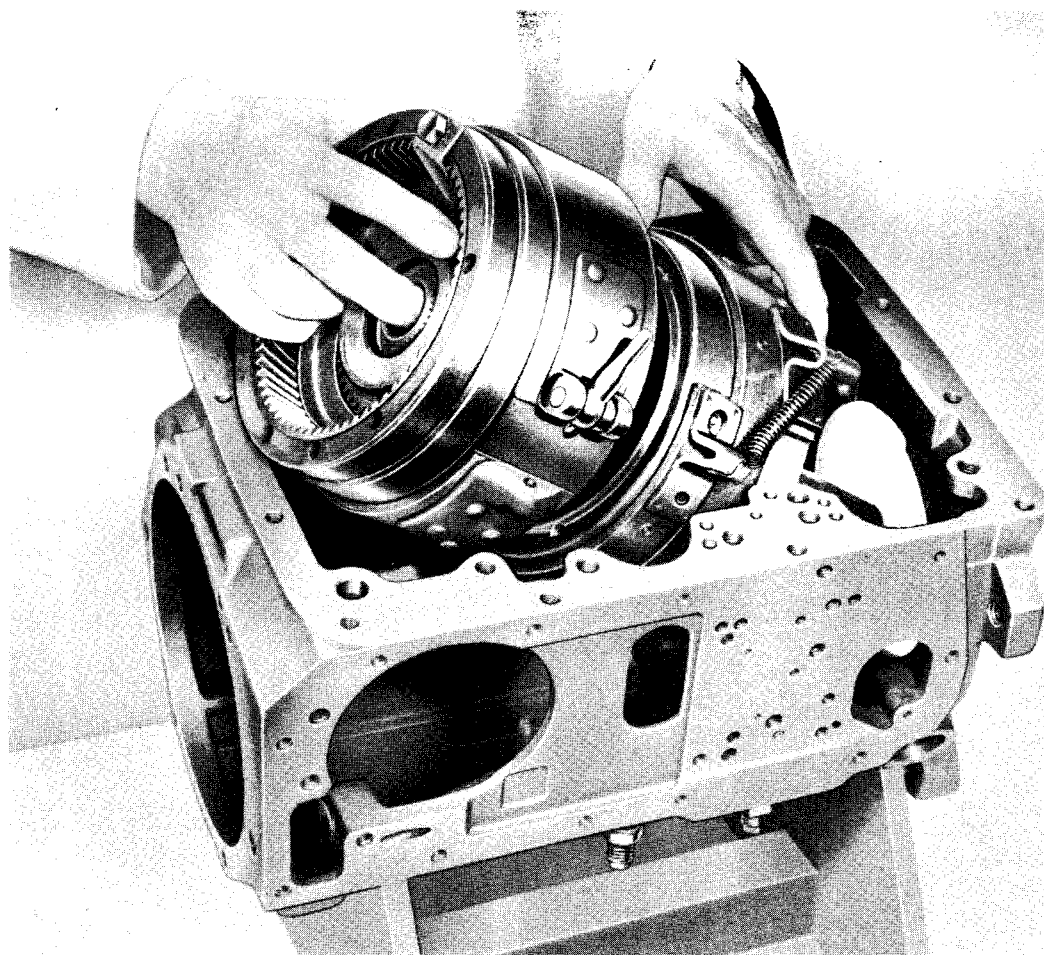
Remove the front drum retaining ring (fig. 5) taking care not to scratch the surface of the intermediate shaft, then lift off the drum assembly. Withdraw the steel and the bronze thrust washers from their recess in the front drum and label them for identification.

### ***Dismantling the front drum***

Figs. 8 and 9 of Chapter 1 show exploded views of the front and rear clutch units respectively; the number of clutch plates in each unit will of course vary according to the type and model of car to which the gearbox is fitted ; full details concerning these variations are given in the Spares Schedule.

Place the front drum assembly in a suitable press and apply sufficient pressure to the clutch cover to enable the spring ring to be prised from its groove as shown in fig. 6. Remove the drum assembly from the press and separate the clutch cover from the drum by tapping the sun gear with a plastic hammer.

Take out the six inner and outer clutch release springs and then lift out the complete pack of clutch



**Fig. 2 Removing drum assembly**

plates ; it is important that the plates are not separated prior to inspection.

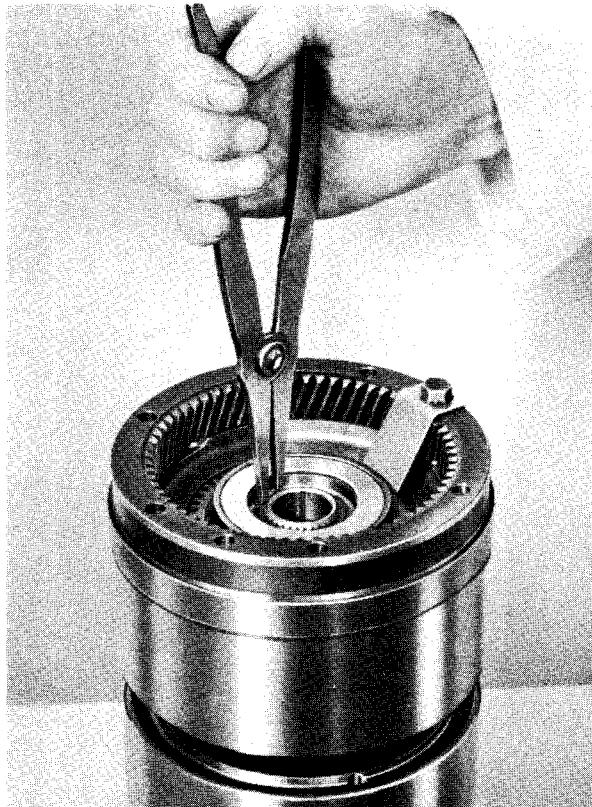
Remove the clutch piston from its annular housing in the clutch cover, by tapping the sun gear sharply with a plastic hammer to jump it out of its position.

Using a blunt screwdriver, remove and discard the oil seal rings and expanders from their respective grooves in the clutch piston and cover.

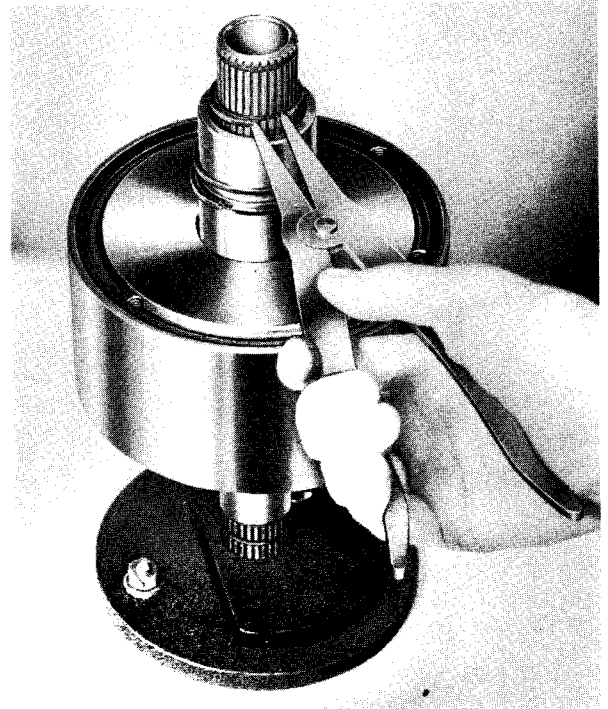
#### ***Dismantling the rear drum***

Remove the rear clutch hub retainer bracket (fig. 3) and withdraw the hub and bronze thrust washer ; the dismantling procedure is then similar to that described for the front drum The clutch release springs of this unit are fitted with small guide pins which should be removed with the springs.

The annulus gear is mounted to the rear drum with two setscrews and should only be removed for replacement purposes.



**Fig. 3 Removing rear drum retaining ring**



**Fig. 4 Removing delivery sleeve retaining ring**

## INSPECTION

Clean all parts thoroughly with clean petrol or paraffin, with the exception of the pack of clutch plates which should be inspected first, as described later in this section.

Inspect all surfaces of the clutch drums for scores and grooves ; only slight damage which can be removed by stoning is permissible. Check the clutch drive pins for security and if loose renew the drum.

Examine the gear teeth of the rear drum annulus gear and the intermediate shaft planet pinions. If damaged, check the gears with which they mesh and renew the particular unit or assembly as permitted by the Spares Schedule.

Examine the splines of the clutch drums and the intermediate shaft, for damage marks, burrs and excessive uneven wear ; only damage which can be rectified by light stoning should be accepted. If any splines are chipped, the particular unit should be renewed.



**Fig. 5 Removing front drum retaining ring**

Check the spring ring grooves of the intermediate shaft for burrs and ridges and the bearing surfaces for scores and scratches ; smooth off with a stone if necessary. Check the planet carrier and the outer diameter of the pinion thrust washers for cracks. Spin each planet gear to check for smooth running and feel them for side play which may indicate worn needle rollers or loose planet retaining pins. The front planet assembly must be renewed as a unit should any of the components become unserviceable, as dismantling is not permitted.

Inspect the clutch release springs for distortion and collapsed coils ; slight wear indicated by brightness of the outer coil diameter is acceptable. Examine the guide pins of the rear clutch springs for distortion and burred ends ; check that they are all of equal length. Inspect the clutch pistons for scores, cracks or distortion and ensure that the seal grooves are perfectly clean.

Examine the piston bore of the clutch cover for scores and the intermediate shaft bushes for security, signs of picking up or heavy wear. Check the seal groove for cleanliness.

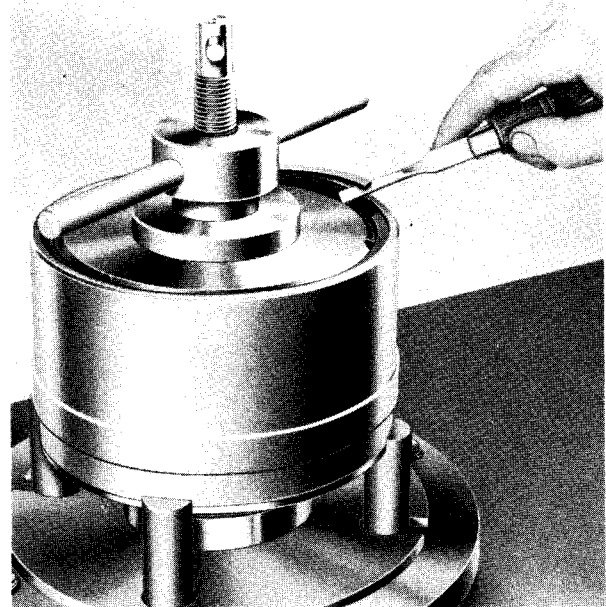
Inspect the oil delivery sleeve for scores; only damage which can be removed by light stoning is acceptable. Check the rings for freedom in their grooves and ensure that the grooves are clean. It is not necessary to remove the rings unless damage necessitates renewal.

Check the centre bearing cap and dowel pin for burrs and damage marks; light damage may be removed by stoning. If the dowel pin is loose or damaged it should be renewed. On late models of gearbox the dowel pin locating hole is drilled right through the cap and in such cases the longer dowel pin should be pressed in until the outer end becomes flush with the cap.

Make sure that the oil passages of the cap are clear then carry out a leakage check between the case and cap and the sleeve in the following manner.

#### ***Checking the oil delivery sleeve***

Dip the sleeve into clean gearbox fluid then refit it into the gearbox case, locating the dowel pin of the cap in one of the two oil holes of the sleeve instead of its correct location ; this blanks off the casing oilways. The cap must be fitted with the machined chamfer towards the front of the case and the bolts tightened



**Fig. 6 Removing clutch cover retaining ring**

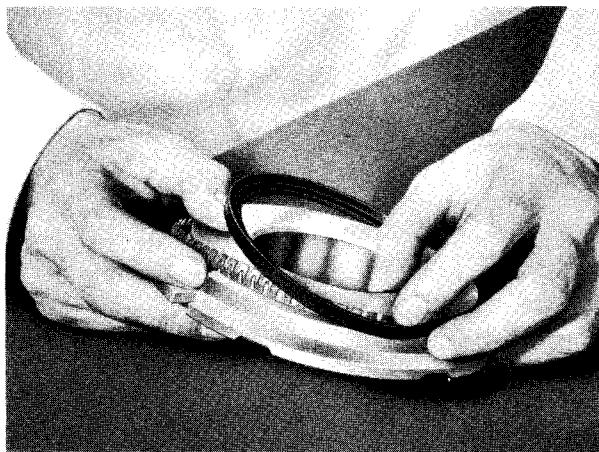
evenly to the correct loading. (If the sleeve can be rocked, it should be renewed). When air pressure is applied to the front and rear clutch passages, as shown for clutch testing in fig. 12, there should be no leakage between the sleeve and the case and cap. In the case of a new oil delivery sleeve, slight leakage may be rectified by very careful dressing of the cap horns. Should this prove unsuccessful, the cap and casing must be renewed.

When the foregoing checks are satisfactory, remove the sleeve ready for re-assembly.

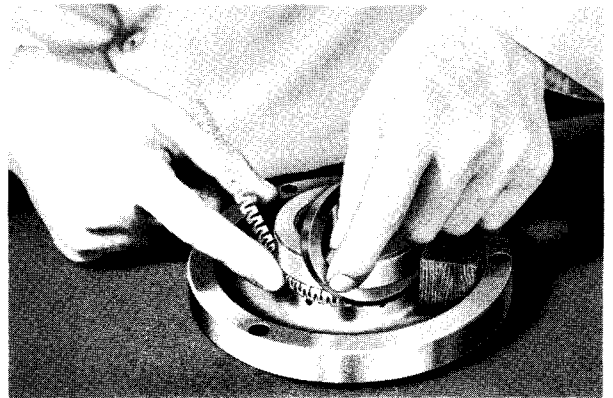
Having retained the clutch plates together, in the order in which they were fitted, it is now possible to inspect each of the surfaces in relation to that with which it mates. This is important as a rough surface of a driven plate may easily be the cause of excessive wear on the mating composition face of the drive plate.

At the clutch cover end of the pack it may be found that there are one or two extra steel plates. These 'spacing' plates should be labelled and kept separate from the other plates, as they are not hardened and vary in thickness.

Slight discolouration of the steel driven plates is acceptable but heavy discolouration caused by excessive overheating may have upset the heat treatment and be the cause of future failure if the plate is not renewed. Check that the driven plates are not distorted by using a surface plate and ensure that the finish of the surfaces is smooth and polished.



**Fig. 7 Fitting expander and seal to piston**



**Fig. 8 Fitting expander and seal to clutch cover**

The composition surfaces of the drive plates should be carefully checked for lifting, flaking and excessive wear. A plate will normally darken with use, but should it be almost black, indicating signs of burning, it must be renewed. If more than one plate is badly burnt the complete set of plates should be renewed.

The surface contour of the drive plates is undulated ; each plate should have six ' waves ' which must not be less than 0.015 in. deep. This can be checked by laying the plate on a surface table and sliding a feeler gauge into the spaces so formed ; if there is evidence of any other distortion the plate must be renewed.

Examine the drive plate serrations and the driven plate slots for burrs and signs of excessive wear. If necessary remove any burrs and then check that the plates slide smoothly over their respective splines or driving pins.

Examine all thrust washers for cracks ; if any washer is cracked, badly scored or worn excessively, it should be renewed and the respective mating surfaces inspected for burrs, scoring and sharp edges.

Examine the bands for loose rivets and worn linings ; if the rivets are loose or the face of a lining is worn down to the grooves, or has started to lift from the steel band the particular band assembly must be changed. When inspecting bands care must be taken not to distort them in any way as they are surface ground to fit the drums. If a lining is found to be badly impregnated with foreign matter, such as bronze caused by bush failure, it should be replaced.

Check the steel bands for distortion and cracks and the anchor ends for broken welds and worn sockets.

Check the rear band operating strut locating pin for security and the strut for play on the pin. If the play is excessive or the pin is loose, renew the complete band assembly.

## ASSEMBLY

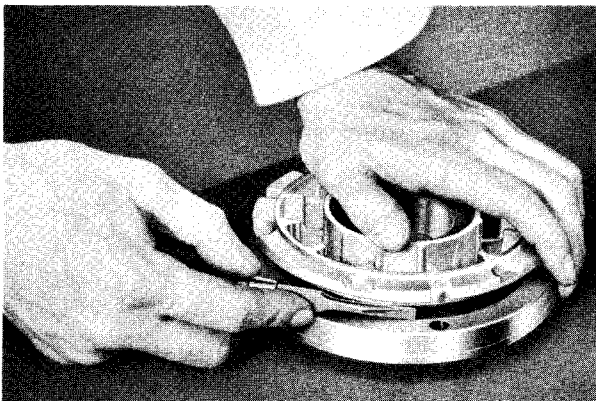
### *Front clutch*

Fit a new seal and expander to the piston in the manner illustrated in fig. 7 care must be taken to ensure that the rubber beds well down into its groove and that the expander does not protrude beyond the bottom edge of the rubber seal.

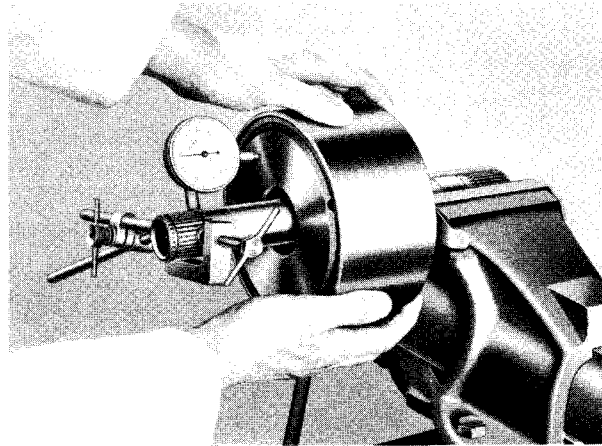
In a similar manner fit a new seal and expander to the clutch cover. After initially inserting the expander and seal into the groove a small wooden block should be placed between the seal and the inner circumference of the cover (fig. 8). This will stop the tendency for seal and expander to creep out of the groove during fitting. Remove the wooden block and check that the expander does not protrude below the seal.

The direction in which the protruding lip of the seal faces is important and must be as shown in the respective illustrations.

With the seals correctly in position the piston may now be inserted into the cover after first smearing the rubbers with 'Gargoyle' grease. The lip of the outer



**Fig. 9** Fitting piston to clutch cover



**Fig. 10** Checking front drum end float

seal should be initially introduced into the cover using the side of a blunt screwdriver drawn over the seal edge as shown in fig. 9; after which the two components can be manually pressed firmly together. Line up the square notches in the piston with the three holes in the cover.

Put the intermediate shaft into the holding fixture clutch hub uppermost. Place the front drum over the shaft so that it rests on the planet gears with its driving pins pointing upwards. Lubricate the surfaces of the clutch plates with clean gearbox fluid and then instal them, fitting a composition drive plate first and then a steel driven plate and so on alternatively until the complete pack is fitted.

Ensure that each composition plate slides freely over the clutch hub splines and that the steel plates are fitted with the square notches over the driving pins.

It should be noted that previously labelled spacing plates must be fitted last, but the thickness may have to be re-assessed as described later.

Drop the six pairs of clutch release springs into their locating holes formed by the plates and then instal the cover into the drum, sun gear first, making sure that the springs engage into the pockets of the clutch piston.

Remove the complete assembly from the intermediate shaft and using a suitable press apply sufficient pressure to the clutch cover to enable the spring ring to be refitted into its groove. Ensure that the ring beds

firmly into its groove and then release the pressure. After removing the assembly from the press, ensure that the outer shoulder of the clutch cover protrudes evenly through the inner circumference of the retaining ring ; if necessary lightly tap the cover into its correct position using a plastic hammer.

The assembly of the clutch plates should now be checked and this is best accomplished by placing the fingers on the teeth of the drive plates and lifting and turning the plates. When correct, the clearance should be just sufficient to allow free rotation without binding.

If the clutch is too free and end float can be felt, or if the plates are binding or solid, it will be necessary to alter the thickness of the spacing plate or plates accordingly.

These plates are supplied in various thicknesses (see Spares Schedule) and can be fitted singly or paired in any combination to give the requisite clearance.

The total number of spacing plates fitted must not exceed two and they must never be fitted in any position other than between the clutch cover and the first steel 'driven' plate.

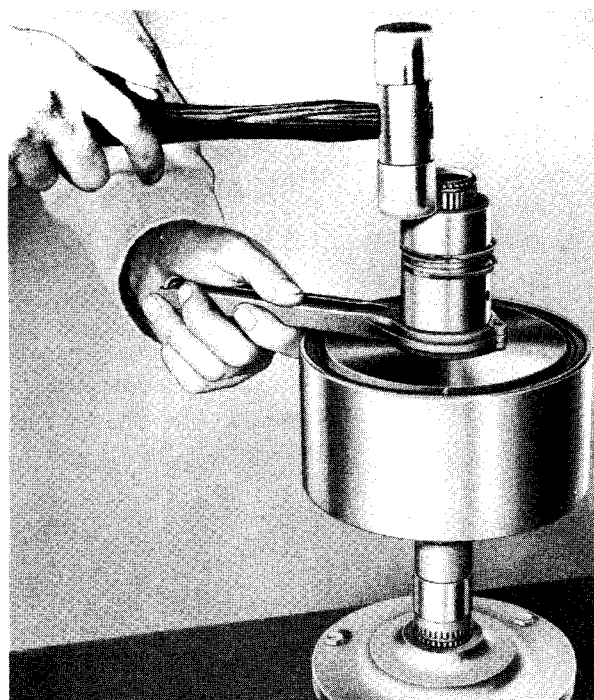
#### **Rear clutch**

If previously removed, refit the annulus gear, screwing up the setscrews evenly ; before final tightening tap the end face of the gear with a plastic hammer to ensure correct location. Assembling of the rest of the unit is now similar to that of the front clutch with the exception that there is no need to mount it on the intermediate shaft ; it is however advisable to temporarily fit the clutch hub to ensure that the drive plates slide freely on the splines. After assembly remove the hub and check and adjust the clutch plate clearance in the same way described for the front clutch.

Refit the hub together with the large bronze thrust washer. The washer should be coated with petroleum jelly to ensure that it is retained in the deep counterbore of the hub. Rotate the hub to engage the splines of the drive plates ; when properly installed, the hub should be flush or slightly below the counterbore of the drum. Fit the hub retainer bracket using a reverse drive flange retaining bolt.

The drum assemblies may now be refitted to the shaft in the following order. Clean gearbox fluid should be used liberally during assembly.

1. Fit the front drum over the shaft on to the hub, rotating it backwards and forwards until all the drive plates are correctly located.
2. In the following order fit the bronze washer, the steel (selective) washer and the spring retaining ring. The selective washer may have to be changed if, as a result of the following endfloat check the clearance is found to be outside the limits.
3. Remove the shaft and drum from the holding fixture and place the shaft in a vice using fibre clamps. With a dial indicator mounted as shown in fig. 10, measure the endfloat of the drum assembly. If outside the limits given in the 'Summary' replace the steel thrust washer for one of suitable thickness, details of which are given in the Spares Schedule.
4. Place the assembly back in the holding stand and using the ring compressing tool (see Chapter 4) fit the oil delivery sleeve, entering the end which



**Fig. 11 Fitting oil delivery sleeve**

has the rings nearest the end of the sleeve first (fig. 11). If the sleeve is too tight to fit by hand, a plastic hammer may be used as shown in the illustration ; only light taps should be necessary. Push the sleeve fully home into the bore of the drum and then fit the spring retaining ring.

5. Refit the thin steel thrust washer, if one was originally fitted, or if a new rear clutch hub has been fitted which has the appropriate counter bored location for a thrust washer.
6. Fit the ring compressing tool over the two exposed rings on the oil delivery sleeve. Slide the rear drum over the shaft and lower it carefully on to the delivery sleeve ; when fully home remove the compressing tool.
7. Fit the rear drum spring retaining ring.

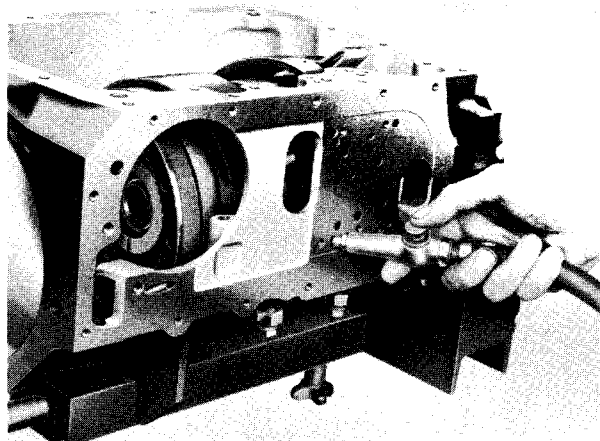


Fig. 12 Checking the clutches

## REFITTING TO THE GEARBOX

Place the bearing cap in position on the oil delivery sleeve (machined flat forward), making sure that the dowel locates positively in its correct hole.

On the modified type of cap fitted with the long dowel pin, incorrect location of the dowel will be evident by the lockplate washer being forced up when the securing setscrews are tightened. If this occurs remove the cap, tap the dowel pin back into position then check the delivery sleeve and the pin for damage before re-assembling correctly.

Fit the front band over its drum so that the smaller of the two anchorage ends will locate with the front band adjusting screw when the assembly is installed. To retain the front band on the drum during installation join the two ends together with a suitable spring or piece of wire.

Slide the rear band on to its drum and then instal the assembly into the gearbox in the reverse manner to removal (fig. 2) ; when in position remove the spring or wire from the front band.

An alternative method is to place the front band into position in the gearbox, insert the shaft assembly through the band and while still tilted slide the rear band on to its drum.

Before securing the bearing cap ensure that the band anchorage ends are properly located on their respective adjusting screws ; then fit the two bearing cap setscrews together with a new tab washer and tighten evenly to the correct torque loading given in the Summary.

Ensure that the drums revolve smoothly on the intermediate shaft then check the action of the clutches by blowing compressed air through the passages illustrated in fig. 12. Correct operation can be both heard and felt. Check thoroughly for air leaks during this test.

Refit the remaining assemblies in the reverse order to that of dismantling and then road test the gearbox as described in Chapter 2.