SECTION FF

GEARBOX

SERIES BN6

For details of the gearbox fitted to BN6 cars refer to Section F.

SECTION FFF

GEARBOX

Mk. I and II (SERIES BN7 and BT7)
AND Mk. II and Mk. III (SERIES BJ7 and BJ8)

NOTE

For all other repair and service procedures see Section F.

Section FFF.1

CENTRAL CONTROL GEARBOX

The power unit for later Mark II BN7 and BT7 cars incorporated a gearbox with a centrally mounted remote control change speed lever in place of the side mounted lever fitted previously. This type of gearbox, with accompanying body and gearbox cover modifications, was used from Car Numbers BN7 16039 and BT7 15881.

The following two sections give the necessary information for dismantling and assembling the central control box.

Section FFF.2

DISMANTLING THE CENTRAL CONTROL GEARBOX

Unscrew the eight short bolts and one long bolt and remove the clutch housing complete with the clutch operating mechanism. Withdraw the drive gear bearing plain and spring plates.

Remove the oil level indicator from the gearbox top cover, unscrew the 12 bolts from the top of the gearbox and lift off the cover. Note that the two cover securing bolts nearest the change speed lever turret are longer. Ensure that the three detent springs positioned in the gearbox casing under the front edge of the cover are not lost.

If it is necessary to remove the change speed lever from the gearbox top cover, release the circlip, washer, and conical spring from the change speed lever turret. Using a small diameter punch, drive the two rollpins in turn into the $\frac{3}{16}$ in. (·187 mm.) holes on each side of the change speed turret. This will cause them to move into the bore of the lever ball. Lift out the lever and retrieve the roll pins from the ball end.

Remove the three detent springs. Cut the locking wires and unscrew the striking fork retaining screws. Hold the gear shifter shafts in the neutral position—this will prevent the interlock balls from operating—and withdraw the third and fourth speed shifter shaft retrieving the detent ball that will drop down into the shaft bore at the front of the gearbox casing. Withdraw the remaining shifter shafts retrieving their detent balls and the two interlocking balls located between the shafts at the front of the gearbox casing. Lift out the three striking forks.

If it is necessary to remove the reverse selector plunger from the reverse striking fork, extract the split pin to release the plunger and spring which in turn will release a detent plunger and spring.

Undo the propeller shaft flange nut, using Service Tool 18G34A to prevent the flange from turning, and pull the flange from the gearbox mainshaft splines. Unscrew the speedometer pinion housing from the gearbox rear extension casing and remove it complete with pinion. Unscrew the eight bolts and remove the gearbox rear extension casing from the main casing. Withdraw the mainshaft bearing plain and spring plates.

In the case of gearboxes fitted with overdrive, unscrew the eight nuts holding the overdrive adaptor plate to the back of the gearbox. Do not disturb the joint between the overdrive and the adaptor plate. Pull the overdrive and adaptor plate away from the gearbox and over the mainshaft. Slide the overdrive oil pump cam off the mainshaft. The mainshaft bearing distance collar and circlip will now be exposed, but may be left in position when dismantling the gearbox. If, when dismantling the mainshaft assembly, it is found to be necessary to remove the mainshaft bearing from the shaft, the circlip and distance collar will have to be withdrawn first. Withdraw the mainshaft bearing plain and spring plates.

Unscrew the reverse idler gear shaft locating screw. Withdraw the shaft and lift out the reverse idler gear.

Push the layshaft forward and pull it out from the front of the gearbox casing. Lower the layshaft gear unit to the bottom of the casing.

Mark the position of the locating peg on the mainshaft bearing housing in relation to the gearbox casing, so that on reassembly the peg may be aligned correctly to locate in the hole provided for it in the rear extension casing or the overdrive adaptor plate. Withdraw the complete mainshaft assembly from the rear of the gearbox casing.

Take out the 18 needle rollers from the rear of the drive gear. Use a suitable brass drift to drive the bearing forwards from its housing and withdraw the drive gear assembly from the front of the gearbox casing.

Lift out the layshaft gear unit and thrust washers.

To dismantle the main shaft assembly follow the instructions given in Section F.5.

Section FFF.3

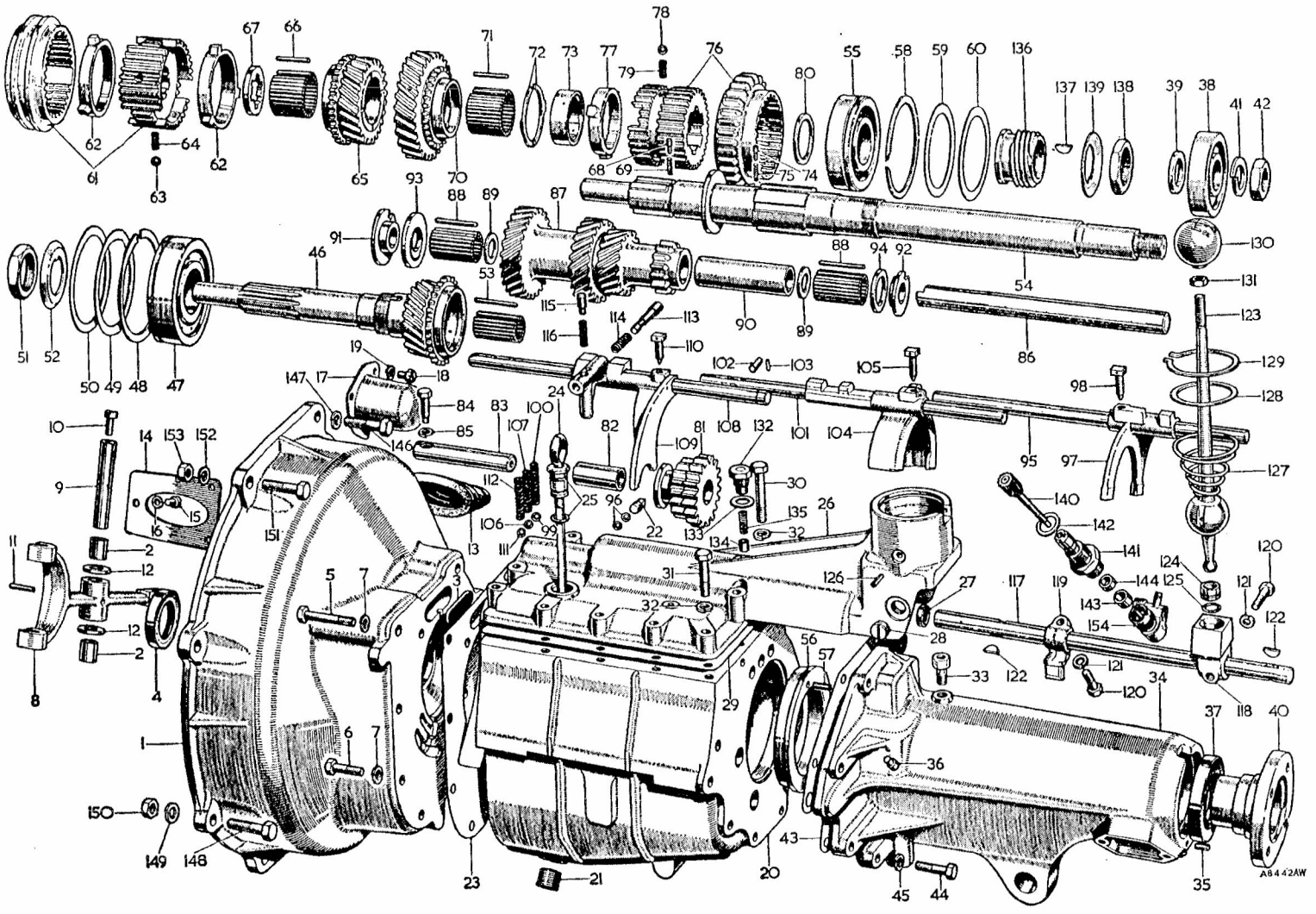
ASSEMBLING THE CENTRAL CONTROL GEARBOX

To assemble the mainshaft follow the instructions given under **"Mainshaft"** in Section F.6.

Fit the spacer to the layshaft gear unit with a roller washer positioned at each end. Smear the needle rollers

THE GEARBOX COMPONENTS

(Gearbox without overdrive)



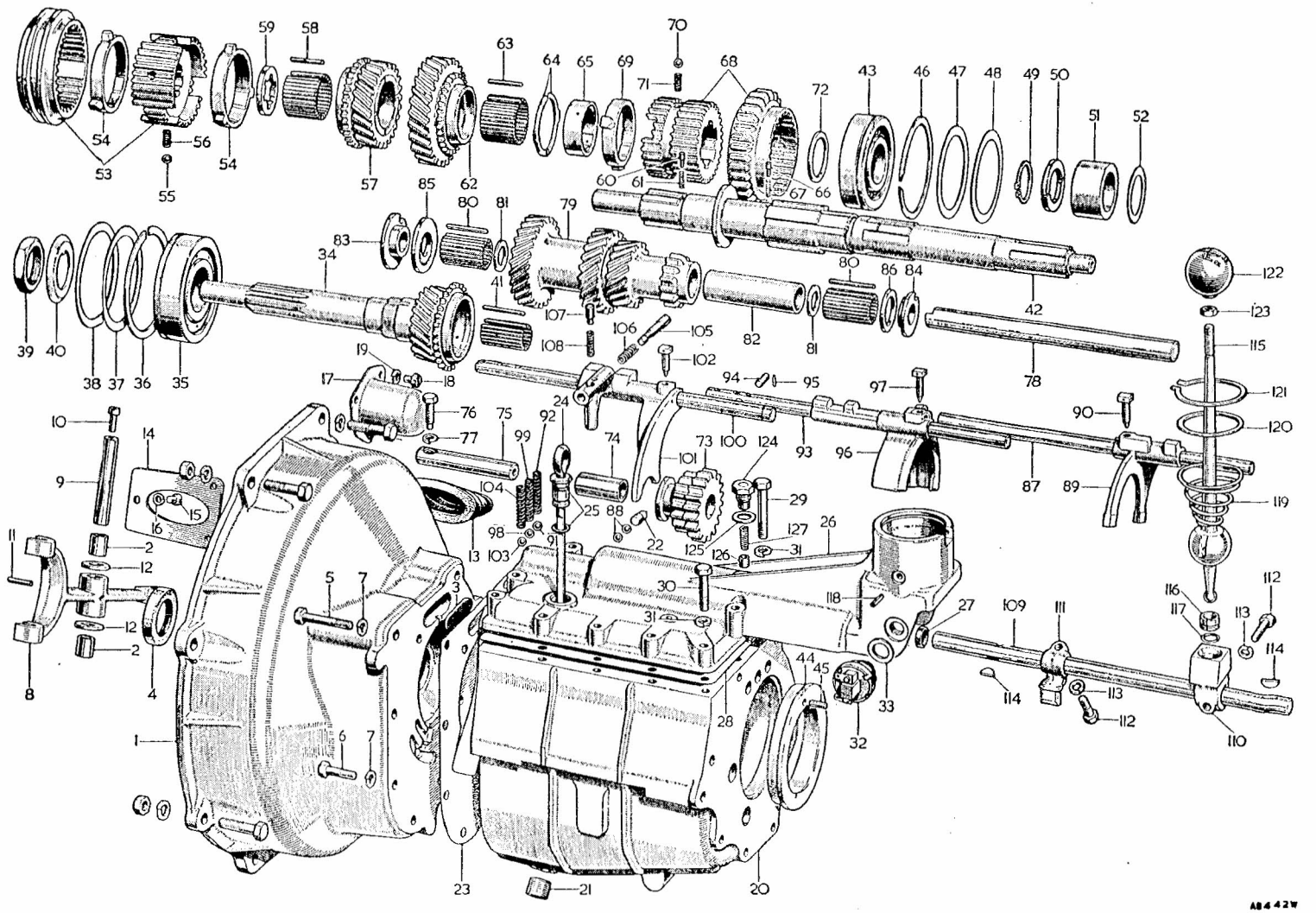
KEY TO THE GEARBOX COMPONENTS

(Gearbox without overdrive)

No.	Description
1.	Clutch housing.
2.	Fork and lever shaft bush.
3.	Buffer pad.
4.	Oil seal.
5.	Bolt—long.
6.	Bolt—short.
7.	Spring washer.
8.	Clutch fork and lever.
9.	Fork and lever shaft.
10.	Clutch withdrawal fork screw.
11.	Taper pin.
12.	Thrust washer for fork and lever.
13.	Fork and lever seal.
14.	Seal retaining plate.
15.	Retaining plate screw.
16.	Spring washer.
17.	Starter end cover.
18.	End cover screw.
19.	Spring washer.
20.	Gearbox case.
21.	Oil drain plug.
22.	Interlock ball hole plug.
23.	Case to clutch housing joint.
24.	Oil level indicator.
25.	Rubber grommet.
26.	Gearbox top cover.
27.	Cover oil seal.
28.	Cover plug.
29.	Cover to gearbox joint.
30.	Bolt—long.
31.	Bolt—short.
32.	Spring washer.
33.	Gearbox breather.
34.	Gearbox extension casing.
35.	Casing taper plug.
36.	Speedometer pinion thrust button.
37.	Oil seal.
38.	Bearing.
39.	Bearing washer.
40.	Coupling flange.
41.	Spring washer.
42.	Flange nut.
43.	Casing to gearbox joint.
44.	Bolt—casing to gearbox.
45.	Spring washer.
46.	Drive gear.
47.	Bearing for drive gear.
48.	Bearing circlip.
49.	Bearing plate.
50.	Bearing plate (spring).
51.	Bearing nut.
52.	Lock washer.
53.	Roller for drive gear.
54.	Mainshaft.
55.	Mainshaft bearing.
56.	Bearing housing.
57.	Locating peg.
58.	Bearing circlip.
59.	Bearing plate.
60.	Bearing plate (spring).
61.	Top and third sliding hub with striking dog.
62.	Sliding hub interceptor
63.	Sliding hub ball.
64.	Ball spring.
65.	Third speed gear.
66.	Gear roller.
67.	Locking plate.
68.	Gear plunger.
69.	Plunger spring.
70.	Second speed gear.
71.	Gear roller.
72.	Gear washer.
73.	Locking plate.
74.	Gear plunger.
75.	Plunger spring.
76.	First speed gear with first and second sliding hub.
77.	Sliding hub interceptor.
78.	Sliding hub ball.
79.	Ball spring.
80.	Mainshaft distance collar.
81.	Reverse gear.
82.	Gear bush.
83.	Gear shaft.
84.	Shaft retaining screw.
85.	Spring washer.
86.	Layshaft.
87.	Layshaft gear unit.
88.	Gear unit roller.
89.	Roller washer.
90.	Roller spacer.
91.	Gear unit thrust plate—front.
92.	Gear unit thrust plate—rear.
93.	Gear unit thrust washer—front.
94.	Gear unit thrust washer—rear.
95.	Top and third shifter shaft.
96.	Shaft interlocking ball.
97.	Top and third striking fork.
98.	Screw for striking fork.
99.	Shifter shaft ball.
100.	Ball spring.
101.	First and second shifter shaft.
102.	Shaft interlocking pin.
103.	Interlocking pin rivet.
104.	First and second striking fork.
105.	Screw for striking fork.
106.	Shifter shaft ball.
107.	Ball spring.
108.	Reverse shifter shaft.
109.	Reverse striking fork.
110.	Screw for striking fork.
111.	Shifter shaft ball.
112.	Ball spring.
113.	Reverse selector plunger.
114.	Plunger spring.
115.	Detent plunger.
116.	Detent plunger spring.
117.	Remote control shaft.
118.	Change speed lever shaft.
119.	Selector lever.
120.	Selector lever and change speed lever socket screw.
121.	Spring washer.
122.	Selector lever and change speed lever socket key.
123.	Change speed lever.
124.	Lever bush.
125.	Circlip for bush.
126.	Rollpin.
127.	Ball end retaining spring.
128.	Spring washer.
129.	Circlip.
130.	Change speed lever knob.
131.	Locknut for knob.
132.	Plunger retaining plug.
133.	Plug washer.
134.	Plunger.
135.	Plunger spring.
136.	Speedometer gear.
137.	Key for gear.
138.	Locknut for gear.
139.	Lockwasher for gear.
140.	Speedometer pinion.
141.	Pinion bearing.
142.	Washer for bearing.
143.	Pinion distance collar.
144.	Pinion oil seal.
145.	Reverse switch hole plug.
146.	Clutch housing bolt—long.
147.	Spring washer.
148.	Clutch housing bolt—short.
149.	Spring washer.
150.	Nut.
151.	Clutch housing dowel bolt.
152.	Spring washer for dowel bolt.
153.	Nut for dowel bolt.
154.	Speedometer drive adaptor box.

THE GEARBOX COMPONENTS

(Gearbox with overdrive)



KEY TO THE GEARBOX COMPONENTS

(Gearbox with overdrive)

No.	Description
1.	*Clutch housing.*
2.	*Fork and lever shaft bush.*
3.	*Buffer pad.*
4.	*Oil seal.*
5.	*Bolt—long.*
6.	*Bolt—short.*
7.	*Spring washer.*
8.	*Clutch fork and lever.*
9.	*Fork and lever shaft.*
10.	*Clutch withdrawal fork, screw.*
11.	*Taper pin.*
12.	*Thrust washer for fork and lever.*
13.	*Fork and lever seal.*
14.	*Seal retaining plate.*
15.	*Retaining plate screw.*
16.	*Spring washer.*
17.	*Starter end cover.*
18.	*End cover screw.*
19.	*Spring washer.*
20.	*Gearbox case.*
21.	*Oil drain plug.*
22.	*Interlock ball hole plug.*
23.	*Case to clutch housing joint.*
24.	*Oil level indicator.*
25.	*Rubber grommet.*
26.	*Gearbox top cover.*
27.	*Cover oil seal.*
28.	*Cover to gearbox joint.*
29.	*Bolt—long.*
30.	*Bolt—short.*
31.	*Spring washer.*
32.	*Overdrive switch.*
33.	*Joint for switch.*
34.	*Drive gear.*
35.	*Bearing for drive gear.*
36.	*Circlip for bearing.*
37.	*Plate for bearing.*
38.	*Plate for bearing (spring).*
39.	*Nut for bearing.*
40.	*Lock washer.*
41.	*Drive gear roller.*
42.	*Mainshaft.*
43.	*Mainshaft bearing.*
44.	*Bearing housing.*
45.	*Locating peg.*
46.	*Bearing circlip.*
47.	*Plate for bearing.*
48.	*Plate for bearing (spring).*
49.	*Mainshaft circlip.*
50.	*Bearing abutment collar.*
51.	*Abutment collar retaining ring.*
52.	*Shim.*
53.	*Top and third sliding hub with striking dog.*
54.	*Sliding hub interceptor.*
55.	*Sliding hub ball.*
56.	*Ball spring.*
57.	*Third speed gear.*
58.	*Roller for gear.*
59.	*Locking plate.*
60.	*Gear plunger.*
61.	*Plunger spring.*
62.	*Second speed gear.*
63.	*Roller for gear.*
64.	*Gear washer.*
65.	*Locking plate.*
66.	*Gear plunger.*
67.	*Plunger spring.*
68.	*First speed gear with first and second sliding hub.*
69.	*Sliding hub interceptor.*
70.	*Sliding hub ball.*
71.	*Ball spring.*
72.	*Mainshaft distance collar.*
73.	*Reverse gear.*
74.	*Gear bush.*
75.	*Gear shaft.*
76.	*Shaft retaining screw.*
77.	*Spring washer.*
78.	*Layshaft.*
79.	*Layshaft gear unit.*
80.	*Gear unit roller.*
81.	*Roller washer.*
82.	*Roller spacer.*
83.	*Gear unit thrust plate—front.*
84.	*Gear unit thrust plate—rear.*
85.	*Gear unit thrust washer—front.*
86.	*Gear unit thrust washer—rear.*
87.	*Top and third shifter shaft.*
88.	*Shaft interlocking ball.*
89.	*Top and third striking fork.*
90.	*Screw for striking fork.*
91.	*Shifter shaft ball.*
92.	*Ball spring.*
93.	*First and second shifter shaft.*
94.	*Shaft interlocking pin.*
95.	*Interlocking pin rivet.*
96.	*First and second striking fork.*
97.	*Screw for striking fork.*
98.	*Shifter shaft ball.*
99.	*Ball spring.*
100.	*Reverse shifter shaft.*
101.	*Reverse striking fork.*
102.	*Screw for striking fork.*
103.	*Shifter shaft ball.*
104.	*Ball spring.*
105.	*Reverse selector plunger.*
106.	*Plunger spring.*
107.	*Detent plunger.*
108.	*Detent plunger spring.*
109.	*Remote control shaft.*
110.	*Change speed lever rocket.*
111.	*Selector lever.*
112.	*Selector lever and change speed lever socket screw.*
113.	*Spring washer.*
114.	*Selector lever and change speed lever socket key.*
115.	*Change speed lever.*
116.	*Lever bush.*
117.	*Circlip for bush.*
118.	*Rollpin.*
119.	*Ball end retaining spring.*
120.	*Washer for spring.*
121.	*Circlip.*
122.	*Change speed lever knob.*
123.	*Locknut for knob.*
124.	*Plunger retaining plug.*
125.	*Plug washer.*
126.	*Plunger.*
127.	*Plunger spring.*

with grease and place them in the ends of the gear unit (23 at each end).

Assemble the gear unit front and rear thrust washers and plates, and position them in the gearbox with grease ensuring that their tags engage the grooves in the gearbox casing.

Place the gear unit in the gearbox and allow it to rest in the bottom.

Smear the 18 mainshaft spigot rollers with grease and place them in the drive gear. Insert the drive gear through the front of the casing and press the bearing into position.

Fit the mainshaft assembly from the rear of the gearbox casing ensuring that the sliding dog and interceptors are in position on the third and fourth speed synchronizing hub. Align the mainshaft bearing housing locating peg with the mark made on the gearbox casing when dismantling, and press the bearing housing into position.

Lift the layshaft gear unit into position and push the layshaft through the front of the gearbox casing making sure that the thrust washers and needle rollers remain in their correct locations.

Place the reverse idler gear in position, push the gear shaft into its housing and secure it in position with its locating screw and washer.

With a non-overdrive gearbox fit the mainshaft bearing plain and spring plates with the plain plate against the bearing. Bolt the gearbox rear extension into position, first ensuring that the rear bearing washer is in position on the mainshaft. Screw in the speedometer pinion and housing. Push the propeller shaft flange onto the mainshaft splines and secure it with the washer and nut, using Service Tool 18G34A to prevent the flange from turning while tightening the nut.

If the reverse selector plunger assembly has been removed from the reverse gear striking fork, refit the detent plunger and spring to the fork. Press down the detent plunger and push in the selector plunger and spring. Fit a new split pin in the end of the plunger. Make sure that the selector plunger, when pressed down into the fork, returns freely.

Place the three gear striking forks in position. Install the reverse gear shifter shaft and secure it to the reverse gear striking fork ensuring that the dowelled end of the locating screw engages in the hole in the shaft. Place the shifter shaft interlock ball into its location between the reverse gear and the first and second speed shifter shaft bores at the front of the gearbox casing.

Hold the reverse striking fork in the neutral position and install the first and second speed gear shifter shaft, noting that this shaft is fitted with an interlocking pin. Fit the fork locating screw and place the second interlock ball into its location between the first and second speed gear and the third and fourth speed gear and the third and fourth speed gear shifter shaft bores.

Holding the first and second speed gear striking fork in the neutral position, install the third and fourth speed gear shifter shaft. Fit the fork locating screw. Tighten the three striking fork locating screws and secure them in position with new locking wires.

To fit the change speed lever to the gearbox top cover, fit the two roll pins into the diametrically opposed $\frac{3}{16}$ in. (·187 mm.) holes on each side of the change speed lever turret. Before driving them in too far, place the change speed lever into its seating with the ball notches opposite the holes. Drive in the rollpins until their ends are level with the bottom of the counterbores on each side of the turret. Place the conical spring, washer, and circlip over the change speed lever. Press the spring down and engage the circlip in the groove in the turret.

Place the shifter shaft detent balls and springs into their bores and refit the gearbox top cover, locating the remote control rod selector arm in the striking forks. Replace the oil level indicator.

In the case of gearboxes fitted with overdrive, the components of the overdrive unit must be checked for alignment, using Service Tool 18G185, before the unit is offered up to the gearbox. Use a long thin screwdriver to align by eye the splines of the uni-directional clutch (see Fig. G.7) with those of the planet carrier. If the splines are not in line it will be found that the splined hub of the uni-directional clutch may be turned with the screwdriver blade in an anti-clockwise direction to the required position. Insert the dummy mainshaft (Service Tool 18G185). Gently turn the coupling flange to and fro while holding the tool to assist in engaging the shaft of the tool with the splines of the planet carrier and uni-directional clutch. Make quite sure that the tool shaft has gone right home into the spigot bush, checking this by using the screwdriver blade as a depth gauge. Place the oil pump operating cam in position in the overdrive unit on the central bushing of the body with the lowest part of the cam in contact with the oil pump plunger. A smear of grease will help to retain the cam in the correct position. Place the mainshaft bearing plain and spring plates in the recess in the adaptor plate (plain plate towards the bearing). Engage top gear in the gearbox and carefully fit the overdrive and adaptor plate over the mainshaft. Thread the mainshaft through the oil pump cam and into the centre bushing of the overdrive body, making sure that the pump cam is not disturbed from its correct position in relation to the pump plunger. Gently turn the first motion shaft to and fro to feel the mainshaft splines into the planet carrier, uni-directional clutch, and oil pump cam. When these parts are correctly aligned the studs on the rear face of the gearbox will have

entered the holes in the adaptor plate. Press the overdrive unit right home, if necessary lightly tapping the propeller shaft driving flange with a copper hammer while turning the first motion shaft of the gearbox.

NOTE.—If any difficulty is experienced in fitting the overdrive it is probable that one of the components has become misaligned. The overdrive must be removed and the components re-aligned with Service Tool 18G185.

Turn the layshaft so that its stepped end is aligned to engage the groove in the clutch housing. Position the drive gear bearing plain and spring plates in the recess in the rear face of the clutch housing (plain plate towards the bearing). Refit the clutch housing to the main casing taking care not to damage the oil seal on the first motion shaft splines.