

PG1 Manual Gearbox



Overhaul Manual

*PG1 Handgeschakelde
versnellingsbak revisiebandboek*

*PG1 Boîte de vitesses manuelle
Manuel de révision*

*PG1 Schaltgetriebe
Überholungsanleitung*

*PG1 Cambio meccanico
Manuale di revisione*

*PG1 Caja de cambios manual
Manual de revisión*

*PG1 Caixa de velocidades manual
Manual de revisão*



AMENDMENT INSTRUCTION SHEET



PG1 MANUAL GEARBOX OVERHAUL MANUAL

Publication Number RCL 0124 ENG

Amendment Number: **GEN009/97ENG**

Date: **12/97**

To ensure that this manual is kept up to date and that a record of amendments to this manual is available, an Amendment Instruction Sheet will be issued with each set of revised pages.

- The Title page of the Manual is re-issued, and the Part No. has been raised to the next edition. Except for the Contents pages, all revised and new pages have the issue date at the foot of each page, together with an indication of whether the pages are revised or new.
- This Amendment Instruction Sheet must be inserted at the front of the manual to indicate that the amendment has been incorporated. Do not discard previous Amendment Instruction sheets.
- Your manual is only complete to this issue providing all prior Amendments are included.
- The filing instructions give section and page numbers affected. Additional pages or complete new sections may be issued, insert the pages as instructed.

FILING INSTRUCTIONS

Section	Discard Existing Pages	Insert New Pages	Reason for Amendment
INTRODUCTION	Title Page	Title Page	Part number raised to 2nd edition.
INTRODUCTION	Page 2	Page 2	Gearbox codes updated.
MANUAL GEARBOX	Contents page	Contents page	Reverse brake added.
MANUAL GEARBOX	Description and operation pages 2, 3, 5, 7 & 9	Description and operation pages 2, 3, 5, 7 & 9	Reverse brake added.
MANUAL GEARBOX	Overhaul page 12	Overhaul page 12	5th/reverse selector - with reverse brake.
MANUAL GEARBOX	Overhaul page 18	Overhaul page 18	Bearing cup removal deleted.
MANUAL GEARBOX	Overhaul page 19	Overhaul page 19	Caution on 5th gear synchro hub .
MANUAL GEARBOX	Overhaul page 25	Overhaul page 25	Remove input shaft bearing after end thrust check.
MANUAL GEARBOX	Overhaul page 27 & 29	Overhaul page 27 & 29	Fit input shaft oil seal, differential oil seal installation and tool number updated.



PG1 MANUAL GEARBOX

OVERHAUL MANUAL

This gearbox is fitted to the following models:-

Rover 218/418 Diesel
New Rover 200 Diesel
New Rover 218
New Rover 400 Diesel
Rover 220
Rover 420
Rover 600 Diesel
Rover 600 Ti
Rover 820
Rover 800 KV6
MG-F

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INTRODUCTION

How to use this manual

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

This manual contains procedures for the overhaul of the gearbox on the bench with the engine removed. For all other information regarding General Information, Adjustments, Removal of oil seals, gearbox unit, consult the Repair Manual for the model concerned.

This manual is divided into 3 sections, Description and Operation, Overhaul and Data, Torque & Tools. 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. Where usage is not obvious the tool is shown 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

With the engine and gearbox assembly removed, the crankshaft pulley end of the engine is referred to as the front.

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 recommended parts are used.

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

Safety features and corrosion prevention treatments embodied in the car may be impaired if other than 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 recommended parts. All Rover recommended parts have the full backing of the vehicle Warranty.

Rover Dealers are obliged to supply only Rover recommended parts.

INTRODUCTION

SPECIFICATION

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 Dealers are not agents of Rover and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

Gearbox identification

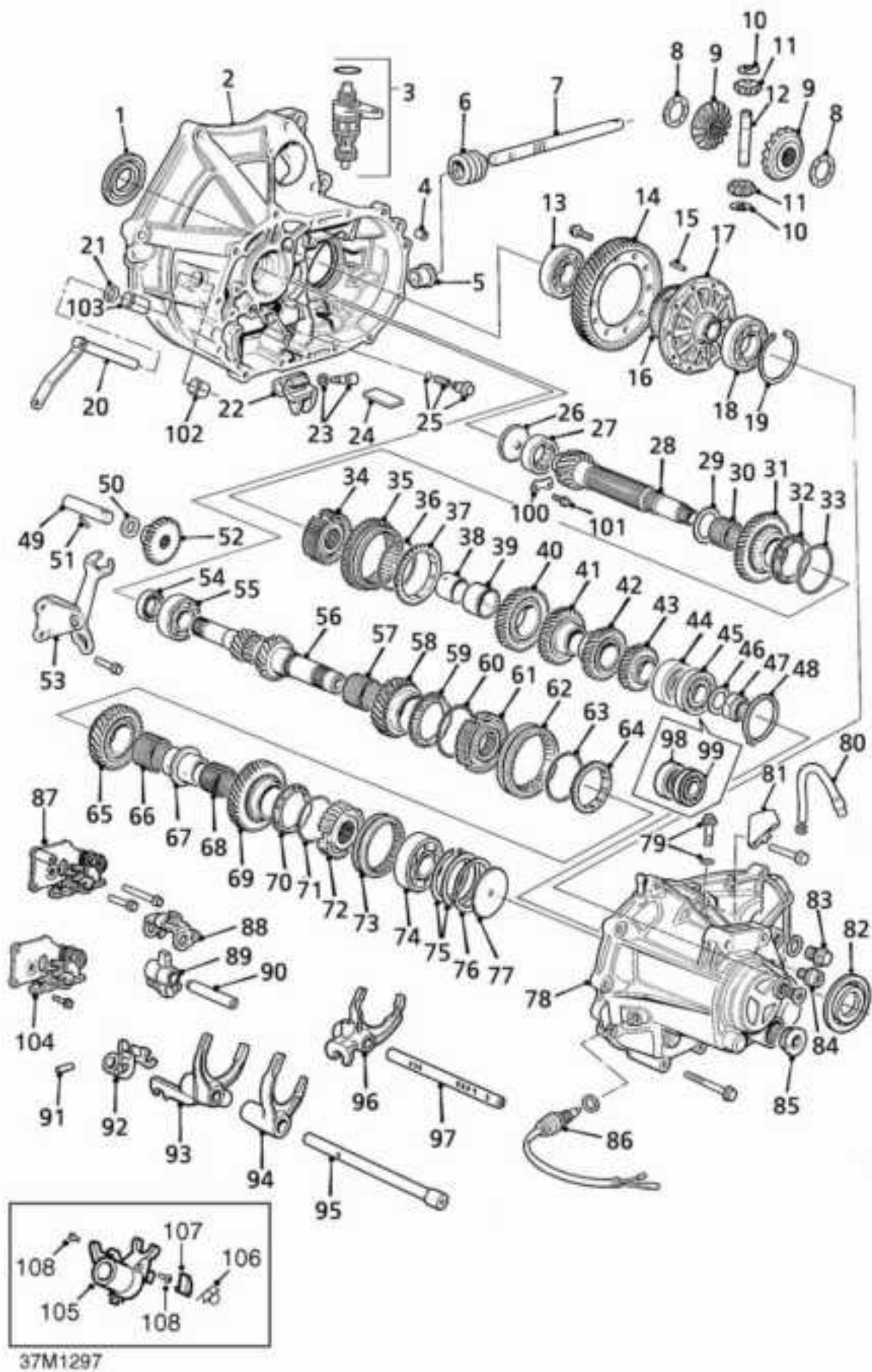
This overhaul manual is applicable to PG1 gearboxes having the following Serial No. prefixes:

C4BP	R4A0
C4BS	R4DT
C6BN	S4DTU
C6BP	S4EM
C6BS	S4FTU
S6BSU	S6AO
C6DTUT	S6BN
C6DTUTH	S6BNU
C6DUTH	S6BS
C6FTUT	S7EMU
K4BS	V4DT
K4BX	V6BS
K6AO	W4DT
K6BN	W4DTUT
K6BS	Y4AO
K7BSUT	
K7BX	
M5BS	



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MANUAL GEARBOX



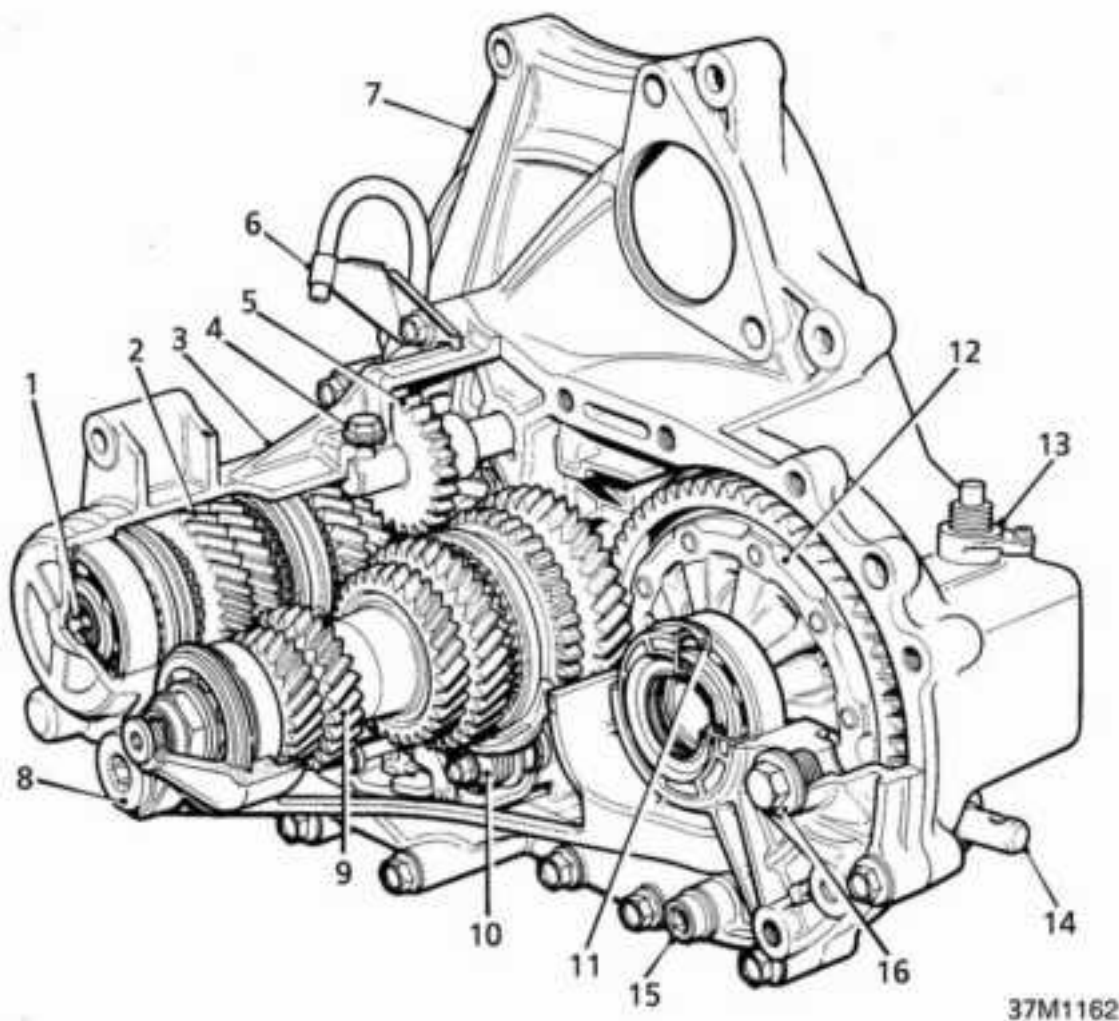


GEARBOX COMPONENTS

- | | | |
|---|---|--|
| 1. Oil seal - differential | 39. Needle roller bearing - 2nd gear | 77. Oil guide plate |
| 2. Differential housing | 40. 2nd gear | 78. Gearbox casing |
| 3. Speedometer drive pinion and housing | 41. 3rd gear | 79. Reverse idler shaft bolt and washer |
| 4. Dowel | 42. 4th gear | 80. Breather pipe |
| 5. Oil seal - selector shaft | 43. 5th gear | 81. Breather pipe bracket |
| 6. Boot | 44. Ball bearing - output shaft | 82. Oil seal - differential |
| 7. Selector shaft | 45. Ball bearing - output shaft | 83. Filler/level plug |
| 8. Thrust washer - sun gear | 46. Tongued washer | 84. Drain plug |
| 9. Sun gear | 47. Output shaft nut - L.H. thread | 85. Access plug - output shaft bearing circlip |
| 10. Thrust washer - planet gear | 48. Circlip | 86. Reverse light switch |
| 11. Planet gear | 49. Reverse idler shaft | 87. Interlock assembly - early gearboxes |
| 12. Pinion shaft | 50. Thrust washer - reverse idler gear | 88. Gearshift holder |
| 13. Ball bearing - differential | 51. Roll pin - reverse idler shaft | 89. Gearshift arm guide |
| 14. Final drive gear | 52. Reverse idler gear | 90. Shift shaft |
| 15. Roll pin - differential pinion shaft | 53. Reverse selector fork | 91. Roll pin - 5th/reverse gear selector |
| 16. Speedometer drive gear | 54. Oil seal - input shaft | 92. Gear selector - 5th/reverse gears |
| 17. Differential casing | 55. Ball bearing - input shaft | 93. Selector fork - 3rd/4th gears |
| 18. Ball bearing - differential | 56. Input shaft | 94. Selector fork - 5th gear |
| 19. Selective shim | 57. Needle roller bearing - 3rd gear | 95. Selector shaft - 5th/reverse gears |
| 20. Clutch release shaft | 58. 3rd gear | 96. Selector fork - 1st/2nd gears |
| 21. Oil seal - clutch release shaft | 59. Synchro ring - 3rd gear | 97. Selector shaft - 1st/2nd gears |
| 22. Selector shaft guide | 60. Synchro spring | 98. Bearing - roller ** |
| 23. Dowel bolt and washer | 61. Synchro hub - 3rd/4th gears | 99. Bearing - ball ** |
| 24. Magnet | 62. Synchro sleeve - 3rd/4th gears | 100. Retainer plate - output shaft bearing ** |
| 25. Detent cap bolt, ball and spring - selector shaft | 63. Synchro spring | 101. Retainer plate bolts - Patchlok ** |
| 26. Oil guide plate | 64. Synchro ring - 4th gear | 102. Clutch release shaft bush - inner |
| 27. Parallel roller bearing - output shaft | 65. 4th gear | 103. Clutch release shaft bush - outer |
| 28. Output shaft | 66. Needle roller bearing - 4th gear | 104. Interlock assembly - later gearboxes |
| 29. Selective thrust washer - 1st gear end float | 67. Distance collar - 4th/5th gears | 105. Gear selector - 5th/reverse gears/with reverse brake* |
| 30. Needle roller bearing - 1st gear | 68. Needle bearing - 5th gear | 106. Spring - reverse brake* |
| 31. 1st gear | 69. 5th gear | 107. Lock plate - reverse brake* |
| 32. Synchro ring - 1st gear | 70. Synchro ring - 5th gear | 108. Taptite screws - reverse brake* |
| 33. Synchro spring | 71. Synchro spring - 5th gear | |
| 34. Synchro hub - 1st/2nd gear | 72. Synchro hub - 5th gear | |
| 35. Synchro sleeve - 1st/2nd gear | 73. Synchro sleeve - 5th gear | |
| 36. Synchro spring | 74. Ball bearing - input shaft | |
| 37. Synchro ring - 2nd gear | 75. Selective snap rings - input shaft end thrust | |
| 38. Selective collar - 2nd gear end float | 76. Belleville washer - input shaft end thrust | |

* Gearboxes with reverse brake fitted

** Fitted to gearboxes having the letter U in the gearbox serial number prefix



SECTIONED VIEW OF GEARBOX

- | | |
|---|--------------------------------------|
| 1. Oil guide plate | 9. Output shaft assembly |
| 2. Input shaft assembly | 10. Shift arm assembly and interlock |
| 3. Gear case | 11. Selective shim |
| 4. Reverse idler shaft bolt | 12. Final drive assembly |
| 5. Reverse idler gear | 13. Speedometer drive pinion housing |
| 6. Breather pipe and bracket | 14. Selector shaft |
| 7. Differential housing | 15. Oil drain plug |
| 8. Access plug - output shaft bearing circlip | 16. Oil filler/level plug |



DESCRIPTION

The 5 speed constant mesh gearbox employs single helical gears for speed transmission and final drive. The input shaft carries the primary input gear, reverse pinion, 2nd gear and 3rd, 4th and 5th gear synchromesh hubs and idler gears. It is supported by two ballraces. End float is controlled by selective circlips and a Belleville washer. Its short input end eliminates the need for support in the engine crankshaft. The output shaft carries the final drive pinion, 1st idler gear, 1st and 2nd synchromesh hubs, 2nd speed idler gears and 3rd, 4th and 5th gears. The shaft is supported in the differential housing by a parallel roller bearing and depending on application, is supported in the gearcase by either a double ballrace or a single ballrace and roller bearing. Pinion location is controlled by a selective washer. The rear end of the shaft is secured by a circlip which retains the bearings in the gear case. Synchromesh is by spring rings and spline extensions in the inner faces of the synchromesh sleeves. Gear selection is via an interlock and gearshift holder assembly which transmits movement of the main selector shaft to the selector forks. Later specification gearboxes employ a reverse brake mechanism. Lubrication is by splash. An oil gutter located on the upper side of the gear case collects splashed oil and directs it to oil guide plates which distribute it to the hollow input and output shafts.

DESCRIPTION - TORSEN DIFFERENTIAL

Gearboxes fitted to certain models incorporate a 'Torsen' limited slip differential. The word 'Torsen' is derived from torque sensing which describes the principle of operation.

Two types of differential are fitted, type A is fitted to gearboxes having serial number prefixes K4BX and K7BSUT. Type B is fitted to gearboxes having serial number prefixes C6FTUT; W4DTUT; C6DTUT and C6DTUTH.

Type A

The assembly comprises a final drive gear bolted to the differential casing; two helical gears splined to the drive shafts and three pairs of element gear assemblies arranged at 120° intervals within the differential casing and running at right angles to the helical gears. Each of the element gear assemblies comprises a worm gear and two spur gears running on a journal pin. The worm gears are in constant

mesh with the helical gears and the spur gears mesh with those of the adjoining element gear assembly. Axial thrust of the helical gears is controlled by a combination of thrust washers and needle roller bearings located at each end of and between the two gears.

Type B

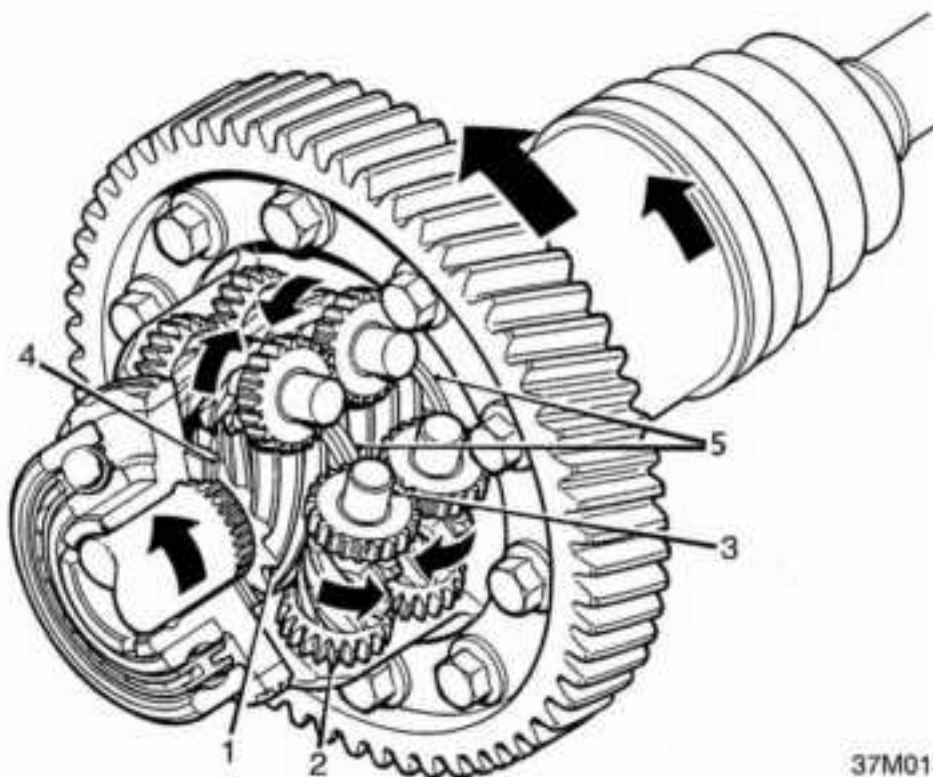
The assembly comprises a final drive gear bolted to the differential casing two helical side gears splined to the drive shafts and four pairs of element gear assemblies arranged at ninety degree intervals within the differential casing and running parallel to the side gears. Each of the element gear assemblies comprises two helical gears of unequal length, the long gears are in constant mesh with the helical side gears splined to the drive shafts and also with the short gears of the adjoining element. Axial thrust of the helical side gears is controlled by thrust washers located between the end of each gear and the differential casing and by a thrust washer and friction washer located between the two gears.

OPERATION

With the exception of reverse all gears are in constant mesh. Forward ratios are obtained by locking a gear to its shaft using its individual synchronizer hub and sleeve. Reverse gear is obtained by engaging reverse idler gear with the reverse gears changing the direction of rotation of the output shaft. When a forward gear is selected the synchronizer sleeve presses the synchromesh female cone into contact with a corresponding male cone in the gear chosen. This synchronizes the speeds of the synchronizer hub and gear. The synchronizer sleeve then engages the gear and by means of a spring ring, teeth extensions on the synchronizer sleeve and detents in the selector shaft holds the selected gear in engagement. Torque is transmitted from the input shaft through the selected gear to the output shaft pinion and final drive gear to the drive shafts.

MANUAL GEARBOX

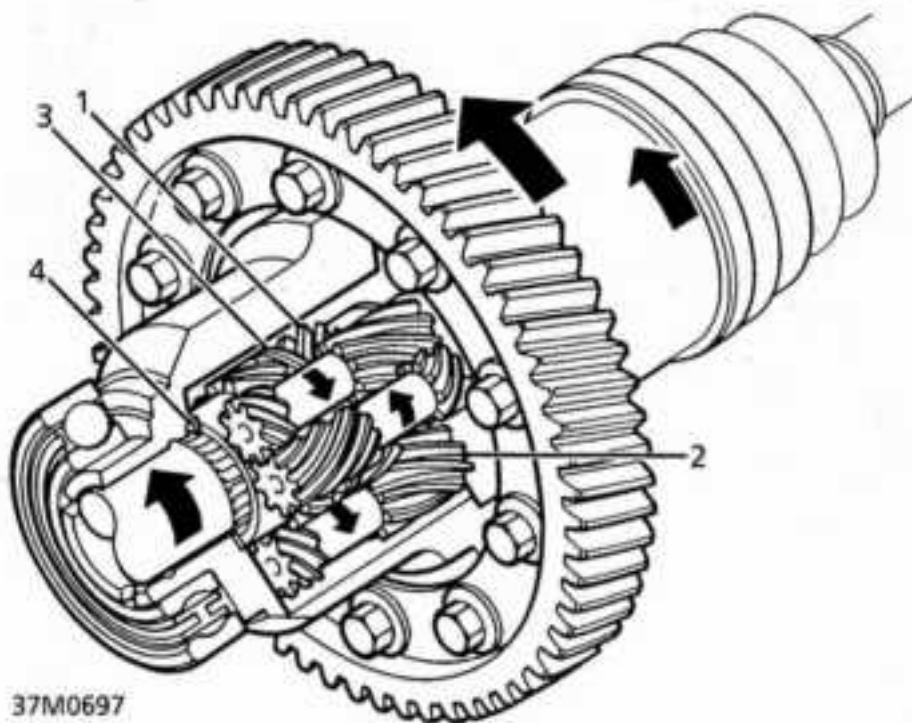
OPERATION - TORSEN DIFFERENTIAL



37M0181

**Torsen differential - Type A - Serial number
prefixes K4BX and K7BSUT**

1. Helical side gear
2. Element gear assembly - worm and spur gears
3. Journal pin
4. Thrust washer and spacing washer
5. Two thrust washers and needle roller bearing



Torsen differential - Type B - Serial number prefixes C6FTUT; W4DTUT; C6DTUT and C6DTUTH

1. Helical side gear
2. Element gear assembly - helical gears
3. Friction washers
4. Thrust washers

Unlike a conventional limited slip differential, the torque sensing differential does not rely on the locking value of friction discs but by the friction produced by the teeth of the two helical side gears splined to the drive shafts meshing with the gears of the element gear assemblies. On Type A differentials, additional locking values are generated by the thrust washers and needle roller bearings located at each end of and between the side gears; whilst on Type B differentials, a combination of thrust washers and friction washers is used.

When both front wheel speeds are equal, then the frictional loads imposed by the element gears on the side gears are also equal. However, when the drive resistance on a road wheel is reduced through loss of traction then a torque imbalance is created; less torque being required to turn the wheel with the highest speed. This torque imbalance is sensed by the differential and results in a lowering of the friction imposed by the element gears on the side gear

driving that particular wheel. This causes a reduction in wheel speed until a point is reached where traction is restored, the torque required to turn both wheels is equal and both wheels are rotating at the same speed.

MANUAL GEARBOX

DESCRIPTION - REVERSE BRAKE

A reverse brake mechanism has been introduced to the PG-1 gearbox, and is operated by the selector fork mechanism, which stops the input shaft from rotating prior to the engagement of reverse gear and provides a quiet and smooth engagement of reverse gear, providing the vehicle is stationary.

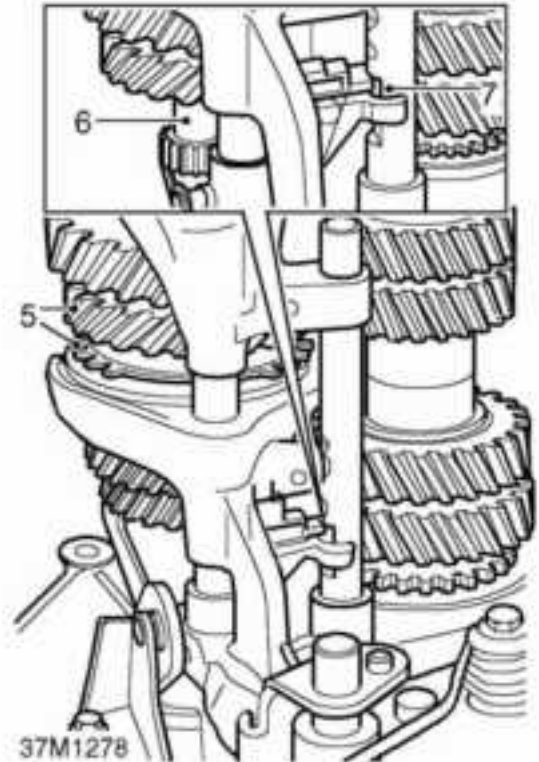
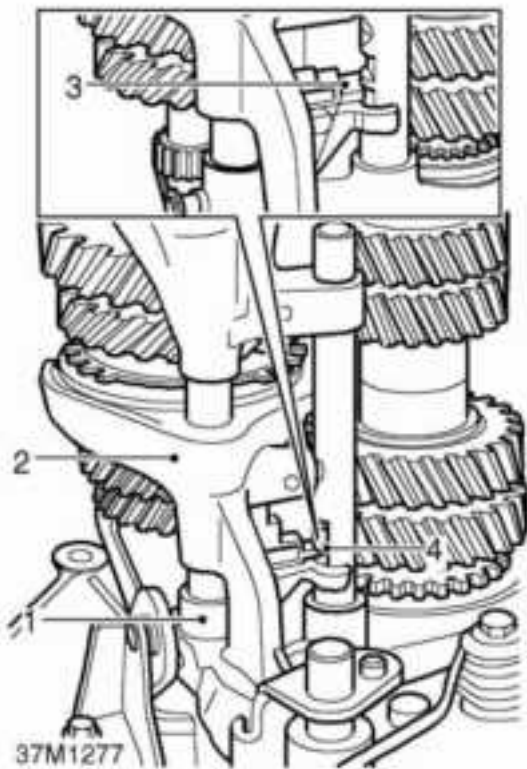
The reverse brake utilizes the 3rd/4th synchro hub for its operation. The 5th/reverse shift piece, which is secured to the selector shaft by a roll pin, and incorporates two guide lugs with two machined grooves that form a platform for a lock plate. The inner face of the lock plate is angled approximately at 45°, with two machined flanges either side of the lock plate which are positioned in machined grooves in the guide lugs. A return spring, which biases the lock plate against the stop surface, extends along the step at the front of the lock plate, with the two free ends of the spring held in position by two 'Taptite' screws either side of the shift piece. A lug on the 3rd/4th selector fork has a machined face at an angle of 45° which acts as a ramp when in contact with the angled face of the lock plate. 1st/2nd selector shaft has a machined abutment surface located below the detent grooves, the abutment surface being the area of contact for the lock plate.



OPERATION - REVERSE BRAKE

When selecting reverse gear, the 5th/reverse shift piece (1) moves upwards, and the angled face of the lock plate (3) contacts the ramp of 3rd/4th selector fork (2). The upward movement carries the lock plate (3) outwards until it contacts the abutment (4) on 1st/2nd selector shaft. From this point, continued upward movement of the 5th /reverse shift piece (1) causes the lock plate (3) to move the 3rd/4th selector and synchro sleeve (5) towards 4th gear. The movement of the 3rd/4th synchro sleeve (5) is sufficient to restrain the input shaft (6), thus permitting smooth engagement of reverse gear.

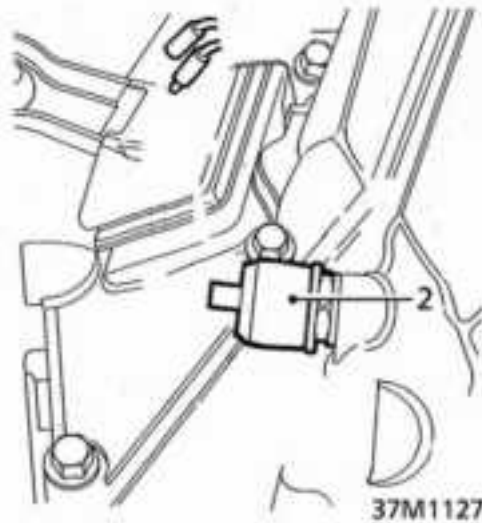
To prevent any further movement of the 3rd/4th synchro sleeve (5) and engagement of 4th gear, the spring on the lock plate (3) moves the lock plate into the machined groove (7) above the abutment (4).



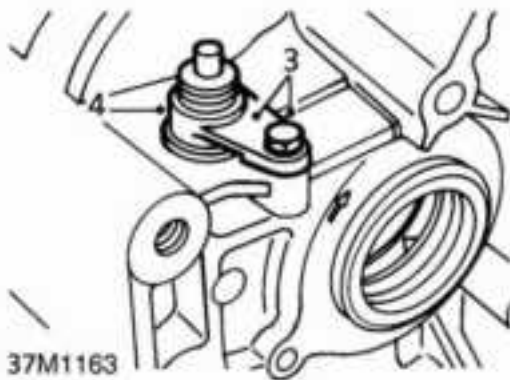


GEARBOX DISMANTLING

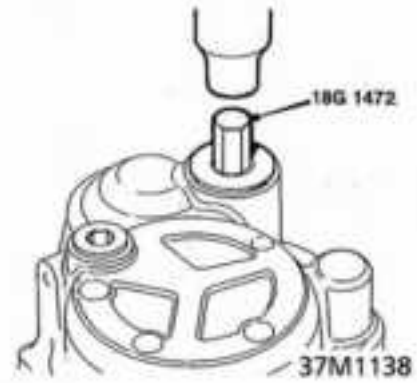
1. Thoroughly clean exterior of gearbox.



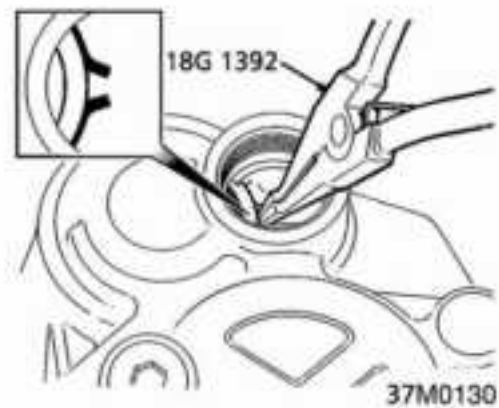
2. Remove reverse light switch; discard sealing washer.



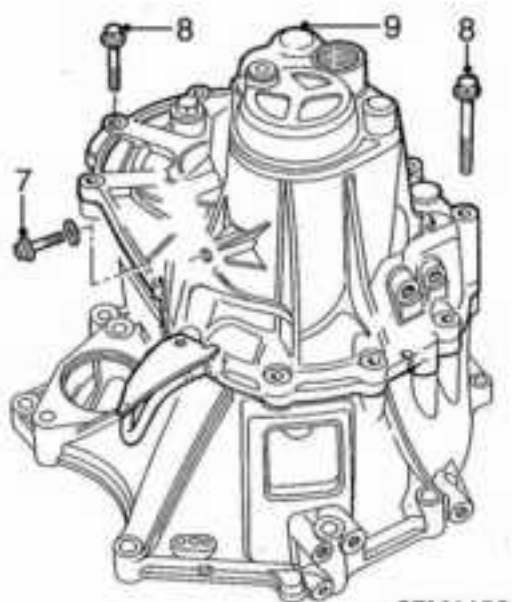
3. Remove bolt and locating plate securing speedometer drive pinion and housing.
4. Remove speedometer drive pinion and housing, discard 'O' ring.



5. Remove access plug using tool 18G 1472.

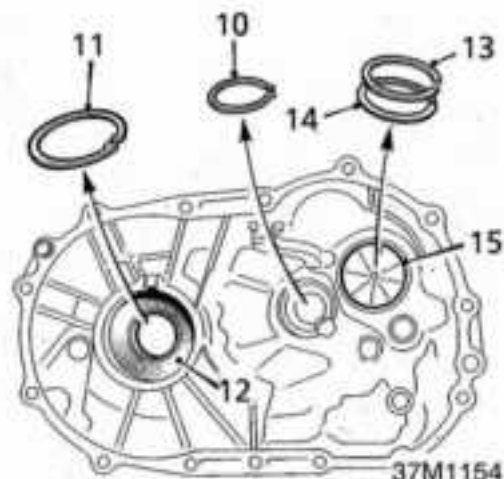


6. Using tool 18G 1392, release circlip retaining output shaft bearing.



37M1128

7. Remove bolt retaining reverse idler shaft, discard washer.
8. Noting their fitted position, remove 14 bolts securing gear case to differential housing; release breather pipe bracket.
9. Using a soft-faced mallet, release gear case from differential housing; remove gear case.



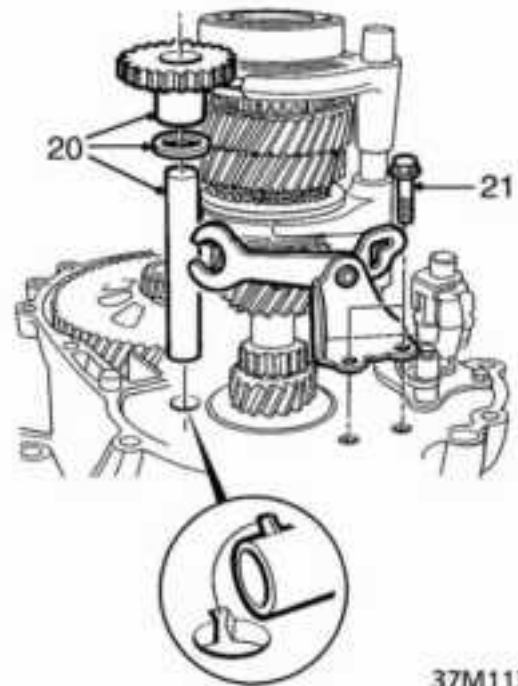
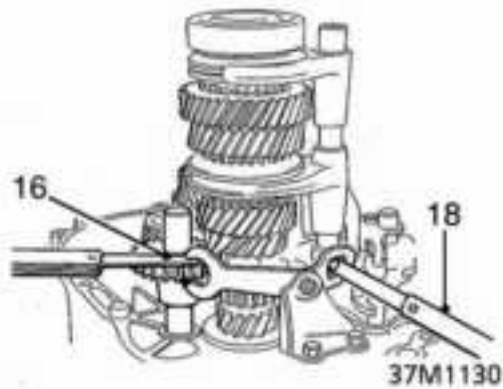
37M1154

10. Remove and discard output shaft bearing circlip from gear case.
11. Remove selective circlip from differential bearing recess in gear case; retain circlip.
12. Remove differential oil seal.



CAUTION: Two types of oil seal have been fitted, retain oil seal for reference to ensure that replacement is of correct type.

13. Remove selective circlip(s).
14. Remove and discard Belleville washer.
15. Remove input shaft oil guide plate.

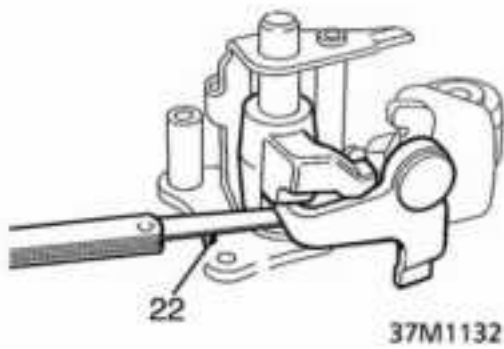


- 16. Using feeler gauges, measure clearance between reverse idler gear and selector fork. Clearance = 0.5 to 1.1 mm
- 17. If clearance obtained exceeds above figure, measure width across prongs of selector fork. Prong width = 13.0 to 13.3 mm.
- 18. Using feeler gauges, measure clearance between pin and selector fork groove. Standard = 0.05 to 0.35 mm
Service limit = 0.5 mm
- 19. If clearance obtained exceeds service limit, measure width of selector fork groove. Groove width = 7.05 to 7.25 mm

- 20. Remove reverse idler gear, thrust washer and idler shaft.
- 21. Remove 2 bolts securing reverse selector fork bracket; remove bracket and fork.



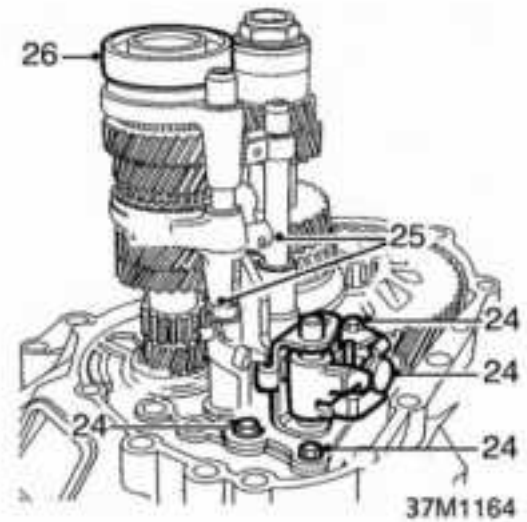
CAUTION: If dimensions obtained exceed figures given, selector fork must be replaced.



22. Using feeler gauges, measure clearance between gearshift arm and guide.
Standard = 0.2 to 0.3 mm
Service limit = 0.55 mm
23. If clearance obtained exceeds service limit, measure width of groove in guide.
Groove width = 8.1 to 8.2 mm

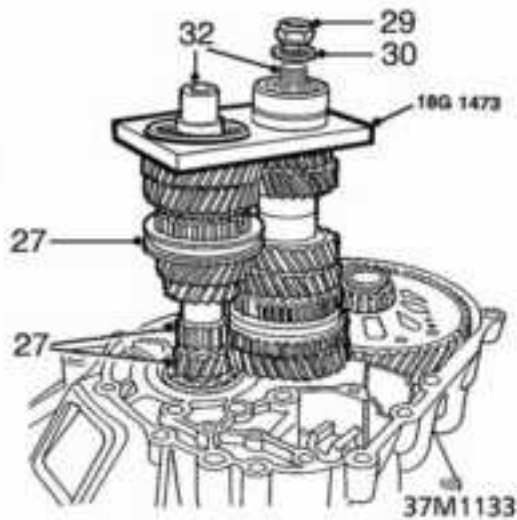


CAUTION: If dimensions obtained exceed figures given, interlock assembly must be replaced.



NOTE: Latest type interlock assembly illustrated

24. Noting their fitted position, remove 3 bolts and retaining interlock assembly; remove assembly.
25. Raise both input and output shafts slightly, remove selector forks and rails.
26. Using 2 suitable levers, remove input shaft bearing.



27. Move synchro sleeve to engage 1st and 4th gears.



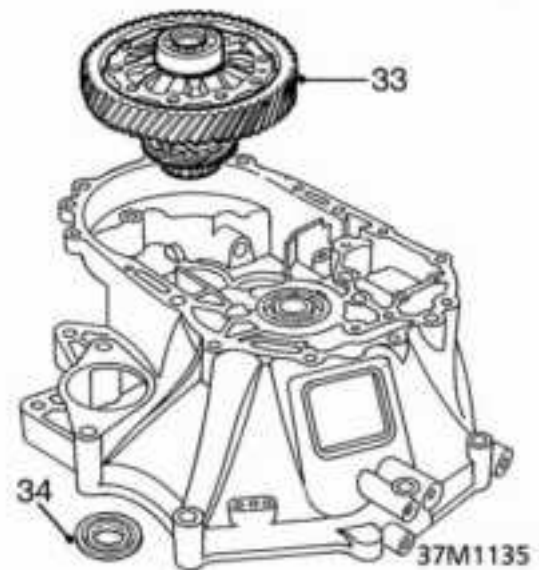
CAUTION: Damage to components will result if gears other than 1st and 4th are engaged.

28. Position tool **18G 1473** on input shaft and around output shaft bearing.
 29. Release staking, remove and discard nut from output shaft.



NOTE: Nut has a LH thread.

30. Remove and discard tongued washer.
 31. Remove tool **18G 1473**.
 32. Remove input and output shafts from differential housing.



33. Lift differential assembly out of housing.

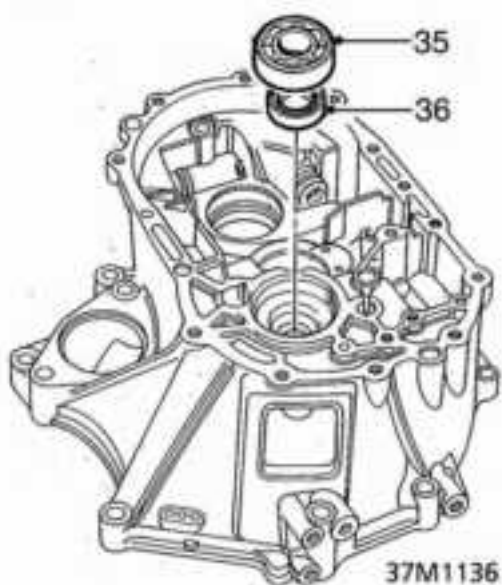


NOTE: Standard differential illustrated.

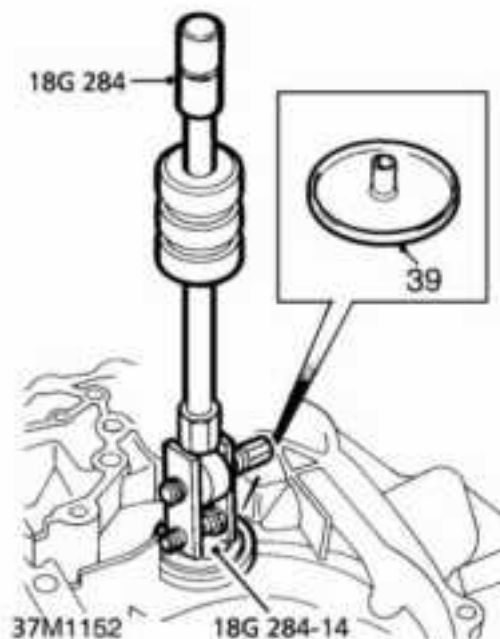
34. Remove differential oil seal.



CAUTION: Two types of oil seal have been fitted, retain oil seal for reference to ensure that replacement is of the correct type.



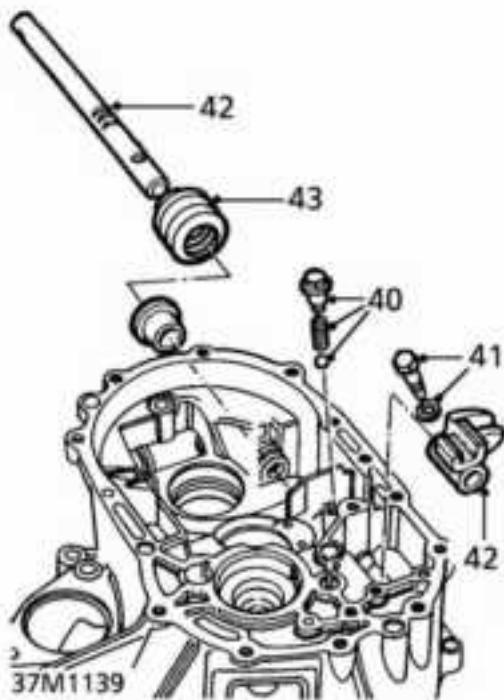
35. Using a soft metal drift, remove input shaft bearing from differential housing; discard bearing.
36. Remove and discard input shaft oil seal.



38. Remove output shaft bearing using tools **18G 284** and **18G 284-14**, discard bearing.
39. Remove output shaft oil guide plate.



37. Remove and discard 2 Patchlok bolts securing output shaft bearing retaining plate - if fitted; remove plate.

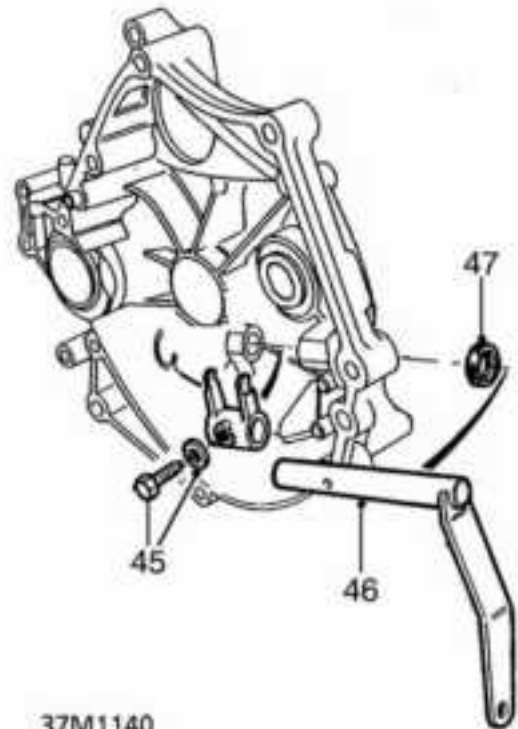


40. Remove detent cap bolt and washer, recover detent spring and ball.



NOTE: Use a stick magnet to recover ball.

41. Remove bolt and washer securing selector shaft guide to shaft.
 42. Withdraw selector shaft; remove selector shaft guide.
 43. Remove gaiter from shaft.
 44. Remove and discard oil seal.



45. Remove bolt and washer securing clutch release fork to release shaft.
 46. Withdraw release shaft.
 47. Remove and discard release shaft oil seal.

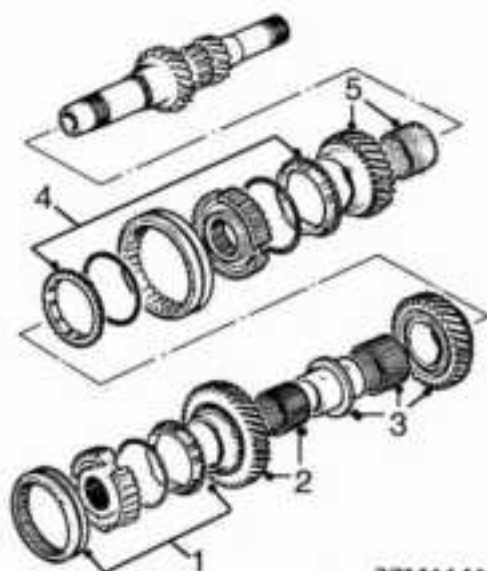
MANUAL GEARBOX

COMPONENT DISMANTLING

Input Shaft



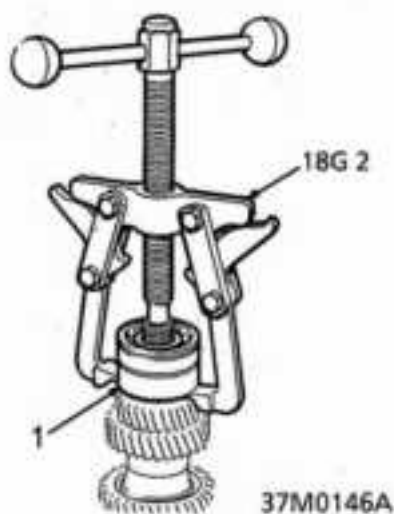
CAUTION: Keep component parts of each synchro assembly together.



37M1141

1. Remove 5th gear synchro assembly.
2. Remove 5th gear and needle bearing.
3. Remove 4th gear together with collar and needle bearing.
4. Remove 3rd/4th synchro assembly.
5. Remove 3rd gear and needle bearing.

Output Shaft

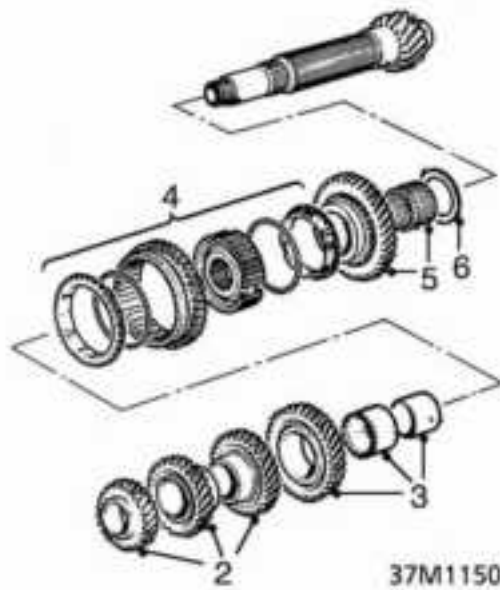


1. Remove bearings using tool **18G 2**, note type of bearing fitted; discard bearings.



NOTE: Depending on the application, either a double ballrace or single ballrace and roller bearing is fitted.

Gearboxes having the letter U in the serial number prefix are all fitted with a single ballrace and roller bearing.

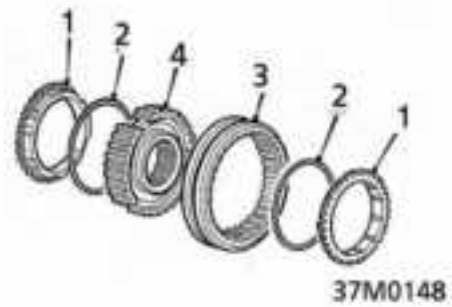


2. Remove 5th, 4th and 3rd gears.
3. Remove 2nd gear, needle bearing and collar.
4. Remove 1st/2nd synchro assembly.

CAUTION: Keep component parts of synchro assembly together.

5. Remove 1st gear and needle bearing.
6. Remove and retain selective thrust washer.

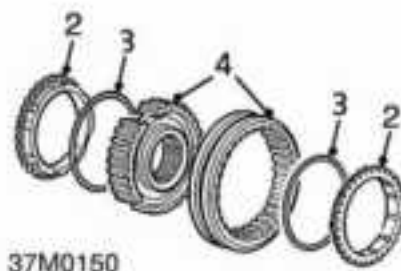
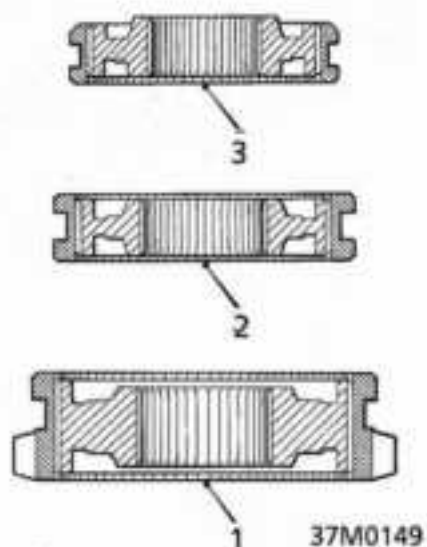
Synchro assemblies



Synchro Assembly Components

1. Synchro ring
2. Spring spring ring
3. Synchro sleeve
4. Synchro hub

NOTE: Only one synchro ring and spring ring are fitted to 5th speed synchro.



2. Remove 2 synchro rings.
3. Remove 2 spring rings.



NOTE: Only one synchro ring and spring ring are fitted to 5th synchro.

4. Remove synchro hub from sleeve.

Synchro Assembly Identification

1. 1st/2nd synchro
2. 3rd/4th synchro
3. 5th synchro

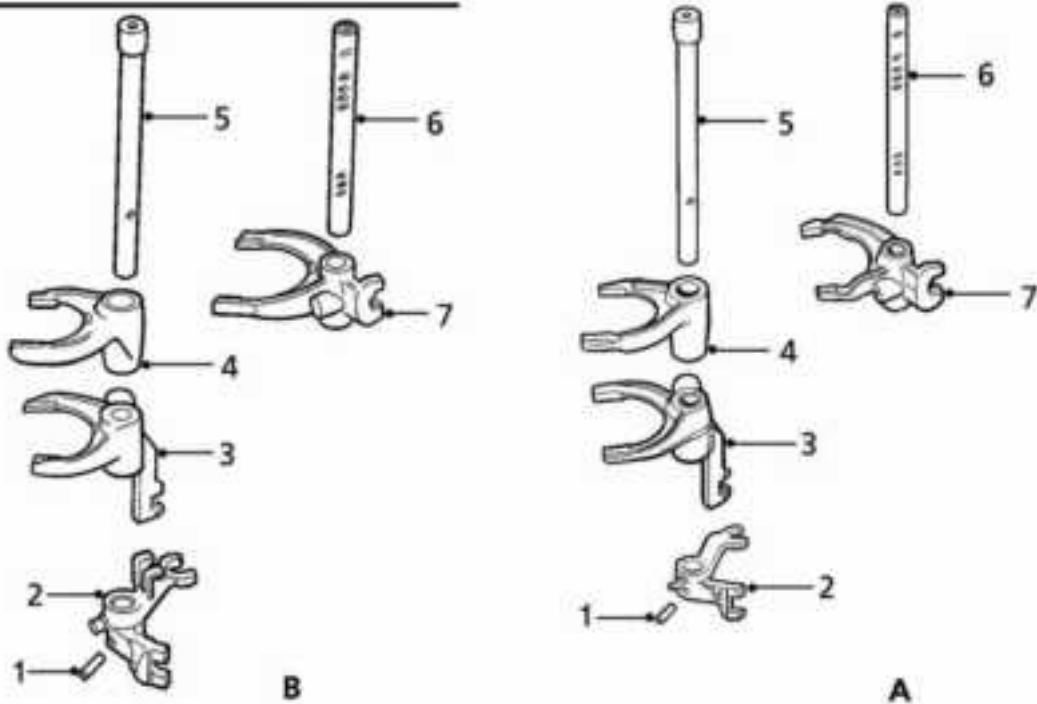


CAUTION: Keep component parts of each synchro assembly together.

1. Suitably mark relative position of each synchro hub to its respective sleeve.



Selector shafts



37M1147

Selector Shaft Components

1. Roll pin
2. 5th/reverse gear selector
3. 3rd/4th gear selector fork
4. 5th gear selector fork
5. 5th/reverse selector shaft
6. 1st/2nd gear selector fork
7. 1st/2nd selector shaft

4. Slide 5th/reverse gear selector off 5th/reverse selector shaft.
5. Slide 3rd/4th and 5th selector forks off 5th/reverse selector shaft.

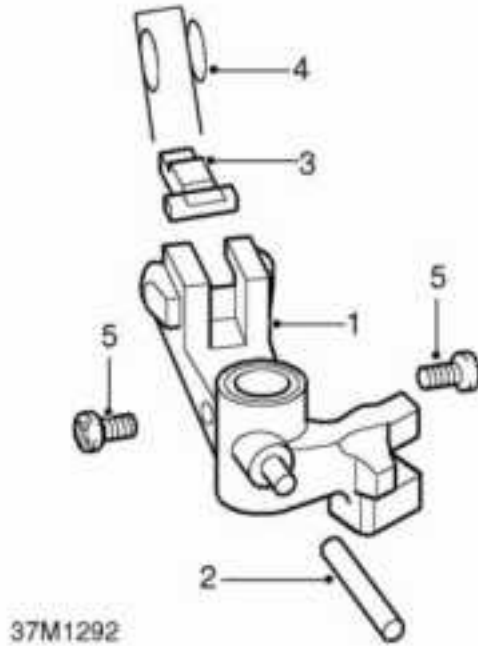
CAUTION: Two types of selector shaft assemblies have been fitted. Type A selectors are manufactured from cast steel whilst type B are manufactured from aluminium bronze and are gold in colour. Do not interchange selector forks or shafts between type A and B assemblies.

1. Identify each selector fork and its fitted position to the relevant selector shaft. Slide 1st/2nd gear selector fork off 1st/2nd selector shaft.
2. Slide 1st/2nd selector shaft out of 5th gear selector fork and 5th/reverse gear selector.
3. Using a suitable punch, remove roll pin securing 5th/reverse gear selector; discard roll pin.

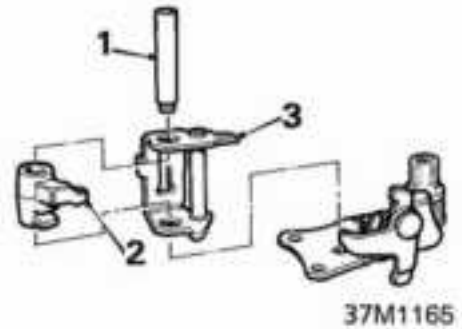
MANUAL GEARBOX

5th/Reverse Selector - with reverse brake

The 5th/reverse selector (1) is secured to the selector shaft by a roll pin (2). The selector incorporates the components for the reverse brake operation. This comprises of a lock plate (3) a retaining spring (4). The spring retains the lock plate in position, with the two ends of the spring located under two 'Taptite' screws (5) which are positioned either side of the 5th/reverse selector.



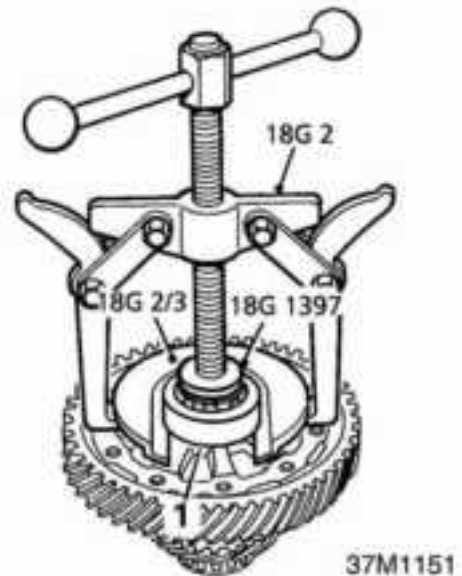
Interlock Assembly



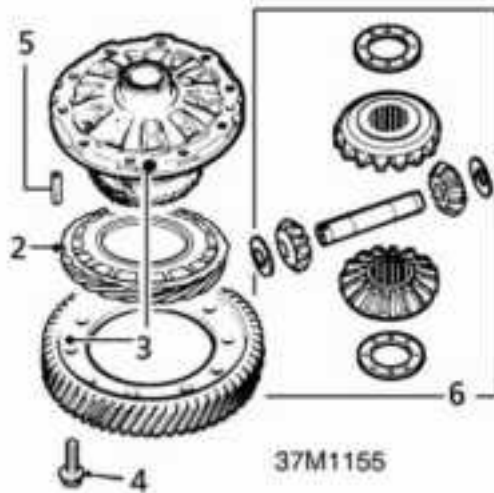
NOTE: A modified interlock assembly having 2 springs has been introduced; this assembly may be fitted as a replacement to early gearboxes.

1. Withdraw shift shaft from gearshift holder and arm guide.
2. Release lug on arm guide from slot in interlock.
3. Slide gearshift holder off arm guide.

Differential Assembly



1. Remove bearings using tools 18G 2, 18G 2/3 and 18G 1397; discard bearings.



2. Remove speedometer drive gear from carrier.
3. Suitably mark fitted position of final drive gear to carrier.
4. Progressively slacken, then remove 10 bolts securing final drive gear to carrier; remove gear.

CAUTION: With the exception of the speedometer drive gear, Torsen differentials are supplied as a complete assembly; do not dismantle.

5. Using a suitable punch, remove roll pin securing pinion shaft; discard pin.
6. Remove pinion shaft, sun gears, planet gears and thrust washers; retain thrust washers - if fitted.

NOTE: Selective thrust washers are fitted to planet gears, non-selective washers are fitted to sun gears.

INSPECTING COMPONENTS

1. Clean all components ensuring all traces of RTV sealant are removed from gear case, differential housing and access plug. Ensure oil drillings in input and output shafts and oil guide plates are clear. Ensure gearbox breather is unobstructed.



CAUTION: Do not clean plastic components with chlorinated solvent e.g. trichloroethane.

2. Check speedometer pinion for wear and pinion housing threads for damage.

Input and Output Shaft Assemblies

1. Check gears for worn or chipped teeth, cracks or uneven wear.
2. Check coning surfaces of gears for wear.



CAUTION: Gearboxes having the letter K in the Serial Number prefix: Commencing at gearbox Serial Numbers K4BS 2027303, K6BS 2018506 and K7BSUT 2002029, the helix angle of 2nd gear on both input and output shafts was changed to 33° and it is essential that if a replacement input shaft or output shaft 2nd gear is to be fitted, the correct replacement is obtained. The 33° helix gears may be fitted to gearboxes built prior to the above Serial Numbers provided that the input shaft and output shaft 2nd gear are replaced together.


3. Check needle bearings for wear and overheating (blueing).



CAUTION: Where any of the above are evident, all bearings on the shaft must be replaced.

MANUAL GEARBOX

4. Check shaft splines for wear and threads of output shaft for damage.
5. Check bearing collars for wear and damage.

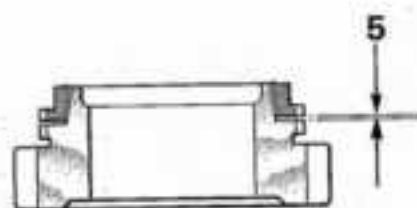
 **NOTE:** Gearboxes having the letter U in the gearbox serial number prefix are fitted with a modified output shaft assembly having an increased diameter and shot peened gears. Due to the increased diameter of the output shaft, differential housing bearing and the method of retaining the bearing, this assembly must not be fitted to any other type of gearbox.

Reverse Idler Shaft and Gear

1. Check idler shaft for wear.
2. Check gear for wear, chipping or cracking of teeth.
3. Check needle bearings for wear, replace gear and bearings as an assembly if wear is evident.

Synchro Assemblies

1. Check component parts of each synchro assembly for wear or damage, ensure teeth on hubs and sleeves are not chipped or rounded off.
2. Ensure teeth on synchro rings are not chipped or damaged, check inner surfaces of rings for wear.
3. Ensure each hub moves freely in its respective sleeve.
4. Place a synchro ring on its respective gear cone and rotate it until it stops (approximately 10 to 20°).



37M0155

5. Measure clearance between synchro ring and gear.
Ring to gear clearance:
Standard = 0.85 to 1.1 mm
Service limit = 0.4 mm (minimum clearance)
6. Repeat for remaining rings and gears.



CAUTION: If any ring to gear clearance is less than above service limit, synchro assembly must be replaced.



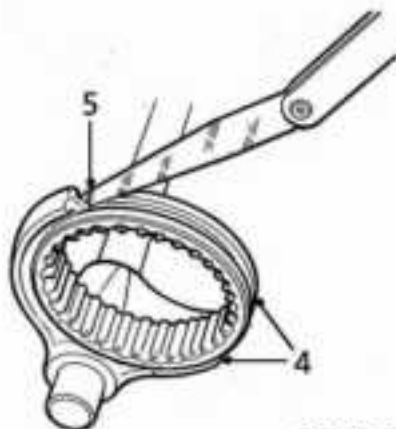
Selector Shafts and Forks

CAUTION: Type B selector shaft assembly: The selector forks fitted to the 5th/reverse selector shaft are matched to the shaft and in the event of any wear or damage, shaft and forks must be replaced as an assembly.

Do not interchange selector forks or shafts between type A and B assemblies.

1. Check shafts for wear and alignment.
2. Check selector forks for wear, cracks or damage.
3. Check the retained detent balls and springs, there must be no visible 'flats' on the balls and springs must keep balls in contact with the staked portion of the selector fork.

CAUTION: It is not possible to replace balls or springs, selector fork must be replaced.



37M0156

4. Assemble each selector fork to its respective synchro sleeve.
5. Check clearance of selector fork in synchro sleeve groove.
Selector fork to groove clearance:
Standard = 0.45 to 0.65 mm
Service limit = 1.0 mm

CAUTION: If clearance is found to exceed service limit, selector fork must be replaced.



37M1156

6. Assemble gearshift arm guide to 3rd/4th selector fork.
7. Using feeler gauges, measure clearance between gearshift arm guide and fork.
Standard = 0.2 to 0.5 mm
Service limit = 0.8 mm
8. If clearance obtained exceeds service limit, measure width of tongue on gearshift arm guide.
Standard = 11.9 to 12.0 mm

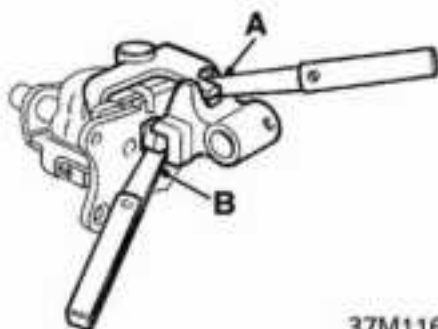
CAUTION: If width of tongue is within limits, 3rd/4th selector fork must be replaced, if width of tongue is less than quoted, gearshift arm guide must be replaced.

9. Repeat above procedures for 1st/2nd selector fork.


MANUAL GEARBOX

Interlock Assembly


1. Check components for wear or damage, replace assembly if necessary.




37M1166

 **NOTE:** Modified interlock assembly illustrated. This assembly may be fitted as a replacement to early gearboxes but modified interlock assemblies fitted to gearboxes having Serial Number prefixes C4BP and C6BP have uprated springs and must not be interchanged with modified interlock assemblies fitted to other gearboxes.

2. Assemble gearshift arm guide to interlock assembly.
3. Using feeler gauges, measure clearance **A**.
Clearance **A**:
Standard = 0.02 to 0.3 mm
Service limit = 0.55 mm
4. If clearance exceeds service limit, check width of groove in gearshift arm guide.
Groove width = 13.05 to 13.25 mm

 **CAUTION:** If width of groove exceeds above dimension, gearshift arm guide must be replaced. If width of groove is within service limit, replace interlock assembly.

5. Using feeler gauges, measure clearance **B** between interlock ball and gearshift arm guide.
Clearance **B**:
Standard = 0.05 to 0.25 mm
Service limit = 0.5 mm
6. If clearance exceeds service limit, measure outside diameter of interlock ball.
Interlock ball outside diameter = 12.05 to 12.15 mm

 **CAUTION:** If diameter of ball is within limits, replace gearshift arm guide, if diameter of ball is less than 12.05 mm, replace interlock assembly.



Differential Assembly

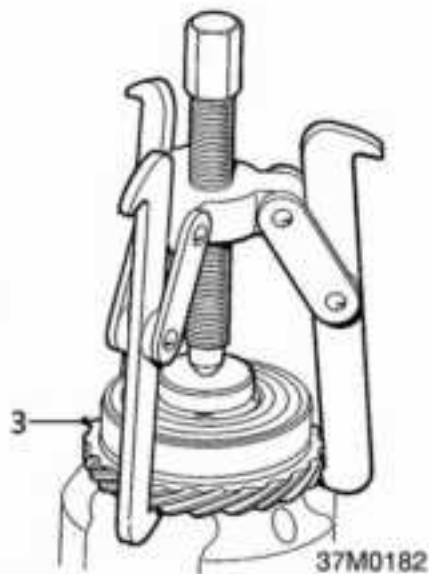
1. Check gear teeth for wear, chipping and signs of overheating.



CAUTION: It is not possible to overhaul Torsen differentials. Replace complete assembly if any of the above are apparent.

Torsen differential

2. Check speedometer drive gear for damage, replace if necessary.



3. Remove speedometer drive gear using a suitable three legged puller and thrust button.

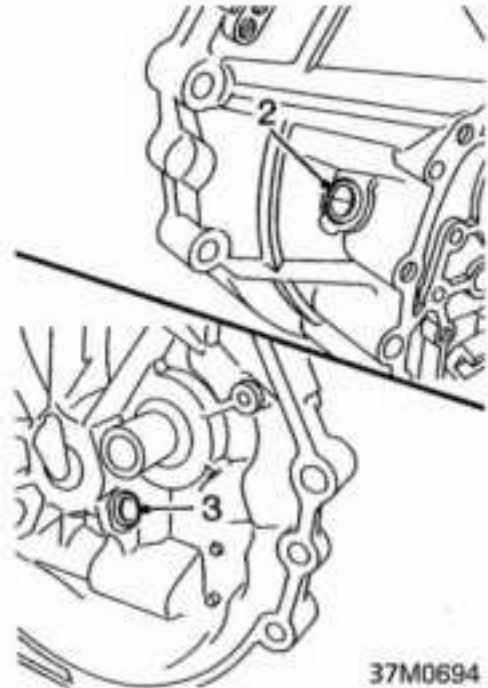
Standard differential

4. Check pinion shaft for wear.
5. Check speedometer drive gear teeth for wear or damage, replace as necessary.

Differential Housing

1. Check housing for damage, check that locating dowels are fitted; check clutch release shaft bushes for damage or wear and that shaft is free to turn, replace if necessary using the following procedure.

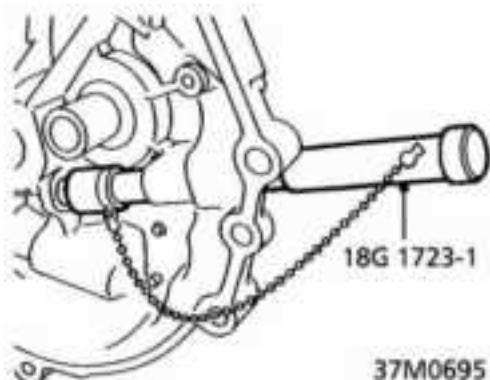
Remove



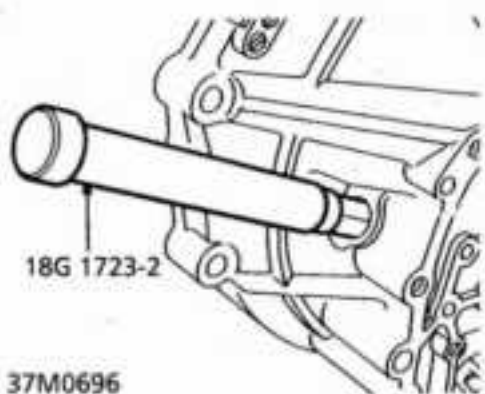
2. *Outer bush:* Using a hacksaw blade, carefully cut a longitudinal slot opposite the split in the bush; prise bush out of differential housing.
3. *Inner bush:* Carefully prise inner bush out of differential housing.

MANUAL GEARBOX

Refit



4. *Inner bush:* Using tool **18G 1723-1**, drift inner bush into differential housing.



5. *Outer bush:* Using tool **18G 1723-2**, drift outer bush into differential housing.



CAUTION: Ensure end of tool **18G 1723-2** is located in inner bush.

6. *Gearboxes fitted with output shaft bearing retainer plate:* Remove all traces of Patchlok compound from output shaft bearing retainer plate bolt holes using an M6 tap.



CAUTION: Ensure bolt holes are thoroughly cleaned.



COMPONENT ASSEMBLING

Differential

1. Assemble planet gears and original thrust washers.
2. Fit sun gears and original thrust washers - if fitted.
3. Rotate gears and thrust washers to align drillings in carrier.

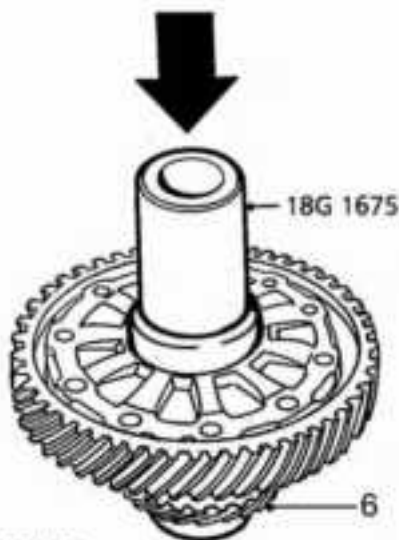


CAUTION: Do not fit roll pin or final drive gear at this stage.

Torsen differential

4. Position speedometer drive gear on carrier.
5. Using a suitable length of tubing, drift gear fully on to carrier.

Standard differential



6. Position speedometer drive gear on carrier.
7. Fit new ball bearings to carrier using tool **18G 1675**.



NOTE: Larger of the two bearings is fitted on speedometer drive gear side.

Synchro Assemblies

1. Assemble each synchro sleeve to its respective hub ensuring that raised teeth on the sleeve are aligned with the deeper grooves in hub.
2. Fit spring rings to retain hub.



NOTE: Only one spring ring is fitted on 5th speed synchro.

3. Assemble synchro rings to their respective sleeves.



CAUTION: When assembling the 5th gear synchro sleeve to hub, it is possible to position the raised teeth on the synchro sleeve in the machined cut-aways for the synchro ring. Although the gearbox can be assembled, it will not be possible to select 5th gear.

MANUAL GEARBOX

Selector Shafts

1. Slide 5th and 3rd/4th selector forks on to 5th/reverse selector shaft.



CAUTION: Ensure that longest portion of selector fork lugs face away from shoulder of shaft.

2. Slide 5th/reverse selector on to 5th/reverse selector shaft; secure selector with a new roll pin.



NOTE: Make sure the lock plate and retaining spring are correctly located on 5th/reverse selector fitted with reverse brake.

3. Slide 1st/2nd gear selector fork on to 1st/2nd selector shaft.
4. Locate 1st/2nd selector shaft in 5th/reverse gear selector and 5th gear selector fork.
5. Locate lug on shift arm guide in gearshift holder.
6. Position gearshift holder to interlock; fit shaft.

Reverse Idler Gear and Shaft

1. Fit a new thrust washer.
2. Smear needle bearing rollers with petroleum jelly and fit in idler gear.
3. Fit reverse idler gear to shaft.



NOTE: Boss on gear must face towards thrust washer.

Input Shaft



NOTE: Smear needle bearing rollers with petroleum jelly prior to assembly.

1. Fit needle bearing rollers in third gear.
2. Fit 3rd gear on shaft.
3. Fit 3rd/4th synchro assembly.
4. Fit needle bearing rollers in 4th gear, position gear on collar and fit assembly on shaft.
5. Fit needle bearing rollers in 5th gear, position gear on collar.



NOTE: Boss on 5th gear must face away from 4th gear.

6. Fit 5th synchro assembly.



NOTE: Machined groove in synchro hub must face towards 5th gear and large chamfer on synchro sleeve must face away from 5th gear.

7. Fit a new input shaft bearing.

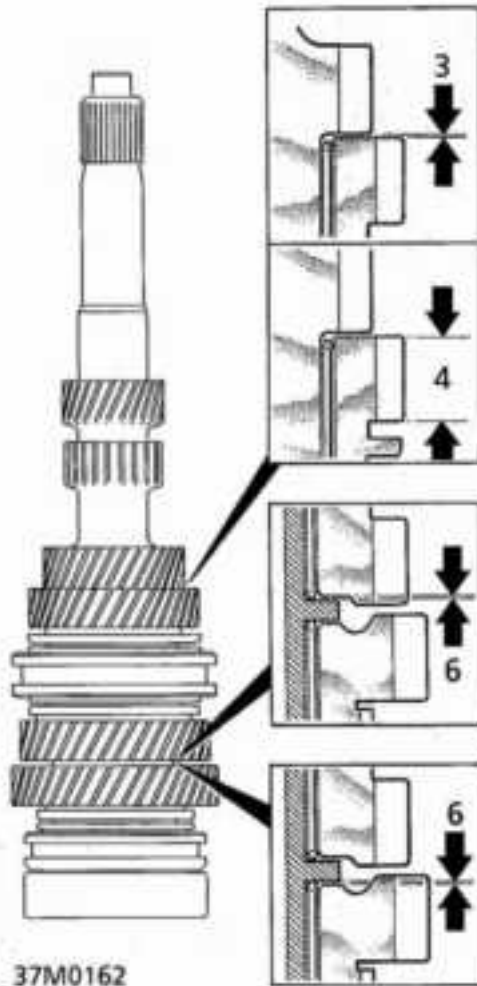


Input Shaft Gear End-float - Check

1. Position input shaft on bed of a hand press with bearing located on a suitable socket.
2. Apply downward pressure to input shaft.



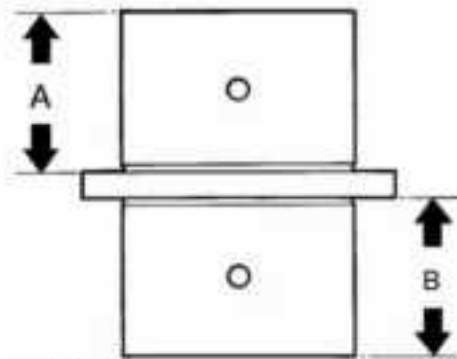
NOTE: Maintain pressure whilst checks are carried out.



37M0162

3. Using feeler gauges, measure clearance between 2nd and 3rd gears.
3rd gear clearance:
Standard = 0.06 to 0.21 mm
Service limit = 0.3 mm

4. If clearance exceeds service limit, measure thickness of 3rd gear.
3rd gear thickness:
Standard = 35.42 to 35.47 mm
Service limit = 35.30 mm
5. If 3rd gear thickness is greater than service limit, replace 3rd gear synchro assembly; if thickness is less than service limit, replace 3rd gear.
6. Using feeler gauges, measure clearance between the spacer collar and 4th gear and spacer collar and 5th gear.
4th and 5th gear clearance:
Standard = 0.06 to 0.21 mm
Service limit = 0.3 mm



37M0163

7. If clearance of either gear exceeds service limit measure length of appropriate side of spacer collar **A** or **B**.
Length A = 4th gear side
Length B = 5th gear side
Spacer collar length **A** or **B**:
Standard = 26.03 to 26.08 mm
Service limit = 26.01 mm
8. If length **A** exceeds service limit, measure thickness of 4th gear.
4th gear thickness:
Standard = 30.92 to 30.97 mm
Service limit = 30.80 mm

9. If thickness of 4th gear exceeds service limit, replace 3rd/4th synchro assembly; if thickness of gear is less than service limit, replace gear.
10. If length **B** exceeds service limit, measure thickness of 5th gear.
5th gear thickness:
Standard = 30.42 to 30.47 mm
Service limit = 30.30 mm
11. If thickness of 5th gear exceeds service limit, replace 5th synchro assembly; if thickness of gear is less than service limit, replace gear.

Output Shaft



NOTE: Smear needle bearing rollers with petroleum jelly prior to assembly.

1. Measure and record thickness of original thrust washer.
2. Fit original thrust washer on shaft.
3. Fit needle bearing rollers in 1st gear.
4. Fit 1st gear on shaft.
5. Fit 1st/2nd synchro assembly.



CAUTION: Ensure reverse gear on synchro sleeve is adjacent to 1st gear.

6. Measure and record length of 2nd gear collar.
7. Fit 2nd gear collar on shaft ensuring lubrication groove is towards 1st/2nd synchro assembly.
8. Fit needle bearing rollers in 2nd gear.
9. Fit 2nd gear on shaft.
10. Fit 3rd and 4th gears ensuring that bosses on gears are adjacent to each other.
11. Fit 5th gear ensuring that large boss on gear is towards threaded portion of shaft.
12. Fit new output shaft bearings ensuring that snap ring groove in ball race is towards threaded portion of shaft.



CAUTION: Ensure that replacement bearings are the same as originally fitted. Where a roller bearing and single ballrace is to be fitted, the single ballrace must be adjacent to threaded portion of shaft.

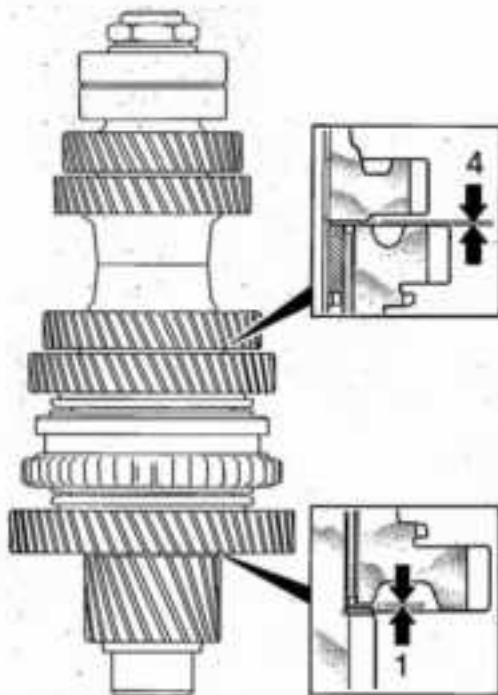
13. Fit a new tongued washer with dished side of washer towards bearing.
14. Secure final drive pinion of shaft in a soft-jawed vice.
15. Fit a new nut and tighten to 110 Nm.



NOTE: Nut has a LH thread; do not stake nut at this stage.



Output Shaft Gear End-float - Check



37M0164

6. Compare length of original collar and select a collar which will provide specified clearance. Collars are available in the following lengths: 28.99 mm and 29.04 mm
7. Having determined thickness of selective thrust washer and length of 2nd gear collar required, fit thrust washer and collar.
8. Secure output shaft nut by staking.

1. Using feeler gauges measure clearance between 1st gear and thrust washer.
Standard = 0.03 to 0.08 mm
Service limit = 0.18 mm
2. From clearance obtained, calculate thickness of thrust washer required to give correct clearance. If clearance obtained exceeds service limit, fit a thicker thrust washer; if it is less than 0.03 mm, fit a thinner thrust washer.

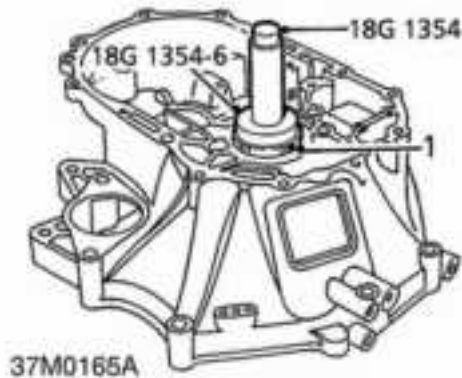


NOTE: Thrust washers are available as follows:
1.96 to 2.08 mm thick in increments of 0.03 mm.

3. Select a thrust washer of the required thickness to bring end-float within limits.
4. Using feeler gauges measure clearance between 2nd and 3rd gears.
2nd/3rd gear clearance = 0.03 to 0.10 mm
5. If clearance exceeds figure given, it will be necessary to fit a shorter 2nd gear collar; if clearance is less than figure given, it will be necessary to fit a longer collar.

MANUAL GEARBOX

Input Shaft End thrust - Check and Adjust



1. Fit a new input shaft bearing in differential housing using tools **18G 1354** and **18G 1354-6**.



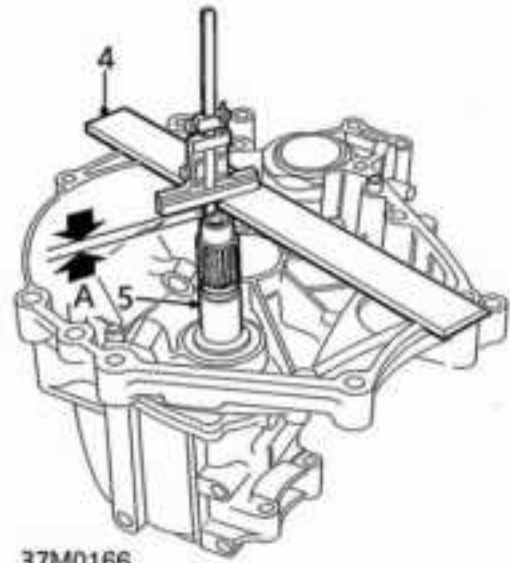
CAUTION: Do not fit oil seal at this stage.

2. Position input shaft assembly in differential housing ensuring it is fully inserted in bearing.



NOTE: Position housing so that end of shaft is clear of bench.

3. Fit gear case, fit and tighten bolts to 45 Nm.



4. Position a straight edge and depth gauge across face of differential housing.
5. Pull input shaft into differential housing and position end of depth gauge on end of shaft; record measurement shown on gauge.
6. Push input shaft towards gearcase, record measurement shown on gauge.
7. Subtract thickness of straight edge from above readings.
8. Subtract first measurement from second measurement; record figure obtained. Call resultant measurement **A**.
9. Calculate thickness of circlip(s) required by subtracting 0.97 mm from dimension **A**.
Input shaft end thrust = 0.14 to 0.21 mm



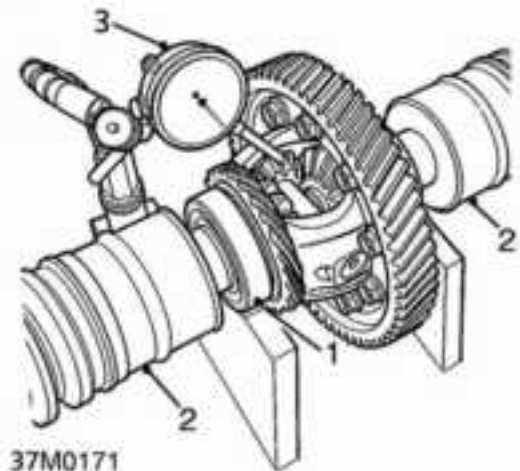
10. Select circlip(s) from sizes available which equal thickness required. Fourteen circlips are available ranging from 0.5 mm to 1.15 mm thick in increments of 0.05 mm.



CAUTION: No more than two circlips may be fitted. It is not always possible to select the exact thickness of circlips required; where this occurs, always fit a slightly thinner pack to avoid pre-loading bearings.

11. Remove bolts securing gear case; remove gear case.
12. Remove input shaft assembly.
13. Remove input shaft bearing from differential housing using a soft metal drift.

Differential Pinion Gear Backlash - Check and Adjust



1. Position differential assembly with bearings located in V blocks.
2. Fit both inboard drive shaft joints to align gears.
3. Assemble a DTI gauge with stylus of gauge contacting one of the planet gears; zero the gauge.
4. Measure and record planet gear backlash.
5. Repeat procedure for other planet gear.
6. Compare backlash figures obtained with the following:
Planet gear backlash = 0.05 to 0.15 mm
7. If backlash is not as specified, remove planet gears, measure thickness of original thrust washers and from figures obtained, calculate thickness of thrust washers required to give correct backlash.



CAUTION: Thrust washers selected must be of equal thickness, and are available from 0.70 to 0.90 mm thick in increments of 0.20 mm.

8. Fit selected thrust washers, secure pinion shaft with a new pin.

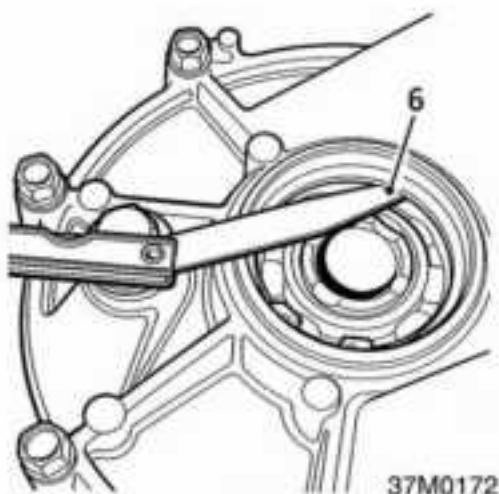
MANUAL GEARBOX

Standard and Torsen differentials:

9. Fit final drive gear to carrier ensuring reference marks are aligned.
10. Fit 10 bolts and tighten progressively to 110 Nm.

Differential Bearing Pre-load - Check and Adjust

1. Position original selective circlip in gear case.
2. Position differential assembly in differential housing.
3. Fit gear case, fit and tighten bolts to 45 Nm.
4. Lightly drive differential assembly into gear case to seat circlip.
5. Lightly drive differential into differential housing to settle bearing.



6. Using feeler gauges measure and record clearance between circlip and bearing outer face.
Correct clearance = 0.15 mm maximum

7. If clearance is not as specified, select the appropriate circlip from the range available.



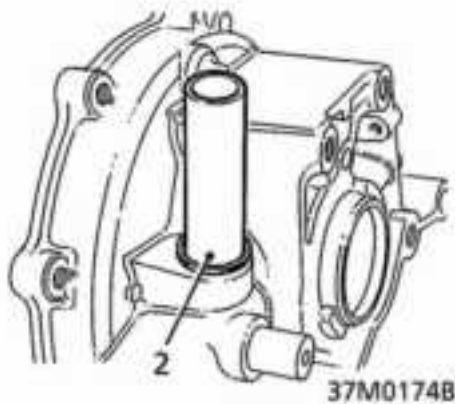
NOTE: Circlips are available from 2.50 to 3.00 mm thick in increments of 0.10 mm.

8. Remove original circlip through oil seal aperture using tool **18G 1392**.
9. Fit selected circlip using tool **18G 1392**.
10. Re-check bearing pre-load using above procedure.
11. Remove differential assembly, retain selected circlip.

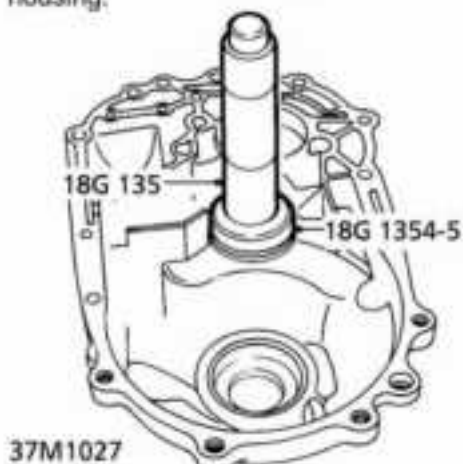


GEARBOX ASSEMBLING

1. Lightly lubricate all components with gearbox oil.

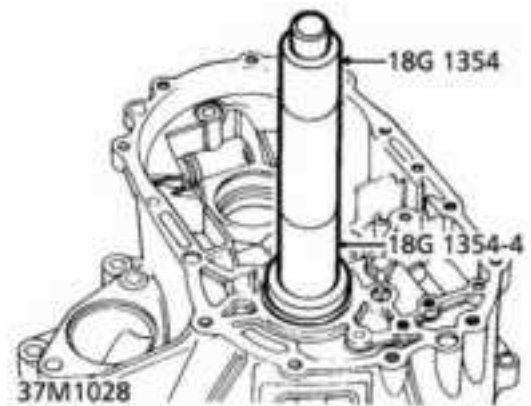


2. Using a suitable piece of tubing, fit a new selector shaft oil seal.
3. Fit output shaft oil guide plate in differential housing.

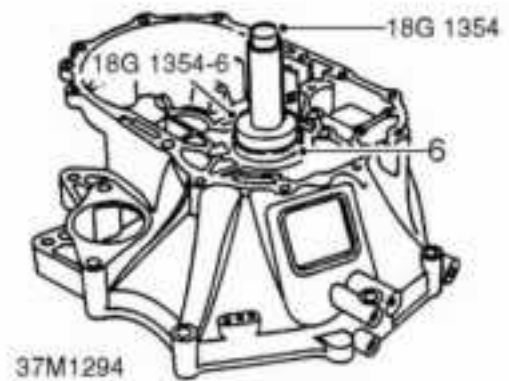


4. Fit a new output shaft bearing in differential housing using tools 18G 1354 and 18G 1354-5.

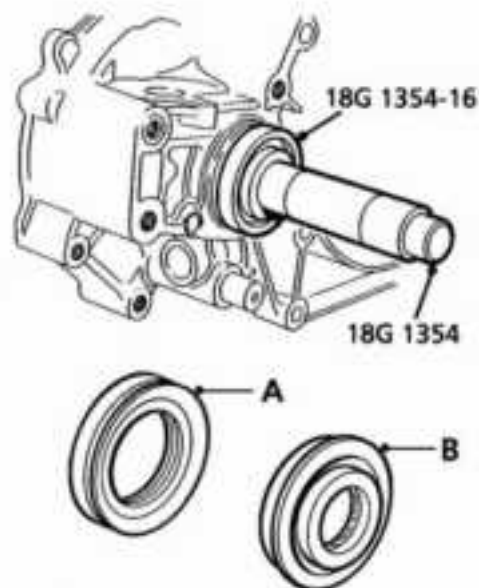
NOTE: Depending on application, output shaft bearing may have oil holes drilled in bearing cage; these holes must face towards output shaft when fitting bearing. Bearings without the oil hole may be fitted either way round.



5. Fit a new input shaft oil seal in differential housing using tools 18G 1354 and 18G 1354-4.



6. Fit input shaft bearing into differential housing using tools 18G 1354 and 18G 1354-6.



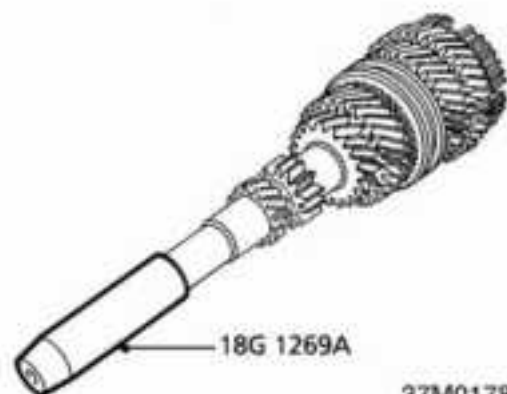
37M1145

CAUTION: Differential oil seals: Type A are fitted with early drive shafts. Type B oil seals are fitted to later drive shafts. The later oil seals are waxed and must be fitted dry. Ensure that replacement seals are the same type as those removed.

7. Fit a new differential oil seal in differential housing using tools 18G 1354 and 18G 1354-16.
8. Fit output shaft bearing retaining plate - if fitted.

CAUTION: Ensure side marked TOP is facing towards output shaft.

9. Fit 2 new Patchlok bolts to secure bearing retaining plate; tighten bolts to 8 Nm.
10. Fit selector shaft and selector shaft guide.
11. Fit and tighten dowel bolt to 28 Nm.
12. Fit detent ball, spring and cap bolt, tighten bolt to 22 Nm.
13. Position differential assembly into housing.



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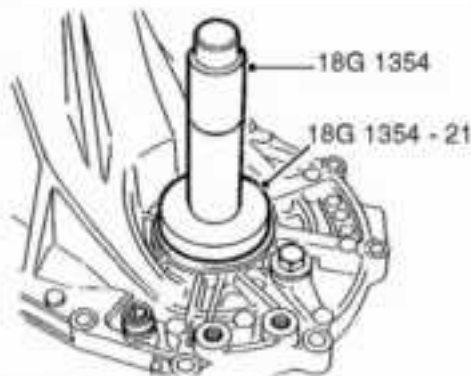
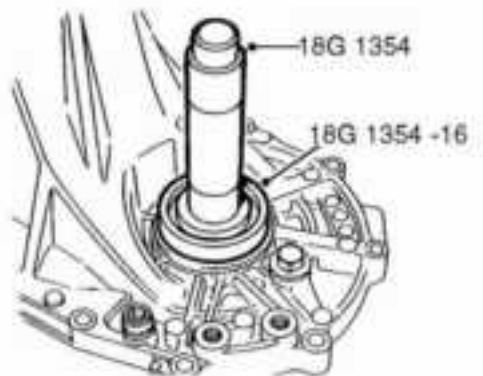
14. Fit seal protector, tool 18G 1269A to input shaft, or apply masking tape to splines to protect oil seal.
15. Place input and output shafts together and fit assembly in differential housing.

NOTE: Position housing so that when fitted, end of input shaft is clear of bench.

16. Remove tool 18G 1269A.
17. Ensure output shaft nut is staked.
18. Position gears in neutral.
19. Raise both shafts slightly and fit selector forks assembly ensuring forks are located in grooves in synchro sleeves.
20. Fit reverse idler gear, thrust washer and shaft.

NOTE: Large boss on idler gear must be towards differential housing.

21. Fit reverse selector fork and bracket.
22. Fit and tighten retaining bolts.
23. Fit interlock assembly ensuring base of interlock locates in slot at lower end of 1st/2nd selector shaft.
24. Fit and tighten interlock retaining bolts.



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25. Fit new differential oil seals in gear case.



NOTE: Type A oil seal - use 18G1354 and 18G 1354-16

Type B oil seal - use 18G 1354 and 18G 1354-21

26. Fit input shaft oil guide plate in gear case.
27. Fit a new Belleville washer and selected circlip(s).
28. Fit selected circlip(s).
29. Fit new output shaft circlip in gear case.
30. Fit selected circlip in differential bearing recess in gear case.
31. Apply a bead of RTV silicone sealant to mating face of gear case.
32. Position gear case over differential housing keeping gear case square to housing.
33. Lower gear case into position and at the same time, expand output shaft bearing circlip using tool 18G 1392.
34. Push gear case fully down on to differential housing.
35. Ensure circlip is fully seated in groove in output shaft bearing, raise output shaft and a click will be heard as circlip enters groove.
36. Fit and progressively tighten gear case bolts to 45 Nm.
37. Fit reverse idler shaft bolt and tighten to 67 Nm. Use a new washer.
38. Apply thread sealant to access plug, fit and tighten plug using tool 18G 1472.
39. Fit reverse light switch and new washer, tighten to 25 Nm.
40. Fit speedometer drive pinion and housing, use a new 'O' ring; fit retaining plate, fit and tighten bolt to 5 Nm.
41. Fit new clutch release shaft oil seal.
42. Fit clutch release shaft and fork.
43. Fit and tighten bolt to 29 Nm.



DATA

Reverse idler gear to selector fork clearance	0.5 to 1.1 mm
Selector fork prong width	13.0 to 13.3 mm
Selector fork groove to pin clearance:	
Standard	0.05 to 0.35 mm
Service limit	0.5 mm
Selector fork groove width	7.05 to 7.25 mm
Gearshift arm to guide clearance:	
Standard	0.2 to 0.3 mm
Service limit	0.55 mm
Interlock shift guide groove width	8.1 to 8.2 mm
Synchro ring to gear clearance:	
Standard	0.85 to 1.1 mm
Service limit (minimum clearance)	0.4 mm
Selector shaft forks in synchro sleeve grooves clearance:	
Standard	0.45 to 0.65 mm
Service limit	1.0 mm
Gearshift arm guide to selector fork clearance:	
Standard	0.2 to 0.5 mm
Service limit	0.8 mm
Gearshift arm guide tongue width	11.9 to 12.0 mm
Gearshift arm guide to interlock assembly clearance:	
Standard	0.05 to 0.35 mm
Service limit	0.6 mm
Gearshift arm guide groove width	13.05 to 13.25 mm
Interlock ball to gearshift arm guide clearance:	
Standard	0.05 to 0.25 mm
Service limit	0.5 mm
Interlock ball outside diameter	12.05 to 12.15 mm
2nd to 3rd gear clearance:	
Standard	0.06 to 0.21 mm
Service limit	0.3 mm
3rd gear thickness:	
Standard	35.42 to 35.47 mm
Service limit	35.30 mm
4th to 5th gear clearance:	
Standard	0.06 to 0.21 mm
Service limit	0.3 mm
Spacer collar length:	
Standard	26.03 to 26.08 mm
Service limit	26.01 mm
4th gear thickness:	
Standard	30.92 to 30.97 mm
Service limit	30.80 mm
5th gear thickness:	
Standard	30.42 to 30.47 mm
Service limit	30.30 mm

MANUAL GEARBOX

1st gear to thrust washer clearance:	
Standard	0.03 to 0.08 mm
Service limit	0.18 mm
2nd to 3rd gear clearance	0.03 to 0.10 mm
Input shaft end thrust	0.14 to 0.21 mm
Planet gear backlash	0.05 to 0.15 mm
Differential bearing to circlip clearance	0.15 mm maximum

TORQUE SETTINGS

Final drive pinion nut	110 Nm
Differential housing to gearcase bolts	45 Nm
Selector shaft guide to selector shaft bolt	28 Nm
Cap bolts - detent balls and springs	22 Nm
Reverse idler shaft bolt	67 Nm
Speedometer drive pinion retaining plate bolt	5 Nm
Reverse light switch	25 Nm
Clutch release shaft pivot bolt	29 Nm
Final drive gear to carrier bolts	110 Nm
Output shaft bearing retainer bolts - if fitted	8 Nm

TOOL NUMBERS

18G 2	General purpose puller
18G 2/3	Adapter - Differential bearing remover
18G 134	Driver handle - main tool
18G 134-12	Adapter - Type B differential oil seal replacer
18G 284	Slide hammer
18G 284-14	Adapter - Slide hammer
18G 1269A	Oil seal protector sleeve
18G 1354	Driver handle (main tool)
18G 1354-4	Input shaft oil seal replacer
18G 1354-5	Bearing replacer
18G 1354-6	Adapter - Input shaft differential bearing
18G 1354-16	Adapter - Type A differential oil seal replacer
18G 1392	Circlip pliers
18G 1397	Bearing puller thrust pad
18G 1472	14 mm Hex key access plug
18G 1473	Anti-spread plate
18G 1675	Differential bearing replacer
18G 1723-1	Clutch release shaft inner bush replacer
18G 1723-2	Clutch release shaft outer bush replacer