

SECTION F

THE GEARBOX

(1½ and 2½ LITRE)

General Description.

Section No. F.1	Removal and replacement of the gearbox.
Section No. F.2	Dismantling and reassembling the gearbox.
Section No. F.3	To dismantle the mainshaft.
Section No. F.4	To reassemble the gearbox.
Section No. F.5	Modified speedometer drive assembly (1½ litre)
Section No. F.6	Modified oil level (2½ litre).

GENERAL DESCRIPTION

The gearbox has four forward speeds and one reverse. Synchromesh is incorporated on second, third and top gears.

Gear changing is effected by a remote control lever located centrally in the car.

Top gear is a direct drive and third and second gears are in constant mesh. First and reverse are obtained by sliding spur gears.

Section F.1

REMOVAL AND REPLACEMENT OF THE GEARBOX

Remove both the front seats and take off the gearbox cowl, gear lever, carpets and floorboards as described in Section A.30. Remove the gearbox oil drain plug and drain the oil.

Disconnect the intermediate shaft at the front end, pull out the clevis pin at the clutch cross-shaft universal joint and disconnect the speedometer drive and reverse light cable. Disconnect the rear steady cable.

Jack up the engine under the rear of the sump and remove the rear mounting attachment bolts. Next remove the bolts holding the aluminium plate on the front of the bell housing. Remove the starter and rest it on the frame. Take off the bell housing nuts (2½ litre) and draw the gearbox back clear of the clutch, when it can be lifted out. On the 1½ litre the bell housing is held by set screws.

Section F.2

DISMANTLING AND REASSEMBLING THE GEARBOX

Remove the drain plug and drain out the oil if this has not already been done. Then take off the clutch carbon release bearing from its forked arm and detach the bell housing from the gearbox.

Two steel washers are placed between the rear face of the bell housing and the front bearing in the gearbox. These should be taken out as they might stick to the bell housing or the bearing. It is essential that they be replaced.

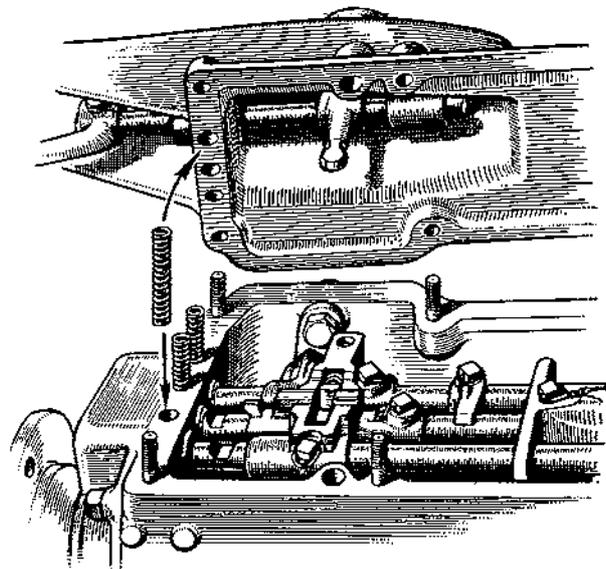
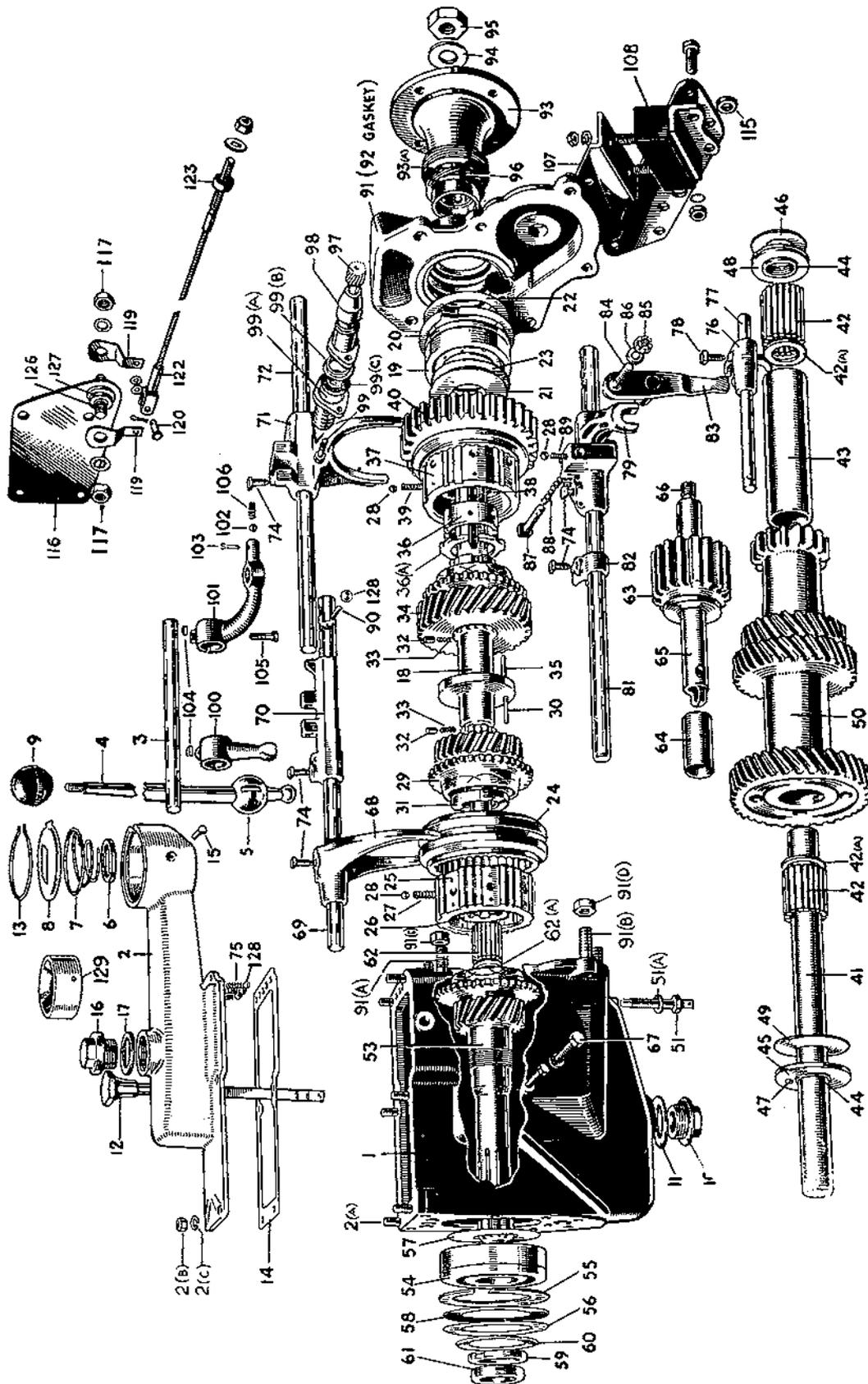


Fig. F.1.
The location of the selector locking ball springs.

THE GEARBOX COMPONENTS (2½ LITRE)



KEY TO GEARBOX COMPONENTS (2½ LITRE)

No.	Description	No.	Description	No.	Description
1.	Gearbox.	41.	Layshaft.	85.	Nut—reverse gear link.
2.	Gearbox cover.	42.	Roller—layshaft.	86.	Washer—reverse gear link.
2 (A).	Stud—gearbox (for cover).	42 (A).	Washer—layshaft roller.	87.	Plunger—reverse selector.
2 (B).	Nut—gearbox cover stud.	43.	Spacer—layshaft roller.	88.	Spring—reverse selector.
2 (C).	Washer—gearbox cover stud.	44.	Retainer—layshaft roller.	89.	Spring—reverse selector ball.
3.	Shaft—gearbox remote control.	45.	Washer—layshaft thrust (front).	90.	Pin—interlock for shaft.
4.	Lever assembly—gear change.	46.	Washer—layshaft thrust (rear).	91.	Casing—speedometer gear.
5.	Ball—gear change lever.	47.	Peg—layshaft roller retaining.	91 (A).	Stud—speedometer gear casing.
6.	Retainer—gear change lever ball.	48.	Plate—layshaft roller retaining (rear).	91 (B).	Stud—speedometer gear casing.
7.	Spring—remote control ball.	49.	Plate—layshaft roller retaining (front).	91 (C).	Nut (for stud).
8.	Plate—retaining—for spring.	50.	Gear unit—layshaft.	91 (D).	Nut (for stud).
9.	Knob—gear change lever.	51.	Screw—layshaft.	92.	Gasket—speedometer gear casing.
10.	Plug—gearbox drain.	51 (A).	Spring washer—layshaft screw.	93.	Flange—universal joint.
11.	Washer—gearbox drain plug.	53.	Drive gear.	93 (A).	Ring—universal joint.
12.	Indicator—gearbox oil level.	54.	Bearing—drive gear.	94.	Washer—universal joint.
13.	Circlip—gearbox cover.	55.	Circlip—drive gear bearing.	95.	Nut—universal joint.
14.	Gasket—gearbox cover.	56.	Guard—drive gear bearing.	96.	Gear—speedometer.
15.	Snug—gear change lever ball.	57.	Plate—drive gear.	97.	Pinion—speedometer.
16.	Plug for gearbox cover assembly.	58.	Spring plate—drive gear.	98.	Speedometer bearing.
17.	Washer—plug.	59.	Locknut—drive gear.	99.	Adaptor bolt—speedometer drive.
18.	Mainshaft.	60.	Washer—drive gear.	99 (A).	Adaptor—speedometer drive.
19.	Bearing—mainshaft.	61.	Oil seal—drive gear.	99 (B).	Ferrule—speedometer drive adaptor.
20.	Circlip—mainshaft bearing.	62.	Bearing—drive gear spigot.	99 (C).	Oil seal—speedometer drive.
21.	Guard—mainshaft bearing.	62 (A).	Washer—drive gear spigot.	100.	Lever—selector (front).
22.	Plate—mainshaft bearing.	63.	Reverse gear.	101.	Lever—selector (rear).
23.	Spring plate—mainshaft bearing.	64.	Bush—reverse gear.	102.	Ball—selector lever.
24.	Dog—mainshaft striking.	65.	Shaft—reverse shaft.	103.	Split pin—selector lever.
25.	Sliding hub—mainshaft—top and 3rd.	66.	Plug—reverse shaft.	104.	Key—selector lever.
26.	Cone—mainshaft sliding hub.	67.	Screw—reverse shaft.	105.	Bolt—selector lever.
27.	Spring—mainshaft sliding hub.	68.	Shifter—top and 3rd gear.	106.	Spring—selector lever.
28.	Ball—mainshaft sliding hub.	69.	Shaft—top and 3rd gear shifter.	107.	Plate—engine mounting (rear).
29.	Gear—mainshaft 3rd speed.	70.	Selector—top and 3rd gear.	108.	Block—engine mounting (rear).
30.	Roller—mainshaft 3rd speed gear.	71.	Shifter—1st and 2nd gear.	115.	Spacing washer—engine mounting plate.
31.	Retaining plate—mainshaft 3rd speed.	72.	Shaft—1st and 2nd gear shifter.	116.	Steady plate—engine—gearbox.
32.	Plunger—mainshaft 3rd speed.	74.	Lock screw for shifter.	117.	Nut—engine steady pin.
33.	Spring—mainshaft 3rd speed plunger.	75.	Spring—interlock ball.	119.	Link—engine steady.
34.	Gear—mainshaft 2nd speed.	76.	Shifter—reverse.	120.	Pin—engine steady cable jaw.
35.	Roller—mainshaft 2nd speed.	77.	Shaft—reverse shifter.	122.	Cable—engine steady (rear).
36.	Lock washer—mainshaft 2nd speed.	78.	Screw—reverse shifter.	123.	Rubber washer—engine steady cable.
36 (A).	Washer—mainshaft 2nd speed.	79.	Selector—reverse.	126.	Pin—engine steady.
37.	Sliding hub—mainshaft 1st speed.	81.	Shaft—reverse selector.	127.	Bush—engine steady.
38.	Cone—mainshaft 1st speed sliding hub.	82.	Steady—reverse selector.	128.	Ball—interlock.
39.	Spring—mainshaft 1st speed sliding hub.	83.	Link—reverse gear.	129.	Liner—gear lever socket.
40.	Gear—mainshaft 1st speed.	84.	Bolt—reverse gear link.		

F THE GEARBOX

(1½ and 2½ LITRE)

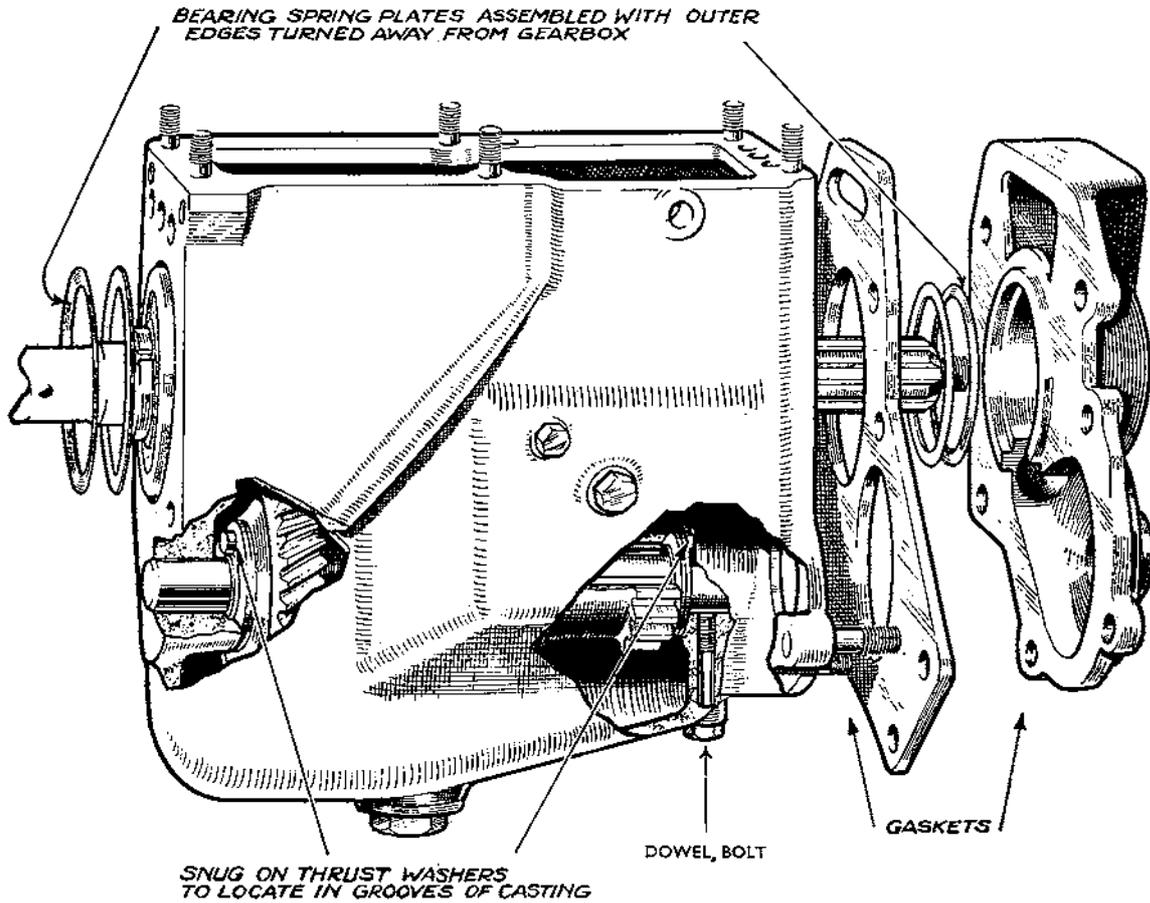


Fig. F.2.

The 1½ litre gearbox partly sectioned to show the position of the spring washers on the mainshaft and the snugs on the layshaft washers which engage grooves in the gearbox casting.

If the top cover of the gearbox has not been removed, take it off carefully and lift out the selector ball springs.

Unlock and slacken the selector fork set screws so that top and reverse gears can be engaged together in order to lock the gear wheels.

Remove the split pin and unscrew the nut holding the driving flange in position, which can then be drawn off complete with the oil return scroll and speedometer drive gear.

Note.—Before removing the driving flange, mark the splines for subsequent replacement in the same relative position.

Next undo the nuts holding the rear cover, which may be removed complete with the speedometer drive pinion.

Take out the gear selector fork set screws and stops and drive out each selector rod towards the rear of the gearbox. Take care to collect the selector locating and interlocking balls and plunger as they are released.

Remove the layshaft retaining screw, which will be found at the lower rear corner of the gearbox, and

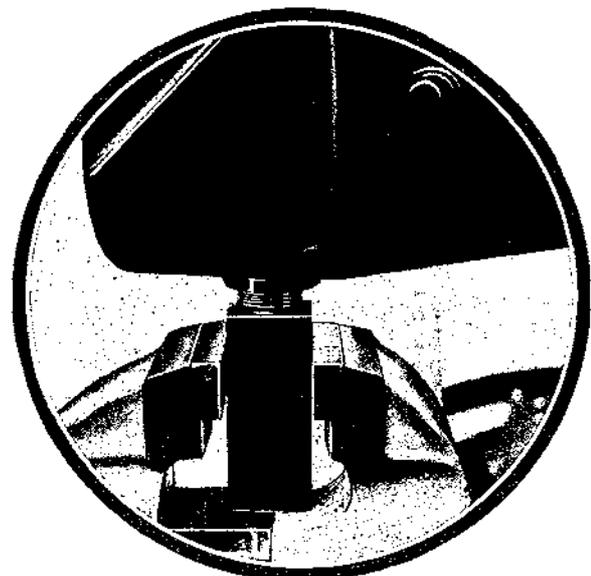


Fig. F.3.

While working on the gearbox this special plug will greatly facilitate all the various dismantling sequences.

then tap out the layshaft spindle, using a dummy shaft $7\frac{9}{16}$ in. long \times $\frac{3}{4}$ in. diameter (192 mm. \times 19 mm.).

Remove the dummy shaft carefully so that the layshaft cluster falls to the bottom of the box and then drive out the primary shaft complete with its ball bearing, by tapping on the rear end of the mainshaft.

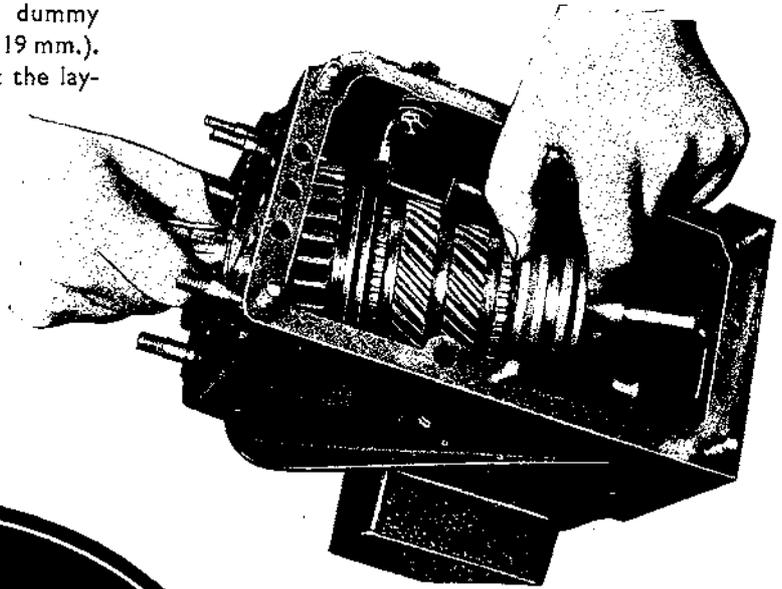
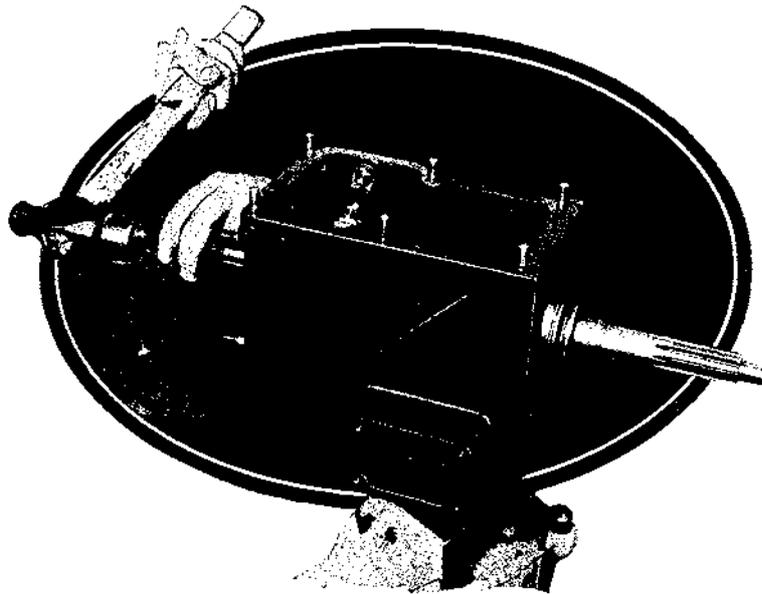


Fig. F.5.

(Above) Removing the sliding shaft assembly from the box.

Fig. F.4.
(Below) Driving out the sliding shaft forwards prior to removal.



which is exposed by a slot in the washer, must be depressed and the washer turned until the male splines are in line with the female splines on the shaft, when the washer may be removed. The gear may then be slipped off and the needle rollers collected.

The second speed gear is located by a splined washer held by a spring-loaded plunger. There is also a split thrust washer.

In order to remove the gear, depress the plunger by means of a piece of wire inserted through the holes in the synchro-collar and the locking washer.

The collar may then be turned and slipped off, the split thrust washer can be lifted out, the gear taken off and the needle rollers collected.

Take out the spigot needle bearing and tap the mainshaft assembly back again so that the rear end ball bearing can be pulled off.

Now lift out the mainshaft assembly through the top of the box, making quite sure that it is guided through the cut-away provided.

It will then be possible to lift out the layshaft cluster, after which the reverse gear link can be removed from the side of the box. Take out the set screws which retain the reverse fork shifter and shaft. They can then be drawn out. Remove the reverse gear.

Section F.3

TO DISMANTLE THE MAINSHAFT

Slide off both synchromesh assemblies. Then remove the third speed gear which is held in position by a ring locked by a plunger. This ring is virtually a splined locking washer, and in order to remove it, the plunger,

Section F.4

TO REASSEMBLE THE GEARBOX

Start by assembling the reverse gear shifter and shaft. The fork grooves of the shifter must always be at the front.

Fit the set screws and assemble the link.

Next fit the distance tube inside the layshaft cluster, together with the two small thrust washers, one at each end.

Place some thick grease on the inside of the cluster and then insert the dummy shaft, after which the

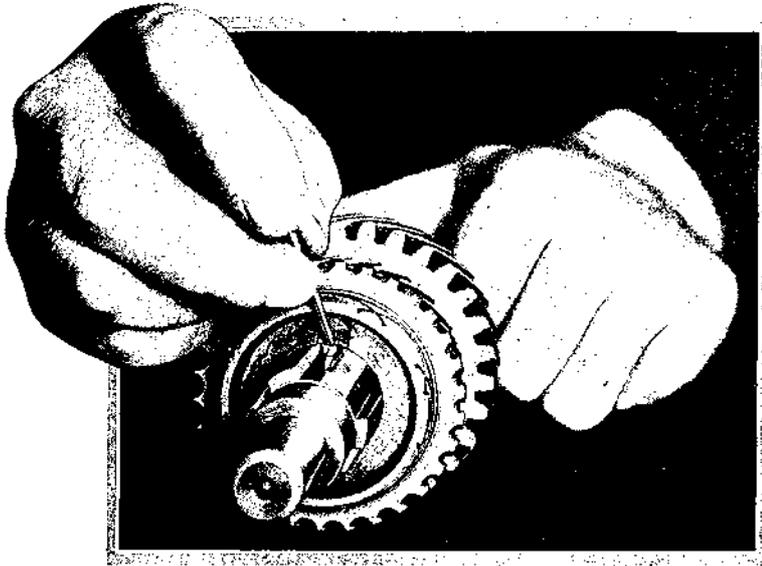


Fig. F.6.

(Left) The third-speed gear is removed from the sliding shaft by depressing the locking plunger against its spring and moving the locking collar round until it can be withdrawn along the splines.

needle rollers can be inserted in position. There are fifteen rollers at either end and these should be followed by the two stepped thrust collars with the larger diameter inwards. Place the large bronze thrust washer at the front end and follow this with the pegged washer.

The small bronze thrust and pegged washers fit at the rear end. The whole assembly can then be lowered into the bottom of the box.

Reassembly of the mainshaft should commence by inserting the spring and plunger at the front end of the shaft and fitting the third gear with its forty-two needle rollers, the procedure being as follows :— Fit the gear wheel and its rollers, slide on the splined thrust washer, depress the plunger through the hole in the gear, push the washer home and then turn to lock it in position.

The next gear to assemble is the second-speed wheel with its twenty-four needle rollers, after the plunger and spring have been inserted. Place the split thrust washer against the gear so that the tab is in line with the plunger. Then slide on the collar, making quite sure that the slots are in line with the tabs on the split thrust washer. Depress the plunger by means of a wire through the hole in the synchro-cone, push the collar right on and then turn it. A sharp click will indicate when the plunger registers correctly. After that slide on the synchro assemblies, using slave components with their internal teeth relieved to guide the balls into position, as shown in Figs. F.7 and F.8.

The mainshaft is then ready for insertion in the gearbox and it should be lowered into place. The dished oil thrower washer should then be fitted with the inner or dished portion nearest the bearing, which

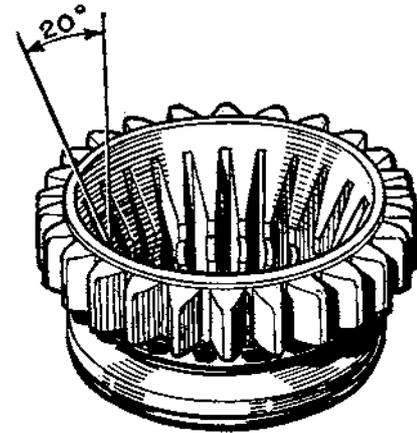


Fig. F.7.

This is the slave dog for the assembly of the first-speed gear, showing the relieved teeth.

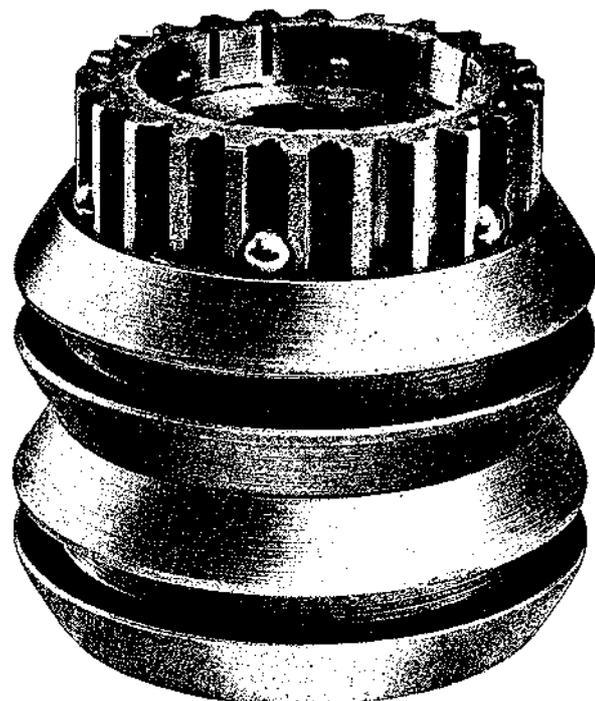


Fig. F.8.

The method of reassembling the third- and fourth-speed synchro mesh hub assembly in order to keep the locating balls and their springs under control. A striking dog with relieved teeth is used to lead the balls into their housings.

BEARING SPRING PLATES ASSEMBLED WITH OUTER EDGES TURNED AWAY FROM GEARBOX

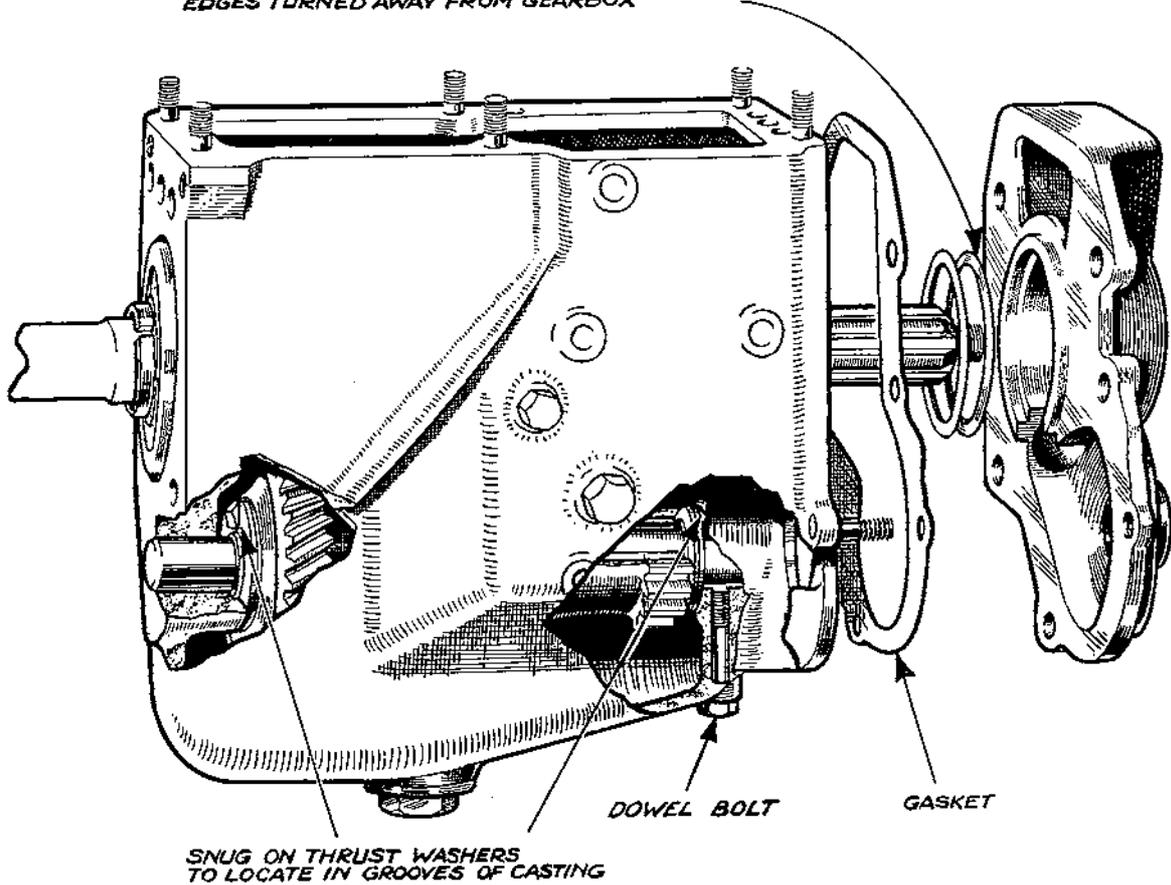


Fig. F.9.

The 2½ litre gearbox partly sectioned to show the correct fitting of the bearing spring plates and the location of the snugs on the thrust washers which must engage the slots in the gearbox bosses.

should now be tapped into place. Make sure that the spring ring is towards the rear and fitted before the race is fully tapped home.

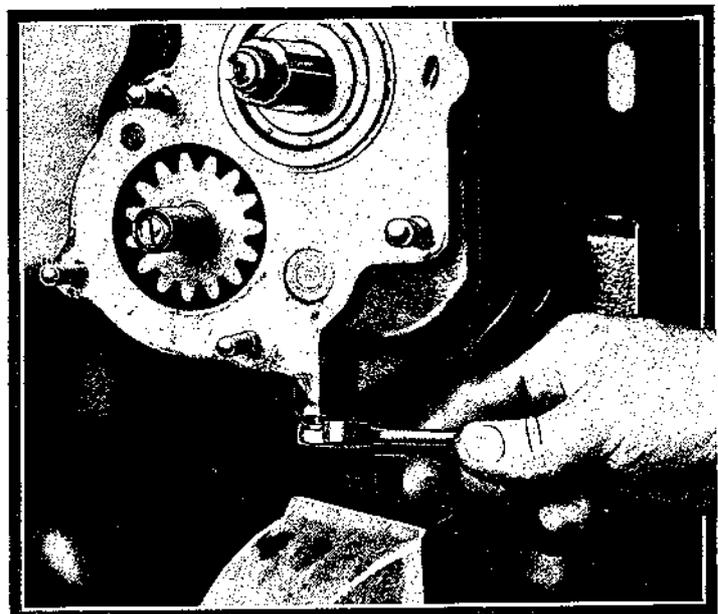
The primary shaft should now be assembled by fitting the dished oil thrower washer (inner edge to bearing) and then the ball bearing itself, complete with spring ring, towards the front end of the shaft. Fit the lock washer and tighten the nut, which has a left-hand thread. The fifteen needle rollers in the spigot bearing can be assembled with the aid of a ¾ in. (19 mm.) diameter bar and some thick grease. Then insert the primary shaft and tap it into its housing and over the main shaft.

Next, lift the layshaft cluster into position so as not to disturb the thrust washers and gently tap the layshaft spindle into position. Fit the layshaft locking bolt and washer.

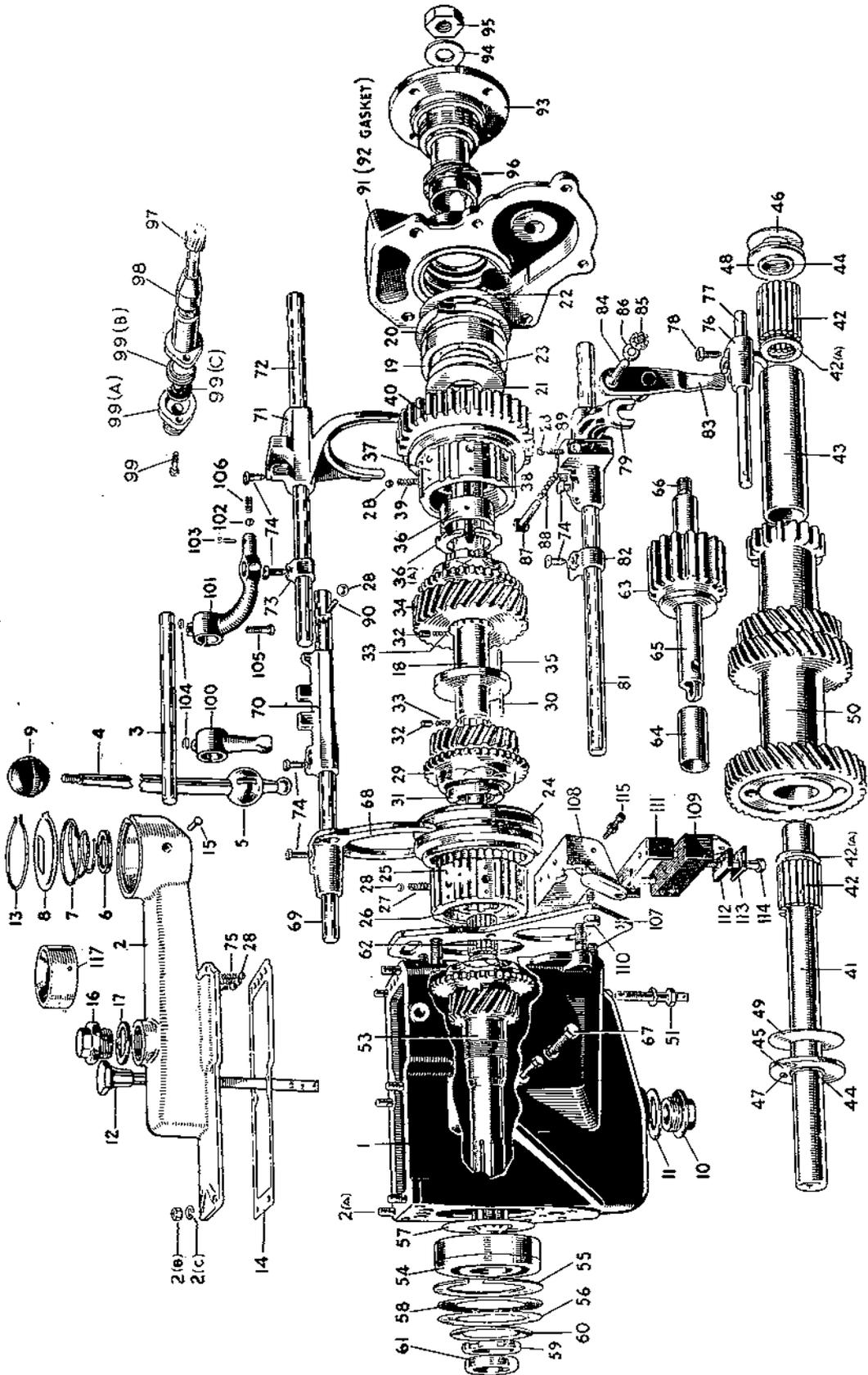
Insert the selector rods, starting with the reverse rod, which is on the left-hand side and has a steady fork and selector jaw.

Fig. F.10.

Removing the layshaft locating dowel bolt.



THE COMPONENT PARTS OF THE GEARBOX (1½ LITRE)



KEY TO GEARBOX COMPONENTS (1½ LITRE)

No.	Description	No.	Description	No.	Description
1.	Gearbox.	38.	Sliding hub cone.	79.	Reverse gear shifter selector.
2.	Gearbox cover for remote control.	39.	Sliding hub spring.	81.	Reverse gear selector shaft.
2A.	Gearbox cover stud.	40.	1st speed gear.	82.	Reverse gear selector steady.
2B.	Gearbox cover stud nut.	41.	Layshaft.	83.	Reverse gear link.
2C.	Gearbox cover stud spring washer.	42.	Layshaft roller bearing.	84.	Reverse gear link pin.
3.	Gearbox change remote control shaft.	42A.	Layshaft roller washer.	85.	Reverse gear link pin nut.
4.	Gear change lever.	43.	Layshaft roller spacer.	86.	Reverse gear link pin washer.
5.	Gear change lever ball.	44.	Layshaft roller retainer.	87.	Reverse gear plunger.
6.	Gear change lever ball retainer.	45.	Layshaft thrust washer—front.	88.	Reverse gear plunger spring.
7.	Remote control ball spring.	46.	Layshaft thrust washer—rear.	89.	Reverse gear plunger ball spring.
8.	Retaining plate for spring.	47.	Layshaft thrust washer peg.	90.	Interlock pin.
9.	Gear change lever knob.	48.	Layshaft washer—rear.	91.	Speedometer gear casing.
10.	Gearbox drain plug.	49.	Layshaft washer—front.	92.	Speedometer gear casing gasket.
11.	Gearbox drain plug gasket.	50.	Layshaft gear unit.	93.	Speedometer gear casing flange.
12.	Gearbox oil level indicator.	51.	Layshaft screw.	94.	Universal joint flange washer.
13.	Spring circlip for gearbox cover.	53.	Drive gear.	95.	Universal joint flange nut.
14.	Gearbox cover gasket.	54.	Drive gear bearing.	96.	Speedometer gear.
15.	Snug for gear change lever ball.	55.	Drive gear bearing circlip.	97.	Speedometer gear pinion.
16.	Plug—gearbox cover.	56.	Drive gear bearing guard.	98.	Speedometer gear pinion bearing.
17.	Gearbox cover plug washer.	57.	Drive gear bearing plate.	99.	Speedometer pinion bearing screw.
18.	Mainshaft.	58.	Drive gear bearing nut.	99A.	Speedometer drive adaptor.
19.	Mainshaft bearing.	59.	Drive gear bearing nut lock washer.	99B.	Speedometer drive adaptor ferrule.
20.	Mainshaft bearing circlip.	60.	Drive gear oil seal.	99C.	Speedometer drive oil seal.
21.	Mainshaft bearing guard.	61.	Drive gear roller bearing.	100.	Selector lever—front.
22.	Mainshaft bearing plate.	62.	Reverse gear.	101.	Selector lever—rear.
23.	Mainshaft bearing striking dog.	63.	Reverse gear bush.	102.	Selector lever ball.
24.	Mainshaft sliding hub—top and 3rd.	64.	Reverse gear shaft.	103.	Selector lever split pin.
25.	Mainshaft sliding hub cone.	65.	Reverse gear shaft plug.	104.	Selector lever key.
26.	Mainshaft sliding hub spring.	66.	Reverse gear shaft screw.	105.	Selector lever bolt.
27.	Mainshaft sliding hub ball.	67.	3rd and 4th gear shifter.	106.	Selector spring.
28.	Mainshaft sliding hub ball.	68.	3rd and 4th gear shifter shaft.	107.	Rear bearer plate.
29.	Mainshaft 3rd speed gear.	69.	3rd and 4th gear shifter selector.	108.	Engine support bracket—rear.
30.	3rd speed gear roller.	70.	1st and 2nd gear shifter.	109.	Engine support bracket bolt.
31.	3rd speed gear collar.	71.	1st and 2nd gear shifter shaft.	110.	Engine support bridge piece.
32.	3rd speed gear plunger.	72.	2nd gear stop.	111.	Rubber washer for bolt.
33.	3rd speed gear spring.	73.	Shifter shaft screw.	112.	Washer for bolt.
34.	2nd speed gear.	74.	Spring—interlock ball.	113.	Bolt (block to bracket).
35.	2nd speed gear roller.	75.	Reverse gear shifter.	114.	Set screw (mounting block and bracket).
36.	2nd speed gear collar.	76.	Reverse gear shifter shaft.	115.	Liner for gear lever socket.
36A.	2nd speed gear washer.	77.	Reverse gear shifter shaft screw.	117.	
37.	Sliding hub—1st and 2nd.	78.			

Now tilt the box to the left and insert the interlock ball in the cross drilling in the rear wall before the top and third gear rod, which is the centre one, is inserted. Insert the next interlocking ball before the last rod goes in.

One flat and one dished washer should be inserted between the rear cover and the rear ball bearing. The flat washer goes next to the bearing and this is followed by the dished washer, which should have its inner edge towards the flat washer.

Assemble the bell housing with the same number of washers as originally fitted between it and the front bearing.

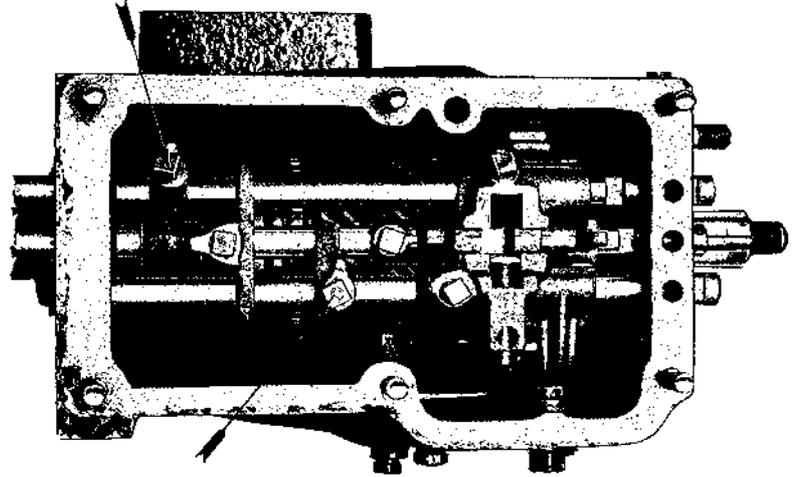


Fig. F.11.

The location of the selector stops for first and second gear (above) and reverse selector stop (below) on 1½ litre. There are no first and second stops on the 2½ litre gearbox.

Section F.5

MODIFIED SPEEDOMETER DRIVE ASSEMBLY (1½ LITRE)

Speedometer troubles such as sticking needles or erratic action have been traced on early 1½ litre models to oil leakage from the gearbox speedometer drive which finally finds its way into the speedometer head. A modified speedometer drive assembly is fitted to engines from No. RMA.8702 onwards to overcome this trouble.

Reference to the illustration on page F.8, which shows both types of speedometer drive (the modified type being inset in the top right-hand corner) will enable the two types to be identified. The later type has an oil seal which prevents the passage of oil from the gearbox into the speedometer cable.

If oil has found its way into the casing, the cable should be withdrawn from the casing and both washed thoroughly in petrol. Before replacing the cable in the casing both must be dried thoroughly and the cable must be coated with high-melting-point grease.

The speedometer must be renewed if oil has found its way into the speedometer head, and to prevent a

recurrence of the trouble it is advisable to fit the later type of drive assembly. The new assembly consists of the following parts:—

Speedometer drive assembly set screw	Part No. S.652	2 off
Speedometer drive adaptor			Part No. S.654	1 off
Speedometer drive adaptor ferrule	Part No. S.653	1 off
Speedometer drive oil seal			Part No. S.651	1 off
Speedometer bearing	...		Part No. S.655	1 off
Speedometer pinion	...		Part No. QA.10395	1 off

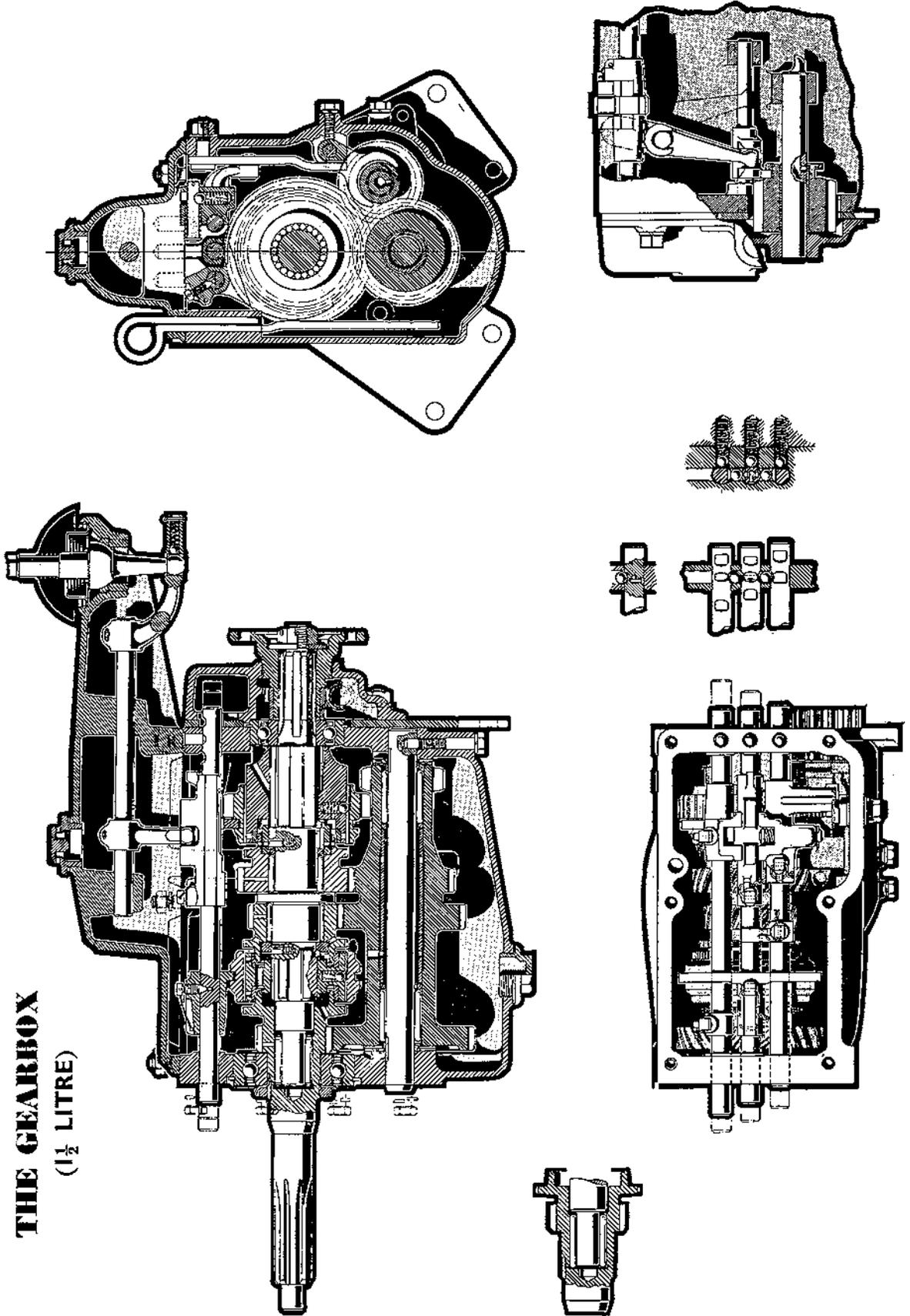
Section F.6

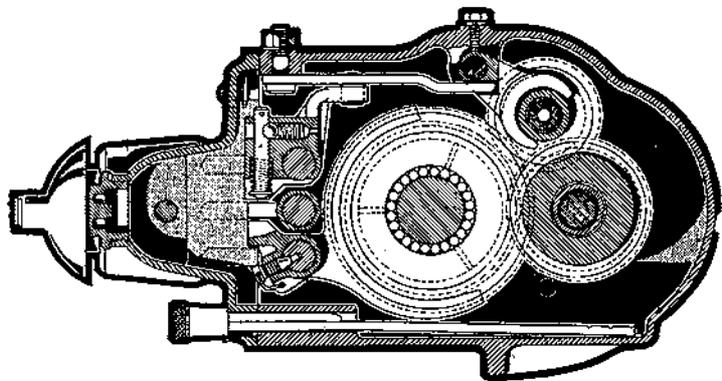
MODIFIED OIL LEVEL (2 LITRE)

Commencing at Engine No. RMB.2/1280 a modified dipstick has been fitted to raise the level of the oil in the gearbox.

This has increased the oil capacity from 2 pints (1.13 litres) to 2⅘ pints (1.49 litres).

THE GEARBOX
(1½ LITRE)





THE GEARBOX
(2½ LITRE)

