

R380 MANUAL GEARBOX



Overhaul Manual

**R380 Handgeschakelde
versnellingsbak revisiehandboek**

**R380 Boite de vitesses manuelle
Manuel de révision**

**R380 Schaltgetriebe
Überholungsanleitung**

**R380 Cambio meccanico
Manuale di revisione**

**R380 Caja de cambios manual
Manual de revisión**

**R380 Caixa de velocidades manual
Manual de revisão**



R380 GEARBOX

OVERHAUL MANUAL

This Overhaul Manual contains information applicable to the following models:

New Range Rover
Range Rover Classic 1995 Models on
Discovery 1995 Models on
Defender 1995 Models on
Discovery 2

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INTRODUCTION

How to use this manual

To assist in the use of this manual the section title is given at the top and the relevant sub - section is given at the bottom of each page.

This manual contains procedures for overhaul of the R380 gearbox on the bench with the clutch and, if applicable, the transfer box removed. For all other information regarding Adjustments, Removal of oil seals, clutch, transfer box and gearbox unit, consult the appropriate Repair Manual for the model concerned.

This manual is divided into 5 sections, Data, Torque Settings, Service Tools, Description and finally, Overhaul. To assist filing of revised information each sub - section is numbered from page 1.

The individual overhaul items are to be followed in the sequence in which they appear. Items numbered in the illustrations are referred to in the text.

Overhaul operations include reference to Service Tool numbers and the associated illustration depicts the tool in use. Operations also include reference to wear limits, relevant data, torque figures, and specialist information and useful assembly details.

WARNINGS, CAUTIONS and **NOTES** have the following meanings:



WARNING: Procedures which must be followed precisely to avoid the possibility of injury.



CAUTION: Calls attention to procedures which must be followed to avoid damage to components.



NOTE: Gives helpful information.

References

Operations covered in this manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and tested after completion and if necessary, a road test of the vehicle is carried out, particularly where safety related items are concerned.

Dimensions

The dimensions quoted are to design engineering specification with Service Limits where applicable.

REPAIRS AND REPLACEMENTS

When replacement parts are required it is essential that only Land Rover recommended parts are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features embodied in the car may be impaired if other than Land Rover recommended parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification.

Torque wrench setting figures given in this Manual must be used. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

The Terms of the vehicle Warranty may be invalidated by the fitting of other than Land Rover recommended parts. All Land Rover recommended parts have the full backing of the vehicle Warranty.

Land Rover Dealers are obliged to supply only recommended parts.

INTRODUCTION

SPECIFICATION

Land Rover are constantly seeking to improve the specification, design and production of their vehicles and alterations take place accordingly. While every effort has been made to ensure the accuracy of this Manual, it should not be regarded as an infallible guide to current specifications of any particular component or vehicle.

This Manual does not constitute an offer for sale of any particular component or vehicle. Land Rover Dealers are not agents of Land Rover and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

GEARBOX IDENTIFICATION

The procedures given in this manual cover overhaul of the R380 gearbox fitted to a range of vehicles and as such, certain differences exist between gearboxes, particularly in respect of the extension housings, gear change housings and transfer box selector housings. It is important therefore that before starting work, the gearbox to be overhauled is correctly identified. Identification can be made by noting the gearbox serial number prefix stamped on the RH side of the gearbox casing and referring to the following table which lists four types of gearbox, A, B, C and D together with their appropriate serial number prefixes.



NOTE: The gearbox types listed are only intended as an aid to identification and do not relate to gearbox part numbers or a particular vehicle.

Overhaul operations in this manual list the applicable gearbox type referred to and it is important that the relevant operation is followed.

Type A gearbox prefixes: - 50A; 51A; 56A; 58A; 60A; 61A; 66A; 68A; 70A; 74A

Type B gearbox prefixes: - 53A; 55A; 63A; 67A; 69A; 73A

Type C gearbox prefix: - 18A

Type D gearbox prefixes: - 64A; 65A

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GENERAL DATA

	NEW	SERVICE LIMIT
Baulk ring clearances	0.5 mm (0.02 in)	0.5 mm (0.02 in)
1st gear end float	0.05 - 0.20 mm (0.002 - 0.008 in)	0.327 mm (0.012 in)
2nd gear end float	0.04 - 0.21 mm (0.0016 - 0.008 in)	0.337 mm (0.013 in)
3rd gear end float	0.11 - 0.21 mm (0.004 - 0.008 in)	0.337 mm (0.013 in)
Adjust 5th - reverse hub - shim to:-	0.005 - 0.055 mm (0.0002 - 0.002 in)	0.055 mm (0.002 in)
Reverse gear idler shaft clearance	0.04 - 0.38 mm (0.0016 - 0.015 in)	0.38 mm (0.015 in)
Output shaft end float		
Early gearboxes:-	0.01 - 0.06 mm (0.0004 - 0.0024in)	0.06 mm (0.0024 in)
Later gearboxes having letter K added to gearbox serial number:-	0.00 - 0.05 mm (0.00 - 0.002 in)	0.05 mm (0.002 in)
Layshaft end float		
Early gearboxes:-	0.01 - 0.06 mm (0.0004 - 0.0024 in)	0.06 mm (0.0024 in)
Later gearboxes having letter K added to gearbox serial number:-	0.0 - 0.05 mm (0.0 - 0.002 in)	0.05 mm (0.002 in)



TORQUE WRENCH SETTINGS

Oil pump to extension case	6 Nm (4.5 lbf.ft)
Attachment plate to gearcase	8 Nm (6 lbf.ft)
Attachment plate to remote housing	8 Nm (6 lbf.ft)
Splash shield bolts	8 Nm (6 lbf.ft)
Bottom cover to clutch housing	8 Nm (6 lbf.ft)
Breather baffle	8 Nm (6 lbf.ft)
Clip to clutch release lever	8 Nm (6 lbf.ft)
Cover to gear change housing*	8 Nm (6 lbf.ft)
Interlock spool retainer to gear case	8 Nm (6 lbf.ft)
Torsion spring locknut - adjusting screw	8 Nm (6 lbf.ft)
Screw - gear lever retention	8 Nm (6 lbf.ft)
Breather	15 Nm (11 lbf.ft)
Gear lever cap retainer bolt	15 Nm (11 lbf.ft)
Reverse inhibitor shaft	16 Nm (12 lbf.ft)
Reverse light switch	24 Nm (17 lbf.ft)
Transfer box to remote housing bolts	25 Nm (18 lbf.ft)
Bias adjustment plate bolts*	25 Nm (18 lbf.ft)
Selector quadrant setscrew*	25 Nm (18 lbf.ft)
Gear change lever yoke setscrew*	25 Nm (18 lbf.ft)
Bridge plates to gear change housing*	25 Nm (18 lbf.ft)
Extension case to gear case*	25 Nm (18 lbf.ft)
Front cover to gear case*	25 Nm (18 lbf.ft)
Gear change housing to extension case	25 Nm (18 lbf.ft)
Gear lever housing to remote housing	25 Nm (18 lbf.ft)
Guide - clutch release sleeve to clutch housing	25 Nm (18 lbf.ft)
Mounting bracket	25 Nm (18 lbf.ft)
Pivot clutch lever to clutch housing	25 Nm (18 lbf.ft)
Pivot plate to clutch housing	25 Nm (18 lbf.ft)
Plug - detent ball and spring*	25 Nm (18 lbf.ft)
Plunger housing to gear change housing	25 Nm (18 lbf.ft)
Remote selector housing to extension case	25 Nm (18 lbf.ft)
Slave cylinder to clutch housing	25 Nm (18 lbf.ft)
Upper gear lever assembly to lower gear lever	25 Nm (18 lbf.ft)
Yoke to selector shaft	25 Nm (18 lbf.ft)
Oil filler/level plug	30 Nm (22 lbf.ft)
Oil drain plug	50 Nm (37 lbf.ft)
Clutch housing to gearbox	72 Nm (53 lbf.ft)
Output flange bolt	90 Nm (66 lbf.ft)
5th gear layshaft stake nut	220 Nm (162 lbf.ft)
Remote housing blanking plug*	30 Nm (22 lbf.ft)
Selector shaft trunnion setscrew*	25 Nm (18 lbf.ft)
Transfer box gaiter support plate bolts	15 Nm (11 lbf.ft)
Gate plate bolts	15 Nm (11 lbf.ft)

* Apply Loctite 290 to threads



SERVICE TOOLS



NOTE: Where the use of special tools is specified, only these tools should be used to avoid the possibility of personal injury and or damage to components.

Land Rover Number	Description
LRT-37-001/2	Adaptor for output shaft oil seal collar and bearing track remover
LRT-37-004	Adaptor for input shaft pilot bearing track remover
LRT-37-009	Puller, bearing and oil seal collar remover
LRT-37-010	Adaptor for output shaft oil seal collar and bearing track
LRT-37-014	Output shaft rear oil seal replacer
LRT-37-015	Output shaft rear support bearing track and oil seal collar replacer.
LRT-37-021	Adaptor for output shaft rear support bearing track and oil seal collar replacer.
LRT-37-022	Adaptor for layshaft bearings
LRT-37-023	Layshaft holding tool
LRT-37-043	Adaptor for input shaft bearing
LRT-37-043/2	Adaptor
LRT-37-044	Adaptor for layshaft bearings
LRT-51-003	Flange holder
LRT-99-002	Hand press
LRT-99-004	Impulse extractor



DESCRIPTION

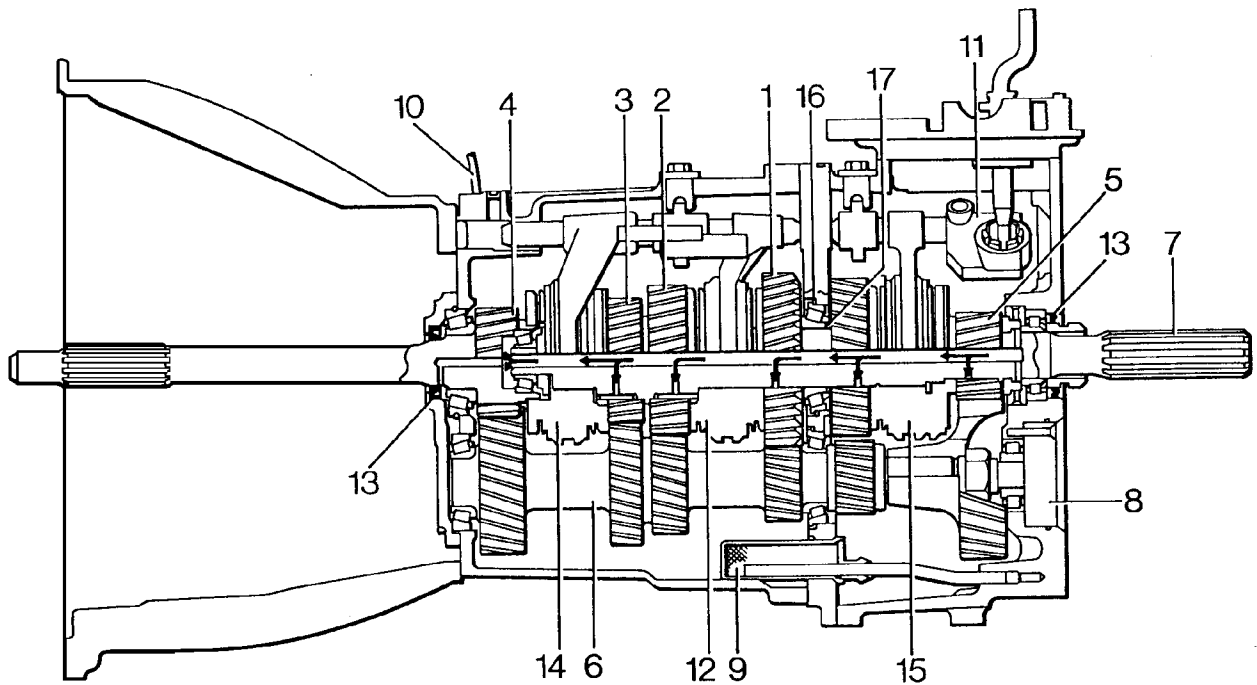
The R380 5 speed all synchromesh gearbox comprises an input shaft, output shaft, layshaft and reverse idler shaft .

Gearbox casings consist of a front cover, gearcase, centre plate and extension housing, all casings are located by dowels and sealed.

Selector forks for 1st/2nd and 3rd/4th gears are located on a single selector shaft inside the main gearcase whilst the selector fork for fifth and reverse gear is located on the same selector shaft inside the extension housing.

The input shaft, output shaft and layshaft are supported by taper roller bearings with all gears running on caged needle roller bearings. Output shaft and layshaft bearings end float is controlled by selective thrust washers located in the centre plate.

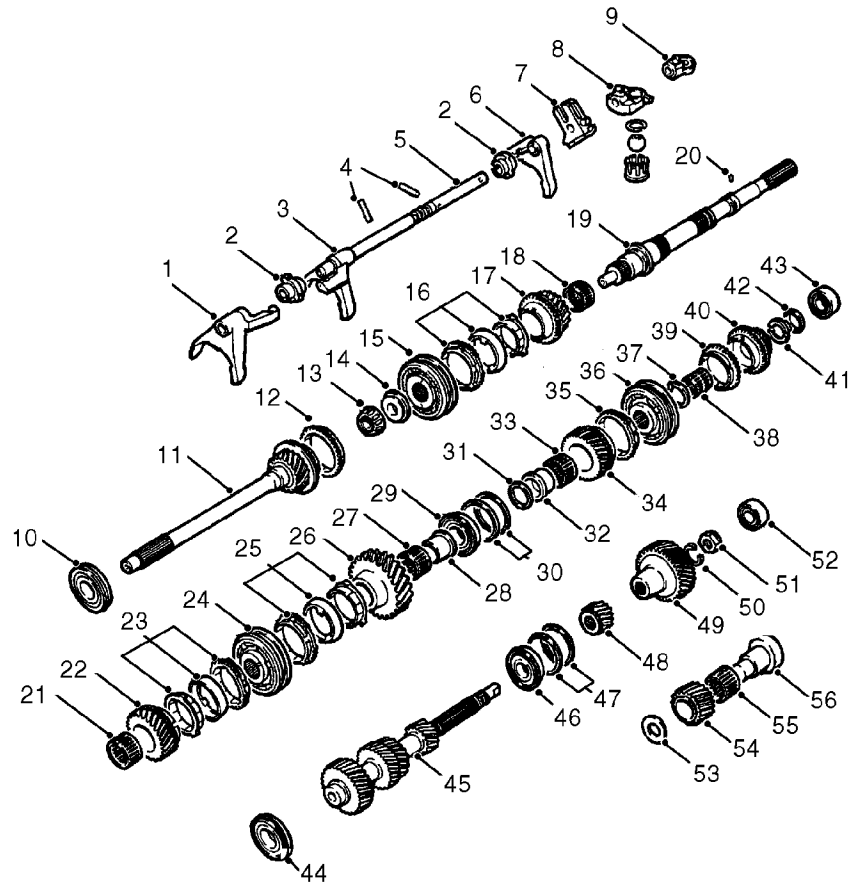
Lubrication is by an oil pump located in the extension housing which directs oil via internal drillings in the output shaft to lubricate the components.



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- | | |
|--------------------------|---|
| 1. Output shaft 1st gear | 10. Breather |
| 2. Output shaft 2nd gear | 11. Single rail gear selector |
| 3. Output shaft 3rd gear | 12. 1st/2nd synchromesh |
| 4. Input shaft/4th gear | 13. Oil seals |
| 5. Output shaft 5th gear | 14. 3rd/4th gear synchromesh |
| 6. Layshaft | 15. 5th/reverse gear synchromesh |
| 7. Output shaft | 16. Selective spacers (output shaft and layshaft end float) |
| 8. Oil pump | 17. Selective spacer (5th gear/reverse hub) |
| 9. Oil filter | |

MANUAL GEARBOX



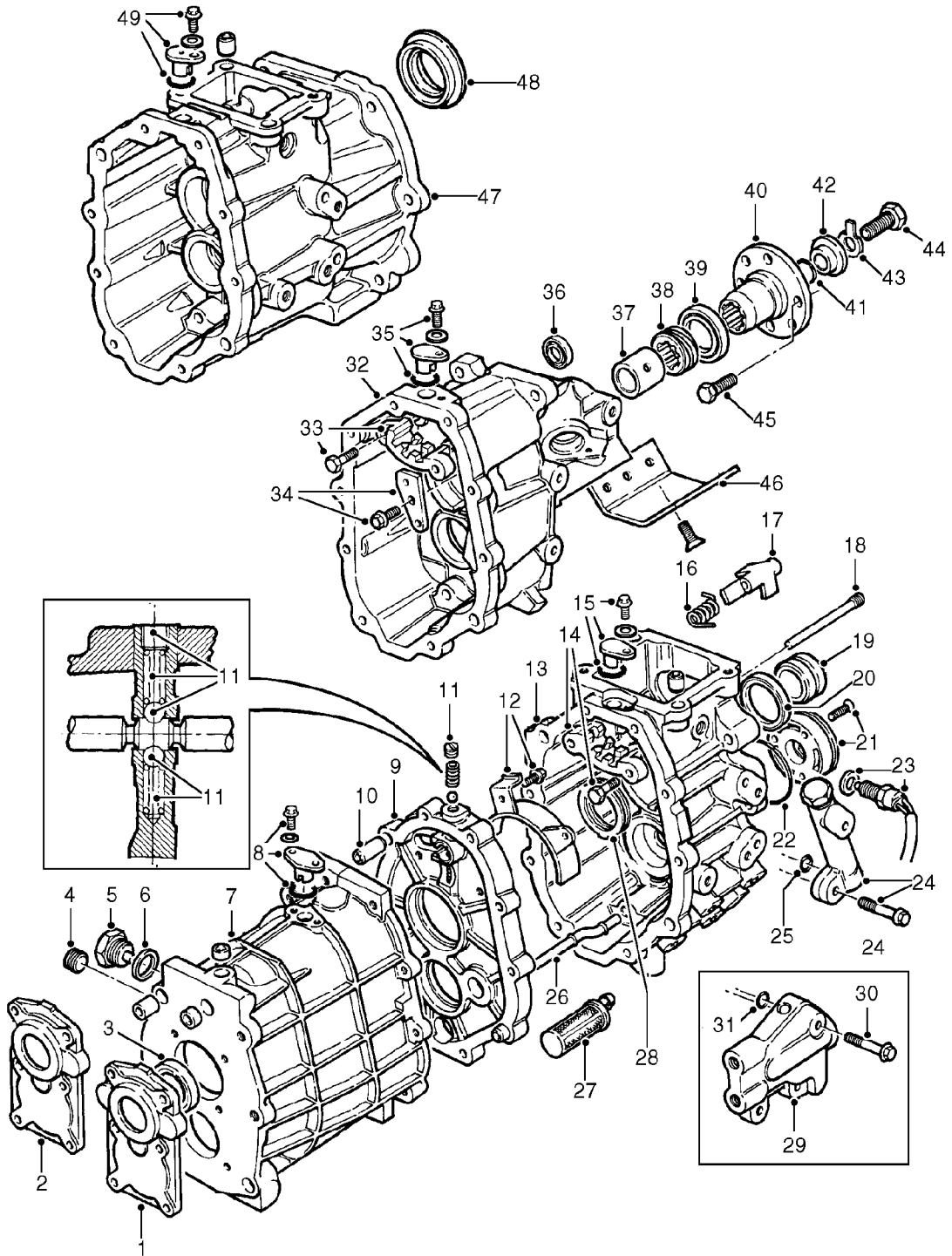
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GEARBOX COMPONENTS - GEARS AND SHAFTS

1. 3rd/4th gear selector fork
2. Interlock spool
3. 1st/2nd gear selector fork
4. Selector shaft yoke pins
5. Selector shaft
6. Reverse/5th gear selector fork
7. Selector quadrant - Type A gearbox
8. Gear change lever yoke - Type B/D gearbox
9. Gear change lever yoke - Type C gearbox
10. Input shaft front taper bearing
11. Input shaft
12. 4th gear synchronesh ring
13. Pilot taper bearing
14. Spacer
15. 3rd/4th gear synchronesh hub and sleeve
16. 3rd gear synchronesh rings
17. 3rd gear
18. Needle roller bearings
19. Output shaft
20. Roll pin
21. Needle bearing
22. 2nd gear
23. 2nd gear synchronesh rings
24. 2nd/1st gear synchronesh hub and sleeve
25. 1st gear synchronesh rings
26. 1st gear
27. Needle roller bearing
28. Bush
29. Output shaft taper bearing
30. Selective shims
31. Selective washer
32. Bush
33. Needle roller bearing
34. Reverse gear
35. Reverse gear synchronesh ring
36. Reverse/5th gear synchronesh hub and sleeve
37. Circlip
38. Needle roller bearings
39. 5th gear synchronesh ring
40. 5th gear
41. 5th gear segments
42. 5th gear segment retaining ring
43. Output shaft rear support bearing
44. Layshaft support bearing
45. Layshaft
46. Layshaft support bearing
47. Selective shims
48. Layshaft reverse gear
49. Layshaft 5th gear
50. Split washer - later gearboxes
51. 5th gear nut
52. Layshaft rear support bearing
53. Spacer
54. Reverse idler gear
55. Needle roller bearing
56. Reverse idler shaft

MANUAL GEARBOX



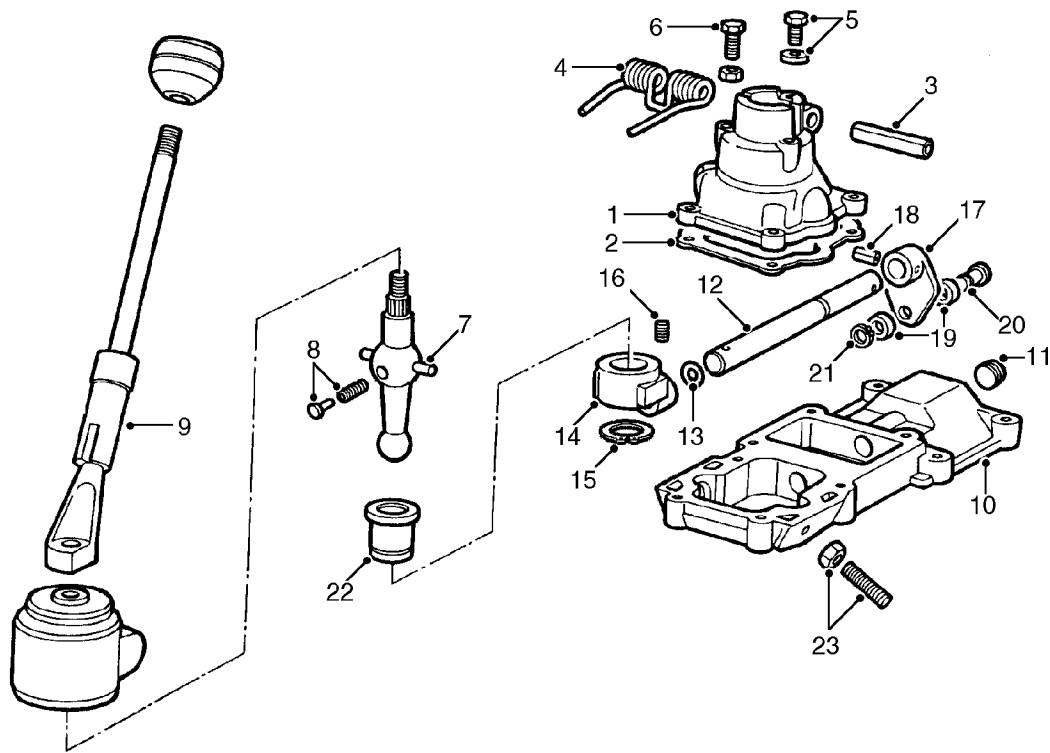
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GEARBOX CASINGS

1. Front cover - Early gearboxes
2. Front cover - Later gearboxes
3. Input shaft oil seal
4. Oil filler/level plug
5. Oil drain plug
6. Sealing washer
7. Gearcase
8. Interlock spool retainer, bolt and 'O' ring - if fitted
9. Centre plate
10. Locating dowels
11. Selector plug, detent balls and springs
12. Splash shield and bolt
13. Extension housing - Types A and B gearbox
14. Gate plate and bolt
15. Interlock spool retainer, bolt and 'O' ring
16. Inhibitor cam spring
17. Inhibitor cam
18. Reverse inhibitor shaft
19. Output shaft oil seal collar
20. Oil seal
21. Oil pump
22. 'O' ring
23. Reverse light switch
24. Oil cooler by-pass and bolt
25. 'O' ring
26. Oil pick-up pipe
27. Oil filter
28. Oil pick-up ring
29. Oil cooler adaptor
30. Bolt
31. 'O' ring
32. Extension housing - Type C gearbox
33. Gate plate and bolt - Type C gearbox
34. Inhibitor cam end plate and bolt - Type C gearbox
35. Interlock spool retainer, bolt and 'O' ring - Type C gearbox
36. Selector shaft oil seal - Type C gearbox
37. Spacer - Type C gearbox
38. Speedometer pinion - Type C gearbox
39. Oil seal - Type C gearbox
40. Output shaft drive flange - Type C gearbox
41. 'O' ring - Type C gearbox
42. Spacer - Type C gearbox
43. Tab washer - Type C gearbox
44. Drive flange bolt - Type C gearbox
45. Drive flange propeller shaft bolt - Type C gearbox
46. Support bracket - Type C gearbox
47. Extension housing - Type D gearbox
48. Oil seal - Type D gearbox
49. Interlock spool retainer, bolt and 'O' ring - Type D gearbox

MANUAL GEARBOX



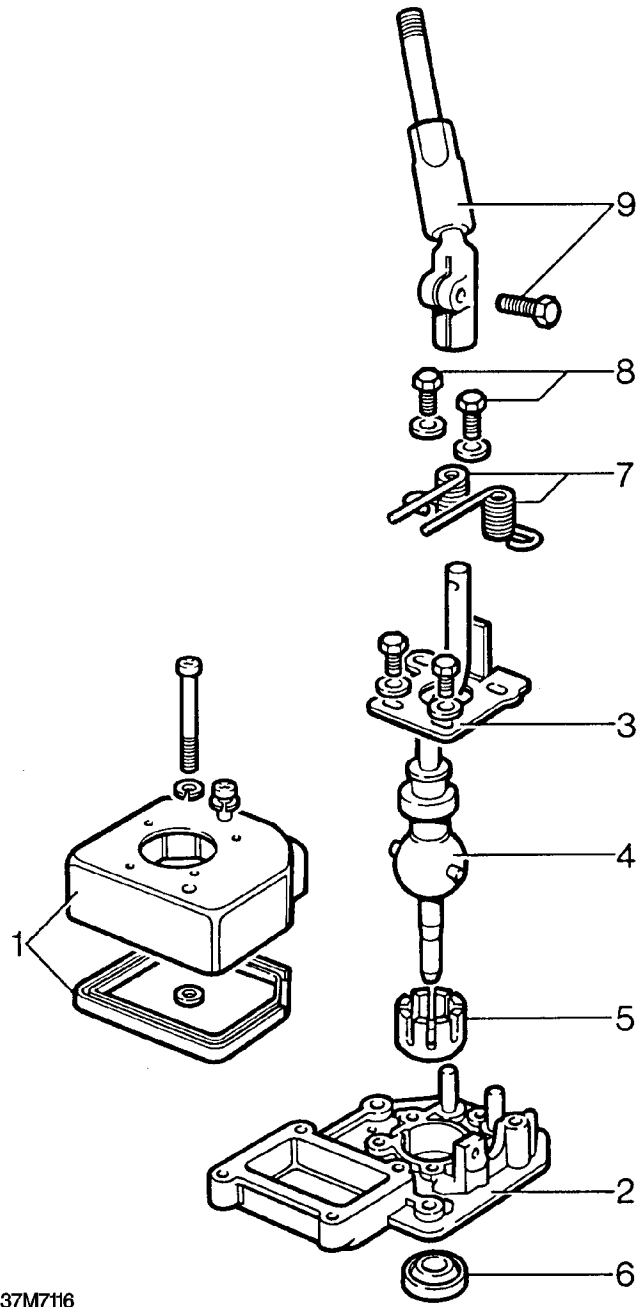
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GEAR CHANGE HOUSING - TYPE A GEARBOX

- | | |
|--|--|
| 1. Gear change housing | 13. 'O' ring |
| 2. Gasket | 14. Trunnion |
| 3. Roll pin | 15. Circlip |
| 4. Bias spring | 16. Trunnion retaining screw |
| 5. Gear lever retaining bolt and washer | 17. Quadrant |
| 6. Gear change housing bolts | 18. Roll pin or setscrew |
| 7. Gear lever | 19. Rollers |
| 8. Nylon pad and spring | 20. Pin |
| 9. Gear lever extension | 21. Circlip |
| 10. Remote housing | 22. Ball pin seating |
| 11. Blanking plug | 23. 5th gear stop screw and locknut |
| 12. Selector shaft | |

MANUAL GEARBOX



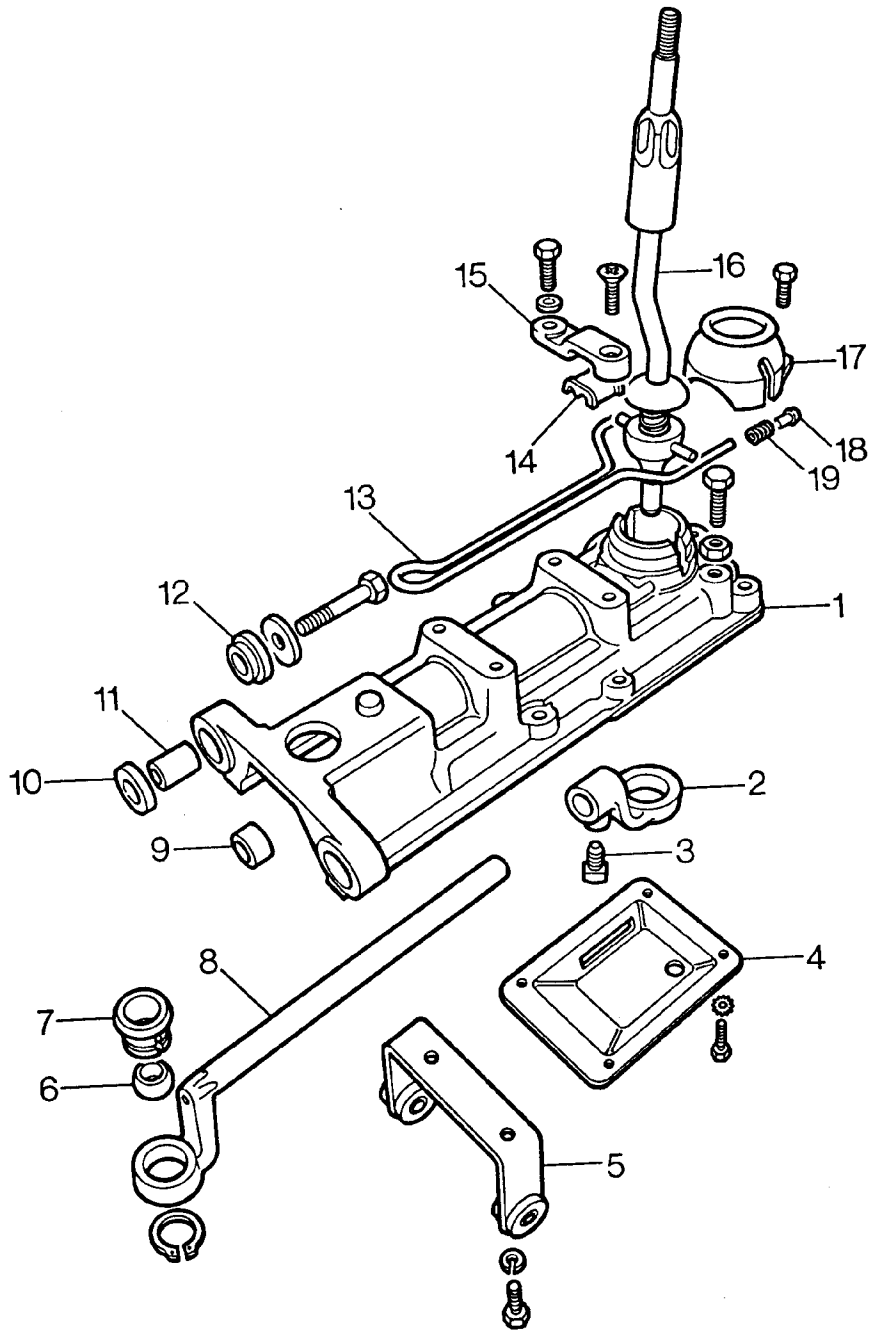
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GEAR CHANGE HOUSING - TYPE B GEARBOX

1. Gear change housing cover and gasket
2. Gear change housing
3. Bias adjustment plate and bolts
4. Lower gear lever
5. Railko bush
6. Lower gear lever housing oil seal
7. Bias springs
8. Bias spring retaining bolts
9. Upper gear lever and bolt

MANUAL GEARBOX



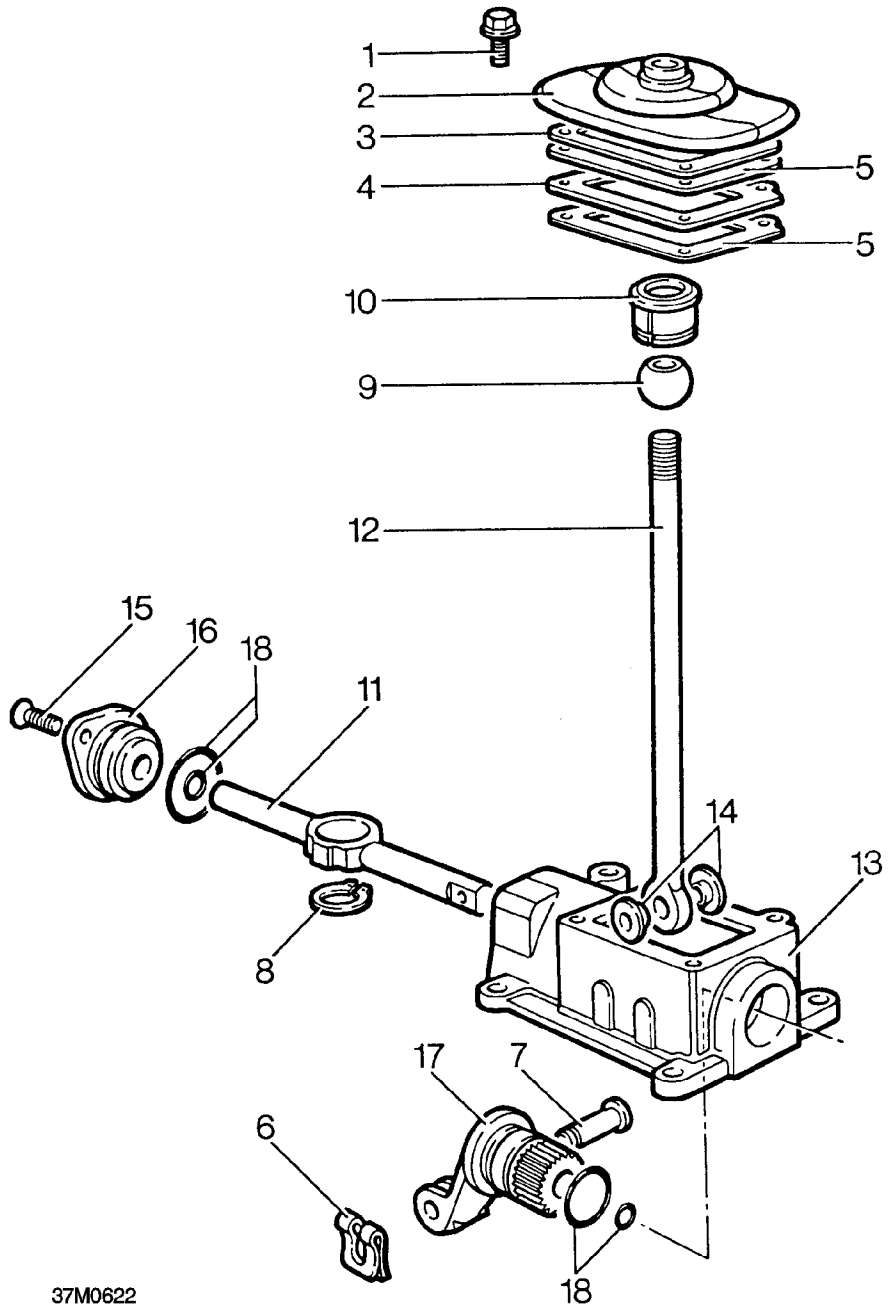
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**REMOTE GEAR CHANGE HOUSING - TYPE C
GEARBOX**

- | | |
|-------------------------------|------------------------------|
| 1. Remote gear change housing | 10. Spacer |
| 2. Selector rod yoke | 11. Mounting rubbers |
| 3. Pinch bolt | 12. Flexible mounting |
| 4. Bottom cover plate | 13. Bias spring |
| 5. Remote gear change bracket | 14. Bridge plate liner |
| 6. Ball pin | 15. Bias spring bridge plate |
| 7. Ball pin seating | 16. Gear lever |
| 8. Selector rod | 17. Gear lever cap |
| 9. Selector rod bush | 18. Plunger |
| | 19. Anti-rattle spring |

MANUAL GEARBOX





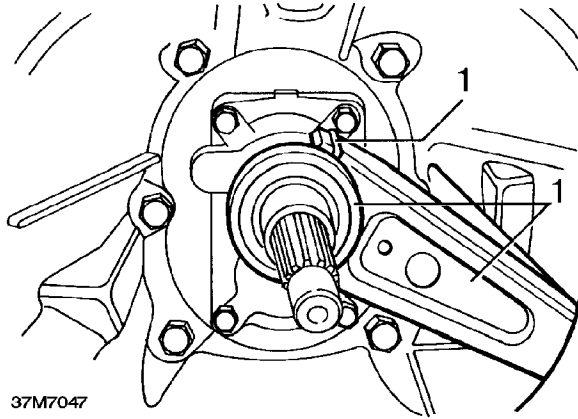
**TRANSFER BOX SELECTOR HOUSING - TYPE A
GEARBOX**

- | | |
|---------------------------------|------------------------|
| 1. Gaiter retaining bolt | 10. Nylon seat |
| 2. Gaiter | 11. Cross shaft |
| 3. Gaiter support plate | 12. Gear lever |
| 4. Gasket plate | 13. Selector housing |
| 5. Gaskets | 14. Bushes |
| 6. Spring clip | 15. Countersunk screws |
| 7. Clevis pin | 16. End cover |
| 8. Circlip retaining nylon seat | 17. Selector fork |
| 9. Gear lever ball | 18. 'O' rings |



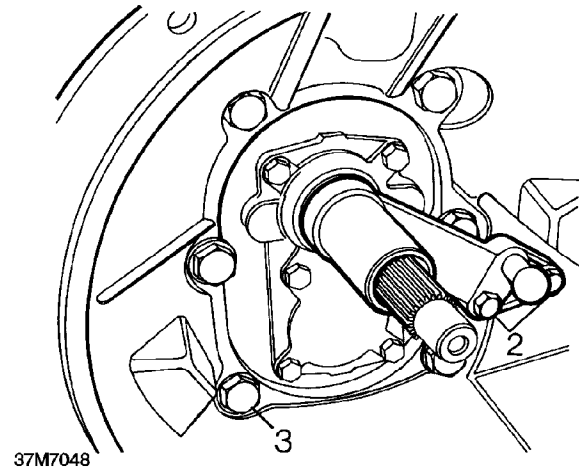
GEARBOX DISMANTLE

Clutch housing - Type A gearbox - Remove



NOTE: Early type front cover illustrated.

1. *If fitted:* Remove and discard clips retaining clutch release bearing pads, remove bearing and clutch release lever, recover pads.



NOTE: Early type front cover illustrated.

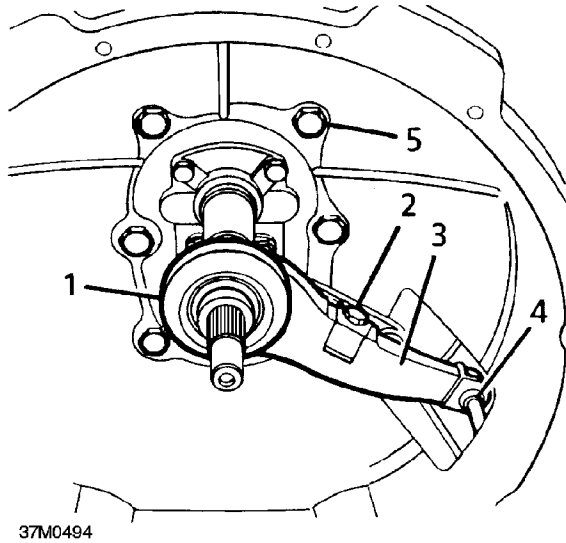
2. Remove 2 bolts securing release lever pivot post, remove post.
3. Remove 6 bolts securing clutch housing to gearbox, remove housing.



NOTE: Dowel located.

MANUAL GEARBOX

Clutch housing - Type B gearbox - Remove

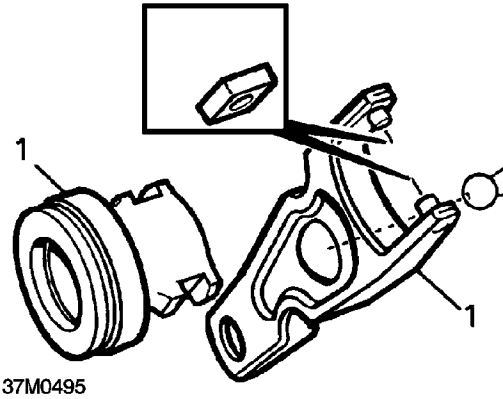


NOTE: Early type front cover illustrated.

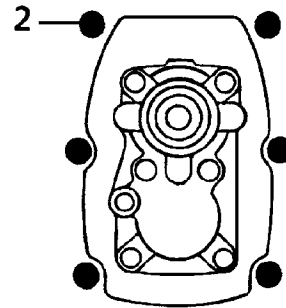
1. Remove clutch release bearing.
2. Remove bolt securing spring clip to clutch release lever, remove clip.
3. Remove clutch release lever.
4. Remove 'C' clip from release lever pivot post, discard clip.
5. Remove 6 bolts securing clutch housing to gearbox, remove housing.

NOTE: Dowel located.

Clutch housing - Type C gearbox - Remove



1. Pull clutch release lever off pivot post, remove lever and clutch release bearing.



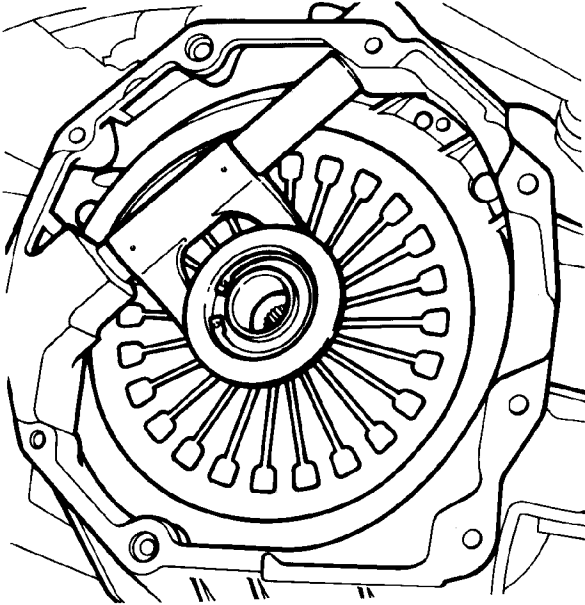
NOTE: Early type front cover illustrated.

2. Remove 6 bolts securing clutch housing to gearbox, remove clutch housing.

NOTE: 2 longest bolts are fitted at dowel locations and have plain washers under their heads.

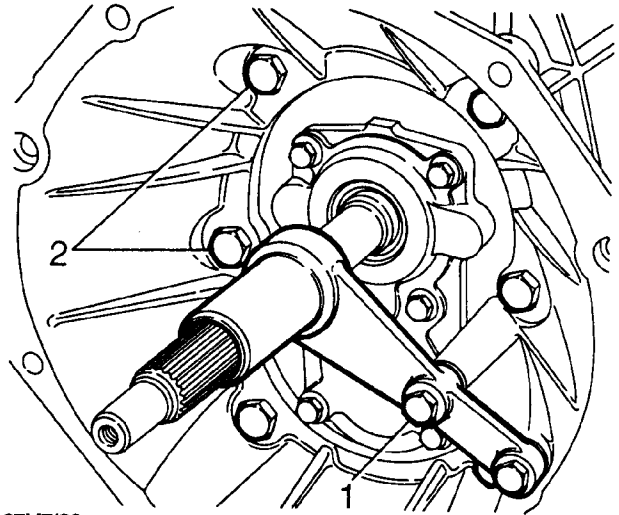


Clutch housing - Type D gearbox - Remove



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△ NOTE: Type D gearboxes have a standard clutch housing adaptor which mates with both V8 and diesel engine clutch housings. The above illustration shows the gearbox removed at the clutch housing adaptor with the clutch housing adaptor (containing the clutch mechanism) still fitted to the engine.



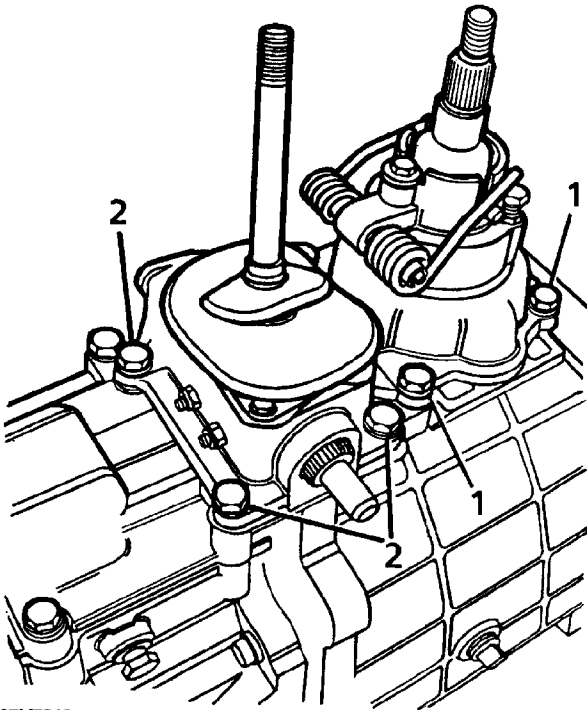
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△ NOTE: Early type front cover illustrated.

1. Remove 2 bolts securing release lever pivot post; remove post.
2. Remove 6 bolts securing adaptor housing to gearbox; remove adaptor housing.

MANUAL GEARBOX

Gear change/selector housings - Type A gearbox - Remove



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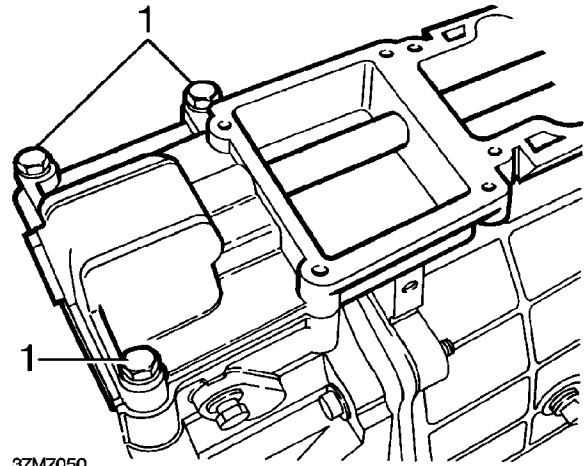
1. Remove 4 bolts securing gear change housing, remove housing.



NOTE: Dowel located.

2. Remove 4 bolts securing transfer box selector housing, remove housing.

Remote housing - Type A gearbox - Remove



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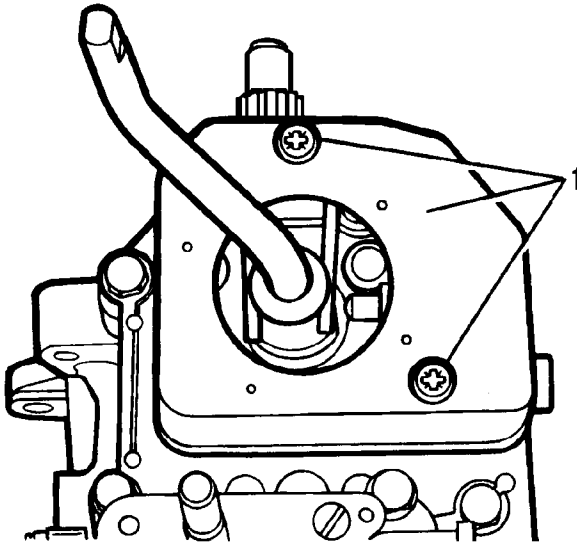
1. Noting their fitted position, remove 3 bolts securing remote housing, remove housing.



NOTE: Dowel located.

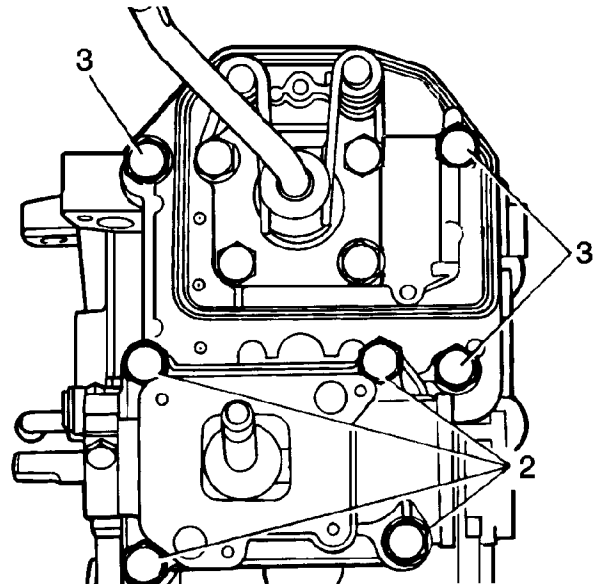


**Gear change/selector housings - Type B gearbox
- Remove**



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1. Remove 2 Torx screws securing gear change housing cover, remove cover; recover sealing rubber.



37M7052

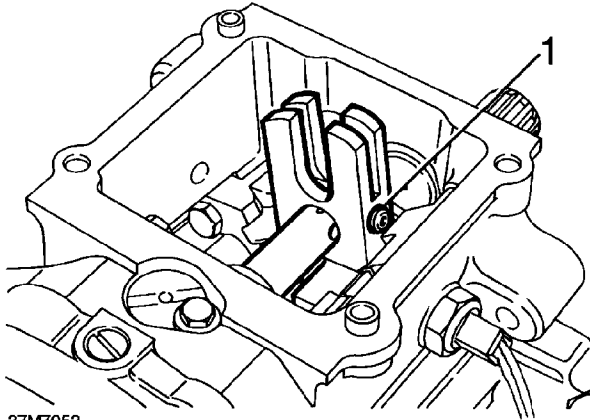
2. Remove 4 bolts securing transfer box selector housing, remove housing.
3. Noting their fitted position, remove 3 bolts securing gear change housing, remove housing.

NOTE: Dowel located.



MANUAL GEARBOX

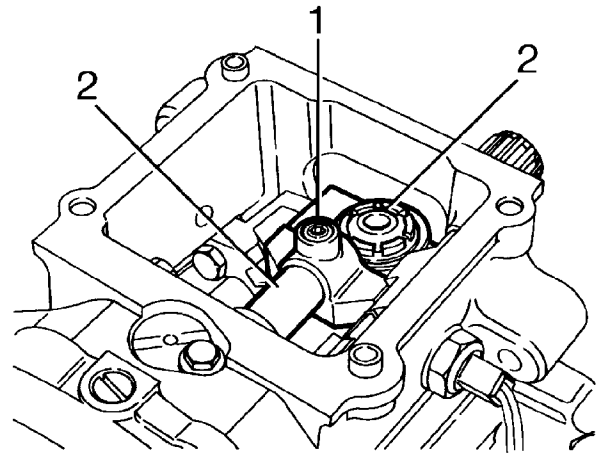
Selector quadrant - Type A gearbox - Remove



37M7053

1. Remove and discard set screw securing selector quadrant.
2. Move selector shaft forwards, remove quadrant.

Gear change lever yoke - Type B gearbox - Remove

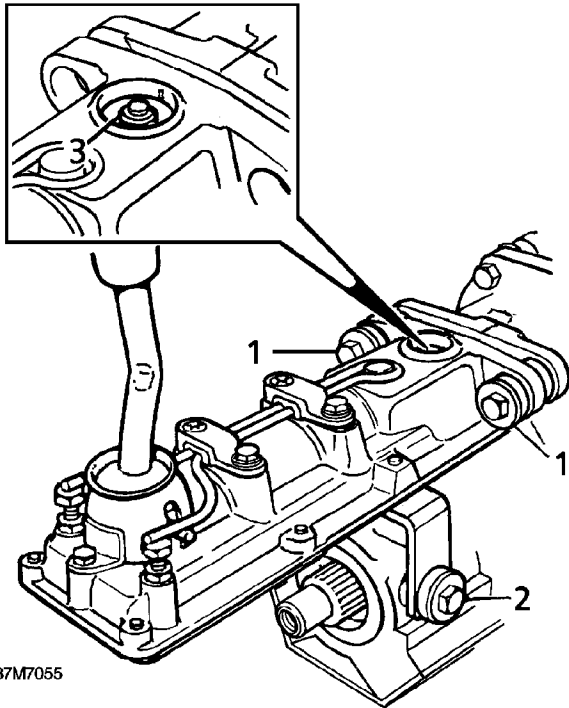


37M7054

1. Remove and discard set screw securing yoke.
2. Move selector shaft forwards, remove yoke.



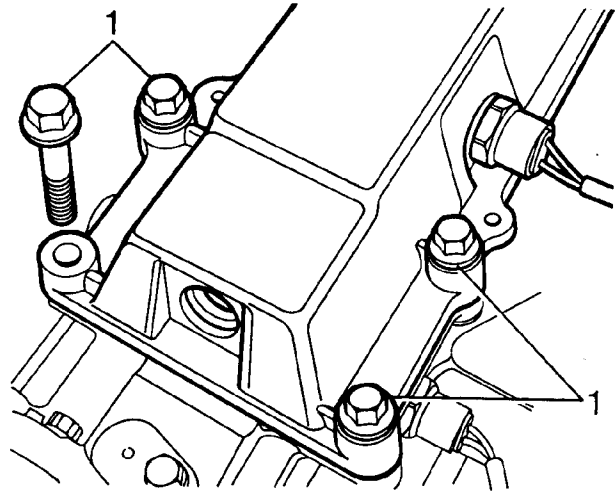
Remote gear change - Type C gearbox - Remove



37M7055

1. Noting fitted positions of mounting rubbers and washers, remove 2 bolts securing remote gear change to extension housing, recover washers and mounting rubbers.
2. Remove 2 bolts securing remote gear change bracket to extension housing, recover washers and mounting rubbers.
3. Release remote gear change from extension housing, disconnect selector rod from selector shaft pin.

Remote gear change - Type D gearbox - Remove

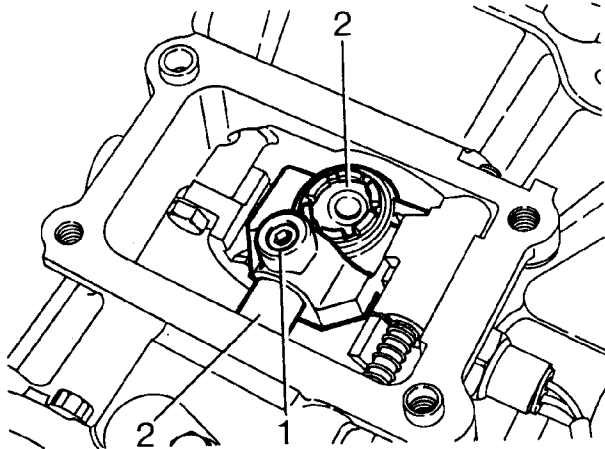


37M7121

1. Remove 4 bolts securing remote gear change to extension housing; release remote gear change from extension housing.

MANUAL GEARBOX

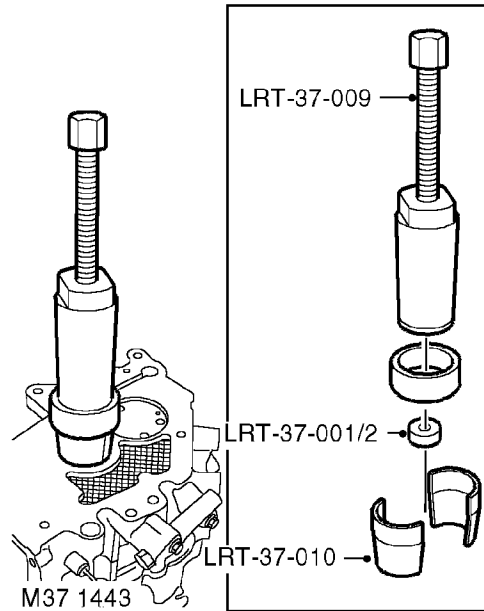
Gear change lever yoke - Type D gearbox - Remove



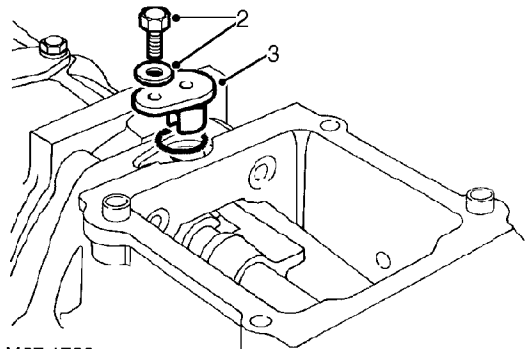
37M7122

1. Remove and discard set screw securing yoke.
2. Move selector shaft forwards, remove yoke.

Extension housing - Types A and B gearbox - Remove

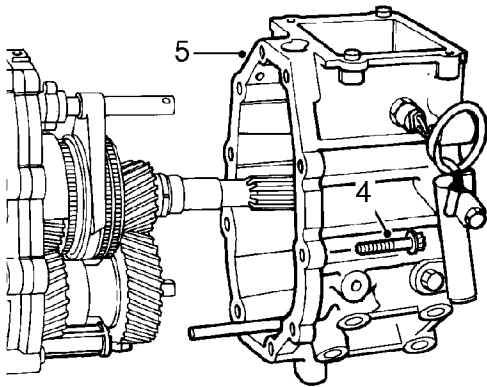


1. Using **LRT-37-009**, **LRT-37-010** and **LRT-37-001/2**, remove output shaft oil seal collar.



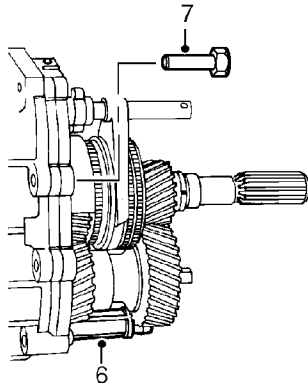
M37 1782

2. Remove bolt and washer securing interlock spool retainer.
3. Remove interlock spool retainer, remove and discard 'O' ring.



M37 1445

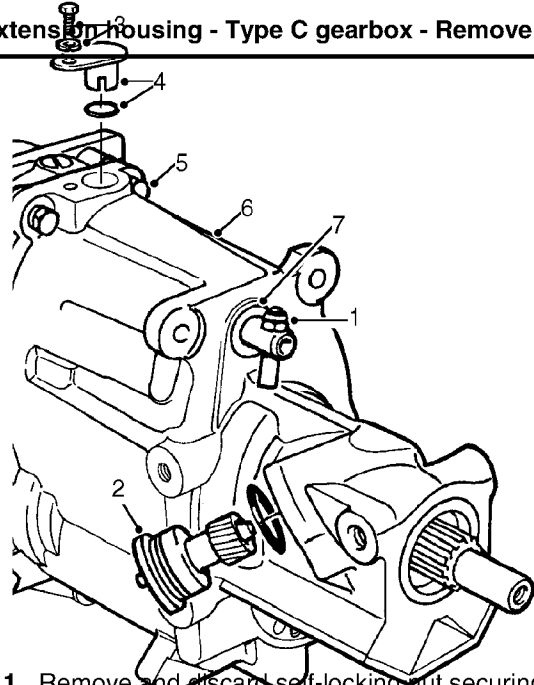
4. Noting fitted of 2 longest bolts, remove 10 bolts securing the extension housing.
5. Place a suitable container underneath the gearbox to catch any oil spillage and remove the extension housing.



M37 1784

6. Remove oil filter.
7. Secure centre plate to gearcase with 2 off 8 x 35 mm slave bolts.

Extension housing - Type C gearbox - Remove



1. Remove and discard self-locking nut securing selector shaft pin to selector shaft; remove pin.
2. Carefully prise speedometer pinion housing and gear out of extension housing, remove and discard 'O' ring.
3. Remove bolt and washer securing interlock spool retainer.
4. Remove interlock spool retainer, remove and discard 'O' ring.
5. Noting fitted position of 2 longest bolts, remove 10 bolts securing extension housing to gearcase.
6. Place a suitable container underneath the gearbox to collect any oil spillage and remove the extension housing.

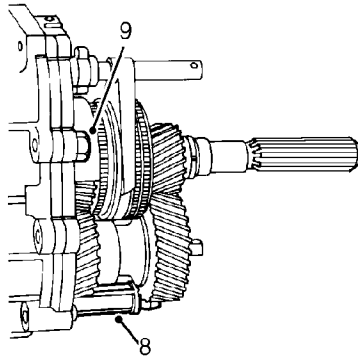


NOTE: Speedometer drive gear may be a tight fit on output shaft and this can prevent removal of extension housing.

Insert suitable blocks of wood between extension housing and centre plate and carefully lever extension housing away until drive gear is released.

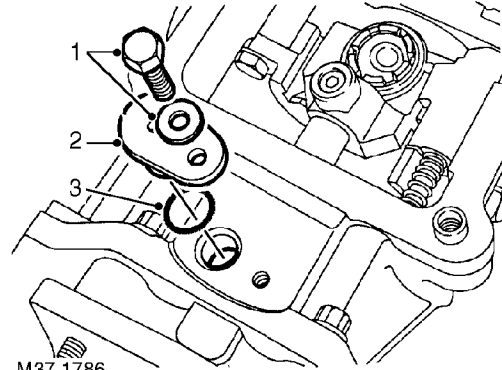
7. Remove and discard selector shaft oil seal.

Extension housing - Type D gearbox - Remove



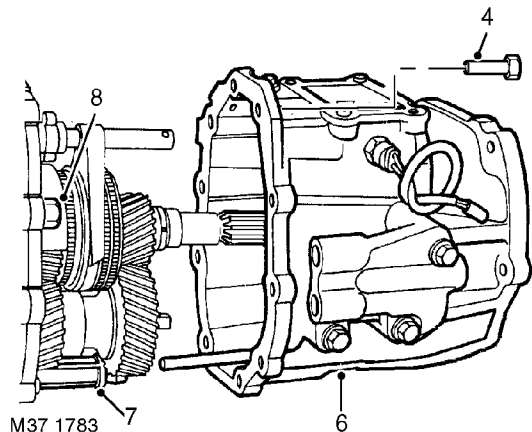
M37 1781

8. Remove oil filter.
9. Secure centre plate to gearcase with 2 off 8 x 35 mm slave bolts.



M37 1786

1. Remove bolt and washer securing interlock spool retainer.
2. Remove interlock spool retainer.
3. Remove and discard 'O' ring - if fitted.

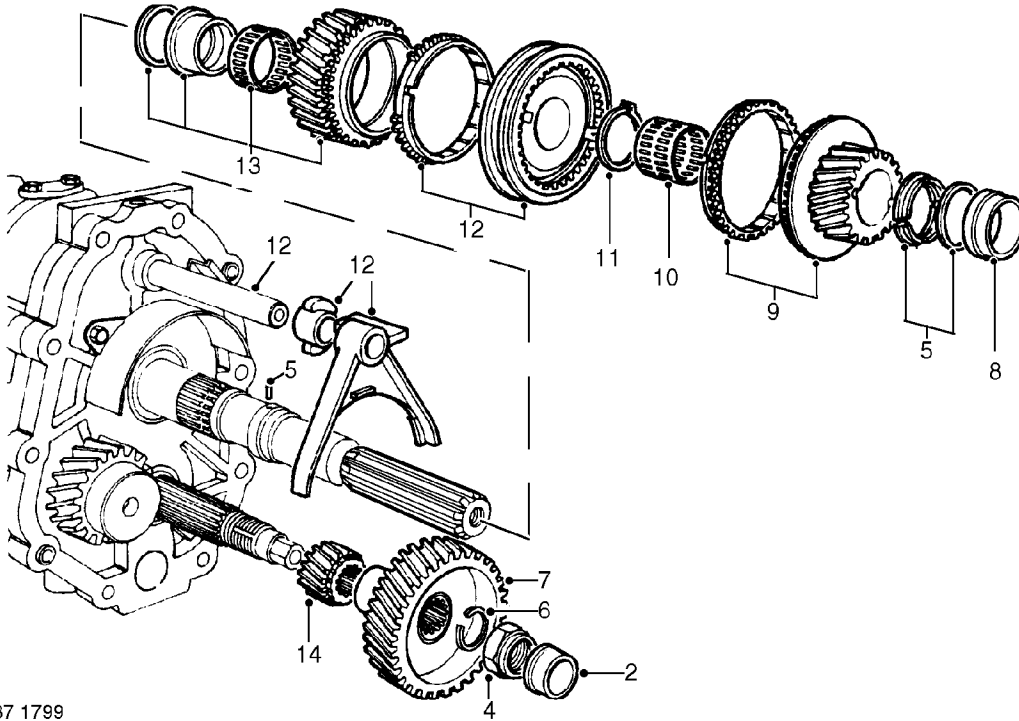


M37 1783

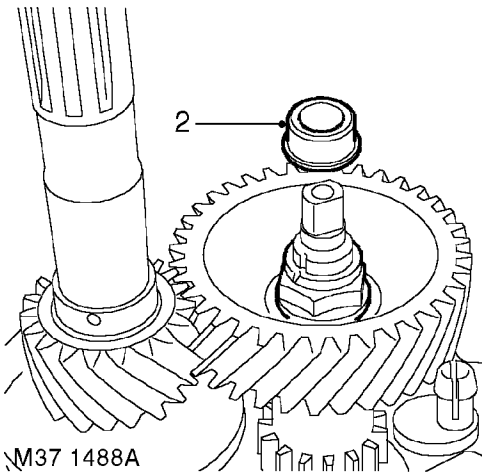
4. Noting fitted position of 2 longest bolts, remove 10 bolts securing extension housing to main gearcase.
5. Using a soft faced mallet, tap extension housing free from its location dowels.
6. Place a suitable container underneath the gearbox to collect any oil spillage and remove the extension housing.
7. Remove oil filter.
8. Secure centre plate to gearcase using 2 off 8 x 35 mm slave bolts.



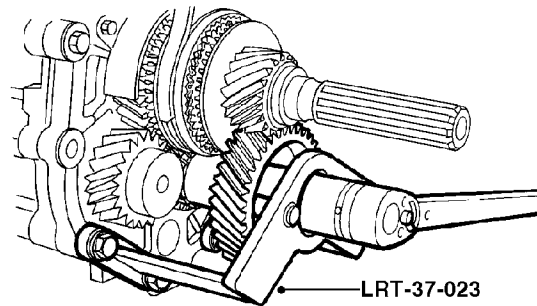
5th and Reverse gear - Remove



M37 1799




M37 1488A



M37 1800

1. Position gearcase as shown
2. Using a suitable two legged puller remove 5th gear layshaft support bearing track from the end of layshaft.

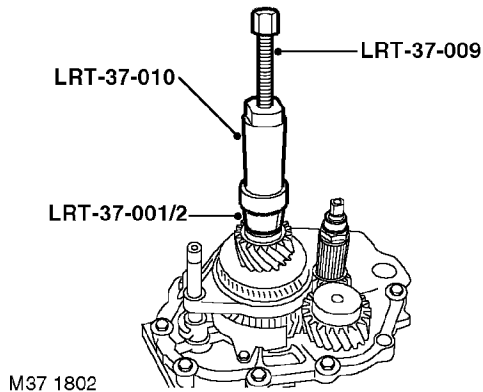
3. Remove staking from 5th laygear retaining nut, fit tool **LRT-37-023** to hold the 5th laygear.

 **NOTE:** If 5th laygear is not drilled to accept prongs of **LRT-37-023**, remove 13 mm (0.5 in) from each prong and locate prongs in counterbores machined in gear. The modified tool may still be used on gearboxes fitted with drilled gears.

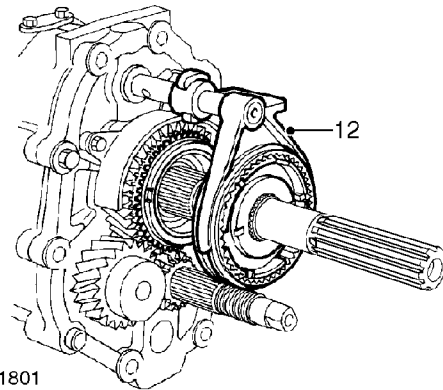
4. Remove and discard the nut.

MANUAL GEARBOX

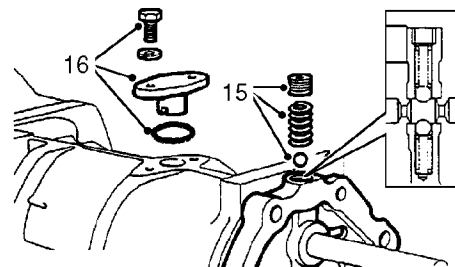
5. Remove thrust collar segments, retaining ring and segments, drift out the roll pin.
6. *Later gearboxes:* Remove split washer securing 5th laygear to shaft.
7. Remove 5th laygear.



8. Remove output shaft rear support bearing track using tools **LRT-37-009**, **LRT-37-010** and **LRT-37-001/2**.
9. Remove output shaft 5th gear with synchromesh baulk ring.
10. Remove output shaft 5th gear split needle roller bearing.
11. Remove and discard circlip securing 5th gear synchromesh hub.



12. Pull selector shaft out of gearcase until selector spool can be rotated clear of fork. Remove 5th and reverse synchromesh hub assembly complete with fork and spool.
13. Remove output shaft reverse gear complete with needle roller bearing and bush noting selective spacer between reverse gear bush and centre plate bearing.
14. Remove layshaft reverse gear.

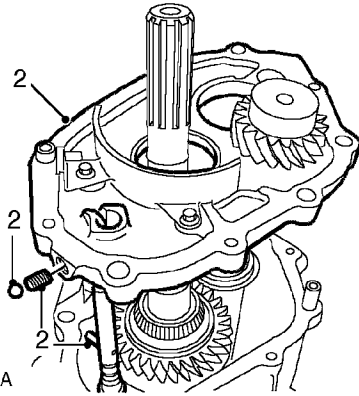


15. Remove centre plate Torx detent plug, spring and ball.
16. Remove 2 bolts securing spool retainer, remove retainer; remove and discard 'O' ring - if fitted.

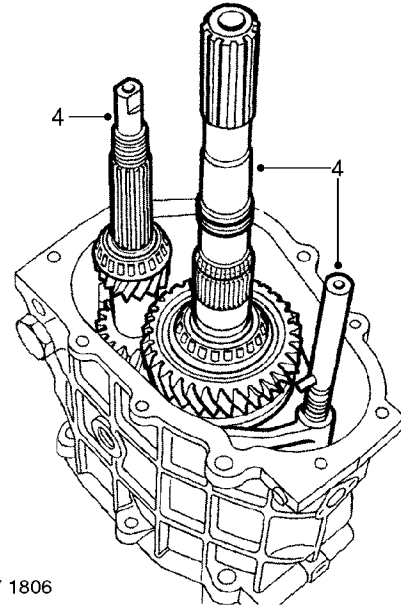


Output shaft and layshaft - Remove

1. Remove slave bolts securing centre plate.



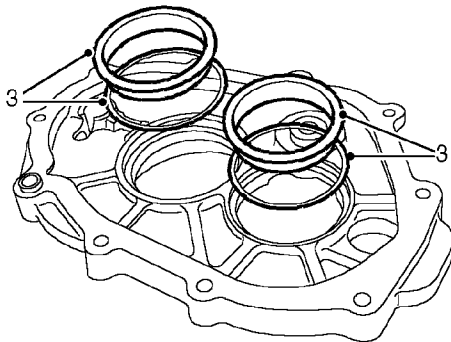
M37 1804A



M37 1806

2. Align selector shaft pin with slot in centre plate and using wooden blocks and hide mallet, drive off centre plate; collect lower detent ball and spring.

4. Remove layshaft, output shaft and selector shaft from casing as an assembly.
5. Remove input shaft, and 4th gear baulk ring. (If not already removed with output shaft).

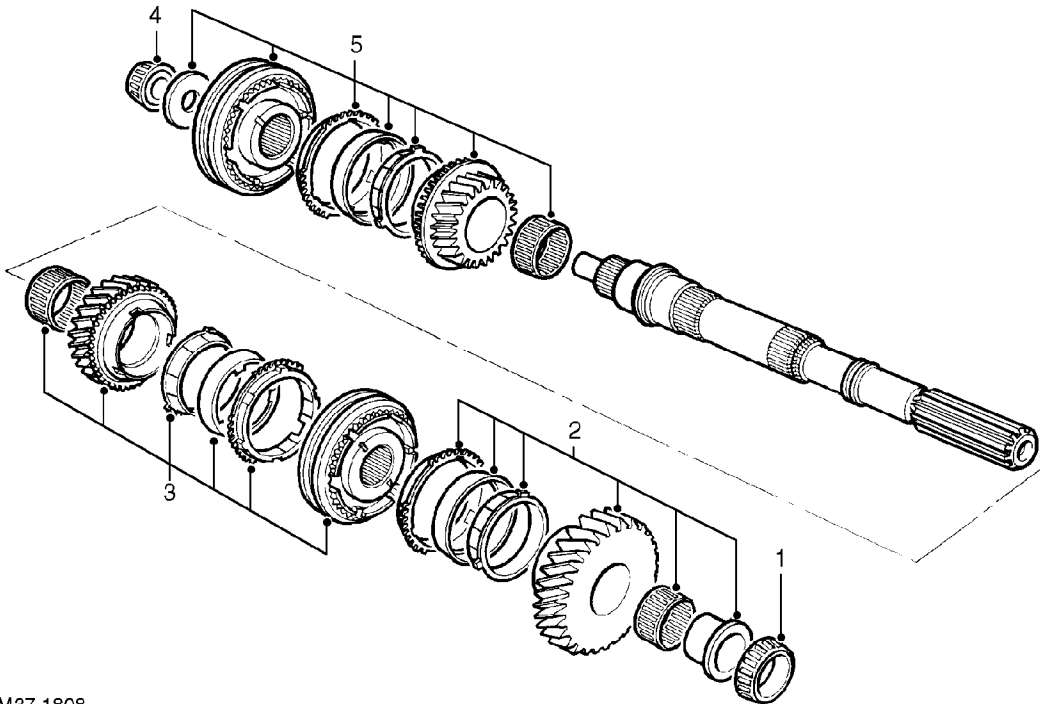


M37 1805

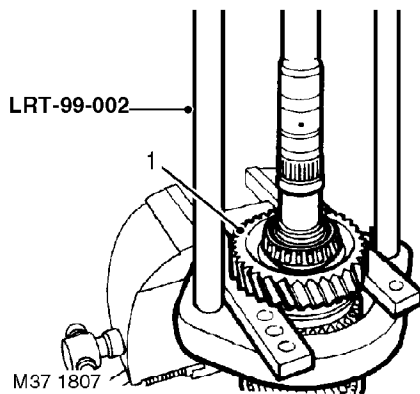
3. Remove bearing tracks and shims from centre plate.

MANUAL GEARBOX

Output shaft - Dismantle

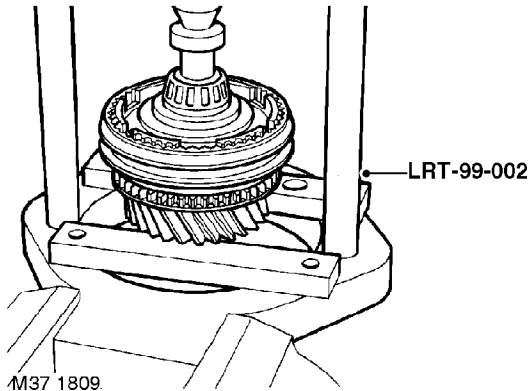


M37 1808



M37 1807

1. Using **LRT-99-002** and support bars under 1st gear, press output shaft support bearing from output shaft.
2. Remove 1st gear, bush, needle bearing and synchromesh baulk rings.
3. Remove 1st/2nd gear synchromesh selector hub, 2nd gear synchromesh baulk rings, second gear and needle bearing.



Gearcase

Degrease and clean all components. Inspect casing for damage, cracks and stripped threads.

1. Fit oil filler/level plug.



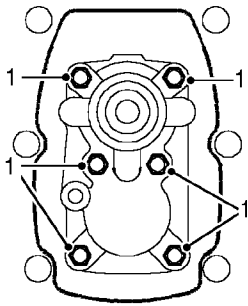
CAUTION: Attach a suitable label indicating gearbox oil is drained.

2. Fit new sealing washer to drain plug, fit plug and tighten to 50 Nm (37 lbf.ft).

4. Invert output shaft and using **LRT-99-002** and support bars under 3rd gear, press off pilot bearing.
5. Remove spacer, 3rd/4th gear synchromesh selector hub, synchromesh baulk rings, 3rd gear and needle bearing.

MANUAL GEARBOX

Front Cover - Remove



M37 1810



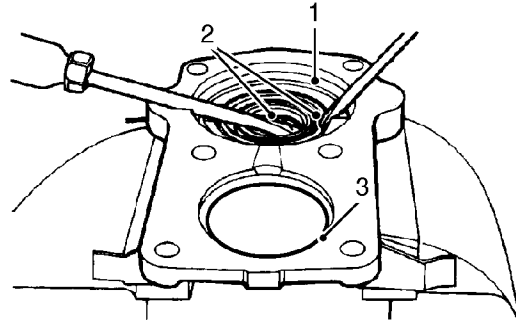
NOTE: Early type front cover illustrated.

1. Remove 6 bolts securing front cover to gearcase, remove cover.

Front Cover - Early Type - Dismantle



NOTE: Early type front cover can be identified by the lug on each side of the cover.



M37 1811

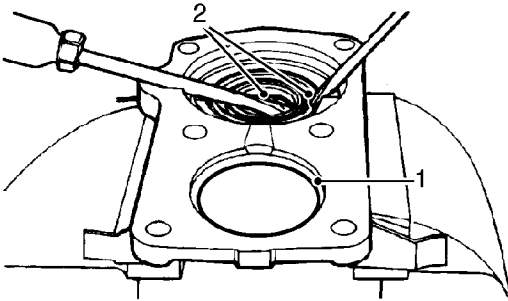
1. Remove input shaft bearing track from front cover. Check that spring clips are intact.
2. Remove and discard oil seal from front cover.
3. Remove layshaft bearing track from front cover.



Front cover - Later Type - Dismantle



NOTE: Later type front covers have one lug only on the side of the cover and layshaft bearing track is pressed into the cover.

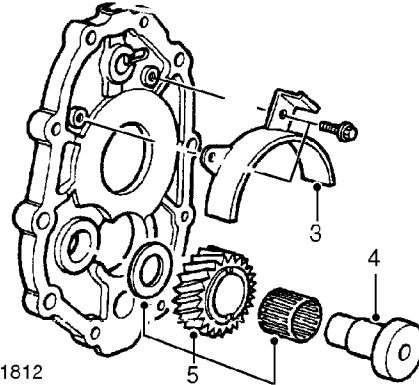


M37 1814

1. Remove layshaft bearing track from front cover.
2. Remove input shaft bearing track from front cover, remove and discard oil seal .

Centre plate - Dismantle

1. Remove bearing tracks and shims.
2. Check selector rail bore for wear.



M37 1812

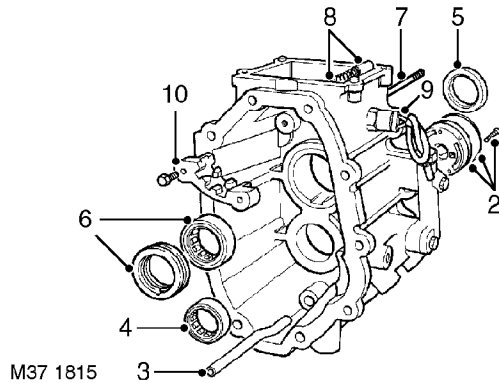
3. Remove 2 bolts securing splash shield.
4. Press out reverse idler gear shaft using suitable press and check shaft for wear.
5. Remove idler gear, needle bearing and spacer and check for wear and damage.
6. Check centre plate detent balls for wear and springs for distortion, replace as necessary.
7. Check that threads of detent plug are not damaged.


MANUAL GEARBOX

Extension housings - Overhaul

Types A and B gearbox

1. Examine for damage to threads and machined faces.




 **NOTE:** Types A and B gearbox extension housing shown.

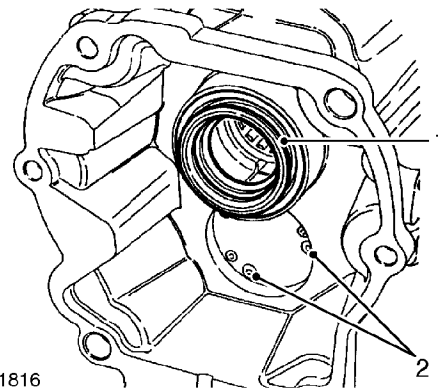
2. Remove 3 screws and remove oil pump, remove and discard 'O' ring.
3. Remove oil pick-up pipe and check for obstruction.
4. Drift out layshaft support bearing.
5. Remove and discard output shaft rear oil seal.
6. Drift out output shaft support bearing and oil pick up ring.
7. Unscrew reverse inhibitor shaft.
8. Remove reverse inhibitor cam and spring.
9. Remove reverse light switch and sealing washer, discard sealing washer.
10. Remove gate plate.
11. Check all components for wear and renew as necessary.

Type C gearbox - As for A and B Types and including the following:

12. Recover speedometer drive gear and spacer.
13. Check speedometer drive gear for wear and damage, renew if necessary.
14. Check speedometer pinion for wear and damage. Check that scrolling on shaft is clear; renew pinion and shaft if necessary.
15. Check slots in interlock spool for wear, renew interlock spool if necessary.

Type C and D gearboxes

 **CAUTION:** The output shaft rear oil seal fitted to Type C and D extension housings is different to Types A and B. When levering out seal, take care not to damage the seal location surfaces.



 **NOTE:** Type D gearbox extension housing shown.

1. Remove and discard output shaft oil seal.
2. Remove 3 screws and remove oil pump, remove and discard 'O' ring.



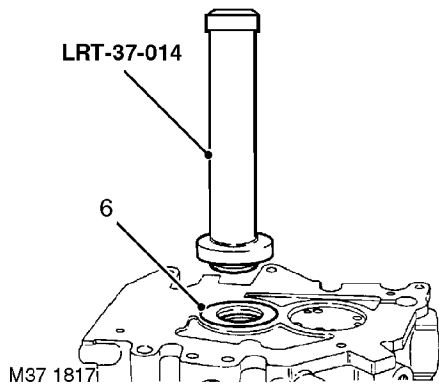
Reassemble

1. Lubricate oil pump recess with gearbox oil.
2. Lubricate new 'O' ring with gearbox oil and fit to oil pump.
3. Locate oil pump into extension housing ensuring that word 'TOP' on pump is towards top of housing.
4. Align fixing screw holes and tap pump lightly at edges until it is fully in housing, fit screws and tighten to 6 Nm (4.5 lbf.ft).



CAUTION: Do not pull pump into housing by tightening screws.

5. Fit new output shaft support bearing.

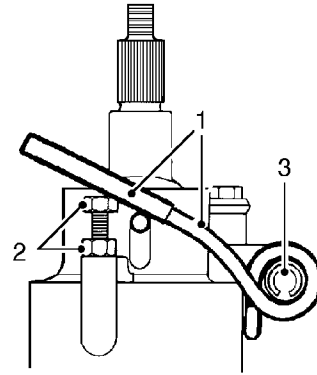


6. Lubricate a new output shaft rear oil seal with gearbox oil and fit seal using tool **LRT-37-014**.
7. Fit new layshaft support bearing.
8. Fit new oil pick-up ring ensuring that tag is aligned with centre of drain slot.
9. Examine gate plate and renew if worn or damaged.
10. Fit gate plate, fit bolts and tighten to 15 Nm (11 lbf.ft).
11. Fit reverse light switch and new sealing washer. Tighten to 24 Nm (17 lbf.ft).
12. Apply Loctite 290 to threads of reverse inhibitor shaft, position shaft and fit reverse inhibitor cam and spring.
13. Tighten reverse inhibitor shaft.
14. Refit oil pick-up pipe, bend uppermost.

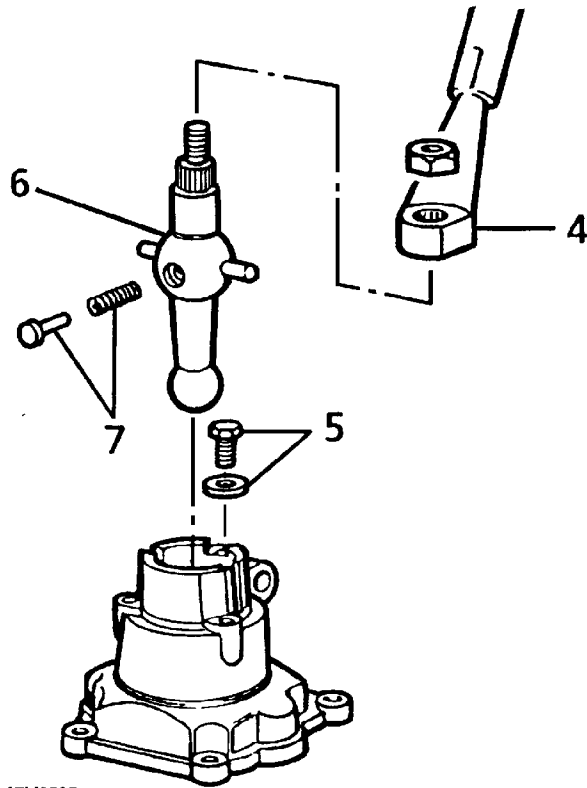
Gear change/selector housings - Overhaul

Gear change housing - Type A gearbox

Dismantle



1. Using a suitable piece of tubing, release both ends of bias spring from ball pins.
2. Slacken locknuts and remove bias spring adjusting screws.
3. Drift out roll pin, remove bias spring.



37M0535

4. Remove extension from lower gear lever.
5. Remove bolt and special washer securing lower gear lever.
6. Carefully withdraw lower gear lever from housing ensuring that spring loaded nylon pad is retained during removal.



WARNING: Personal injury may result if pad is not retained.

7. Release nylon pad, recover spring.
8. Clean all components.

Inspection

1. Check lower gear lever ball pin for wear, replace if necessary.



CAUTION: If lower gear lever is to be replaced then ball pin seating, located in remote housing should also be replaced.

2. Check nylon pad and spring for wear and damage, replace if necessary.
3. Check bias spring roll pin for damage, replace if necessary.

Reassemble

1. Smear ball pin with multi-purpose grease and fit spring and nylon pad.
2. Depress nylon pad against spring pressure, position lower gear lever in housing.



CAUTION: Ensure nylon pad is facing away from bias spring location.

3. Fit lower gear lever retaining bolt and special washer, tighten bolt to 15 Nm (11 lbf.ft).
4. Fit extension to lower gear lever.
5. Position roll pin and bias spring to housing, fit roll pin.
6. Fit bias spring adjusting screws and locknuts.
7. Using a suitable piece of tubing locate both ends of bias spring over ball pins.

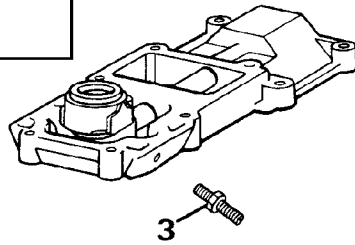
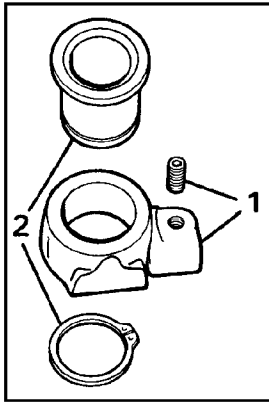


NOTE: Do not adjust bias spring at this stage.



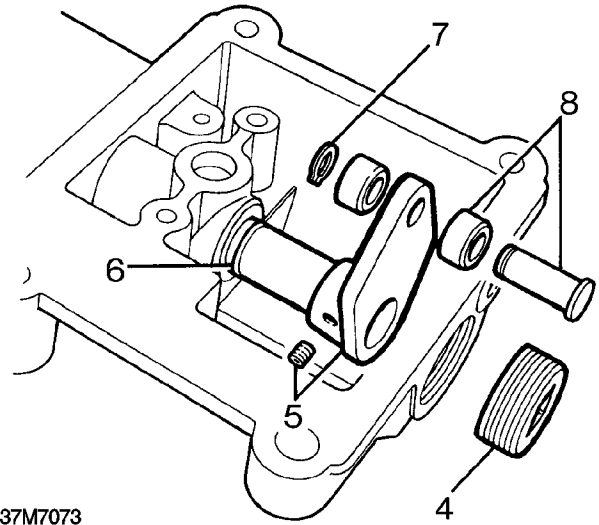
Remote housing - Type A gearbox

Dismantle



37M7072

1. Remove setscrew securing trunnion to selector shaft, remove trunnion.
2. Remove and discard circlip securing ball pin seating to trunnion, remove seating.
3. Loosen locknut, remove 5th gear stop screw.



37M7073

4. Remove blanking plug from end of remote housing.
5. Remove setscrew securing quadrant to selector shaft, remove quadrant.

NOTE: Early gearboxes: Quadrant is secured by a roll pin.

6. Remove selector shaft from remote housing, remove and discard 'O' ring.
7. Remove and discard circlip retaining rollers and pin to quadrant.
8. Remove pin, recover rollers.
9. Clean all components.

Inspection

1. Check selector shaft and bore in remote housing for wear.
2. Check quadrant rollers and pin for wear.
3. Check ball pin seating for wear.
4. Replace worn components as necessary.

MANUAL GEARBOX

Reassemble

1. Lubricate selector shaft and new 'O' ring with gearbox oil.
2. Fit 'O' ring to selector shaft.
3. Fit shaft to remote housing.
4. Position rollers to quadrant, fit pin and secure with new circlip.



CAUTION: Ensure that head of pin is on opposite side of quadrant to selector shaft boss.

5. Fit quadrant to selector shaft.
6. Apply Loctite 290 to threads of setscrew, fit setscrew and tighten to 25 Nm (18 lbf.ft).



NOTE: Early gearboxes: Fit new roll pin.

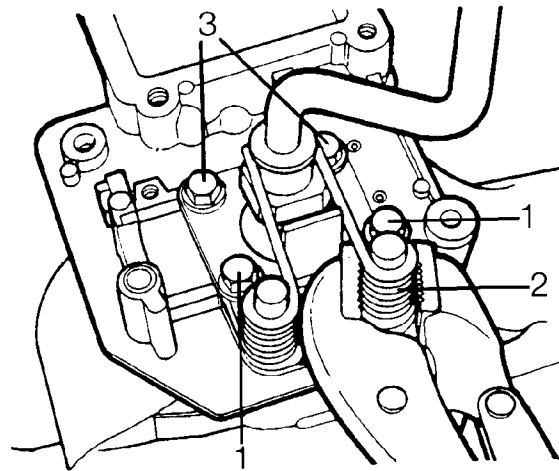
7. Apply Loctite 290 to threads of blanking plug, fit plug and tighten to 30 Nm (22 lbf.ft).
8. Smear ball pin seating with multi-purpose grease.
9. Position ball pin seating in trunnion, secure with a new circlip.
10. Position trunnion on selector shaft.
11. Apply Loctite 290 to threads of setscrew, fit setscrew and tighten to 25 Nm (18 lbf.ft).
12. Fit 5th gear stop screw, fit but do not tighten locknut.



NOTE: 5th gear stop screw adjustment is carried out during gearbox reassembly.

Gear change housing - Type B gearbox

Dismantle



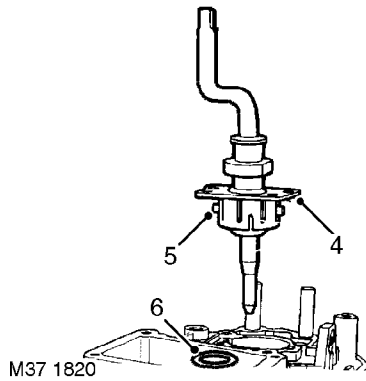
37M7074

1. Remove bolts retaining bias springs.



WARNING: To avoid personal injury, restrain each spring in turn with a pair of grips while the bolts are being removed.

2. Remove the two bias springs.
3. Remove 2 bolts securing bias spring adjustment plate.



4. Lift lower lever assembly out of gear change housing.
5. Remove and discard Railko bush.
6. Remove and discard oil seal from housing.
7. Clean all components.

Inspection

1. Check ball cross pin slots in gear change housing for wear.
2. Check ball and pins for wear.
3. Check bias springs for distortion.
4. Replace worn components as necessary.

Reassemble

1. Apply multi-purpose grease to ball and cross pins.
2. Apply multi-purpose grease to new Railko bush and fit to gear change housing.



CAUTION: Ensure that the slots in each bush are aligned with slots in housing.

3. Lubricate a new oil seal with gearbox oil.
4. Fit oil seal, lip side towards housing, using a suitable mandrel.
5. Position gear lever to gear change housing ensuring ball cross pins are located in slots in housing and Railko bush.
6. Position bias spring adjustment plate to gear change housing,
7. Apply Loctite 290 to threads of 2 short bias spring adjustment plate bolts.
8. Fit bolts to secure front of bias adjustment plate and tighten to 25 Nm (18 lbf.ft).
9. Position bias spring to pillar ensuring longest end of spring is against gear lever.
10. Apply Loctite 290 to threads of 2 long bias adjustment plate bolts.
11. Restrain bias spring using a suitable pair of grips, ensure short end of bias spring is positioned on outside edge of bolt hole.



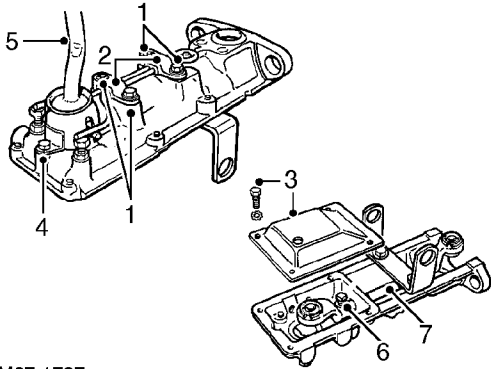
WARNING: Personal injury may result if bias spring is not retained.

12. Fit bolt and washer ensuring end of bias spring is restrained beneath washer; tighten bolt to 25 Nm (18 lbf.ft).
13. Repeat above procedures for remaining bias spring.

MANUAL GEARBOX

Remote gear change - Type C gearbox

Dismantle



M37 1787

1. Remove 2 bolts and 2 countersunk screws securing bias spring bridge plates.
2. Remove bridge plates, bridge plate liners and bias spring.
3. Remove 4 bolts and washers securing bottom cover plate, remove plate.
4. Remove bolt securing gear lever cap, remove cap.
5. Remove gear lever, recover anti-rattle spring and plunger.
6. Remove pinch bolt securing selector rod yoke, remove yoke.
7. Withdraw selector rod from remote housing.
8. Clean all components.

Inspection

1. Check selector rod bushes in remote housing for wear.



NOTE: Bushes may be pressed in and out of remote housing using a hand press and suitable mandrel.

2. Check selector rod for wear, replace if necessary.
3. Check anti-rattle spring for distortion and plunger for wear; replace if necessary.
4. Check gear lever ball pin, cross pins, bushes and selector rod yoke balls for wear and replace if necessary. If yoke balls are worn, remove and discard circlip, press ball and seating out of yoke.
5. Lubricate replacement ball and seating with multi-purpose grease and press into yoke; secure using new circlip.
6. Check bias spring for distortion, replace if necessary.
7. Check condition of mounting rubbers, replace as a set if necessary.

Reassemble

1. Lubricate selector rod and bushes with multi-purpose grease, insert rod in remote housing.
2. Lubricate gear lever ball pin and selector rod yoke balls with multi-purpose grease.
3. Fit yoke to selector rod, fit pinch bolt and tighten to 25 Nm (18 lbf.ft).
4. Assemble anti-rattle spring and plunger to gear lever.
5. Fit gear lever ensuring ball pin is located in yoke and anti-rattle spring and plunger are not displaced.
6. Fit gear lever cap, fit bolt and tighten to 15 Nm (11 lbf.ft).



NOTE: Do not fit bottom cover plate at this stage.

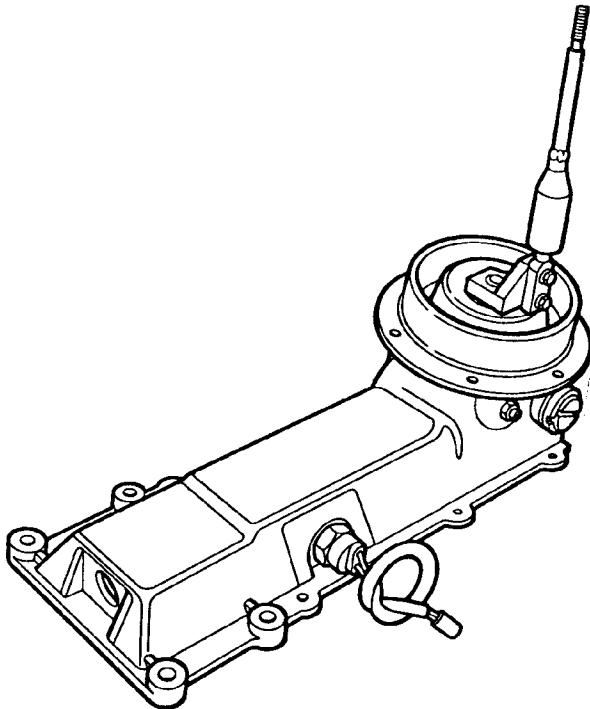
7. Loosen bias spring adjustment bolt locknuts.
8. Fit bias spring, bridge plate liners and bridge plates.
9. Fit bolts and countersunk screws and tighten to 25 Nm (18 lbf.ft).



NOTE: Final adjustment of bias spring is carried out after remote gear change is fitted to gearbox.



Remote gear change - Type D gearbox

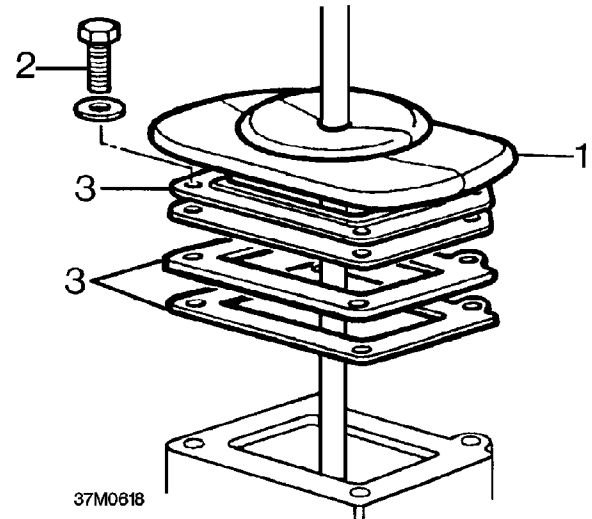


37M7126

△ NOTE: With the exception of the reverse light switch, the remote gear change fitted to Type D gearboxes is not a repairable item. It must be replaced if components are found to be worn.

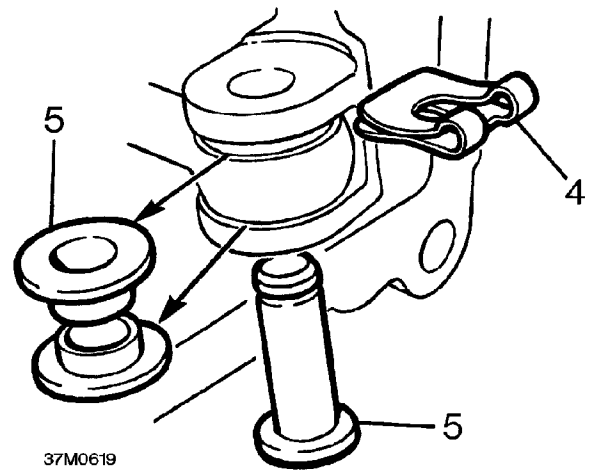
Transfer box selector housing - Type A gearbox - Overhaul

Dismantle



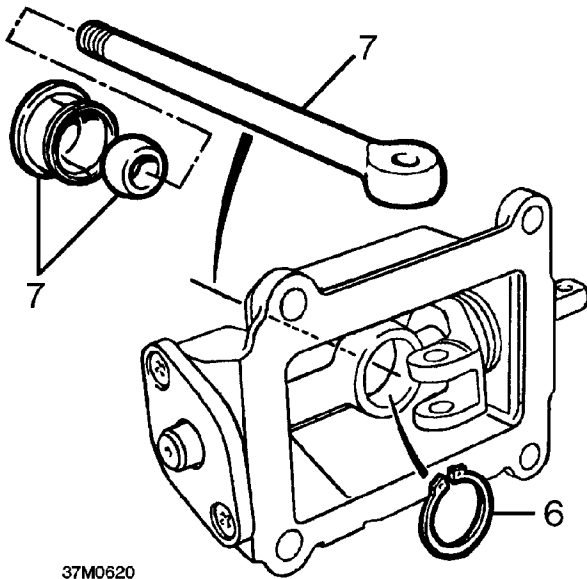
37M0618

1. Slide gaiter off gear lever.
2. Remove 4 bolts securing gaiter support plate and gate plate.
3. Remove gaiter support plate and gate plate, discard gaskets.

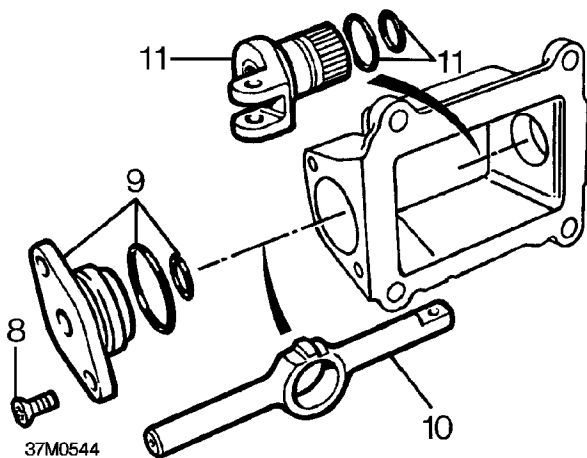


37M0619

4. Remove and discard spring clip retaining selector fork clevis pin.
5. Remove clevis pin from selector fork, remove and discard 2 bushes.



6. Remove and discard circlip retaining nylon ball seating.
7. Remove gear lever, recover nylon seating and ball.



8. Remove 2 countersunk head screws securing end cover to housing.
9. Remove end cover, remove and discard 2 'O' rings.
10. Withdraw cross shaft.
11. Remove selector fork, remove and discard 2 'O' rings.
12. Clean all components.

Inspection

1. Check gaiter for splits and damage.
2. Check nylon seating and ball for wear, replace if necessary.



CAUTION: Seating and ball should be renewed as an assembly.

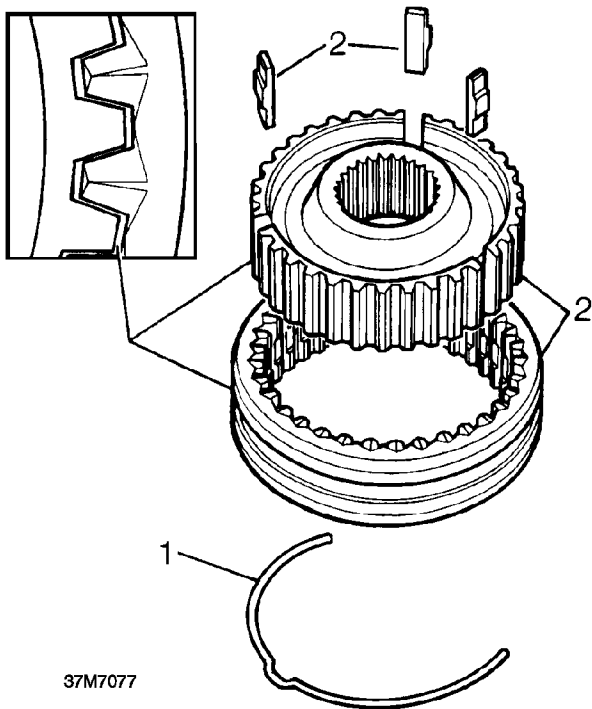
3. Check selector fork and clevis pin for wear.
4. Check cross shaft and end cover for wear.
5. Replace components as necessary.

Reassemble

1. Lubricate new 'O' rings with gearbox oil and fit to selector fork, position fork in housing.
2. Lubricate cross shaft with multi-purpose grease and locate longest end of shaft in selector fork.
3. Lubricate new 'O' rings with gearbox oil and fit to end cover.
4. Position end cover on cross shaft, fit and tighten countersunk screws.
5. Assemble ball and nylon seating to gear lever ensuring that groove in seating is towards cross shaft.
6. Lubricate ball and nylon seating with multi-purpose grease and locate in cross shaft; retain with a new circlip.
7. Position new bushes to gear lever, locate in selector fork and fit clevis pin.
8. Fit new spring clip to retain clevis pin.
9. Position gate plate and gaiter support plate to housing, use new gaskets.
10. Fit retaining bolts and tighten to 15 Nm (11 lbf.ft).
11. Fit gaiter.

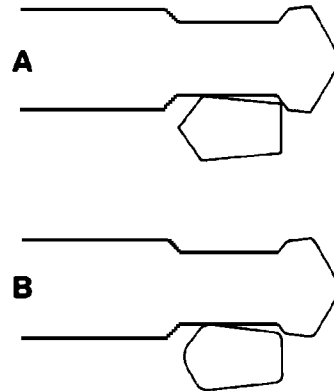


Synchromesh assemblies - Overhaul



37M7077

1. Remove spring clips from both sides of assembly.
2. Remove slippers and separate the hub from the sleeve.
3. Examine all parts for damage and wear, check spring clips for tension.
4. Check no excessive radial movement exists between inner members and output shaft splines.
5. Examine inner and outer splines for wear.



37M7078

6. Examine the dog teeth for wear and damage.



NOTE: Example 'A' shows a tooth in good condition. Example 'B' shows the rounded corners of a worn tooth.

7. Replace unit if excessively worn.

Reassemble

8. Refit inner hub to sleeve.



NOTE: Hubs and sleeves have a master spline combination and can only be assembled one way. The sleeves are further identified with a series of half moon notches which clearly identify which side of the assembly faces which gear. Ensure the slot in the hub aligns with the centre notch on the sleeve.

Assy	Hub	Sleeve	Against Gear
1st/2nd	- 2 gear side	1 Notch -	1st 2nd
3rd/4th	-	3 Notches -	3rd 4th
5th/Rev	-	5 Notches	5th

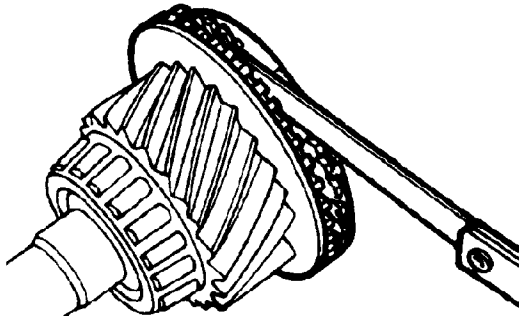
9. Fit slippers and secure with a spring each side of the synchromesh assembly ensuring the step on each spring locates on a different slipper.



NOTE: 5th and reverse synchromesh hubs have different springs which are coloured yellow.

MANUAL GEARBOX

Checking baulk ring clearances



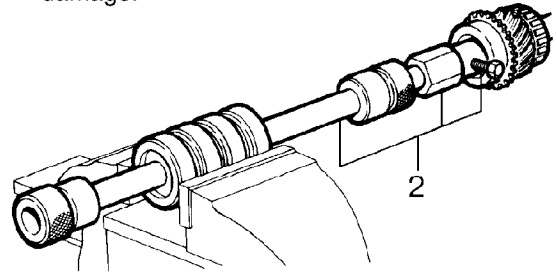
M37 1821

Check clearance of all baulk rings and gears by pressing the baulk rings against the gear and measuring the gap.

Minimum clearance - 0.5 mm (0.020 in).

Input shaft - Overhaul

1. Examine the gear and dog teeth for wear and damage.

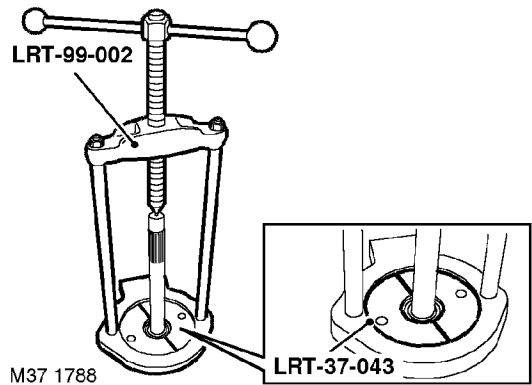


37M7080

2. Using **LRT-99-004** and **LRT-37-004** remove pilot bearing track.

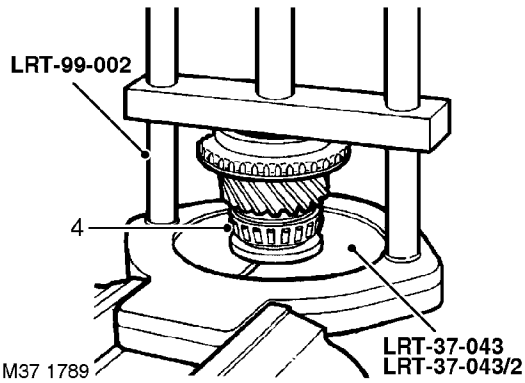


CAUTION: Ensure that the bearing is supported by the lip inside LRT-37-004.

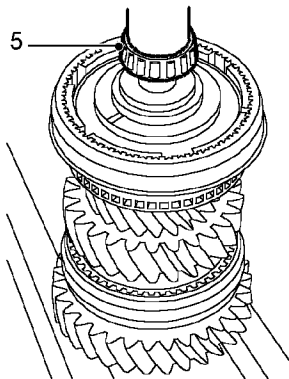


M37 1788

3. Using **LRT-37-043** and **LRT-99-002** remove taper roller bearing.

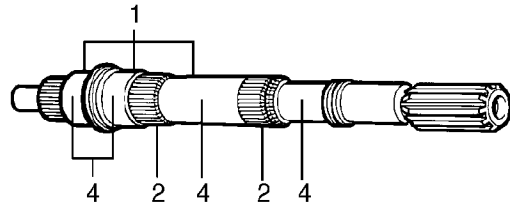


- Using **LRT-99-002**, **LRT-37-043** and **LRT-37-043/2**, fit a new taper roller bearing.



- Support the shaft under **LRT-99-002** and using a suitable mandrel, fit a new taper roller bearing.

Output shaft - Inspection



M37 1791

- Examine bearing journals for wear and scores.
- Examine splines for wear and damage.
- Use an air line to check that the main oil feed from pump and feed to spigot bearing are clear.
- Check oil feed holes to roller bearing are clear.

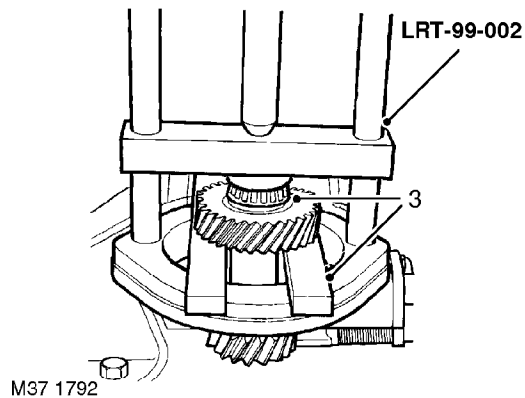
MANUAL GEARBOX

Layshaft - Overhaul

1. Using **LRT-99-002**, **LRT-37-022** and **LRT-37-044**, remove layshaft bearings.
2. Examine layshaft for wear and damage.



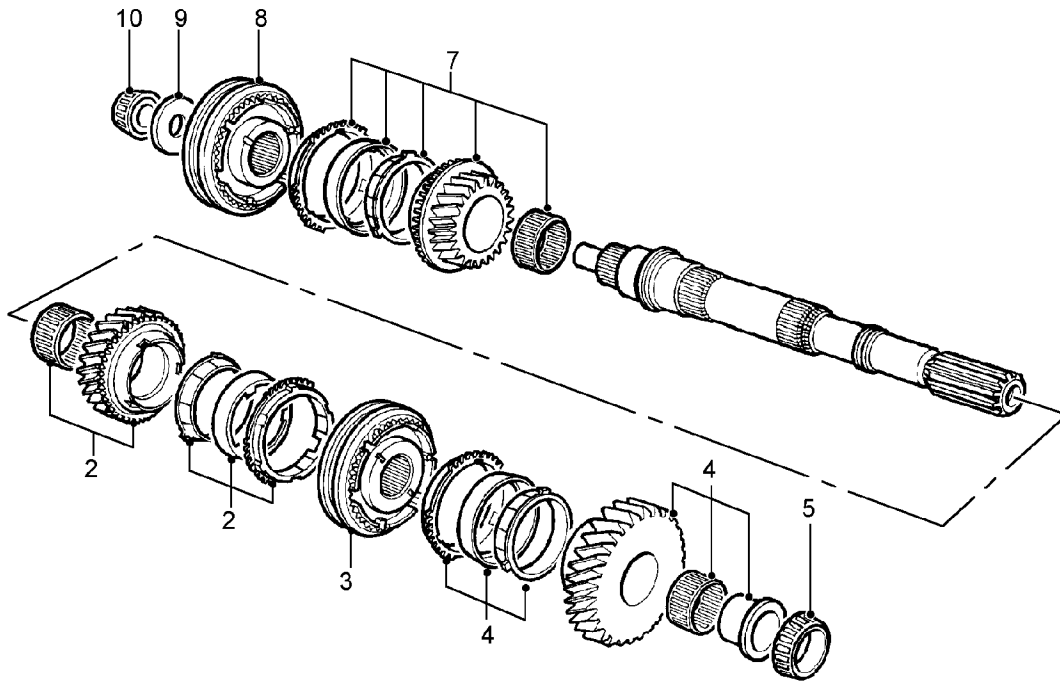
NOTE: Layshaft and layshaft 5th gear fitted to later gearboxes are machined to enable fitment of a split washer to prevent gear movement on shaft. The modified layshaft, gear and split washer may be fitted to early gearboxes as an assembly.



3. Using press **LRT-99-002** and a suitable mandrel, positioned on bearing inner race, fit new taper roller bearings.



Output shaft - Reassemble



M37 1793

1. Clamp output shaft in protected vice jaws, output end upwards.
2. Fit 2nd gear needle roller bearing, 2nd gear and synchromesh baulk rings on to output shaft.



NOTE: Rotate each baulk ring to ensure they locate onto each other.

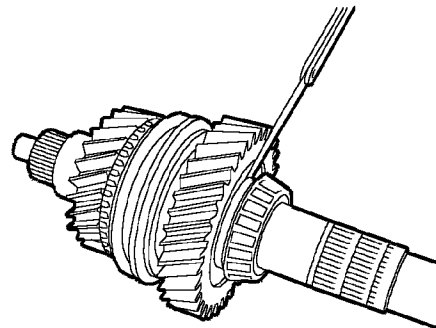
3. Assemble the 1st and 2nd synchromesh selector hub on to output shaft splines, noting the 2nd gear side marking. Ensure that baulk ring has located correctly inside hub.



NOTE: Rotate the ring slightly as the hub is lowered.

4. Fit 1st gear synchromesh baulk rings, needle roller bearing, 1st gear and bush on to output shaft ensuring baulk rings locate correctly inside selector hub.
5. Using **LRT-99-002**, and a suitable mandrel positioned on bearing inner race, press on output shaft taper roller bearing taking care not to disturb the position of the synchromesh baulk rings and gears.

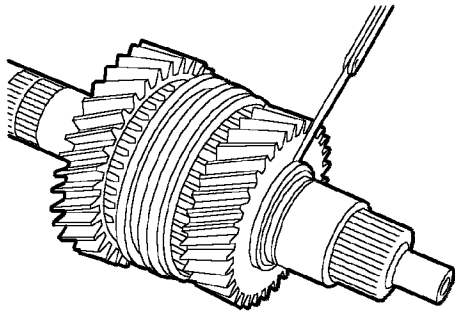
6. Check 1st and 2nd gear end-float.



M37 1525

Checking 1st gear end-float

New: 0.05 - 0.20 mm (0.002 - 0.008 in)
Service limit: 0.327 mm (0.012 in)



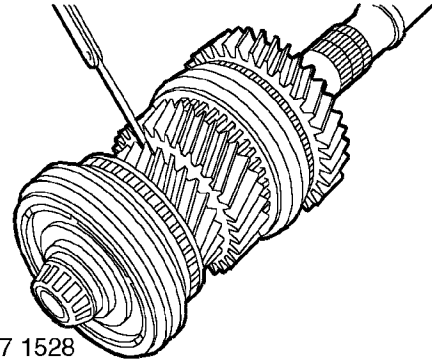
M37 1526

Checking 2nd gear end-float

New: 0.04 - 0.21 mm (0.0016 - 0.008 in)
Service limit: 0.337 mm (0.013 in)

7. Invert output shaft in vice and fit 3rd gear needle roller bearing, third gear and synchromesh baulk rings.
8. Assemble 3rd/4th gear synchromesh selector hub, noting 3rd speed side markings, on to output shaft splines taking care to locate the baulk rings into recesses in the selector hub.
9. Fit spacer.

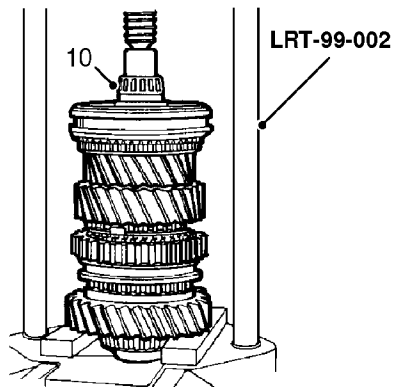
Check end float of 3rd gear.



M37 1528

Checking 3rd gear end-float

New: 0.11 - 0.21 mm (0.004 - 0.008 in)
Service limit: 0.337 mm (0.013 in)



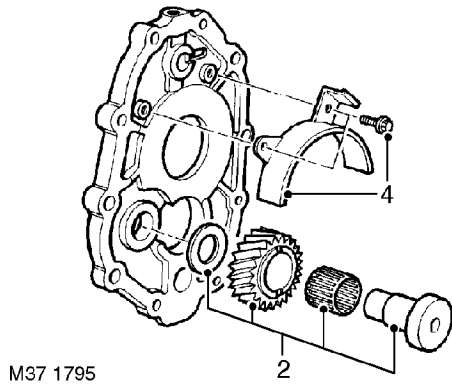
M37 1794

10. Using **LRT-99-002** and a suitable mandrel positioned on bearing inner race, press on new pilot bearing.



Reverse idler gear and centre plate - Reassemble

1. Examine components for wear and damage.



2. Assemble reverse idler gear needle roller bearing, idler gear, spacer and shaft and using suitable tool, press into centre plate.
3. Using feeler gauges, check clearance between reverse idler gear and shaft flange, fit a thicker or thinner spacer if necessary in order to achieve correct clearance.

New clearance:

0.04 - 0.38 mm (0.0016in - 0.015 in)

Service limit:

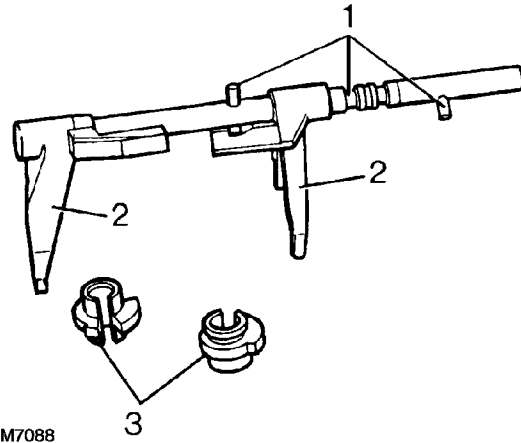
0.38 mm (0.015 in)

4. Fit splash shield, fit bolts and tighten to 8 Nm (6 lbf.ft).



CAUTION: Do not fit detent balls or springs at this stage.

Selectors - Inspection



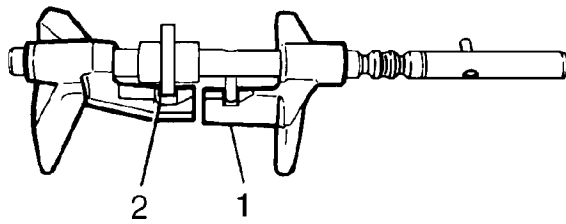
1. Examine selector rail and pins for wear and damage.
2. Examine selector forks for wear and damage.



NOTE: The selector rail and fork is only supplied as a complete assembly.

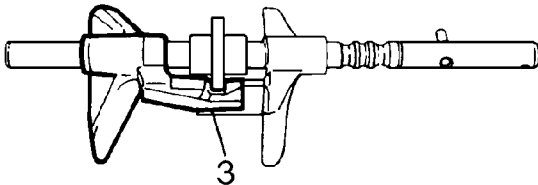
3. Examine interlock spools for wear and damage.

Selectors - Reassemble



37M7091

1. Rest 1st/2nd fork and shaft assembly on bench and locate pin in jaw of fork.
2. Fit interlock spool and 3rd/4th fork and engage spool in jaw of fork.



37M7092

3. Slide spool and fork towards 1st/2nd selector until slot in spool locates over pin keeping the spool engaged in 3rd/4th fork jaw.

GEARBOX REASSEMBLE

Output shaft and layshaft end float



NOTE: The end float setting for both the output shaft and the layshaft has to be determined before the gearbox can be reassembled. This is achieved by clamping the output shaft and layshaft separately between the centre plate and main casing and measuring the movement of each shaft with a dial test indicator.

Shimming

1. Fit new bearing tracks to front cover.



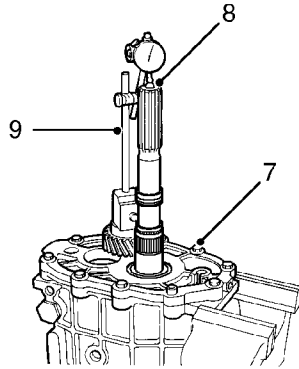
CAUTION: Ensure input shaft bearing track is correct for type of front cover fitted. Early covers having a lug each side of cover, bearing track is retained with a spring clip. Later covers having a lug on one side of cover, press bearing track into cover using a suitable mandrel.

2. Fit front cover to gearcase without oil seal.
3. Clamp gearcase in vice with front cover downwards.
4. Fit input shaft.



CAUTION: Do not fit 4th gear baulk ring.

5. Fit output shaft assembly to input shaft.
6. Fit output shaft bearing shim and track to centre plate.



M37 1796

7. Fit centre plate and bolt down using 8 off 8 x 35 mm slave bolts.



CAUTION: Do not fit detent ball or spring at this stage.

8. Fit large ball bearing to rear of output shaft.
9. Mount dial test indicator.
10. Rotate output shaft to settle bearings.
11. Lift output shaft and note DTI reading.

The end float setting for the output shaft and layshaft is:-

Early gearboxes without suffix K added to serial number:

New: 0.01 - 0.06 mm (0.0004 - 0.0024 in)

Service limit: 0.06 mm (0.0024 in)

Later gearboxes with suffix K added to serial number:

New: 0.00 - 0.05 mm (0.00 - 0.002 in)

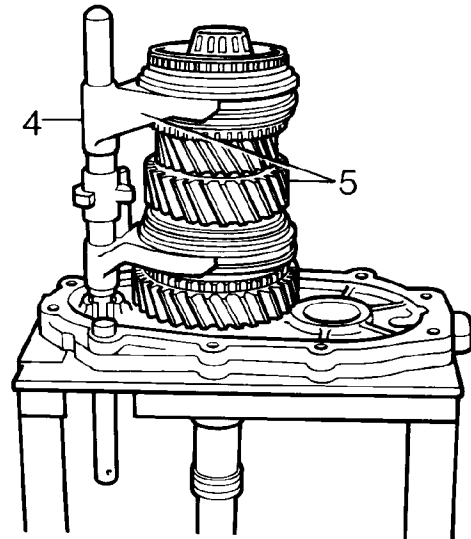
Service limit: 0.05 mm (0.002 in)

Shims to make up the required clearances are placed under the respective bearing tracks in the centre plate.

12. Dismantle and substitute shims if reading incorrect.
13. Remove output shaft assembly and repeat procedure for layshaft.
14. Remove centre plate, layshaft and output shaft.
15. Remove front cover.
16. Remove input shaft bearing track from front cover, retain track with cover.

Assembling output shaft and layshaft to centre plate

1. Secure centre plate to suitable workstand.
2. Fit selected shims and bearing tracks.
3. Fit lower detent ball and spring, use a dummy bar to temporarily hold the ball in place.



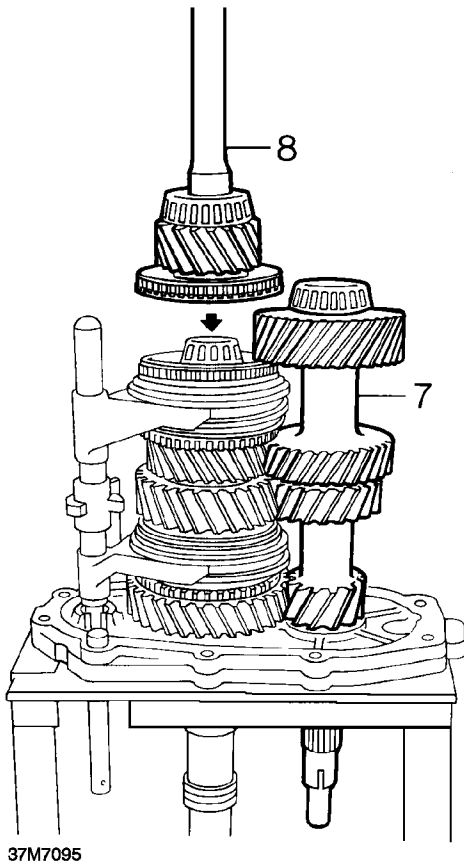
37M7094

4. Check both synchromesh units are in neutral and fit selector shaft assembly to output shaft.
5. Fit output shaft and selectors as complete unit to centre plate aligning pin with slot in plate.

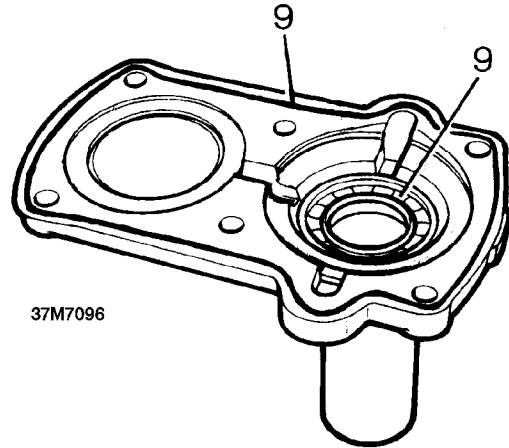


CAUTION: Take care that as dummy shaft is removed, detent spring and ball are not displaced.

6. Fit 4th gear synchromesh baulk ring.



7. Fit layshaft whilst lifting output shaft to clear layshaft rear bearing.
8. Lubricate pilot bearing with gearbox oil and fit input shaft.



NOTE: Early type front cover illustrated.



9. Fit new oil seal to front cover. Ensure seal is fitted down to shoulder. Apply sealant, Part No. STC 3254 to front cover as shown.

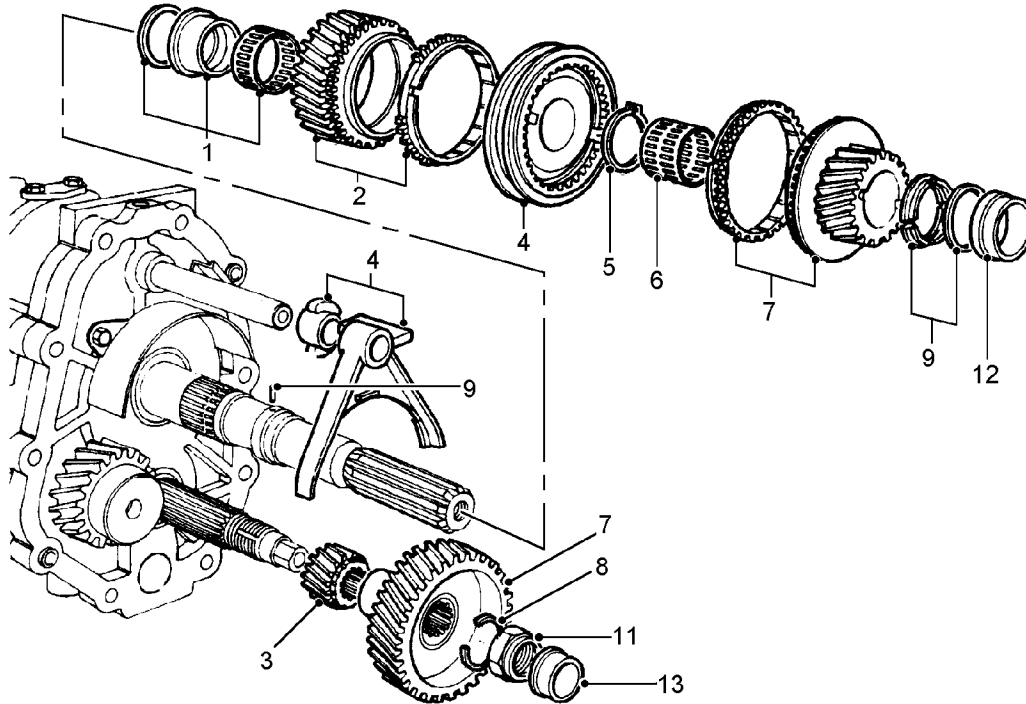


CAUTION: Oil seal must be fitted dry.

10. Fit input and layshaft bearing tracks in front cover.
11. Apply Loctite 290 to threads of front cover bolts, fit bolts and tighten by diagonal selection to 25 Nm (18 lbf.ft).
12. Apply sealant, Part No. STC 3254 to centre plate and fit main casing to centre plate.
13. Bolt casing and centre plate together using 2 off 8 x 35 slave bolts.
14. Lubricate a new 'O' ring with gearbox oil and fit to interlock spool retainer.
15. Fit interlock spool retainer, fit bolt and tighten to 8 Nm (6 lbf.ft).
16. Remove casing from stand and clamp in vice.



Reverse and 5th gear - Reassemble



M37 1797

1. Fit output shaft reverse gear selective washer, bush and needle bearing.
2. Fit output shaft reverse gear and synchromesh baulk ring.
3. Fit layshaft reverse gear.
4. Assemble selector spool, selector fork and reverse/5th gear synchromesh hub. Fit as one assembly to output shaft splines and selector shaft.

6. Fit 5th gear split needle bearing.
7. Fit 5th gear and 5th gear synchromesh baulk ring to output shaft, fit layshaft 5th gear.
8. *Later gearboxes:* Fit split washer to retain layshaft 5th gear.

NOTE: Bevelled side of washer must face towards gear.

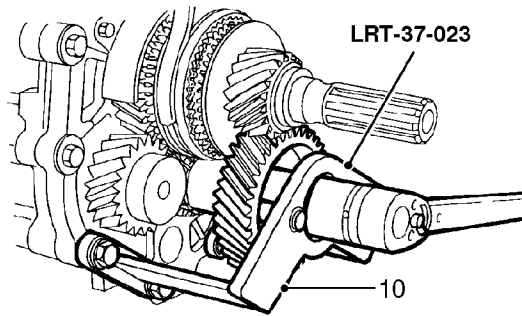
CAUTION: Ensure synchromesh baulk ring locates inside hub.

9. Fit new output shaft thrust collar roll pin. Locate 5th gear thrust segments and retaining ring.

5. Fit new circlip.

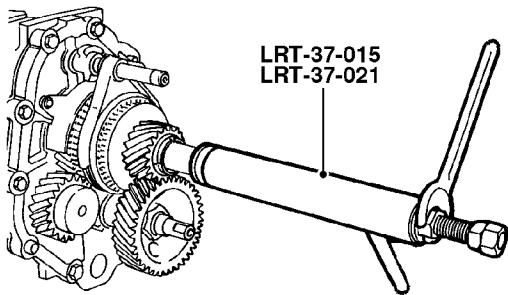
NOTE: The fit of the circlip is controlled by the selective washer behind the reverse gear. Adjust to 0.005 - 0.055 mm (0.0002 - 0.002 in).

MANUAL GEARBOX



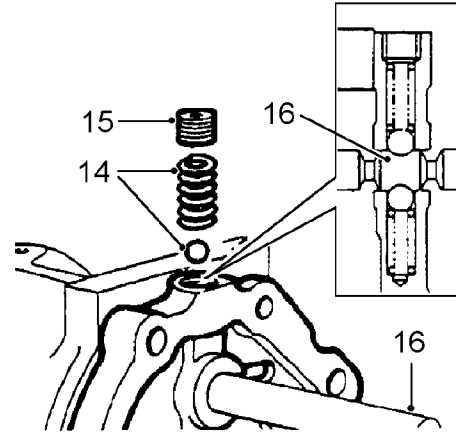
M37 1798

10. Using **LRT-37-023** to hold layshaft 5th gear, fit a new layshaft stake nut and tighten to 220 Nm (162 lbf.ft).
11. Stake layshaft 5th gear nut.



M37 1822

12. Using **LRT-37-015** and **LRT-37-021** press output shaft rear support bearing track to collar on output shaft.
13. Apply small amount of heat and fit layshaft rear support bearing.



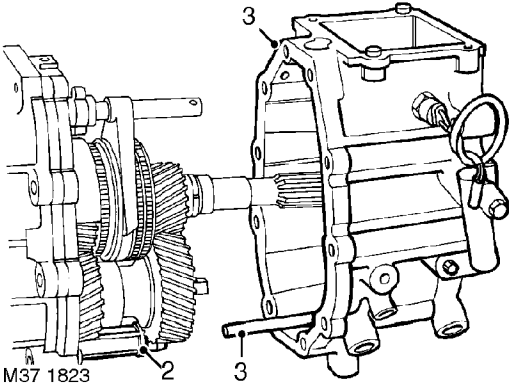
37M1206A

14. Fit centre plate detent ball and spring.
15. Apply Loctite 290 to threads of detent plug, fit plug and tighten to 25 Nm (18 lbf.ft).
16. Move selector shaft and check that detent balls can be felt to engage in detent.



Extension housing - Type A and B Gearbox - Refit

1. Remove slave bolts from centre plate.

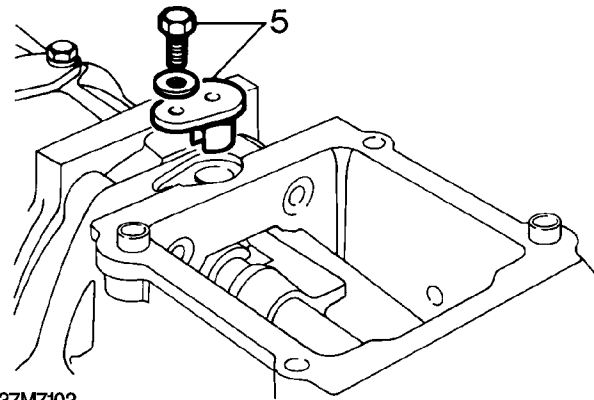


2. Fit oil filter.
3. Apply sealant, Part No. STC 3254 to mating surfaces and fit extension housing ensuring oil pipe locates in filter and drive locates in oil pump.



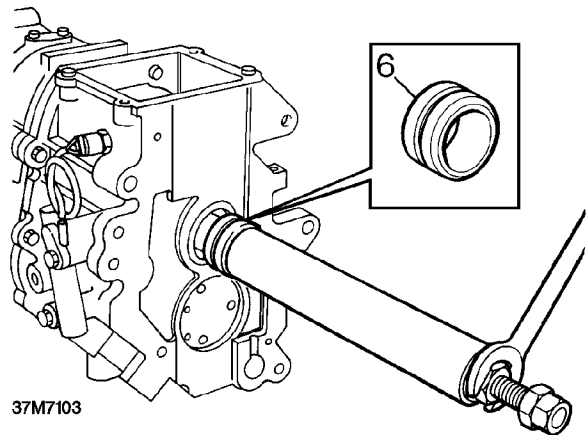
CAUTION: Do not use force, if necessary, remove extension housing and re-align oil pump drive.

4. Apply Loctite 290 to threads of extension housing securing bolts, fit bolts and tighten by diagonal selection to 25 Nm (18 lbf.ft).



37M7102

5. Lubricate a new 'O' ring with gearbox oil and fit to extension housing interlock spool retainer. Fit retainer, fit bolt and washer and tighten bolt to 8 Nm (6 lbf.ft).



37M7103

6. Using **LRT-37-015** and **LRT-37-021** press on output shaft oil seal collar, narrow portion of collar leading.

MANUAL GEARBOX

Extension housing - Type C gearbox - Refit

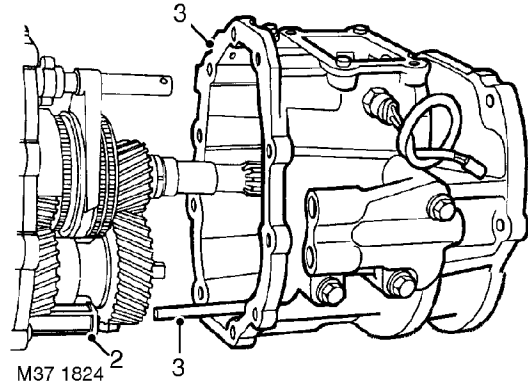
1. Lubricate a new selector shaft oil seal with gearbox oil and fit seal.
2. Remove slave bolts from centre plate.
3. Fit oil filter.
4. Fit spacer
5. Position speedometer drive gear on output shaft splines.
6. Using a round nosed punch, carefully tap speedometer drive gear into position.
7. Apply sealant, Part No. STC 3254 to mating surfaces.
8. Fit extension housing ensuring oil pipe locates in filter and drive locates in oil pump.



CAUTION: Do not use force, if necessary, remove extension housing and re-align oil pump drive.

9. Apply Loctite 290 to threads of extension housing bolts, fit bolts and tighten by diagonal selection to 25 Nm (18 lbf.ft).
10. Lubricate a new 'O' ring with gearbox oil and fit to speedometer pinion housing.
11. Lubricate speedometer pinion with silicone grease.
12. Fit speedometer pinion housing ensuring teeth of pinion mesh with those of driven gear.
13. Lubricate a new 'O' ring with gearbox oil and fit to extension housing interlock spool retainer. Fit retainer, fit bolt and washer and tighten bolt to 8 Nm (6 lbf.ft).
14. Fit selector shaft pin to selector shaft, fit and tighten a new self-locking nut.

Extension housing - Type D gearbox - Refit

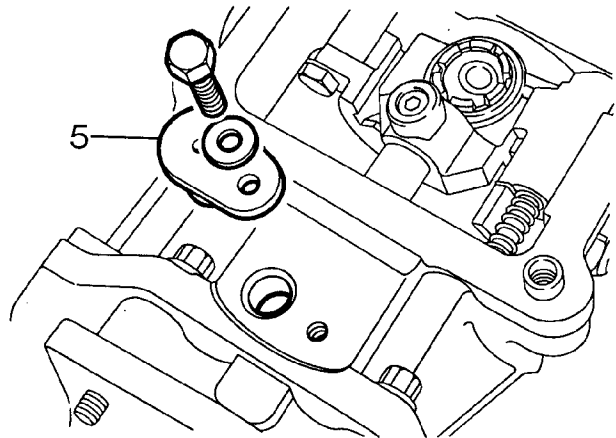


1. Remove slave bolts from centre plate.
2. Fit oil filter.
3. Apply sealant, Part No. STC 3254 to mating surfaces and fit extension housing. Ensure that oil pipe locates in filter and that drive locates in oil pump.



CAUTION: Do not use force. If necessary, remove extension housing and re-align oil pump drive.

4. Apply Loctite 290 to threads of extension housing retaining bolts, fit bolts and tighten by diagonal selection to 25 Nm (18 lbf.ft).

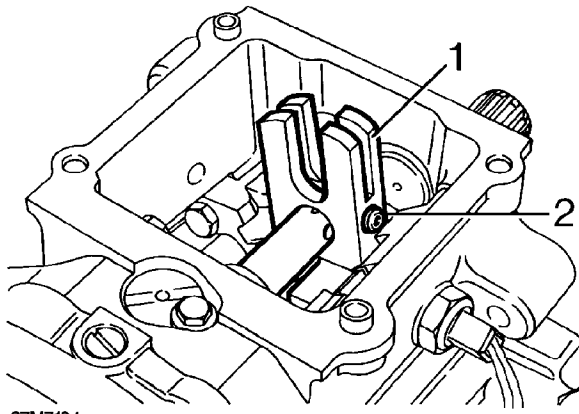


37M7129

5. Lubricate a new 'O' ring with gearbox oil and fit to interlock spool retainer. Fit retainer, fit bolt and washer and tighten bolt to 8 Nm (6 lbf.ft).



Selector quadrant - Type A gearbox - Refit



37M7104

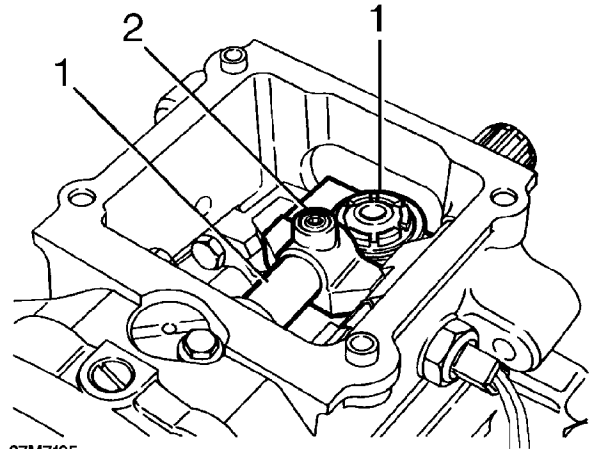
1. Position selector quadrant to selector shaft.
2. Apply Loctite 290 to threads of a new setscrew. Fit and tighten screw to 25 Nm (18 lbf.ft).



CAUTION: Ensure end of setscrew locates in hole in selector shaft.

3. Move selector shaft to neutral position.

Gear change lever yoke - Type B gearbox - Refit



37M7105

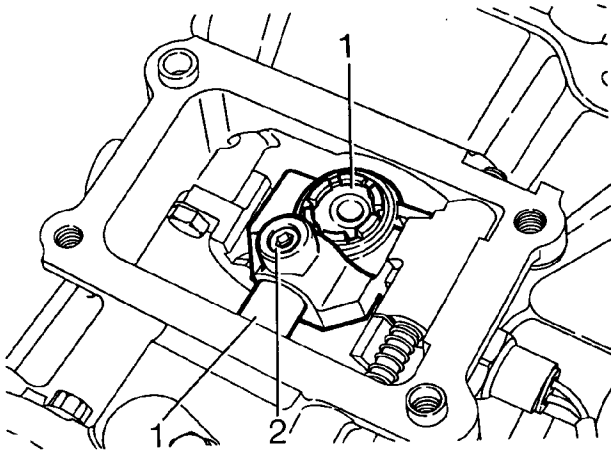
1. Position gear change lever yoke on selector shaft with ball facing towards output shaft.
2. Apply Loctite 290 to threads of a new setscrew, fit and tighten screw to 25 Nm (18 lbf.ft).



CAUTION: Ensure end of setscrew locates in hole in selector shaft.

MANUAL GEARBOX

Gear change lever yoke - Type D gearbox - Refit



37M7130

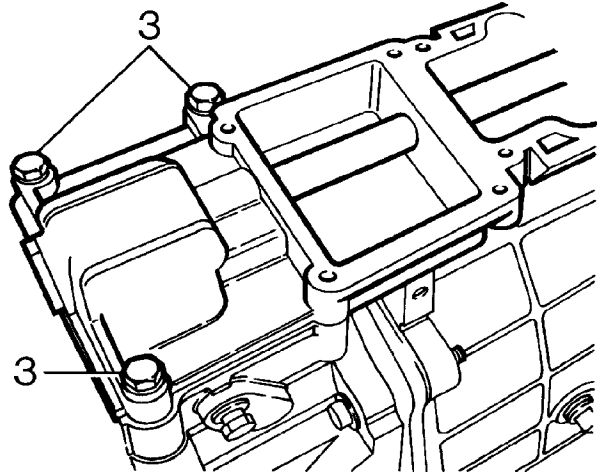
1. Position gear lever yoke on selector shaft with ball facing towards output shaft.
2. Apply Loctite 290 to threads of a new setscrew. Fit and tighten screw to 25 Nm (18 lbf.ft).



CAUTION: Ensure end of setscrew locates in hole in selector shaft.

Remote housing - Type A gearbox - Refit

1. Apply sealant, Part No. STC 3254 to mating surfaces and fit to extension housing.
2. Position remote housing to extension housing and gearcase ensuring rollers locate in quadrant.



37M7106

3. Fit and lightly tighten 3 bolts in positions shown.



NOTE: Bolts are tightened when gear change housing is fitted.



Transfer box selector housing - Type A gearbox - Refit

1. Smear a new gasket with grease and fit to remote housing.
2. Position transfer box selector housing to remote housing.
3. Fit and lightly tighten 4 bolts.



NOTE: Bolts are tightened when gear change housing is fitted.

Gear change housing - Type A gearbox - Refit

1. Smear a new gasket with grease and fit to remote housing.
2. Position gear change housing to remote housing ensuring gear lever ball is correctly located.
3. Fit and lightly tighten 4 bolts.
4. Tighten remote housing, transfer box selector housing and gear change housing bolts to 25 Nm (18 lbf.ft).
5. Adjust 5th gear stop screw.

MANUAL GEARBOX

5th gear stop screw adjustment - Type A gearbox

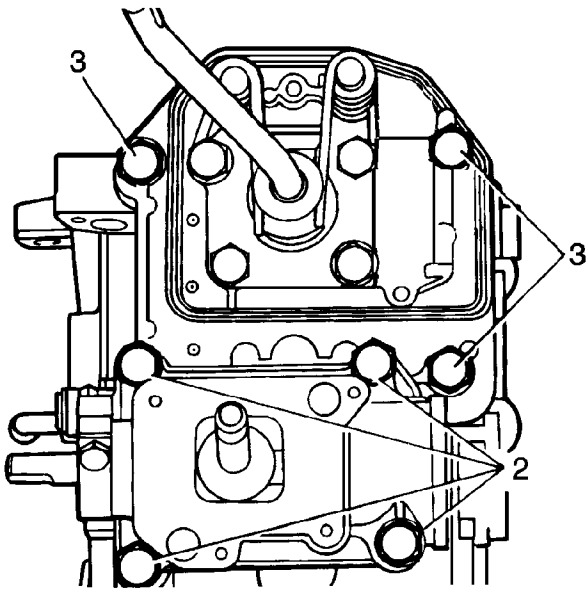
1. Select reverse gear. While applying light pressure to gear lever towards left, turn screw clockwise until it contacts yoke.
2. Turn screw anti-clockwise until 25 mm (1.0 in) of free play is felt at knob, ensure 5th gear can be engaged.
3. Tighten locknut.
4. Check all other gears can be selected.

Transfer box selector housing - Type B gearbox - Refit

1. Smear a new gasket with grease and fit to gearcase.
2. Position transfer box selector housing to gearcase, fit 4 bolts and tighten to 25 Nm (18 lbf.ft).



Gear change housing - Type B gearbox - Refit



37M7107

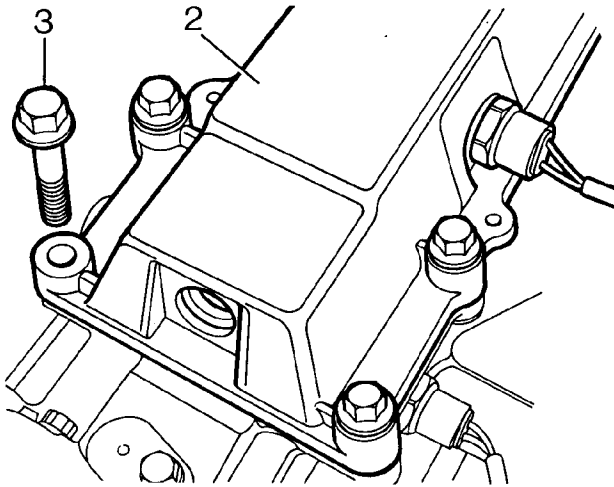
1. Apply sealant, Part No. STC 3254 to mating surfaces of extension housing.
2. Position gear change housing to extension housing ensuring that gear lever passes through centre of gear change lever yoke and engages in the gate plate.
3. Fit bolts and tighten to 25 Nm (18 lbf.ft).

Remote gear change - Type C gearbox - Refit

1. Apply lithium based grease to selector rod yoke.
2. Position remote gear change to extension housing ensuring selector shaft pin is located in selector rod yoke.
3. Fit bolts, washers and mounting rubbers securing remote gear change to extension housing; do not tighten bolts at this stage.
4. Fit bolts, washers and mounting rubbers securing bracket to extension housing.
5. Tighten all bolts to 25 Nm (18 lbf.ft).

MANUAL GEARBOX

Remote gear change - Type D gearbox - Refit



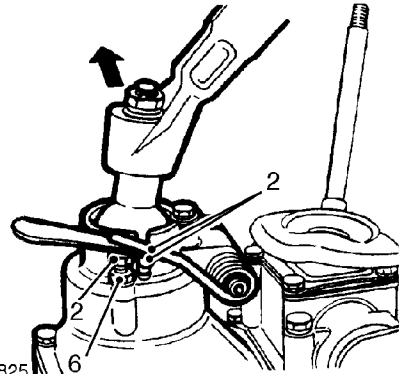
37M7131

1. Apply sealant, Part No. STC 3254 to mating surfaces of extension housing and remote gear change housing.
2. Position remote gear change housing on extension housing. Ensure that gear lever ball is correctly located.
3. Fit bolts and tighten to 25 Nm (18 lbf.ft).

Bias spring adjustment - Type A gearbox



NOTE: The purpose of this adjustment is to set both bolts so that the bias spring legs apply equal pressure on both ends of the gear lever cross pin when third or fourth gear is engaged. This will ensure that when the lever is in neutral, the gear change mechanism is automatically aligned for third or fourth gear.

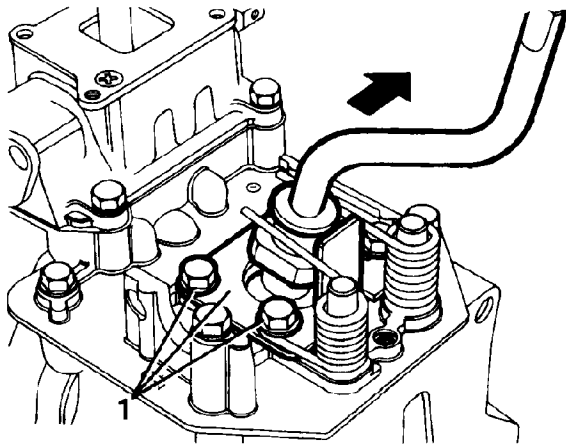


M37 1825

1. Select third or fourth gear.
2. Adjust the two adjusting screws until both legs of the spring are approximately 0.5 mm (0.02 in) clear of the cross pin in the gear lever.
3. Apply a light load to the gear lever in a left hand direction and adjust the right hand adjusting screw downward until the right hand spring leg just makes contact with the cross pin.
4. Repeat the same procedure for the left hand adjusting screw.
5. Lower both adjusting screws equal amounts until the radial play is just eliminated.
6. Tighten locknuts.
7. Return gear lever to neutral position and rock across the gate several times. The gear lever should return to the third and fourth gate.

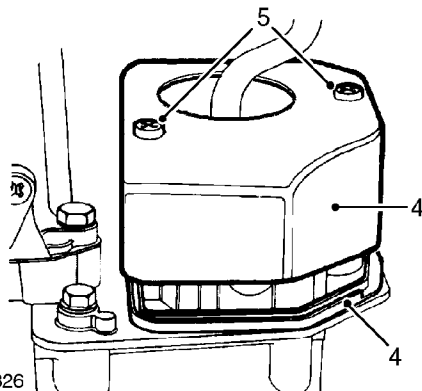


Bias spring adjustment - Type B gearbox



37M7109

1. Loosen bias adjustment plate bolts. Select fourth gear and move lever fully to the right.
2. Tighten bias adjustment plate bolts to 25 Nm (18 lbf.ft).
3. Check adjustment is correct by selecting third and fourth gears.



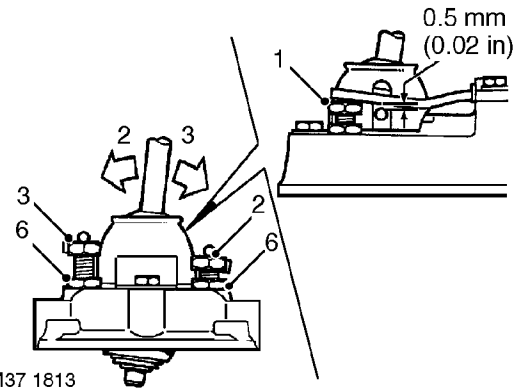
M37 1826

4. Fit sealing rubber to gear change housing, fit housing.
5. Apply Loctite 290 to threads of securing screws, fit screws and tighten to 8 Nm (6 lbf.ft)

Bias spring adjustment - Type C gearbox



NOTE: The purpose of this adjustment is to ensure that when bias spring is correctly adjusted, the gear change mechanism is automatically aligned for 3rd or 4th gear selection when gear lever is in neutral.

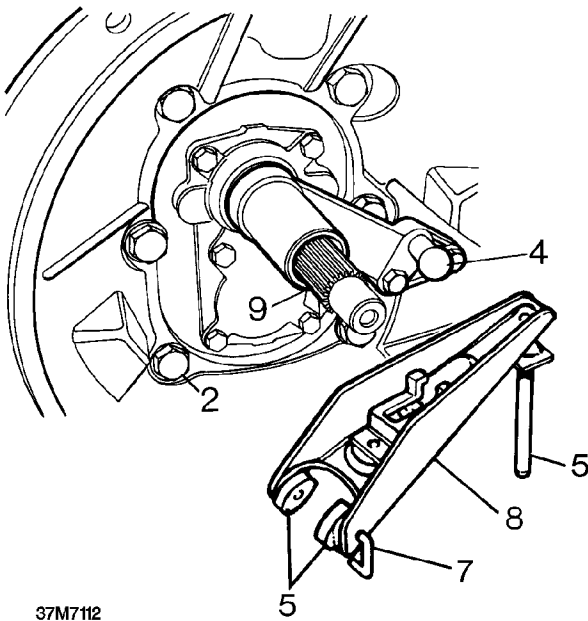


M37 1813

1. Adjust both bias spring adjustment bolts until a clearance of 0.5 mm (0.02 in) exists between both legs of bias spring and gear lever cross pin.
2. Apply a light load to move gear lever to the left and adjust right hand bolt until right hand leg of bias spring just contacts gear lever cross pin.
3. Move gear lever to the right and adjust left hand bolt.
4. Check that with gear lever moved fully to the left and right, spring legs just contact gear lever cross pin.
5. Select neutral then rock gear lever across the gate; when released, lever should return to 3rd/4th position.
6. Tighten adjusting bolt locknuts.


MANUAL GEARBOX

Clutch housing - Type A gearbox - Refit




37M7112

1. Position clutch housing to gearbox.
2. Fit securing bolts.

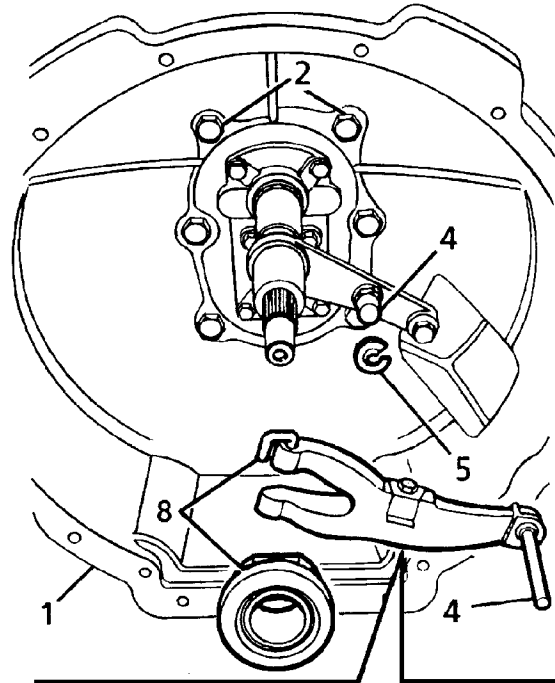
 **NOTE:** The 12 x 45 mm bolts must be fitted through locating dowels.

3. Tighten bolts by diagonal selection to 72 Nm (53 lbf.ft).
4. Fit pivot post, fit and tighten bolts.
5. Apply lithium based grease to pivot post, pads and push rod.
6. Position pads to clutch release lever, fit release bearing.
7. Fit new clips to retain pads.

 **NOTE:** Clips may become displaced in service with no loss of performance.

8. Fit release lever.
9. Apply lithium based grease to splines of input shaft.

Clutch housing - Type B gearbox - Refit



37M0616

1. Position clutch housing to gearbox.
2. Fit securing bolts.

 **NOTE:** The 12 x 45 mm bolts must be fitted through locating dowels.

3. Tighten bolts by diagonal selection to 72 Nm (53 lbf.ft).
4. Apply lithium based grease to pivot post, release lever, socket and push rod.
5. Fit a new 'C' clip to pivot post, fit post.
6. Fit spring clip to release lever, fit but do not tighten bolt.



7. Position release lever to pivot post ensuring spring clip is located behind 'C' clip; tighten bolt.
8. Fit clutch release bearing and retain using new clips.



NOTE: Clips may become displaced in service with no loss of performance.

9. Apply lithium based grease to splines of input shaft.

Clutch housing - Type C gearbox - Refit

1. Position clutch housing to gearbox.
2. Fit securing bolts.



NOTE: The 2 longest bolts must be fitted at locating dowel positions.

3. Tighten bolts by diagonal selection to 72 Nm (53 lbf.ft).
4. Apply lithium based grease to pivot post.
5. Fit release lever and clutch release bearing.
6. Apply lithium based grease to splines of input shaft.

Adaptor housing - Type D gearbox - Refit

1. Position adaptor housing to gearbox.
2. Fit securing bolts.



NOTE: The two longest bolts must be fitted at locating dowel positions.

3. Tighten bolts by diagonal selection to 72 Nm (53 lbf.ft).
4. Apply lithium based grease to pivot post.
5. Fit pivot post, fit 2 bolts and tighten to 25 Nm (18 lbf.ft).
6. Apply lithium based grease to splines of input shaft.