



MG RV8

LI77S gearbox

overhaul manual

LT 77S

GEARBOX

OVERHAUL

MANUAL

INTRODUCTION

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 77 mm 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 Rover/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 Rover/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 Rover/Land Rover recommended parts. All Rover/Land Rover recommended parts have the full backing of the vehicle Warranty.

Rover/Land Rover Dealers are obliged to supply only recommended parts.

SPECIFICATION

Rover/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. Rover/Land Rover Dealers are not agents of Rover/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 77 mm 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 three types of gearbox, A, B and C 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; 55A; 56A; 59A; 60A; 61A; 63A

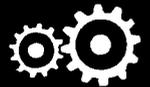
Type B gearbox prefixes: – 53A; 54A

Type C gearbox prefix: – 28A

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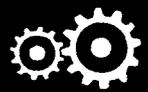
DATA

Reverse selector lever to slipper pad clearance . . .	0.725 mm, maximum
Force required to trip reverse plunger – Type B gearbox	45 to 55 kg
Synchro outer ring to gear clearance	0.38 mm, minimum
2nd gear end float	0.20 mm, maximum
3rd gear end float	0.20 mm, maximum
1st gear bush end float	0.075 mm, maximum
1st gear end float	0.20 mm, maximum
5th synchro hub to thrust washer clearance	0.055 mm, maximum
Input shaft bearing end float	0.06 mm, maximum
Layshaft bearing	0.025 mm end float to 0.025 mm pre – load
Bias spring to adjusting bolt clearance – Type A gearbox	0.05 mm
Reverse plunger to gear lever clearance – Type B gearbox	0.6 to 0.85 mm
Reverse baulk plate to gear lever bush clearance – Type C gearbox	0.254 mm, minimum
1st/2nd gate stop adjustment clearance – Type C gearbox	0.25 to 2.25 mm



TORQUE WRENCH SETTINGS

Oil pump to extension housing bolts	10 Nm
Lower gear lever retaining bolt	10 Nm
Drain plug	50 Nm
Oil filter plug – Type A and Type B gearboxes	73 Nm
5th gear spool guide bolts	10 Nm
Reverse gear plunger assembly bolts – Type B gearbox	25 Nm
Gear change housing bolts	25 Nm
Gaiter support plate bolts	15 Nm
Bias spring adjustment plate bolts	25 Nm
Reverse gear plunger assembly bolt	25 Nm
Spool retainer bolts	10 Nm
Layshaft stake nut	220 Nm
5th gear selector fork bracket bolts	25 Nm
Extension housing bolts	25 Nm
Front cover to gearcase bolts	25 Nm
Transfer box selector housing bolts	25 Nm
Remote housing bolts	25 Nm
Clutch housing to gearcase bolts	75 Nm
Remote gear change to extension housing bolts – Type C gearbox	35 Nm



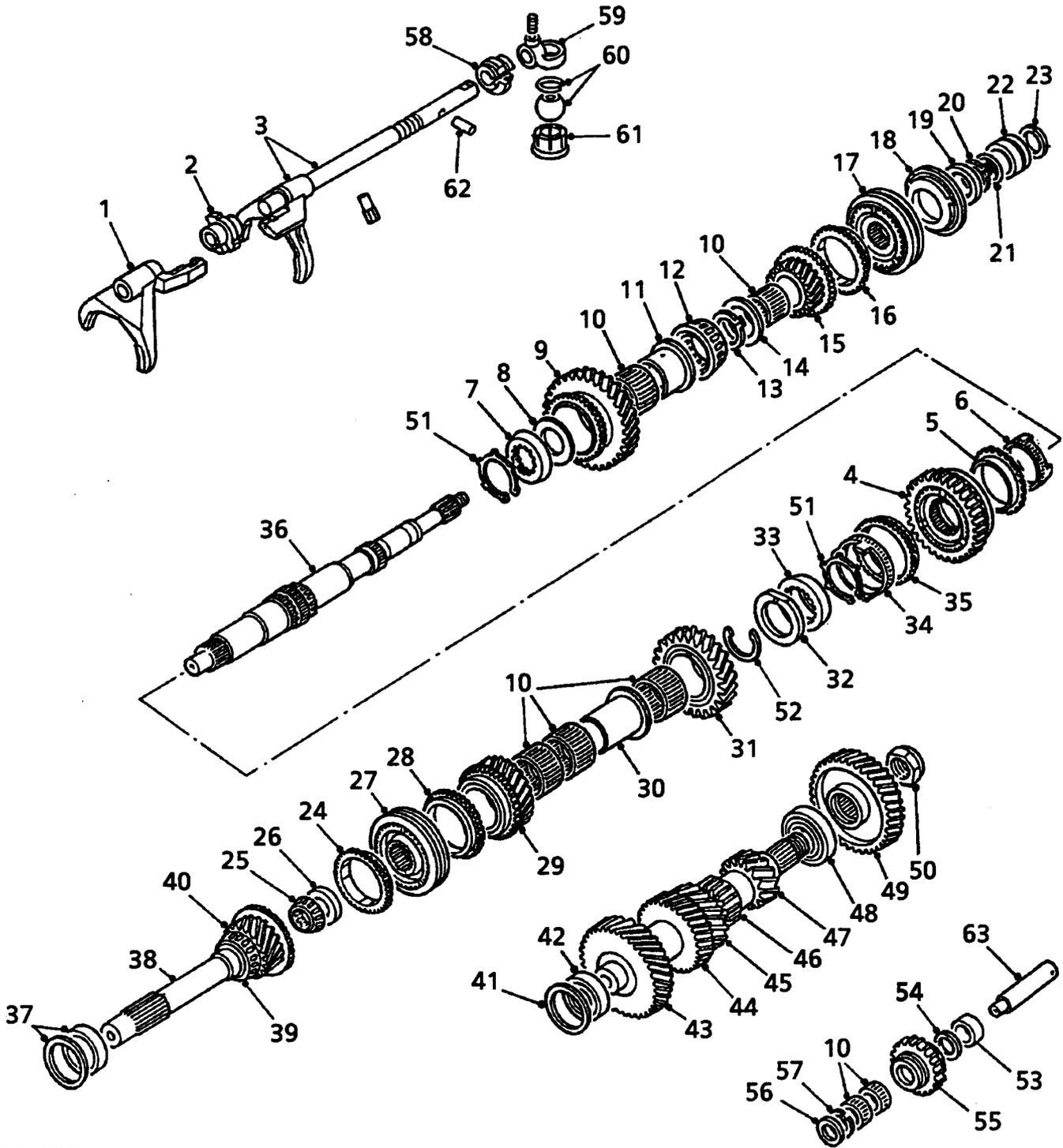
SERVICE TOOLS

Land Rover Number	Rover Number	Description
LRT - 37 - 001	18G47BA	Input shaft bearing remover/adaptor
LRT - 37 - 004	18G284AAH	Adapter/remover input shaft pilot bearing track
LRT - 99 - 004	18G284	Impulse extractor
LRT - 37 - 009	18G705	Remover bearing race - centre - Main tool
LRT - 37 - 010	18G705 - 1A	Adapter/remover mainshaft oil seal track and layshaft 5th gear
LRT - 37 - 012	18G1400	Remover 5th speed synchro hub and gear cluster - Main tool
LRT - 37 - 013	18G1400 - 1	Adapter mainshaft 5th gear remover
LRT - 37 - 014	18G1422	Mainshaft rear oil seal replacer
LRT - 37 - 015	18G1431	Mainshaft 5th gear and oil seal collar replacer
LRT - 37 - 017	18G705 - 7	Layshaft bearing remover
LRT - 37 - 018	-	Dummy bearing
LRT - 37 - 019	-	Guide - rear bearing replacer
LRT - 99 - 002	MS47	Hand press
LRT - 51 - 003	18G1205	Flange holder
-	18G1354 - 8	Bearing/oil seal replacer

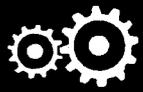
Service tools must be obtained direct from the manufacturers:

V.L.Churchill,
P.O.Box No 3,
London Road,
Daventry,
Northants, NN11.4NF.
England

MANUAL GEARBOX



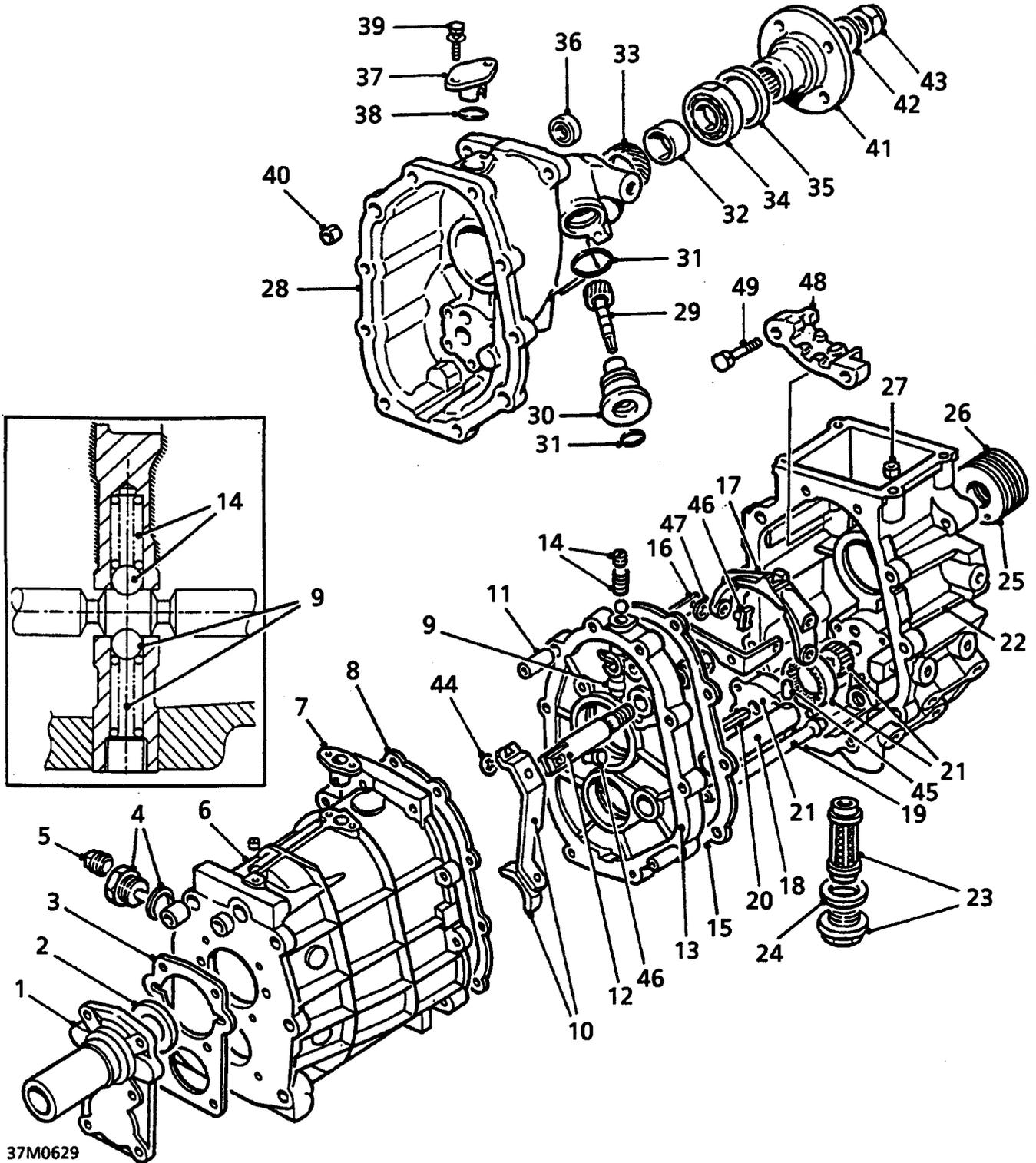
37M0621



GEARBOX COMPONENTS - GEARS AND SHAFTS

- | | |
|--|---|
| 1. 3rd/4th gear selector fork | 35. 2nd gear outer synchro ring |
| 2. Interlock spool | 36. Output shaft |
| 3. 1st/2nd selector fork and selector shaft assembly | 37. Input shaft front bearing track and selective thrust washer |
| 4. 1st/2nd synchro | 38. Input shaft |
| 5. 1st gear outer synchro ring | 39. Input shaft front taper bearing |
| 6. 1st gear inner synchro ring | 40. 4th gear |
| 7. Synchro cone | 41. Selective thrust washer |
| 8. Thrust washer | 42. Layshaft front taper bearing |
| 9. 1st gear | 43. Layshaft 4th gear |
| 10. Needle roller bearings | 44. Layshaft 3rd gear |
| 11. 1st gear selective bush | 45. Layshaft 2nd gear |
| 12. Centre taper roller bearing | 46. Layshaft reverse gear |
| 13. Circlip | 47. Layshaft 1st gear |
| 14. Thrust washer | 48. Layshaft rear taper bearing |
| 15. 5th gear | 49. Layshaft 5th gear |
| 16. 5th gear synchro ring | 50. Layshaft 5th gear stake nut |
| 17. 5th gear synchro | 51. Circlips |
| 18. 5th gear synchro retainer plate | 52. Snap ring retaining 2nd gear synchro cone and spacer |
| 19. 5th gear synchro selective thrust washer | 53. Spacer |
| 20. Circlip | 54. Circlip |
| 21. Oil seal | 55. Reverse idler gear |
| 22. Oil seal collar | 56. Thrust washer |
| 23. Snap ring | 57. Circlip |
| 24. 4th gear synchro ring | 58. 5th gear interlock spool |
| 25. Pilot taper bearing | 59. Selector lever yoke - Type B gearbox |
| 26. Spacer | 60. Gear change ball and snap ring - Type B gearbox |
| 27. 3rd/4th gear synchro | 61. Gear change nylon seating - Type B gearbox |
| 28. 3rd gear synchro ring | 62. Selector shaft roll pin |
| 29. 3rd gear | 63. Reverse idler shaft |
| 30. 3rd gear bush | |
| 31. 2nd gear | |
| 32. Thrust washer | |
| 33. Synchro cone | |
| 34. 2nd gear inner synchro ring | |

MANUAL GEARBOX



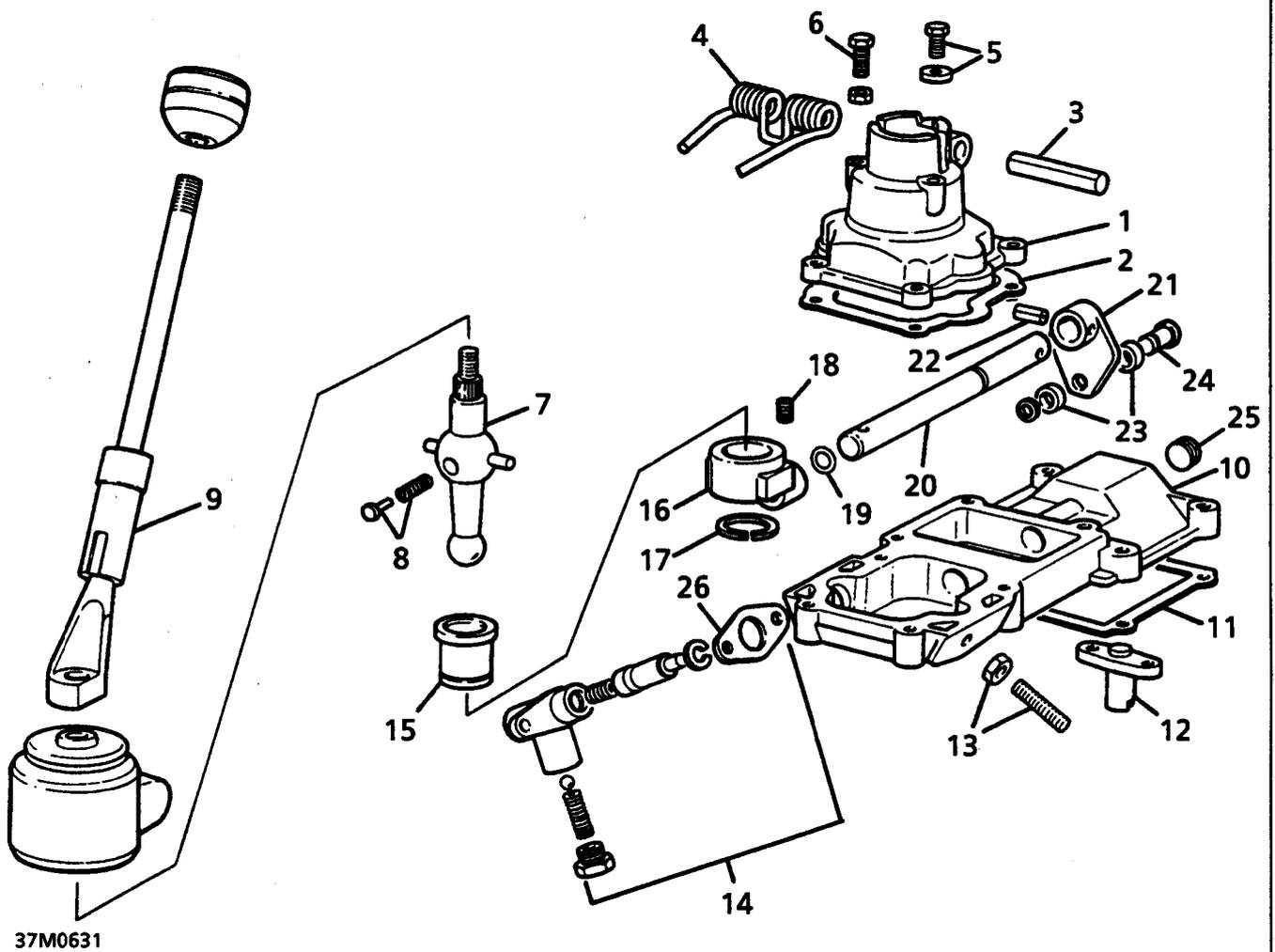
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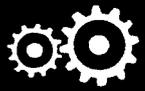


GEARBOX CASINGS

1. Front cover
2. Input shaft oil seal
3. Front cover gasket
4. Oil drain plug and washer
5. Oil level plug
6. Gearcase
7. Spool retainer
8. Gasket
9. Inner detent ball and spring
10. Reverse lever and slipper pad
11. Locating dowels - centre plate to gearcase
12. Reverse lever pivot post
13. Centre plate
14. Selector plug, outer detent ball and spring
15. Gasket
16. 5th gear selector bracket
17. 5th gear selector fork
18. Reverse gear shaft
19. Oil pick - up pipe
20. Oil pump drive
21. Oil pump gears and cover
22. 5th gear extension housing - Types A and B gearbox
23. Drain plug and filter - Types A and B gearbox
24. Sealing washer - Types A and B gearbox
25. Ferrobestos bush
26. Output shaft oil seal - Types A and B gearbox
27. Locating dowels - Types A and B gearbox
28. 5th gear extension housing - Type C gearbox
29. Speedometer pinion - Type C gearbox
30. Speedometer pinion housing - Type C gearbox
31. 'O' ring - Type C gearbox
32. Spacer - Type C gearbox
33. Speedometer drive gear - Type C gearbox
34. Output shaft bearing - Type C gearbox
35. Output shaft oil seal - Type C gearbox
36. Selector shaft oil seal - Type C gearbox
37. 5th gear spool guide - Type C gearbox
38. 'O' ring - Type C gearbox
39. Spool guide bolts - Type C gearbox
40. Locating dowel - Type C gearbox
41. Output shaft drive flange - Type C gearbox
42. Washer
43. Drive flange nut - Type C gearbox
44. 'E' clip
45. 5th selector fork pivot pin
46. Reverse selector lever pin
47. 'E' clip
48. Gate plate - Type B gearbox
49. Gate plate securing bolts - Type B gearbox

MANUAL GEARBOX

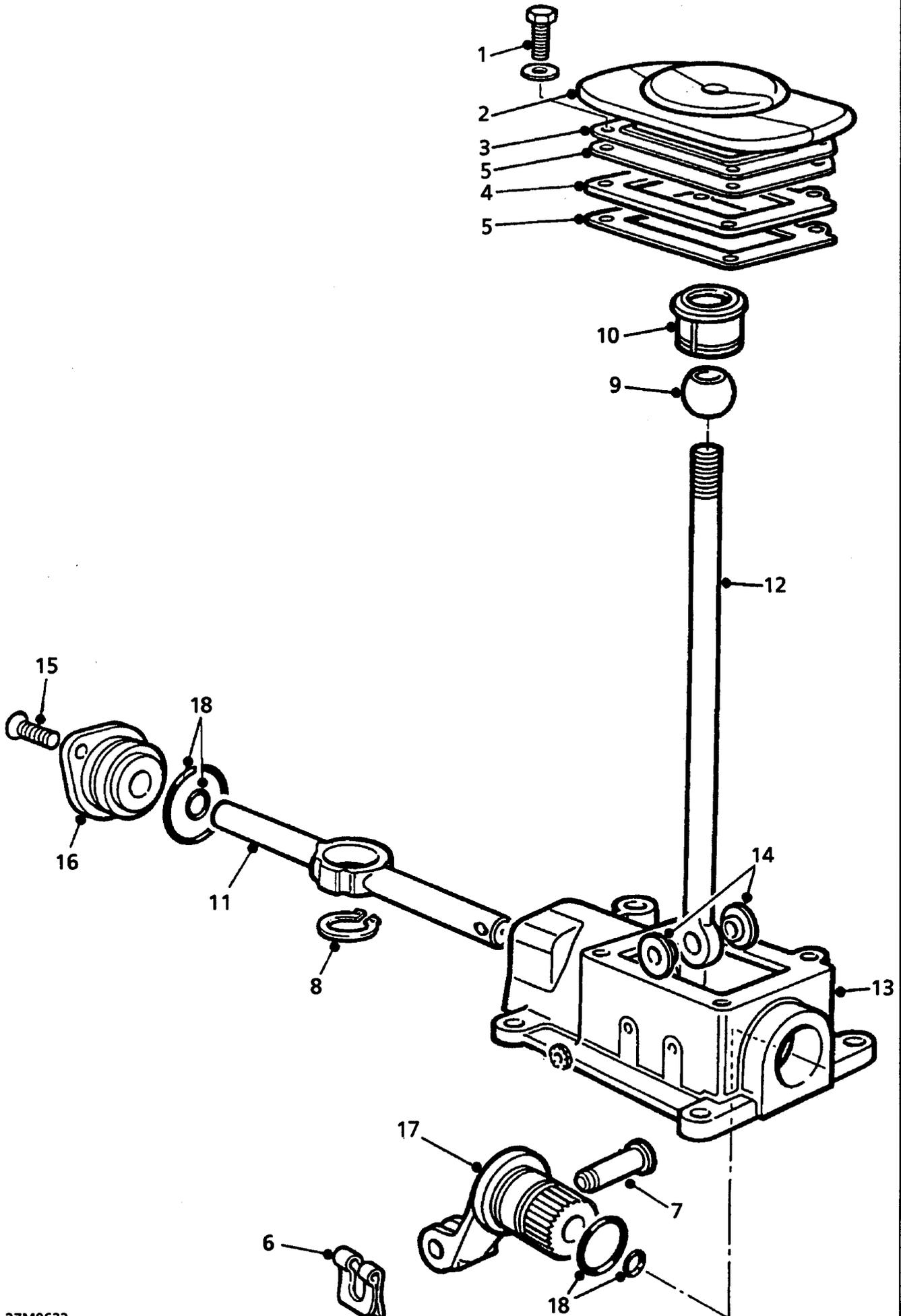




**GEAR CHANGE HOUSING - TYPE A
GEARBOX**

- | | |
|---|------------------------------|
| 1. Gear change housing | 15. Ball pin seating |
| 2. Gasket | 16. Trunnion |
| 3. Roll pin | 17. Circlip |
| 4. Bias spring | 18. Trunnion retaining screw |
| 5. Gear lever retaining bolt and washer | 19. 'O' ring |
| 6. Gear change housing bolts | 20. Selector shaft |
| 7. Gear lever | 21. Selector quadrant |
| 8. Nylon pad and spring | 22. Roll pin |
| 9. Gear lever extension | 23. Rollers |
| 10. Remote housing | 24. Pin |
| 11. Gasket | 25. Blanking plug |
| 12. 5th gear spool guide | 26. Shim |
| 13. 5th gear stop screw and locknut | |
| 14. Reverse gear plunger assembly | |

MANUAL GEARBOX



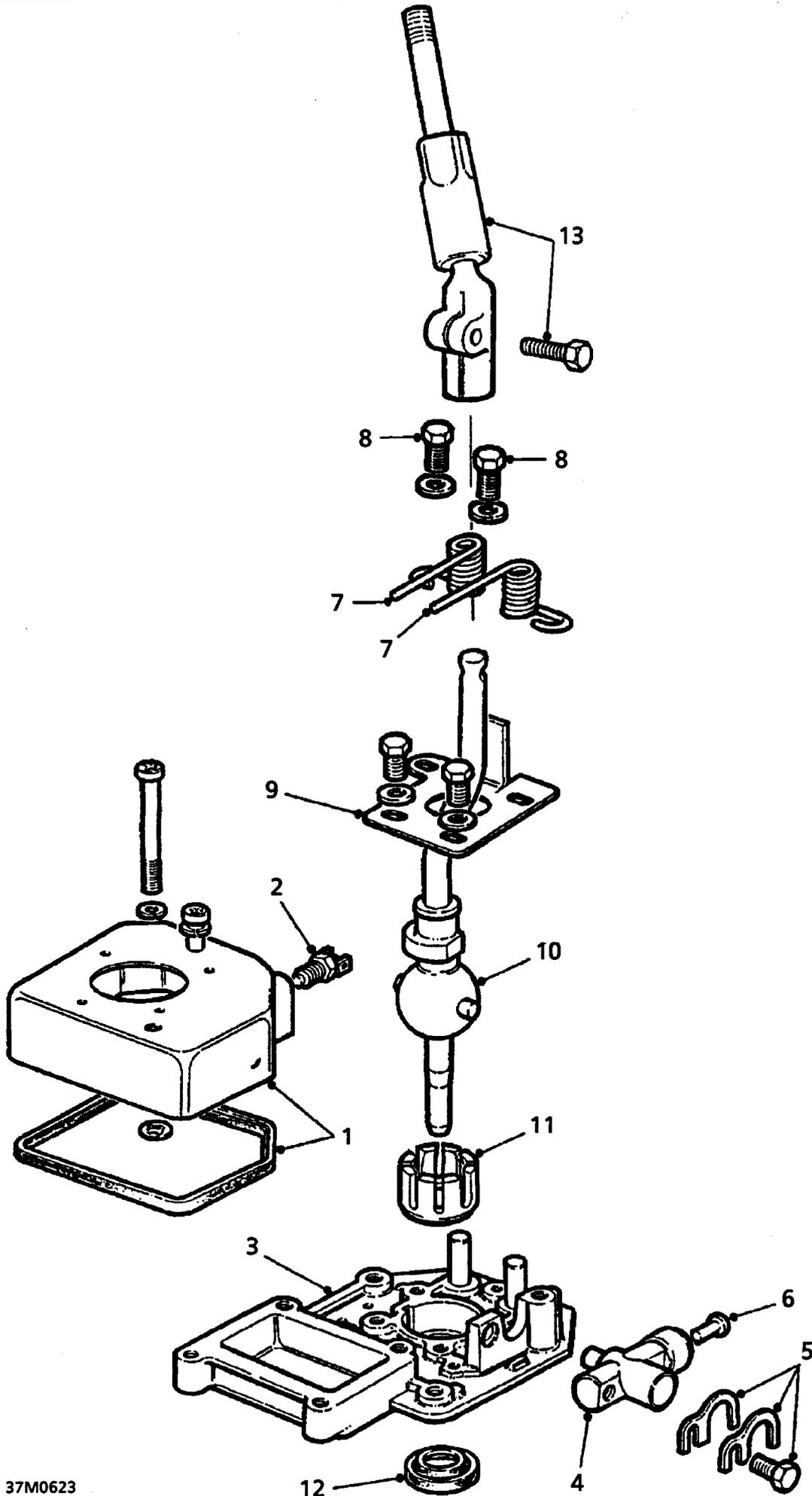
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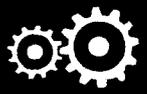
TRANSFER BOX SELECTOR HOUSING
- TYPE A GEARBOX

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

MANUAL GEARBOX



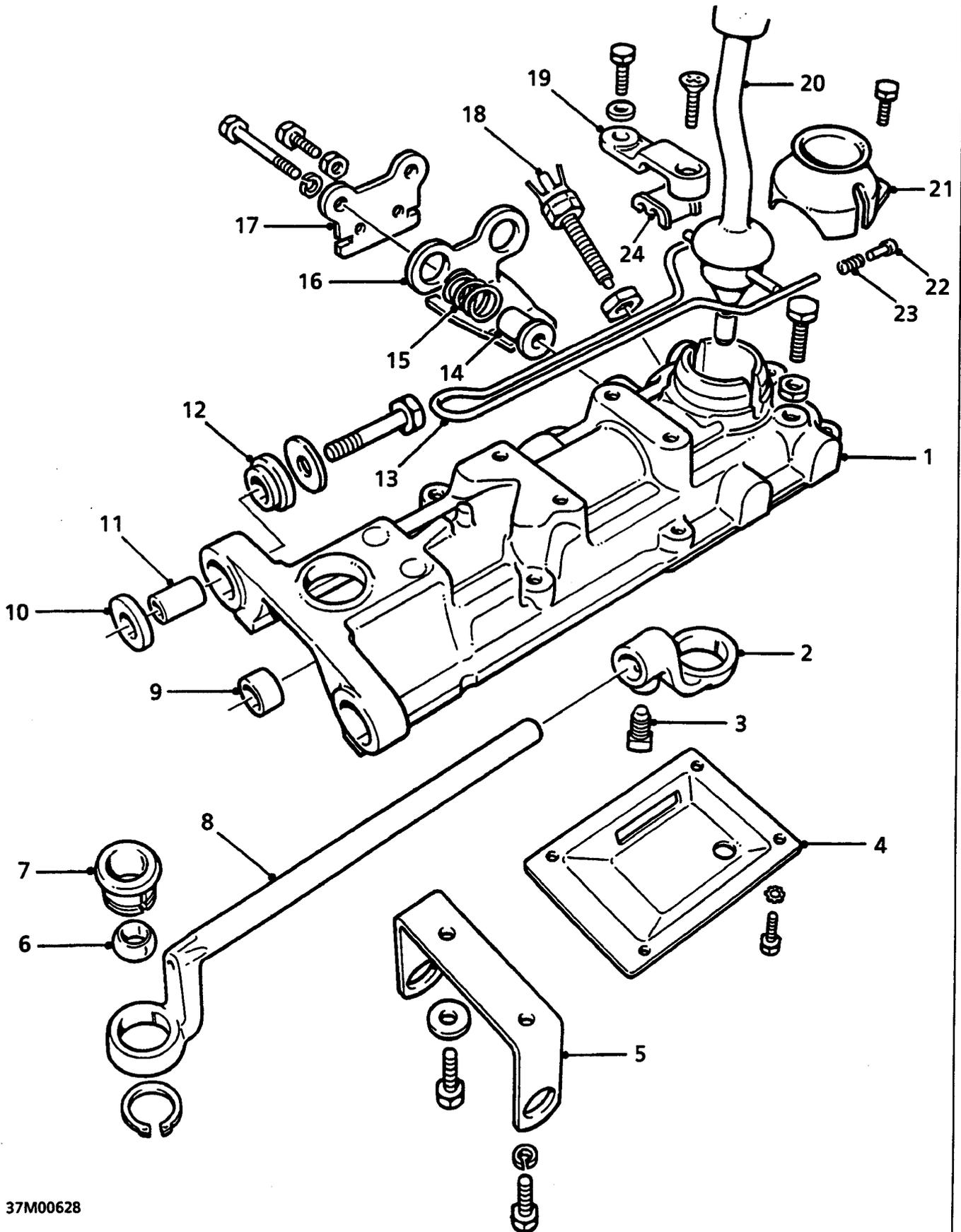
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**GEAR CHANGE HOUSING - TYPE B
GEARBOX**

1. Gear change housing cover and gasket
2. Reverse lamp switch
3. Gear change housing
4. Reverse gear plunger
5. Reverse gear plunger shims and bolt
6. Reverse lamp plunger
7. Bias springs
8. Bias spring retaining bolts
9. Bias adjustment plate
10. Lower gear lever
11. Railko bush
12. Lower gear lever housing oil seal
13. Upper gear lever bolt

MANUAL GEARBOX



37M00628



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

- | | |
|-------------------------------|------------------------------|
| 1. Remote gear change housing | 14. Spacer |
| 2. Selector rod yoke | 15. Spring |
| 3. Pinch bolt | 16. Baulk plate |
| 4. Bottom cover plate | 17. Backing plate |
| 5. Remote gear change bracket | 18. Reverse light switch |
| 6. Ball pin | 19. Bias spring bridge plate |
| 7. Ball pin seating | 20. Gear lever |
| 8. Selector rod | 21. Gear lever cap |
| 9. Selector rod bush | 22. Plunger |
| 10. Washer | 23. Anti - rattle spring |
| 11. Spacer | 24. Bridge plate liner |
| 12. Mounting rubbers | |
| 13. Bias spring | |

MANUAL GEARBOX

OPERATION

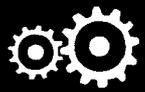
The 77mm 5 speed gearbox comprises an input shaft, output shaft, layshaft and reverse idler shaft having synchromesh on all forward gears.

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

Selector forks for 1st/2nd and 3rd/4th gears are located on a selector shaft, whilst the selector fork for 5th gear is located in a bracket secured to the centre plate and is operated via a spool secured to the selector shaft. Reverse gear selection is by means of a reverse selector lever attached to a pivot post.

The input shaft, output shaft and layshaft are supported by taper roller bearings with all gears running on caged needle roller bearings. End float of 1st and 3rd gears is controlled by means of selective bushes whilst input shaft and layshaft bearing end float is controlled by selective thrust washers.

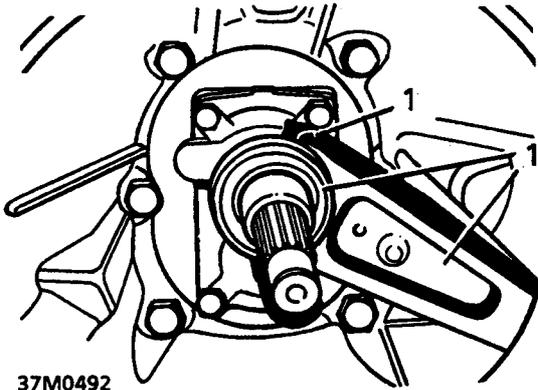
Lubrication is by an oil pump located in the extension housing which directs oil via internal drillings in the output shaft to lubricate the components.



GEARBOX DISMANTLE

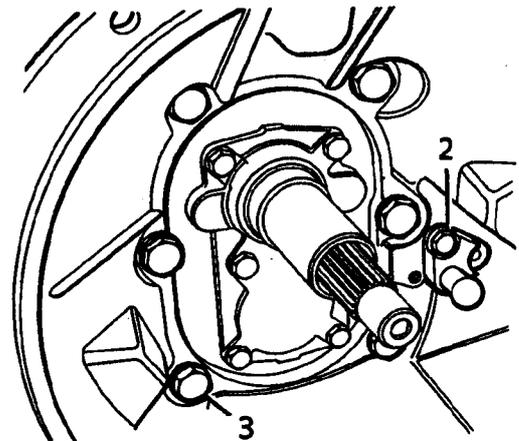
Service Repair No. 37.20.04

Clutch housing - Type A gearbox - Remove



37M0492

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



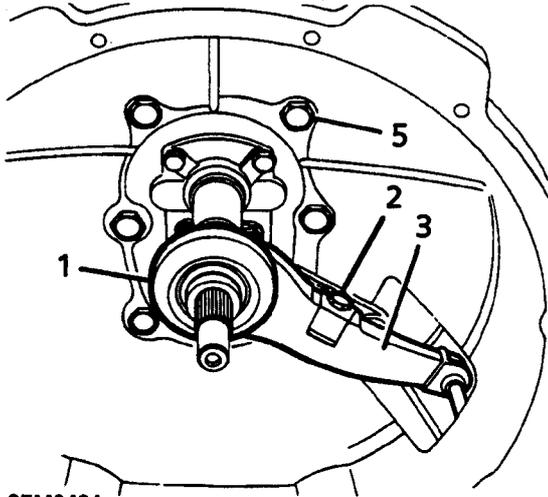
37M0493

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

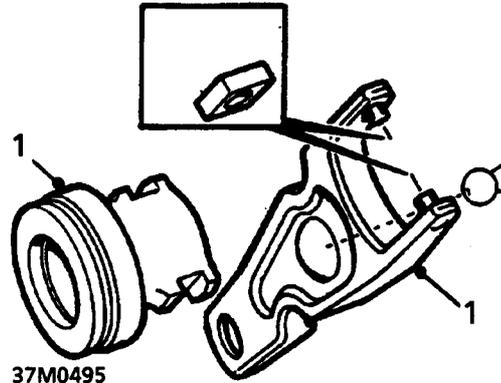


37M0494

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.

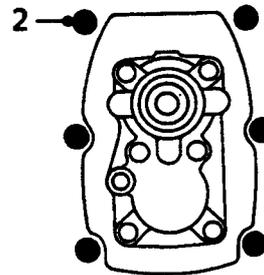
Note: Dowel located.

Clutch housing - Type C gearbox - Remove



37M0495

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



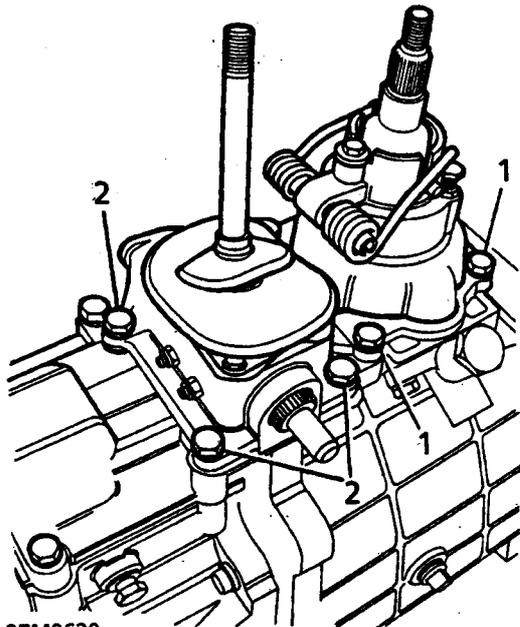
37M0496

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.



Gear change/selector housings - Type A gearbox - Remove



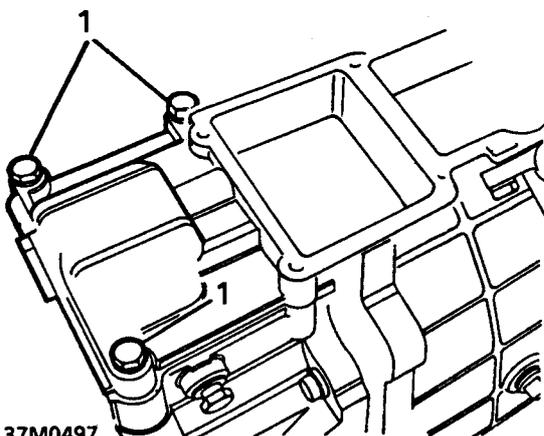
37M0630

1. Remove 4 bolts securing gear change housing, remove housing; discard gasket.

Note: Dowel located.

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

Remote housing - Type A gearbox - Remove

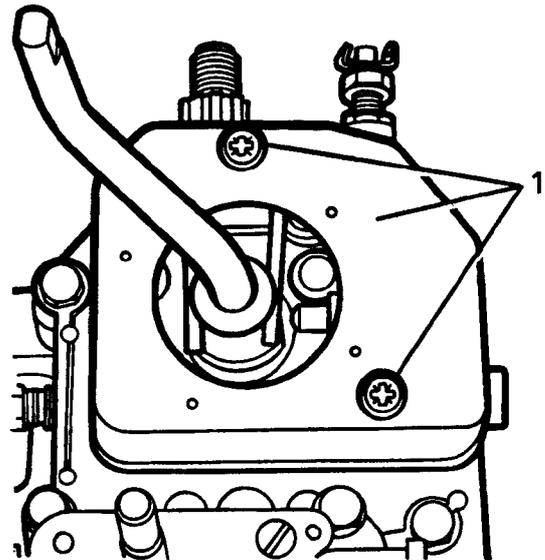


37M0497

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

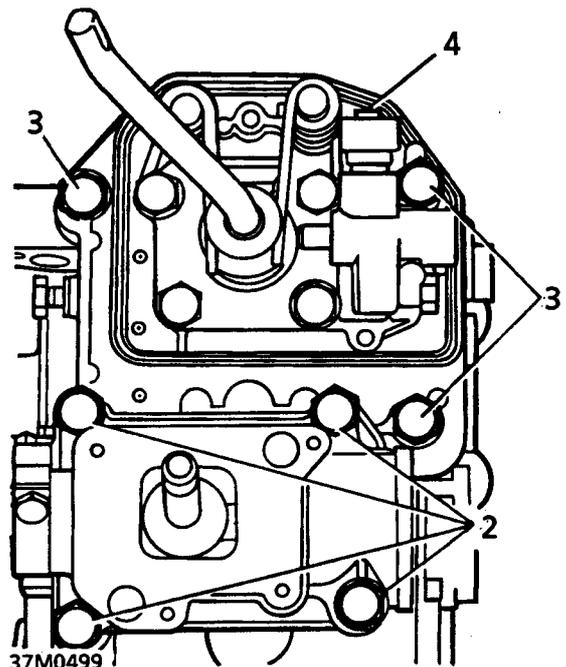
Note: Dowel located.

Gear change/selector housings - Type B gearbox - Remove



37M0498

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



37M0499

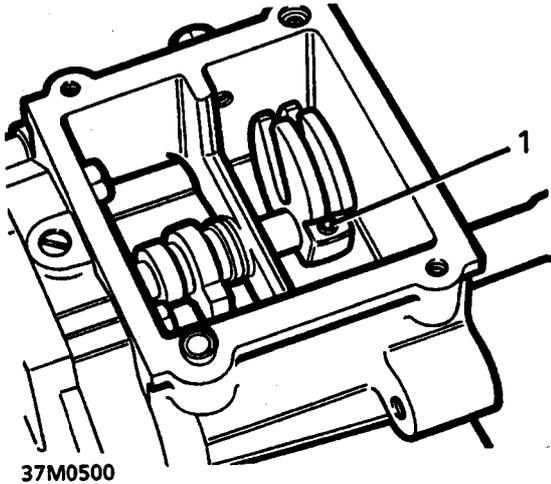
2. Remove 4 bolts securing transfer box selector housing, remove housing; discard gasket.
3. Noting their fitted position, remove 3 bolts securing gear change housing, remove housing; discard gasket.

Note: Dowel located.

4. Remove reverse switch plunger from reverse switch.

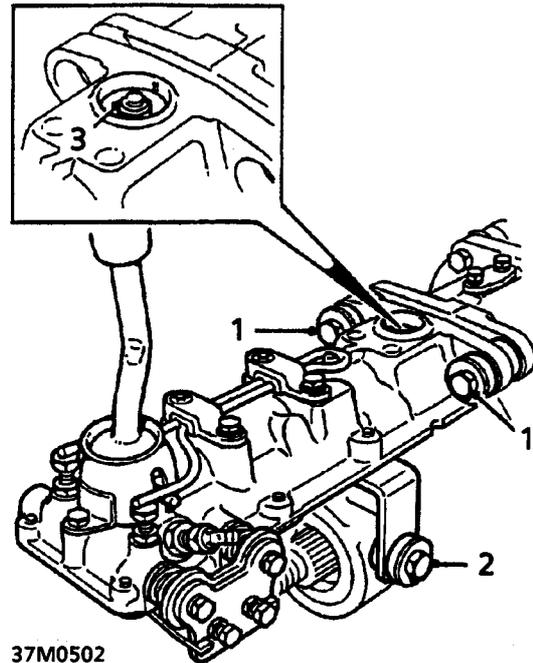
MANUAL GEARBOX

Selector quadrant - Type A gearbox - Remove



1. Using a suitable punch, drive out roll pin securing selector quadrant, discard pin.
2. Move selector shaft forwards, remove quadrant.

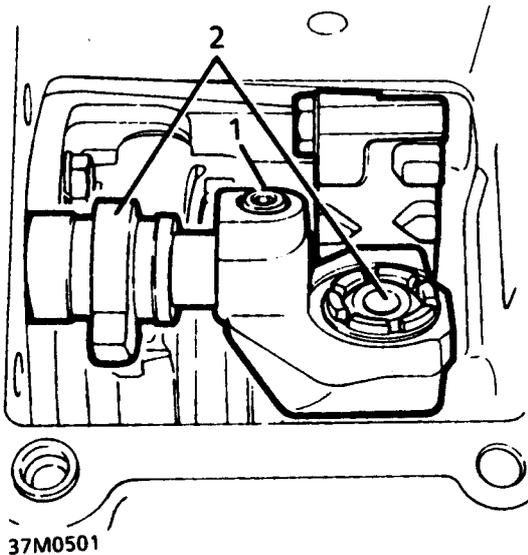
Remote gear change - Type C gearbox - Remove



37M0502

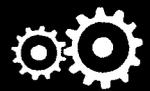
1. Noting fitted positions of mounting rubbers and washers, remove 2 bolts securing remote gear change to extension housing, recover washers and mounting rubbers.
2. Remove 2 bolts securing remote gear change bracket to extension housing, recover washers and mounting rubbers.
3. Release remote gear change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

Gear change lever yoke - Type B gearbox - Remove

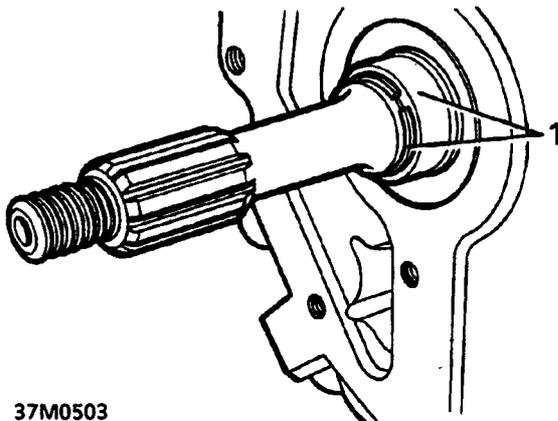


37M0501

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

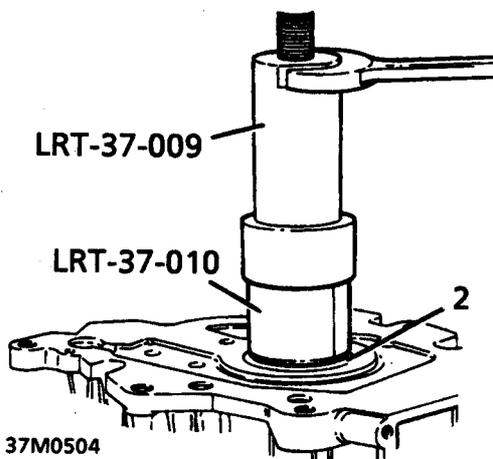


Extension housing - Types A and B gearbox - Remove



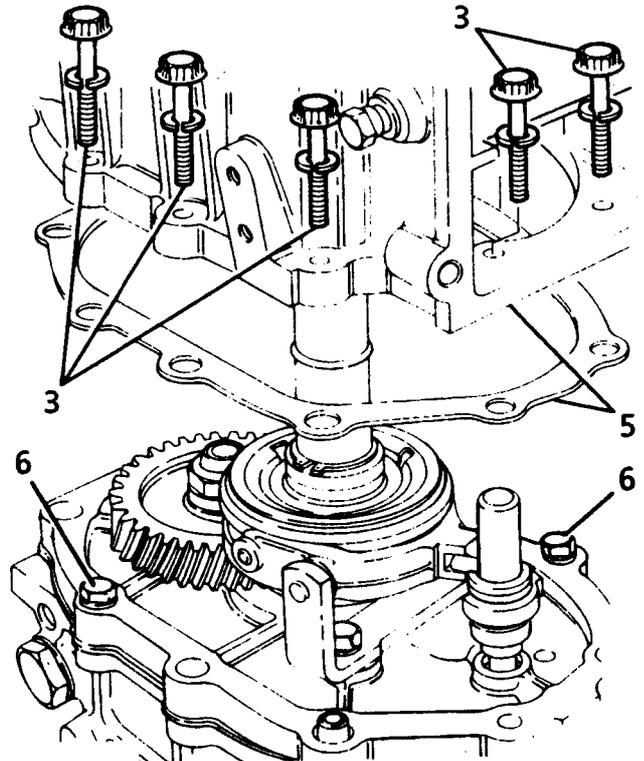
37M0503

1. Remove and discard snap ring securing output shaft oil seal collar.



37M0504

2. Using tools LRT - 37 - 009 and LRT - 37 - 010, remove output shaft oil seal collar.



37M0505

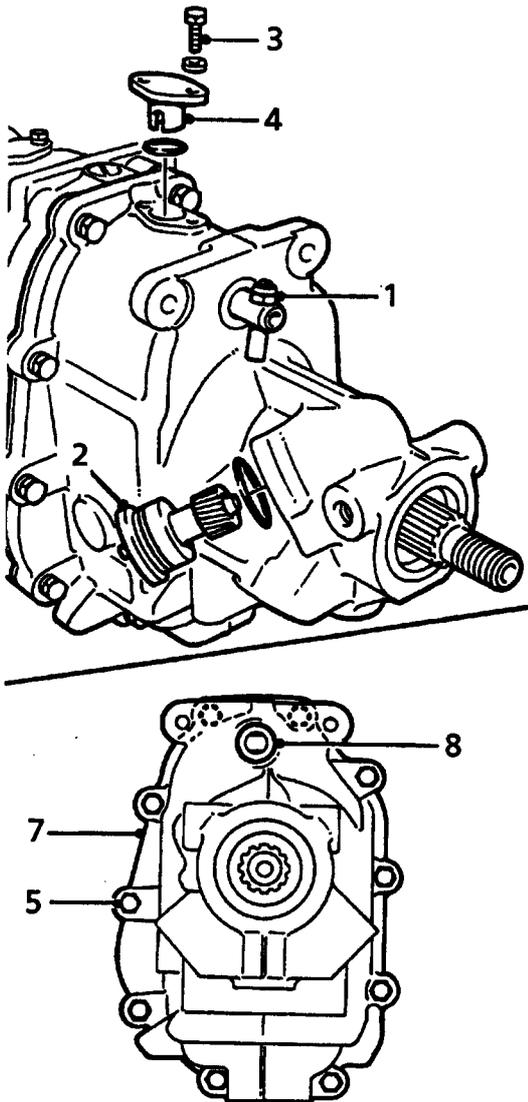
3. Noting their fitted positions, remove 10 bolts securing extension housing.
4. Using a soft - faced mallet, tap extension housing to free it from locating dowels.
5. Remove extension housing, remove and discard gasket.

Note: Dowel located.

6. Secure centre plate to gearcase with 2 8 x 35 mm bolts.

MANUAL GEARBOX

Extension housing - Type C gearbox - Remove



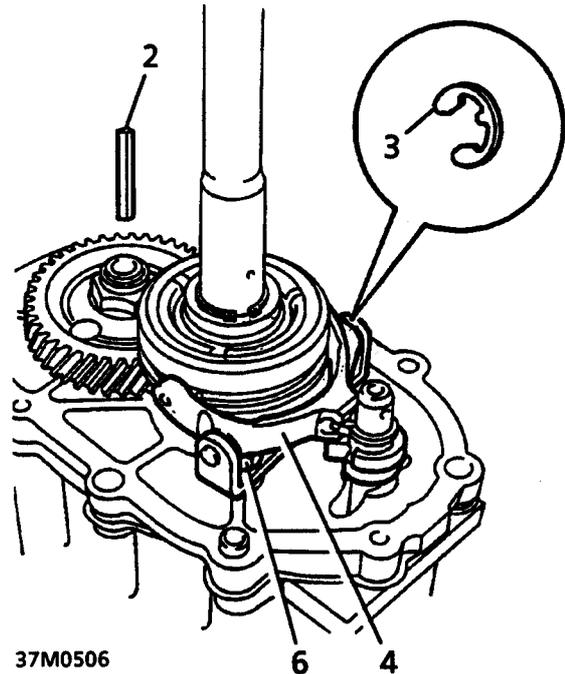
37M0624

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 2 bolts securing 5th gear spool guide to extension housing.
4. Remove 5th gear spool guide, remove and discard 'O' ring.
5. Noting their fitted position, remove 10 bolts securing extension housing to gearcase.
6. Using a soft faced mallet, tap extension housing to free it from locating dowels.
7. Remove extension housing, remove and discard gasket.

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 upwards until drive gear is released.

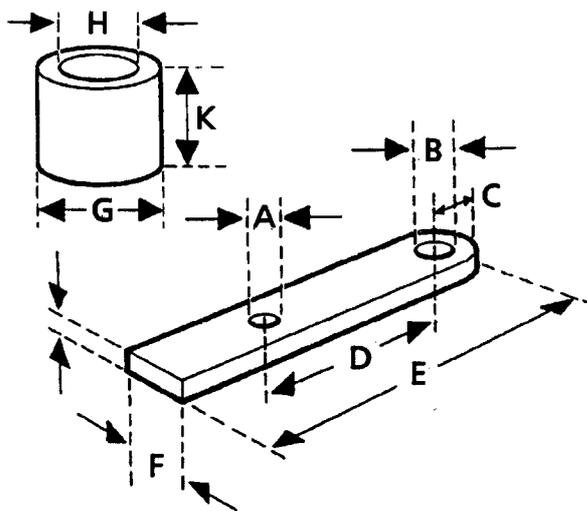
8. Remove and discard selector shaft oil seal.
9. Secure centre plate to gearcase with 2 8 x 35 mm bolts.

Output shaft and layshaft 5th gears - Remove



37M0506

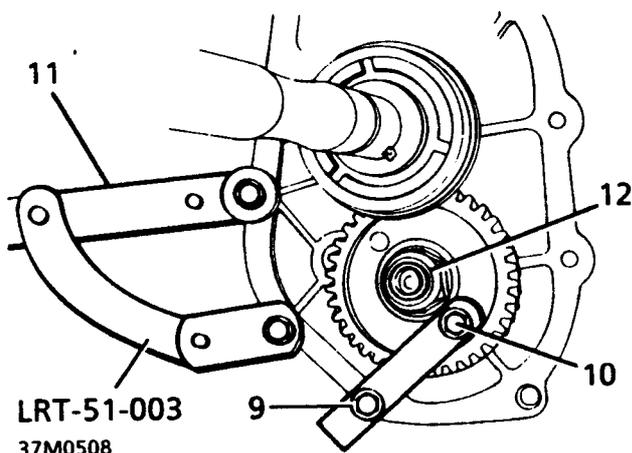
1. *If fitted:* Remove and discard 'O' ring from output shaft.
2. Remove oil pump drive shaft.
3. Remove and discard 2 'E' clips securing 5th gear selector fork to selector fork bracket; remove 2 pins
4. Release 5th gear selector fork from interlock spool, slide interlock spool off shaft, collect slippers from fork.
5. *If fitted:* Remove and discard 'E' clip from shaft.
6. Remove 2 bolts securing selector fork bracket, remove bracket.
7. Using feeler gauges, measure and record clearance between selective washer and circlip. If clearance exceeds 0.05 mm maximum, selective washer must be replaced on assembly.



37M0507

- A = 8 mm diameter
- B = 10 mm diameter
- C = 10 mm radius
- D = 55 mm
- E = 100 mm
- F = 20 mm
- G = 5 mm
- H = 8 mm diameter
- J = 20 mm diameter
- K = 23 mm

8. Make up a retaining strap and spacer to the dimensions given.



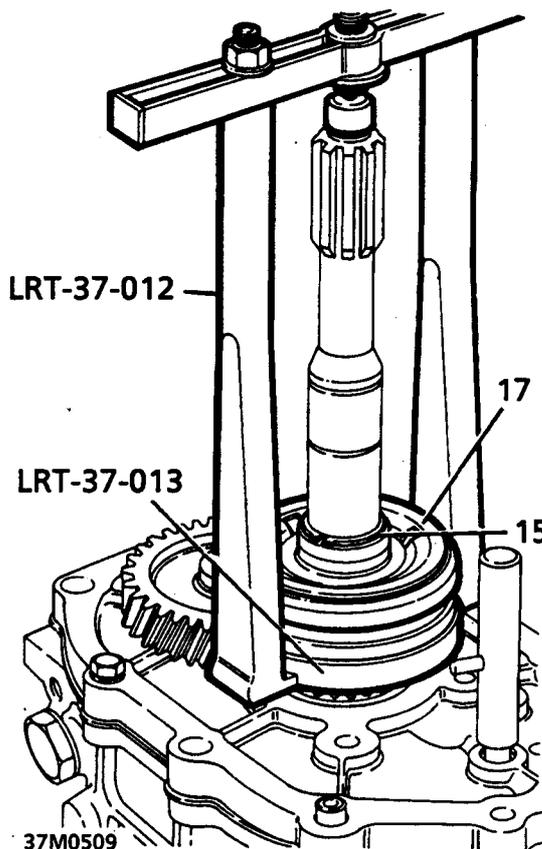
LRT-51-003
37M0508

9. Position spacer and retaining strap to gearcase and secure using 8 x 35 mm bolt.
10. Position retaining strap to layshaft 5th gear and secure using a suitable bolt.
11. Secure tool LRT - 51 - 003 to gearcase using 2 8 x 35 mm bolts.

12. Remove staking from nut securing layshaft 5th gear.
13. Restrain gearbox using tool LRT - 51 - 003, remove and discard layshaft 5th gear nut.

CAUTION: Do not lock gears together, retaining strap must be used.

14. Remove tool LRT - 51 - 003, retaining strap and spacer.



37M0509

15. Remove and discard circlip retaining 5th gear synchro assembly on output shaft, retain selective thrust washer if clearance obtained was as specified.
16. Assemble tools LRT - 37 - 012 and LRT - 37 - 013 to 5th gear synchro assembly.

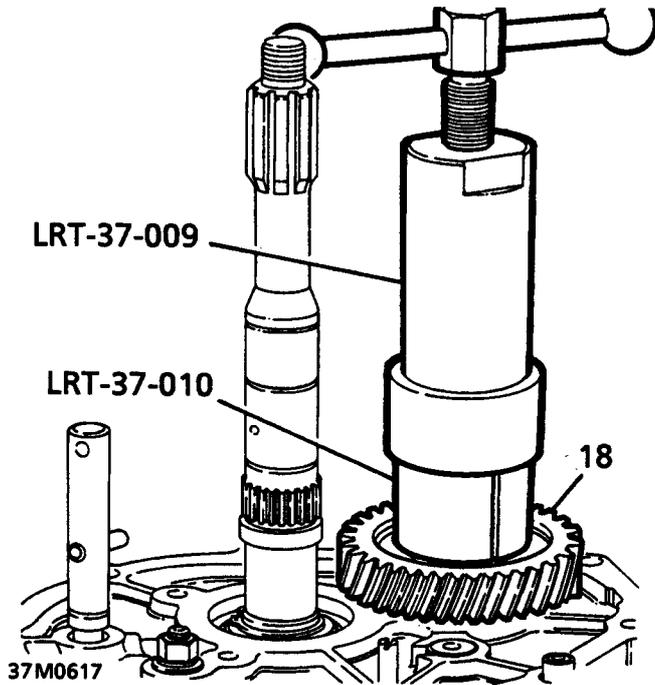
CAUTION: Ensure tangs on tool LRT - 37 - 012 locate between the pins in cut - outs of tool LRT - 37 - 013.

Note: If a plate is fitted at rear of synchro assembly, tool LRT - 37 - 013 is not required; tool LRT - 37 - 012 must locate on plate.

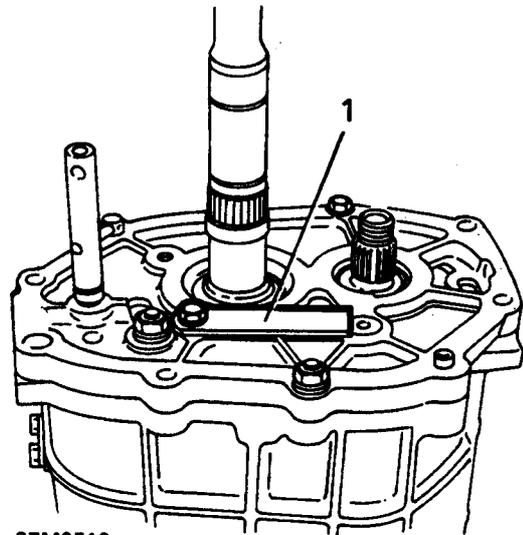
17. Remove 5th gear synchro assembly and 5th gear, recover needle bearing and thrust washer; retain washer.

CAUTION: Keep components of synchro assembly together.

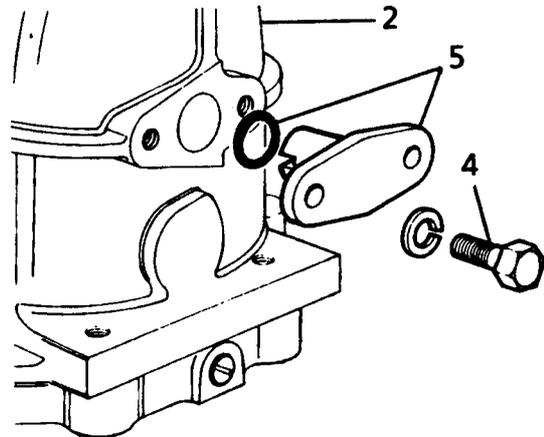
Gearcase - Remove



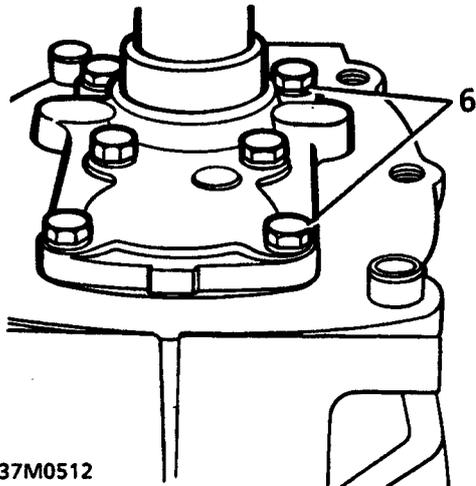
18. Using tools LRT - 37 - 009 and LRT - 37 - 010, remove layshaft 5th gear.



1. Position retaining strap to centre plate and over the end of reverse idler shaft, secure strap using a suitable bolt.



2. Invert gearbox.
3. Remove 2 8 x 35 mm bolts securing centre plate to gearcase.
4. Remove 2 bolts securing selector shaft spool retainer.
5. Withdraw spool retainer, discard 'O' ring.



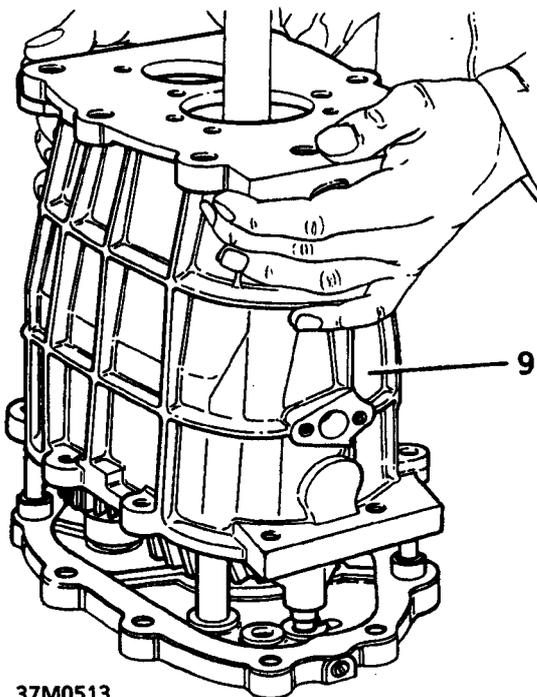
37M0512

6. Remove 6 bolts securing front cover to gearcase, remove cover; discard gasket.

Note: Dowel located.

7. Remove and discard input shaft oil seal.
8. Remove selective thrust washers.

CAUTION: Retain thrust washers.

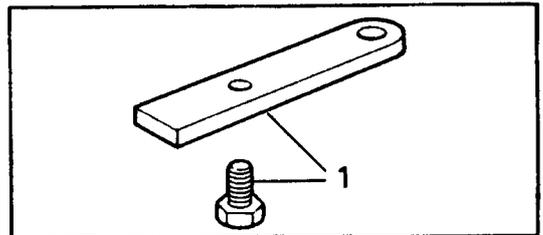
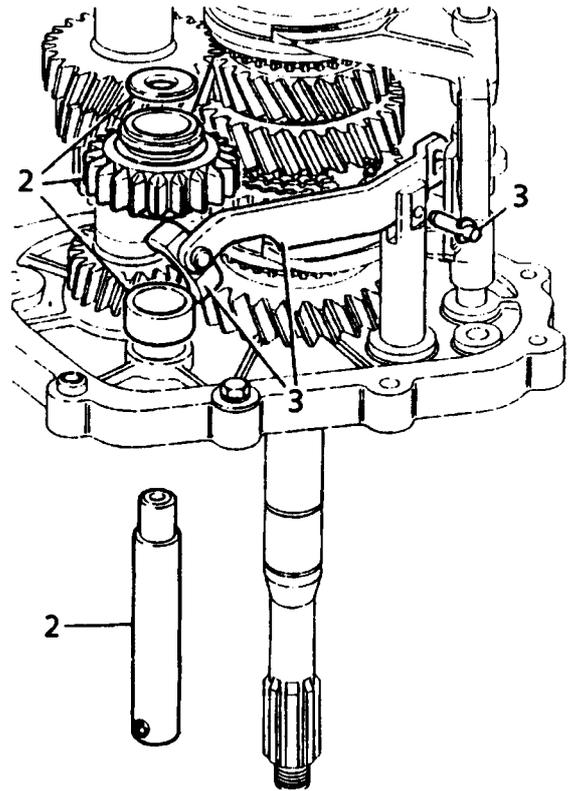


37M0513

9. Tap gearcase with a soft - faced mallet to free it from locating dowels, lift gearcase off centre plate.

Reverse idler shaft, layshaft and input shaft - Remove

Reverse idler shaft



37M0514

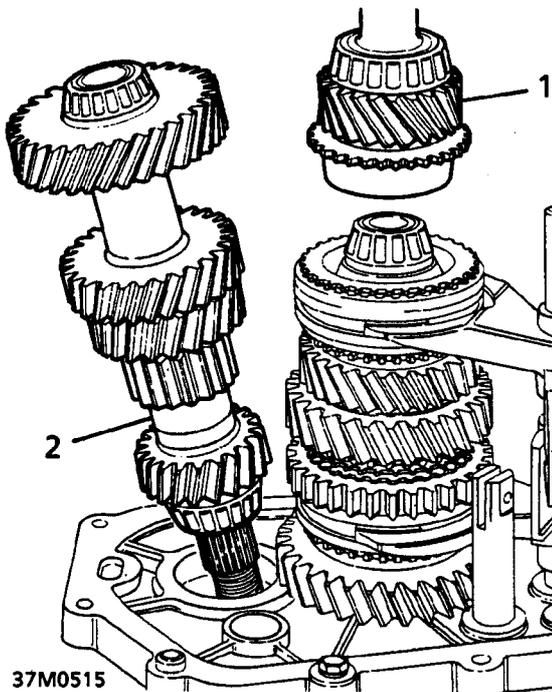
1. Remove bolt securing retaining strap, remove strap.
2. Withdraw reverse idler shaft, recover thrust washer, reverse gear and spacer.

CAUTION: Retain thrust washer.

3. Remove pin and 'E' clip retaining reverse selector lever, remove selector lever and slipper pad.

MANUAL GEARBOX

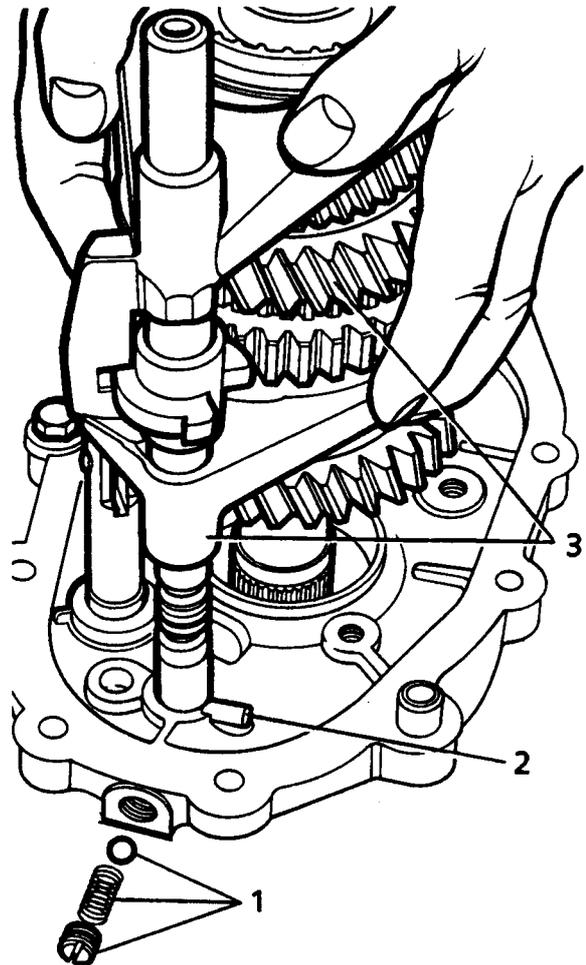
Layshaft and input shaft



1. Remove input shaft together with 4th gear synchro ring.
2. Raise output shaft until layshaft can be tilted sideways and removed from centre plate.

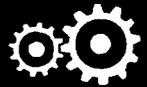
CAUTION: Do not lift output shaft more than is necessary, otherwise 4th synchro assembly will be displaced.

Output Shaft - Remove

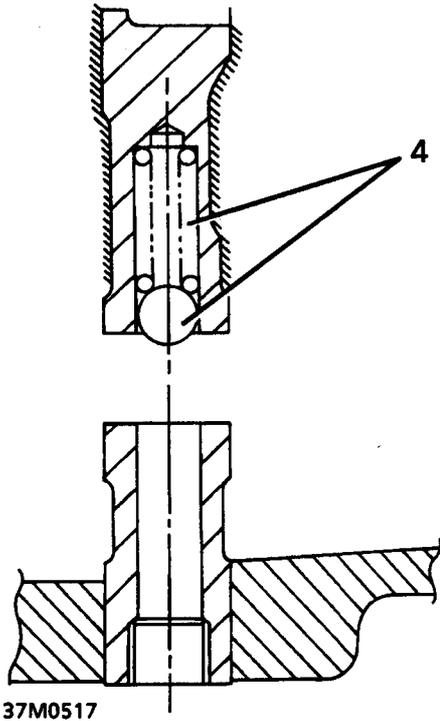


1. Remove detent plug, spring and outer detent ball.
2. Align 5th gear selector pin with slot in centre plate.
3. Remove output shaft assembly together with selector shaft and forks.

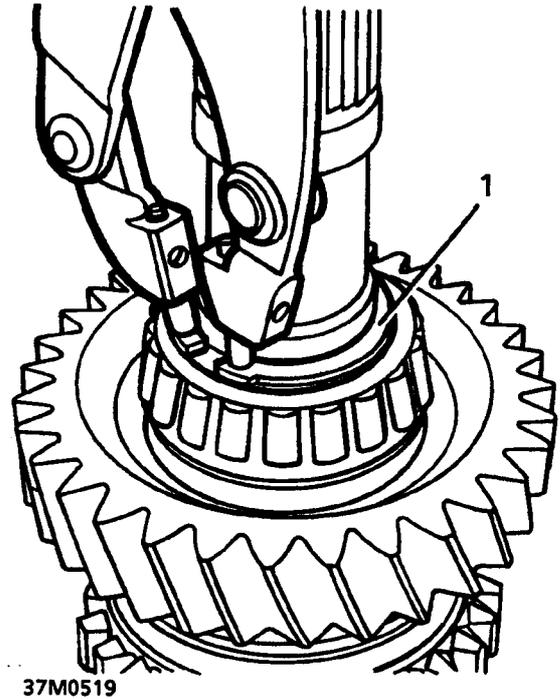
CAUTION: Keep component parts of output shaft together.



Output Shaft - Dismantle



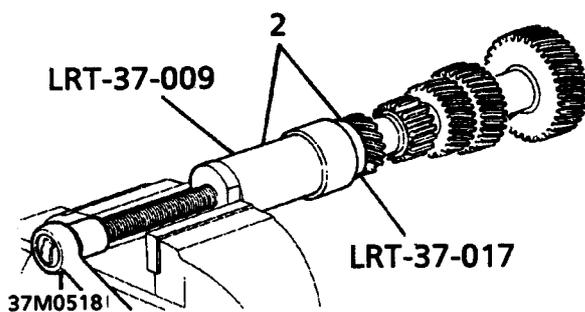
4. Recover detent ball and inner spring.



1. Remove and discard circlip retaining 1st gear assembly.

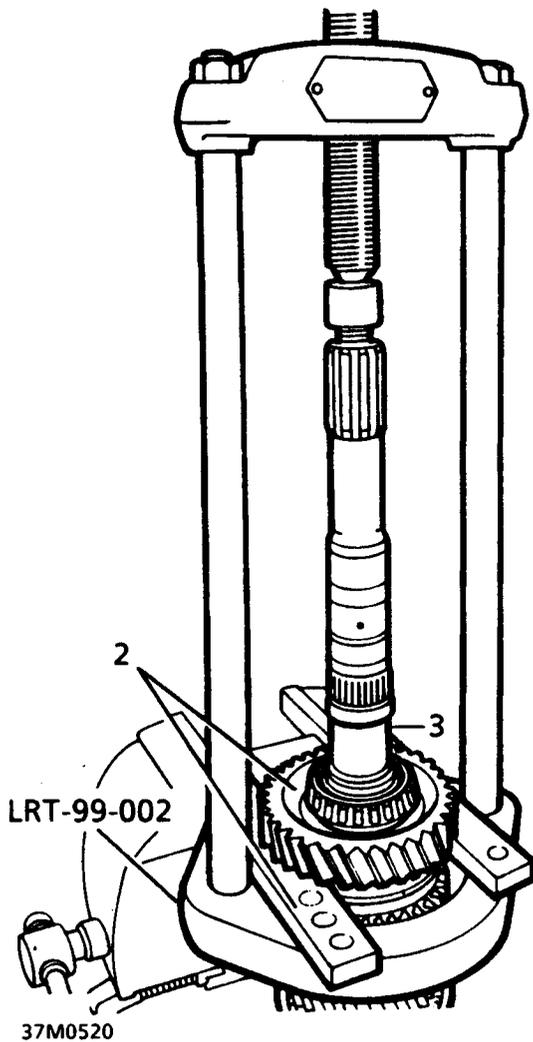
Layshaft - Dismantle

1. Check bearings for wear, overheating and smoothness of operation; bearings must not be removed if they are to be re-used.



2. If renewal of bearings is necessary, remove bearings using tools LRT - 37 - 009 and LRT - 37 - 017; discard bearings.
3. Check gears for wear, chipping of teeth and splines for damage; replace layshaft if necessary.

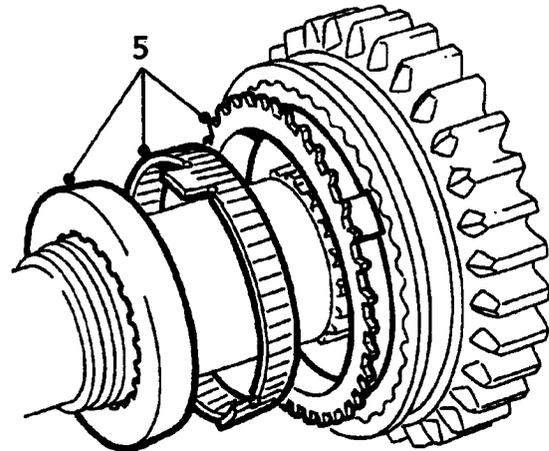
MANUAL GEARBOX



2. Position output shaft in tool LRT - 99 - 002; support 1st gear by means of 2 suitable bars.
3. Press output shaft out of 1st gear, collect taper roller bearing, selective bush, thrust washer and needle bearing.

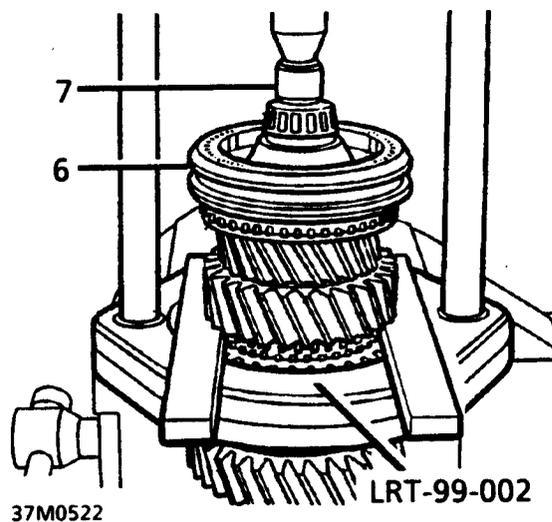
CAUTION: Retain selective bush and thrust washer.

4. Remove output shaft from tool LRT - 99 - 002.



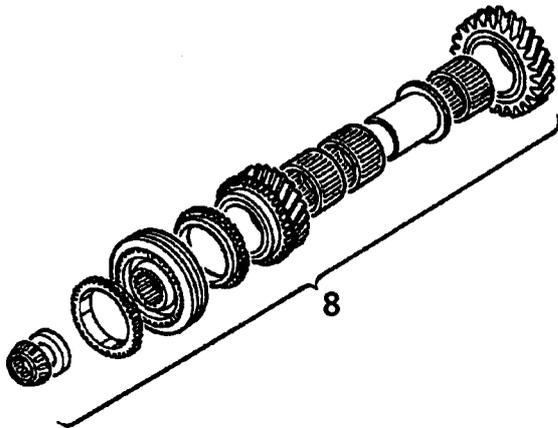
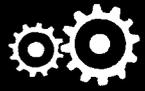
37M0521

5. Remove synchro cone, inner and outer synchro rings from 1st/2nd synchro.



37M0522

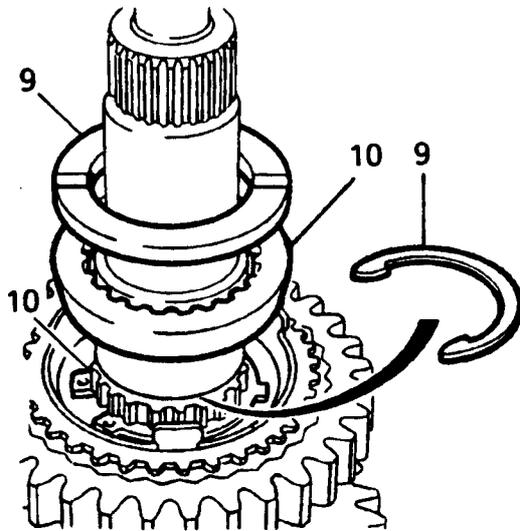
6. Invert output shaft and position it in tool LRT - 99 - 002; support 2nd gear by means of 2 suitable bars placed between 1st/2nd synchro assembly and 2nd gear.
7. Press output shaft out of 2nd gear.



37M0523

8. Collect pilot taper roller bearing, spacer, 3rd/4th synchro assembly, 3rd gear, needle bearings, 3rd gear bush and 2nd gear.

CAUTION: Retain bush; keep component parts of synchro assembly together.

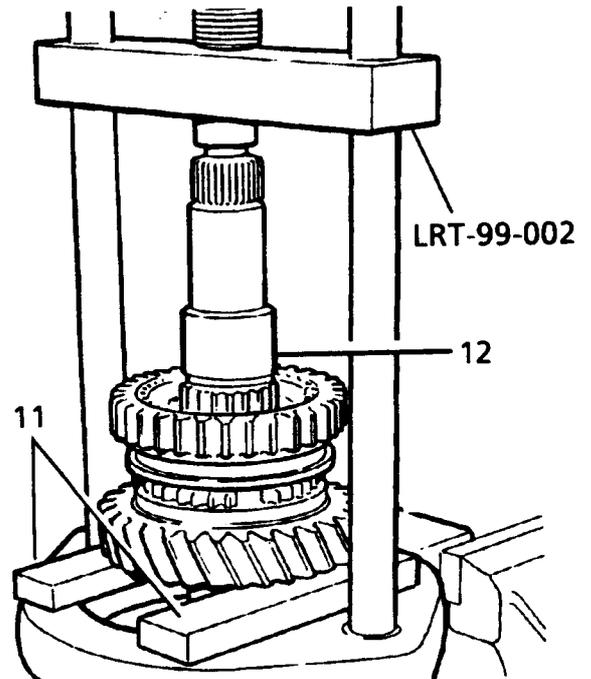


37M0524

9. Remove 'C' clip and thrust washer.

CAUTION: Retain thrust washer.

10. Remove and discard circlip, remove 1st/2nd synchro cone.



37M0613

11. Position output shaft in tool LRT - 99 - 002, support 1st/2nd synchro assembly by means of 2 suitable bars.
12. Press output shaft out of 1st/2nd synchro assembly.

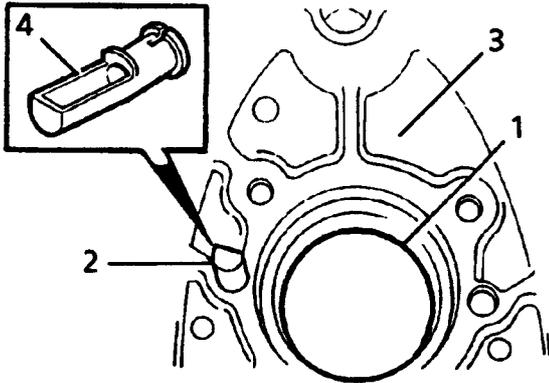
CAUTION: Keep component parts of synchro assembly together.

MANUAL GEARBOX

Gearbox casings and oil pump

1. Thoroughly clean front cover, gearcase, centre plate and extension housing. Remove all traces of gasket material using gasket removal spray. Remove all traces of sealant from plug and bolt holes.

Gearcase - Inspection



37M0525

1. Check output shaft and layshaft front bearing tracks for wear and damage, replace if necessary.

Note: Bearing tracks may be a loose fit but should be retained in position unless they and the bearings are to be replaced.

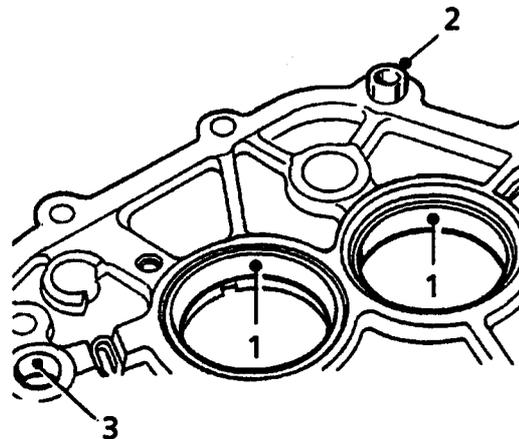
2. Remove and discard oil scoop.
3. Check gearcase for damage, cracks and damaged threads; check locating dowels are fitted.
4. Fit a new oil scoop ensuring cut - out is towards top of gearcase.

Front cover - Inspection

1. Check front cover for damage, remove any burrs from lip of oil seal recess.

CAUTION: Do not fit a new oil seal at this stage.

Centre plate - Inspection

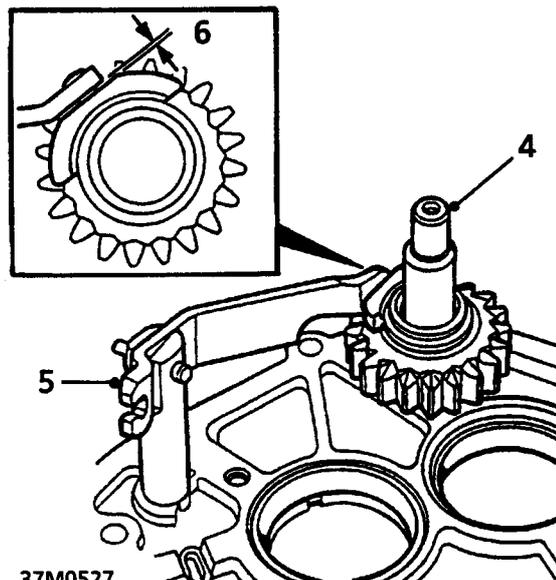


37M0526

1. Check bearing tracks for wear and damage, replace if necessary.

CAUTION: Do not remove bearing tracks unless tracks and bearings are to be replaced.

2. Check centre plate for damage and that locating dowels are fitted.
3. Check selector shaft bore for wear; if wear is evident, centre plate must be replaced.



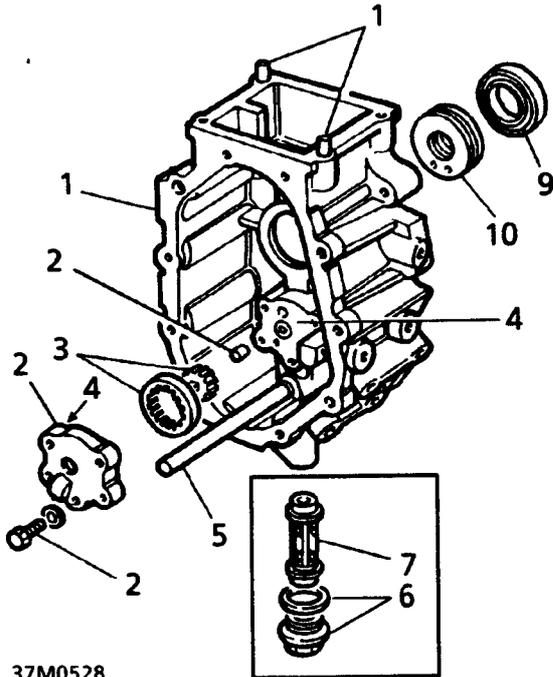
37M0527

4. Temporarily assemble reverse idler shaft, gear, bearings and spacer to centre plate.
5. Temporarily assemble reverse selector lever pivot post, reverse selector lever, slipper pad and pin.
6. Using feeler gauges, check that clearance between reverse selector lever and slipper pad does not exceed 0.725 mm. If clearance exceeds this dimension, replace slipper pad.



7. Remove components.

Extension housing and oil pump - Inspection



37M0528

Note: Types A and B gearbox extension housing shown.

1. Check extension housing for damage, cracks and damaged threads; check locating dowels are fitted.
2. Remove bolts securing oil pump cover, release cover from locating dowel.
3. Check gears for wear and chipping of teeth.
4. Check gear running surfaces of cover and extension housing for scoring; replace oil pump as an assembly if scoring is evident. If oil pump gear running surface of extension housing is scored, replace housing.
5. Check oil pick - up pipe is clear.

CAUTION: Do not remove pick - up pipe.

If fitted

6. Remove plug, discard sealing washer.
7. Remove filter, clean or replace as necessary.
8. Fit filter, fit new sealing washer and drain plug; tighten plug to 73 Nm.

Types A, B and C gearbox

9. Remove and discard output shaft oil seal.
10. Remove and discard Ferrobestos bush.

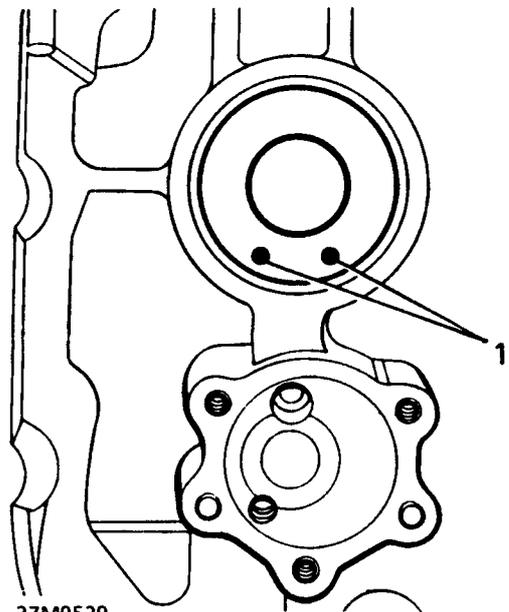
WARNING: Bush contains asbestos; do not attempt to clean bush, dispose of it in accordance with legislative requirements.

Type C gearbox

1. Recover speedometer drive gear and spacer.

2. Remove output shaft bearing using suitable bearing extractor.
3. Check output shaft bearing for wear and damage, replace if necessary.
4. Check speedometer drive gear for wear and damage, replace if necessary.
5. Check speedometer pinion for wear and damage and that scrolling on shaft is clear; replace pinion and shaft if necessary.
6. Check slots in 5th gear spool guide for wear, replace spool guide if necessary.

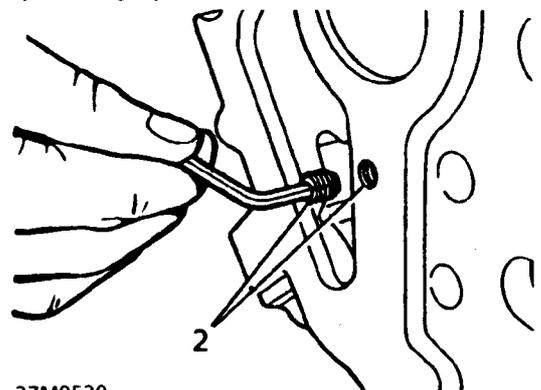
Types A, B and C gearbox



37M0529

1. Fit new Ferrobestos bush ensuring oil drain holes face towards bottom of extension housing.

CAUTION: If drain holes are not positioned correctly, leakage past oil seal will result.

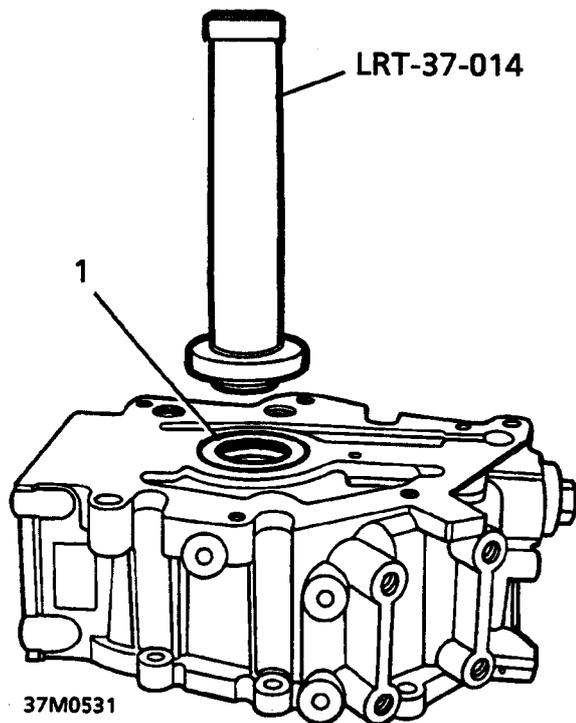


37M0530

2. If extension housing is being replaced, remove setscrew or bolt from old housing.
3. Remove all traces of Loctite from threads.
4. Apply Loctite 242 to threads of setscrew or bolt and fit to replacement housing; tighten setscrew or bolt.

MANUAL GEARBOX

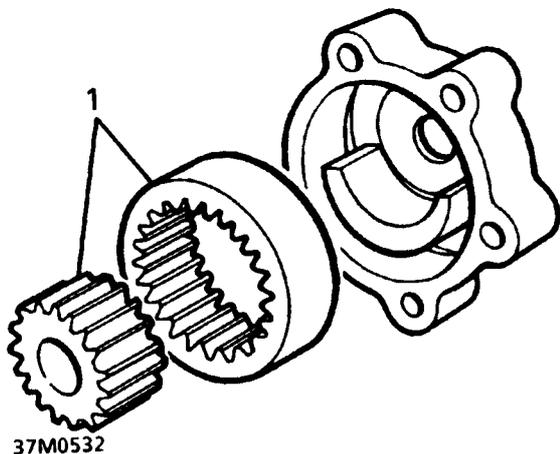
Types A and B gearbox only



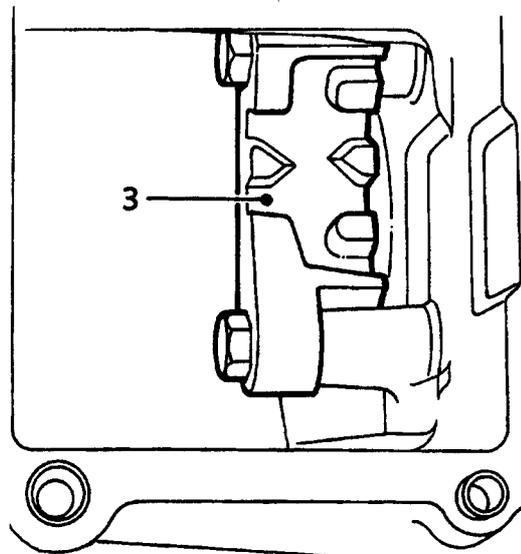
1. Smear a new output shaft oil seal with gearbox oil.
2. Fit oil seal, lip side towards extension housing using tool LRT - 37 - 014.

CAUTION: Type C gearbox - do not fit bearing or oil seal at this stage.

Types A, B and C gearbox



1. Apply gearbox oil to oil pump gears, position gears to cover.
2. Fit oil pump to extension housing, fit bolts and tighten progressively to 10 Nm.



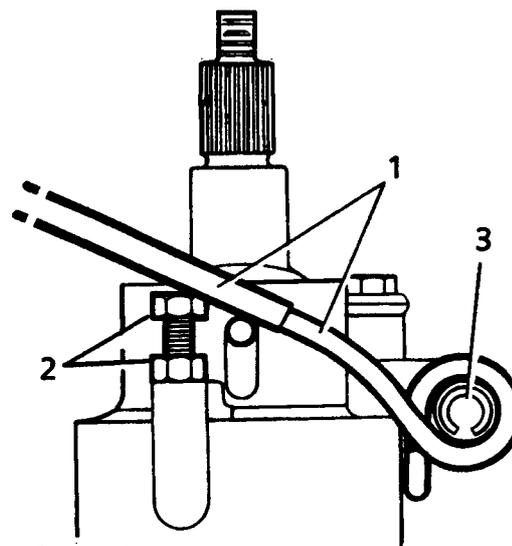
37M0533

3. If fitted: Check slots in gate plate for wear, replace plate if necessary.

Gear change/selector housings - Overhaul

Gear change housing - Type A gearbox

Dismantle



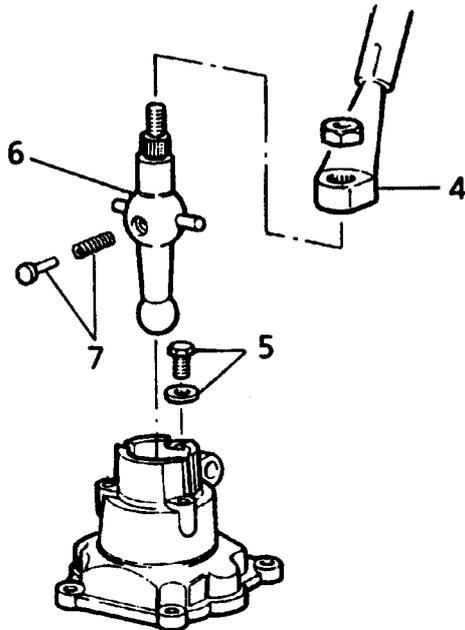
37M0534

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.



Remote housing - Type A gearbox

Dismantle



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.

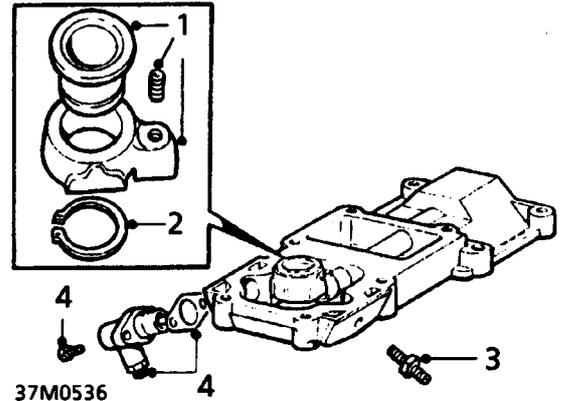
Reassemble

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 10 Nm.
4. Fit extension to lower gear lever.
5. Position roll pin 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.

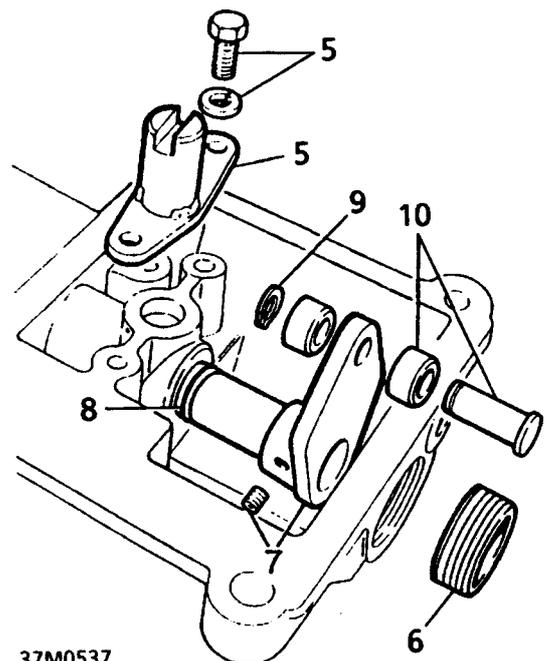
Note: Do not adjust bias spring at this stage.



37M0536

1. Remove setscrew securing trunnion to selector shaft, remove trunnion.
2. Remove and discard circlip securing ball pin seating to trunnion, remove seating.
3. Slacken locknut, remove 5th gear stop screw.
4. Remove 2 bolts securing reverse gear plunger, remove plunger, recover shim(s).

CAUTION: Retain shim(s).

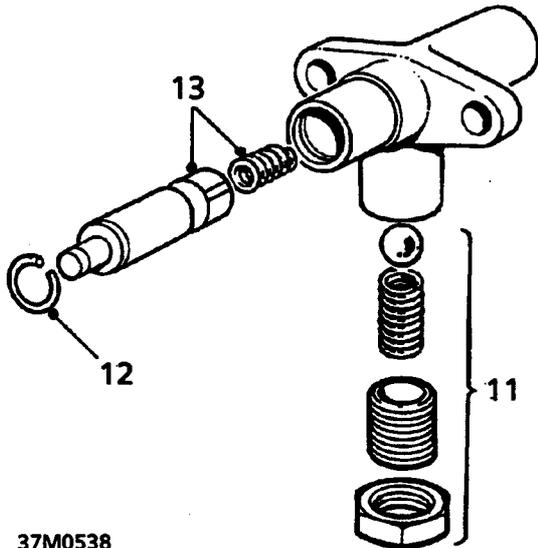


37M0537

5. Remove 2 bolts securing 5th gear spool guide, remove guide.
6. Remove blanking plug from end of remote housing.
7. Remove setscrew securing quadrant to selector shaft, remove quadrant.

MANUAL GEARBOX

8. Remove selector shaft from remote housing, remove and discard 'O' ring.
9. Remove and discard circlip retaining rollers and pin to quadrant.
10. Remove pin, recover rollers.



37M0538

11. Slacken locknut and remove plug from reverse gear plunger, withdraw spring and detent ball.
12. Remove and discard circlip retaining release plunger.
13. Withdraw release plunger and spring.
14. 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.

CAUTION: If ball pin seating is worn it must be replaced together with the lower gear lever.

4. Check reverse gear plunger detent ball and ball seating in plunger body for wear; check springs for wear and distortion.
5. Replace worn components as necessary.

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 242 to threads of setscrew, fit and tighten setscrew.
7. Apply Loctite 242 to threads of blanking plug, fit and tighten plug.
8. Position 5th gear spool guide, apply Loctite 242 to threads of securing bolts, fit and tighten bolts to 10 Nm.

9. Smear ball pin seating with multi-purpose grease.
10. Position ball pin seating in trunnion, secure with a new circlip.
11. Position trunnion on selector shaft.
12. Apply Loctite 242 to threads of setscrew, fit and tighten setscrew.
13. Smear reverse gear plunger and spring with multi-purpose grease.
14. Fit spring and plunger, secure with a new circlip.
15. Smear detent ball and spring with gearbox oil and fit to reverse gear plunger.
16. Fit plug and tighten locknut.

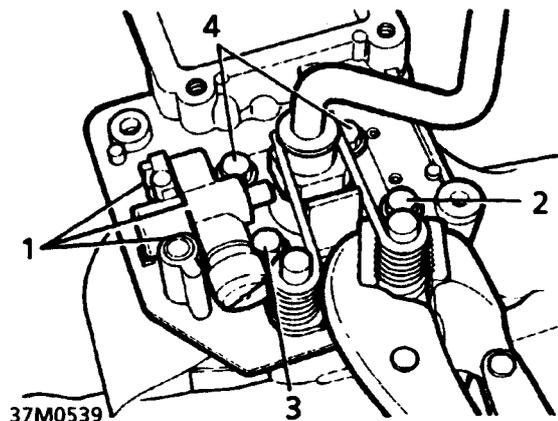
Note: Reverse gear plunger adjustment is carried out during gearbox reassembly.

17. Check that plunger returns when depressed.
18. Position reverse gear plunger and original shim(s) to remote housing, fit bolts and tighten to 10 Nm.
19. 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



37M0539

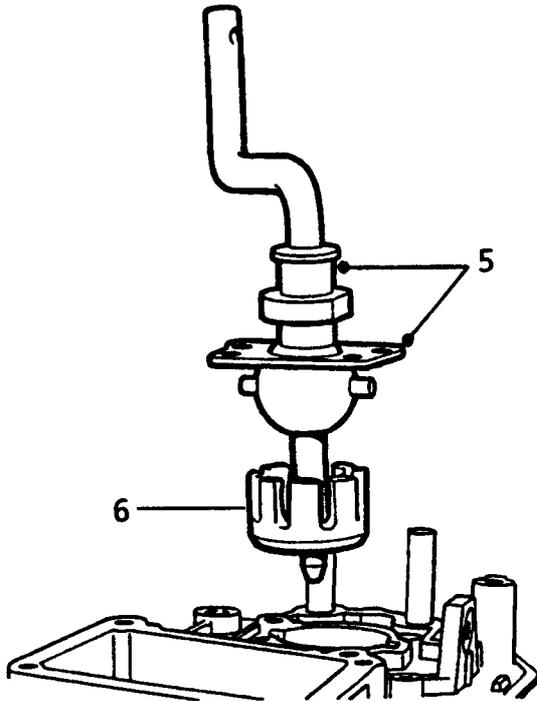
1. Remove bolt securing reverse plunger, remove plunger; recover shim(s).

CAUTION: Retain shim(s).

2. Restrain bias spring using a suitable pair of grips and remove bolt retaining spring; remove spring.

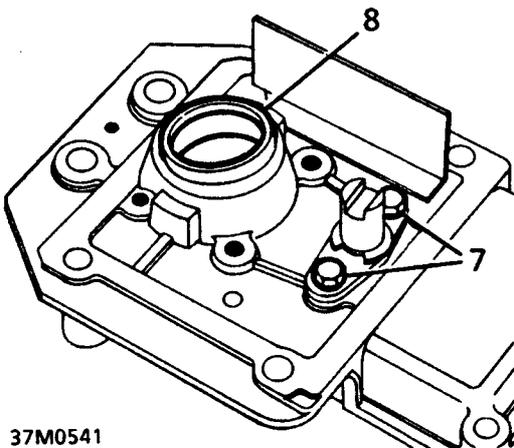
WARNING: Personal injury may result if bias spring is not restrained.

3. Repeat procedure for remaining bias spring.
4. Remove 2 bolts securing bias adjustment plate to gear change housing.



37M0540

5. Remove gear lever and bias adjustment plate.
6. Remove and discard Railko bush.



37M0541

7. Invert gear change housing, check that spool guide bolts are tight.
8. Remove and discard oil seal.

Inspection

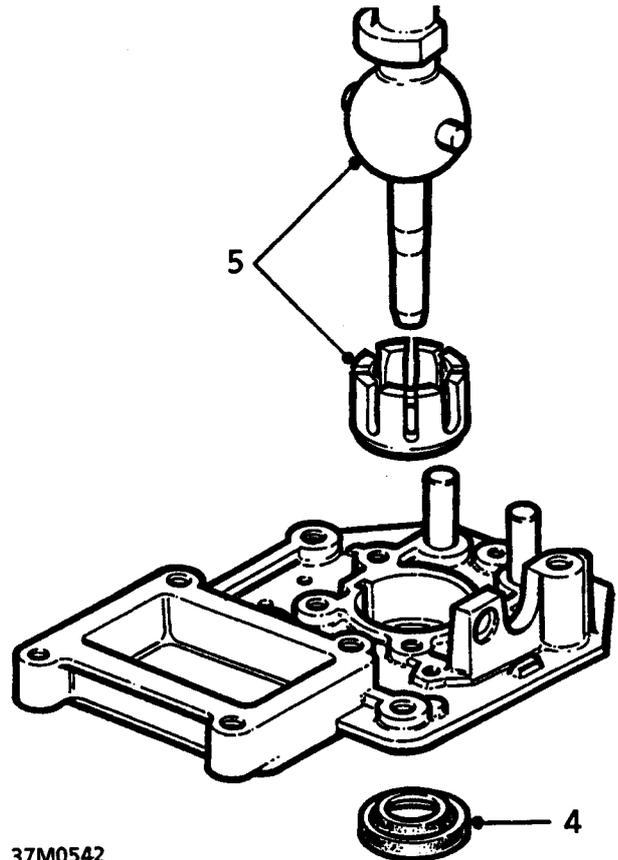
1. Check ball cross pin slots in gear change housing for wear.
2. Check ball and cross pins for wear.
3. Check bias springs for distortion.
4. Replace worn components as necessary.
5. Fit reverse switch plunger to reverse switch.
6. Position reverse plunger on bed of hand press and check that plunger 'trips' when a load of 45 to 55 kg is applied to end of plunger. Replace plunger as an assembly if operation is not satisfactory.

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 slots in bush are aligned with slots in housing.

3. Lubricate a new oil seal with gearbox oil.

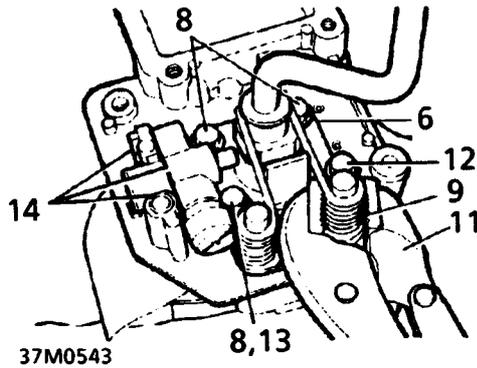


37M0542

4. Fit oil seal 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.

Transfer box selector housing - Type A gearbox - Overhaul

Dismantle

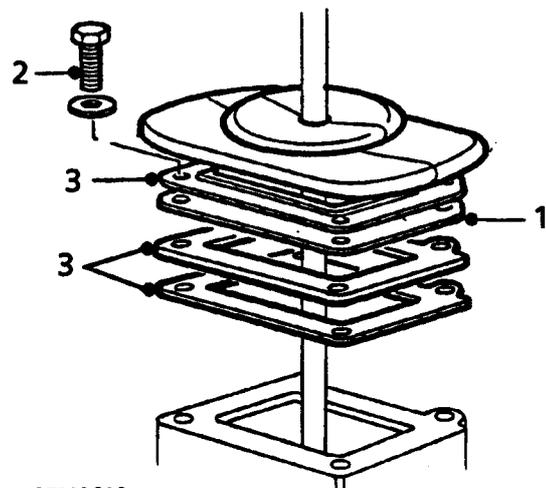


6. Position bias spring adjustment plate to gear change housing.
7. Apply Loctite 222 to threads of 2 short bias adjustment plate bolts.
8. Fit bolts to secure front of bias adjustment plate and tighten to 25 Nm.
9. Position bias spring to pillar ensuring longest end of spring is against gear lever.
10. Apply Loctite 222 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.

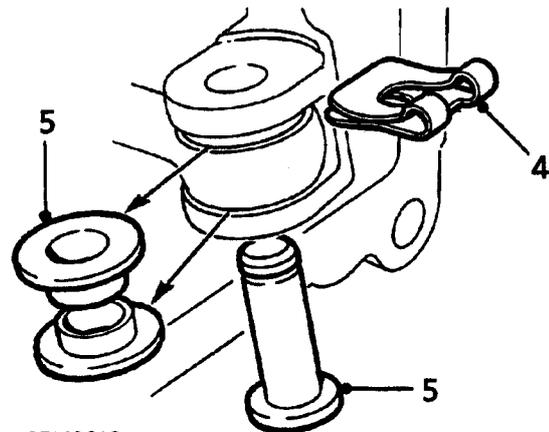
WARNING: Personal injury may result if bias spring is not restrained.

12. Fit bolt and washer ensuring end of bias spring is retained beneath washer; tighten bolt to 25 Nm.
13. Repeat procedure for remaining bias spring.
14. Fit reverse plunger and original shim(s), fit bolt and tighten to 25 Nm.

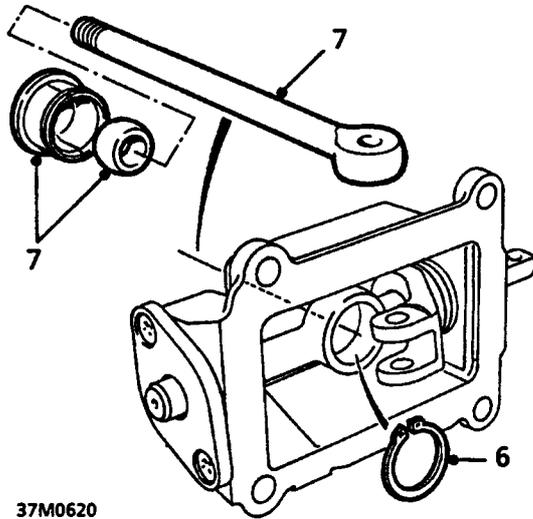
Note: Do not carry out reverse gear plunger adjustment or fit housing cover at this stage.



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.

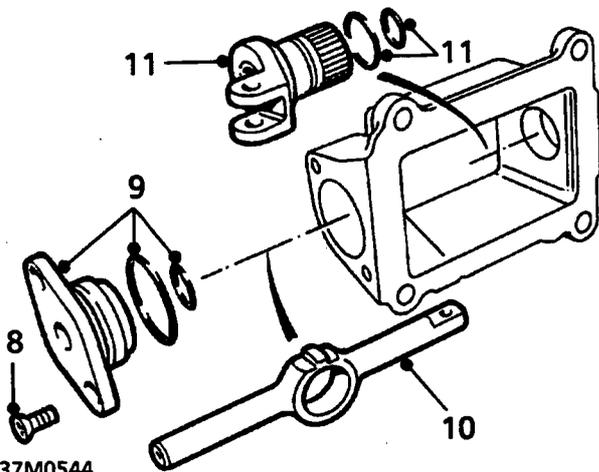


4. Remove and discard spring clip retaining selector fork clevis pin.
5. Remove clevis pin from selector fork, remove and discard 2 bushes.



37M0620

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



37M0544

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.

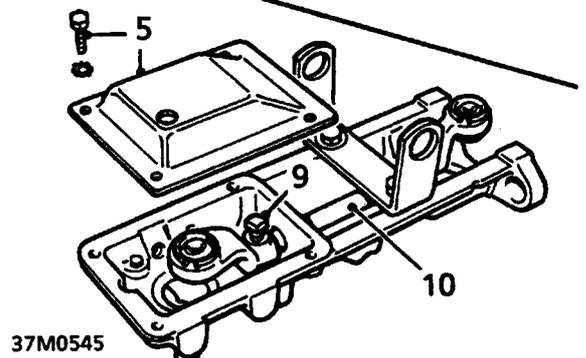
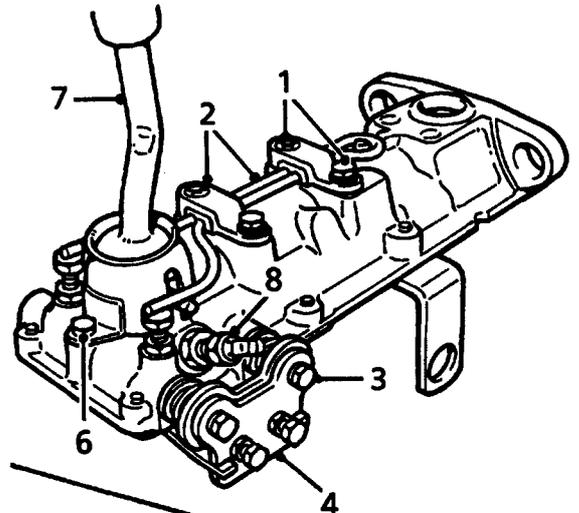
3. Check selector fork and clevis pin for wear.
4. Check cross shaft and end cover for wear.
5. Replace components as necessary.

Reassemble

1. Smear new 'O' rings with gearbox oil and fit to selector fork, position fork in housing.
2. Smear cross shaft with multi-purpose grease and locate longest end of shaft in selector fork.
3. Smear 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. Smear 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. Fit gaiter.

Remote gear change - Type C gearbox

Dismantle



37M0545

1. Remove 2 bolts and 2 countersunk screws securing bias spring bridge plates.
2. Remove bridge plates, bridge plate liners and bias spring.

MANUAL GEARBOX

3. Remove 2 bolts and washers securing reverse baulk plate.
4. Remove reverse baulk plate, springs, spacers and shims.
5. Remove 4 bolts and washers securing bottom cover plate, remove plate.
6. Remove bolt securing gear lever cap, remove cap.
7. Remove gear lever, recover anti - rattle spring and plunger.
8. Slacken locknut, remove reverse light switch.
9. Remove pinch bolt securing selector rod yoke, remove yoke.
10. Withdraw selector rod from remote housing.
11. Clean components.

8. Fit reverse baulk plate, springs, spacers and original shims.
9. Fit and tighten reverse baulk plate retaining bolts.

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

10. Slacken bias spring adjustment bolt locknuts.
11. Fit bias spring, bridge plate liners and bridge plates.
12. Fit and tighten bolts and countersunk screws.

Note: Final adjustment of bias spring, 1st/2nd gate stop and reverse baulk plate is carried out after remote gear change is fitted to gearbox.

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 and bush 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.

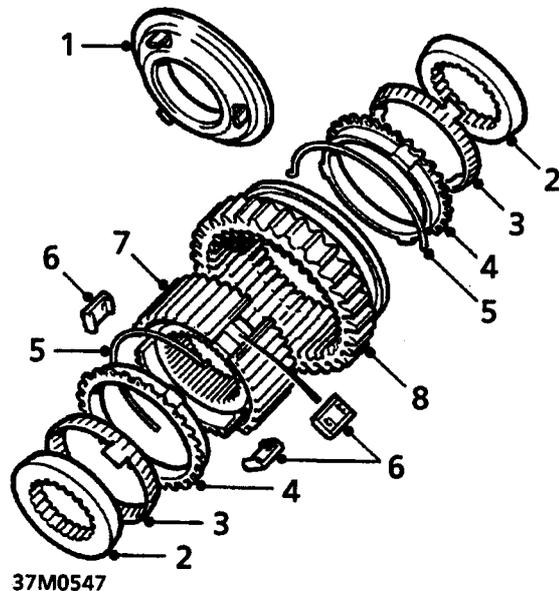
Reassemble

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 and tighten pinch bolt.
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 and tighten bolt.
7. Fit reverse light switch.

Note: Do not tighten locknut at this stage; final adjustment of reverse light switch must be carried out after gearbox is refitted in vehicle.

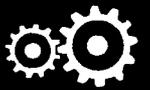
Synchro assemblies - Overhaul

CAUTION: Keep component parts of synchro assemblies together.

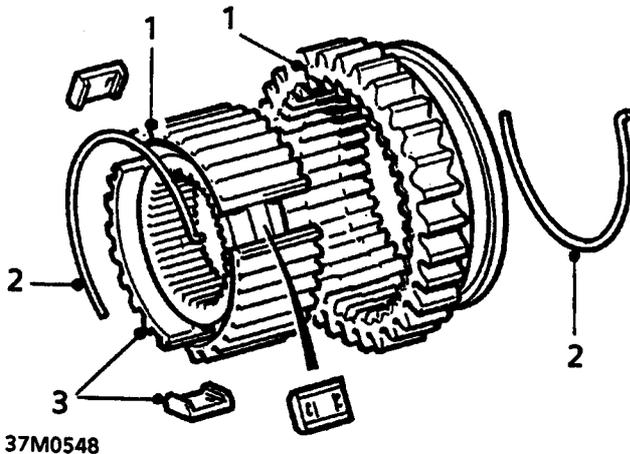


Synchro Assembly Components

1. Retainer plate - 5th synchro only
2. Synchro cone - 1st/2nd synchro only
3. Inner synchro ring - 1st/2nd synchro only
4. Outer synchro ring
5. Spring ring
6. Slippers
7. Synchro hub
8. Synchro sleeve



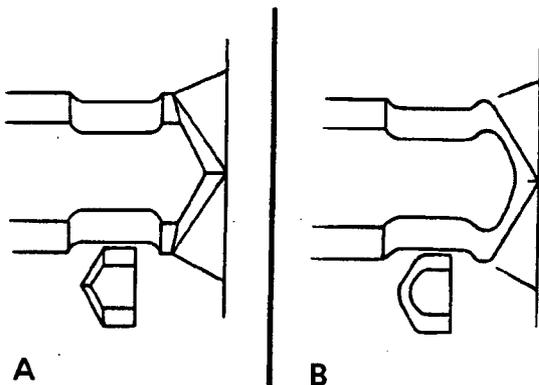
Dismantle



1. Suitably mark relative position of each hub to its respective sleeve.
2. Remove 2 spring rings.
3. Remove hub from sleeve, collect 3 slippers.
4. Clean all components.

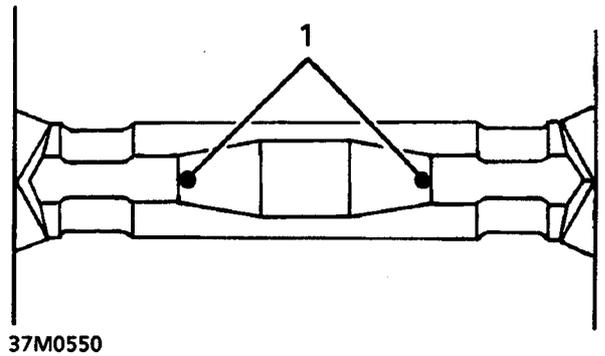
Inspection

1. Check all components for wear and damage, check spring rings for distortion and loss of tension.
2. Check that no radial movement exists between splines of 1st/2nd and 3rd/4th synchro hubs and mating splines of output shaft.
3. Check that no radial movement exists between mating splines of synchro hubs and sleeves; check that hubs move freely from side to side of sleeve.



4. Check mating teeth profiles of synchro hubs and sleeves. Tooth profiles **A** are satisfactory, profiles **B** are unsatisfactory.

1st/2nd synchro assembly

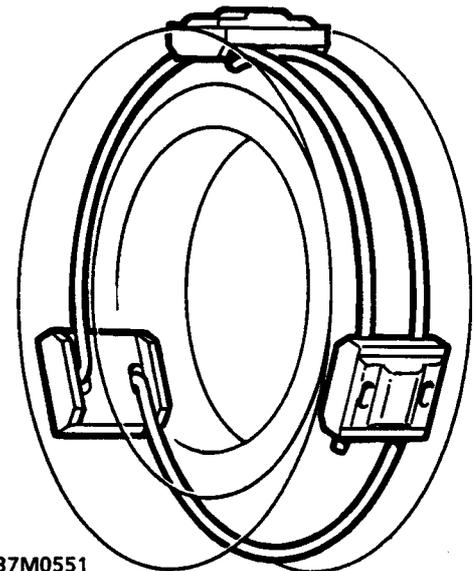


1. Check that edges of machined step in inner splines of synchro sleeve are sharp not rounded.

CAUTION: Should any component of a synchro assembly show signs of wear or damage, synchro must be replaced as an assembly.

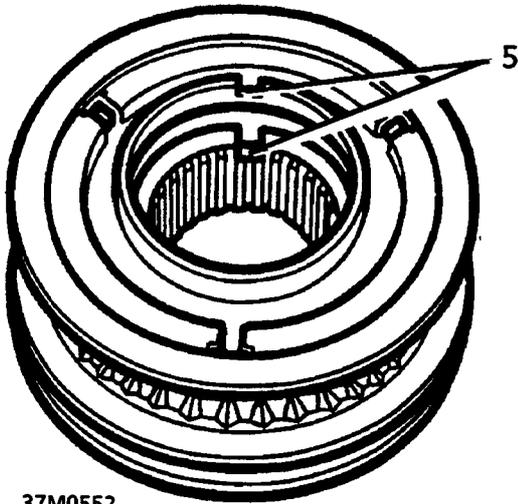
Reassemble

1. Smear all components with gearbox oil prior to assembly.
2. Assemble synchro hub to sleeve ensuring that reference marks are aligned.
3. Position slippers to synchro hub ensuring radiussed face of each slipper is towards synchro sleeve.



4. Fit spring rings ensuring that hooked end of each ring is located in hole in the same slipper and that rings run in opposite directions.

MANUAL GEARBOX

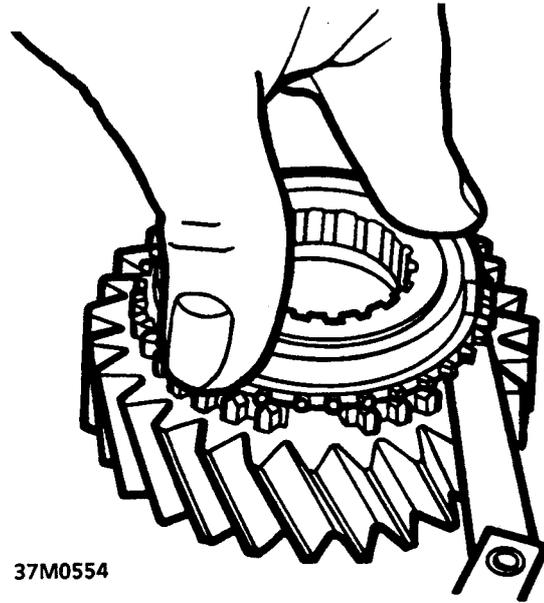


37M0552

5. 5th synchro assembly: Fit retainer plate ensuring tag is located in slot in synchro hub.

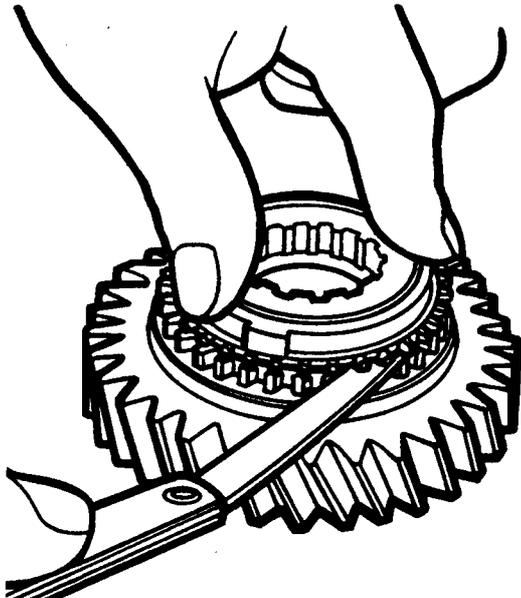
Checking synchro ring clearances

1. Assemble synchro outer rings to their respective gears.



37M0554

2nd gear



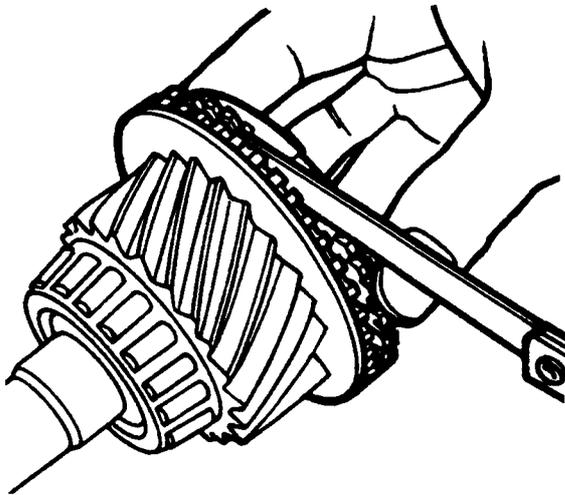
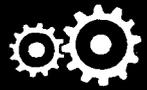
37M0553

1st gear



37M0555

3rd gear



37M0556

4th gear

1. Press each synchro outer ring against gear and using feeler gauges, measure gap between ring and gear.
Synchro outer ring to gear clearance = 0.38 mm - minimum.
2. If clearance between any synchro ring and gear is less than specified, renew synchro assembly.

Input shaft - Inspection

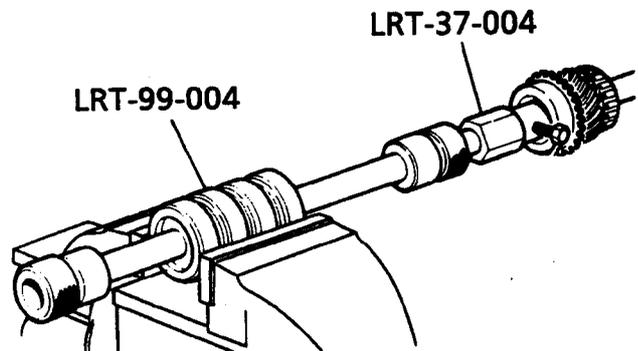
1. Check gear for wear and chipping of teeth.
2. Check bearings for wear and signs of overheating, check pilot bearing track for wear.
3. Check input shaft splines and oil seal track for wear and damage.



37M0557

5th gear

Front and pilot bearings - Renew

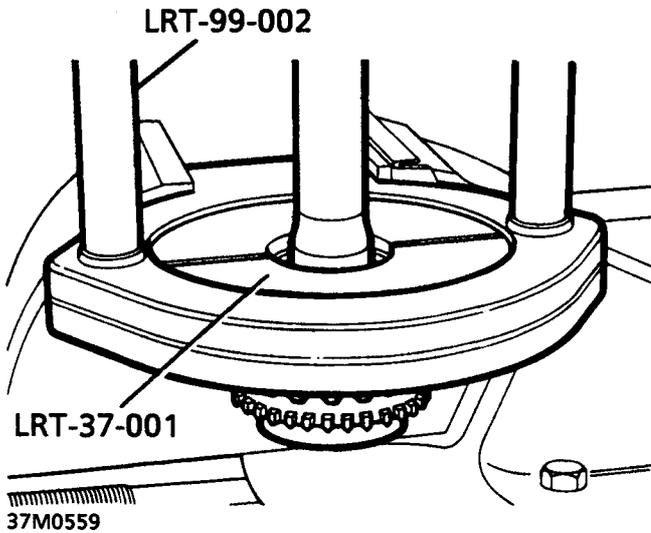


37M0558

CAUTION: Do not remove pilot bearing track unless either the pilot bearing or the bearing track is to be replaced.

1. Using tools LRT - 99 - 004 and LRT - 37 - 004, remove and discard pilot bearing track.

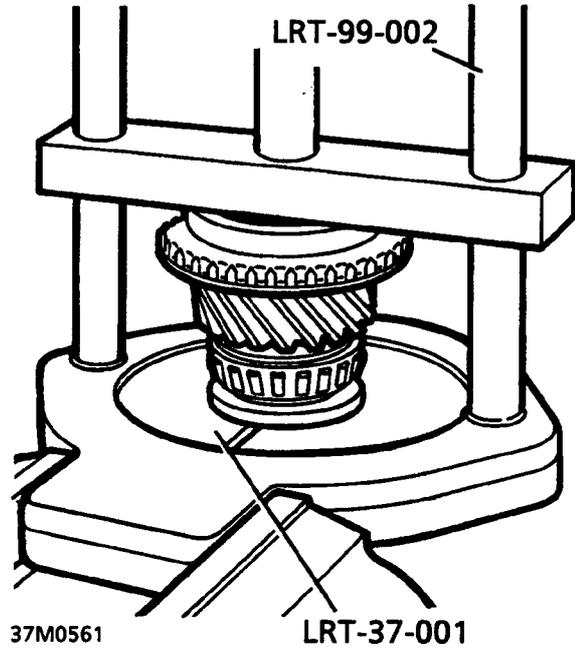
MANUAL GEARBOX



CAUTION: Do not remove front bearing unless it is to be replaced. If bearing is to be replaced, remove and discard bearing track from gearbox casing.

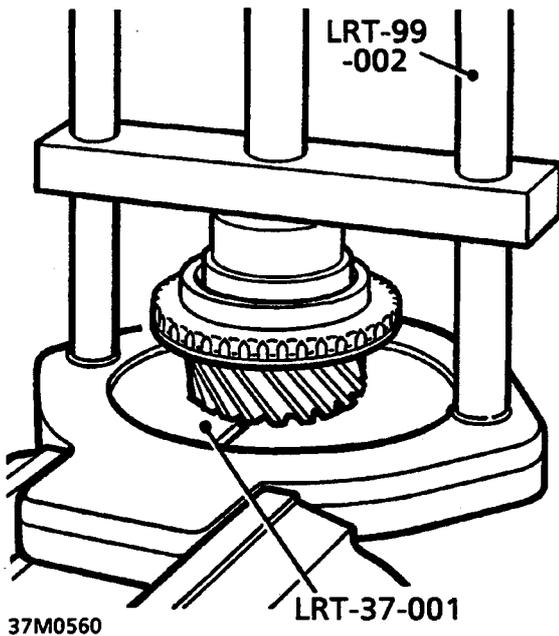
- Using tools LRT - 37 - 001 and LRT - 99 - 002, remove and discard front bearing.

CAUTION: Ensure lip of tool LRT - 37 - 001 is located behind front bearing.

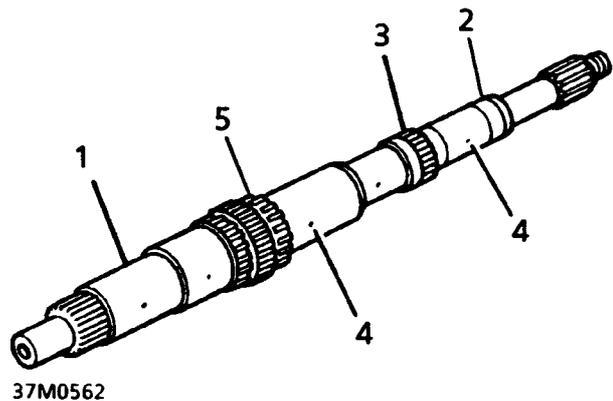


- Using tools LRT - 37 - 001 and LRT - 99 - 002, press a new front bearing on to input shaft.

Output shaft and gears - Inspection



- Using tools LRT - 37 - 001, LRT - 99 - 002 and a suitable mandrel, press in a new pilot bearing track.



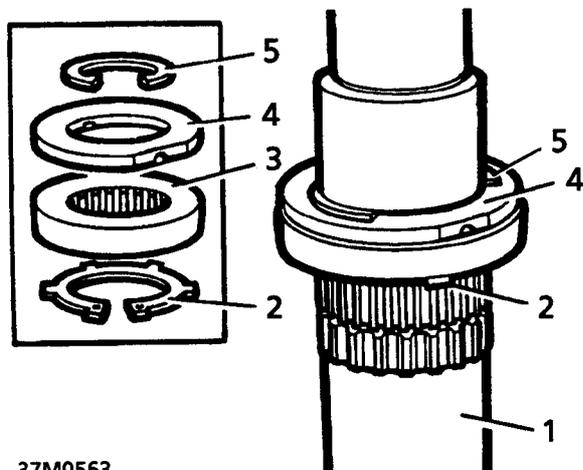
- Check bearing journals for wear.
- Check condition of circlip grooves.
- Check splines for wear and damage.
- Check oil drillings are unobstructed.
- Check gear teeth for signs of wear and chipping.
- Check gear splines for wear and damage.
- Check bushes, bearings and thrust washers for wear and damage.

CAUTION: Do not discard a damaged 1st gear selective bush until end - float checks have been carried out. If pilot bearing track in input shaft has been replaced, discard original pilot bearing.

- Replace components as necessary.



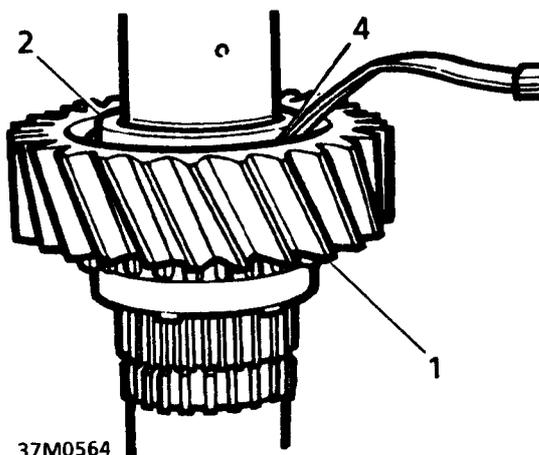
Check end - float of gears



37M0563

1. Secure front end of output shaft in a soft-jawed vice.
2. Fit a new 1st/2nd synchro circlip.
3. Fit 1st/2nd synchro cone.
4. Fit a new thrust washer.
5. Fit a new 'C' clip to retain thrust washer.

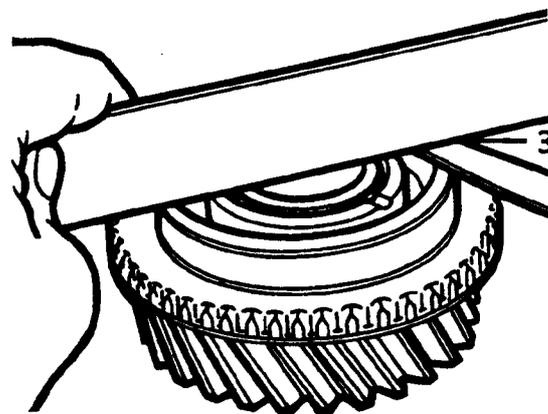
2nd gear end - float



37M0564

1. Assemble needle roller bearing to 2nd gear, position on output shaft.
2. Fit 3rd gear bush.
3. Press bush towards gear.
4. Using feeler gauges, check end float between 2nd gear and bush flange.
2nd gear end float = 0.20 mm - maximum.
5. If end float exceeds above figure, fit a new 3rd gear bush and re-check. If end float is still excessive, fit a new 2nd gear.
6. Remove components from output shaft.

3rd gear end - float



37M0565

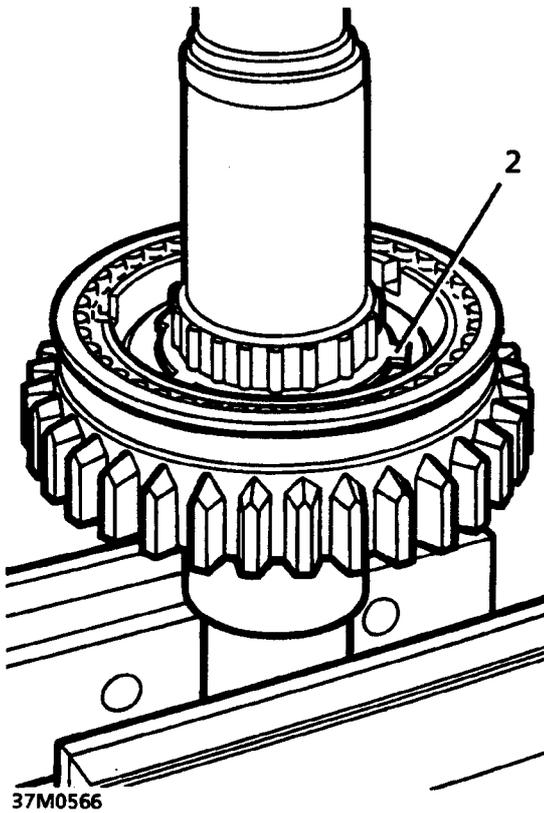
1. Assemble needle roller bearings and 3rd gear bush to 3rd gear.

Note: Bush flange must be on bevel teeth side of gear.

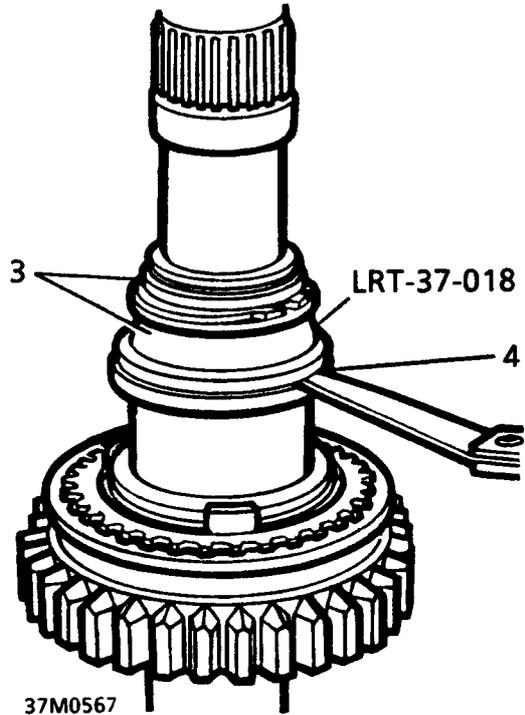
2. Place gear on a flat surface, bevel teeth side downwards.
3. Using a straight edge and feeler gauges determine gear end float by measuring clearance between straight edge and flange of gear.
Clearance = 0.20 mm - maximum.
4. If clearance exceeds above figure, fit a new 3rd gear bush and re-check.
5. If clearance is still excessive, fit a new 3rd gear.

MANUAL GEARBOX

1st gear bush end - float



1. Secure rear end of output shaft in a soft-jawed vice.
2. Fit 1st/2nd synchro assembly, original 1st gear bush and thrust washer; fit a new circlip.

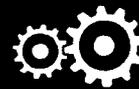


3. Position dummy bearing, tool LRT-37-018 on output shaft, fit a new circlip.
4. Using feeler gauges, check and record clearance between flange of 1st gear bush and dummy bearing.

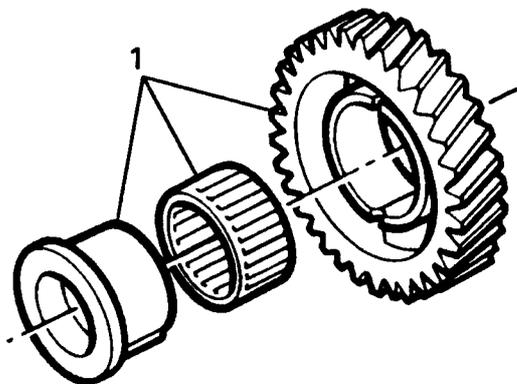
Note: Figure obtained is 1st gear bush end - float.
1st gear bush end - float = 0.075 mm - maximum.

5. Remove circlip, dummy bearing and 1st gear bush.
6. If 1st gear bush end - float exceeded 0.075 mm, measure overall length of bush and from the range available, select a bush of sufficient length to give correct clearance. Discard original bush.

Note: Bushes are available from 30.905 mm to 31.155 mm in length rising in increments of 0.050 mm.

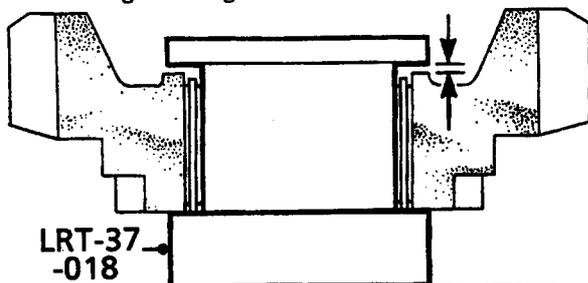


1st gear end - float



37M0568

1. Fit selected 1st gear bush and needle bearing to 1st gear.



37M0632

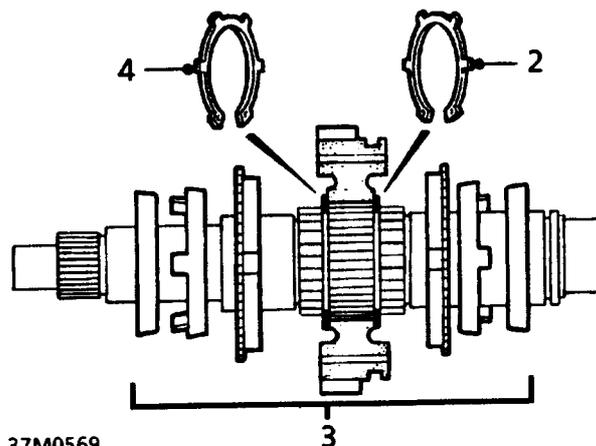
2. Place 1st gear on dummy bearing tool LRT - 37 - 018.
3. Using feeler gauges, measure gap between 1st gear and flange of bush.

Note: Figure obtained is end - float of 1st gear.
1st gear end - float = 0.20 mm - maximum.

4. If end - float exceeds 0.20 mm, fit a new 1st gear and re - check. If end - float is still excessive, remove bush and rub bottom end of bush on wet or dry paper placed on a flat surface. Recheck gear end - float at frequent intervals and continue until end - float is correct.

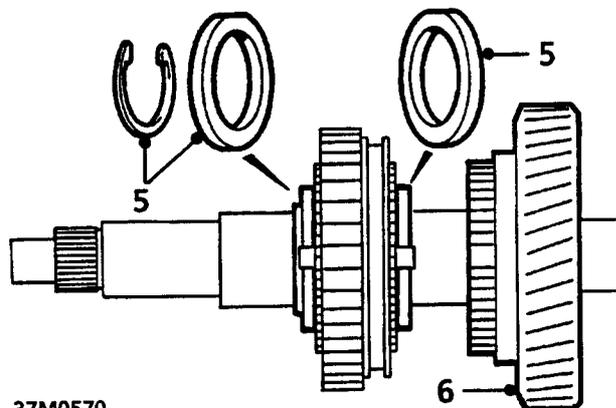
Output shaft - Reassemble

1. Smear all components with gearbox oil prior to assembly.



37M0569

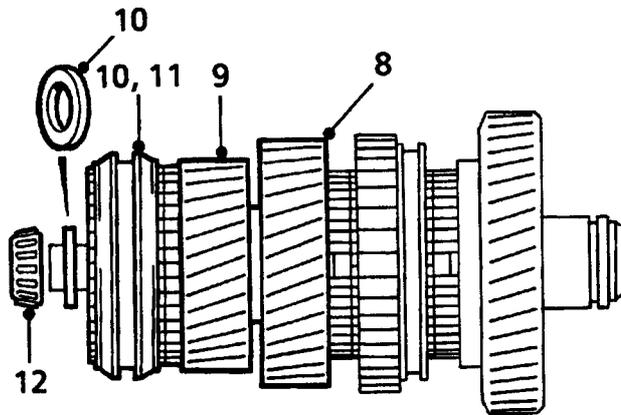
2. Fit a new circlip to output shaft.
3. Position 1st/2nd synchro assembly on output shaft.
4. Fit a new circlip to retain synchro assembly.



37M0570

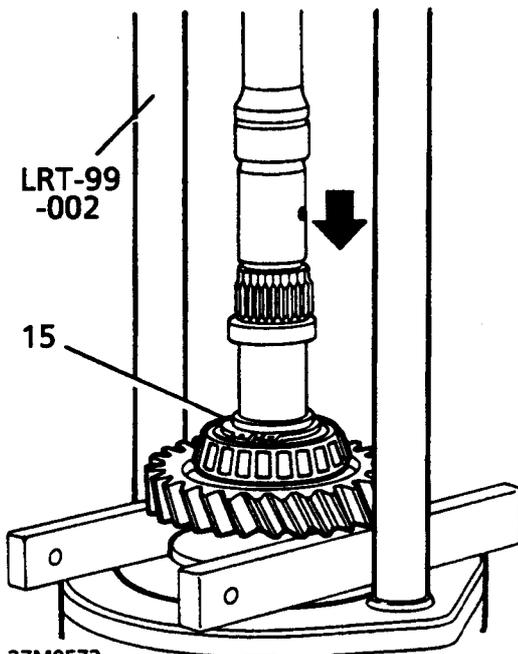
5. Fit thrust washers and 'C' clip.
6. Assemble selected 1st gear bush and needle bearing to 1st gear, position assembly on output shaft.
7. Ensure slots in outer synchro rings are aligned with slippers.

Layshaft - Reassemble



37M0571

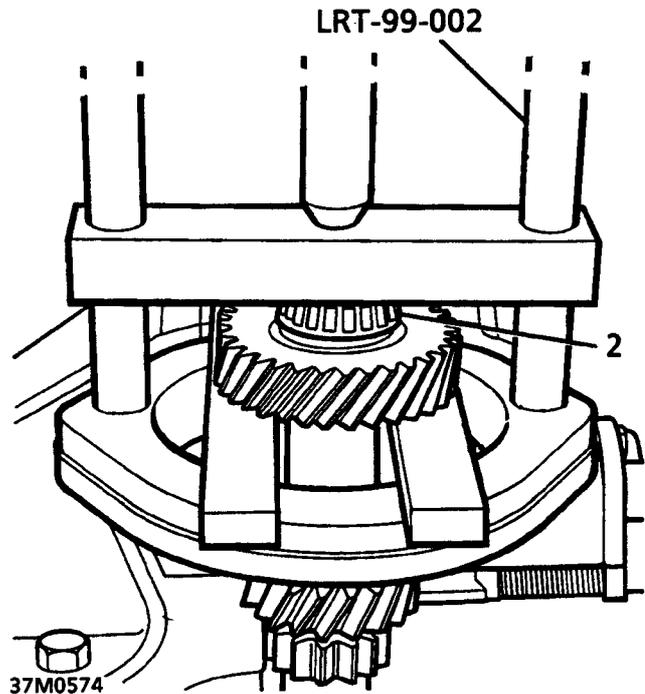
8. Fit thrust washer, position 2nd gear and bearing to shaft, press on 2nd gear.
9. Fit 3rd gear bush, needle bearings and 3rd gear.
10. Fit 3rd/4th synchro assembly and spacer.
11. Check synchro rings are aligned.
12. Using a suitable mandrel, press pilot taper bearing on to shaft.
13. Remove output shaft from press, secure bearing using a new circlip.



37M0573

14. Position output shaft in tool LRT - 99 - 002 , support 1st gear using 2 suitable bars.
15. Press output shaft down against circlip.

CAUTION: Do not use excess force, ensure circlip is not displaced.

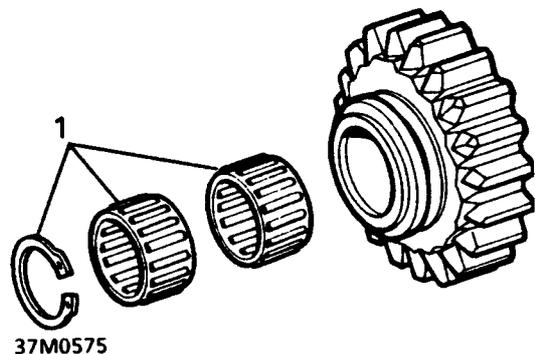


37M0574

1. Position layshaft on bed of tool LRT - 99 - 002, support layshaft by means of 2 suitable bars.
2. Using tool LRT - 99 - 002, press new front and rear bearings on to layshaft.

Reverse gear and idler shaft - Overhaul

Dismantle



37M0575

1. Remove and discard circlip retaining needle bearings, remove 2 needle bearings.

Inspection

1. Check bearings for wear and signs of overheating.

Note: In order to achieve correct meshing of reverse idler gear, one of the bearing cages is twisted during manufacture. If gear was jumping

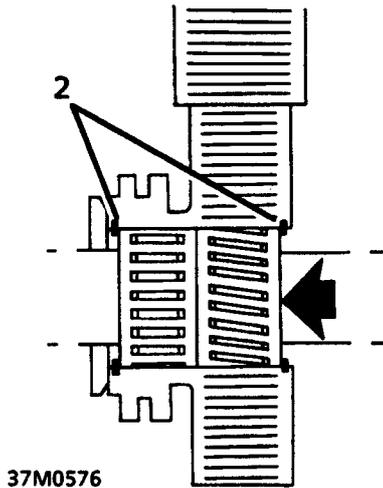


out of engagement, both bearings must be replaced.

2. Check idler gear teeth for chipping and wear.
3. Check idler shaft for wear.
4. Replace components as necessary.

Reassemble

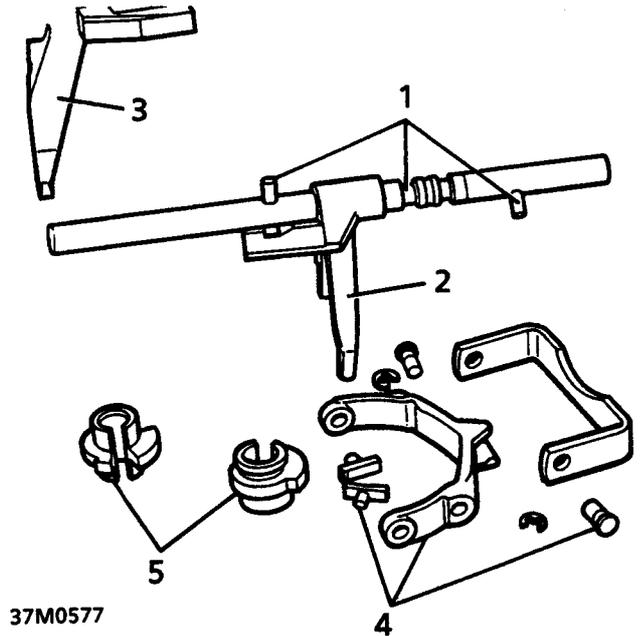
1. Smear all components with gearbox oil prior to assembly.



2. Assemble needle bearings to reverse idler gear, secure using new circlips.

Selector shaft, forks and yoke - Overhaul

Inspection



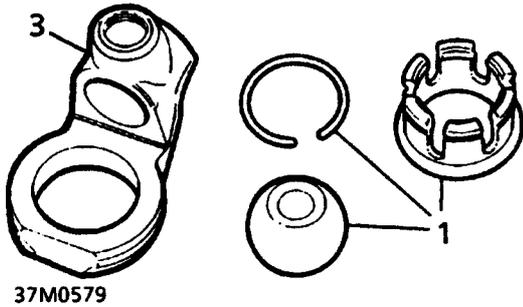
1. Check selector shaft and pins for wear and damage.
2. Check 1st/2nd selector fork for wear, cracks and damage.

Note: Selector shaft pins and 1st/2nd selector fork are only supplied as an assembly.

3. Check 3rd/4th selector fork for wear, cracks and damage.
4. Check 5th gear selector fork for wear, cracks and damage and pads and pivot pins for wear.
5. Check interlock spools for wear.

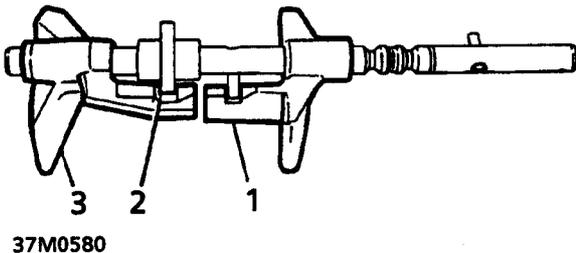
MANUAL GEARBOX

Selector yoke - Type B gearbox

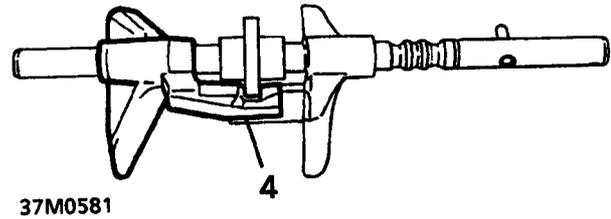


1. Remove and discard snap ring retaining gear change ball, remove nylon seating from selector yoke.
2. Check ball and nylon seating for wear.
3. Check selector yoke for wear.
4. Renew components as necessary, use a new snap ring to retain gear change ball.
5. Apply multi-purpose grease to gear change ball and nylon seating.

Reassemble



1. Locate 1st/2nd selector fork jaw on selector shaft pin.
2. Position interlock spool on selector shaft.
3. Slide 3rd/4th selector fork on to selector shaft and locate selector fork jaw on spool.

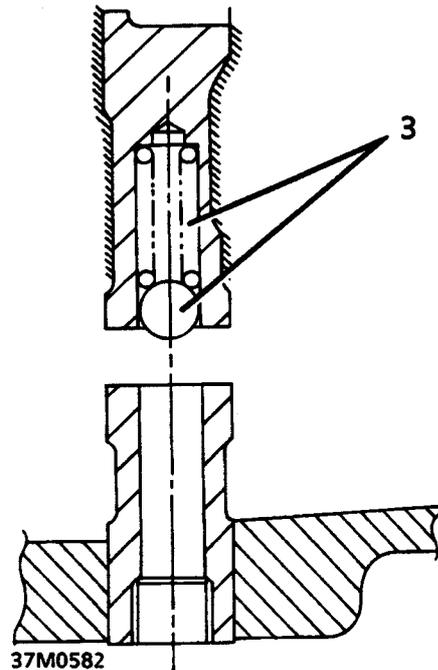


4. Slide 3rd/4th selector fork and interlock spool towards 1st/2nd selector fork and engage slot in spool on selector shaft pin.

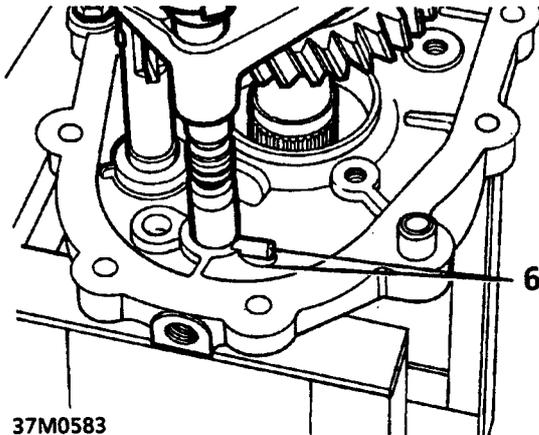
GEARBOX REASSEMBLE

Centre plate and shafts - Refit

1. Smear components with gearbox oil prior to assembly.
2. Fit bearing tracks to centre plate.



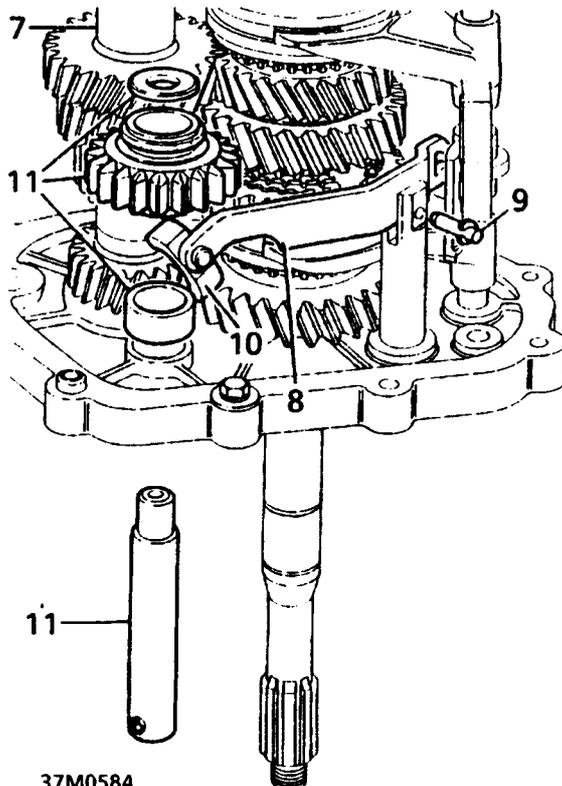
3. Apply multi-purpose grease to inner detent ball and spring, fit spring and ball to centre plate.
4. Support centre plate on suitable blocks of wood.
5. Check that 1st/2nd and 3rd/4th synchro assemblies are in neutral.



37M0583

6. Position output shaft and selector shaft to centre plate as an assembly.

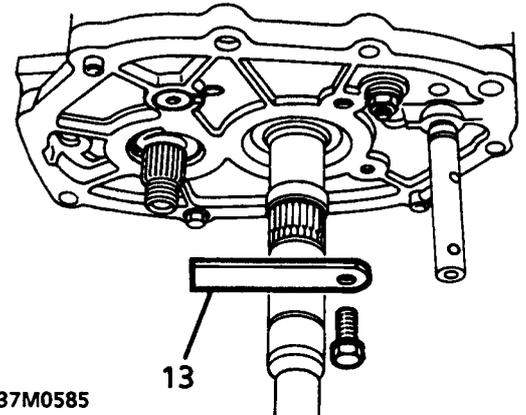
CAUTION: Ensure selector shaft pin engages with slot in centre plate.



37M0584

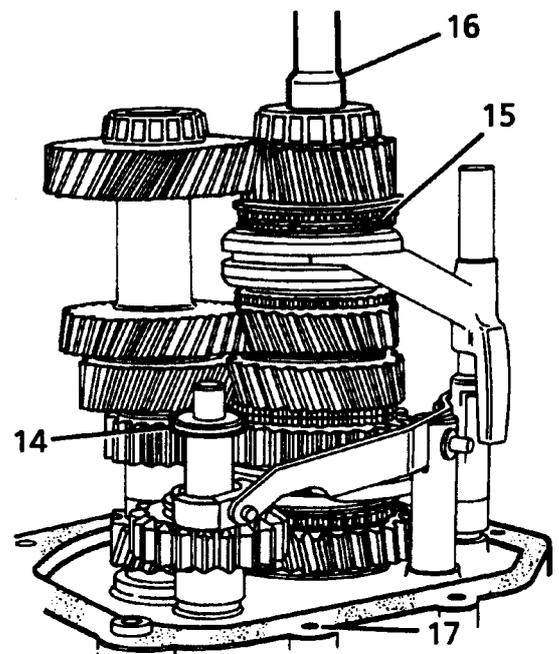
7. Lift output shaft slightly and fit layshaft.
8. Position reverse selector lever to pivot post ensuring interlock spool flange is located in slot in reverse selector lever.
9. Fit reverse selector lever pin, secure using new 'E' clip.
10. Fit slipper pad to reverse selector lever.
11. Fit reverse idler shaft, spacer and reverse idler gear ensuring that slipper pad is located in groove in idler gear.

12. Position reverse idler shaft roll pin in slot in centre plate.



37M0585

13. Retain reverse idler shaft by means of the retaining strap and a suitable bolt.

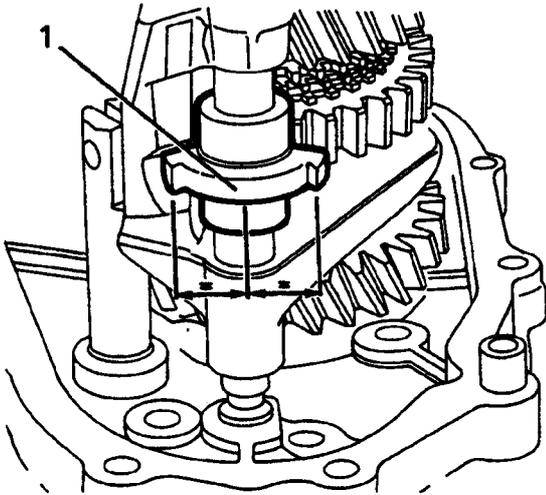


37M0586

14. Fit a new thrust washer to reverse idler shaft.
15. Fit synchro ring to 3rd/4th synchro assembly.
16. Position input shaft to output shaft.
17. Smear a new gasket with grease and fit to centre plate.

MANUAL GEARBOX

Gearcase - Refit



37M0587

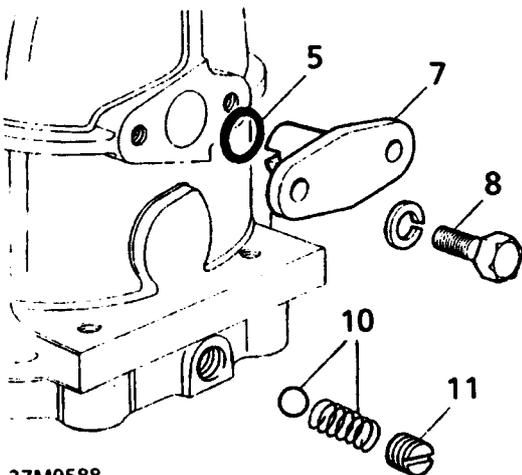
1. Rotate selector shaft until interlock spool is positioned as shown.

CAUTION: Ensure pin is not displaced.

2. Check oil scoop is fitted in gearcase and locating dowels are fitted in centre plate.
3. Carefully lower gearcase on to centre plate ensuring selector shaft is correctly located.

CAUTION: Do not use force when fitting gearcase.

4. Temporarily secure gearcase to centre plate using 2 8 x 35 mm bolts and nuts.



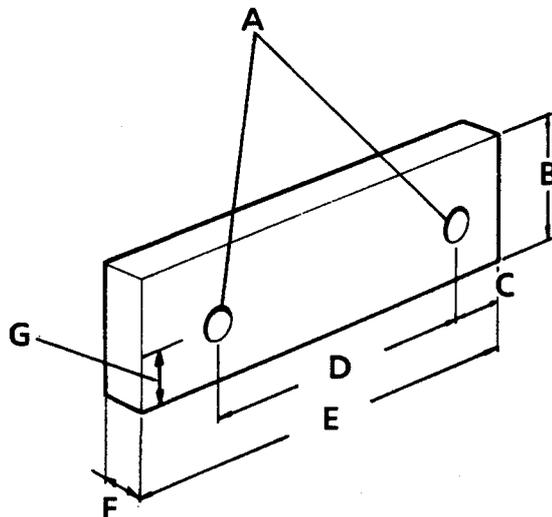
37M0588

5. Smear a new 'O' ring with gearbox oil and fit to spool retainer.
6. Apply suitable non-hardening sealing compound to joint face of spool retainer.
7. Fit spool retainer ensuring slot in retainer locates over interlock spool.

CAUTION: Do not use force to fit spool retainer. If slot does not engage interlock spool, remove gearcase and reposition interlock spool.

8. Apply Loctite 242 to threads of spool retainer bolts; fit bolts and tighten to 10 Nm
9. Apply multi-purpose grease to outer detent ball and spring.
10. Fit outer detent ball and spring.
11. Apply Loctite 242 to threads of detent plug, fit plug and screw it into centre plate until detent springs are 'coil bound'.
12. Screw plug out 1 to 1.5 turns and stake into position.

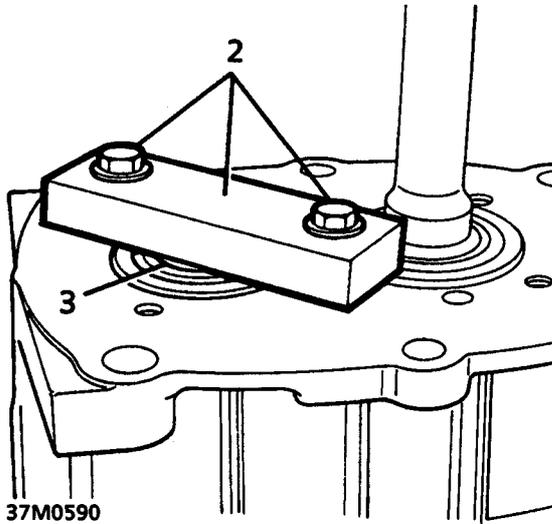
Layshaft and output shaft 5th gears - Refit



37M0589

- A = 9.0 mm dia
- B = 38.0 mm
- C = 14.5 mm
- D = 86.0 mm
- E = 127.0 mm
- F = 12.0 mm
- G = 16.0 mm

1. Make up a support plate to the dimensions given.



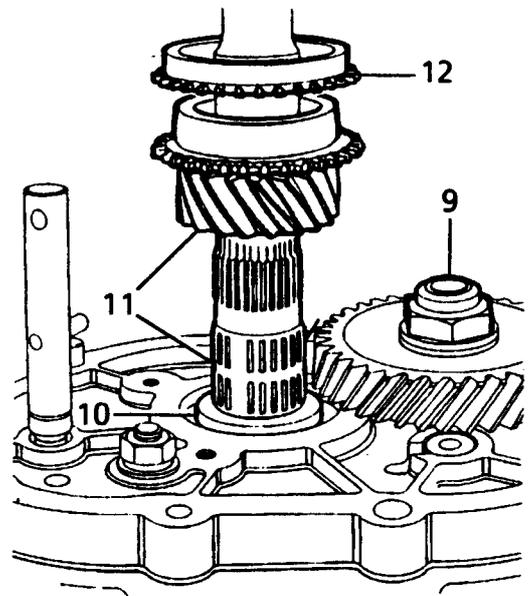
37M0590

2. Position support plate to gearcase so that plate is over end of layshaft and edge of input shaft bearing outer track; secure plate using 2 8 x 25 mm bolts.
3. Insert a suitable packing washer 3.5 mm thick between end of layshaft and support plate.

CAUTION: It is essential that layshaft is retained to prevent loads being transferred to the front bearing when 5th gear is pressed on to layshaft.

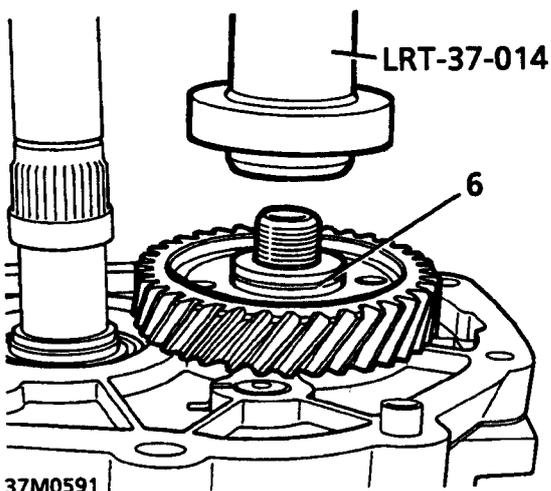
4. Invert gearcase and support on suitable blocks of wood.
5. Remove strap retaining reverse idler gear shaft.

CAUTION: ensure shaft is not displaced.



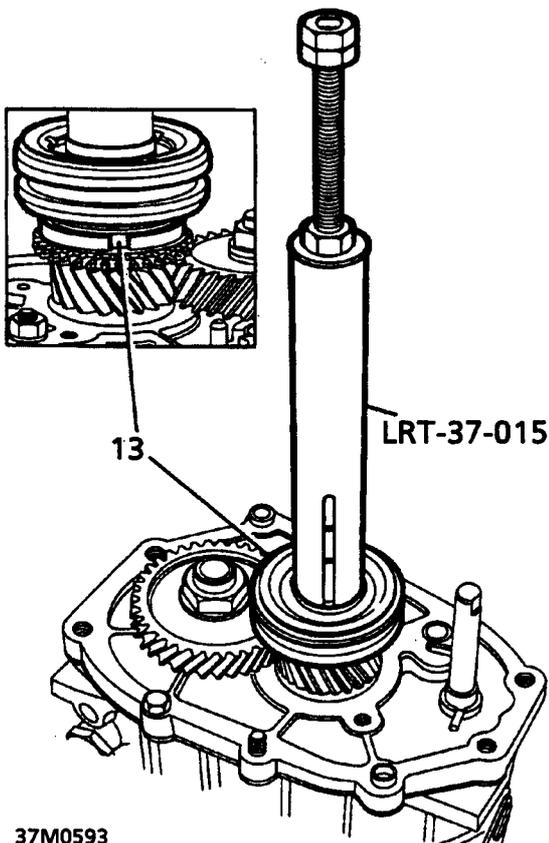
37M0592

9. Fit but do not tighten a new stake nut to layshaft.
10. Fit thrust washer on output shaft.
11. Fit 5th gear needle bearing and 5th gear.
12. Fit 5th synchro assembly outer synchro ring.



37M0591

6. Position 5th gear to layshaft ensuring groove is towards end of layshaft.
7. Fit 5th gear using tool LRT - 37 - 014.
8. Remove support plate.

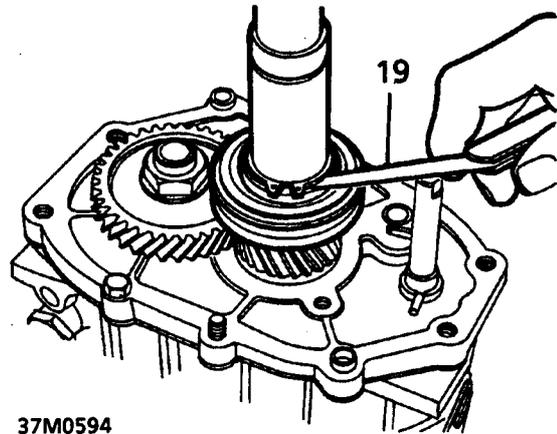


37M0593

13. Position 5th synchro assembly on output shaft with retainer plate towards end of output shaft.
14. Temporarily remove retainer plate from synchro.
15. Press 5th synchro assembly on to output shaft using tool LRT - 37 - 015.

CAUTION: Take great care when pressing synchro assembly on to shaft that slippers locate in slots in synchro ring.

16. Remove tool LRT - 37 - 015, fit retainer plate to synchro assembly.
17. Measure and record thickness of original selective thrust washer.
18. Fit original selective thrust washer and a new circlip to output shaft.



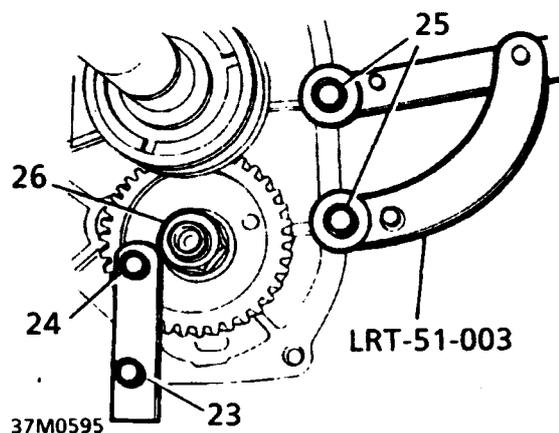
37M0594

19. Using feeler gauges, measure clearance between synchro hub and thrust washer. 5th synchro hub to thrust washer clearance = 0.055 mm - maximum.
20. If necessary, select the appropriate size thrust washer from the range available which will give a clearance of between 0.005 mm to 0.055 mm.

Note: Thrust washers are available from 5.10 mm to 5.64 mm thick rising in increments of 0.06 mm.

21. If necessary, remove circlip and original thrust washer; discard washer.
22. Fit selected thrust washer, secure with a new circlip.

CAUTION: The following procedure must be followed when tightening layshaft stake nut. Locking gears together in order to tighten nut will damage gearbox components.

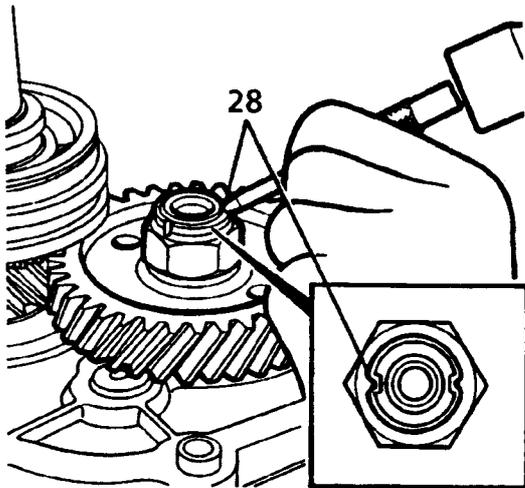


37M0595

23. Position spacer and retaining strap to gearcase and secure using 8 x 35 mm bolt.
24. Position retaining strap to layshaft 5th gear and secure using a suitable bolt.
25. Secure tool LRT - 51 - 003 to gearcase using 2 8 x 35 mm bolts.



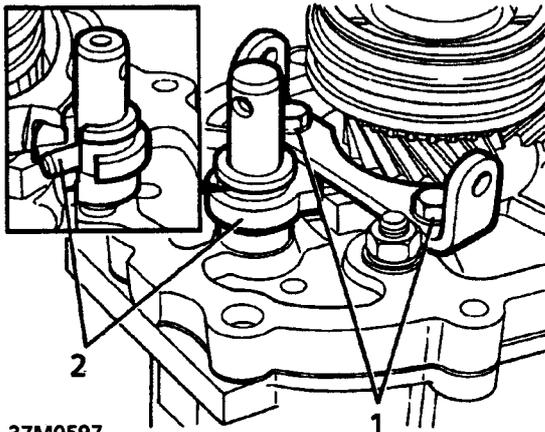
26. Restrain gearcase using tool LRT - 51 - 003 and tighten layshaft stake nut to 220 Nm.
27. Remove retaining strap and tool LRT - 51 - 003.



37M0596

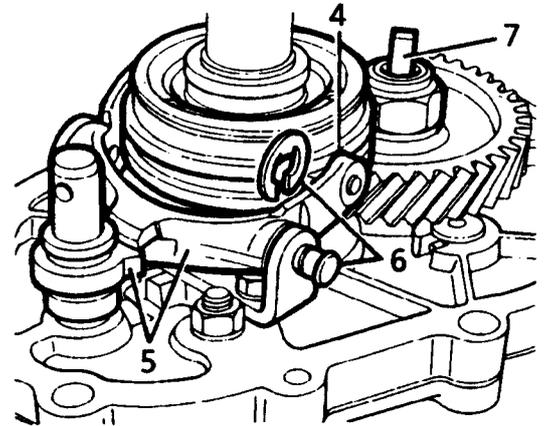
28. Using a round nosed punch stake nut collar into slots in layshaft.

5th gear selector fork - Refit



37M0597

1. Position selector fork bracket to centre plate, fit 2 bolts and tighten to 25 Nm.
2. Fit 5th gear interlock spool to selector shaft ensuring longest side of spool is towards centre plate.
3. Position clean cloth over holes in centre plate.



37M0598

4. Fit slippers to 5th gear selector fork.
5. Position selector fork to bracket at the same time locating slippers in 5th gear synchro sleeve and slot in fork to interlock spool.
6. Fit pins to selector fork and bracket, retain pins using new 'E' clips.
7. Fit oil pump drive to layshaft.
8. Remove cloth from centre plate.

Input shaft and layshaft bearing end - float - Check and adjust

1. Remove layshaft support plate.
2. Fit a new gasket to front cover.

Note: Do not fit oil seal at this stage.

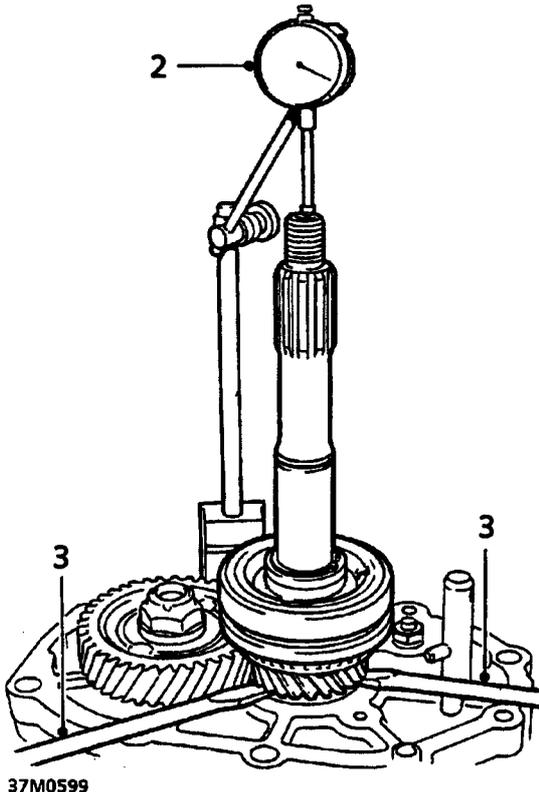
3. Fit original thrust washers to input shaft and layshaft bearing.
4. Fit front cover, fit 6 bolts and tighten by diagonal selection to 25 Nm.

Input shaft

1. Press output shaft downwards and rotate it to settle bearings.

Layshaft

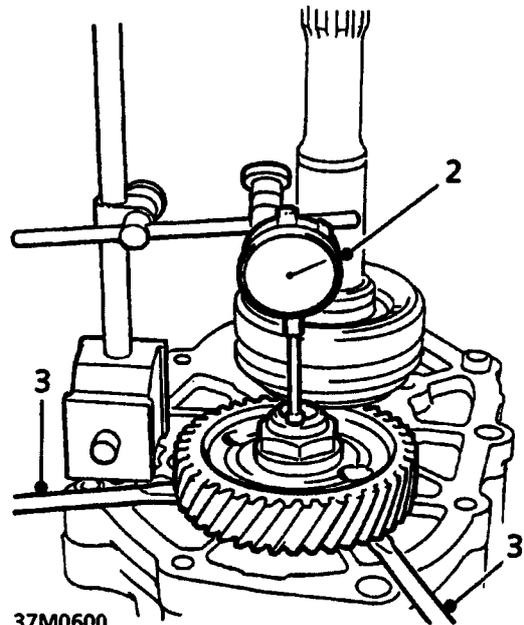
1. Press layshaft 5th gear downwards and rotate it to settle bearings.



37M0599

2. Assemble a DTI gauge to end of output shaft and zero gauge.
3. Using 2 suitable levers inserted between centre plate and 5th gear, raise output shaft and note and record DTI reading.
Correct input shaft endfloat = 0.1 to 0.6 mm.

CAUTION: Ensure levers are inserted as far as possible beneath 5th gear to avoid chipping gear teeth. Do not allow insertion of levers to raise output shaft.



37M0600

2. Assemble a DTI gauge to end of layshaft and zero gauge.
3. Insert 2 suitable levers between layshaft 5th gear and centre case, use slight pressure, raise layshaft and note and record DTI gauge reading.
Correct layshaft bearing endfloat = 0.025 mm preload to 0.025 mm endfloat.

CAUTION: Ensure levers are inserted as far as possible beneath 5th gear to avoid chipping gear teeth. Do not allow insertion of levers to raise layshaft.

Calculate endfloat.

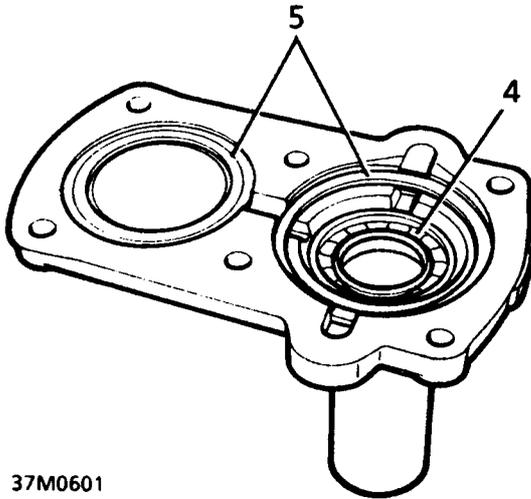
1. If input shaft endfloat was not as specified, add or subtract from the thickness of the original thrust washer the thickness of thrust washer required to give correct endfloat.

Note: Thrust washers are available from 1.51 to 2.77 mm in thickness rising in increments of 0.06 mm.

2. If layshaft bearing endfloat was not as specified, add or subtract from the thickness of the original thrust washer the thickness of thrust washer required to give correct endfloat.

Note: Thrust washers are available from 1.36 to 2.38 mm in thickness rising in increments of 0.06 mm.

3. Remove 6 bolts securing front cover, remove front cover, retain gasket.



37M0601

4. Lubricate a new oil seal with gearbox oil and fit to front cover.

CAUTION: Ensure lip of oil seal is towards gearcase.

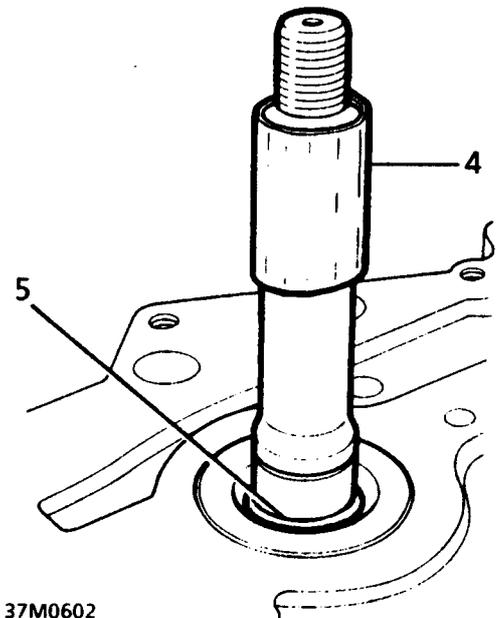
5. Fit selected thrust washers to input shaft and layshaft.
6. Mask splines of input using suitable adhesive tape.
7. Smear original gasket with grease and position it on gearcase.
8. Fit front cover, apply Loctite 242 to threads of bolts and tighten by diagonal selection to 25 Nm.
9. Remove adhesive tape from input shaft.

Extension housing – Types A and B gearbox – Refit

1. Smear a new gasket with grease and fit to centre plate.
2. Fit extension housing ensuring oil pick-up pipe and drive are correctly aligned.

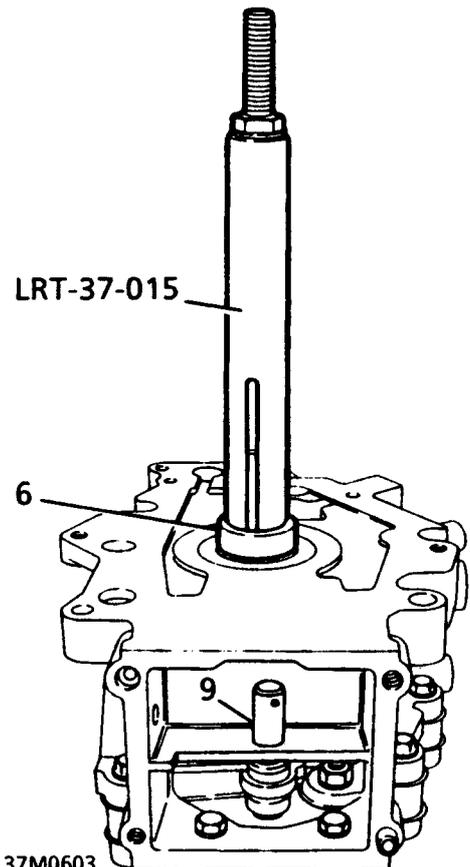
CAUTION: Do not use force, if necessary, remove extension housing and re-align oil pump drive.

3. Fit extension housing bolts and tighten progressively by diagonal selection to 25 Nm.



37M0602

4. Mask splines of output shaft using suitable adhesive tape.
5. Smear new 'O' ring with gearbox oil and fit to output shaft location in extension housing.



37M0603

6. Fit collar using tool LRT-37-015.
7. Remove adhesive tape from output shaft.
8. Fit a new snap ring to retain oil seal collar.
9. If fitted: Fit a new 'E' clip to selector shaft.

MANUAL GEARBOX

Extension housing - Type C gearbox - Refit

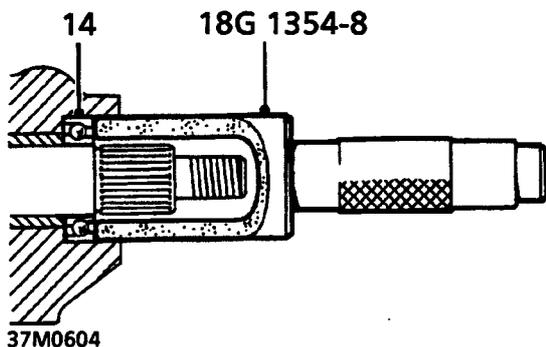
1. Ensure oil pick - up pipe ferrule is fitted in centre plate.
2. Smear a new gasket with grease and fit to centre plate.
3. Note position of speedometer drive gear locating flats on output shaft.

CAUTION: It is essential that locating flats on output shaft and speedometer drive gear are aligned when gear is fitted.

4. Fit extension housing ensuring oil pick - up pipe and drive are correctly aligned.

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

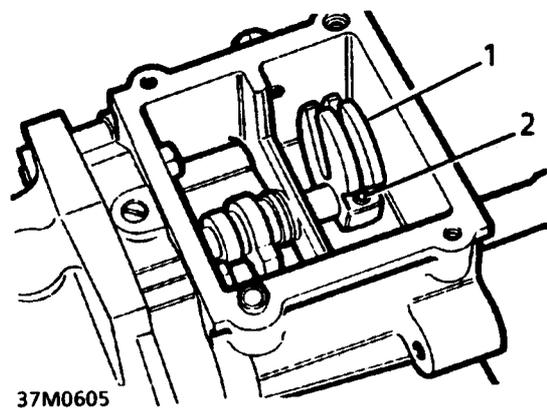
5. Fit extension housing bolts and tighten by diagonal selection to 25 Nm.
6. Position speedometer drive gear on output shaft ensuring that locating flats on inside of gear are aligned with flats on output shaft and indentations around circumference of gear are towards end of output shaft.
7. Using a round nosed punch, carefully tap speedometer drive gear into position.
8. Fit spacer.
9. Smear a new 'O' ring with gearbox oil and fit to speedometer pinion housing.
10. Lubricate speedometer pinion with silicone grease.
11. Fit speedometer pinion housing ensuring teeth of pinion mesh with those of driven gear.
12. Lubricate bearing with gearbox oil.
13. Position bearing on output shaft with closed end of bearing towards end of shaft.



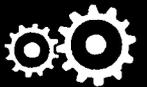
14. Fit bearing using tool 18G 1354 - 8.
15. Lubricate a new output shaft oil seal with gearbox oil.
16. Position oil seal, lip leading on output shaft, fit seal using tool 18G 1354 - 8.
17. Lubricate a new 'O' ring with gearbox oil and fit to 5th gear spool guide.

18. Fit 5th gear spool guide ensuring slot in guide locates on flange of 5th gear interlock spool.
19. Apply Loctite 242 to threads of spool guide bolts.
20. Fit and tighten 5th gear spool guide bolts to 10 Nm.
21. Lubricate a new selector shaft oil seal with gearbox oil.
22. Fit selector shaft oil seal, lip side leading to extension housing.
23. Fit selector shaft pin to selector shaft, fit and tighten a new self - locking nut.

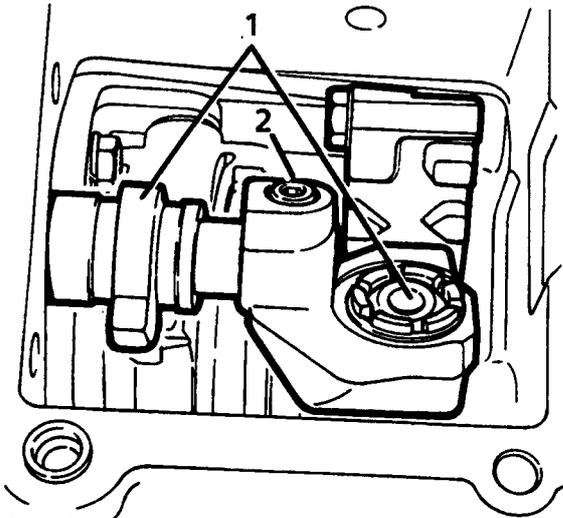
Selector quadrant - Type A gearbox - Refit



1. Position selector quadrant to selector shaft ensuring roll pin lug on quadrant is on the left hand side when viewed from rear of gearbox.
2. Secure quadrant using a new roll pin.
3. Move selector shaft to neutral position.



Gear change lever yoke - Type B gearbox - Refit



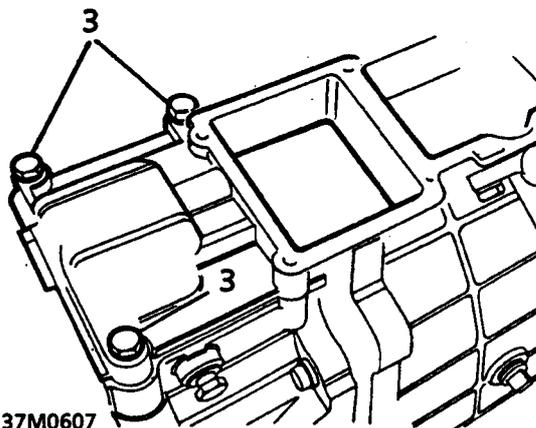
37M0606

1. Position gear change lever yoke on selector shaft with ball facing towards output shaft.
2. Apply Loctite 242 to threads of a new setscrew, fit and tighten screw.

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

Remote housing - Type A gearbox - Refit

1. Smear a new gasket with grease and fit to extension housing.
2. Position remote housing to extension housing and gearcase ensuring rollers locate in quadrant.



37M0607

3. Fit but do not fully tighten 3 bolts in positions shown.

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 but do not fully tighten 4 bolts.

Gear change housing - Type A gearbox - Refit

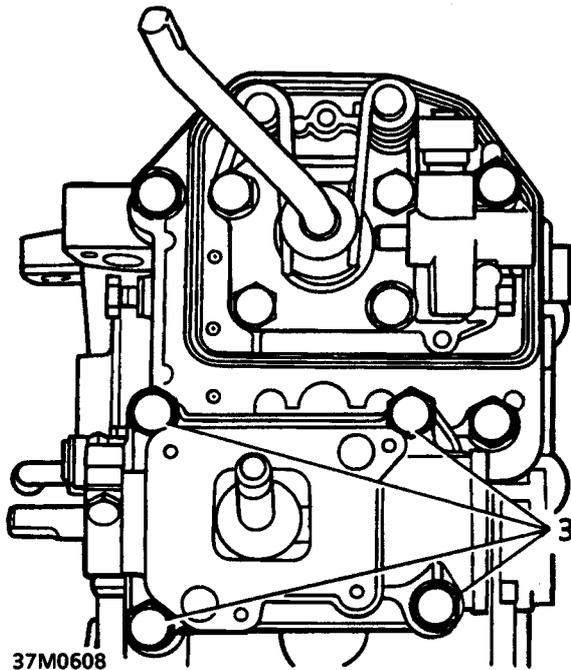
1. Smear a new gasket with grease and fit to remote housing.
2. Position gear change housing to remote housing ensuring gear lever ball is correctly located.
3. Fit but do not fully tighten 4 bolts.
4. Tighten remote housing, transfer box selector housing and gear change housing bolts to 25 Nm.

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.

MANUAL GEARBOX

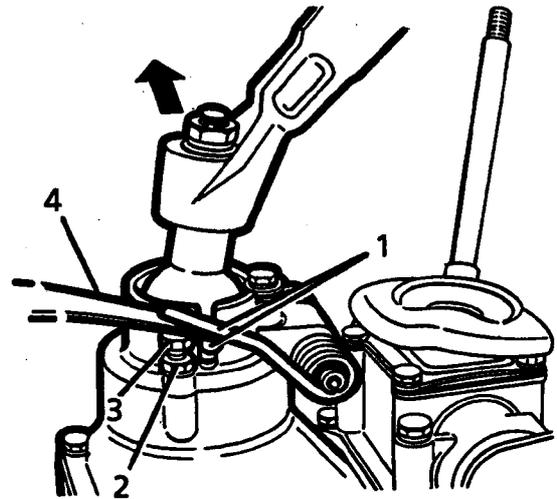
Gear change housing - Type B gearbox - Refit



37M0608

1. Smear a new gasket with grease and fit to 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 and that spool retainer is located over 5th gear interlock spool.
3. Fit bolts and tighten to 25 Nm.

Bias spring adjustment - Type A gearbox



37M0609

Note: The purpose of this procedure 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.

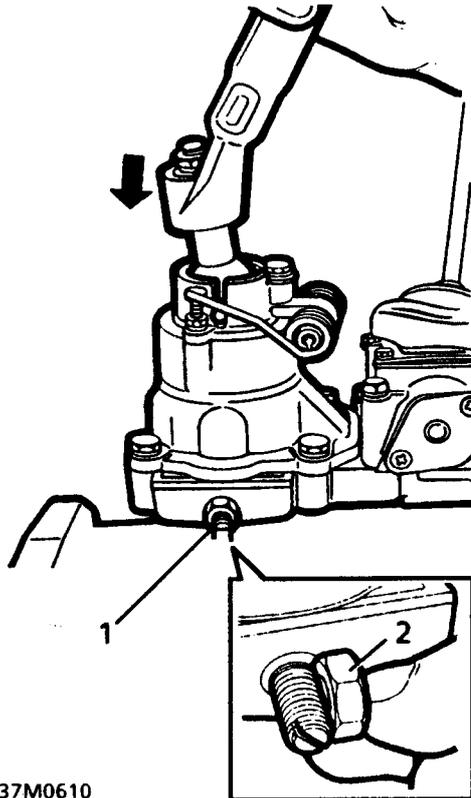
1. Select 4th gear.

Note: Ensure legs of bias spring are located on ball pins.

2. Slacken both adjustment bolt locknuts.
3. Turn adjustment bolts until bolt heads just contact legs of bias spring.
4. Using assistance, apply light hand pressure to move gear lever to the right and screw left hand adjusting bolt in or out until a 0.05 mm feeler gauge can be inserted between head of bolt and bias spring.
5. Tighten left hand adjusting bolt locknut.
6. Move gear lever to the left and using assistance, repeat adjustment procedure on right hand side of bias spring.



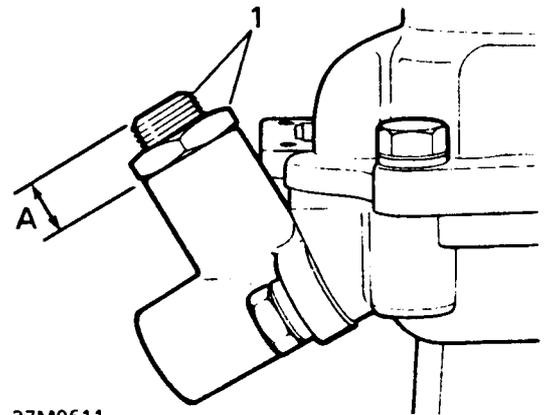
5th gear stop screw adjustment - Type A gearbox



37M0610

1. Remove locknut from adjusting screw.
2. Position locknut to adjusting screw and turn screw in or out until length of screw equals distance across corners of locknut.
3. Fit but do not tighten locknut.
4. Select 5th gear.
5. Apply light hand pressure to gear lever and at the same time, turn adjusting screw clockwise until it can be felt to contact selector yoke. Then turn screw half a turn anti-clockwise; tighten locknut.

Reverse gear plunger adjustment - Type A gearbox

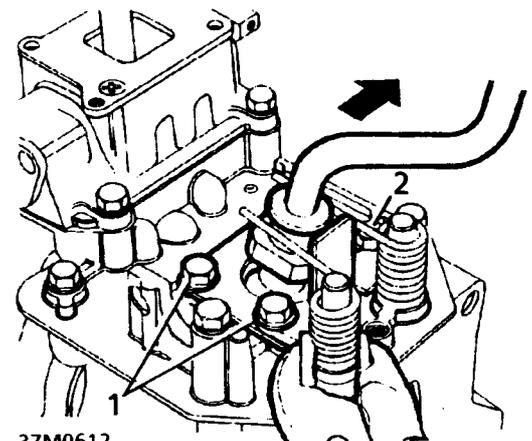


37M0611

1. Slacken locknut, screw plug in or out of housing until dimension 'A' is 12 mm; tighten locknut.

Note: It may be necessary to carry out further adjustment when gearbox is refitted. To increase pull over load screw plug clockwise and to decrease pull over load, screw plug anti-clockwise.

Bias adjustment plate setting - Type B gearbox



37M0612

1. Using assistance restrain LH bias spring using a suitable pair of grips; slacken but do not remove 2 bolts.

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

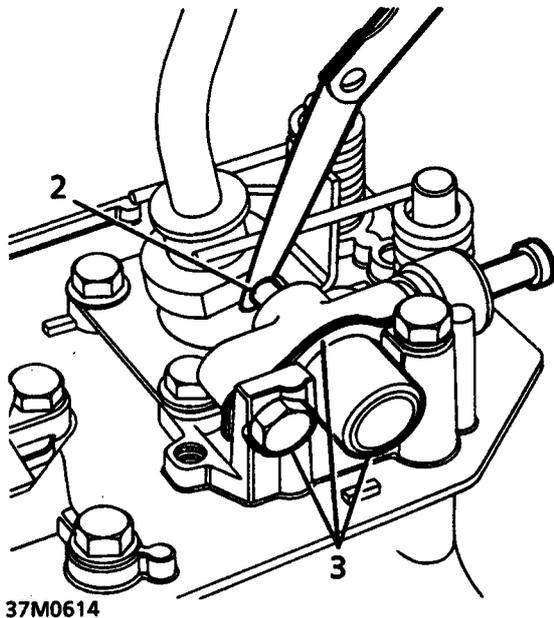
2. Repeat procedure for RH bias spring.
3. Select 4th gear, then move gear lever fully to the right.

MANUAL GEARBOX

4. Using assistance, hold gear lever in this position and ensuring ends of bias springs are positioned beneath washers, tighten all 4 bolts to 25 Nm.
5. Check adjustment by selecting 3rd gear then 4th gear.

Note: If gears cannot be selected smoothly, repeat adjustment procedure.

Reverse gear plunger adjustment - Type B gearbox



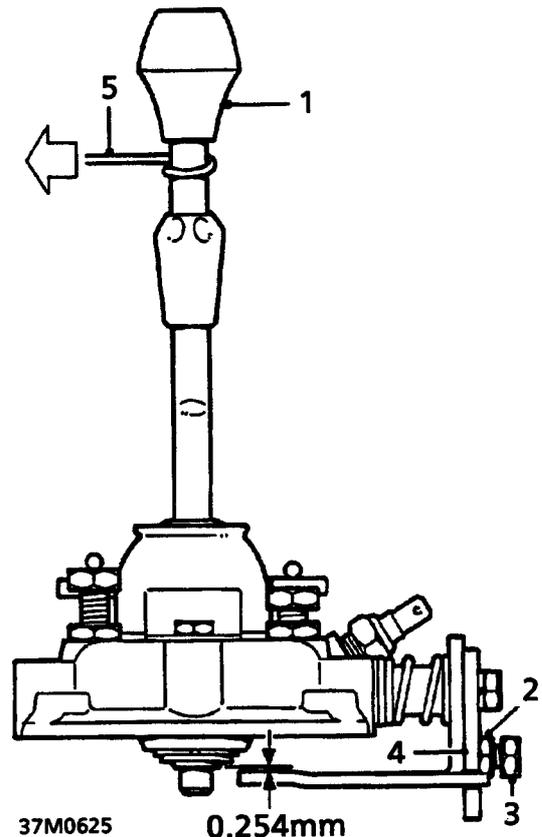
1. Select 1st gear.
2. Using feeler gauges, measure clearance between reverse plunger and side of gear lever.
Correct clearance = 0.6 mm to 0.85 mm.
3. If clearance is not as specified, remove bolt securing reverse gear plunger assembly and add or subtract shims as necessary until clearance is correct.
4. Fit bolt and tighten to 25 Nm.
5. Position sealing rubber to gear change housing.
6. Fit gear change housing cover, fit and tighten 2 Torx screws.

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 35 Nm.

Reverse baulk plate adjustment - Type C gearbox



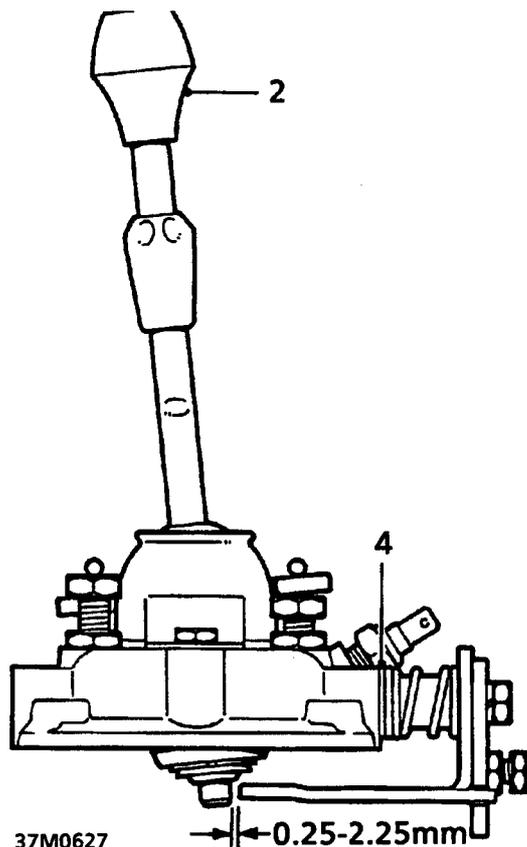
1. Select neutral and position gear lever vertically.
2. Slacken baulk plate adjusting bolt locknuts.
3. Slacken baulk plate adjusting bolts evenly until baulk plate just contacts backing plate.
4. Tighten the baulk plate adjusting bolts evenly until baulk plate just moves out of contact with backing plate.
5. Attach a suitable spring balance to top of gear lever and check force required to overcome resistance of baulk plate springs.
6. Note reading on spring balance; adjustment is correct when a force of 12.2 to 14.2 kgf is required to move gear lever. Tighten or slacken baulk plate adjusting bolts as necessary.
7. Check that a minimum clearance of 0.254 mm exists between upper face of baulk plate and lower edge of gear lever bush, adjust position of baulk plate if necessary and recheck force required to move gear lever.



- On completion, tighten adjusting bolt locknuts.

1st/2nd gate stop adjustment - Type C gearbox

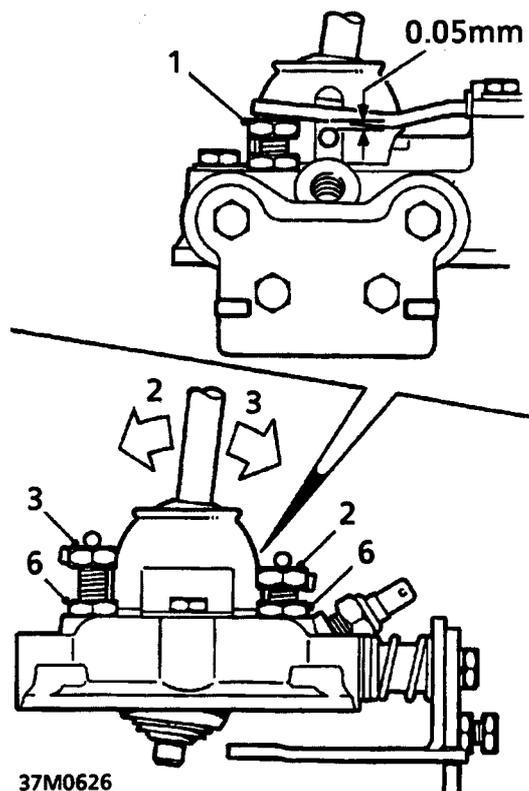
- Ensure that reverse baulk plate adjustment is correct.



- Engage 1st gear.
- Check that a clearance of 0.25 to 2.25 mm exists between side of gear lever and edge of reverse baulk plate.
- If necessary, add or subtract shims from reverse baulk plate to obtain above dimension.
- Check above with 2nd gear engaged.
- Position bottom cover plate to remote housing, fit and tighten 4 bolts.

Bias spring adjustment - Type C gearbox

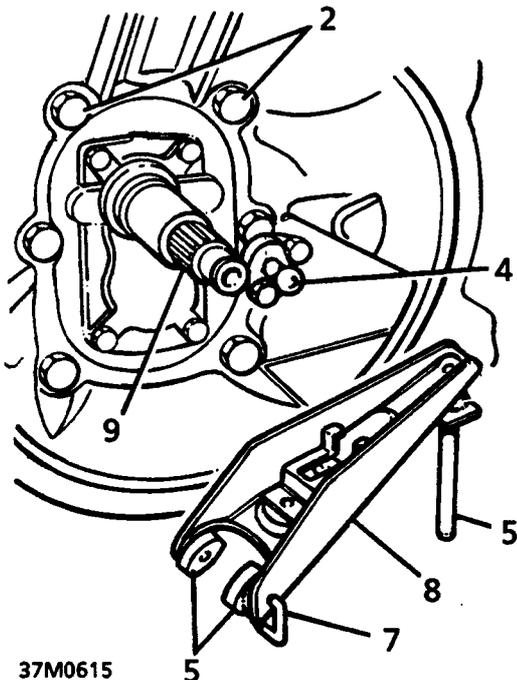
Note: The purpose of this adjustment is to ensure that when bias spring is correctly adjusted, the gear change mechanism is automatically aligned for 3rd or 4th gear selection when gear lever is in neutral.



- Adjust both bias spring adjustment bolts until a clearance of 0.05 mm exists between both legs of bias spring and gear lever cross pin.
- 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.
- Move gear lever to the right and adjust left hand bolt.
- Check that with gear lever moved fully to the left and right, spring legs just contact gear lever cross pin.
- Select neutral then rock gear lever across the gate; when released, lever should return to 3rd/4th position.
- Tighten adjusting bolt locknuts.

MANUAL GEARBOX

Clutch housing - Type A gearbox - Refit



37M0615

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

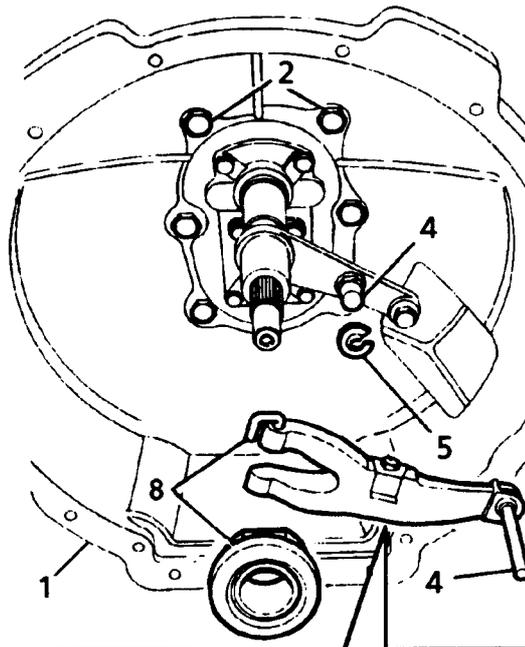
Note: The 12 x 45 mm bolts must be fitted through locating dowels.

3. Tighten bolts by diagonal selection to 75 Nm.
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 dislodged 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 75 Nm.
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.



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 75 Nm.
4. Apply lithium based grease to pivot post.
5. Fit release lever and clutch release bearing.