GEARBOX OPERATIONS

Main Gearbox

continued

GEARBOX OPERATIONS

Primary pinion
—remove and refit .. .. refer to 37.12.08

Reverse idler gear
—remove and refit 37.20.13
—overhaul 37.20.14

Reverse selector stop
—remove, refit and adjust 37.16.28

Transfer gearbox

Intermediate gears assembly
—remove and refit .. .. refer to 37.29.28

Speedometer drive housing
—remove and refit 37.25.09
—overhaul 37.25.13

Transfer gearbox complete
—remove and refit 37.29.25
—overhaul 37.29.28

Transmission brake—refer to Division 70 (Brakes)

Front output housing

Front output shaft housing
—remove and refit 37.10.05
—overhaul 37.10.06

Power take-off
—remove and refit A37.33.01
—adjusting overload clutch A37.33.11

Winch
—general descrption A37.34.00
—operation A37.34.10
—remove and refit A37.34.11

FRONT OUTPUT SHAFT HOUSING

–Remove and refit **37.10.05**

Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.

NOTE: Remove power take-off chain case when winch is fitted. A37.33.01.

4. Remove the transmission brake. 70.45.16.
5. Remove the transfer box. 37.29.25.
6. Remove the transfer gear selector shaft plunger.
7. Remove the top cover from the transfer box.
8. Remove the pinch bolt from the transfer selector fork.
9. Remove the front output shaft housing from the transfer box, taking care to catch the four wheel drive locking dog which will be released.
10. Withdraw the loose selector fork from the transfer box.

Refitting

11. If the selector shafts have been removed, refer to 37.10.06 for refitting procedure.
12. Place the transfer gear selector fork in position, with the threaded side of the pinch bolt hole towards the centre of the transfer box.
13. Smear both sides of the joint washer with a general purpose grease and place in position on the transfer box.
14. Offer the output shaft housing to the transfer box, carefully locating the transfer gear selector shaft through the selector fork

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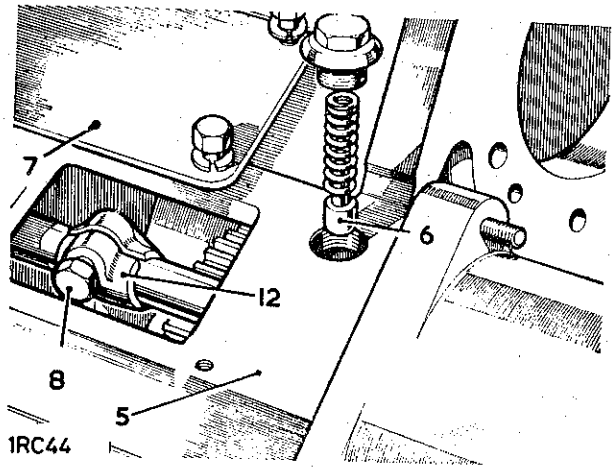

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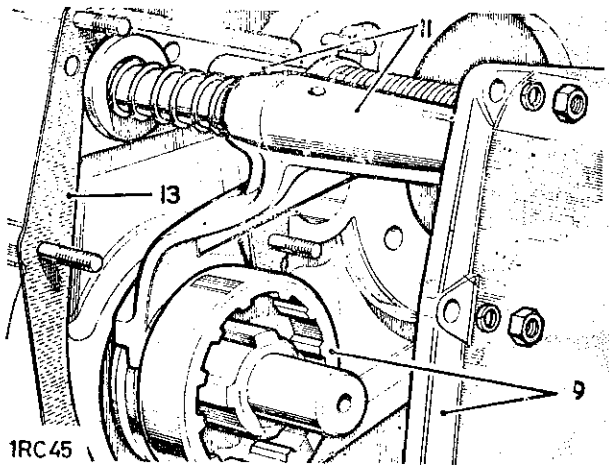

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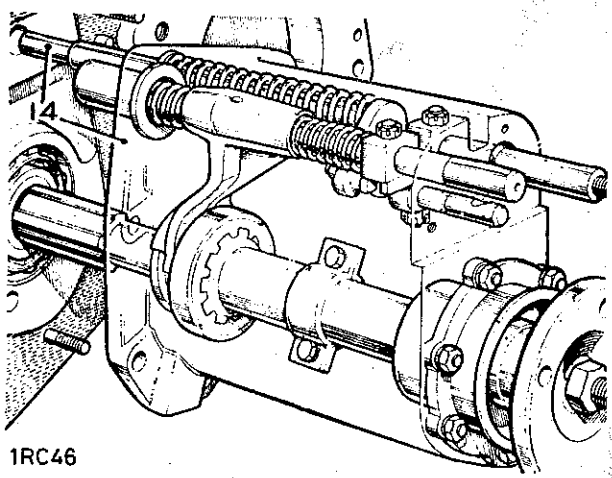
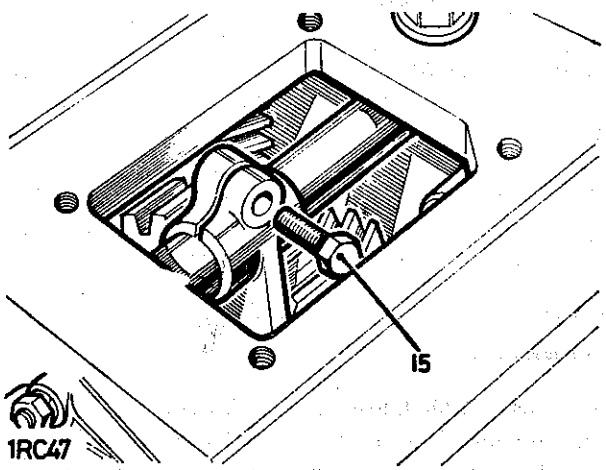


1RC46

15. Complete the refitting by reversing the removal procedure. Ensure that the selector fork pinch bolt engages the groove in the selector shaft.
16. Replenish the gearbox oil with the recommended lubricant (Division 09).



FRONT OUTPUT SHAFT HOUSING

—Overhaul 37.10.06

Dismantling the housing

1. Remove the front output shaft housing. 37.10.05.
2. Remove the link from the transfer gear selector shaft.
3. Remove the four wheel drive control lever.
4. Remove the selector shaft dust cover.
5. Withdraw the selector shaft assemblies and the four wheel drive locking dog from the housing.
6. Remove the flange from the front output shaft.
7. Remove the oil seal retainer and gasket.
8. Press out the oil seal.
9. Remove the front output shaft from the housing.
10. Press out the bearing from the housing.
11. Remove the sealing rings for the four wheel drive locking pin and the transfer gear shaft.

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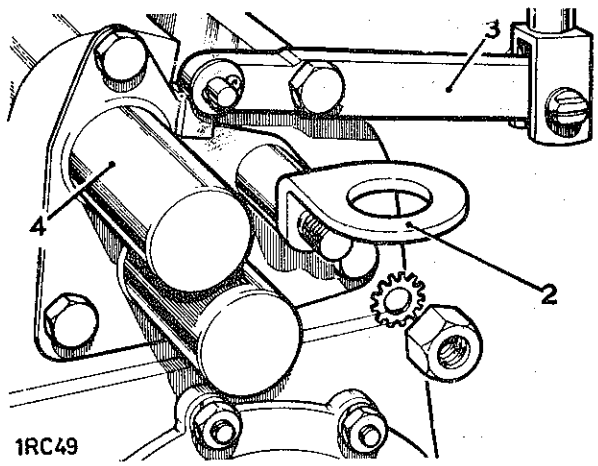

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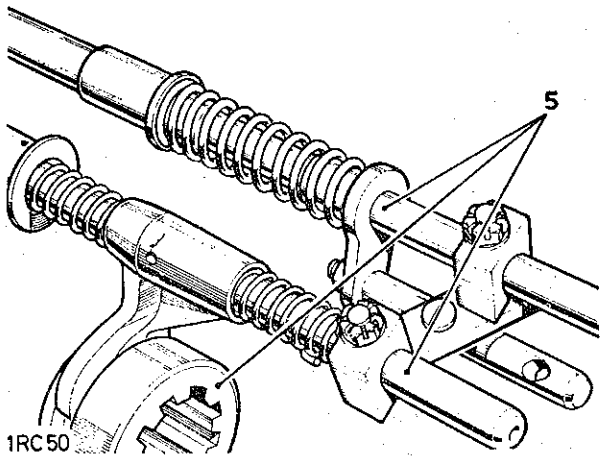
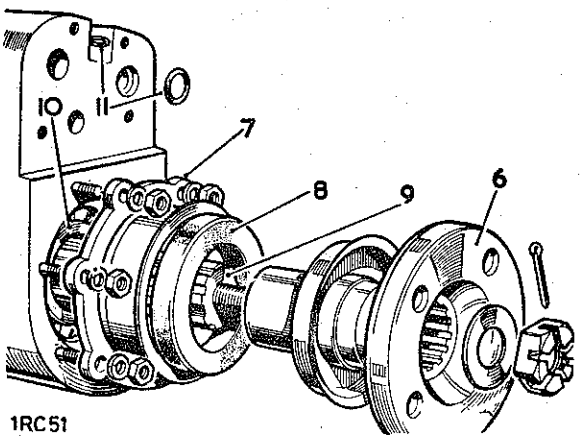


1RC50



1RC51

Dismantling the four wheel drive selector shaft

12. Remove the block from the selector shaft.
13. Withdraw the springs and selector fork from the shaft.

Dismantling the transfer gear selector shaft

14. Slide the distance tube, bush, spring and pivot shaft assembly from the selector shaft.
15. Remove the block.
16. Remove the connector from the pivot shaft.
17. Remove the coupling from the pivot shaft.

Dismantling the front output shaft

18. Remove the fixings.
19. Lift the two halves of the oil thrower from the shaft.

Inspecting

20. Renew any components which show obvious wear or damage. Examine the bush in the four wheel drive control lever and replace if necessary.
21. Examine the four wheel drive selector fork and bushes, and renew as necessary. New bushes must be pressed flush with the end faces of the fork boss, and reamed in position to 15,887 mm + 0,012 mm (0.6255 in. + 0.0005 in.) diameter, and must be a sliding fit on the selector shaft.
22. Check the four wheel drive selector shaft springs, the free length should be 69,8 mm (2.75 in.).
23. Check the transfer selector shaft spring, the free length should be 181,76 mm (7.156 in.).
24. Examine the bush in the rear end of the front output shaft. The bush must be a sliding fit on the front end of the transfer box output shaft and must be firmly retained in its bore. If bush replacement is necessary, press the new bush flush with the end of the shaft and ream in position to 22,2 mm + 0,013 mm (0.8755 in.) + 0.0005 in.) diameter.

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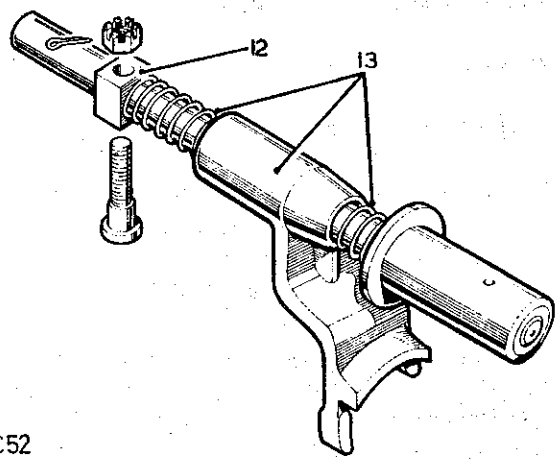

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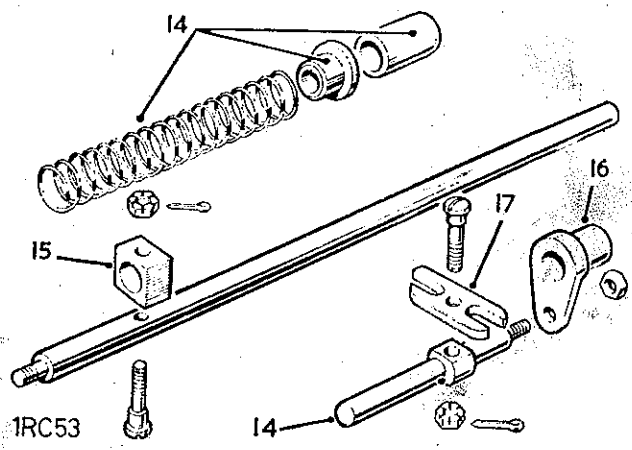

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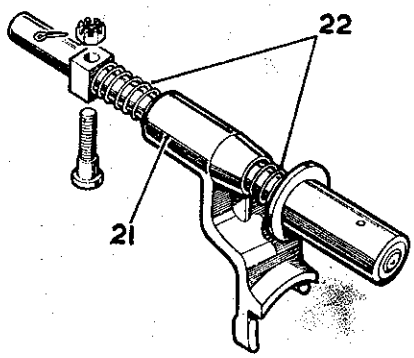


1RC 54

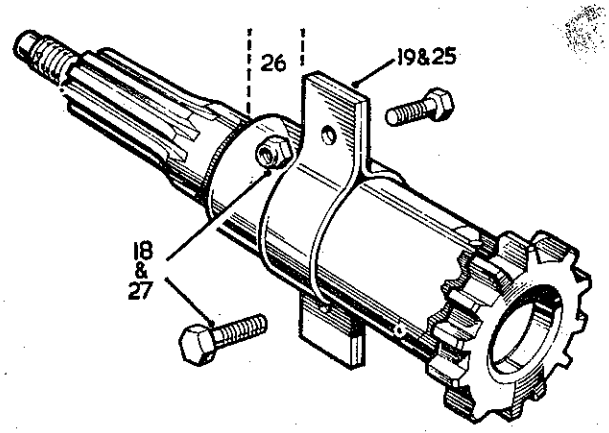
Assembling the front output shaft

25. Fit the oil thrower to the front output shaft, do not fully tighten the fixings at this stage.
26. Position the oil thrower 25 mm (1 in.) from the shoulder on the shaft, as illustrated.
27. Tighten the fixings.

Assembling the transfer gear selector shaft.

28. Fit the connector to the pivot shaft noting the relationship of the countersink in the hole at the other end of the shaft.
29. Do not fully tighten the fixings at this stage.
30. Fit the coupling to the pivot shaft locating the extended arm correctly, as illustrated.
31. Fit the block to the transfer gear selector shaft, locating the fixings so that the nut and split pin are on the same side of the shaft as the plunger grooves.
32. Locate the pivot shaft assembly in position on the transfer gear selector shaft.
33. Engage the coupling with the special screw.

continued



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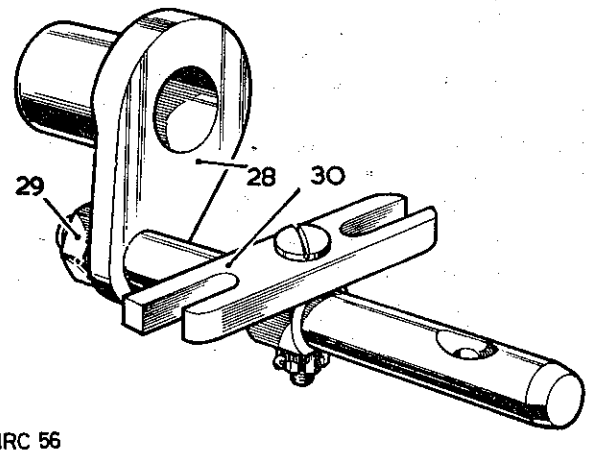

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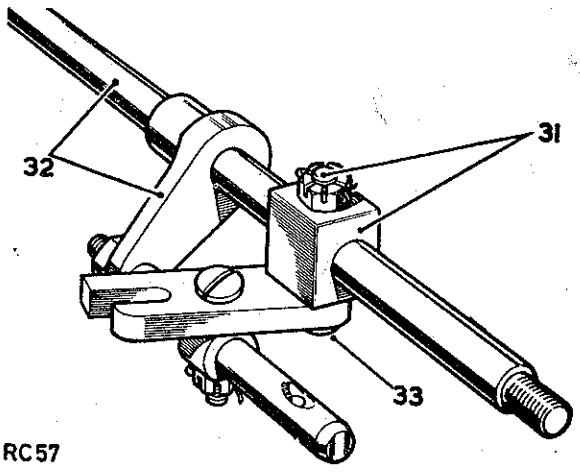

1RC57

34. Fit the spring, locating bush and distance tube on to the selector shaft.

Assembling the four wheel drive selector shaft

35. Fit the springs and selector fork to the shaft. Note that the two springs are identical and are interchangeable.
36. Fit the block to the selector shaft.

Assembling the housing

37. Fit the oil seal for the front output shaft, lipped side inward, into the retainer, with a smear of sealant on the seal outside diameter.
38. Press the bearing into the housing.
39. Smear both sides of the joint washer with general purpose grease, and fit the oil seal retainer and joint washer to the housing.
40. Fit the front output shaft.
41. If the mud shield has been removed, refit it, dished side first, to the output flange.
42. Fit the flange to the output shaft.
43. Tighten the securing nut to a torque figure of 11,75 kgf.m (85 lbf. ft.).

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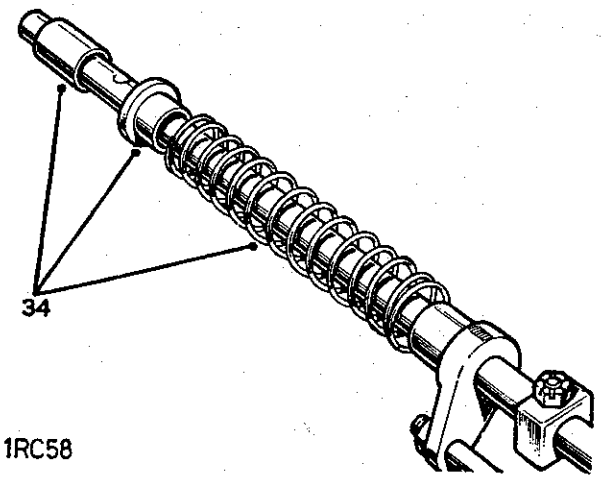

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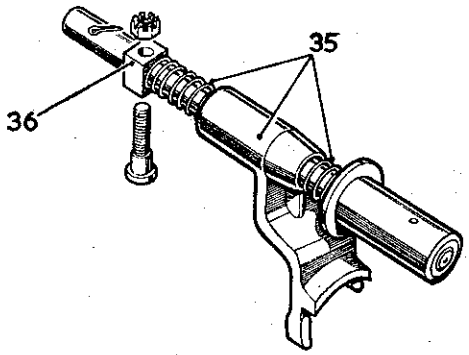

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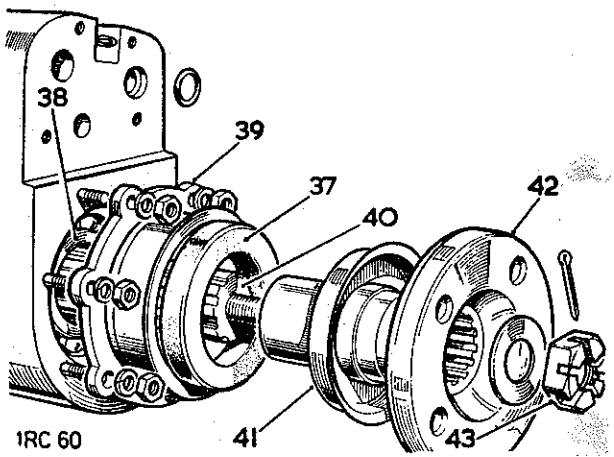

1RC 60

Pre-alignment of selector shafts

44. Locate the two selector shafts together by engaging the coupling with the special screws.
45. Locate the selector shaft assembly into the **front** face of the output shaft housing.
46. Fit the four wheel drive locking pin, engaging it in the countersunk hole in the pivot shaft. This will ensure correct radial alignment of the pivot shaft to the connector.
47. Fully tighten the nut to secure the connector to the pivot shaft.
48. Remove the locking pin and withdraw the selector shafts as one unit, then without disturbing their alignment, engage them into their correct location in the output shaft housing, while at the same time fitting the four wheel drive locking dog over the output shaft and into the selector fork.
49. If convenient, it will be advantageous at this stage to fit the front output shaft housing to the transfer box 37.10.05.
50. Fit the sealing rings for the transfer gear selector shaft and the four wheel drive locking pin.

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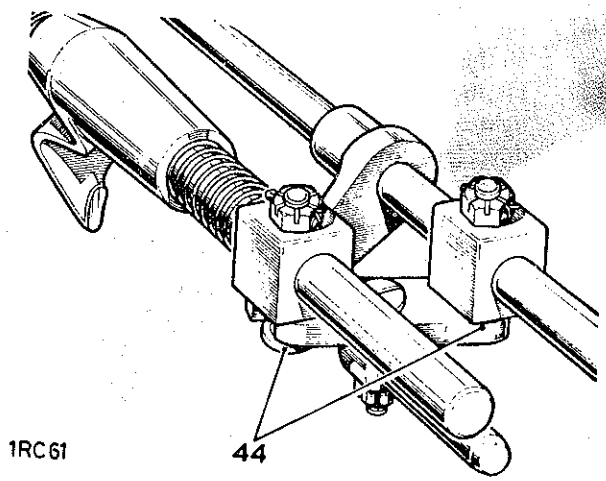

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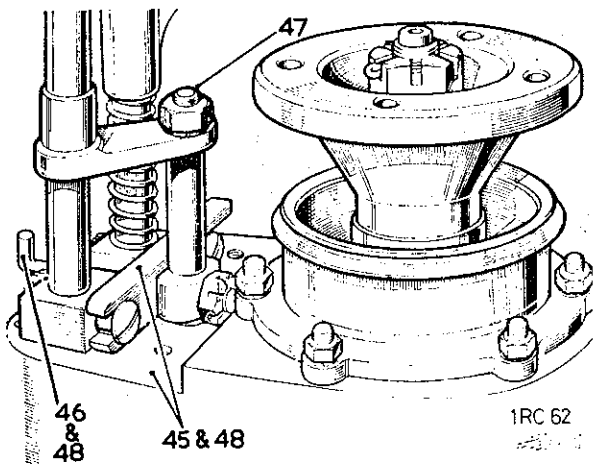
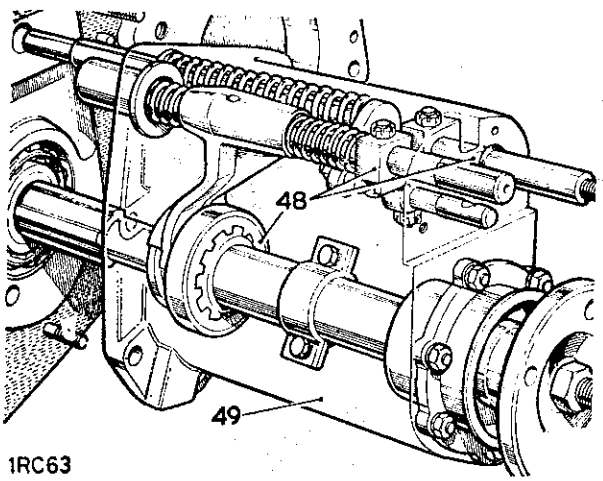
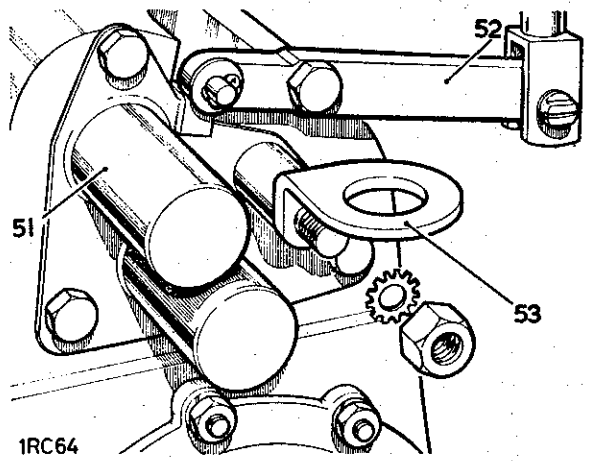


1RC 62



1RC63

51. Fit the selector shaft dust cover, using Bostik sealant on the joint face.
52. Fit the lever to the selector shaft, but do not fully tighten the fixing, pending setting the four wheel drive lever during floor refitting.
53. Fit the transfer gearshaft link.
54. Fit the four wheel drive locking pin and control lever.
55. Refit the front output shaft housing. 37.10.05.



DATA

Four wheel drive selector fork bush	15,887 to 15,899 mm (0.6255 to 0.6260 in.) reamed diameter
Four wheel drive selector shaft springs, free length	69,8 mm (2.75 in.)
Transfer selector shaft spring, free length	181,76 mm (7.156 in.)
Bush for output shaft	22,200 to 22,213 mm (0.8755 to 0.8760 in.) reamed diameter

BELL HOUSING

–Remove and refit 37.12.07

Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
8. Withdraw the lever, taking care to retain the spring strip located between the lever ball and link.
9. Fully adjust the transmission brake to lock 'hard on'.
10. Remove the primary pinion cover and oil seal assembly.
11. Withdraw the joint washer.

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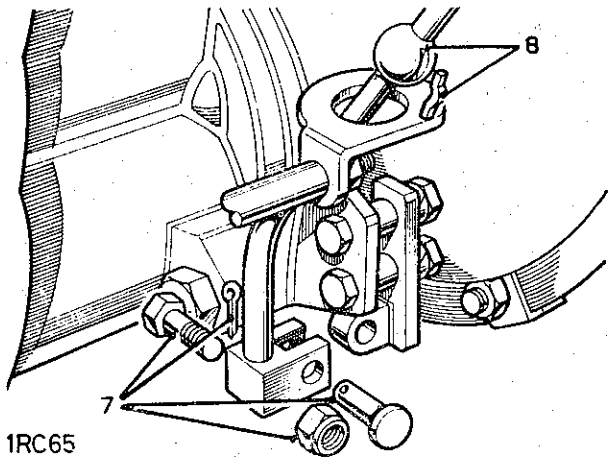

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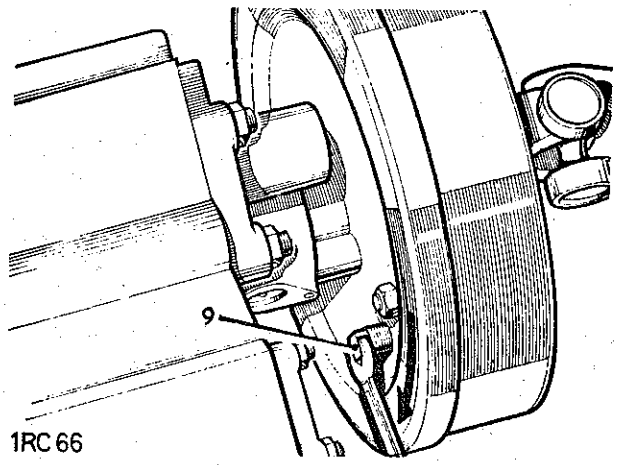

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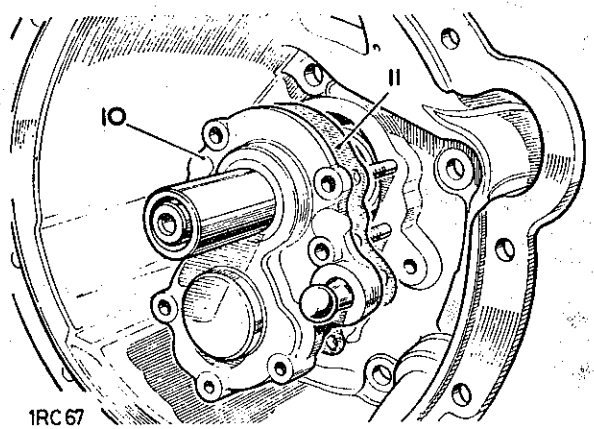
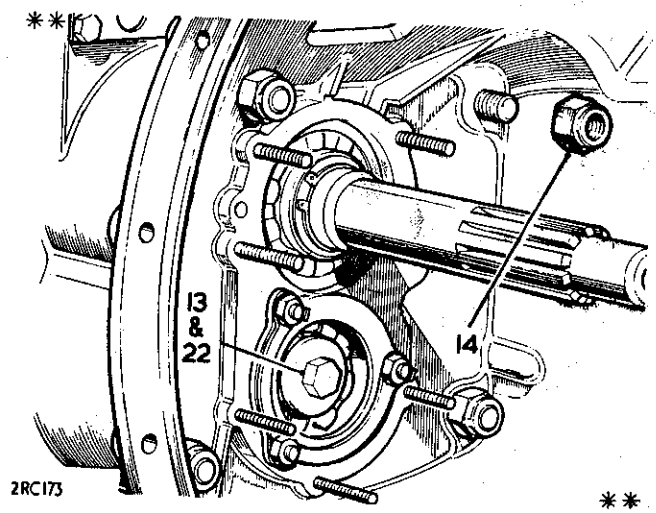


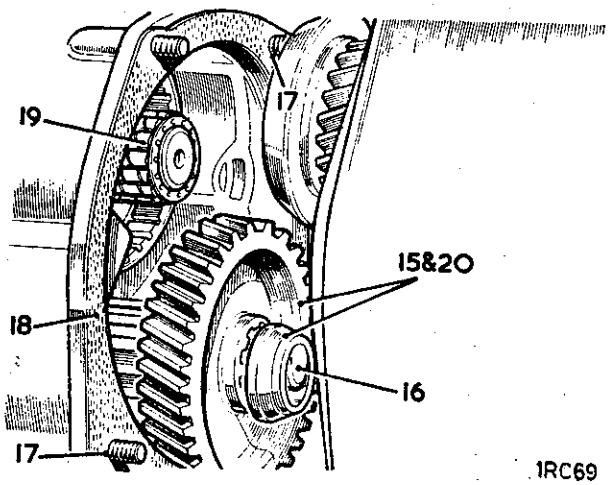
1RC67

12. Select any gear.
13.** Remove the layshaft securing bolt and washer. DO NOT remove the circlip from the primary pinion.**
14. Remove the bell housing fixings.
15. Retain the constant gear and conical distance piece which are released during the following procedure.
16. Hold the layshaft depressed fully rearwards and ease the housing from the gearbox.

Refitting

17. Two of the bell housing to gearbox fixings are special fitted bolts, and must be positioned diagonally opposite each other.
18. Smear both sides of the joint washer with a general purpose grease and place in position on the gearbox.
19. Ensure that the roller bearing for the primary pinion is in position.
20. Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
21. Retain the constant gear and conical distance piece in position, by holding through the layshaft bearing, from the inside of the bell housing, then offer the bell housing to the gearbox, using special care to align the constant gear with the splines on the layshaft.
22. Complete the reassembly by reversing 1 to 14. The layshaft securing bolt must be tightened to a torque figure of 8,5 kgf.m (60 lb. ft.).
23. Check and replenish the gearbox lubricating oil.
24. Adjust the transmission brake. 70.45.09.





BELL HOUSING

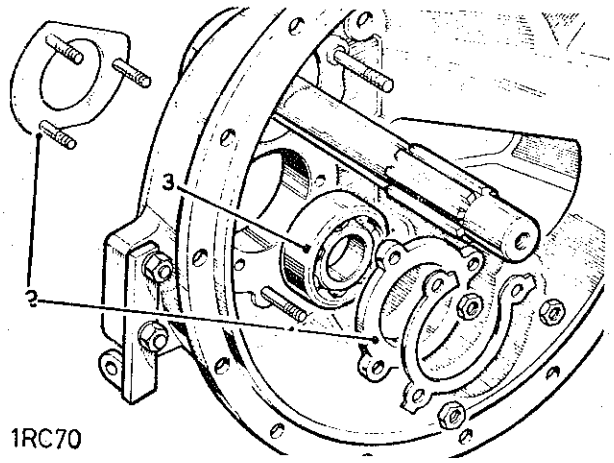
—Overhaul 37.12.08

Dismantling

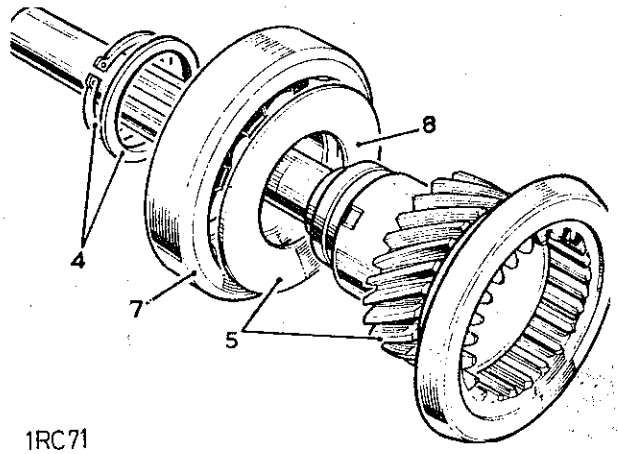
1. Remove the bell housing. 37.12.07.
2. Remove the layshaft bearing retainer and bearing plate.
3. Press the layshaft bearing from the bell housing.
4. Remove the circlip and distance washer.
5. Press out the primary pinion and shield.
6. Remove the bearing retaining plates.
7. Press out the primary pinion bearing.

Assembling

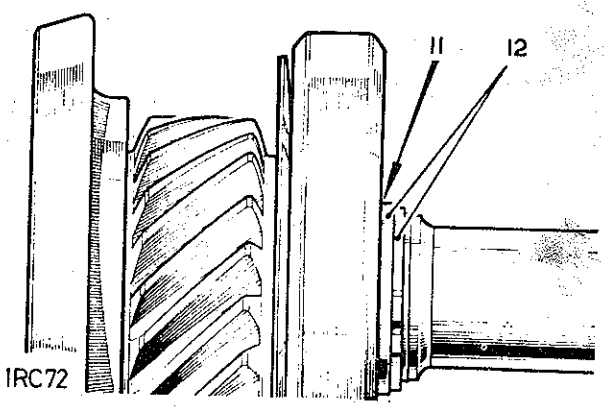
8. Fit the shield to the primary pinion, concave side toward the pinion teeth.
9. Reverse 5 to 7.
10. Fit the distance washer and position a new circlip in the retaining groove.
11. Check the end-float between the primary pinion and the distance washer. End-float must be the minimum obtainable, selecting a suitable distance washer from the range available.
12. Fit the selected distance washer and circlip.
13. Reverse 1 to 3.



1RC70



1RC71



1RC72

GEARBOX MAIN CASING

–Remove and refit **37.12.40**

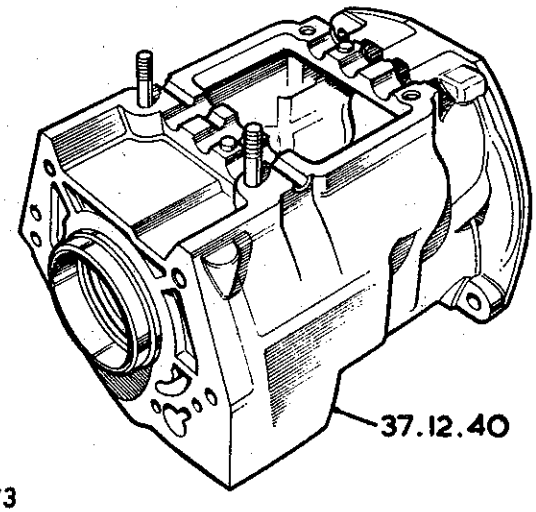
NOTE: If it is required to change the rear main oil seal only, it is not necessary to completely dismantle the gearbox. The oil seal is accessible after removing the intermediate gear and the mainshaft gear from the transfer box, see 37.29.10 and 37.20.25 for details.

Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the transmission brake. 70.45.16.
6. Remove the transfer box. 37.29.25.
7. Remove the main gear change lever. 37.16.04.
8. Remove the clutch withdrawal unit. 33.25.12.
9. Remove the bell housing. 37.12.07.
10. Remove the selector shafts. 37.16.31.
11. Remove the layshaft. 37.20.19.
12. Remove the mainshaft. 37.20.25.
13. When 1 to 12 are complete the gearbox main casing is released and can be dismantled as described under 'Overhaul', 37.12.43.

Refitting

14. Reverse 1 to 12.



1RC73

GEARBOX MAIN CASE

—Overhaul 37.12.43

Dismantling

1. Remove the gearbox main case. 37.12.40.
2. Prise the oil seal from the rear of the mainshaft bearing housing.
3. Remove the circlip retaining the bearing housing to the rear face of the gearbox.
4. Press out the housing, complete with bearing, in a forward direction.
5. Remove the circlip.
6. Press the mainshaft rear bearing from the housing.
7. With the case warm, drive out the layshaft bearing outer race, using a suitable drift applied through the two extractor holes provided in the case rear face. (See also item 8).
8. An alternative method is to use a mandrel, approximately 300 mm (12 in.) long by 43,50 mm (1.687 in.) diameter, so that it is a tight fit in the outer race. Warm the gearbox case and outer race, keep the mandrel as cool as possible. With the casing warm, insert the mandrel into the outer race which will shrink on to the mandrel and withdraw easily.
9. The remaining oil drain and filler plugs, studs, dowels and retaining plate for selector shaft oil seals, can be removed as required. See 37.20.13 for removal of reverse idler gear and shaft if required.

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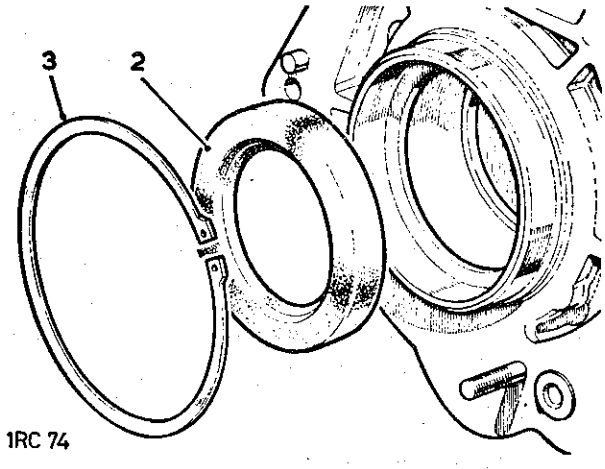

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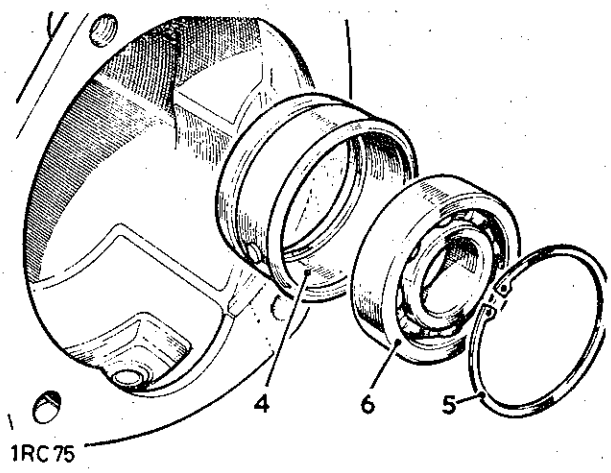
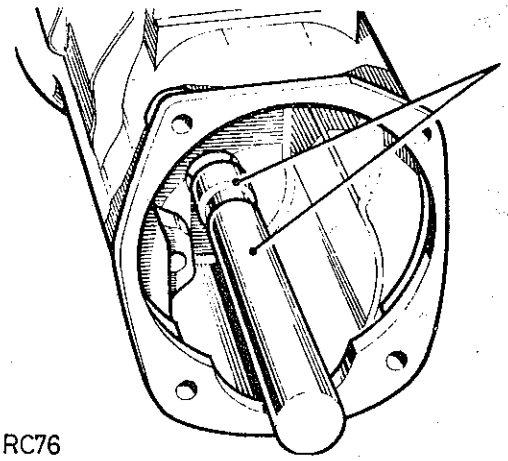


1RC 75



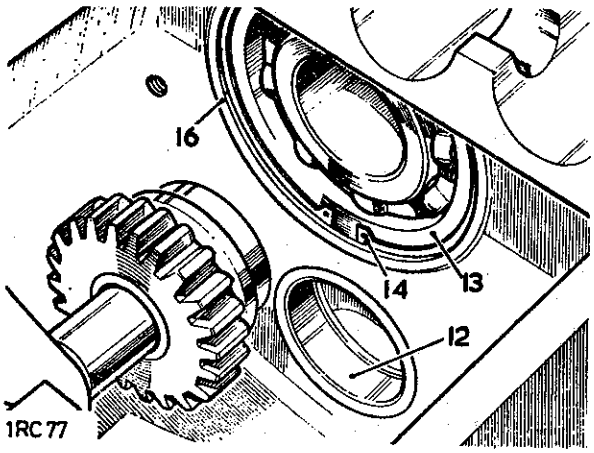
1RC76

Inspecting

10. Check all components for wear and damage.
11. Ensure that the two dowels in the gearbox top face, and the two dowels in the rear face, are secure.

Assembling

12. Press the layshaft rear bearing outer race, lipped edge first, into the gearbox case.
13. Press the mainshaft rear bearing into the housing.
14. Retain with a circlip.
15. Fit the main shaft rear oil seal, lipped side first, into the bearing housing.
16. Smear the outside diameter of the bearing housing with Loctite Retaining Compound (Grade AVV), Part No. 600303 and press it into position.
    NOTE: The gearbox should not be filled with lubricating oil or used for twenty-four hours, to allow the Loctite to fully cure.
17. Fit the retaining circlip to the groove in the bearing housing where it protrudes through the rear face of the gearbox.
18. Refit the gearbox main case. 37.12.40.



MAIN GEARCHANGE LEVER

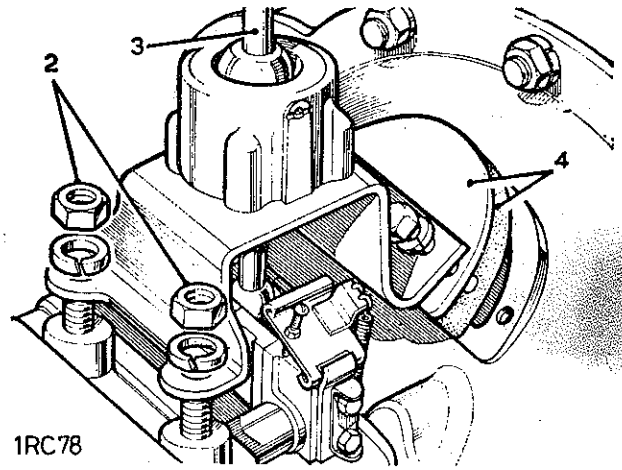
—Remove and refit **37.16.04**

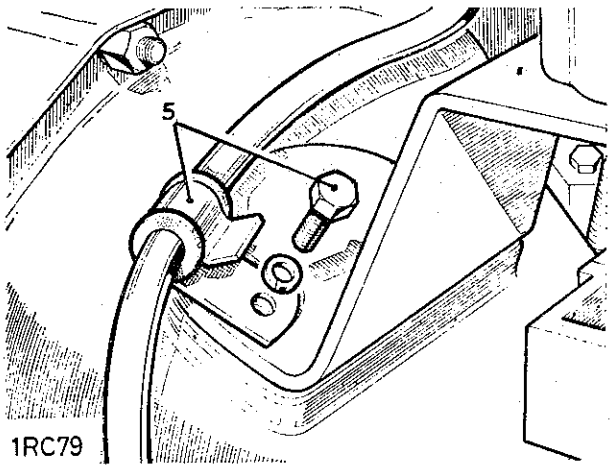
Removing

1. Remove the front floor. 76.10.12.
2. Remove the fixings.
3. Remove the main gearchange lever complete.
4. To prevent loss, lift off the top cover plate and rubber seal from the bell housing.

Refitting

5. Reverse 1 to 4, noting that a retaining clip for the speedometer cable locates under the head of the front left hand gearchange lever securing bolt.





MAIN GEARCHANGE LEVER

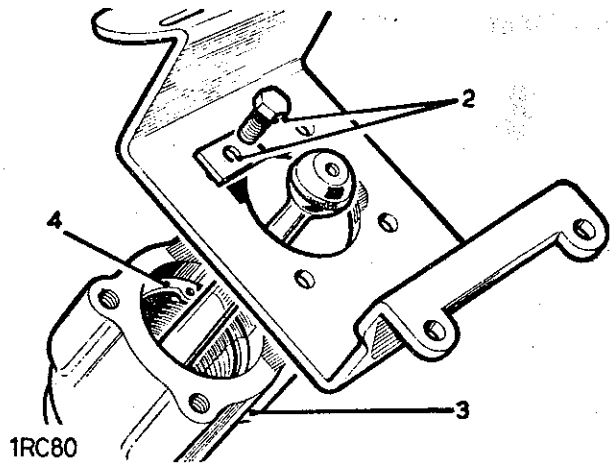
—Overhaul 37.16.10

Dismantling

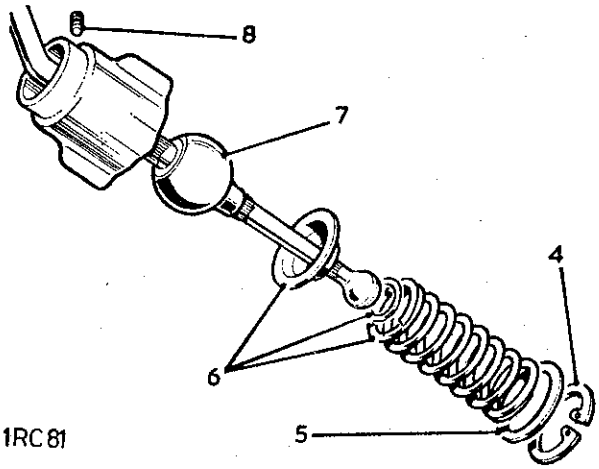
1. Remove the gearchange lever. 37.16.04.
2. Remove the fixings at the mounting plate.
3. Remove the lever housing from the mounting plate.
4. Remove the lever housing circlip.
5. Withdraw the retaining plate.
6. Withdraw the spring and rubber 'O' ring.
7. Lift out the gearchange lever.
8. Withdraw the lever ball locating pin.
9. Examine the components visually and renew any that show obvious wear or damage.

Assembling

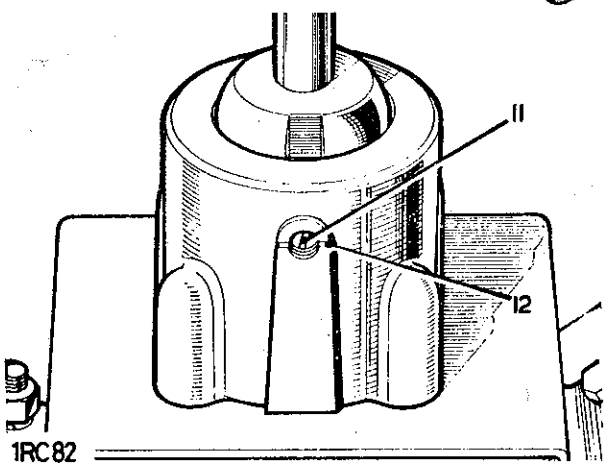
10. Reverse 2 to 8.
11. Ensure that the lever locating pin engages the slot in the lever ball.
12. Secure the pin by peening.
13. Refit the gearchange lever. 37.16.04.



1RC80



1RC81



1RC82

REVERSE STOP FOR MAIN GEARCHANGE LEVER

—Remove, refit and adjust 37.16.28

Removing

1. Remove the front floor. 76.10.12.
2. Remove the hinge adjuster.
3. Remove the hinge and bracket from the reverse selector shaft.
4. Detach the two springs.

Refitting

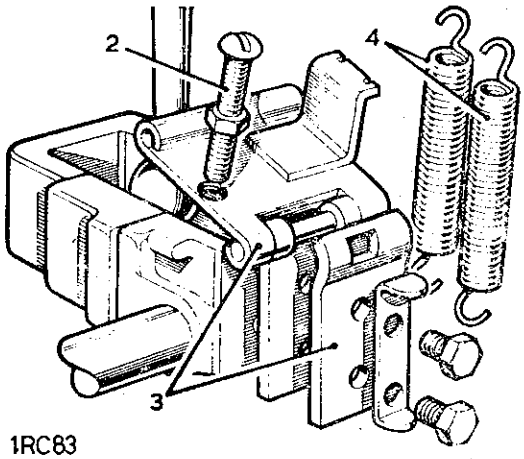
5. Reverse 1 to 4. Adjust the reverse stop before fitting the front floor, items 6 to 9.

Adjusting

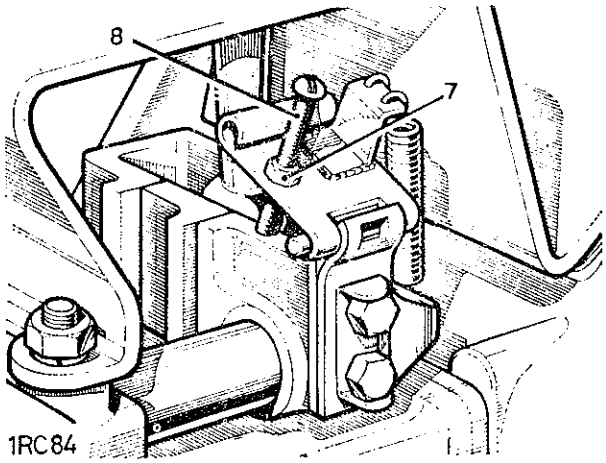
6. Release the fixings and slide the reverse stop inspection cover up the four wheel drive selector lever.

NOTE: If the gear box cover does not incorporate an inspection cover, then the adjustment must be carried out before the gearbox cover is fitted.

7. Slacken the adjusting screw locknut.
8. Adjust the screw so that the hinge rides easily up the gear lever when reverse gear is selected, while at the same time appreciable resistance is felt on moving the gear lever to the reverse position.
9. Ensure that 1st gear engages correctly, if there is any tendency to simultaneously engage reverse gear, re-adjust the reverse stop.



1RC83



1RC84

MAIN GEARCHANGE SELECTORS

–Remove and refit **37.16.31**

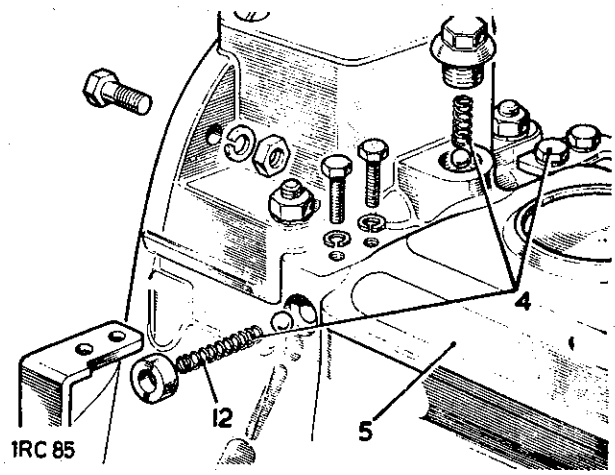
Removing

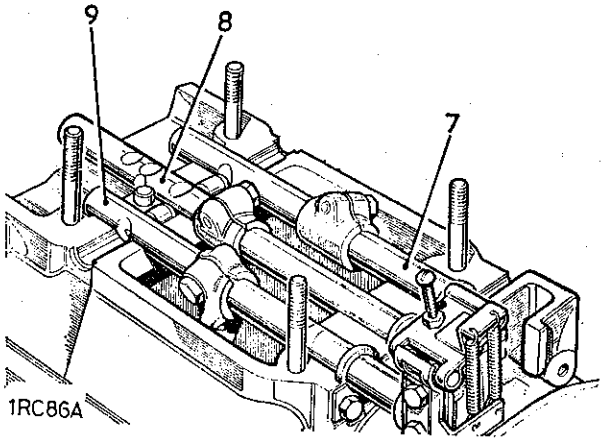
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Remove the main gearchange lever. 37.16.04.
4. Remove the three selector springs and pack the drillings in the top cover with grease, to retain the selector balls when the cover is removed.
5. Remove the top cover from the gearbox and collect the three selector balls.
6. Select third gear.
7. Lift, turn and withdraw the third/fourth selector shaft.
8. Withdraw the first/second selector shaft.
9. Withdraw the reverse selector shaft.

Refitting

10. Reverse 3 to 9.

continued

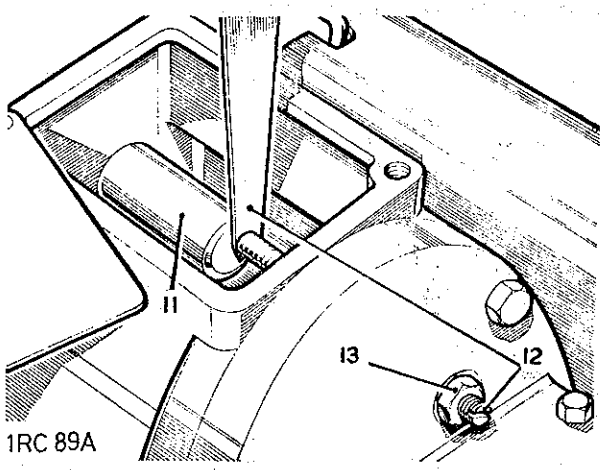




11. Select reverse gear.
12. Adjust the reverse gear stop bolt so that there is 0,05 mm (0.002 in.) clearance between the selector shaft and the end of the bolt.
13. Tighten the locknut.

NOTE: If the transfer box has been removed from the main gearbox, the foregoing adjustment must be carried out after the transfer box has been refitted.

14. Reverse 1 and 2.



DATA

Reverse gear selector shaft stop setting.	0,05 mm (0.002 in.) clearance between shaft and stop.

MAIN GEARCHANGE SELECTORS

–Overhaul 37.16.34

Dismantling

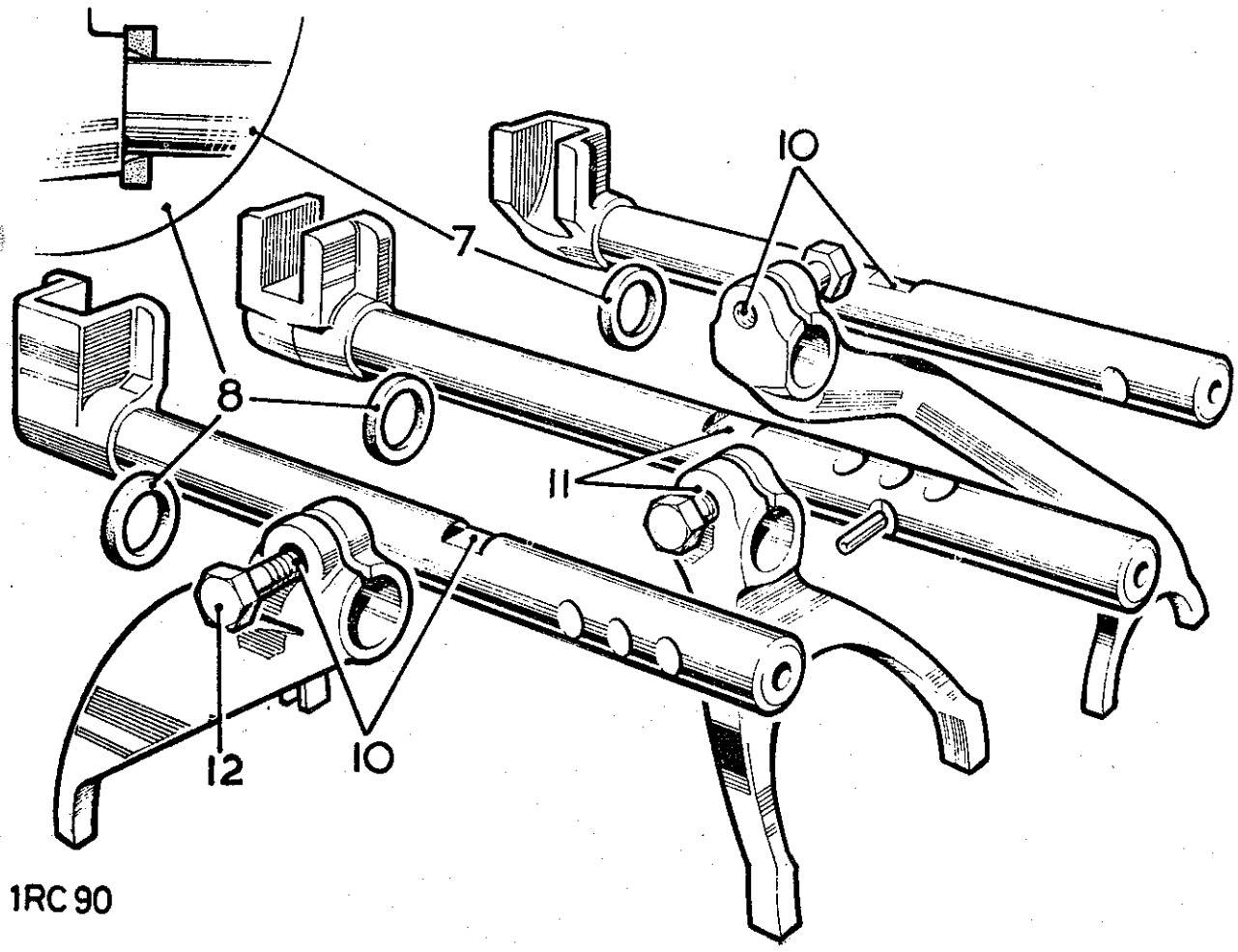
1. Remove the gearchange selectors. 37.16.31.
2. Remove the reverse selector stop. 37.16.28.
3. Remove the pinch bolts.
4. Withdraw the selector forks.
5. Withdraw the seals.

Inspecting

6. Examine the components visually and replace worn or damaged items.

Assembling

7. Fit the larger diameter tapered seal to the reverse shaft with the thinner edge of the seal toward the front of the shaft.
8. Fit the two remaining tapered seals, thinner edges toward the front of the shafts.
9. Position the selector forks on the shafts.
10. Align the pinch bolt holes with the grooves on top of the shafts.
11. On the first/second gear selector, the groove required is the one nearest to the front of the shaft.
12. Fit the pinch bolts. There is radial movement between the selector fork and shaft before the pinch bolt is tightened, and the fork should be secured in the mid-position.
13. Reverse 1 and 2.



1RC 90

GEARBOX COMPLETE ASSEMBLY

—Remove and refit 37.20.01

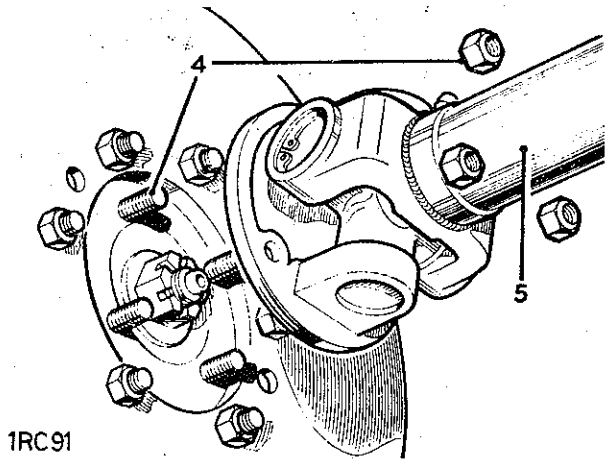
Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil
4. Remove the rear propeller shaft fixings at the transmission brake.
5. Move aside the shaft.
6. Remove the front propeller shaft fixings at the front output coupling.
7. Move aside the shaft.

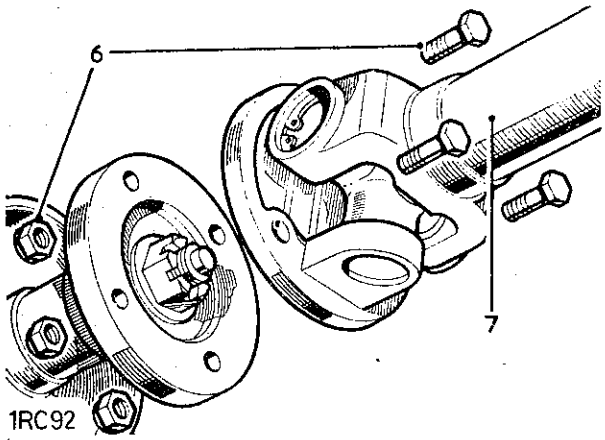
NOTE: Vehicles fitted with Power take-off.
First remove Power take-off A37.33.01

8. Disconnect the hand brake expander rod from the relay lever.

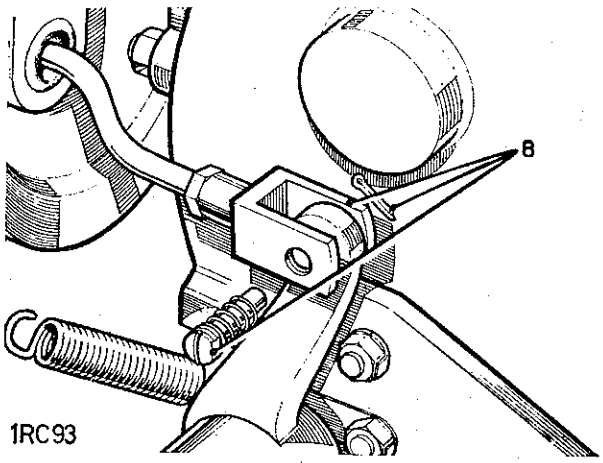
continued



1RC91



1RC92



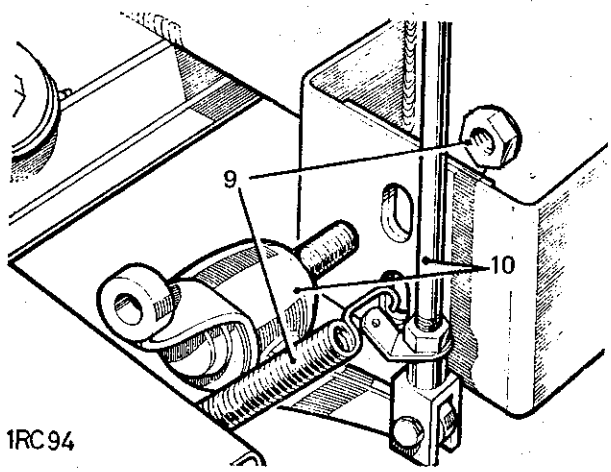
1RC93

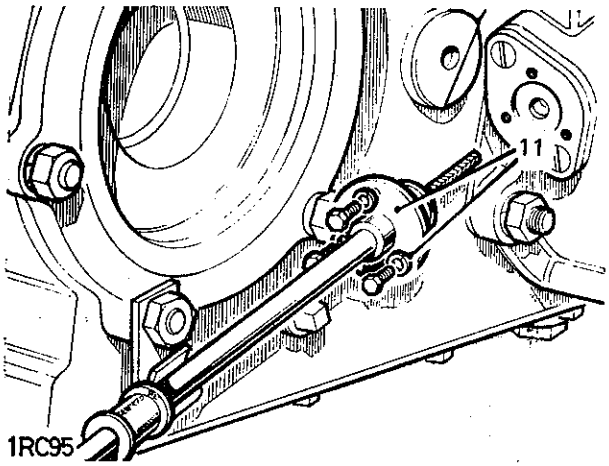
9. Remove the brake lever and relay fixings.
10. Remove the brake lever and relay mechanism.
11. Disconnect the speedometer cable from the gearbox.

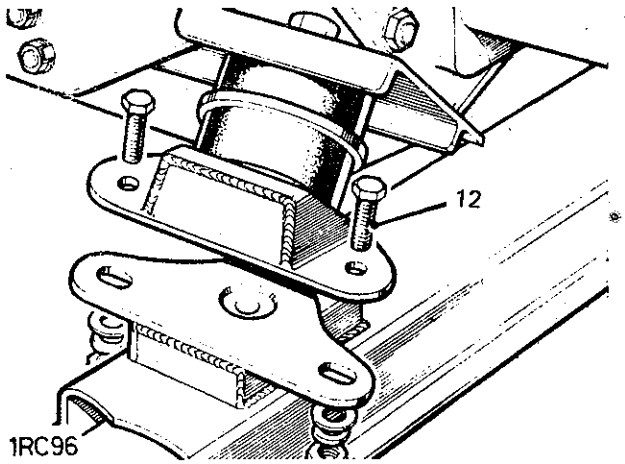
NOTE: Check the location of the engine earth strap, on certain models it is fitted between the gear box and chassis and must therefore be disconnected.

12. Remove the fixings from two rear mountings for the gearbox.

continued

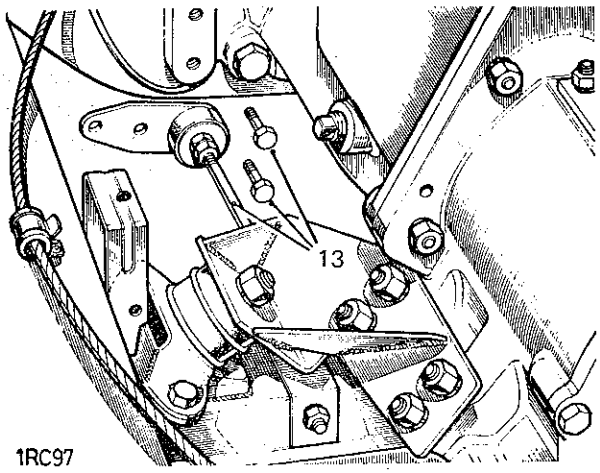






13. A tie rod is fitted between the gearbox and chassis. Where applicable, release the bracket at the bell housing and move the tie rod clear.
14. Remove the clutch slave cylinder from the bell housing.
15. Jack up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the flywheel housing and chassis, to retain the engine position when the gearbox is removed.
16. Place a suitable sling around the gearbox and tension it sufficient to take the weight.
17. Remove the remaining fixings securing the bell housing to the flywheel housing.
18. Carefully withdraw the gearbox rearwards clear of the clutch and lift from the vehicle.

continued



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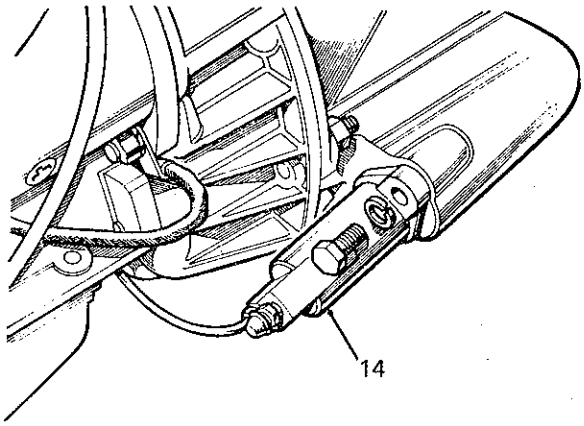

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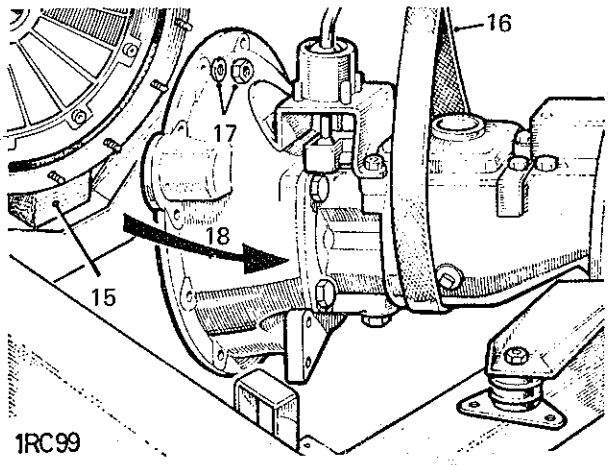
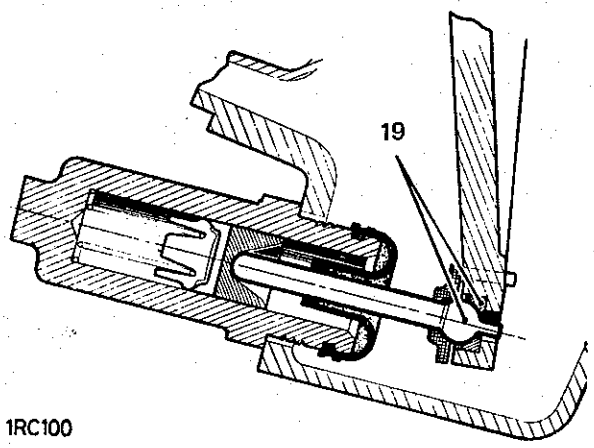


1RC99

Refitting

19. Reverse 1 to 19. When refitting the clutch slave cylinder, take care to ensure that the cylinder push rod engages in the seating in the clutch release lever.
20. Bleed the clutch hydraulic system as necessary. 33.15.01.



1RC100

REVERSE IDLER GEAR AND SHAFT

Removing

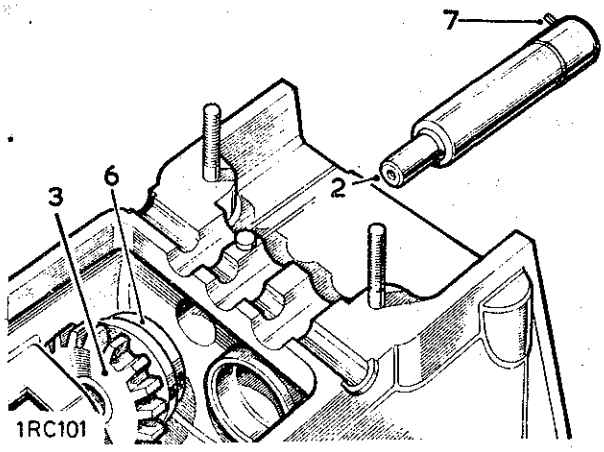
1. Remove the gearbox main case. 37.12.40.
2. Warm the gearbox case and drive out the reverse gear idler shaft from inside the case.
3. Lift out the reverse wheel assembly.

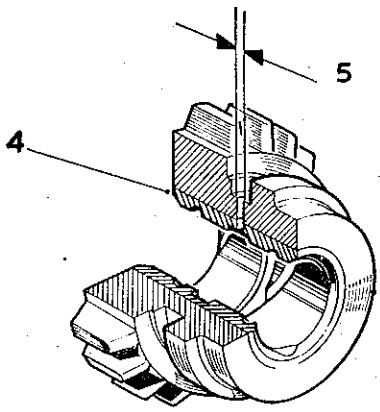
Overhauling

4. Check the bush in the reverse wheel assembly. If a new bush is required it must be secured by peening after being pressed into position, and then reamed to 20,637 mm + 0,025 mm (0.8125 in. + 0.001 in.) diameter.
5. After reaming and peening as already described, drill a 3,18 mm (0.125 in.) diameter hole through the bush, using the existing hole in the gear as a pilot. Afterwards remove all fraze from the bore.

Refitting

6. Fit the reverse wheel assembly with the plain side to the rear of the gearbox.
7. Press in the reverse shaft until flush with gearbox rear face, aligning the spring pin with the slot provided in the rear face.
8. Reverse 1.





1RC102

DATA

Bush for reverse gear wheel	20,637 to 20,662mm (0.8125 to 0.8135 in.) reamed diameter
Lubrication hole in bush	3,18 mm (0.125 in.) drilled diameter

LAYSHAFT

–Remove and refit **37.20.19**

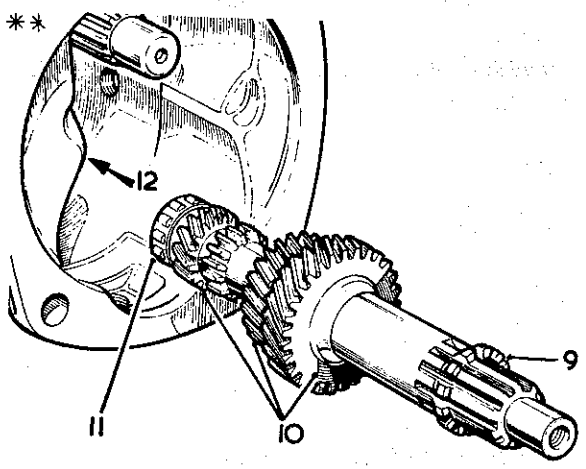
Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Remove the bell housing. 37.12.07.
8. ** Manoeuvre the layshaft forward and downwards to clear the mainshaft.**
9. Withdraw the layshaft.
10. The first, second and third gears are integral with the layshaft and cannot be removed.
11. If required, press the rear bearing inner race from the layshaft.
12. If required, refer to 37.12.43 for removal of layshaft rear bearing outer race.

Refitting

13. ** Reverse 11 as necessary.
14. Reverse 12 as necessary.
15. Fit the layshaft and rear inner bearing member assembly.**

continued



IRC 103B

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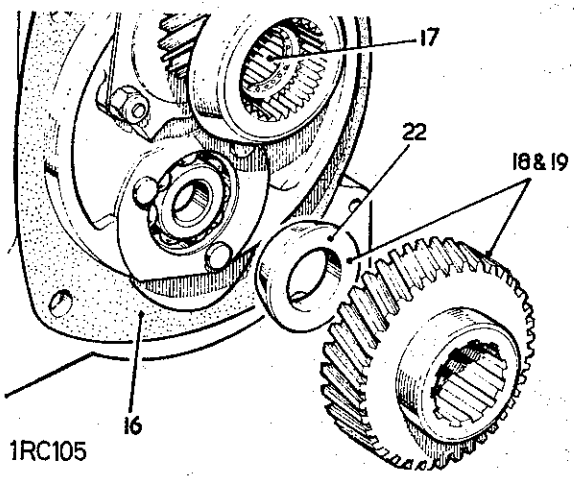
16. Place the bell housing joint washer in position.
17. Ensure that the roller bearing for the primary pinion is in position.
18. Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
19. Retain the constant gear and conical distance piece in position, by holding from inside the bell housing, then offer the bell housing to the gearbox, aligning the constant gear with the splines on the layshaft.
20. Fit the bell housing fixings.
21. Loosely fit the layshaft securing bolt and washer and check that the layshaft has definite but minimum end-float.
22. To adjust, replace the conical distance piece, available in a range of thicknesses.
23. Tighten the layshaft securing bolt, torque loading 8,5 kgf.m (60 lbf. ft.).
24. Reverse 1 to 7.



MAINSHAFT ASSEMBLY

—Remove and refit 37.20.25

Service tool: 600300, tool for mainshaft nut

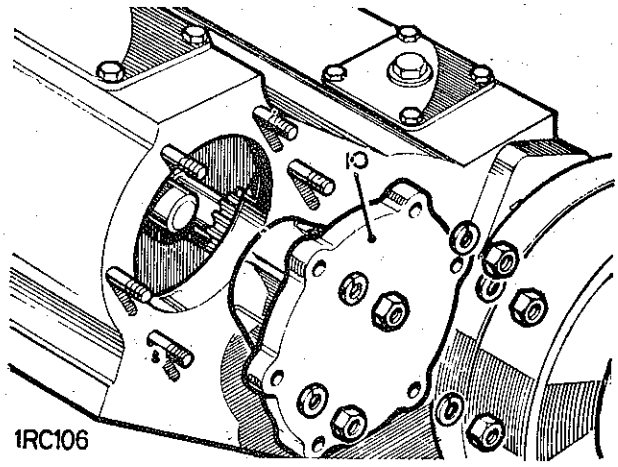
Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Remove the bell housing. 37.12.07.
8. Remove the selector shafts. 37.16.31.
9. Remove the layshaft. 37.20.19.
10. Remove the rear bearing housing from the transfer box.
11. Open the tab washer.
12. Remove the mainshaft nut. 600300.
13. Withdraw the tab washer and shim washer.
14. Withdraw the mainshaft transfer gear.
15. Remove the oil thrower.
16. Drive out the mainshaft from the gearbox.

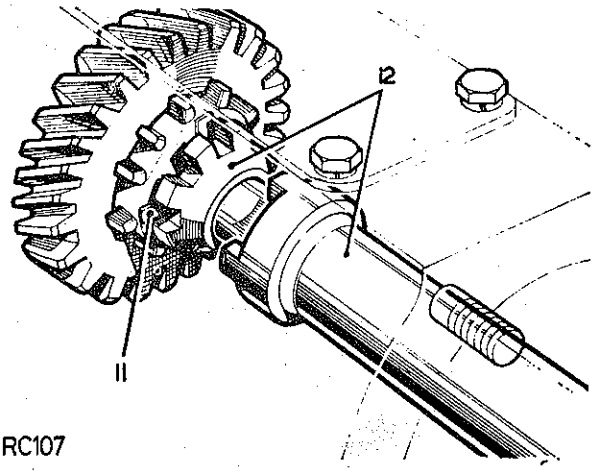
Refitting

NOTE: If any mainshaft components have been renewed, the checks described under 'Mainshaft overhaul' 37.20.31 must be carried out.

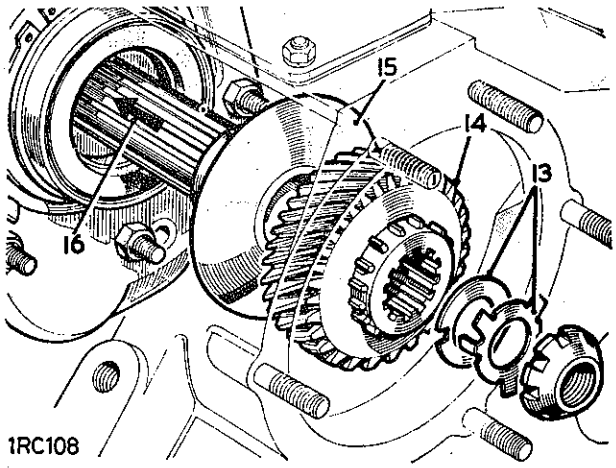
17. Reverse 1 to 16.



1RC106



1RC107



1RC108

MAINSHAFT ASSEMBLY

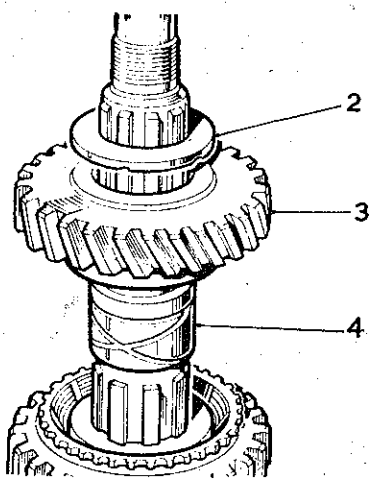
—Overhaul **37.20.31**

Dismantling

1. Remove the mainshaft. 37.20.25.

Mainshaft rear end

2. Withdraw the thrust washer.
3. Lift off the first speed gear.
4. Withdraw the bush for the first speed gear.
5. Withdraw the synchroniser rear cone.
6. Lift off complete the first/second speed synchroniser unit.
7. Withdraw the synchroniser front cone.

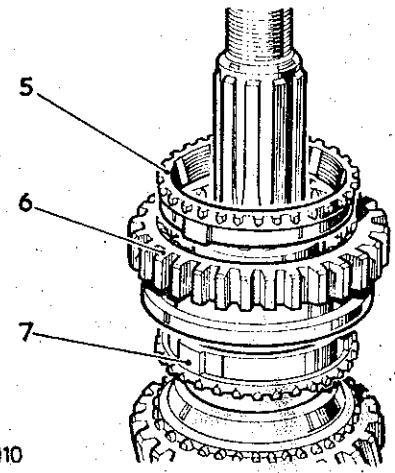


1RC 109

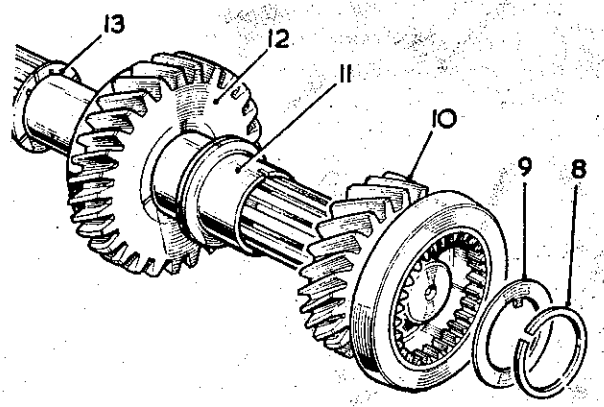
Mainshaft front end

8. Remove the retainer ring from the groove in the mainshaft.
9. Withdraw the thrust washer, then the following items:
10. Third speed gear.
11. Distance sleeve.
12. Second speed gear.

continued

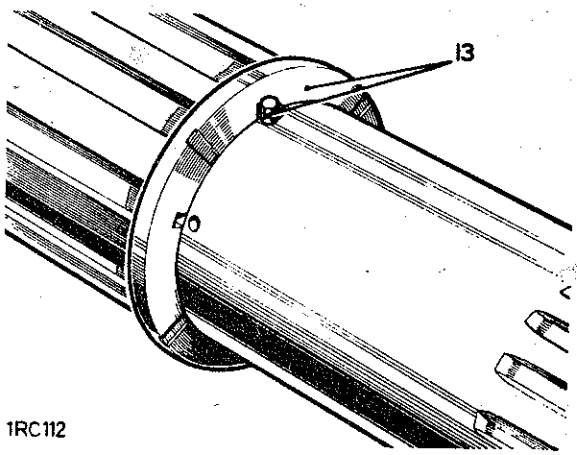


1RC110



1RC111

13. If it is required to remove the thrust washer for the second speed gear, first remove the locating peg for the distance sleeve; the peg is a press fit in the mainshaft.



1RC112

First/second speed synchroniser

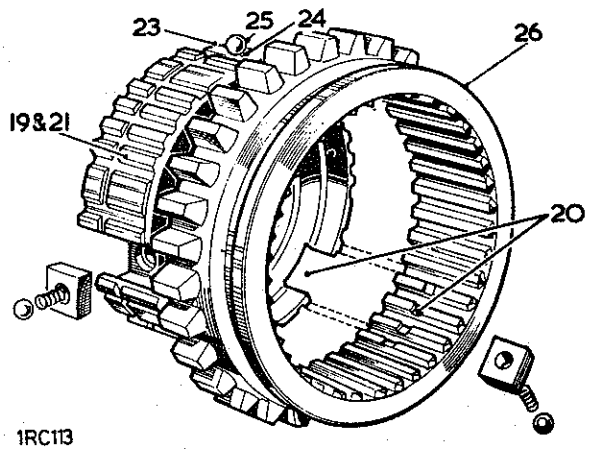
14. Before dismantling, take precautions to avoid the loss of components as they are released. Three springs, balls and sliding blocks are retained in the unit under spring pressure.
15. Dismantle the synchroniser assembly, first pushing down the sliding blocks to free the balls from the retaining grooves in the outer member.

Inspecting

16. Examine all components for wear and damage.
17. Discard the mainshaft spring ring. Use a new replacement on assembly.
18. Check the synchronising clutch for third/fourth gears for wear, the detent springs can be replaced if required. A load of 6,5 to 9 kg (15 to 20 lb.) should be required to actuate the clutch against the combined detent springs pressure.

Assembling
First/second speed synchroniser

19. Note the position of the longer splines on the inner member, formed by the offset groove.
20. Align the detent spring bores in the inner member with the ball retaining grooves in the outer member.
21. Fit the inner member to the outer member, entering the longer splines on the inner member at the gear teeth side of the outer member.
22. Repeat 20 and 21 in alternative positions and select the best position for easy slide fit.
23. Position the sliding blocks on the inner member, radiused faces outward.
24. Locate the springs through the sliding blocks and into the housing bores in the inner member.
25. Position the balls on the spring ends; press home in sequence and retain by hand.
26. Lift the outer member to retain the balls. Continue lifting until the balls spring home into the retainer grooves.



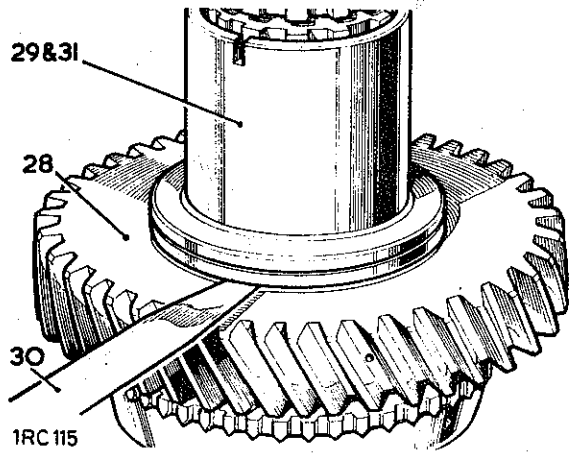
1RC113

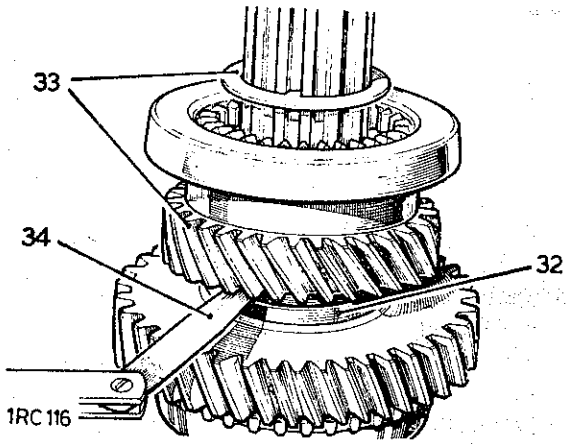
continued

Mainshaft, front end

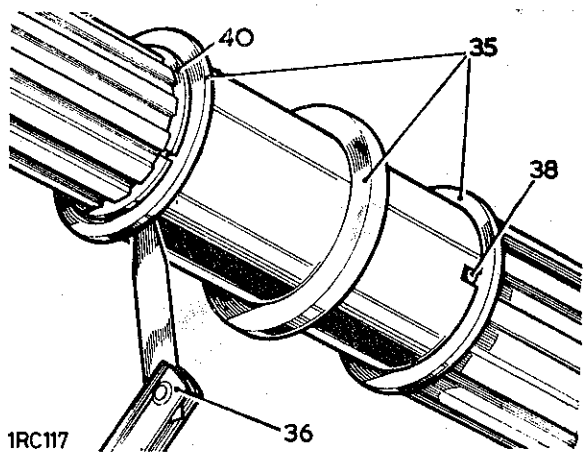
27. If the thrust washer for the second speed gear has been removed from the mainshaft, place the washer in position chamfered face first, engaging it over its locating peg. Do not fit the locating peg for the distance sleeve at this stage.
28. Fit the second speed gear, coned face last, to the end of the distance sleeve with the **larger** slot.
29. Slide the gear and sleeve assembly on to the mainshaft to abut with the thrust washer.
30. Holding the sleeve hard against the thrust washer, check the end float of the second speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).
31. The end-float of the second and the third speed gears is controlled by the length of the distance sleeve. With a new sleeve, the clearance may be excessive and can be corrected by rubbing down the applicable end face of the sleeve on a face plate and emery cloth. In the event of insufficient clearance, a new sleeve must be fitted.
32. Retain the second speed gear and distance sleeve on the mainshaft.
33. Fit the third speed gear and thrust washer.
34. Hold the thrust washer hard against the sleeve and check the end-float of the third speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).
End-float adjustment is as already described in item 31.

continued





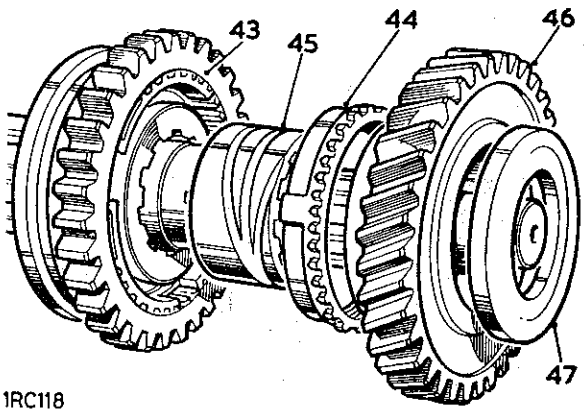
35. Remove the gears and distance sleeve from the mainshaft and refit the thrust washers and distance sleeve only, retain in position with the old spring ring.
36. Check the end-float of the distance sleeve, this must be 0,03 to 0,20 mm (0.001 to 0.008 in.).
Adjustment is made by changing either of the thrust washers which are available in a range of thicknesses.
37. When the end-float of the mainshaft gears and distance piece are correct, remove the spring ring, thrust washer for third speed gear and the distance sleeve.
38. If removed, fit the distance sleeve locating peg to the mainshaft, ensuring that the thrust washer for the second speed gear is engaged on its locating peg.
39. Fit the second speed gear, distance sleeve, third speed gear and thrust washer to the mainshaft.
40. Retain with a new spring ring.



1RC117

Main shaft rear end

41. Position the main shaft with the rear end uppermost.
42. Position a synchroniser cone on to the second speed gear.
43. Fit the first/second synchroniser unit to the shaft, reverse gear side uppermost.
44. Position a synchroniser cone on to the synchroniser inner member.
45.** Fit the bush for first speed gear with the circular oil groove end uppermost. Ensure that the bush rear face is 0,05 to 0,18 mm (0.002 to 0.007 in.) below the end of the mainshaft splines; check by temporarily fitting the thrust washer, stepped face uppermost, and measuring the clearance between the bush and the thrust washer.**
46. Fit the first speed gear.
47. Fit the thrust washer, stepped face uppermost.
48. Refit the mainshaft assembly and third/fourth synchroniser unit as described in 37.20.25.



1RC118

DATA

Third/fourth gear synchronising clutch load	6,5 to 9 kg. (15 to 20 lb.).
End float of second speed gear	0,10 to 0,18 mm (0.004 to 0.007 in.).
End float of third speed gear	0,10 to 0,18 mm (0.004 to 0.007 in.).
End float of distance sleeve	0,03 to 0,20 mm (0.001 to 0.008 in.).
End float of first speed gear	0,10 to 0,20 mm (0.004 to 0.008 in.).
**Clearance between first gear bush rear face and thrust washer.	0,05 to 0,18 mm (0.002 to 0.007 in.); adjust bush length to suit.**

SPEEDOMETER DRIVE HOUSING

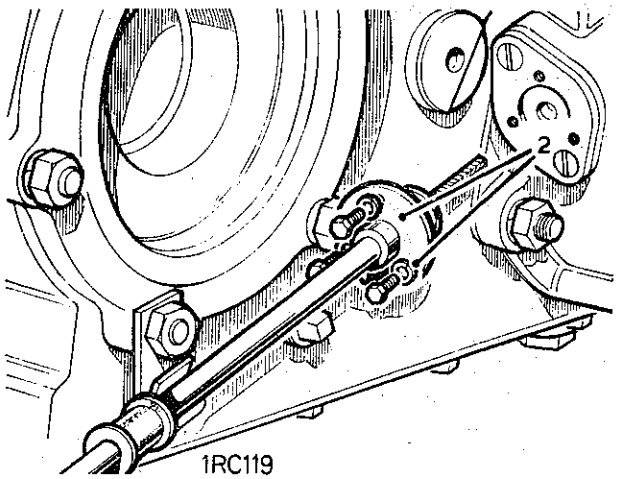
—Remove and refit 37.25.09

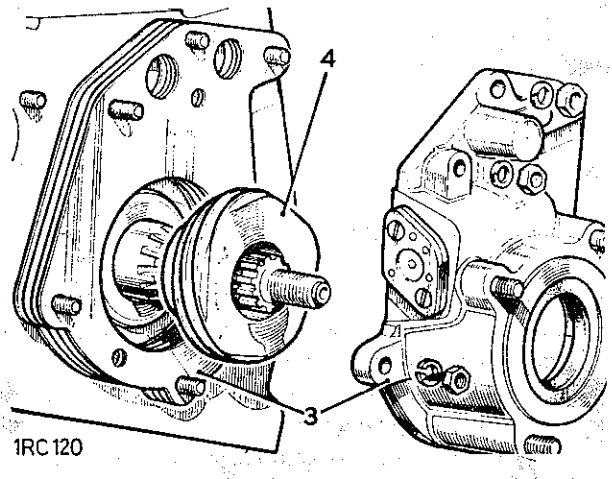
Removing

1. Remove the transmission brake. 70.45.16.
2. Disconnect the speedometer cable from the gearbox.
3. Remove the speedometer drive housing complete with shims.
4. Withdraw the speedometer drive worm.

Refitting

5. Reverse 1 to 4. If necessary, replenish the gearbox lubricating oil.



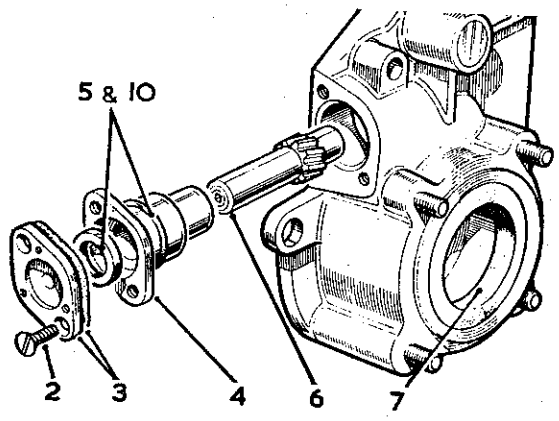


SPEEDOMETER DRIVE HOUSING

–Overhaul 37.25.13

Dismantling

1. Remove the speedometer drive housing, 37.25.09.
2. Remove the pinion retainer fixings.
3. Withdraw the retainer and gasket.
4. Withdraw the pinion sleeve.
5. Remove the oil seal and 'O' ring.
6. Withdraw the speedometer pinion.
7. Remove the output shaft oil seal from the speedometer housing.



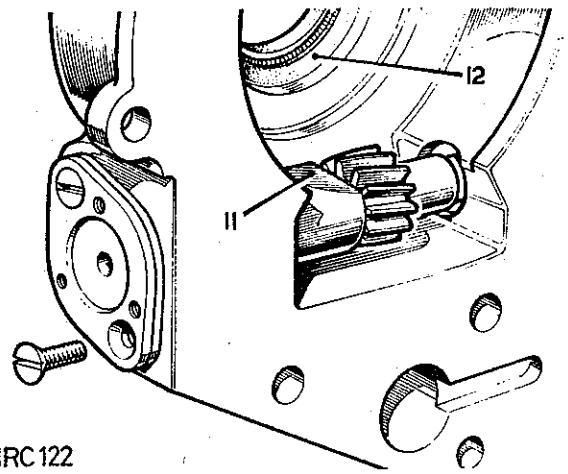
1RC121

Inspecting

8. Examine the pinion teeth and the speedometer drive worm for wear.
9. Check the sleeve which should be a slide fit on the pinion.

Assembling

10. Fit the oil seal, lipped side inwards, and 'O' ring to the sleeve.
11. Fit the pinion and sleeve, ensuring that the relieved face on the sleeve will be towards the speedometer drive worm when assembled.
12. Fit the output shaft oil seal, lipped side inward, using jointing compound on the seal outer diameter. The housing may be warmed to facilitate assembly.
13. Refit the drive housing. 37.25.09.



1RC122

TRANSFER GEARBOX

—Remove and refit **37.29.25**

Service tool: 605862, intermediate shaft extractor

Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the transmission brake. 70.45.16.
5. Disconnect the front propeller shaft from the gearbox.

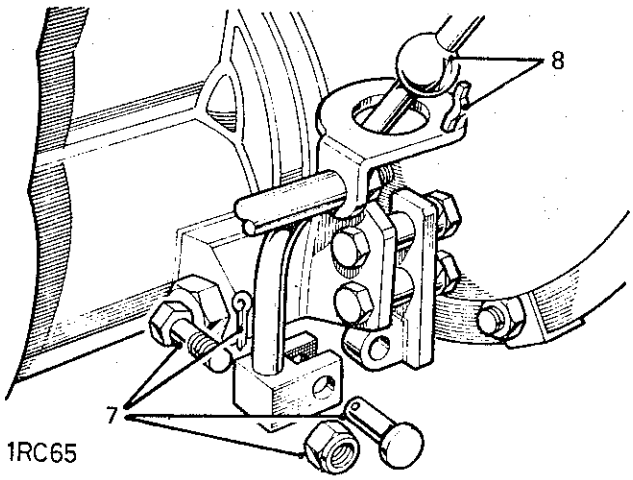
NOTE: If the vehicle is fitted with a Power take-off and winch driven from the transfer case, first disconnect the Power take-off. A37.33.01

6. Disconnect the speedometer cable from the gearbox.
7. Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
8. Withdraw the lever, taking care to retain the spring strip, located between the lever ball and link.
9. Remove the brake lever and relay fixings.
10. Remove the hand brake lever and relay mechanism.

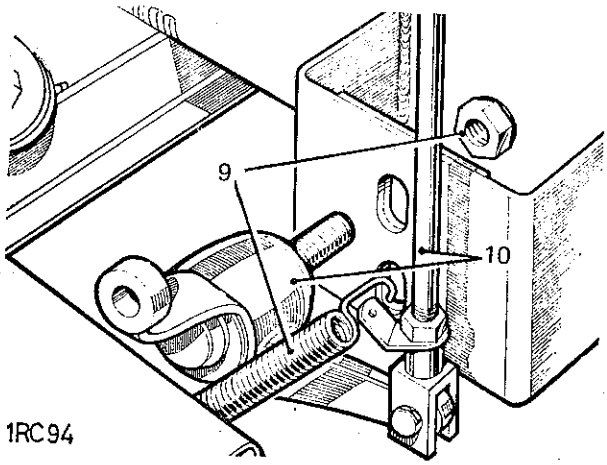
NOTE: Check the location of the engine earth strap, on certain models it is fitted between the gearbox and chassis and must therefore be disconnected.

11. Remove the fixings from the two rear mountings for the gearbox.

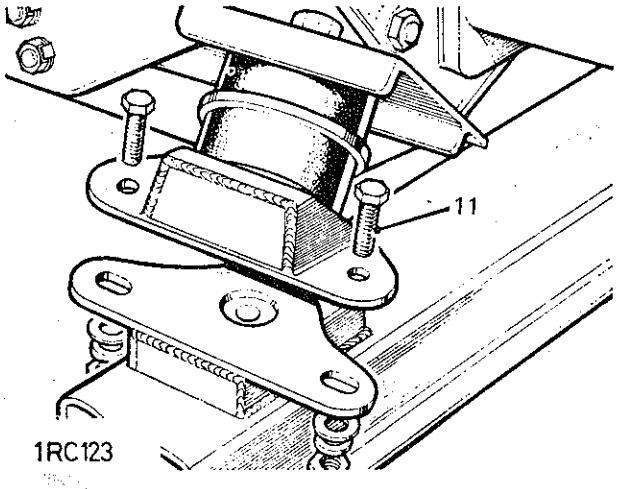
continued



1RC65



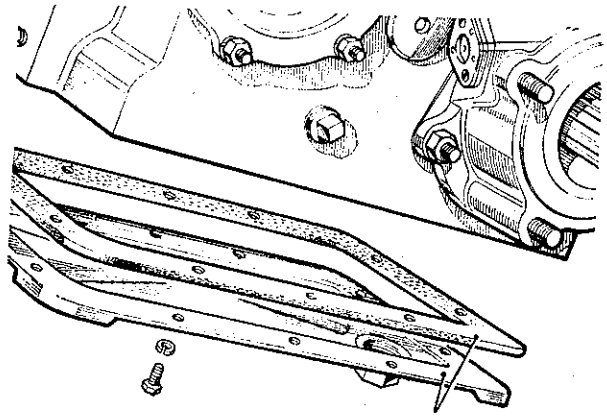
1RC94



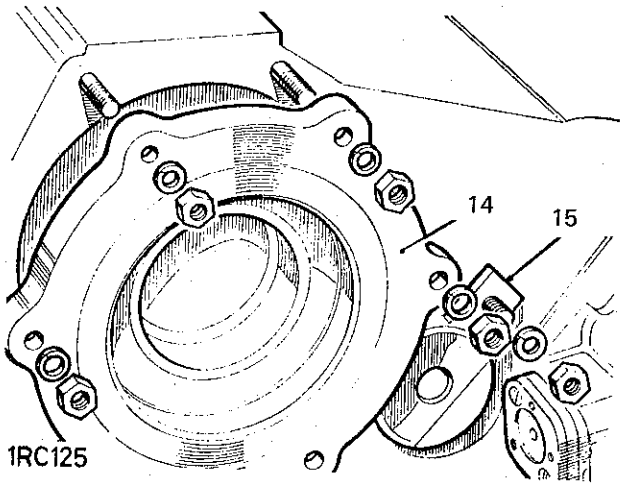
1RC123

12. Jack-up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the flywheel housing and the chassis to support the gearbox.
13. Remove the bottom cover plate and gasket from the transfer box.
14. Remove the mainshaft rear bearing housing, or if fitted, the power take off drive unit.
15. Remove the fixings from the retaining plate for the intermediate shaft.
16. Support the intermediate gear by hand while using Service tool 605862 to withdraw the intermediate shaft complete with retaining plate and oil seal 'O' ring. Withdraw the intermediate gear and roller bearings through the bottom of the casing.

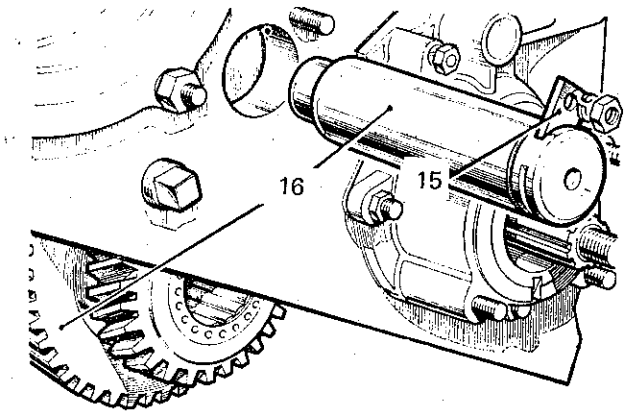
continued



1RC124

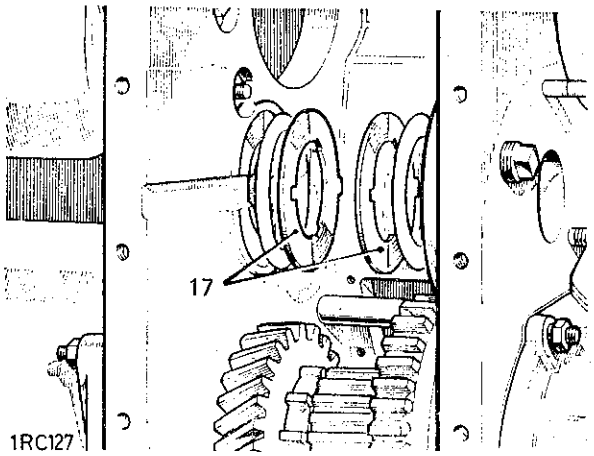


1RC125



1RC126

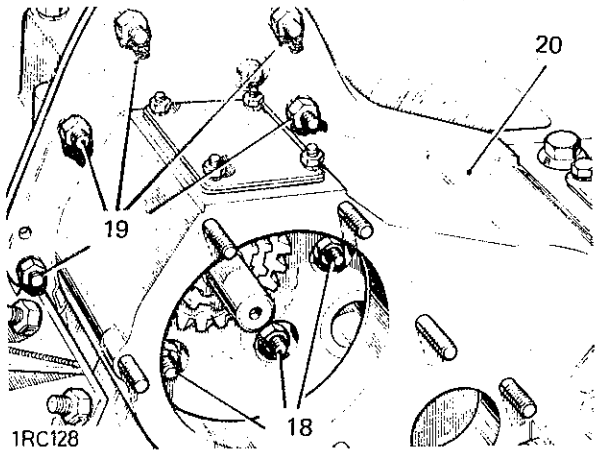
17. Remove the thrust washers and if fitted, shims located between each end of the intermediate gear and casing.
18. Remove the internal fixings.
19. Remove the external fixings.
20. Withdraw the transfer gearbox and joint washer from the main gearbox.



Refitting

21. Smear both sides of the joint washer with general purpose grease and place it in position on the main gearbox.
22. Fit the transfer box to the main gearbox, engaging the dowel locations.
23. Fit any shims for the intermediate gear, between the thrust washers and the casing, ensuring that the thrust washer bronze faces are towards the intermediate gear. Use a little general purpose grease to retain in position.

NOTE: If the intermediate gear, bearings or thrust washers have been renewed, the gear end-float must be checked and adjusted, as described under 'Transfer box overhaul', 37.29.28.



24. Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.
25. Fit the intermediate shaft, together with its oil seal 'O' ring and retaining plate, through the casing, shims, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
26. Reverse 1 to 15. When refitting the bottom cover plate gasket, smear both sides with jointing compound.

TRANSFER GEARBOX (HELICAL AND SPUR GEAR TYPE)

–Overhaul 37.29.28

Service tool: **243241, thread protector**

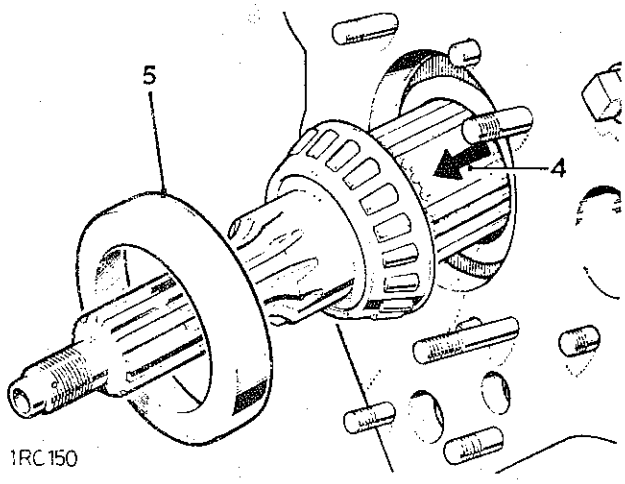
Dismantling

1. Remove the transfer gearbox. 37.29.25.
2. Remove the front output shaft housing. 37.10.05.
3. Remove the speedometer drive housing. 37.25.09.
4. Using a mallet, drive the output shaft rearwards.
5. Withdraw the rear bearing outer race when released from the casing.
6. Fit protection cap 243241, over the threaded end of the output shaft, and drive the shaft forward as far as possible.
7. Slide the shaft to the rear and insert a suitable packing piece between the rollers of the front bearing and the outer race.

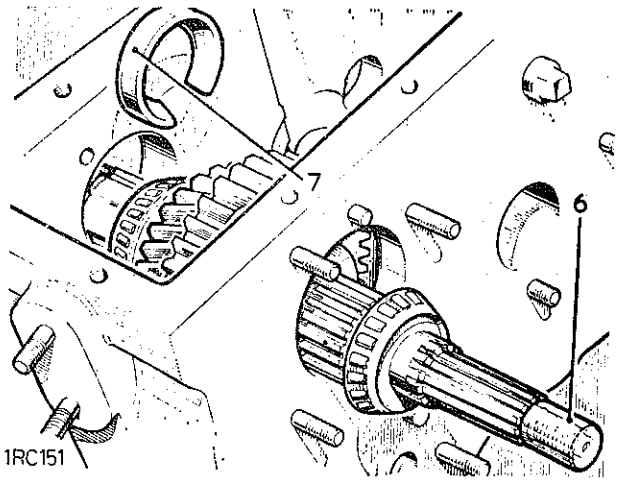
NOTE: A packing piece can be made from a scrap bearing outer race, with the outer diameter reduced to give clearance in the transfer box and suitably slotted to fit over the shaft.

8. Remove the circlip retaining the front bearing outer race.
9. With the packing piece in position, drive the shaft forward.
10. Withdraw the front bearing outer race.

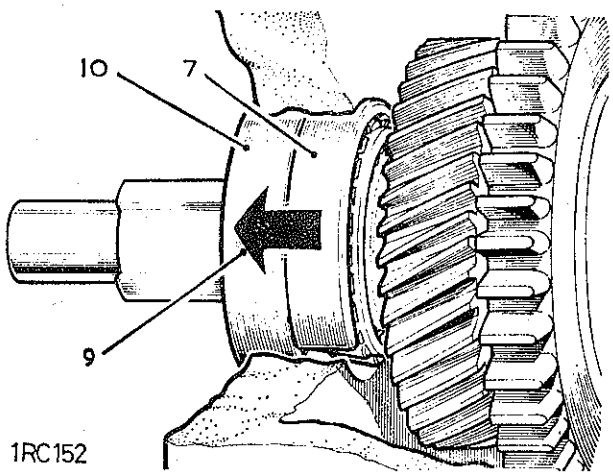
continued



1RC150



1RC151

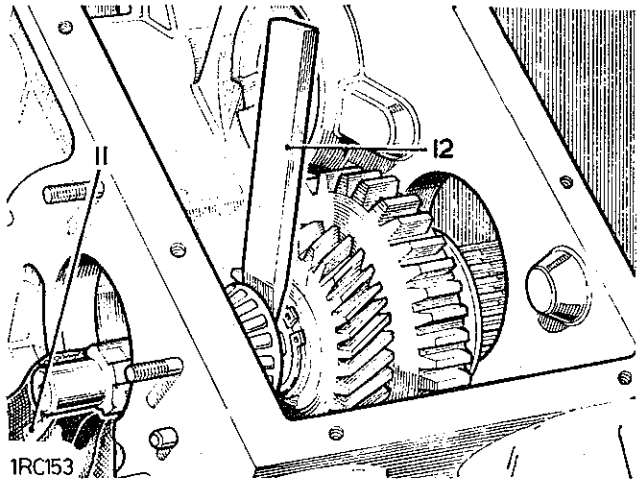


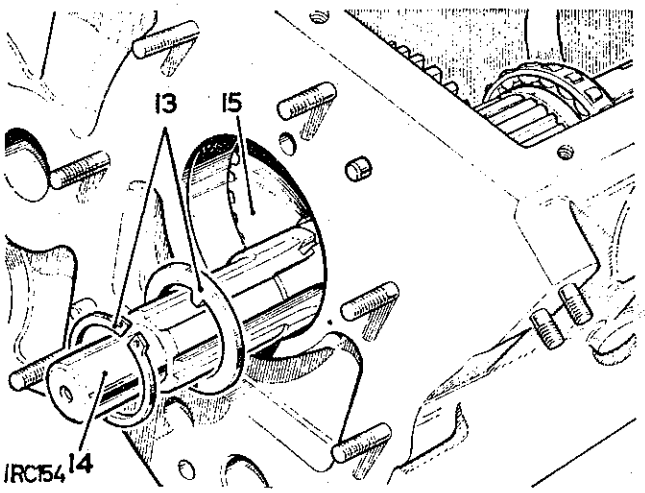
1RC152

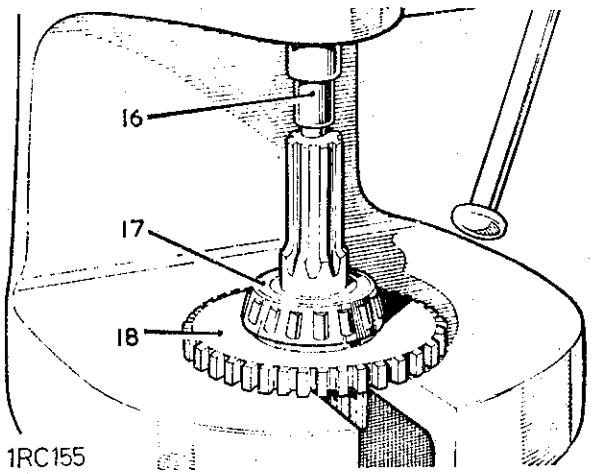
(HELICAL AND SPUR GEAR TYPE)

11. Place pads of rag in position to protect the transfer box bearing bores during the following operations.
12. Using a suitable mild steel bar with a chisel end, drive the front bearing from the output shaft.
13. Remove the circlip and thrust washer from the output shaft.
14. Withdraw the shaft through the gears.
15. Remove the gears through the bottom of the casing.
16. Retain the protector 243241 on the shaft threads.
17. Extract or press the rear bearing from the output shaft.
18. As illustrated, the low speed gear may be used as a press block for the removal of the rear bearing.

continued

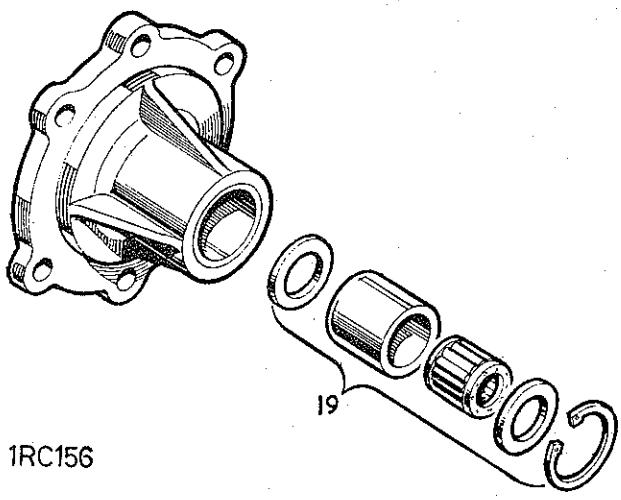






(HELICAL AND SPUR GEAR TYPE)

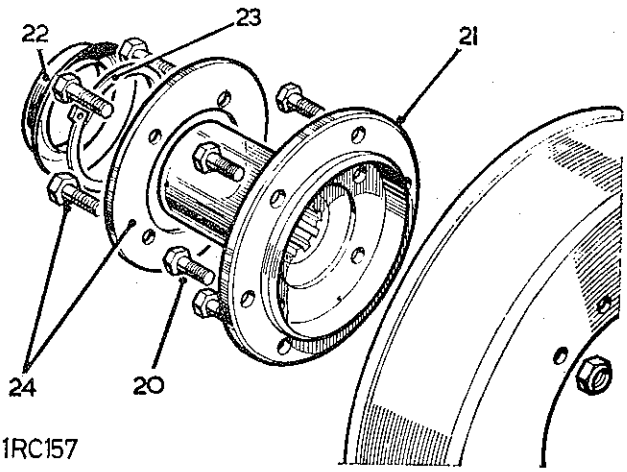
19. Remove the circlip, retaining plate and roller bearing from the mainshaft rear bearing housing.
20. Remove the fixings, flange to brake drum.
21. Withdraw the coupling flange.
22. Prise off the mud shield.
23. Remove the retaining circlip from the propeller shaft bolts.
24. Withdraw the bolts and retainer plate.



1RC156

Inspecting

25. Renew any components which show obvious wear or damage. Check the condition of the shaft splines for the low gear wheel, it is important that the spline corners are not worn.
Note that the low gear wheel is a loose fit on the shaft, this allows the gear to tilt in operation, causing the spline edges at the annular groove to bite on the splines of the low speed gear, locking it in position. Examine the sleeve of the output flange for damage which could cause failure of the oil seal.

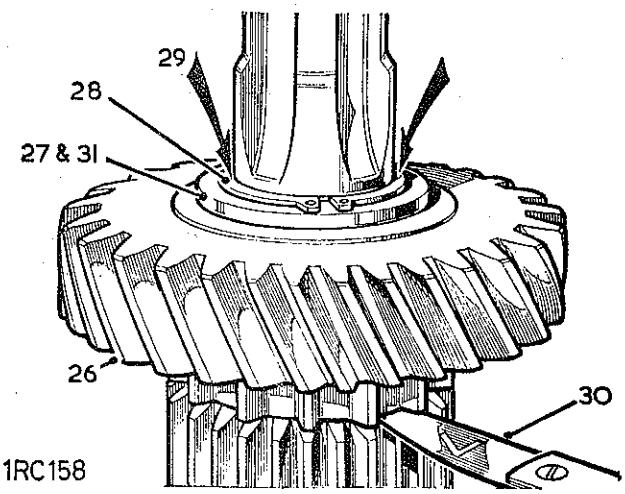


1RC157

Pre-assembly check, items 26 to 31.

26. Fit the high gear wheel on to the output shaft.
27. Fit the thrust washer.
28. Fit the circlip.
29. Place a suitable piece of tube over the shaft and push the circlip towards the gear to produce minimum gear end-float.
30. Maintaining this condition, check the end-float between the gear and the shaft, this must be 0,15 mm to 0,20 mm (0.006 in. to 0.008 in.) under these conditions.
31. Adjustment of the high gear wheel end-float is made by reducing the thickness of the thrust washer, or fitting a new thrust washer, as required. If fitting a new thrust washer fails to reduce the end-float to the required limits, replace the shaft and/or gear.

continued



1RC158

(HELICAL AND SPUR GEAR TYPE)

Assembling

32. Position the high and low gears in the transfer box.
33. Fit the output shaft, from the rear of the box, to engage the gears.
34. Fit the thrust washer, determined during the pre-assembly check, to the output shaft and secure, using a new circlip.
35. Use pads of rag to protect the transfer box bearing bores, and drive the two roller bearings on to the output shaft. Fit the front bearing outer race and secure with a circlip.
36. Fit the rear bearing outer race.
37. Using the protection cap 243241 over the threaded end of the output shaft, drive the shaft forward until the front bearing is hard against the circlip. Then lightly tap the rear bearing outer race further in to remove all end-float from the output shaft without introducing pre-load.

Setting the output shaft bearing pre-load, items 38 to 44

38. Fit the speedometer housing, without any shims, and loosely retain with nuts and spring washers.
39. Measure the rolling resistance of the output shaft, using a nylon cord attached to a spring balance. Coil the cord around the low gear wheel selector groove and note the measurement recorded on the spring balance required to rotate the output shaft after having overcome inertia.
40. Ensure that the cord does not slip, giving a false reading.
41. Bearing pre-load is correct when a figure of 0,9 to 1,8 kg. (2 to 4 lbs.) is recorded on the spring balance. Adjustment is made by tightening the speedometer housing securing nuts, progressively and evenly.
42. When the bearing pre-load is correct, ensure that the clearance between the speedometer housing and the transfer box is evenly disposed, using feeler gauges. The measured clearance obtained is equal to the thickness of shims required for subsequent assembly between the speedometer housing and transfer box to maintain correct bearing pre-load.

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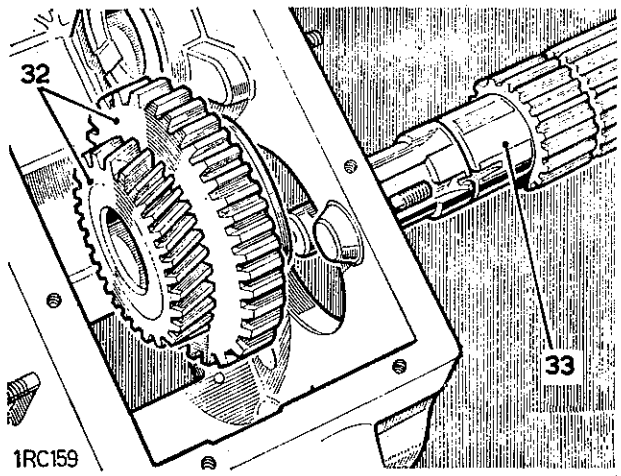

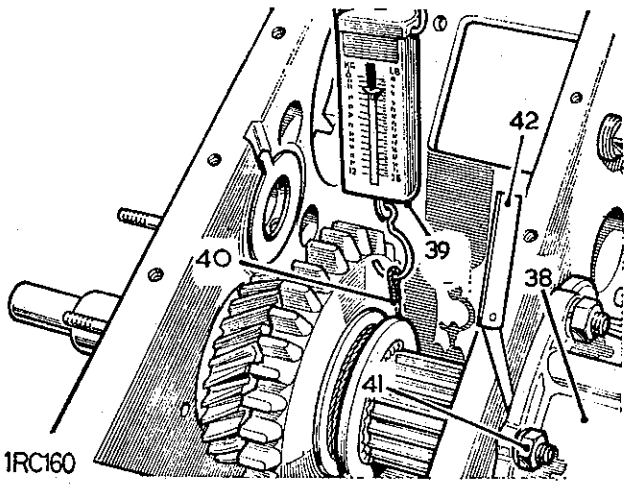

(HELICAL AND SPUR GEAR TYPE)

43. Withdraw the spring balance and nylon cord from the low gear wheel, and remove the speedometer housing from the transfer box.
44. Using the determined thickness of shims, fit the speedometer drive worm and housing.

Determining the intermediate gear end-float, items 45 to 49

45. Place the two thrust washers for the intermediate gear in position in the transfer box and retain with a film of grease. The washers must be fitted with the bronze faces inward and located in the casing by their tabs.
46. Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels
47. Fit the intermediate shaft through the casing, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
48. Using feeler gauges, check the end-float of the intermediate gear, this must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.).
49. Adjustment is made by grinding the steel face of the thrust washers to increase end-float, or by fitting shims, available in 0,25 mm (0.010 in.) thickness, between the thrust washers and the casing to reduce end-float.

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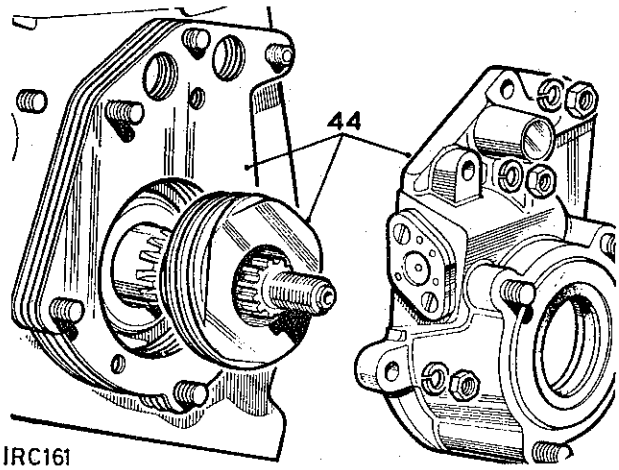
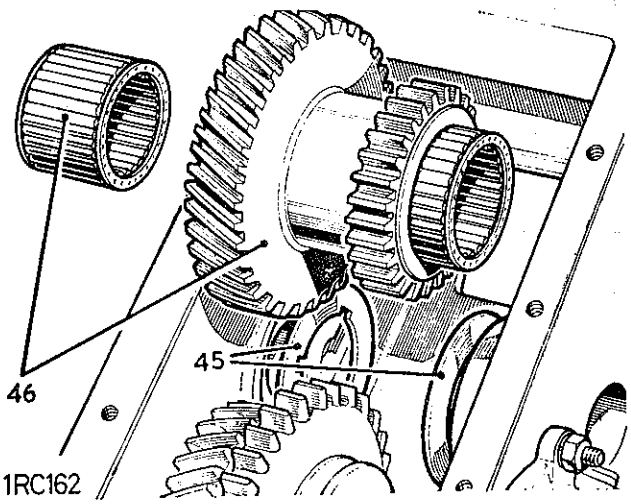
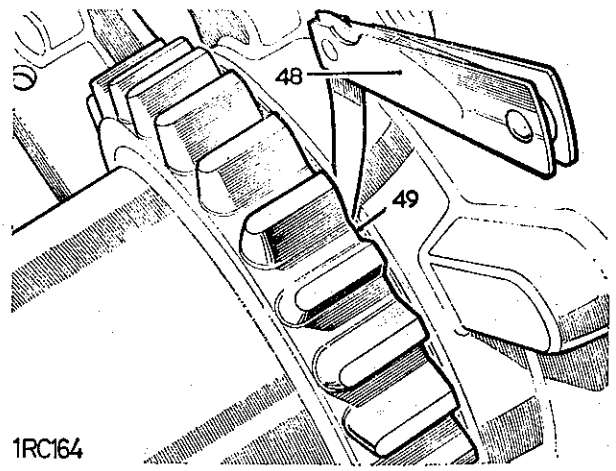


1RC161



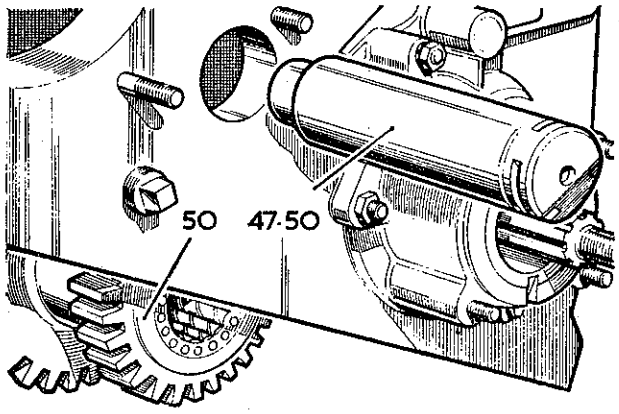
1RC162



1RC164

(HELICAL AND SPUR GEAR TYPE)

50. When the intermediate gear end-float is correct, remove the intermediate shaft and gear, and place aside for subsequent assembly after the transfer box has been fitted to the main gearbox.
51. Re-assemble the rear bearing housing and the output drive flange by reversing the removal procedure.
52. Refit the transfer gearbox. 37.29.25.



1RC 163

DATA

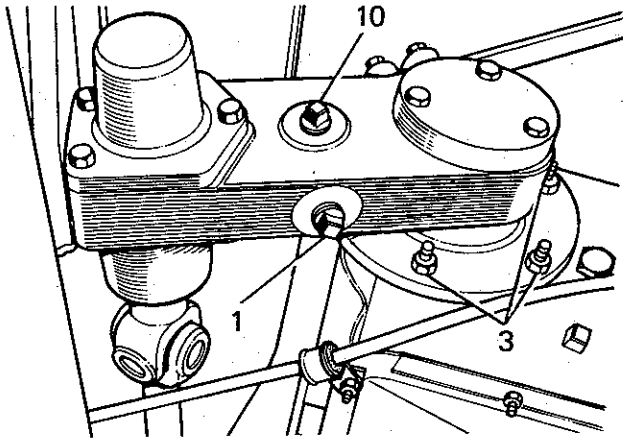
High gear end-float	0,15 to 0,20 mm (0.006 to 0.008 in.).
Intermediate gear end-float	0,10 to 0,20 mm (0.004 to 0.008 in.).
Output shaft bearing pre-load	0,9 to 1,8 kg. (2 to 4 lb.) measured with spring balance cord coiled around the low gear-wheel selector groove.

POWER TAKE-OFF

–Remove and refit **A37.33.01**

Removing

1. Remove drain plug to drain lubricant.
2. Remove key locking grub screw from universal hub to drive shaft.
3. Remove six retaining nuts and spring washers holding power take-off to transfer case.
4. Carefully ease power take-off from transfer case, disengaging drive shaft shaft at the same time.
5. To remove selector assembly, remove centre seat squab and seat panel.
6. Disengage engagement lever.
7. Remove selector fixing studs to transfer case.
8. Lift selector assembly from transfer case.



Refitting

9. Reverse 1 to 8.
10. Refill with the recommended lubricant (Division 09).

POWER TAKE-OFF

–Overload clutch adjustment A37.33.11

Testing

This adjustment is to be checked every 20,000 km (12,000 miles) or 12 months.

The adjustment may be checked by using one of the following :—

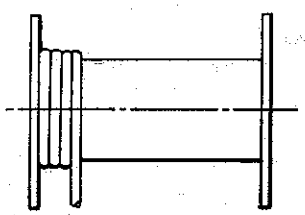
A. A line dynamometer.
B. The field method.

WARNING: **Before commencing the tests, ensure:**

1. **All connections are secure and not liable to slip.**
2. **All loops and kinks are removed from the winch rope.**
3. **All personnel are well clear of the winch rope .**
4. **All slack in the winch rope is to be taken up slowly until lightly tensioned.**

Method A — The line dynamometer

1. Position the vehcile on hard standing of either concrete or sealed bitumen.
2. Connect the dynamometer to a suitable ground anchor, e.g. heavy vehicle or suitable fixed anchor.
3. Layout sufficient winch rope cable so that are FOUR TURNS of the cable remaining on the winch drum.
4. Connect the end of the winch rope to the line dynamometer.
5. With the foot brake fully applied, engage and start winch in operation.



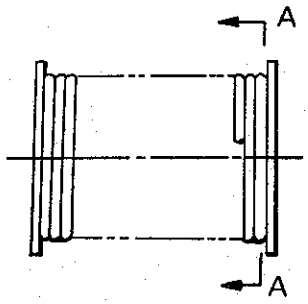
Continued

6. The adjustment can be considered correct when the clutch overload mechanism cuts in at 26 700 N (6,000 lb.f.) read of the line dynamometer. The overload action will be clearly noticable by an audible clatter from the chain case.

CAUTION: **Do not allow this overload action to continue for any longer than a few seconds once it has commenced, otherwise damage to the overload clutch will result.**

Method B — Field method

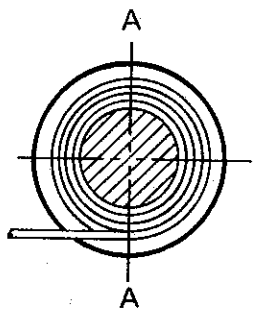
1. Position the vehicle on hard standing of either concrete of sealed bitumen.
2. Layout sufficient winch rope so that FOUR COMPLETE LAYERS (not four turns as Method A) of rope remain on the winch drum.
3. Connect the end of winch rope to a suitable anchor.
4. With the foot brake fully applied, engage and start the winch in operation.
5. Noting WARNING and CAUTION are carried out.
6. Adjustment can be considered correct if the vehicle starts to skid with the wheels locked just before the clutch overload mechanism cuts in. The overload action will be clearly noticeable by an audible clatter from the chain case.
7. This method will enable a setting of 26 700 ± 2225 N (6,000 + 500 lb.f.) to be obtained.



Adjustment

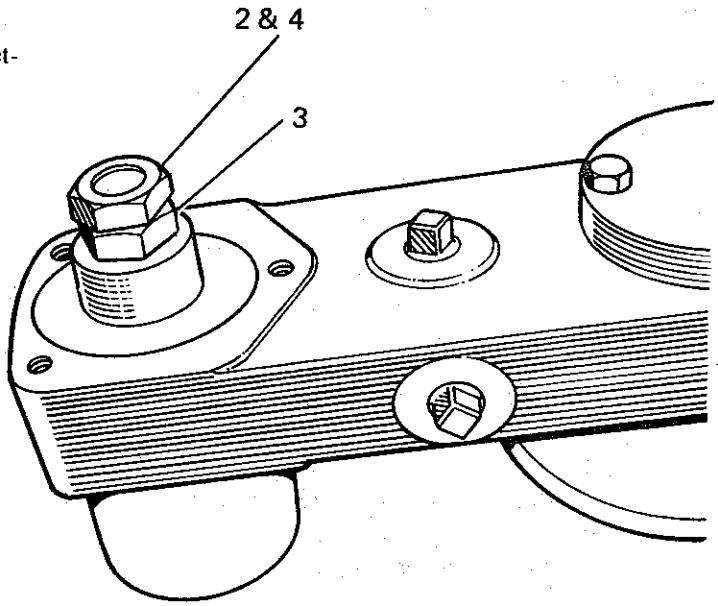
Should it be necessary to adjust the overload clutch proceed as follows :—

1. Remove cover plate from the power take-off to allow access to the overload clutch adjusting nut and lock nut.



Continued

2. Loosen the locknut.
3. Turn the adjusting nut clockwise to increase the setting and anti-clockwise to reduce the setting.
4. Lock the locknut and recheck the adjustment.
5. Replace cover plate.



WINCH

General Description A37.34.00

The drum winch is a front mounted unit capable of a line pull of 26 700 N (6,000 lb.f.) with a fair lead angle of up to 45 degrees in any direction. The winch drum is mounted on a dead shaft together with the main gear case. This dead shaft forms a cross member in the fair lead frame assembly carrying the fair lead rollers and providing the mounting locations for the complete unit. The main gear case is provided with a lever which will allow the drum to free spool. Power for the unit is taken from the vehicle power take off via a chain case containing a torque limiting clutch (with audible warning) and divided transmission shaft assembly with three universal joints and an intermediate support bearing. The drive for the unit is engaged by a handle, extending through the heel board of the cab.

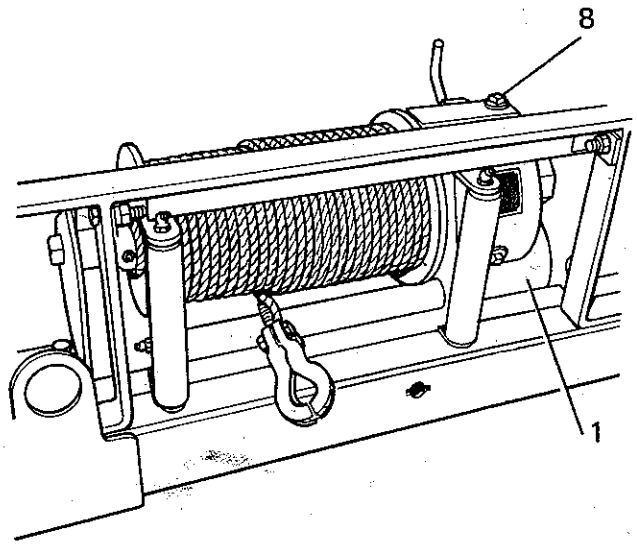
Operation A37.34.10

With vehicle transfer gearbox in neutral position, shift the free spool lever on the winch drum, to "OUT" position, as indicated on plate. The wire rope may now be spooled out by hand and drive reconnected when sufficient rope is paid out. The re-engagement of the gearing is facilitated by rocking the drum.

NOTE: The maximum rope tension will be achieved with the rope winding on to the first layer on the drum.

Continued

The winch power take-off is now engaged by shifting the andle in the cabin fully forwards (it may be necessary to engage a gear and let clutch out slightly to facilitate engagement of the power take-off.)
The winch may now be operated in any gear of the vehicle main gearbox and controlled using vehicle main clutch. Should the winch be overloaded, the torque limiting device will slip, with the associated warning noise of a sharp clattering from under the cab. This device is self re-setting and will drive immediately the overload is removed.
When closing down operation of the winch, the free spool lever should be left in the "IN" position so that the drum will not rotate freely and allow the wire to run out while the vehicle is travelling. The chain sling and hook may be stowed in a convenient position around brushguard.



—Remove and refit **A37.34.11**

Removing

1. Remove drain plug to drain lubricant.
2. Disconnect black out lights from brushguard.
3. Remove fixings from brushguard and remove brushguard from vehicle.
4. Remove locking grub screw from drive shaft at input universal joint yoke.
5. Remove winch mounting bolts.
6. Remove winch.

Refitting

7. Reverse 1 to 6.
8. Refill with the correct lubricant (Division 09).