2000E 3 rail box as fitted to 1969/70 4/4 Morgan

CORTINA

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2000E 3 rail box as fitted to 1969/70 4/4 Morgan

#### GENERAL DESCRIPTION

#### CLUTCH

The clutch mechanism consists of a single dry plate disc with a diaphragm spring pressure plate which is bolted to the engine flywheel. The clutch release system is self-adjusting and is hydraulically actuated. A flexible pipe line connects the operating cylinder with the master cylinder bolted to the engine rear bulkhead.

The diaphragm spring is pivoted on specially shouldered pins and retained to these pins by two fulcrum rings. The spring is retained to the pressure plate by three spring steel clips which are riveted to the pressure plate. When the diaphragm's centre is moved towards the flywheel by the release bearing the diaphragm's outer edge deflects towards the gearbox causing the clutch to disengage.

#### GEARBOX

The gearbox has four forward ratios and one reverse. All the forward gears are engaged through forged blocker ring synchromesh units.

The constant mesh gears between the countershaft, mainshaft and main drive gear are helical to ensure quiet operation whilst reverse gear is spur cut and meshes with teeth cut on the outside of the first/second gear synchroniser sleeve.

There are three types of gearchanging mechanism:-

- Column change gear lever by a rod linkage to a selector housing mounted on top of the gearbox. With two distinct movements for engaging the gear and gate.
- (2) Normal floorchange gear lever as fitted to previous Cortina models.
- (3) A new remote floorchange gear lever built into the extension housing, with a single rod running parallel with the mainshaft to transfer the gear lever movement.

The top opening gearbox case is the same for all three methods of gearchanging.

A common extension housing is used for the column change and normal floorchange whilst the remote change utilises a special housing.



**Gear Lever Positions** 

#### QUICK REFERENCE DATA

#### PERIODIC SERVICE ATTENTION

The clutch master cylinder fluid level should be checked at 6,000 mile service intervals.

Top-up to the correct level, approximately  $\frac{1}{2}$  in. below the top face, with approved fluid, ESW FM 6C2. The cap and the area surrounding it should be wiped with a clean rag before removing the cap, to prevent dirt entering when it is removed.

Ensure that the air vent in the filler cap is clear before replacing the cap.

The master cylinder and operating cylinder hydraulic seals should be replaced at 36,000 mile intervals.

The gearbox filler plug screws into the side of the gearbox casing and the drain plug screws into the bottom.

At the first 1,000 miles top-up the gearbox oil.

At the first 6,000 miles drain the gearbox oil and refill with new oil of the correct grade; thereafter topping-up as required every 6,000 miles.

#### DATA

Clutch							5				
Туре						are		 		 Sin	gle dry plate
Actuation			202					 	7.5	 	Hydraulic
Hydraulic	fluid		***					 -	-	 E	SW FM 6C2
Master cyl	inder	diame	eter					 		 	0.70 in.
Operating	cylind	der dia	ameter					 		 	0.875 in.
Clutch dis	c linir	ng – o	utside	diame	ter			 		 	7½ in.
Pressure p	olate -	- diam - to fly	neter ywheel	 bolt ti	 ighten	ing tor	que	  	 	   12	7½ in. 2 to 15 lb. ft.
Gearbox											

Grade of lubricant S.A.E. 80 E.P. (ESW-M2C-83A) ... .... .... Gearbox capacity ... ... 2<sup>1</sup> Imp. pints ... ... .... \*\*\* ..... .... Speedometer driven gear 22 (1,300 c.c.) 23 (Except 1,300 c.c.) .... ... ... .... Speedometer driving gear 7 (Except 1,300 c.c.) 6 (1,300 c.c.) .... ... .... ... G.T. Ratios 1,300 c.c. 1,500 c.c.

Gearbox Overall Overall Gearbox G'box Overall 3.543 15.745 3.543 14.615 2.972 12.490 First .... .... .... Second 2.396 10.648 2.396 9.883 2.010 7.819 .... Third .... 1.412 6.275 1.412 5.824 1.397 5.448 .... .... Top 1.000 1.000 4.444 4.125 1.000 3.900 1.17 3.963 Reverse 3.963 17.611 16.347 3.324 12.963 ... ....

Section 7A-4

## SERVICE AND REPAIR OPERATIONS

## GEARBOX ASSEMBLY - REPLACE

#### **To Remove**

- 1. Open the bonnet and disconnect the battery.
- 2. Disconnect the throttle linkage at the carburettor.

#### 3. (a) G.T. gear change

Remove the centre console after removing four crcsshead securing screws. Remove the gear lever knob.

Beneath the carpet is another rubber gaiter secured by a metal ring to the floor pan. Remove the ring and gaiter. Unscrew the gear lever turret.

## (b) Normal floor change

Remove the metal ring securing the gear lever gaiter to the floor pan and lift off. Unscrew the gear lever turret.

#### (c) Column gearchange

(i) Disconnect the gear selector rod at the lower end from the gear selector cross-shaft by removing the spring clip.

(ii) Disconnect the cross-shaft from the pivot on the gearbox casing by removing the spring pin, two flat washers and one wave washer.

(iii) Disconnect the gate selector rod from the gate selector lever on the gearbox top cover.

- 4. Jack up the car and fit stands all round.
- 5. Remove the four bolts joining the drive shaft to the rear axle pinion flange. Lower the rear and slide the front yoke from the gearbox. Fit a dummy yoke in the gearbox to prevent oil loss.





**Gate Selector Levers** 

**Gear Selector Levers** 

- 6. Unscrew the forked retainer and disconnect the speedometer cable and driven gear.
- 7. Disconnect the exhaust pipe from the manifold.
- 8. Remove the clutch operating cylinder circlip and move the cylinder to one side.
- 9. Remove the two starter motor securing bolts and move the starter motor to one side.
- Remove the bolts securing the clutch housing to the engine. Note that a top bolt also secures an earth strap.
- 11. Remove the bolts securing the lower dust cover and detach the cover.
- 12. Place a support jack beneath the rear of the engine.
- 13. Remove the four bolts securing the gearbox crossmember to the body. Slide the gearbox rearwards whilst supporting its weight and detach it from the engine.
- 14. Unscrew the four bolts securing the clutch housing to the gearbox and remove it.
- 15. Remove the crossmember centre bolt and detach it from the gearbox.

#### To Replace

- Place the crossmember on the rubber mounting and fit the centre bolt to attach it to the gearbox.
- Fit the clutch housing to the gearbox and tighten the four bolts. Fit the clutch release arm and bearing.
- 18. Ensure that the adaptor plate is positioned on the rear of the engine and offer the gearbox up so that the main drive gear spigot enters the crankshaft pilot bearing. Push the gearbox fully home.
- Replace the four crossmember-to-body bolts and spring washers. Remove the engine support jack.
- 20. Replace the bolts securing the clutch housing to the engine. The uppermost pair are plain bolts and one also secures an earth strap. The remainder are dowel bolts.
- 21. Replace the lower dust cover.
- 22. Refit the starter motor.
- 23. Replace the clutch operating cylinder and retain it with a circlip.
- 24. Reconnect the exhaust pipe to the manifold.
- 25. Replace the speedometer driven gear and retain it with the forked retainer.
- 26. Refit the drive shaft and replace the four nuts and bolts at the pinion flange.

#### 27. G.T. gearchange

Refit the gear lever lower gaiter and retain it beneath the carpet to the floor pan with the metal ring. Fit the gear lever and turret. Replace the centre console and upper gaiter.

#### Normal floorchange

Replace the rubber gaiter and retain it with the metal ring. Fit the gear lever knob.

- 28. Reconnect the throttle linkage at the carburettor.
- 39. Reconnect the battery earth strap.
- 30. Top-up the gearbox with oil as required, ensuring car is level.

## 31. Column gearchange

(i) Connect the gate selector rod to the lever on the top cover, securing it with a spring clip.

(ii) Slide the gear selector cross-shaft arm onto the pivot on the gearbox casing. Secure it with a flat washer, wave washer, flat washer and spring pin; in that order.

(iii) Reconnect the gear selector rod to the cross-shaft and retain with a spring clip.

## CLUTCH RELEASE BEARING - REPLACE

## To Remove

- 1. Remove the release arm rubber gaiter.
- 2. Withdraw the release arm and bearing assembly from the clutch housing.
- 3. Unhook the release arm from the bearing.
- 4. Press the release bearing from the hub.

#### To Replace

- 5. Press the release bearing onto the hub.
- Engage the release arm in the hooked ends of the release bearing.
- 7. Pass the release arm through the aperture in the clutch housing and slide the release bearing onto the main drive gear bearing retainer.
- 8. Replace the rubber gaiter.

## CLUTCH PRESSURE PLATE AND/OR DISC - REPLACE

## **Tools Required**

P 7091-A Clutch disc locator (modified as illustrated) or Tool P 7137

1. Slacken the six clutch retaining bolts evenly, working diagonally across the clutch.



Clutch Components - Exploded View

- 2. Remove the clutch disc and pressure plate.
- Place the clutch disc in position on the flywheel with the hub towards the flywheel. Align the clutch disc with the locator Tool No. P 7137.
- Refit the pressure plate assembly, locating on the dowels. Fit the six securing bolts and spring washers; torque to 12 to 15 lb. ft.
- 5. Remove locator tool.

# CLUTCH PILOT BEARING - REPLACE

#### **Tools Required**

7600-A or BClutch pilot bearing remover (main tool)CP 7600-6Clutch pilot bearing remover (adaptor)P 7137Spigot bearing replacer and clutch disc locator

- Push the adaptor, Tool No. CP 7600-6, behind the bearing and screw the main tool, 7600-A or B, into the adaptor. Tighten the wing nut to extract the bearing.
- 2. Position the new bearing on Tool No. P 7137 and tap it into place in the crankshaft flange.

# EXTENSION HOUSING ASSEMBLY - OVERHAUL

#### **Tools Required**

P 7657-4	Extension housing oil seal remover
P 7038	Extension housing bearing remover/replacer
P 7095	Extension housing all and

Extension housing oil seal replacer



Selector Fork and Pin

#### A. G.T. gearchange

- 1. Remove the gearbox top cover and springs.
- 2. Remove the inspection cover.
- 3. Remove the pins, or tapered screws, securing the selector forks to the selector rails. Hold the lower end of the pins with a piece of wire to prevent them falling into the gearbox.
- 4. Remove the central first/second gear rail.
- 5. Remove the left-hand side third/top gear rail and slide off the over-run stop tube.
- 6. Unscrew the bolt securing the angled selector arm to the extension rod in the extension housing after removing the locking wire. Slide off the arm.
- 7. Remove the extension rod forward bearing bridge.
- 8. Unscrew the three gear lever turret bolts and withdraw it complete with extension rod.
- 9. Remove the extension housing complete with the reverse selector rail.
- Remove the reverse rail from the extension housing and the extension rod from the gear lever turret.
- 11. Punch out the retaining pin and remove the reverse relay lever from the extension housing.
- 12. Extract the extension housing oil seal by screwing Tool No. P 7657-4 into Tool No. 7657 and then screw the assembly into the seal. Tighten the centre bolt to remove the seal.
- 13. Drive the rear bearing into the housing to remove it. Use Tool No. P 7038.
- At the rear of the extension housing are a spring-loaded plunger and a spring-loaded detent ball. Lift the lock tabs and remove the two retaining bolts and extract the plunger, ball and springs.

#### **To Reassemble**

15. Locate a new bearing on Tool No. P 7038 and drive it into the extension housing, with the split (in the bearing at approximately 35° to the vertical line), until the rear end is flush with the deeper recessed face. See illust.





Remote Floor Change–Inspection Cover Removed

- 16. Install the reverse relay lever in the extension housing. Tap in a new retaining pin.
- 17. Fit the reverse gear selector rail (identified by two detent grooves) through the right-hand bore in the extension housing.
- 18. Engage the reverse rail in the gearbox case and push the extension housing home engaging the reverse selector fork. Fit the five bolts and spring washers to secure the extension housing to the gearbox.
- Slide the extension rod through the bore in the turret housing and fit the turret to the extension housing. Secure with three bolts and spring washers.
- 20. Refit the forward bearing bridge over the extension rod, with the cut-out forwards, and secure it with two bolts.
- Replace the angled selector arm on the extension rod with the arms uppermost. Secure it with a bolt and lock with wire.
- 22. Slide the reverse rail back slightly, fit the centre rail (identified by a cross drilling with a floating pin in one end). Ensure that the uppermost arm of the angled selector arm is to the left of the rail. Engage the first/second gear selector fork as the rail is pushed in.
- Slide in the third/top gear rail, passing it through the over-run stop tube and the third/top selector fork.
- 24. Pin or screw the selector forks to the rails, and fit the gear lever.
- 25. Fit the spring-loaded plunger and the detent ball and spring in the bores beneath the gear lever turret. Do not bend up the lock tabs at this stage.
- 26. Select either third or fourth gear and check that the angled selector arm clears the first/ second gear selector rail flat (C). If a fouling condition occurs, fit the next sized plunger down. Conversely, if fouling occurs between the angled selector arm and the reverse gear face (B) the next sized plunger up should be fitted, see following table.



Remote Floorchange - Reverse Plunger Selection

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The plungers available are as follows:-

Part Number	Size & Dimension A
2821E-7K187-H	1.410 in.
2821E-7K187-G	1.390 in.
2821E-7K187-F	1.350 in.
2821E-7K187-E	1.320 in.
2821E-7K187-D	1.290 in.

When the correct plunger has been fitted, bend up the lock tabs.

- 27. Replace the top cover, detent balls and springs, securing with four bolts and spring washers.
- 28. Replace the inspection cover, securing with three bolts and spring washers and the breather bolt and washer on the lower left-hand corner.
- 29. Fit a new extension housing oil seal, driving it into position with Tool No. P 7095.
- 30. Check engagement of all gears.

## B. Normal Floor change and Column change

#### 1. Floorchange only

Unscrew the turret and remove the gear lever.

- 2. Remove the five bolts securing the extension housing to the gearbox and detach the extension housing.
- 3. Extract the extension housing oil seal by screwing Tool No. P 7657-4 into Tool No. 7657 and then screw the assembly into the seal. Tighten the centre bolt to remove the seal.
- 4. Drive the rear bearing into the extension housing to remove it. Use Tool No. P 7038.
- 5. Locate a new bearing on Tool No. P 7038 and drive it into the extension housing, with the split uppermost, until the rear end is flush with the deeper recessed face.
- 6. Refit the extension housing to the gearbox and secure with five bolts and spring washers.
- 7. Fit a new extension housing oil seal, driving it into position with Tool No. P 7095.

8. Floorchange only Replace the gear lever and check all gears.

EXTENSION HOUSING AND MAINSHAFT ASSEMBLY - REPLACE

#### **Tools Required**

P 7113 Dummy countershaft

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# A. G.T. gearchange

# To Dismantle

- 1. Remove the gearbox top cover and springs. Tip the gearbox and remove the detent balls. 2. Remove the inspection cover. 3. Remove the pins or tapered screws securing the selector forks to the selector rails. Hold
- the lower end of the pins with a piece of wire to prevent them falling into the gearbox.
- 4. Remove the central first/second gear rail.
- 5.
- Remove the left-hand side third/top gear rail, detaching the over-run stop tube. Unscrew the bolt securing the angled selector arm to the extension rod after removing 6. the locking wire. Slide off the arm.
- 7. Remove the extension rod forward bearing bridge. 8.
- Unscrew the three gear lever turret bolts and withdraw it complete with extension rod. 9. Remove the extension housing complete with the reverse selector rail.
- 10. Lift out the selector forks.
- 11. From the front face of the casing, drive the countershaft rearwards slightly, then using a dummy countershaft, Tool No. P 7113, push the countershaft out of the gearbox. The countershaft gear will now lie at the bottom of the gearbox case.
- 12. Withdraw the mainshaft assembly from the gearbox.
- To Reassemble
- 13. Install the caged needle rollers in the bore in the main drive gear.
- 14. Position a blocker ring inside the third/top gear synchroniser assembly, aligning the slots 15. Position an extension housing gasket on the rear of the gearbox, securing it with a thin



Remote Floorchange Centre Rail



Extension Housing Removed

with a

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- 16. Pass the mainshaft into the gearbox, locating the front spigot in the main drive gear bearing. Tap the mainshaft in, aligning the dowel pin on the rear bearing carrier with the centre selector rail hole.
- 17. Carefully, with pieces of string at each end, lift the countershaft gear into mesh with the mainshaft and main drive gears. Take care that the thrust washers in the case at each end of the countershaft gear are not displaced.
- 18. Refit the countershaft from the rear, keeping it in contact with the dummy countershaft and finally tap it in so that the front face just protrudes from the gearbox.

Ensure that the flat on the end is so positioned to fit in the recess in the extension housing.

- 19. Slide the extension rod through the bore in the turret housing and fit the turret to the extension housing. Secure with three bolts and spring washers.
- Engage the reverse rail in the gearbox case and push the extension housing home. Fit
  the five bolts and spring washers.
- 21. Refit the forward bearing bridge over the extension rod, with the cut-out forwards, and secure it with two bolts.
- 22. Replace the angled selector arm on the extension rod with the arms uppermost. Secure it with a bolt and lock with wire.
- 23. Slide the reverse rail back slightly, fit the centre rail, (identified by a cross drilling with a floating pin in one end). Ensure that the uppermost arm of the angled selector arm is to the left of the rail. Engage the first/second gear selector fork as the rail is pushed in.
- Slide in the third/top gear rail, passing it through the over-run stop tube and the third/top selector fork.
- 25. Pin or screw the selector forks to the rails, and fit the gear lever.



Floorchange (both types)

29

Column Change

Selector Fork and Gate Positions



26. Select either third or fourth gear and check that the angled selector arm clears the first/ second gear selector rail flat (C). If a fouling condition occurs, fit the next sized plunger down. Conversely, if fouling occurs between the angled selector arm and the reverse gear face (B) the next sized plunger up should be fitted, see following table.

The plungers available are as follows:-

Part Number	Size & Dimension A				
2821E-7K187-H	1.410 in.				
2821E-7K187-G	1.390 in.				
2821E-7K187-F	1.350 in.				
2821E-7K187-E	1.320 in.				
2821E-7K187-D	1.290 in.				

- 27. When the correct plunger is obtained, bend up the lock tabs to retain the bolts,
- Replace the top cover, detent balls and springs, securing with four bolts and spring washers.
- 29. Replace the inspection cover, securing with three bolts and spring washers and the breather bolt and washer on the lower left-hand corner.
- 30. Check engagement of all gears.

#### B. Normal Floor change and Column change

#### **To Dismantle**

- 1. Unscrew the five bolts securing the extension housing to the gearbox and detach.
- Remove the gearbox top cover and springs. Tip the gearbox and remove the detent balls from the gearbox casing.
- Remove the pins or tapered screws securing the selector fork or forks and gates to the selector rails. Hold the lower end of the pins with a piece of wire to prevent them falling into the gearbox.
- 4. Remove the selector rails and forks.
  - (a) Floor change
  - Withdraw the third/top gear rail to the rear and lift out the over-run stop tube.
  - (ii) Withdraw the first/second gear rail and remove the floating pin from the cross drilling at the front end. Rotate the shaft and complete the withdrawal.
  - (iii) Rotate the reverse gear rail and withdraw it.
  - (iv) Lift out the selector forks.
  - (b) Column change

(i) Withdraw the left-hand side first/second gear rail to the rear and remove. Lift out the selector gate.

(ii) Withdraw the central third/top gear rail to the rear, taking care not to lose the floating pin at the forward end, and lift out the selector gate and the over-run stop tube.

- (iii) Withdraw the reverse gear rail to the rear.
- (iv) Lift out the selector forks.

- From the front face of the casing, drive the countershaft rearwards slightly, then using a dummy countershaft, Tool No. P 7113, push the countershaft out of the gearbox. The countershaft gear will now lie at the bottom of the gearbox.
- 6. Withdraw the mainshaft assembly from the gearbox.

#### To Reassemble

- 7. Install the caged needle rollers in the bore in the main drive gear. •
- Position a blocker ring inside the third/top gear synchroniser assembly, aligning the slots with the blocker bars.
- Position an extension housing gasket on the rear of the gearbox, securing it with a thin smear of grease.
- Pass the mainshaft into the gearbox, locating the front spigot in the main drive gear bearing. Tap the mainshaft in, aligning the dowel pin on the rear bearing carrier with the centre selector rail hole.
- Carefully, with pieces of string at each end, lift the countershaft gear into mesh with the mainshaft and main drive gears. Take care that the thrust washers in the case at each end of the countershaft gear are not displaced.
- 12. Refit the countershaft from the rear, keeping it in contact with the dummy countershaft and finally tap it in so that the front face just protrudes from the gearbox. Ensure that the flat on the end is so positioned that it will fit in the recess in the extension housing.
- Place the selector forks on the gears. The first/second and third/top gear forks should have the longer boss facing rearwards. The reverse fork has the longer boss facing forwards.
- 14. Fit the selector rails.
  - (a) Column change
  - (i) Insert the reverse gear rail identified by two detents in one end in the right-hand bore, engaging the reverse fork.

(ii) Insert the first/second gear selector rail in the left side bore from the rear, passing it through the selector fork and then fitting the selector gate with the cut-out inwards.



Checking the Over-run Stop Tube

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(iii) Insert the third/top gear selector rail in the central bore from the rear, passing it through the over-run stop tube, the selector gate and the fork. Before inserting the rail into the front face of the gearbox ensure that the floating pin is fitted at the front end of the rail.

#### (b) Floor change

(i) Install the reverse gear rail in the right-hand bore, turning it through 90° to clear the casing.

(ii) Install the first/second gear rail in the central bore and before it is pushed fully home ensure that the floating pin is in position in the forward end.

(iii) Place the two installed rails in neutral position and slide the third/top gear rail in the left-hand bore, engaging the over-run stop tube and the third/top fork.

- 15. Secure the forks and gates to the rails with the pins or screws.
- 16. Place the detent balls in the holes in the casing above the rails.

#### 17. Floor change only

Engage third gear, press down on the detent ball, and measure the clearance between the over-run stop tube and the face of the selector fork.

Select a bright steel washer, which just fits the rail, to reduce this clearance to zero. If necessary, select a slightly thicker washer and file the excess from the selector fork or the stop tube.

 Replace the gearbox top cover, using a new gasket. Ensure that the selector shaft balls and springs are correctly located and then secure the cover with four bolts and lockwashers.

#### 19. (a) Floor change

Secure the gear lever housing to the casing, ensuring that the reverse relay lever engages the reverse selector rail. Note that the rear left-hand securing bolt is also a breather and must be free from obstruction.

#### (b) Column change

Fit a new gasket to the rear cover plate and secure it to the extension housing with four bolts and lockwashers.



Mainshaft - Exploded View

Note that the lower left-hand bolt also incorporates a breather which must be kept free from sealer.

20. Check that all gears can be engaged.

# EXTENSION HOUSING AND MAINSHAFT ASSEMBLY - OVERHAUL

#### **Tools Required**

- P 7098 Mainshaft nut spanner
- P 4090-6 Third/top synchroniser remover
- P 4090-7 First gear and mainshaft bearing remover
- P 4090-3 First/second synchroniser remover
- P 4000-31A Mainshaft bearing replacer
- P 7657-4 Extension housing oil seal remover
- P 7095 Extension housing oil seal replacer
- P 7038 Extension housing bearing remover/replacer
- 1. Dismantle the mainshaft assembly.

(a) Lift up the retaining tab behind the mainshaft nut and then unscrew this nut (use ring spanner, Tool No. P 7098). Remove the speedometer drive gear, lock-ball and spacer from the mainshaft.

(b) Remove the circlip at the forward end of the mainshaft and discard it. Locate the adaptor (Tool No. P 4090-6) around the rear face of the third gear and in the base plate of a press. Press the mainshaft out of the third/top gear synchroniser and the third gear whilst supporting the mainshaft from beneath to prevent it dropping.

(c) Remove the first gear, splined collar, bearing carrier and bearing from the mainshaft by locating the adaptors (Tool No. P 4090-7) around the front face of the first gear and in the base plate of a press. Press the components off the mainshaft in the same way as in item (b) above but bring the ram down on the splined end.

(d) Carefully remove the circlip which is located in the mainshaft behind the first/second gear synchroniser hub and discard it.





Synchroniser Mating Marks

Removing Third Gear

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1

(e) Locate the adaptors (Tool No. P 4090-3) around the front face of the second gear and in the base plate of a press. Press the second gear and the first/second gear synchroniser assembly from the mainshaft.

NOTE – The synchroniser hubs and sleeves are mated together and also to the mainshaft. Mating marks are etched on the corresponding splines of the hub, the sleeve and adjacent to the spline on the mainshaft.

2. Reassemble the mainshaft assembly.

When reassembling the mainshaft new circlips must be used.

(a) Slide the second gear along the mainshaft and onto its bearing so that the dog-teeth face at the rear.

- (b) Locate a blocker ring on the cone face of the second gear.
- (c) Assemble the first/second gear synchroniser:

(i) If a new unit is being installed, slide the synchroniser sleeve off the splined hub. Clean all the preservative from the hub, sleeve, blocker bars and springs. Lightly oil them.

(ii) Fit the synchroniser sleeve over the hub with the mating marks aligned. Locate a blocker bar in each of the three slots cut in the hub.

(iii) Install a blocker bar spring to run around, clockwise or anti-clockwise, inside the synchroniser sleeve beneath the blocker bars. The tagged end of the spring must locate in the "U" section of a blocker bar. Fit the other spring to the opposite face of the synchroniser unit ensuring that the spring tag locates in the same blocker bar as the spring just previously fitted and runs in the same rotational direction. View direct onto one side of the synchroniser assembly and note the direction of rotation of the spring (clockwise or anti-clockwise). View direct onto the other side of the synchroniser assembly—the direction of rotation of the spring should be the same as for the first spring, when viewed face on (see illustration).





Synchroniser Spring Rotation

Countershaft - Exploded View





(d) Locate the first/second gear synchroniser assembly on the mainshaft and engage it on the splines as far as possible. Fit a suitable adaptor (Tool No. P 4090-7) behind the synchroniser assembly and locate it in the bed of a press. Press the mainshaft into the synchroniser assembly, taking care that it does not tilt as it moves over the circlip groove.

(e) Carefully fit a new circlip to the groove in the mainshaft behind the first/second gear synchroniser.

(f) Fit a blocker ring in the first/second gear synchroniser so that the cut-outs in the blocker ring fit over the blocker bars.

(g) Slide the first gear onto the mainshaft so that the dog-teeth are located adjacent to the blocker ring on the first/second gear synchroniser.

(h) Fit the splined collar behind the first gear.

(i) Position the bearing carrier on the mainshaft with the dowel hole to the rear. Fit the mainshaft bearing. Slightly withdraw the bearing carrier rearwards to fit over the bearing.

(*j*) Locate the adaptor (Tool No. P 4000-31A) over the bearing and insert the assembly in a slave ring (Tool No. 370) in the bed of a press. Press the bearing home onto its journal on the mainshaft.

(k) Slide the third gear onto the front end of the mainshaft with the dog-teeth away from the integral thrust collar. Locate a blocker ring on the taper face of the gear.

(/) Place a blocker bar spring in position on the rear face of the third/top gear synchroniser hub and note its direction of rotation. Ensure that the mating marks on the hub and main-shaft correspond and engage it on the splines as far as possible.

Support the hub on the adaptor (Tool No. P 4090-7) and locate it in the bed of a press. Press the hub fully home and then fit a new circlip on the mainshaft in front of the hub.

(m) Locate the blocker bars in position and fit the synchroniser sleeve onto the hub with the back angling on the internal splines facing the third gear and the mating marks in line.

(n) Install the remaining blocker bar spring in the synchroniser hub in the same way as described previously (paragraph (c) iii).

(o) Place the spacer and lock-ball on the mainshaft and slide on the speedometer gear and lock tab. Screw on the mainshaft nut and torque to 25 lb. ft. (use ring spanner, Tool No. P 7098). Bend the lock tab to retain the nut.

 Extract the extension housing oil seal by screwing Tool No. P 7657-4 into Tool No. 7657 and then screw the assembly into the seal. Tighten the centre bolt to remove the seal.

4. Drive the rear bearing into the housing to remove it. Use Tool No. P 7038.

#### 5. Floor change only

Punch out the retaining pin and remove the reverse relay lever from the extension housing.

#### To Reassemble

- Locate a new bearing on Tool No. P 7038 and drive it into the extension housing, with the split uppermost, until the rear end is flush with the deeper recessed face.
- 7. Install the reverse relay lever in the extension housing. Tap in a new retaining pin.
- 8. Fit a new extension housing oil seal, driving it into position with Tool No. P 7095.

## GEARBOX - OVERHAUL

#### **Tools Required**

P 7043Reverse idler gear removerP 4090-3AMain drive gear bearing removerP 7136Main drive gear oil seal replacerP 7113Dummy countershaftP 4000-29detail "a" & "b" Main drive gear bearing replacer

#### To Dismantle

- Unscrew the three bolts and spring washers securing the main drive gear retainer to the gearbox case. Withdraw the retainer and paper gasket, taking care not to damage the seal. Carefully tap out the main drive gear.
- Remove the countershaft gear and two thrust washers from the gearbox. In both ends of the countershaft there are twenty-two needle rollers retained by a small washer on each side of each set of rollers. Remove these rollers and the dummy countershaft.
- 3. Withdraw the reverse idler shaft with Tool No. P 7043. Should this tool not be available, locate a nut, a flat washer and a sleeve on a  $\frac{5}{16}$  in. 24 UNF threaded bolt. Screw the bolt into the reverse idler shaft and tighten the nut to withdraw the shaft.
- Dismantle the main drive gear. Remove the circlip securing the main drive gear bearing, support the bearing in adaptors (Tool No. P 4090-3A) and press out the main drive gear.
- 5. Overhaul the main drive gear bearing retainer if necessary:-
  - (a) Remove the oil seal and discard it.

(b) Place a new oil seal on the replacer (Tool No. P 7136) so that when fitted the lips face the gearbox. Drive the seal into the retainer.

#### To Reassemble

6. Reassemble the countershaft gear:-

Fit a retaining washer to abut the machined shoulder inside the gear. Grease the needle rollers and locate twenty-two in the recess in the gear. Fit a retaining washer over the rollers and slide the dummy countershaft (Tool No. P 7113) through the gear. Repeat the procedure for the rollers at the other end. Grease the thrust washers and locate them in position inside the gearbox with the tongues in the machined recesses.

- Position the countershaft gear in the bottom of the gearbox case, taking care not to displace the thrust washers.
- 8. Assemble the main drive gear. Position the main drive gear bearing on the gear with the external circlip groove on the bearing away from the gear. Support the assembly with the adaptor (Tool No. P 4000-29, detail "a") and press the bearing home on the gear, using a press adaptor (detail "b") located in the spigot recess of the main drive gear. Fit the small circlip in the groove in the shaft.
- Fit the large circlip to the groove in the main drive gear bearing and then fit the main drive gear to the gearbox.
- 10. Fit the main drive gear bearing retainer to the gearbox. First fit a new gasket on the gearbox front face. Ensure that the oil groove in the retainer is in line with the oil passage in the

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gearbox casing and that the gasket does not cover this passage. Coat the three retaining bolts with sealer and fit them, complete with spring washers. Tighten securely.

11. Position the reverse idler gear inside the gearbox with the selector fork groove towards the rear. Fit the shaft through the case and gear so that the flats will be positioned to mate with the recess in the extension housing.

# REPLACE OR OVERHAUL GEARBOX SELECTOR COMPONENTS - COLUMN CHANGE ONLY

#### **Tools Required**

P 6061	Spring compressor
P 7103	Adaptor
P 7102	Oil seal replacer
P 7102	Oil seal protector
detail "c" or "d"	
P 7118	Oil seal protector

## **To Dismantle**

- Bend back the tab that locks the gate selector arm retaining nut on the top of the case. Unscrew the nut, remove the tab washer and lift off the arm and flat washer. Remove the gate selector finger from inside the cover, taking care not to damage the oil seal.
- Unscrew the locknut and remove the flat washer retaining the selector lever to the cross-shaft. Remove the circlip and flat washer located at the opposite end of the crossshaft to the selector lever.
- Insert spring compressor Tool No. P 6061 and adaptor Tool No. P 7103 between the top cover and the outer spring seat. Compress the spring and remove the circlip locating this seat on the cross-shaft.
- 4. Using a suitable lever, part the gear selector fingers and remove the circlip which is located between them.



**Compressing the Top Cover Spring** 

- Carefully withdraw the cross-shaft taking care not to damage the oil seals at either side of the gearbox top cover.
- 6. Remove the outer spring seat, spring and shift fingers from the gearbox top cover.
- Inspect the seals in the gearbox top cover. Any seals that are cracked, scored, stretched, or swollen, or that are in any way considered unserviceable should be replaced.
- Remove any unserviceable oil seals from the top cover and clean the area thoroughly before fitting new seals.
- 9. Three seals of two different sizes are fitted to the cover. The seal fitted in the largest counterbore hole for the cross-shaft is 1.20 in. diameter, the seal fitted at other end of this shaft and the seal for the gate selector finger being same diameter, 1.00 in.

#### To Reassemble

- 10. Fit the larger diameter seal to the adaptor Tool No. 7102 and driver Tool No. 575 so that the seal lip, when fitted to the cover, will face inwards. Drive the seal right home.
- Using the same driver Tool No. 575 and adaptor Tool No. 7102, fit the other two oil seals (lip inwards) in a similar manner.
- 12. Locate the shift fingers in the cover adjacent to the larger cross-shaft drilling.
- 13. Insert the reverse stop spring and outer spring seat in the cover in that order.
- Place the cross-shaft seal protector Tool No. P 7102 detail 'c', over the threaded end of the cross-shaft on R.H.D. cars, or use Tool No. P 7102 detail 'd', over the circlip groove end for L.H.D. cars.
- 15. Grease the protector and then pass the cross-shaft and seal protector assembly (protector first) through the top cover, commencing at larger diameter seal.

NOTE – To ensure correct assembly of the cross-shaft to the shift fingers the two 'flats' machined on the threaded end of the cross-shaft must be at right-angles to the shift finger.



Removing the Centre Circlip

Refitting the Top Cover Oil Seal

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- 16. Using a suitable lever, part the shift fingers and fit a circlip to the groove in the cross-shaft.
  - 17. Fit spring compressor Tool No. P 6061 between the gearbox top cover side wall and the outer spring seat. Compress the spring and fit a circlip to the cross-shaft to retain the outer spring seat in its correct position.
  - 18. Push the cross-shaft right home whilst keeping the seal protector in position. Remove the seal protector. Fit the selector lever to the cross-shaft so that it points forward, fit a flat washer and locknut. Tighten the nut securely. Fit a flat washer and a circlip to the other end of the cross-shaft.
  - 19. Fit a seal protector Tool No. P 7118, to the gate selector finger and from inside the cover pass the gate selector finger through the bore in the top of top cover, taking care not to damage the oil seal. The end of the finger must engage in the groove in the forward shift finger on the cross-shaft.
  - 20. Fit the gate selector arm from the exterior of the top cover so that the outer end of the arm is positioned to left-hand side of the top cover and parallel to the cross-shaft. The straight edge of the arm should be to the front of the car.
  - 21. Fit a tab washer and nut, then tighten securely. Lift up the tab to lock the nut.
  - 22. Replace the gearbox top cover, using a new gasket. Ensure that the selector rail balls and springs are correctly located and then secure the cover with four bolts and lockwashers.
  - 23. Check that all gears can be selected.

#### EXTENSION HOUSING OIL SEAL - REPLACE

#### **Tools Required**

P 8095 Transmission mainshaft oil seal replacer
7657 Oil seal remover (main tool)
P 7657-4 Transmission mainshaft oil seal remover (adaptor)

- 1. Chock the front wheels and jack up the rear of the car. Fit stands.
- Mark the drive shaft and pinion flange and remove the four bolts and self-locking nuts. Remove the drive shaft.
- 3. Extract the oil seal from the rear of the extension housing using Tool Nos. 7657 and P 7657-4.
- 4. Locate a new mainshaft oil seal on replacer Tool No. 7095, so that the lip on the seal faces into the extension housing and then drive the seal into position in the housing.
- Replace the drive shaft by sliding the front universal joint yoke onto the splines of the mainshaft, taking care not to damage the extension housing oil seal. Align the mating marks on the drive shaft and pinion flanges, fit the retaining bolts and secure with four new selflocking nuts.
- 6. Remove the stands, lower the car to the ground and remove the chocks from the front wheels.

#### COLUMN GEARCHANGE LINKAGE - OVERHAUL

#### **Tools Required**

P 7138 Linkage adjusting gauge

#### **To Dismantle**

1. Remove the main gearchange rod.

(a) Remove four screws securing the steering column upper shroud and detach shroud.

(b) Remove the steering wheel.

(c) Remove the circlip, flat washer, wave washer and upper nylon bearing at the top of the gearchange rod.

(d) Lift out the gear lever, after depressing the two spring-loaded pins beneath the rubber cover.

(e) From under the bonnet, remove the gate selector pivot arm after unscrewing the locknut. There is a wave washer beneath the arm which is also removed.

(f) Disconnect the gear selector down-rod from the lever on the gearchange rod, by removing the spring clip.

(g) Remove the floor cover plate inside the car. It is secured by two crosshead screws.

(*h*) Depress the plunger on the top of the gearchange rod, move the rod to one side to just clear the bracket and lift it upwards out of the car.

 There is a pivot bracket bolted to the rear bulkhead just below the heater pressing. Disconnect the two gate selector rods attached to the arm which pivots on the bracket; they are secured by spring clips.

Remove the pivot arm by unscrewing the locknut.

 There is a gear selector cross rod which pivots between a bracket bolted to the body side rail and a pin in the gearbox case. Remove the two bolts securing the bracket to the side rail. Remove the spring clip securing the small lever on the end of the cross rod to the lever on the gearbox top cover.

Remove the spring clip on the pin in the gearbox case and remove the cross rod.

#### To Reassemble

- 4. Ensure that all the bushes in the linkage are not worn or distorted.
- Slide the gear selector cross rod onto the pivot pin in the gearbox case. Retain it with a flat washer, wave washer, flat washer and a spring pin through the hole in the pivot, in that order.





Column Change Linkage Adjustment

Column Change - Lower Linkage

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Column Gearchange - Exploded View

- Place the bracket over the other end of the cross rod and secure it to the body side rail with two bolts and spring washers.
- Reconnect the small rod between the cross rod and the lever on the gearbox top cover. Retain it with a spring clip at each end.
- Replace the gate selector pivot arm on the vertical pin on the bracket beneath the heater pressing. Retain it with a wave washer, flat washer and locknut.
- Reconnect the rod between lever on the top cover and the pivot arm. Secure with a spring clip.
- 10. Slide the main gearchange rod into position through the aperture in the floor pan and engage the pin at the lower end in the bore in the steering box. Depress the plunger at the top and locate it in the bracket. Release the plunger.
- Refit the gate selector arm to the pivot on the steering column, ensuring that a wave washer is beneath it. Replace the flat washer and locknut, engaging the arm in the slot in the gearchange rod.
- Reconnect the gate selector rod to the pivot arm beneath the heater pressing. Secure with a spring clip.
- Reconnect the gear selector down rod to the arm welded to the gearchange rod. Secure with a spring clip.
- Replace the nylon bearing, wave washer, flat washer and circlip at the top of the gearchange rod.
- 15. Replace the gear lever.
- 16. Refit the steering wheel and shroud.
- 17. Adjust the linkage.

(a) Slacken the adjusting nuts on the gate selector arm and gear selector arm at the bottom of the steering column.

(b) Fit the setting gauge (Tool No. P 7138) between the gear selector arm and the top face of the steering box, ensuring that the protruding pins are on each side of the selector arm (see illustration).

- (c) Screw up the locknuts to just touch the square pivots.
- (d) Finally tighten the locknuts.
- (e) Check all gears can be engaged.

#### CLUTCH HYDRAULIC SYSTEM - BLEED

#### **Tools required**

P 2006 Bleed valve

- Clean the area round the bleed valve on the operating cylinder and remove the dust excluding rubber cap.
- Fit a bleed tube on the bleed valve P 2006 and place the other end of the tube in a bottle containing fluid, ESW FM 6C2 keeping the end of tube beneath the surface of the fluid throughout the bleeding operation.
- 3. Open the bleed valve by turning it anti-clockwise and slowly depress and release the clutch pedal several times. For each stroke some fluid or air should be pumped out of the tube. If neither fluid nor air is pumped out, the bleed valve is not properly opened or there is a blockage in the pipe line.

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NOTE - Where air in the system is suspected, remember that initial application of the clutch pedal will cause air trapped in the bleed tube to be forced into the fluid container.

 Continue depressing and releasing the clutch pedal slowly until no more air bubbles emerge from the tube, ensuring that the fluid level in the reservoir is maintained during the bleeding operation

Do not replenish the reservoir with fluid obtained from the system as it may be aerated or contaminated.

- Close the bleed valve tightly with the pedal fully released, when fluid alone comes out of the bleed tube with each stroke of the clutch pedal. Refit the dust excluding rubber cap.
- 6. Refill the reservoir to the correct level and refit the cap.

#### CLUTCH OPERATING CYLINDER - REPLACE

#### To Remove

- 1. Jack up the front of the car and fit chassis stands.
- 2. Detach the fluid pipe by unscrewing the union nut, using a blanking plug to prevent dirt entering the pipe.
- Remove the retaining circlip from around the cylinder body after slipping the rubber boot
  off the operating cylinder.
- Push the cylinder forwards out of its location, removing the boot and the push rod simultaneously.

#### To Replace

- 5. Slide the cylinder into its location in the clutch housing flange from the front. Push the push-rod through the rubber boot and insert the push-rod with the boot hanging loose, into the operating cylinder and clutch release arm.
- Fit a circlip, ensuring that it is correctly located in its groove and fit the rubber boot on the operating cylinder.
- 7. Reconnect the fluid pipe, tighten the union nut.
- 8. Bleed the system .



#### **Clutch Operating Cylinder – Exploded View**

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# CLUTCH OPERATING CYLINDER - OVERHAUL

# To Dismantle

- 1. Remove the piston and seal by extracting the circlip from the cylinder body, and then removing the piston and spring assembly from the cylinder.
- 2. Unscrew the bleed valve on the side of the operating cylinder.
- 3. Pull the spring and then the rubber piston seal off the spigot at the front of the piston. 4. Wash all parts in hydraulic fluid, alcohol and examine the rubber piston seal carefully. Renew the seal if there is any sign of ESW FM 6C2

## To Reassemble

- 5. Locate the piston seal on the spigot at the front end of the piston with the recess in the seal away from the piston. Locate the spring on the piston spigot.
- Dip the piston and seal in hydraulic fluid and carefully insert, spring first, into the cylinder. 6.
- 7. Replace the bleed valve but do not tighten.



Clutch Master Cylinder - Exploded View

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#### CLUTCH MASTER CYLINDER - REPLACE

#### To Remove

- 1. Disconnect the clutch master cylinder push-rod from the pedal by unscrewing the nut and withdrawing the spring washer and concentric bolt.
- Detach the fluid pipe by unscrewing the union nut, using a blanking plug to prevent dirt entering the line.
- Withdraw the master cylinder after removing two spring washers and nuts securing the master cylinder to the bulkhead.
- 4. Empty the contents of the fluid reservoir into a waste container.

#### To Replace

- Refit the master cylinder to the engine bulkhead, securing with two spring washers and nuts.
- 6. Reconnect the fluid pipe, do not overtighten the union.
- Reconnect the clutch master cylinder push rod to the pedal by passing the concentric bolts through the push rod and then the pedal. Fit a spring washer and nut; 12 to 15 lb. ft.
- Top-up the master cylinder reservoir with clean approved fluid, ESW FM 6C2, and then bleed the system. Check the action of the clutch.

## CLUTCH MASTER CYLINDER - OVERHAUL

#### **To Dismantle**

- 1. Remove the rubber boot. Withdraw the circlip and remove the pushrod.
- 2. Withdraw the piston and valve assembly from the cylinder.
- 3. Remove the piston from the valve assembly. The spring retainer is held in position on the spigot end of the piston by a tab which engages under a shoulder on the front of the piston. Lift up the tab and remove the spring retainer, spring and valve assembly from the piston.
- 4. Dismantle the valve assembly by compressing the spring and moving the valve stem to one side in the retainer, so releasing the end of the valve stem from the key-hole slot in the retainer. Slide the valve spacer and shim off the valve stem.
- 5. Remove the rubber valve seal and piston seal if necessary.
- Wash the parts in methylated spirits, approved fluid ESW FM 6C2, or commercial alcohol. Carefully inspect the piston rubber seal and renew if there is any sign of damage to the sealing lip.

### To Reassemble

- 7. Replace the piston seal with the lip away from the large diameter of the piston.
- 8. Fit the valve seal to the valve stem with the lip outwards and away from the spring. Slide the shim, valve spacer, with legs over the valve seal, and return spring over the valve stem. Ensure that the convex face of the shim abuts the valve stem flange.
- 9. Fit the spring retainer in the rear end of the return spring, compress the spring and locate the valve stem in the key-hole slot in the end of the spring retainer.
- 10. Insert the front of the piston in the spring retainer, and secure it by locating the spring retainer tab under the front shoulder of the piston.
- 11. Dip the piston and seal in hydraulic fluid and insert the piston assembly in the cylinder, valve seal end first.
- 12. Install the push-rod in the master cylinder. Locate the washer and fit the retaining circlip.
- 13. Refit the rubber boot to the clutch master cylinder.



Removing the Piston Valve



Refitting the Piston Valve Assembly

#### 317T-25 15° Valve Seat Narrowing Cutter - Inlet

This cutter has an angle of 15°.

(Existing Tool)



## GEARBOX

#### CP 4000 Hand Press (Main Tool)

Used in conjunction with different adaptor sets to assist in the completion of various rear axle operations. (Existing Tool)

## P 4000-29 Main Drive Gear Bearing Replacer

Consists of a replacer adaptor and a floating guide, used in conjunction with P 4090-6, the 370 taper base or CP 4009 and a workshop press. (Existing Tool)

#### P 4000-31A Mainshaft Bearing and Hub Replacer

Consists of a ring and a collar, used with the 370 taper base and a workshop press. (Existing Tool)

#### P 4090-3A Main Drive Gear Bearing Remover

Used in conjunction with the 370 taper base and a workshop press, to remove all hubs, except first gear from the mainshaft. (Existing Tool)









## P 4090-6 Mainshaft Hubs Remover

Used in conjunction with the 370 taper base, P 4000-29 and P 4000-31A. (Existing Tool)

P 4090-7A First Gear Remover

Use detail "a" only to remove first gear.

(Existing Tool)



### P 6061 Spring Compressor (Main Tool)

Used to compress the reverse stop spring to assist removal of the circlip. (Existing Tool)

#### P 7038 Transmission Extension Bearing Remover/ Replacer

Used to replace the transmission extension bearing and is essential particularly when thin shell bearings are fitted. (Existing Tool)

## P 7043 Mainshaft Ball Bearing and Idler Shaft Remover

Used to remove the mainshaft ball bearing and idler shaft. (Existing Tool)

#### P 7089 Gearbox Bracket

Used in conjunction with the 200A or B Engine Stand, this bracket enables the gearbox to be held in a rigid position for stripping or rebuilding. (Existing Tool)









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## P 7093 Interlock Plunger Assembly Tool

A small guide rod which facilitates the assembly of the interlock plunger to the gearbox housing.

(Existing Tool)

## P 7095 Transmission Mainshaft Oil Seal Replacer

This driver-type tool ensures correct location of the transmission mainshaft oil seal without danger of damage to components. (Existing Tool)

#### P 7098 Mainshaft Nut Wrench

A specially shaped wrench with a  $\frac{1}{2}$  in. square drive used in conjunction with a suitable tension wrench to ensure correct torque loading of the mainshaft nut. (Existing Tool)

## P 7102R-H Gear Selector Housing Oil Seal Replacer

Consists of two replacer pads and one seal protector, used in conjunction with the 575 Light Universal Handle, to replace the gear selector housing oil seal.

(Existing Tool)

#### P 7102L-H Gear Selector Housing Oil Seal Replacer

Consists of two replacer pads and one seal protector, used in conjunction with the 575 Light Universal Handle, to replace the gear selector housing oil seal.

(Existing Tool)

#### P 7103 Gear Selector Housing Spring Compressor

This tool simplifies removal or replacement of the transmission gear selector shaft circlip.

(Existing Tool)













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## P 7113 Dummy Countershaft

An accurately machined shaft which provides a means of removing the cluster gear assembly complete from the gearbox. (Existing Tool)



Provides a safeguard for the oil seal in the top of the gearchange housing when fitting the lever and shaft assembly. (Existing Tool)

# P 7136 Main Drive Gear Oil Seal Replacer

This tool ensures the accurate replacement of the oil seal. (New Tool)

## P 7137 Spigot Bearing Replacer

This tool eliminates the danger of damaging the bearing during replacement. (New Tool)

# P 7138 Gearchange Relay Rod Setting Gauge

Consists of a setting plate and spacer. This tool may be used for both left- and right-hand drive cars. (New Tool)

# 7600-A or B Flywheel Bearing Remover (Main Tool)

Used in conjunction with a suitable adaptor, facilitates removal of the flywheel bearing. (Existing Tool)





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# CP 7600-6 Flywheel Bearing Remover (Adaptor)

A split collet used in conjunction with 7600-A or B Main Tool (Existing Tool)

# 7657 Mainshaft Oil Seal Remover (Main Tool)

Used in conjunction with a suitable adaptor to remove the mainshaft oil seal without the need of removing the gearbox from the car. (Existing Tool)

# P 7657-4 Mainshaft Oil Seal Remover (Adaptor)

Used in conjunction with 7657 Main Tool the hollow centre allows the tool to be applied over the shaft, thus allowing the seal to be removed. (Existing Tool)

## CBW 1A Pressure Test Gauge (BW-1)

Only one of the eight pressure take-off adaptors is required on the "New Cortina" automatic transmission. (Existing Tool)

#### CBW 34 Front Band Spacer Gauge (BWA-34)

A small steel gauge which is essential to obtain the correct setting when adjusting the front band. (Existing Tool)

#### CBW 35B Bench Cradle (BWA-35)

The use of this tool permits complete freedom to carry out the various adjustments and assembly operations without difficulty. (Existing Tool)













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