

SECTION F

THE GEARBOX

General Description.

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GENERAL DESCRIPTION

The gearbox has four forward gears and one reverse gear.

Synchromesh is incorporated on second, third and fourth gears.

Top gear is obtained by direct drive, third and second through gears in constant mesh, and first and reverse by sliding gears. Reference to the facing page will show the method of engagement.

Section F.1

TO REMOVE THE GEARBOX WITH THE ENGINE IN THE CHASSIS

Remove the floor mats and take up the floorboards. Remove the gearbox cowl.

Disconnect the propeller shaft at its forward end, marking the flanges so that they can be replaced in the same relative position on reassembly.

Jack up the engine unit under the rear of the sump, using a large piece of wood between the jack and the sump to spread the load, and disconnect the speedometer drive at the gearbox end.

Disconnect the clutch operating lever from its connecting rod.

Release the rear engine unit mounting by removing the two nuts and bolts of the rubber mounting.

Undo all the retaining screws holding the bell housing to the crankcase and lift out the gearbox, taking care not to place any load on the drive gear shaft and clutch centre.

Section F.2

TO DISMANTLE THE GEARBOX

It will be found advantageous to support the gearbox in a vice by means of a piece of steel bar approximately $1\frac{1}{2}$ in. (40 mm.) square by 5 in. (127 mm.) long, this being suitably machined and threaded at

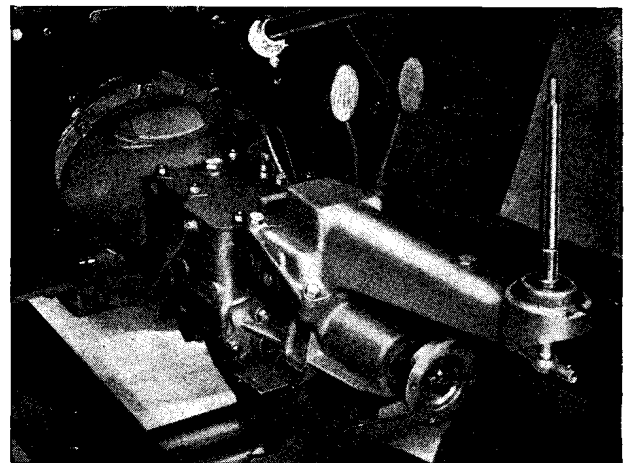


Fig. F.1.

The gearbox ready for removal.

one end to enable it to be screwed into the gearbox drain plug hole (see Fig. F.2).

Remove the dipstick and drain plug from the gearbox and drain off the oil.

Release the clutch housing from the gearbox by removing the fixing bolts and spring washers.

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Extract the split pin from the nut retaining the drive flange at the rear of the gearbox sliding shaft and remove the nut and plain washer.

Remove the six nuts securing the top cover assembly to the gearbox and the four bolts and spring washers securing the remote control cover assembly to the gearbox extension.

Remove the three selector springs.

Using the extractor, Tool No. T.108 (Section Q), withdraw the propeller shaft driving flange. It is advisable to use an extractor of this type to avoid

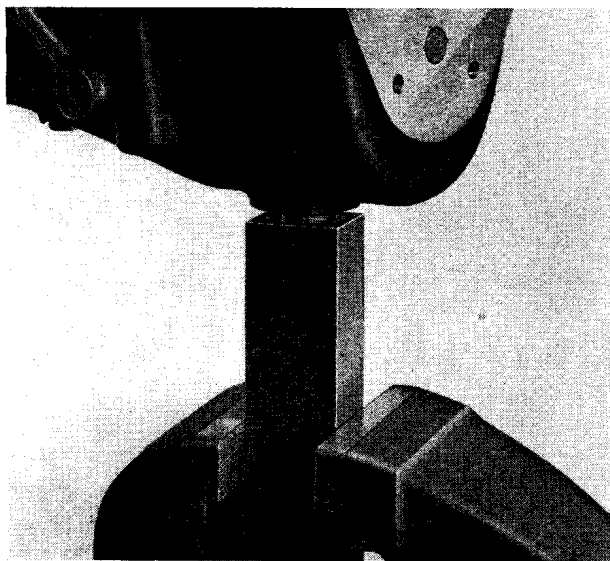


Fig. F.2.

A plug threaded into the drain plug hole is used to hold the gearbox in the vice.

distortion of the flange face. Before doing so, it is advisable to mark both the flange and the shaft so that they can be replaced in exactly the same position.

Detach the speedometer drive housing from the right-hand side of the gearbox. Care should be exercised not to damage the paper gasket on the joint face of the housing.

Extract the lock-wire from the eight square-headed screws locking the gear shifters and stops to the selector shafts and remove the screws.

Slacken the nuts and set bolts securing the gearbox rear casing to the gearbox and withdraw sufficiently to allow the gear shifters to be removed from the ends of the selector shafts.

Remove the nuts and set bolts completely and withdraw the gearbox rear casing from the gearbox.

On early type gearboxes withdraw the selector shafts one at a time, taking care not to lose the selector lock balls in the process. Later models have a third and top selector shaft extended at its front end and fixed with a circlip to prevent its accidental with-

drawal and the loss of the synchromesh balls. In this case the circlip must, of course, be removed before the shaft can be withdrawn. This also makes it imperative to remove the gearbox from the engine before dismantling. Now lift out the selector forks. Reference to page E.10 will show the interlocking mechanism of the shifter balls. Observe the correct position of the gear shifters and stops on the selector spindles as shown in the plan view of the shifters and shafts.

Remove the layshaft spindle locating screw from the rear of the gearbox.

Extract the layshaft spindle by tapping it at the forward end with a suitable copper or brass drift.

Remove the drive gear with its journal bearing by tapping the mainshaft towards the front of the gearbox, using a suitable copper drift.

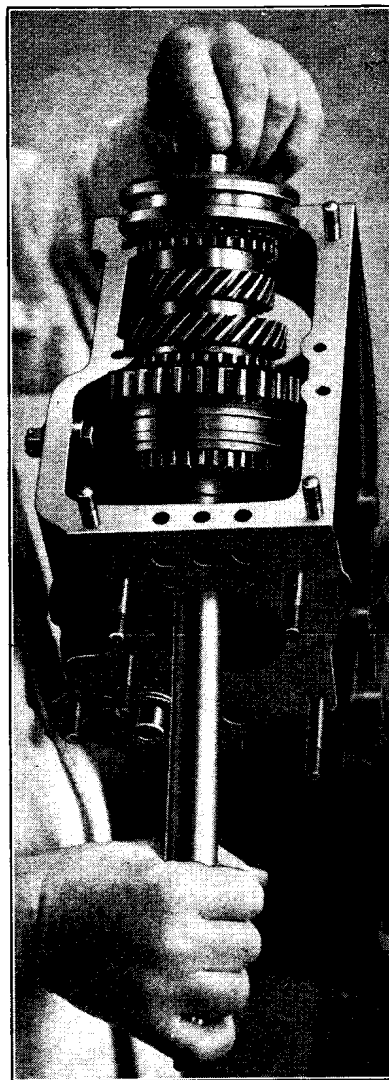


Fig. F.3.

Showing the method of withdrawing the gearbox mainshaft assembly.

Before the mainshaft can be removed it is necessary to extract the journal bearing from its housing, using a suitable drift for this purpose.

The mainshaft assembly can then be withdrawn from the gearbox as shown in Fig. F.3.

Extract the layshaft gear unit, observing that the tabs on the thrust pads line up with the slots cut in the boss at the front and rear walls of the gearbox.

care must be exercised not to lose the spring and plunger or the twenty-eight needle bearings. (See Fig. F.4.) And it must be noted that next to the second gear collar is a thrust washer, which is in two halves, having tongues which engage with slots in the forward face of the collar. It is important that this washer is correctly replaced on reassembly to centralise the collar.

Section F.3

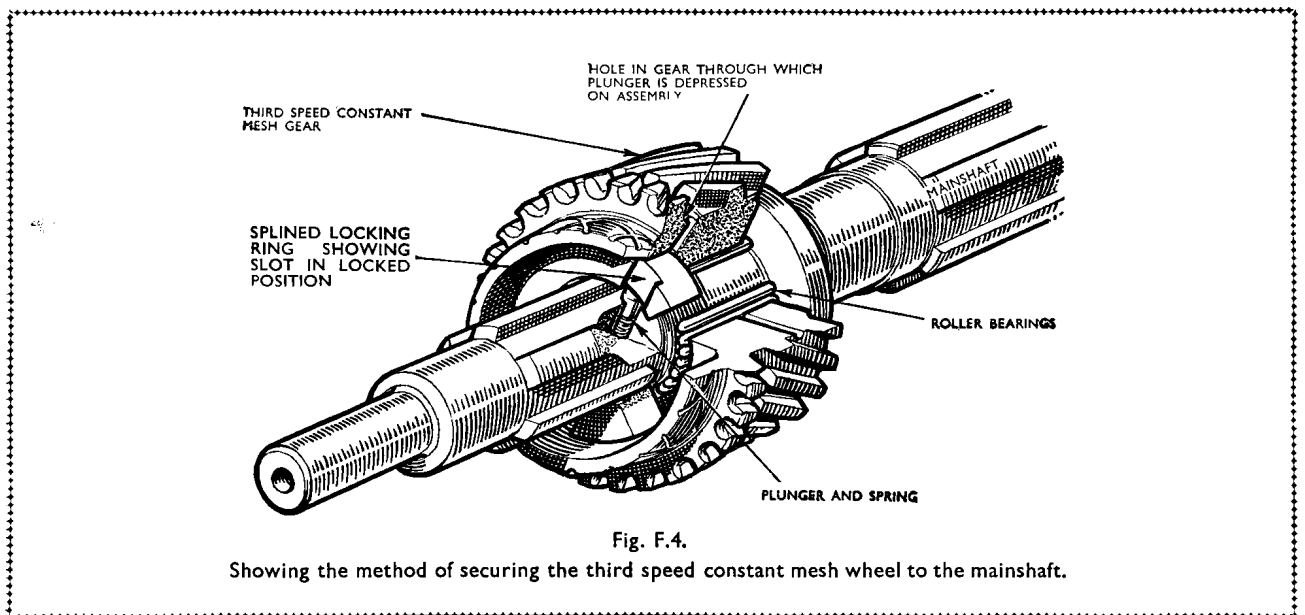
TO DISMANTLE THE MAINSHAFT

Withdraw the top and third gear synchromesh hub from the forward end of the shaft, observing that the plain side of the hub goes to the rear of the gearbox.

Section F.4

DISMANTLING THE SYNCHROMESH MECHANISM

The striking dogs for top, third and second gears are retained on sliding hubs by balls and springs which



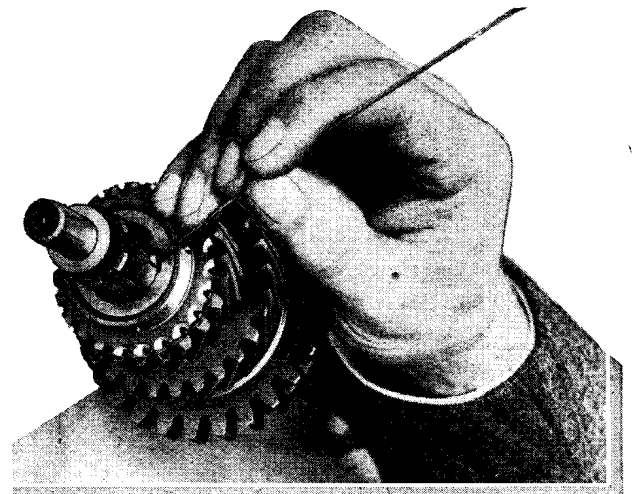
Remove the third speed gear collar by pressing down the spring-loaded locking plunger and rotating the collar until the female splines register with the male splines on the mainshaft (see Fig. F.4).

The third gear can now be withdrawn.

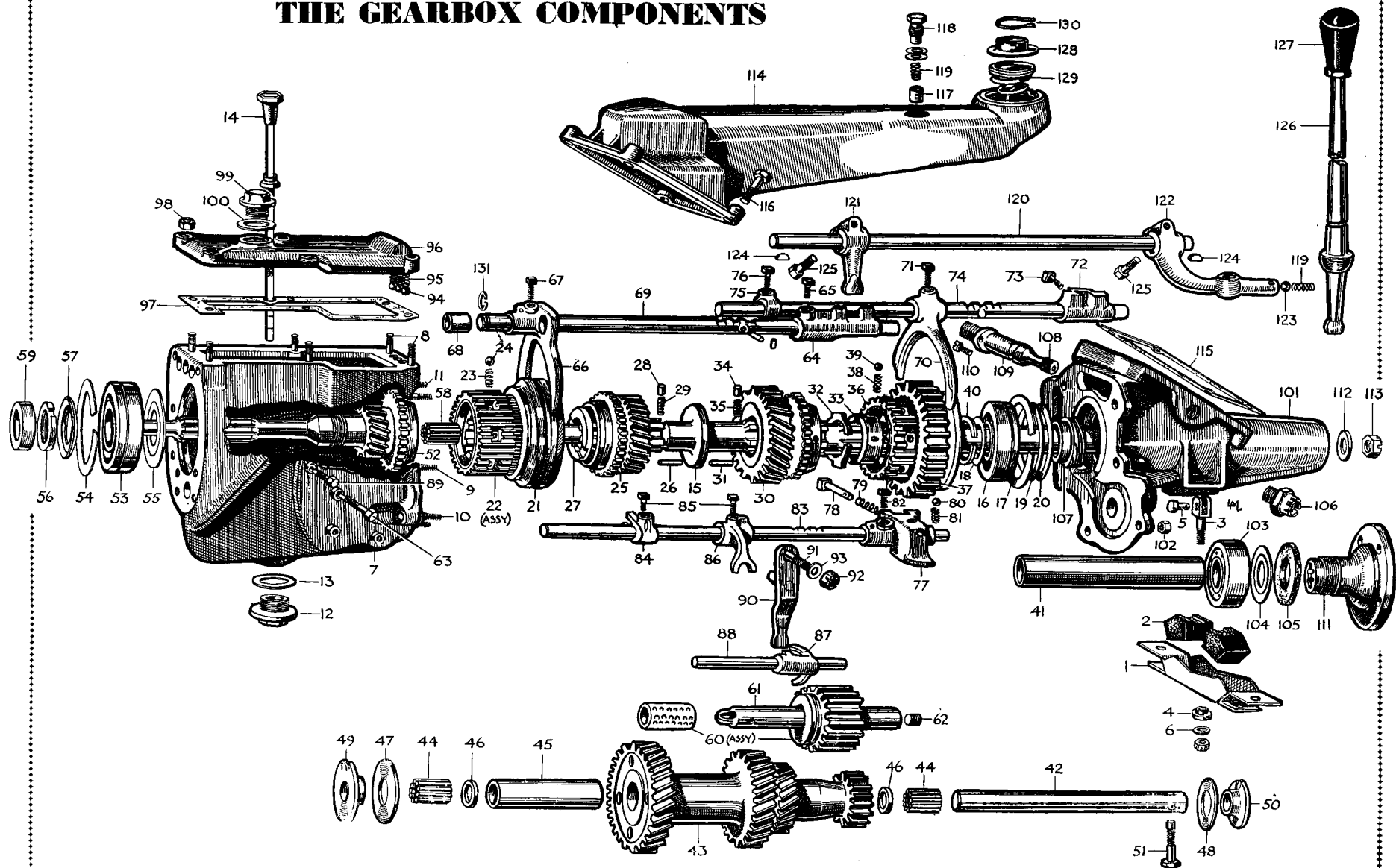
Care must be exercised to prevent the loss of the plunger and spring or the thirty-two needle bearings on which the third gear is mounted.

Extract the circlip from the rear end of the mainshaft and remove the first and second gear synchromesh hub ; the conical lining end of the hub faces to the front of the gearbox.

The withdrawal of the second gear from the mainshaft is executed in a similar manner to that for the third gear, namely by pressing down the locking plunger through the hole provided and rotating the collar until the two sets of splines coincide. Again,



THE GEARBOX COMPONENTS



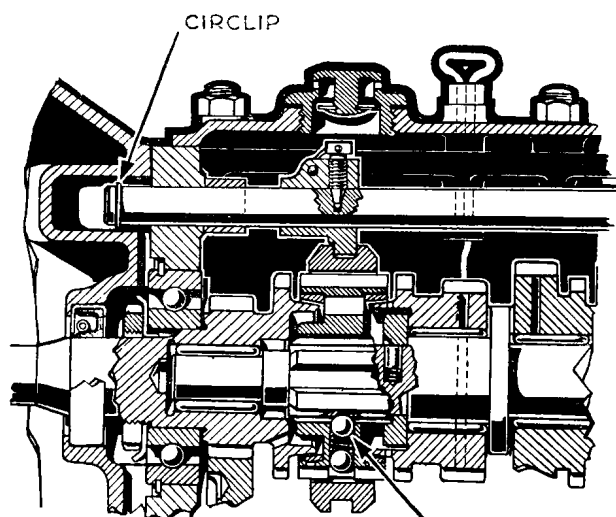
KEY TO THE GEARBOX COMPONENTS

No.	Description	No.	Description	No.	Description
1.	Rear engine bearer bracket.	45.	Spacer—layshaft gear unit.	89.	Locating screw—shaft.
2.	Support rubber.	46.	Washer—layshaft.	90.	Reverse link assembly.
3.	Fork end.	47.	Thrust washer—front.	91.	Fulcrum pin—link.
4.	Engine rebound rubber.	48.	Thrust washer—rear.	92.	Nut—fulcrum pin.
5.	Clevis pin—fork end.	49.	Bearing plate—front.	93.	Washer—fulcrum pin.
6.	Washer.	50.	Bearing plate—rear.	94.	Ball—shaft.
7.	Gearbox casing (with studs).	51.	Screw—layshaft.	95.	Spring—shifter shaft.
8.	Stud—gearbox top cover.	52.	First motion shaft.	96.	Gearbox cover.
9.	Stud—speedometer casing (medium).	53.	Bearing—first motion shaft.	97.	Gasket—cover.
10.	Stud—speedometer casing (long).	54.	Circlip—first motion shaft.	98.	Nut—cover.
11.	Stud—speedometer casing (short).	55.	Guard—bearing (first motion shaft).	99.	Filler plug—gearbox.
12.	Plug—oil drain.	56.	Nut—first motion shaft bearing.	100.	Washer for plug.
13.	Washer—drain plug.	57.	Lock washer—bearing.	101.	Rear casing.
14.	Oil level indicator.	58.	Spigot bearing rollers.	102.	Nut—rear casing.
15.	Mainshaft.	59.	Oil seal—first motion shaft.	103.	Ball bearing.
16.	Mainshaft bearing.	60.	Reverse gear (with bush).	104.	Guard.
17.	Circlip—mainshaft bearing.	61.	Shaft—reverse gear.	105.	Oil retaining washer.
18.	Guard—bearing—first motion shaft.	62.	Plug—reverse shaft.	106.	Hole plug—reverse light.
19.	Plate—guard.	63.	Screw—reverse shaft.	107.	Speedometer gear.
20.	Spring plate—guard.	64.	Top and third gear selector.	108.	Speedometer pinion and shaft.
21.	Striking dog.	65.	Locating screw—selector.	109.	Bearing—pinion.
22.	Sliding hub assembly (top and third).	66.	Top and third gear shifter.	110.	Screw—pinion bearing.
23.	Spring—sliding hub.	67.	Locating screw—shifter.	111.	Flange—universal joint.
24.	Ball—sliding hub.	68.	Distance tube—top and third.	112.	Washer—flange nut.
25.	Third speed gear.	69.	Shaft—top and third shifter.	113.	Nut—flange to mainshaft.
26.	Rollers—third speed gear.	70.	First and second gear shifter.	114.	Remote control cover.
27.	Collar—third speed gear.	71.	Locating screw.	115.	Gasket—cover.
28.	Plunger—third speed gear.	72.	First and second gear selector.	116.	Cover bolt—to rear casing.
29.	Spring—plunger.	73.	Locating screw.	117.	Housing cover plunger.
30.	Second speed gear.	74.	Shaft—first and second shifter.	118.	Plug—operating shaft.
31.	Rollers—second speed gear.	75.	Stop—shaft.	119.	Spring—operating shaft.
32.	Washer—second speed gear.	76.	Locating screw—stop.	120.	Remote control shaft.
33.	Collar—second speed gear.	77.	Reverse gear selector.	121.	Selector lever (front).
34.	Plunger—second speed gear.	78.	Plunger—reverse gear selector.	122.	Selector lever (rear).
35.	Spring—plunger.	79.	Spring—plunger.	123.	Ball—lever.
36.	Sliding hub (first and second).	80.	Ball—reverse plunger.	124.	Key—actuating shaft and selector levers.
37.	First speed gear.	81.	Spring—ball.	125.	Bolt—actuating shaft and selector levers.
38.	Spring—first speed gear.	82.	Locating screw.	126.	Change speed lever.
39.	Ball—first speed gear.	83.	Shaft—reverse selector.	127.	Knob—change speed lever.
40.	Circlip.	84.	Steady—reverse selector shaft.	128.	Cover—lever.
41.	Distance-piece.	85.	Locating screw—steady.	129.	Spring—anti-rattle change speed lever.
42.	Layshaft.	86.	Gear shifter—reverse selector shaft.	130.	Circlip—cover.
43.	Gear unit—layshaft.	87.	Gear shifter—reverse gear.	131.	Circlip—shaft—third and top.
44.	Rollers—layshaft gear unit.	88.	Shaft—reverse gear shifter.		

F THE GEARBOX

are housed within the sliding hubs and register with a central groove in the internally cut teeth of the striking dogs. Each sliding hub, therefore, can be pushed out from its striking dog when sufficient effort is applied to overcome the springs.

The ball housing openings are peened over to retain the balls in position and prevent their loss.



LOCATING BALL

Fig. F.6.

This part section of the gearbox indicates the lengthened third speed shifter shaft and its retaining circlip and the location of the additional locating ball in the synchromesh sliding hub.

Section F.5

REASSEMBLY OF THE SYNCHROMESH MECHANISM

The striking dog is placed against the end of the sliding hub and pushed through into engagement with it, when the balls will spring into an indentation ground in the centre of the teeth and the assembly is completed.

Reassembly of gearbox

The reassembly of the gearbox, mainshaft, etc., is carried out in the reverse manner to that detailed for dismantling, but care must be taken when fitting the layshaft to see that the tags on the thrust washers at each end fit into the grooves in the bosses in the gearbox.

Note.—For easy assembly of the layshaft with its bearings, it is recommended that a dummy shaft $\frac{9}{16}$ in. diameter by $6\frac{1}{2}$ in. long (14.29 mm. diameter by 161.13 mm. long) be used.

Care must also be taken in the case of the later boxes to replace the circlip on the forward end of the third and top selector shaft.

Cases have been found of the balls and springs being ejected from the top and third synchro hub due to discrepancies in the position of the third speed shifter shaft stop on the gear change cover. To overcome this (and also the possibility of the third gear being inadvertently moved beyond its position when the gear change extension cover is removed) a new shifter shaft is being fitted with a circlip which gives a positive stop for third gear under all conditions.

Section F.6

MODIFIED SYNCHROMESH HUB

To further ensure that the synchro balls and springs do not become released, each ball is now being peened into the synchro hub (each with two square-ended depressions at the end of each ball hole around the hub) ; also a modified top and third striking dog, which is tapered internally each end, is now fitted to maintain the synchro hub in the correct position.

The following parts (for Service purposes) are deleted :—

		No. Off
24245	Striking Dog (Top and 3rd)	1
SA.2435	Sliding Hub (Top and 3rd), with Sliding Cones	1
	Comprising :—	
24246	Sliding Hub	1
24247	Cone for Sliding Hub	2
SA.2402/2	Shifter Shaft Assembly (Top and 3rd)	1
	Comprising :—	
24367	Shaft	1
3648	Pin for Shaft	1
3649	Rivet for Shaft	1
	and replaced (for Service modification only) by :—	
SA.2435/1	Sliding Hub (Top and 3rd), with Sliding Cones	1
	Comprising :—	
24246	Sliding Hub	1
24247	Cone for Sliding Hub	2
24248	Spring for Sliding Hub	6
1279	Ball for Sliding Hub	6
SA.2402/3	Shifter Shaft Assembly (Top and 3rd)	1
	Comprising :—	
24457	Shaft	1
24377	Circlip	1
3648	Pin for Shaft	1
3649	Rivet for Shaft	1
24465	Striking Dog (Top and 3rd)	1

Gearbox (Production Modifications)

Commencing Gearbox No. TF.939 for Series "TD" Midget.

The new shifter shaft is being fitted with a circlip which gives a positive stop for third gear under all conditions.

The following parts are deleted :—

		No. Off
SA.2402/2	Shifter Shaft Assembly (Top and 3rd)	1
	Comprising :—	
24367	Shaft	1
3648	Pin for Shaft	1
3649	Rivet for Shaft	1

and replaced by :—		
SA.2402/3	Shifter Shaft Assembly (Top and 3rd)	No. Off 1
Comprising :—		
24457	Shaft	1
24377	Circlip	1
3648	Pin for Shaft	1
3649	Rivet for Shaft	1

Commencing at Engine No. 3114 and Gearbox No. TF.513 for Series “TD” Midget. The existing arrangement of synchro balls were peened into the synchro hub to prevent ejection.

The following parts are deleted :—		
SA.2435	Sliding Hub (Top and 3rd), with Sliding Cones	No. Off 1
Comprising :—		
24246	Sliding Hub	1
24247	Cone for Sliding Hub	2

and replaced by :—		
SA.2435/1	Sliding Hub (Top and 3rd), with Sliding Cones	No. Off 1
Comprising :—		
24246	Sliding Hub	1
24247	Cone for Sliding Hub	2
24248	Spring for Sliding Hub	6
1279	Ball for Sliding Hub	6

Commencing Gearbox No. TJ.800 and Engine No. XPAG/TD/6533 for Series “TD” Midget and Gearbox No. SH.335, Engine No. XPAG/SC/16431 for Series “Y” 1½ Litre.

To positively maintain the top and third synchro hub in the correct position one of the spring holes has been bored right through and an additional ball added. This ball locates in an indent in the gearbox mainshaft.

The following parts are deleted :—		
SA.2435/1	Sliding Hub (Top and 3rd), with Sliding Cones	No. Off 1
Comprising :—		
24246	Sliding Hub	1
24247	Cone for Sliding Hub	2

24248	Spring for Sliding Hub	6
1279	Ball for Sliding Hub	6
24151	Gearbox Mainshaft	1

and replaced by :—		
SA.2435/2	Sliding Hub (Top and 3rd), with Sliding Cones	No. Off 1
Comprising :—		
24466	Sliding Hub	1
24247	Cone for Sliding Hub	2
24248	Spring for Sliding Hub	6
1279	Ball for Sliding Hub	7
24467	Gearbox Mainshaft	1

Section F.7

SPEEDOMETER DRIVE MODIFICATION

Starting at Gearbox No. TW396 the speedometer gear is keyed to the gearbox mainshaft to provide a more positive drive.

Care must therefore be taken when dismantling not to lose the key and to make sure that it is in position on reassembly.

New Part Nos. have been allocated to the modified parts as follows :—

Mainshaft (Part No. 168209).

Speedometer gear (Part No. 168210).

Speedometer gear key (Part No. X20139).

Part No. 168209 can be used to service the earlier mainshafts to Part No. X24467, and the speedometer gear (Part No. 168210) can be used to service gears to Part No. MG900/231 by omitting the key.