

# **LT230Q**

## **TRANSFER GEARBOX**



### **Overhaul Manual**

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**LT230Q**  
**Verdeelbak revisieboek**

**LT230Q**  
**Boîte de transfert**  
**Manuel de révision**

**LT230Q**  
**Verteilergetriebe**  
**Überholungsanleitung**

**LT230Q**  
**Riduttore**  
**Manuale di revisione**

**LT230Q**  
**Caja de transferencia**  
**Manual de revisión**

**LT230Q**  
**Caixa de velocidades manual**  
**Manual de revisão**





# Technical Information Review

While every attempt is made to ensure that the technical information we supply is as accurate and up to date as possible, from time to time, errors do occur. There may also be instances where the style or content of our publications do not meet your exact needs.

We would value your assistance in helping us to improve the quality of our publications and invite you to submit details of any technical errors, or improvements you would like to see, in the space below.

Publication part number and edition .....

Publication title .....

Section and/or pages affected .....

**Technical information errors:**

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**Other improvements/changes you would like us to consider:**

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Service manager's signature .....

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Technical Communication, Rover Group After Sales, PO BOX 29,  
Cowley, Oxford, OX4 5NL

Dealer Stamp



# LT230Q TRANSFER BOX

## OVERHAUL MANUAL

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This transfer box is fitted to the following models:

**Serial No. Prefix 36D and 37D - Discovery**  
**Serial No. Prefix 38D and 40D - Defender**

Publication Part No. LRL 0082ENG - 2nd Edition  
Published by Rover Technical Communication  
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## INTRODUCTION

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### 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 LT230Q transfer box. For all other information regarding adjustments and removal of oil seals, 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.

Individual items are to be overhauled in the sequence in which they appear in the Manual. 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, 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.



# INTRODUCTION

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## REPAIRS AND REPLACEMENTS

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

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

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

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

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

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

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## SPECIFICATION

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

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

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# TRANSFER BOX

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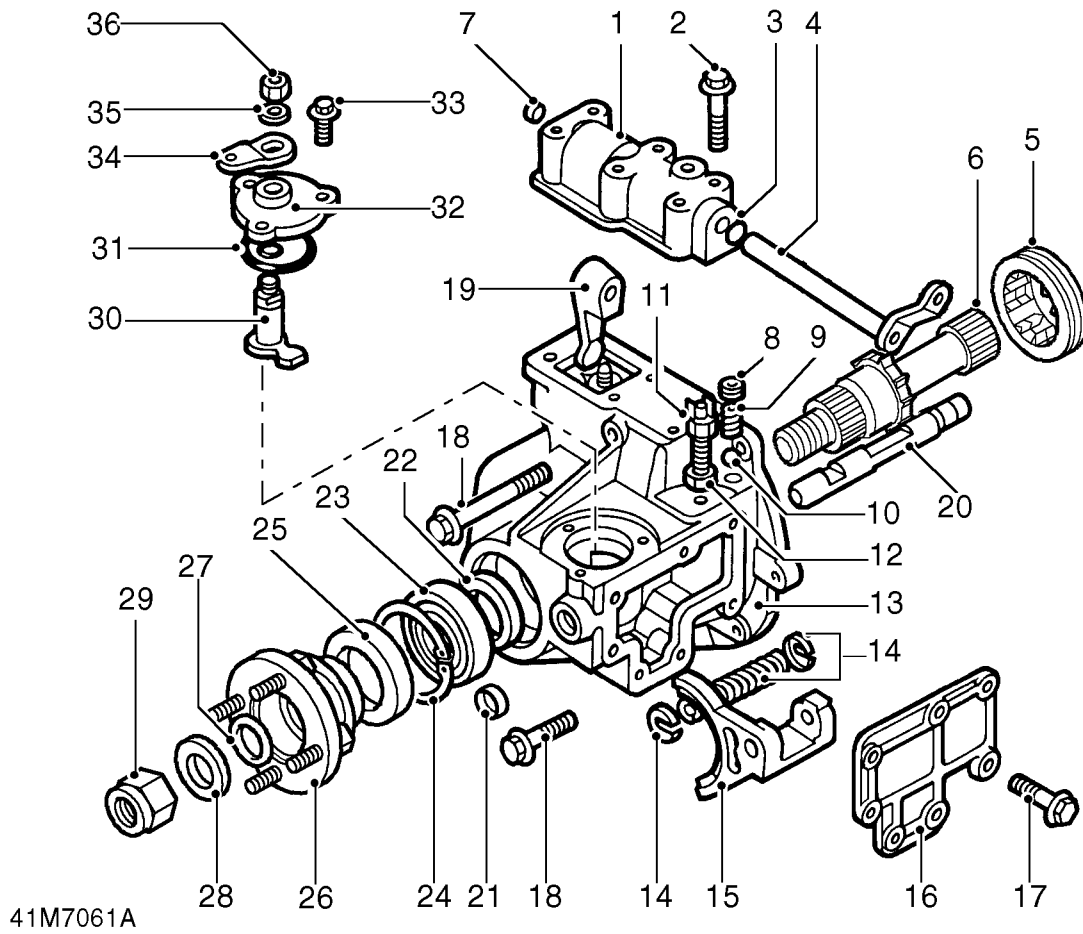




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# TRANSFER BOX

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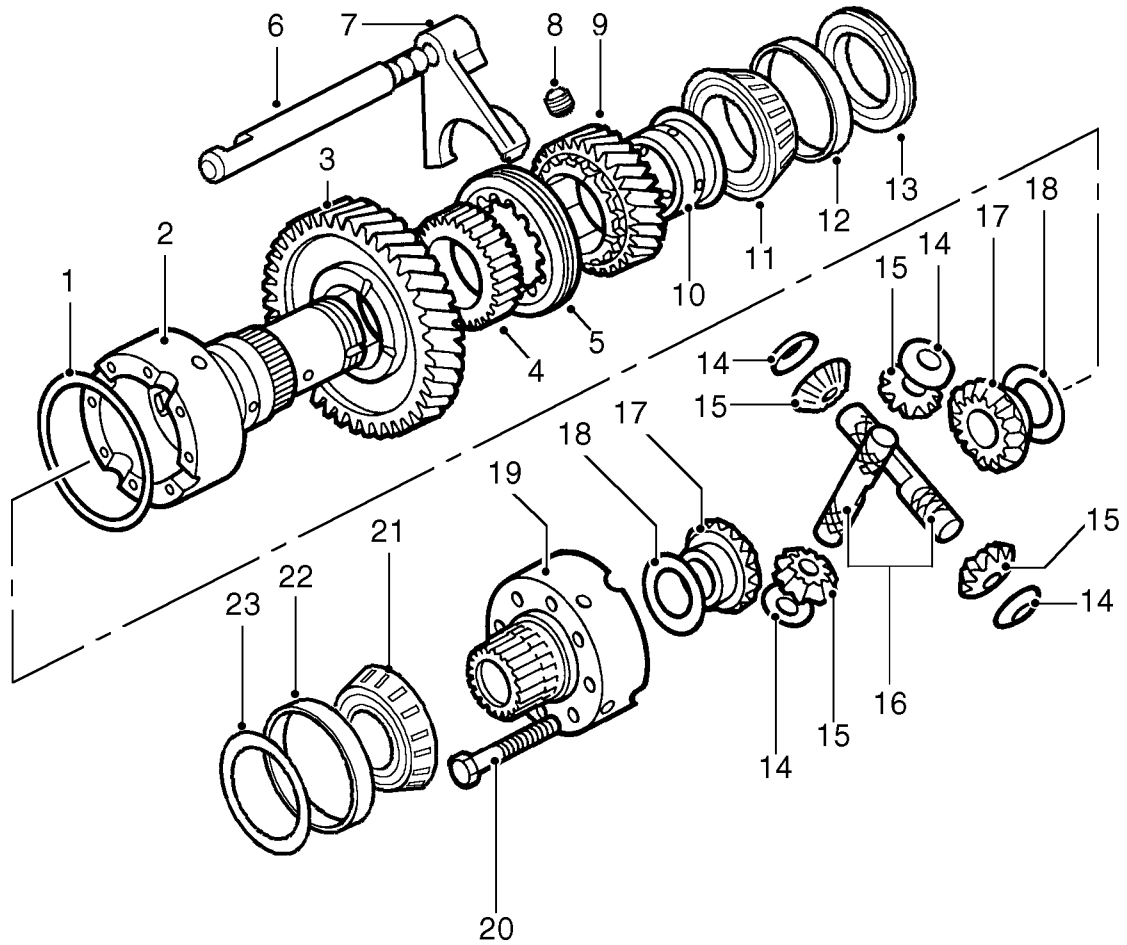
**FRONT OUTPUT HOUSING COMPONENTS**

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1. High/low cross shaft housing
2. Bolt - high/low cross shaft housing
3. 'O' ring
4. High/low cross shaft and lever
5. Dog clutch
6. Front output shaft
7. Hollow plug
8. Detent plug - differential lock
9. Detent spring - differential lock
10. Detent ball - differential lock
11. Differential lock warning lamp switch
12. Locknut
13. Front output housing
14. Spring and clips - differential lock
15. Differential lock selector fork
16. Cover plate
17. Bolt - cover plate
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19. High/low selector finger
20. Differential lock selector shaft
21. Plug
22. Bearing spacer
23. Output shaft bearing
24. Circlip
25. Oil seal
26. Output shaft flange and mud shield
27. Felt washer
28. Steel washer
29. Self-locking nut
30. Differential lock selector finger and shaft
31. 'O' rings
32. Differential lock selector housing
33. Bolt - housing
34. Selector lever
35. Washer
36. Self-locking nut



# TRANSFER BOX



41M7292A



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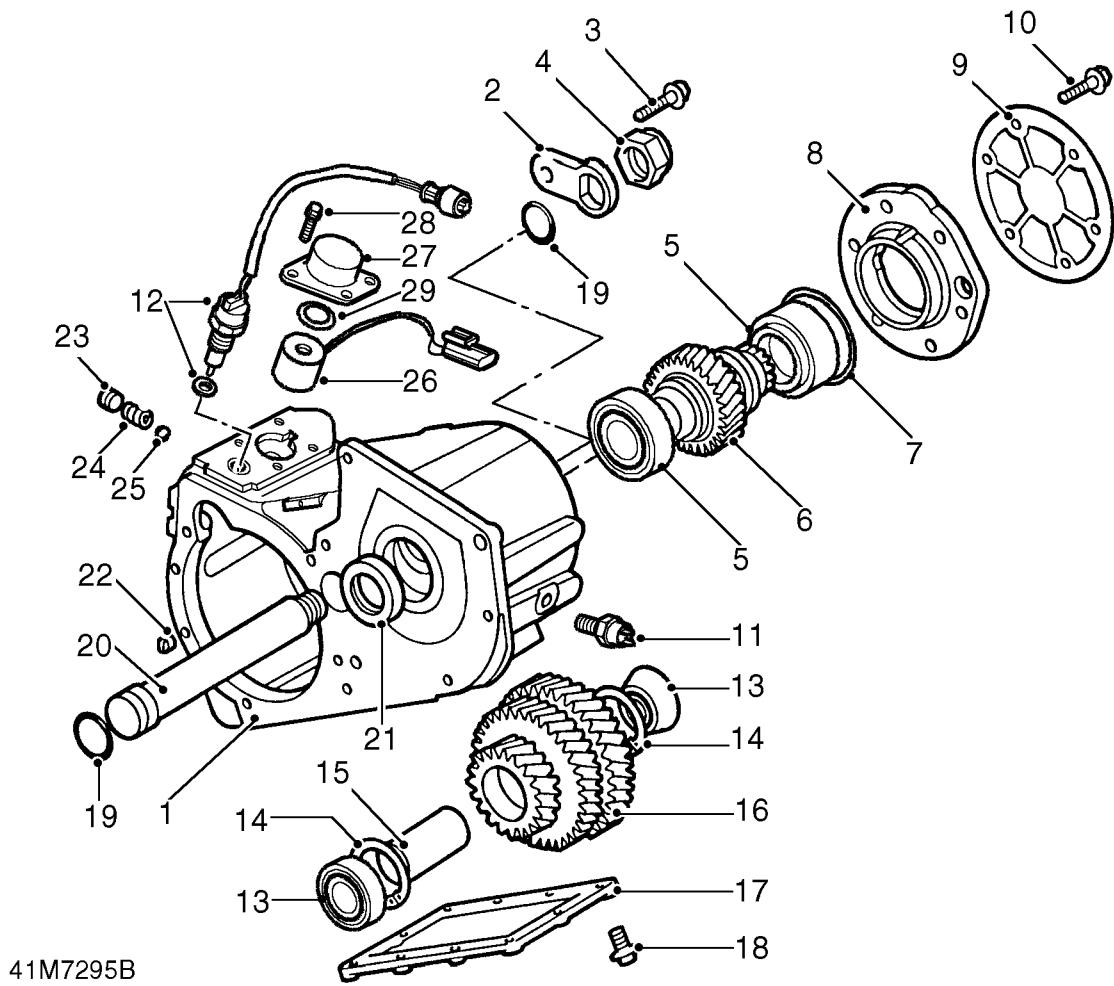
**DIFFERENTIAL COMPONENTS**

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1. Retaining ring
2. Differential carrier - rear half
3. Low range gear
4. High/low hub
5. High/low selector sleeve
6. High/low selector shaft
7. High/low selector fork
8. Setscrew - high/low selector fork
9. High range gear
10. High range gear bush
11. Differential rear bearing
12. Bearing outer track
13. Bearing retaining nut
14. Dished thrust washers
15. Planet gears
16. Cross shafts
17. Sun gears
18. Selective thrust washers
19. Differential carrier - front half
20. Bolt - differential carriers
21. Differential front bearing
22. Bearing outer track
23. Selective shim

# TRANSFER BOX

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**MAIN CASING COMPONENTS**

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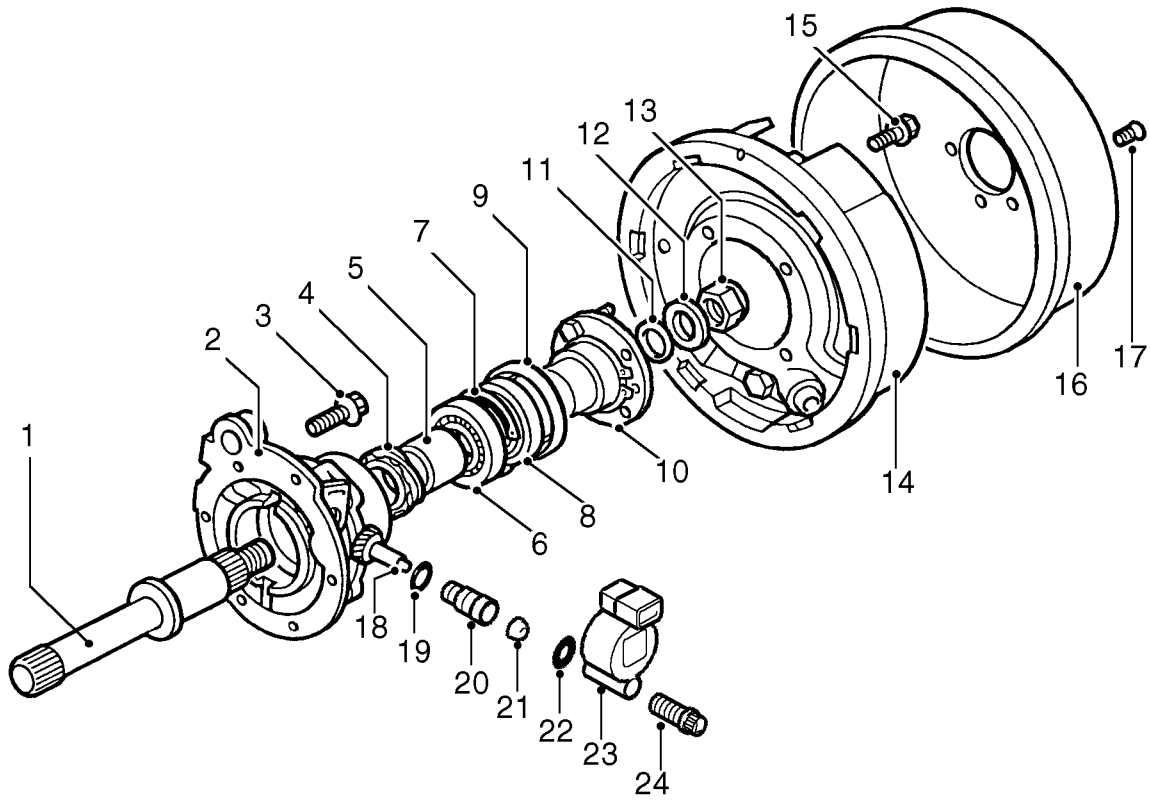
- |   |  |
|---|--|
| 1. Main casing                                      | 15. Collapsible spacer                 |
| 2. Retaining plate                                  | 16. Intermediate gears                 |
| 3. Bolt - retaining plate                           | 17. Bottom cover plate                 |
| 4. Stake nut - intermediate shaft                   | 18. Bolt - bottom cover plate          |
| 5. Bearings and outer tracks - mainshaft input gear | 19. 'O' rings - intermediate shaft     |
| 6. Mainshaft input gear *                           | 20. Intermediate shaft                 |
| 7. Selective shim                                   | 21. Mainshaft oil seal                 |
| 8. Mainshaft input gear bearing housing             | 22. Locating dowel                     |
| 9. Cover plate/power take-off cover *               | 23. Detent plug - high/low selector    |
| 10. Bolt - cover plate                              | 24. Detent spring - high/low selector  |
| 11. Oil temperature switch **                       | 25. Detent ball - high/low selector    |
| 12. Neutral warning lamp switch and washer **       | 26. Interlock solenoid **              |
| 13. Bearings and outer tracks - intermediate gears  | 27. Cover - interlock solenoid **      |
| 14. Circlips  | 28. Bolt - interlock solenoid cover ** |
|   | 29. Belleville washer **               |

\* Defender mainshaft input gear and Discovery power take-off cover plate illustrated

\*\* If fitted

# TRANSFER BOX

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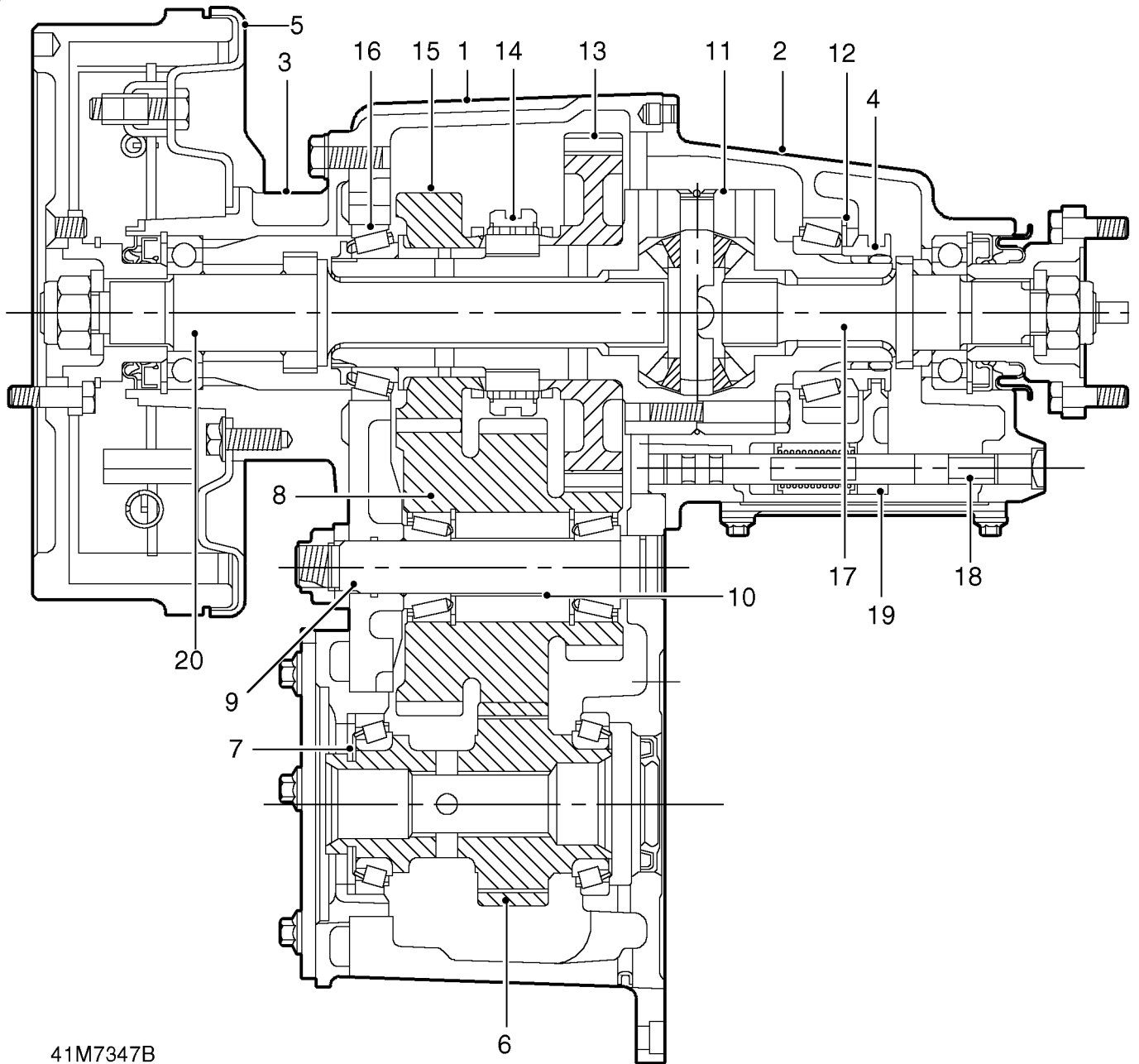
**REAR OUTPUT HOUSING AND TRANSMISSION  
BRAKE COMPONENTS**

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- |                                      |  |
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| <b>1.</b> Rear output shaft          | <b>13.</b> Self-locking nut                    |
| <b>2.</b> Rear output housing        | <b>14.</b> Transmission brake backplate        |
| <b>3.</b> Bolt - rear output housing | <b>15.</b> Bolt - transmission brake backplate |
| <b>4.</b> Speedometer drive gear     | <b>16.</b> Transmission brake drum             |
| <b>5.</b> Spacer                     | <b>17.</b> Countersunk screw                   |
| <b>6.</b> Output shaft bearing       | <b>18.</b> Speedometer driven gear             |
| <b>7.</b> Circlip                    | <b>19.</b> 'O' ring                            |
| <b>8.</b> Oil seal                   | <b>20.</b> Speedometer driven gear housing     |
| <b>9.</b> Mud shield                 | <b>21.</b> Seal                                |
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| <b>11.</b> Felt washer               | <b>23.</b> Vehicle speed sensor *              |
| <b>12.</b> Steel washer              | <b>24.</b> Allen screw *                       |

\* If fitted

# TRANSFER BOX



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## TRANSFER BOX CROSS SECTION

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- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Main casing</li> <li>2. Front output housing</li> <li>3. Rear output housing</li> <li>4. Dog clutch</li> <li>5. Transmission brake</li> <li>6. Mainshaft input gear</li> <li>7. Selective shim - input gear bearing pre-load</li> <li>8. Intermediate gear cluster</li> <li>9. Intermediate shaft</li> <li>10. Collapsible spacer</li> </ol> | <ol style="list-style-type: none"> <li>11. Differential assembly</li> <li>12. Selective shim - differential bearing pre-load</li> <li>13. Low range gear</li> <li>14. High/low selector sleeve and hub</li> <li>15. High range gear and bush</li> <li>16. Differential rear bearing</li> <li>17. Front output shaft</li> <li>18. Differential lock selector shaft</li> <li>19. Selector fork</li> <li>20. Rear output shaft</li> </ol> |
|--|--|

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## DESCRIPTION

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### Introduction

The LT230Q transfer box is mounted at the rear of the main gearbox and transmits drive to the front and rear axles via the propeller shafts.

The LT230Q, whilst similar to the LT230T differs mainly in the following areas:

Helix angle of gears increased to 31° together with an increase in the number of gear teeth thus giving quieter running and an increase in power transmission efficiency.

Increased length mainshaft input gears together with increased thickness bearing housing and repositioned bearing.

Redesigned intermediate gear bearings.

Redesigned high gear bush giving quieter running.

### Construction

The transfer box comprises three main assemblies, the main casing, front output housing and rear output housing.

The main casing carries the mainshaft input gear, the intermediate gears and the differential together with the high/low range gears, selector shaft and fork.

The front output housing carries the front output shaft and flange, high/low cross shaft, housing and selector and the differential lock selector shaft and fork. A dog clutch on the front output shaft is operated by the differential lock selector fork to engage/disengage the differential lock.

The rear output housing carries the output shaft and flange and the speedometer drive and driven gears. A mechanically operated transmission brake is attached to the housing, the brake drum being attached to the output flange.

All housings and cover plates are sealed to the main casing by sealant; mud and water ingress being prevented by mud shields and throwers located at each end of the output housings and on the output flanges.

### Mainshaft input gear

The gearbox output shaft is splined into the mainshaft input gear which is supported by taper roller bearings.

Input gear bearing pre-load is achieved by the use of a selective shim located in the bearing housing. An additional power take-off gear is located at the rear of the input gear for certain applications.



# TRANSFER BOX

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## Intermediate gears

The intermediate gear cluster is supported by taper roller bearings located at each end of the cluster and running on the intermediate shaft which, in turn, is supported at the front and rear by the main casing.

Intermediate gear bearing pre-load is achieved by means of a collapsible spacer positioned between the bearings, the amount of compression applied to the spacer is by means of a nut on the end of the intermediate shaft.

## Differential assembly

The differential assembly is supported at the front and rear by taper roller bearings, the bearing outer tracks being located in the front and rear output housings. Bearing pre-load is achieved by means of a selective shim located in the front output housing.

The differential rear shaft carries the low range gear, high/low selector sleeve and hub, high range gear and bush and the differential rear bearing; these components being secured to the shaft by a special nut.

The differential assembly comprises front and rear half carriers with integral shafts and sun and planet gears mounted on cross shafts within the half carriers. Dished, non-selective thrust washers control the engagement of the planet gears with the sun gears whilst selective thrust washers are used to control the engagement of the sun gears and load to turn of the differential. The differential carrier halves are bolted together, a retaining ring providing positive location of the cross shafts.

The high/low selector shaft and fork are located at the side of the differential, movement of the shaft, fork and selector sleeve being controlled by the high/low selector finger. A spring loaded detent ball fitted in the main casing locates in grooves in the shaft.

For certain markets, a neutral warning lamp switch operated by the high/low selector shaft and an interlock solenoid are fitted in the main casing.

## Front output housing assembly

The front output shaft is supported in the front output housing by a single bearing and is splined into the differential front shaft.

The high/low cross shaft is located in a housing bolted to the top of the output housing and is connected to the high/low selector finger which locates in a slot in the selector shaft.

The differential lock selector housing is also bolted to the top of the output housing, the selector finger passes through the housing, locating in a slot in the differential lock selector shaft. The differential lock selector shaft passes through the selector fork which is located beneath a plate bolted to the side of the output housing. A spring loaded detent ball fitted in the output housing locates in grooves in the shaft.

A differential lock warning lamp switch operated by movement of the selector fork and shaft is screwed into the top of the output housing.

## Rear output housing assembly

The rear output shaft is supported in the rear output housing by a single bearing and is splined into the differential rear shaft. The output shaft also carries the speedometer drive gear which meshes with the driven gear located in the rear output housing.

## Lubrication

Lubrication is by splash, oil filler/level and drain plugs being located in the main casing. An oil temperature switch is fitted for certain applications.



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**OPERATION**

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The gearbox output shaft transmits power to the mainshaft input gear which is in constant mesh with one of the intermediate gears. The intermediate gears are in constant mesh with the high and low range output gears running on the differential rear shaft.

Power is transmitted to the output shafts by locking either the high or low range gears to the differential rear shaft. This is achieved by means of the high/low selector fork, sleeve and splined hub.

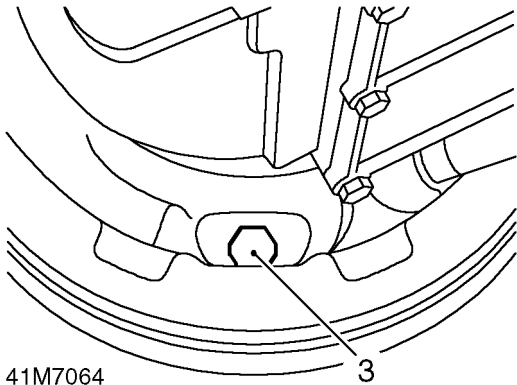
The differential lock, when applied, prevents all available power being transmitted to the road wheels offering least resistance and is especially useful for 'off-road' conditions. When selected, the selector fork engages the dog clutch on the differential shaft with a gear on the front output shaft; this locks the differential and provides fixed drive thereby transmitting equal power to both output shafts.



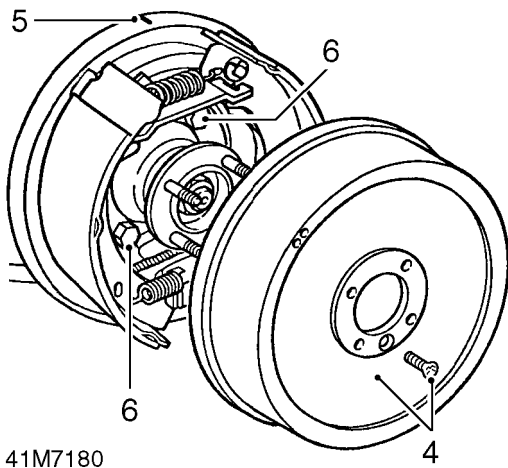


## TRANSFER BOX DISMANTLING

1. Clean exterior of transfer box.
2. Drain and discard the oil, refit drain plug.



3. Slacken bolt to release transmission brake adjustment.

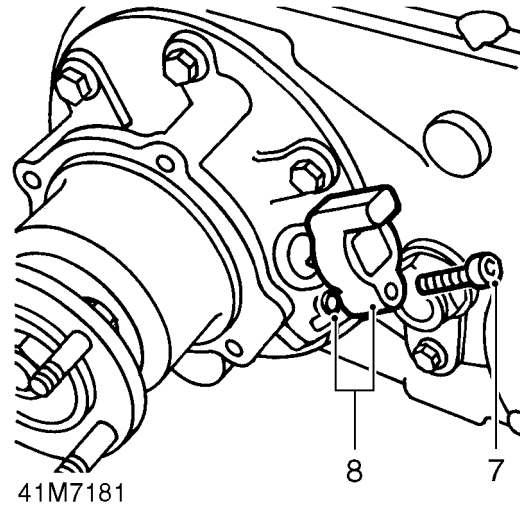


4. Remove countersunk screw securing transmission brake drum, remove drum.

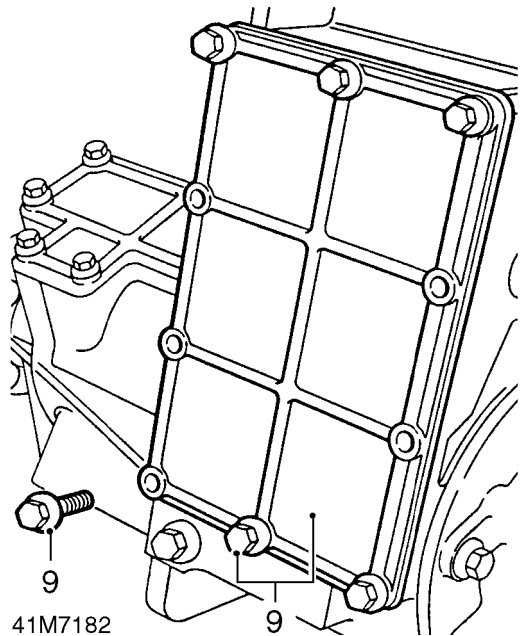
**NOTE: 2 screws may be fitted.**



5. Make suitable alignment marks between transmission brake backplate and rear output housing.
6. Remove 4 bolts securing transmission brake backplate, remove backplate.

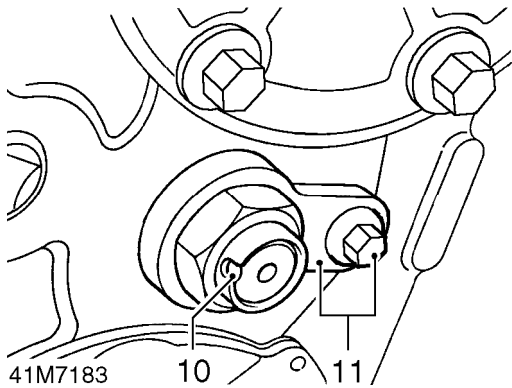


7. Remove Allen screw securing vehicle speed sensor - if fitted.
8. Remove vehicle speed sensor, remove and discard 'O' ring - if fitted.

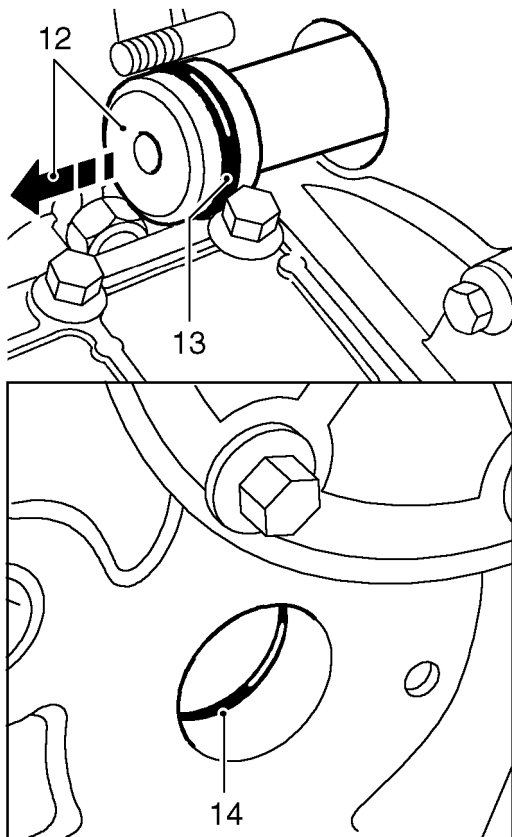


9. Remove 6 bolts securing bottom cover, remove cover.

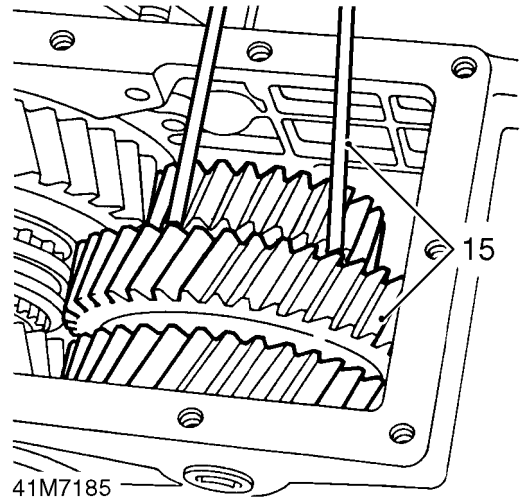
## TRANSFER BOX



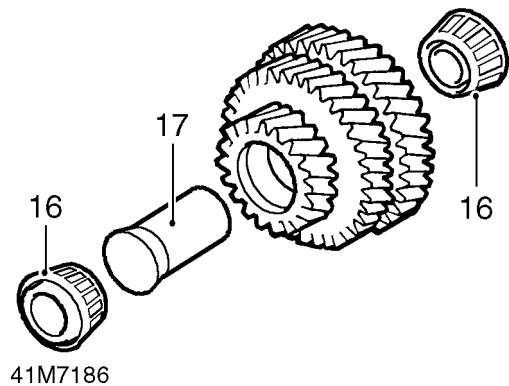
10. Release staking from intermediate shaft nut, remove and discard nut.
11. Remove bolt securing anti-rotation plate, remove plate.



12. Using a soft metal drift on threaded end of intermediate shaft, drive shaft out of main casing.
13. Remove and discard 'O' ring from intermediate shaft.
14. Remove and discard 'O' ring from main casing.

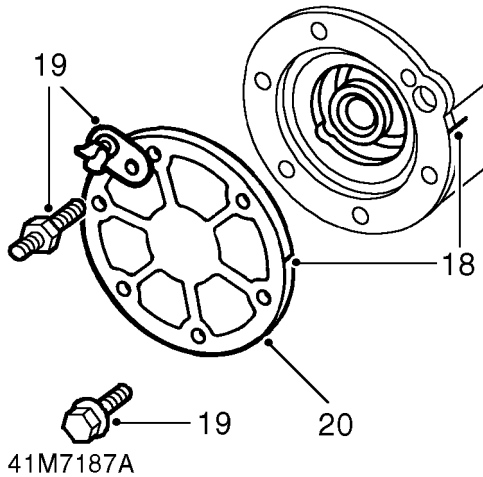


15. Wrap a suitable length of wire around intermediate gears and using assistance, lift gears out of main casing.



16. Remove and discard 2 taper roller bearings from intermediate gears.
17. Remove and discard collapsible spacer from intermediate gears.

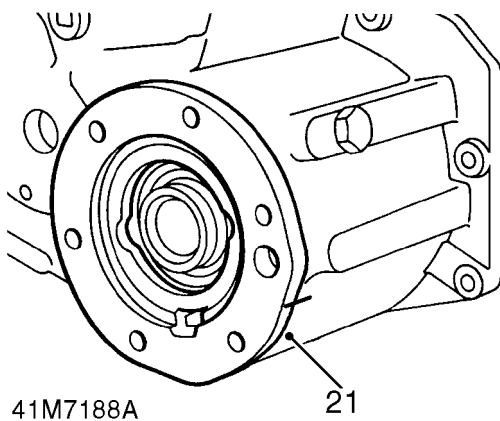
**CAUTION:** Do not remove bearing tracks at this stage.



**NOTE:** Discovery cover plate illustrated.



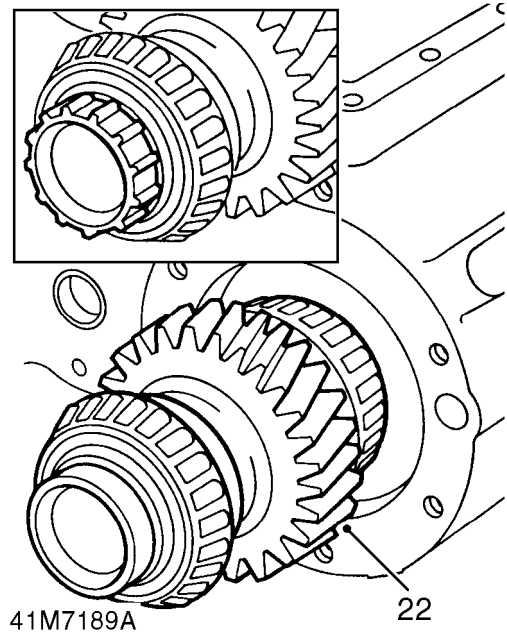
- 18. Make suitable alignment marks between cover plate/power take-off cover, mainshaft input gear bearing housing and main casing.
- 19. Noting fitted position of stud nut and harness/speedometer cable clip, remove 5 bolts and stud nut securing cover plate/ power take-off cover, recover clip.
- 20. Remove cover plate/power take-off cover.



- 21. Remove mainshaft input gear bearing housing.



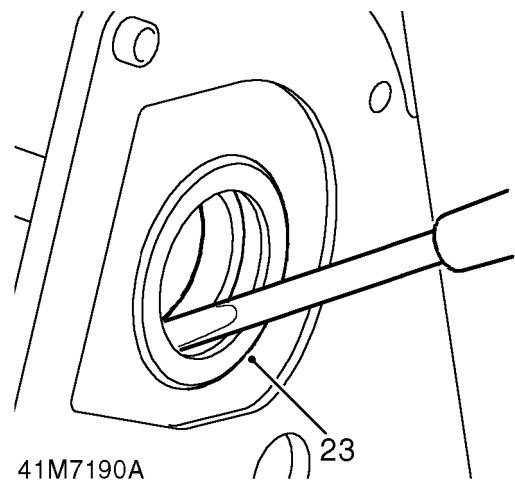
**CAUTION:** Do not remove mainshaft input gear bearing track at this stage.



- 22. Remove mainshaft input gear together with taper roller bearings.



**NOTE:** Input gear fitted to Defender transfer boxes has an additional dog tooth gear - see inset on illustration.

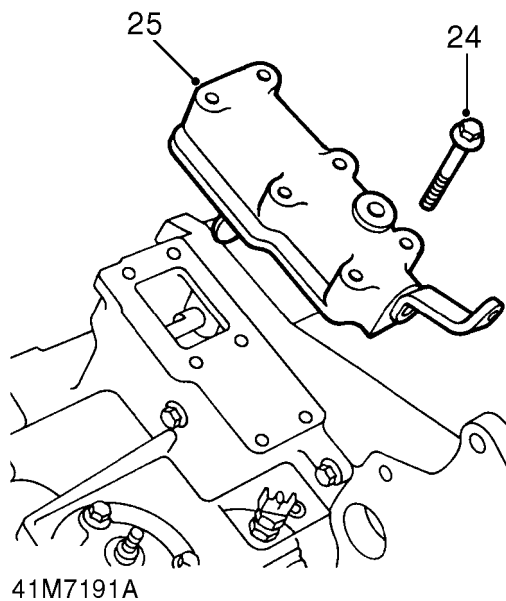


- 23. Remove and discard mainshaft oil seal from main casing.




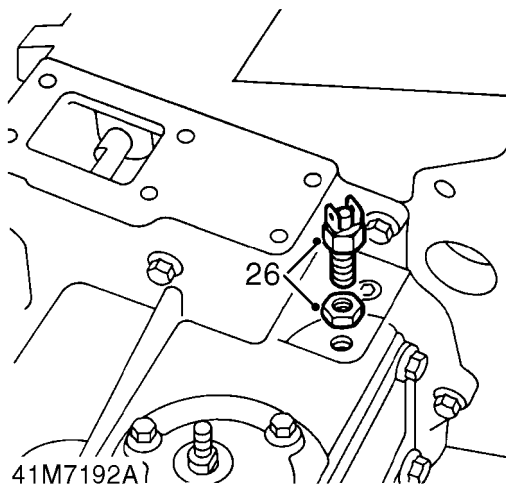
**CAUTION:** Do not remove mainshaft input gear bearing track at this stage.

## TRANSFER BOX

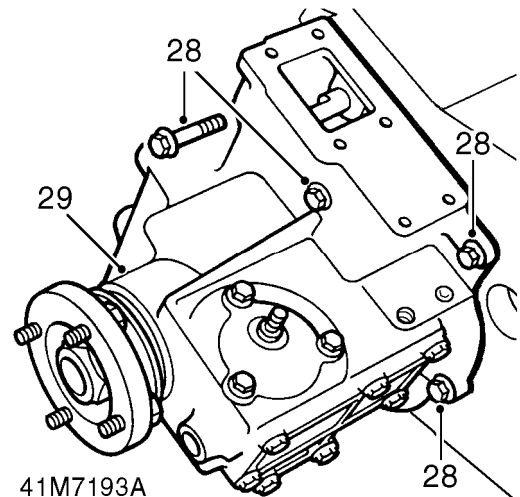


24. Remove 6 bolts securing high/low cross shaft housing.
25. Remove cross shaft housing.

 **CAUTION: Do not carry out further dismantling of cross shaft housing at this stage.**




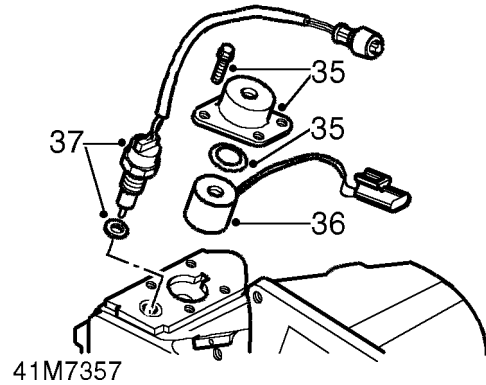
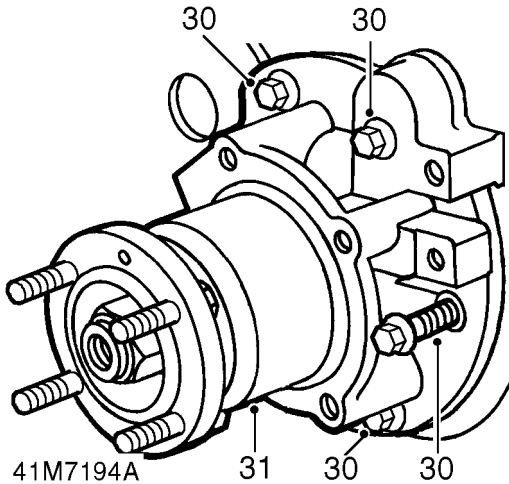
26. Slacken locknut and remove differential lock warning lamp switch from front output housing.
27. Clean sealant from threads of switch and output housing.



28. Noting fitted position of longest bolt, remove 8 bolts securing front output housing to main casing.
29. Remove front output housing.

 **NOTE: Dowel located.**

 **CAUTION: Do not carry out further dismantling of front output housing at this stage.**

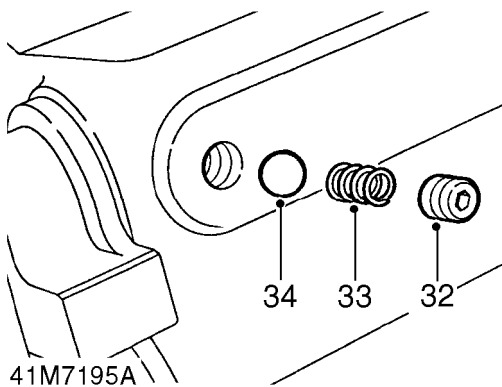


- 30. Noting their fitted position, remove shoulder bolt, 5 bolts and 2 washers securing rear output housing to main casing.
- 31. Remove rear output housing.

**NOTE:** Dowel located.



**CAUTION:** Do not carry out further dismantling of rear output housing at this stage.



- 32. Remove plug securing high/low selector shaft detent spring and ball.
- 33. Remove detent spring.
- 34. Remove ball using a stick magnet.



**CAUTION:** Suitably identify plug, detent spring and ball to their fitted positions, do not interchange with differential lock selector shaft detent components.

*If fitted*

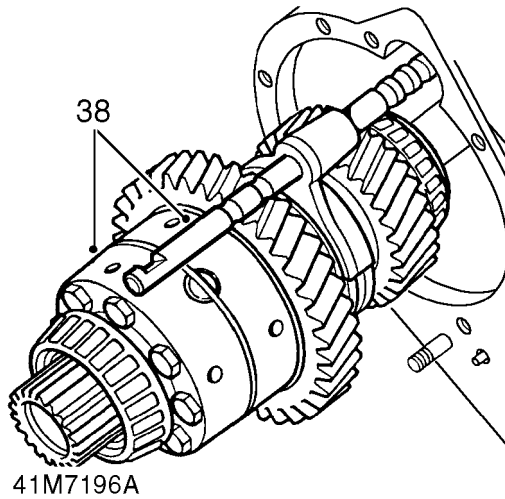
- 35. Remove 4 bolts securing interlock solenoid cover, remove cover and Belleville washer.
- 36. Remove interlock solenoid.
- 37. Remove neutral warning lamp switch and washer.



# TRANSFER BOX

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All transfer boxes



38. Withdraw differential assembly together with high/low selector shaft and fork.

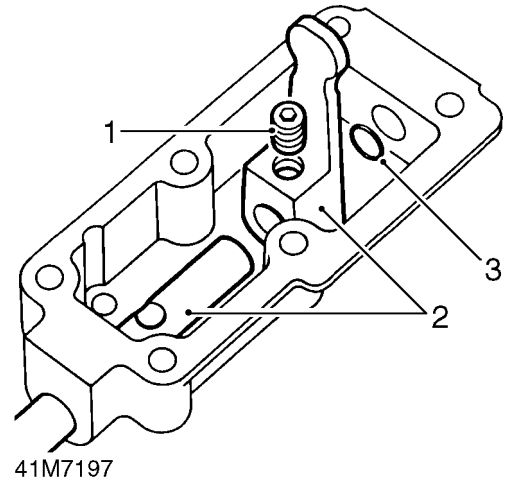
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## COMPONENT DISMANTLING

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### High/low cross shaft housing

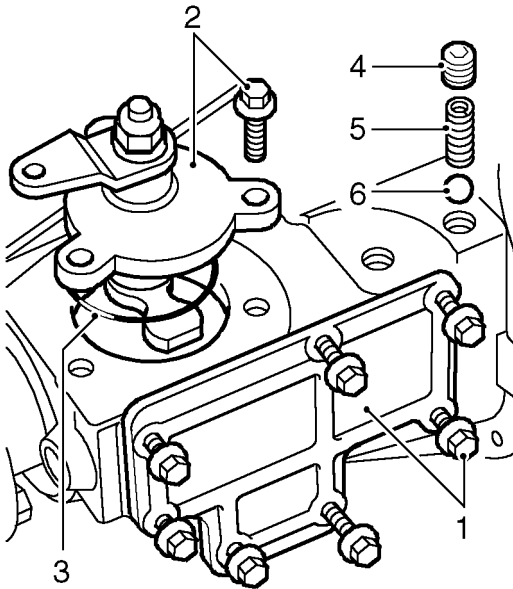
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1. Remove setscrew securing high/low selector finger to cross shaft.
2. Withdraw cross shaft from housing, recover high/low selector finger.
3. Remove and discard 'O' ring.



Front output housing

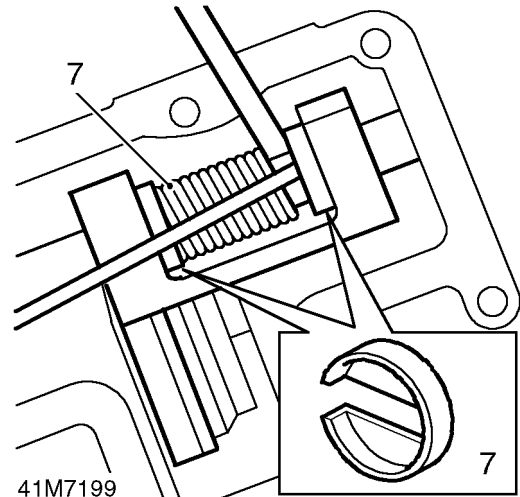


41M7198

1. Remove 7 bolts securing differential lock selector side cover, remove cover.
2. Remove 3 bolts securing differential lock selector housing, remove housing and selector as an assembly.
3. Remove and discard 'O' ring from selector housing.
4. Remove plug securing differential lock detent spring and ball.
5. Remove detent spring.
6. Remove ball using a stick magnet.

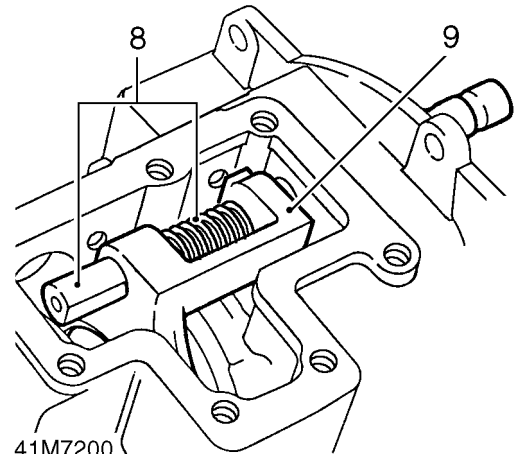


**CAUTION:** Suitably identify plug, detent spring and ball to their fitted positions, do not interchange with high/low selector shaft detent components.



41M7199

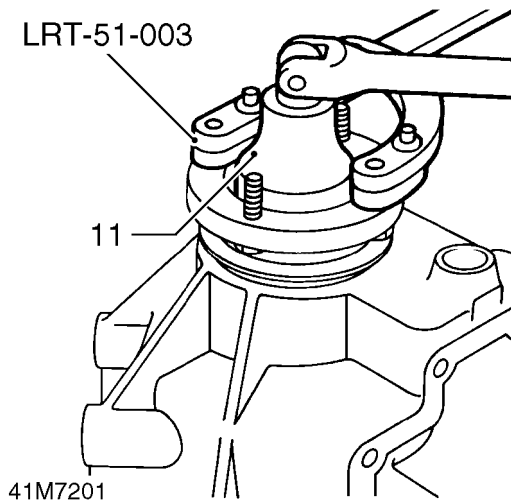
7. Compress differential lock selector fork spring and remove retaining clip from each end of spring.



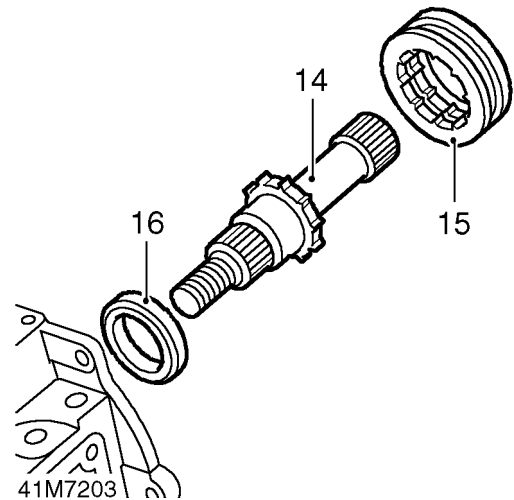
41M7200

8. Withdraw differential lock selector shaft from front output housing, recover spring.
9. Remove differential lock selector fork.


## TRANSFER BOX

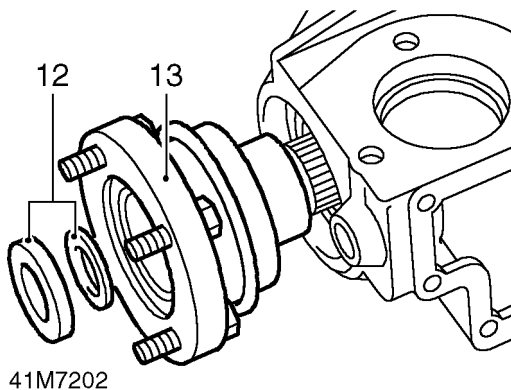


10. Position propeller shaft flange holding tool **LRT-51-003** to output shaft flange.
11. Remove and discard self-locking nut.




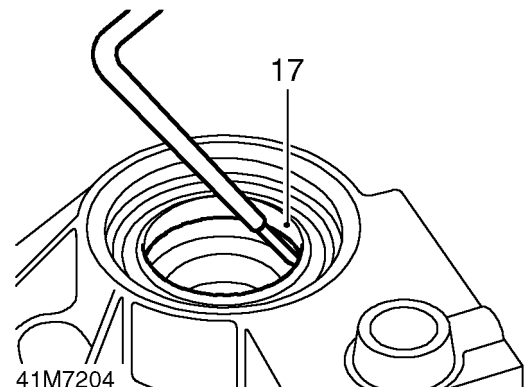
14. Using a mallet, drive output shaft out of front output housing.

 **NOTE:** If it is necessary to use a hand press to remove output shaft, position thrust button LRT-370-11/2 between shaft and press mandrel.

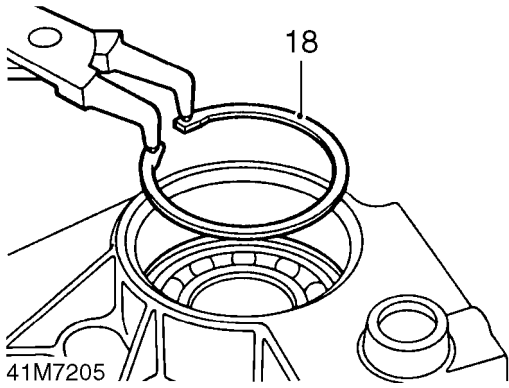


12. Remove steel and felt washers, discard felt washer.
13. Remove output shaft flange together with mud shield.

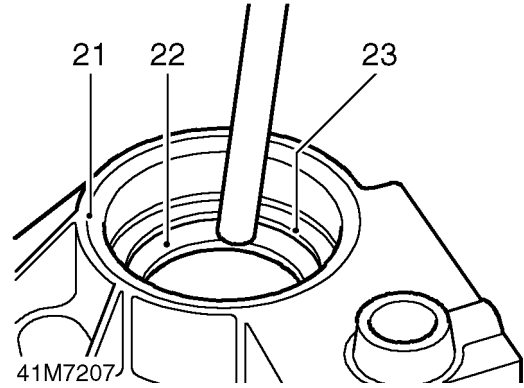
 **NOTE:** A replacement output flange will be supplied with new mud shield and output shaft oil seal.



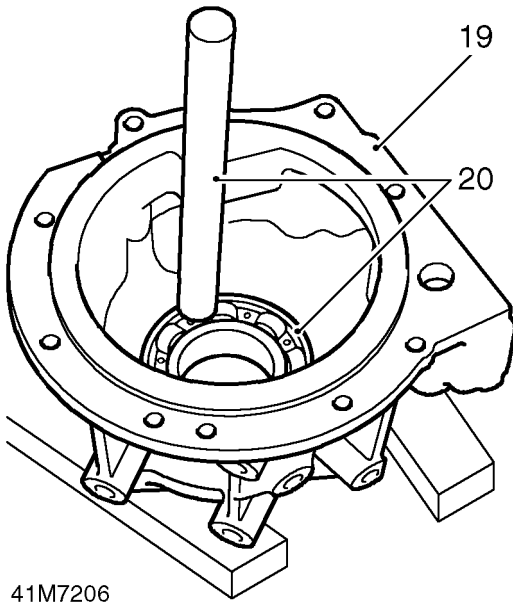
17. Taking care not to damage front output housing, remove and discard output shaft oil seal.



18. Using suitable circlip pliers, remove and discard circlip retaining output shaft bearing.



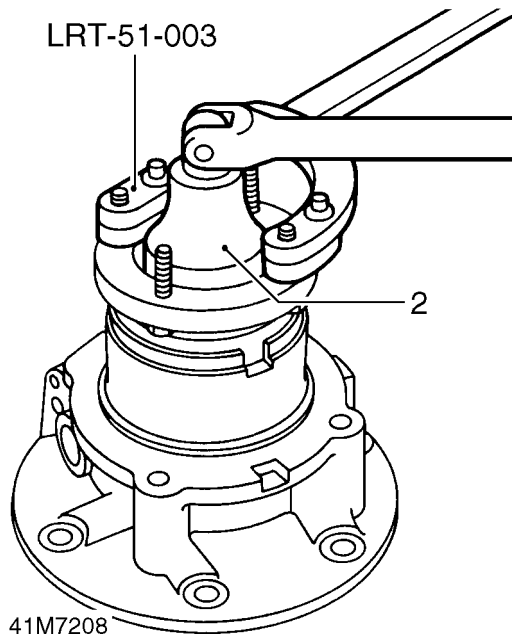
21. Invert front output housing.  
 22. Using a soft metal drift, drive differential bearing track out of housing, discard bearing track.  
 23. Remove selective shim.



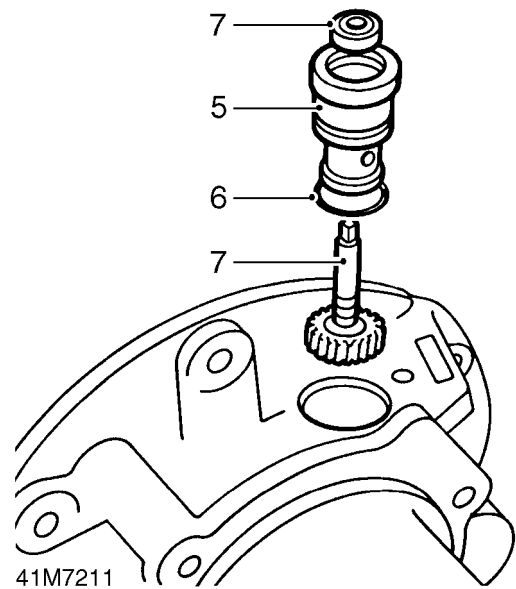
19. Support front output housing on suitable blocks of wood.  
 20. Using a soft metal drift, drive output shaft bearing out of housing; discard bearing.

# TRANSFER BOX

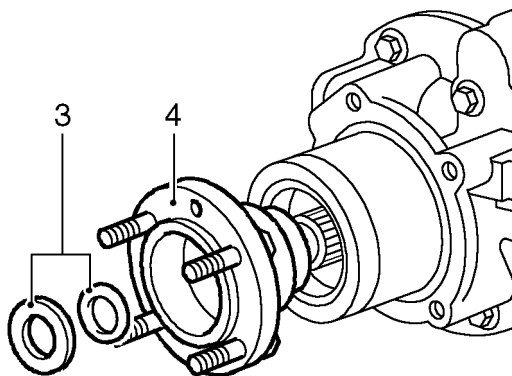
## Rear output housing



1. Position propeller shaft flange holding tool **LRT-51-003** to output shaft flange.
2. Remove and discard self-locking nut.



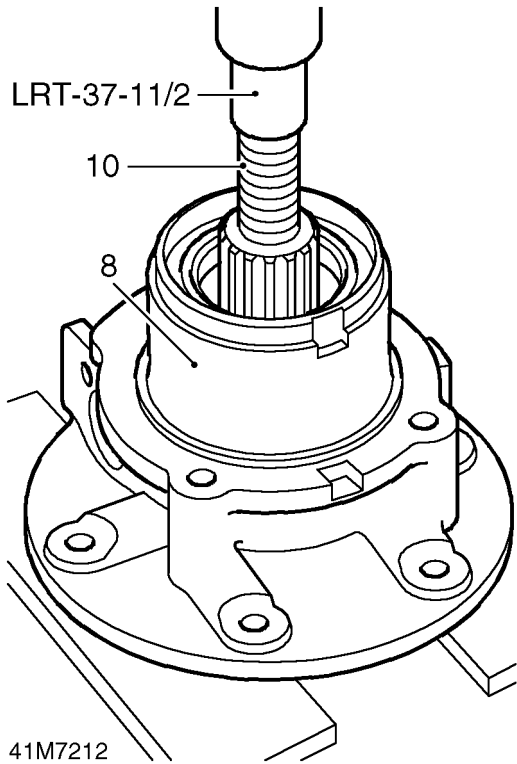
5. Carefully lever speedometer driven gear and housing out of rear output housing.
6. Remove and discard 'O' ring.
7. Withdraw speedometer driven gear from housing, remove and discard oil seal from housing.



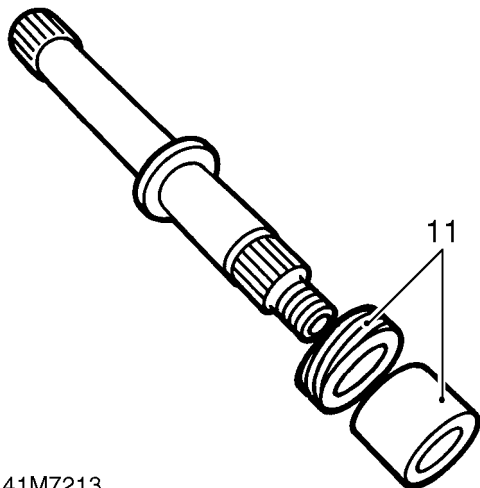
3. Remove steel and felt washers, discard felt washer.
4. Remove output shaft flange together with circlip.



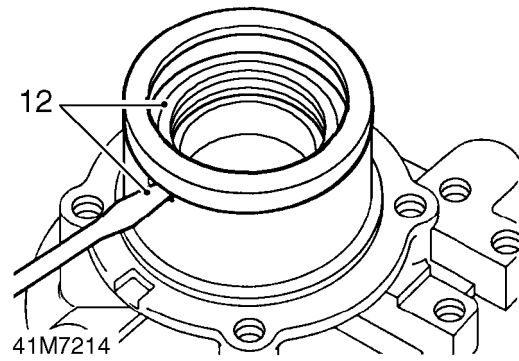
**NOTE: A replacement output flange will be supplied together with new output shaft oil seal.**



8. Position rear output housing on bed of hand press.
9. Position thrust button **LRT-37-11/2** between end of output shaft and press mandrel.
10. Press output shaft out of housing.



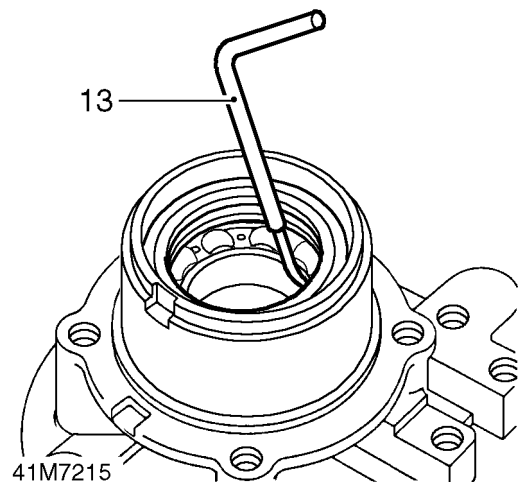
11. Recover spacer and speedometer drive gear from output shaft.



12. Using a screwdriver inserted in slot in rear output housing, lever mud shield out of housing.

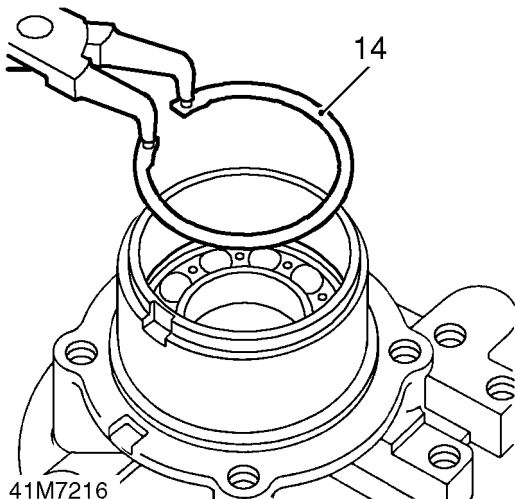


**CAUTION: Discard mud shield if it is damaged.**

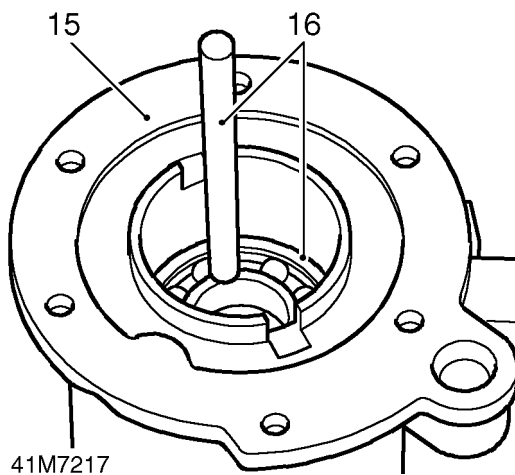


13. Taking care not to damage rear output housing, remove and discard output shaft oil seal.

# TRANSFER BOX

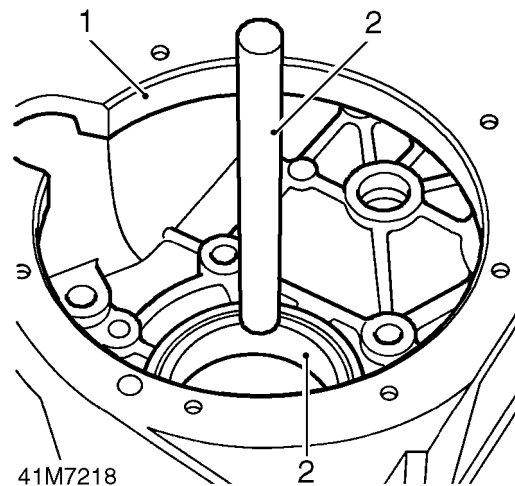


14. Using suitable circlip pliers, remove and discard circlip retaining output shaft bearing.

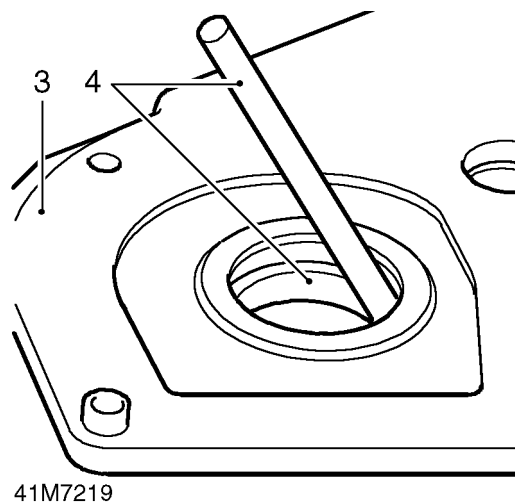


15. Support rear output housing on suitable blocks of wood.
16. Using a soft metal drift, drive output shaft bearing out of housing; discard bearing.

## Main casing



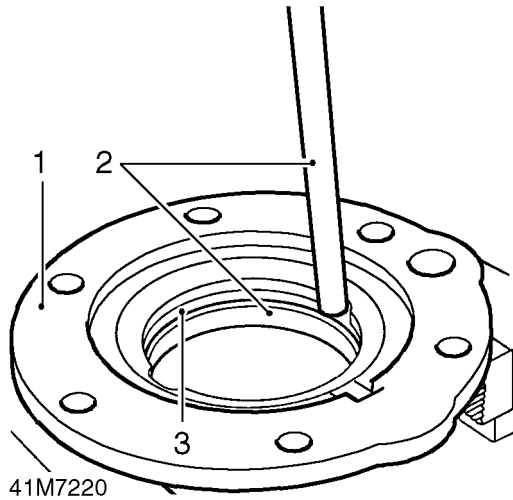
1. Support main casing on suitable blocks of wood.
2. Using a soft metal drift, drive differential rear bearing track out of main casing; discard bearing track.



3. Invert main casing.
4. Using a soft metal drift, drive mainshaft input gear bearing track out of main casing; discard bearing track.

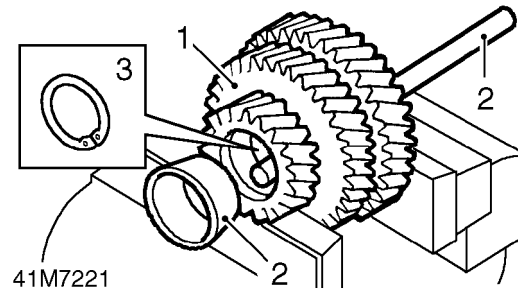


### Mainshaft input gear bearing housing



1. Secure mainshaft input gear bearing housing in a soft-jawed vice.
2. Using a soft metal drift, drive input gear bearing track out of housing; discard bearing track.
3. Remove selective shim.

### Intermediate gears

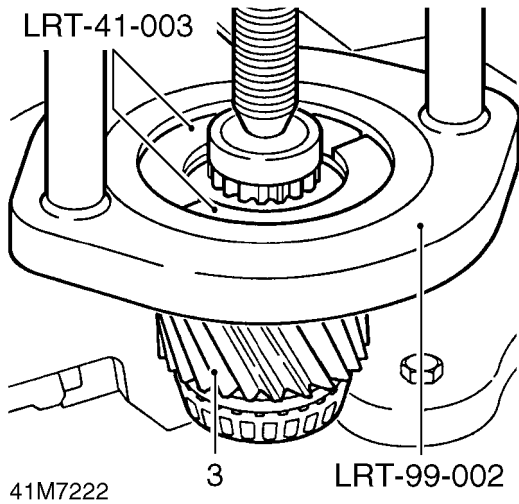


1. Secure intermediate gears in a soft-jawed vice.
2. Using a soft metal drift, drive intermediate shaft bearing track out of gears; discard bearing track.
3. Remove and discard circlip.
4. Repeat above procedure for remaining bearing track.



# TRANSFER BOX

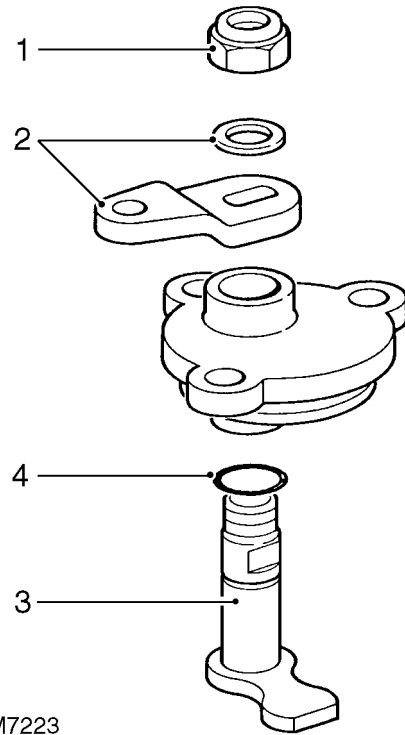
## Mainshaft input gear assembly



**NOTE: Defender input gear illustrated.**

1. Secure hand press **LRT-99-002** in a vice.
2. Assemble collars **LRT-41-003** around bearing to be removed.
3. Position mainshaft in hand press, remove and discard bearing.
4. Repeat above procedure for remaining bearing.

## Differential lock selector

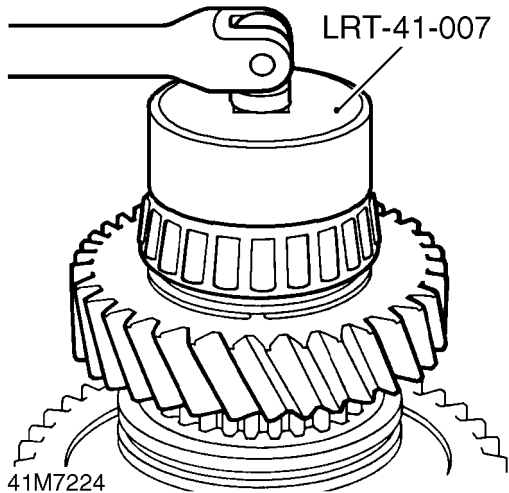


1. Remove and discard self-locking nut retaining selector lever.
2. Remove washer and selector lever.
3. Withdraw selector finger and shaft from housing.
4. Remove and discard 'O' ring.

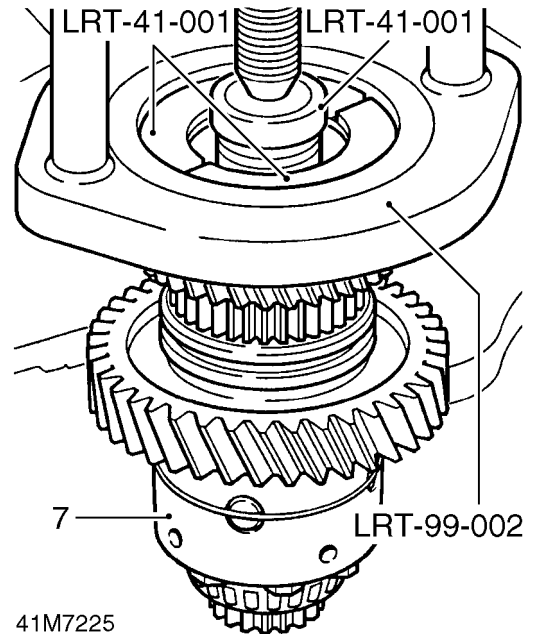


## Differential


1. Secure differential in a soft-jawed vice.
2. Remove staking from bearing retaining nut.



3. Remove nut using tool **LRT-41-007**; discard nut.



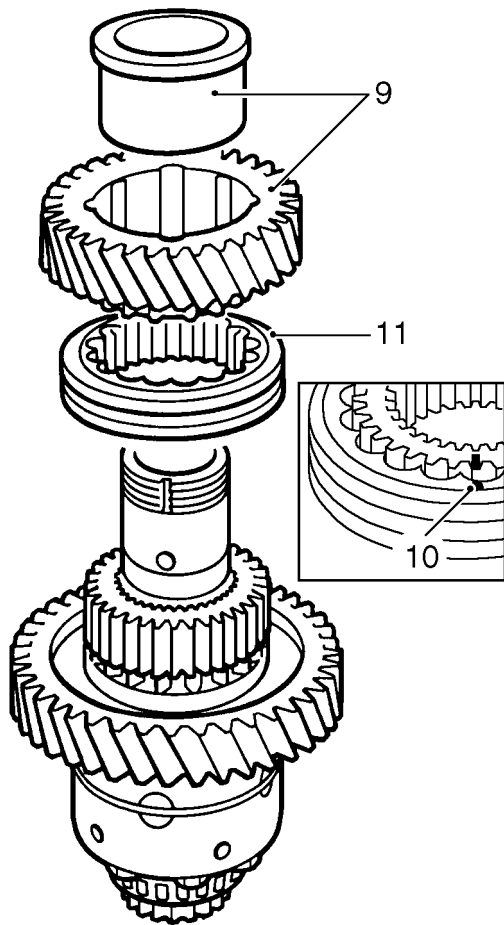
4. Secure hand press **LRT-99-002** in a vice.
5. Secure collars **LRT-41-001** around rear bearing.

 **NOTE: This bearing is adjacent to threaded end of differential shaft.**

6. Position differential in hand press with thrust button, part of tool **LRT-41-001** between press mandrel and differential shaft.
7. Press differential out of bearing.

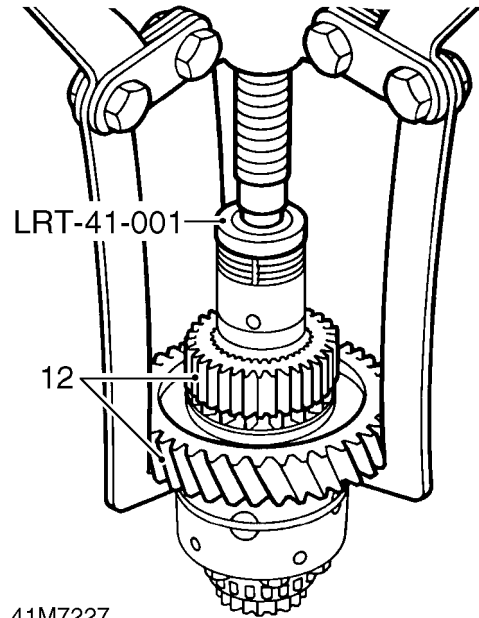
 **CAUTION: Take care that differential does not drop out of bearing.**

8. Remove differential from press, discard bearing.



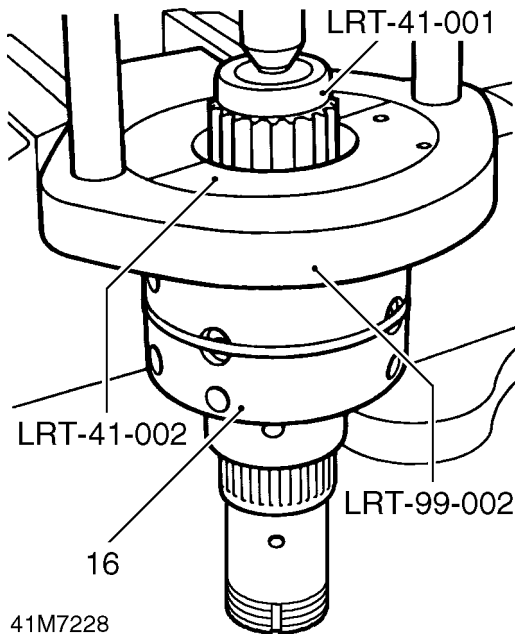
41M7226

9. Remove high range gear and bush taking care not to disturb high/low selector sleeve.
10. Make suitable alignment marks between high/low selector sleeve and hub.
11. Remove high/low selector sleeve.



41M7227

12. Using a suitable puller and thrust button, part of tool **LRT-41-001**, remove high/low hub and low range gear.



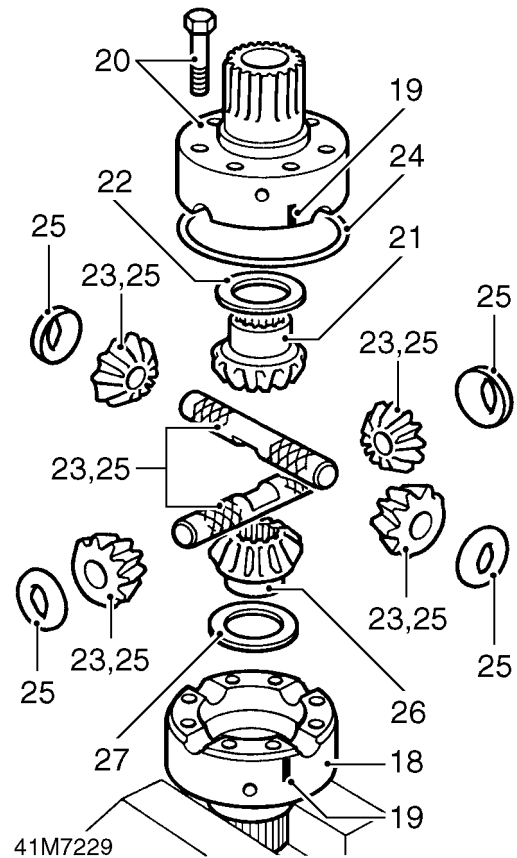
- 13. Secure hand press **LRT-99-002** in a vice.
- 14. Assemble collars **LRT-41-002** around front bearing.

**NOTE:** This bearing is adjacent to splined end of differential shaft.

- 15. Position differential in hand press with thrust button, part of tool **LRT-41-001** between press mandrel and differential shaft.
- 16. Press differential out of bearing.

**CAUTION:** Take care that differential does not drop out of bearing.

- 17. Remove differential from press, discard bearing.



- 18. Secure rear half of differential carrier in a soft-jawed vice.
- 19. Make suitable alignment marks between front and rear halves of differential carrier.
- 20. Remove 8 bolts securing front half of carrier to rear; remove carrier.
- 21. Suitably identify front sun gear to front half of carrier, remove sun gear.
- 22. Remove and discard thrust washer.
- 23. Suitably identify each planet gear to its shaft and fitted position of each cross shaft to rear half of carrier.
- 24. Remove retaining ring.
- 25. Remove planet gears and cross shafts, remove and discard dished thrust washers.
- 26. Suitably identify rear sun gear to rear half of carrier, remove sun gear.
- 27. Remove and discard thrust washer.

# TRANSFER BOX

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## INSPECTING COMPONENTS

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1. Clean all components, remove all traces of silicone sealant using solvent and a plastic scraper.
2. Clean all traces of Loctite and sealant from threads of bolts and tapped holes. Ensure holes are clean and dry.



**CAUTION: Do not use a tap to clear threads in tapped holes.**

3. Check all casings and covers for cracks and damage.
4. Replace any component found to be worn or damaged.

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## Intermediate gears and shaft

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1. Check gear teeth for cracks, chipping and uneven wear.
2. Check shaft for wear and threads for damage.



### Mainshaft input gear

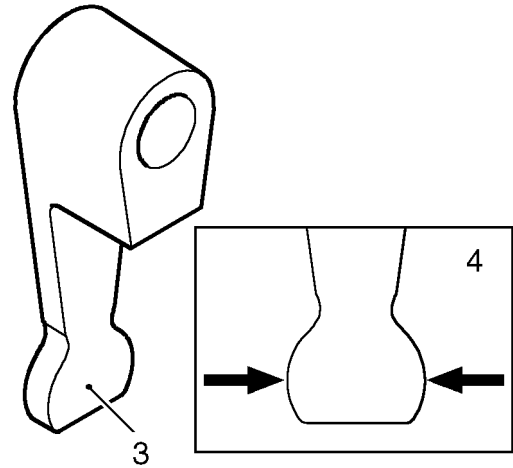
1. Check gear teeth for cracks, chipping and uneven wear.
2. Check that cross drillings in shaft are clear.

### Defender only

3. Check that ends of dog teeth are not 'rounded-off' or chipped.

### High/low cross shaft and housing

1. Check mating surfaces of cross shaft and drilling in housing for wear.
2. Check core plug in housing for signs of leakage or corrosion, apply Loctite 326 to replacement plug.



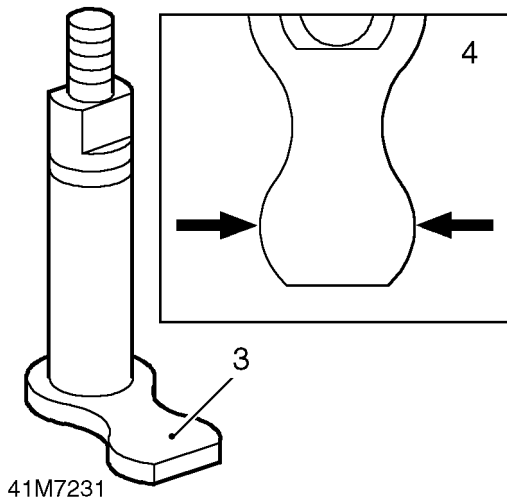
41M7230

3. Check high/low selector finger for wear.
4. Measure across widest portion of finger:  
Finger width = 15.90 to 15.95 mm (0.625 to 0.627 in)

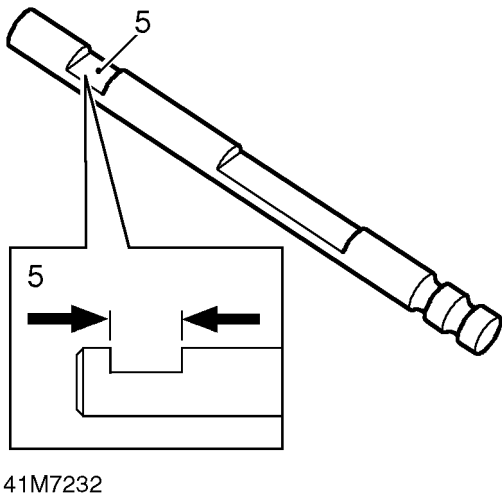
# TRANSFER BOX

## Front output housing and differential lock selector

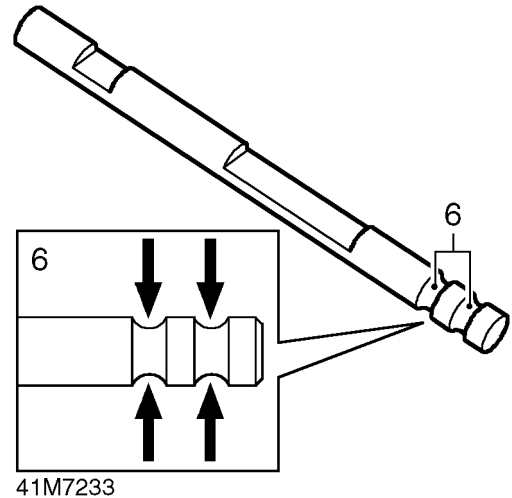
1. Check bearing track recesses in housing for damage, rectify or replace housing as necessary.
2. Check differential lock selector finger shaft and drilling in housing for wear.



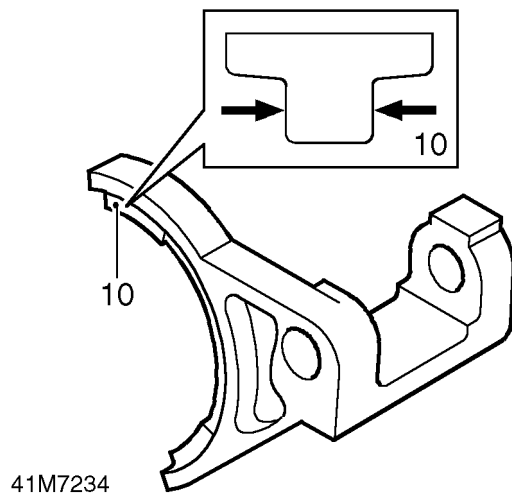
3. Check differential lock selector finger for wear.
4. Measure across widest portion of finger:  
Finger width = 15.90 to 15.95 mm (0.625 to 0.627 in)



5. Check differential lock selector finger groove width in differential lock selector shaft:  
Groove width = 16.0 to 16.1 mm (0.63 to 0.64 in)



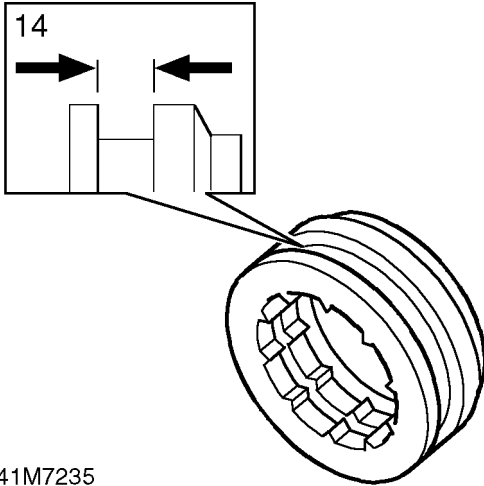
6. Check detent grooves in differential lock selector shaft for wear.
7. Check differential lock detent ball for flat spots.
8. Check detent spring for distortion.
9. Check differential lock selector fork for cracks and wear.



10. Check differential lock selector fork finger width:  
Finger width = 7.92 to 7.97 mm (0.311 to 0.313 in)
11. Check differential lock selector fork spring for distortion and clips for wear and damage.
12. Check spring free length:  
Free length = 84.58 mm (3.33 in)



13. Check dog clutch internal teeth and grooves for wear and damage.



41M7235

14. Check dog clutch selector fork groove width:  
Groove width = 8.05 to 8.20 mm (0.32 to 0.33 in)
15. Check threads and splines of output shaft for damage and wear.
16. Check dog clutch teeth on shaft for wear and damage.

### Rear output housing

1. Check bearing track recess in housing for damage, rectify or replace housing as necessary.
2. Check speedometer drive and driven gears for damage and wear.
3. Check splines and threads of output shaft for damage and wear.



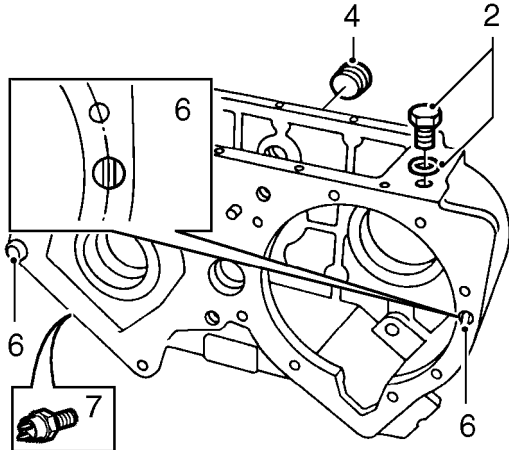
# TRANSFER BOX

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## Main casing

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1. Check bearing track recesses in main casing for damage, rectify or replace casing as necessary.



41M7123A

2. Remove drain plug, discard sealing washer.
3. Fit new sealing washer, fit drain plug and tighten to 30 Nm (22 lbf.ft).
4. Remove filler plug, check threads for damage.
5. Fit but do not fully tighten filler plug.
6. Check that locating dowels are fitted in casing and that blade of front output housing dowel is positioned as shown.
7. Remove oil temperature switch - if fitted, remove sealant from threads of switch and main casing.
8. Apply Hylosil PL32 sealant to threads, fit and tighten switch.
9. Check high/low detent ball for flat spots.
10. Check detent spring for distortion.

## Mainshaft input gear bearing housing

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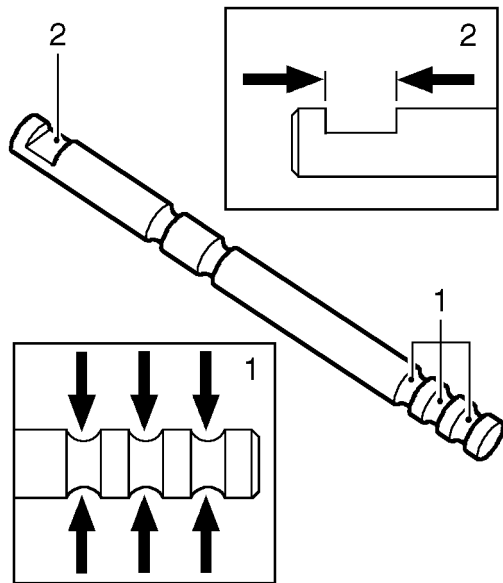
1. Check bearing track recess in housing for damage, rectify or replace housing as necessary.



### High/low selector fork and shaft

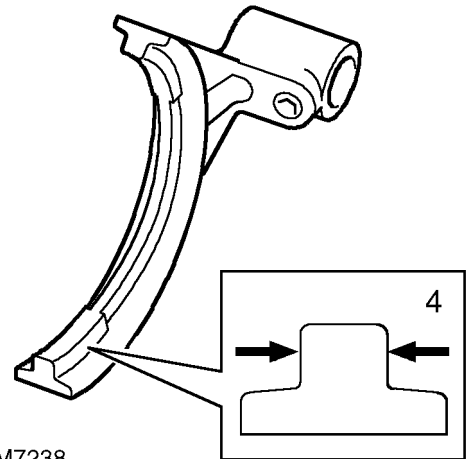


**NOTE:** There is no need to remove selector fork from shaft unless fork or shaft is to be replaced. If fork is removed, coat threads of set screw with Loctite 290 prior to assembly.



41M7237

1. Check detent grooves in shaft for wear.
2. Check high/low selector finger groove width in shaft:  
Groove width = 16.0 to 16.1 mm (0.63 to 0.64 in)



41M7238

3. Check high/low selector fork for cracks and wear.
4. Check high/low selector fork finger width:  
Finger width = 7.37 to 7.47 mm (0.290 to 0.294 in)

# TRANSFER BOX

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## Differential

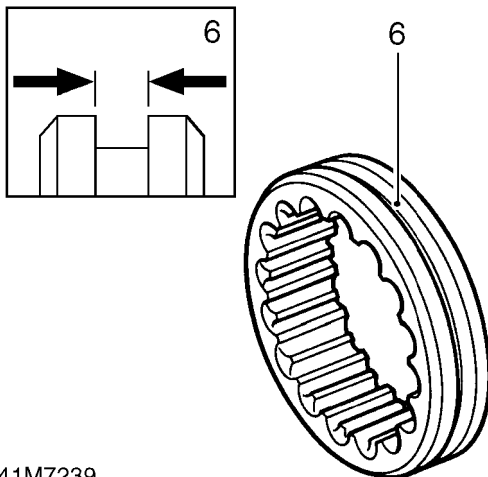
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1. Check sun and planet gears for wear, cracks and chipping of teeth.
2. Check cross shafts and recesses in both halves of differential carrier for damage and wear.



**CAUTION: Ensure planet gears are retained with their respective shafts.**

3. Check retaining ring for distortion.
4. Check splines of differential for wear and damage.
5. Check teeth of high/low hub for cracks, chipping and uneven wear.



41M7239

6. Check selector fork groove width in high/low hub:  
Groove width = 7.5 to 7.6 mm (0.295 to 0.3 in)
7. Check splines and teeth of high/low selector sleeve for uneven wear, cracks, damage and chipping.
8. Check teeth of high and low range gears for cracks, chipping and uneven wear.
9. Check high range gear bush for wear and damage.

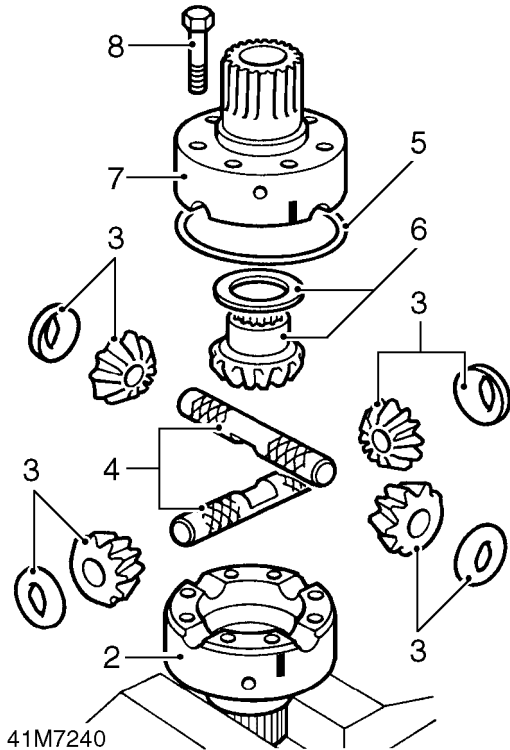


## COMPONENT ASSEMBLING

1. Lubricate all components with recommended oil.

### Differential

1. Lightly oil threads of differential bolts.



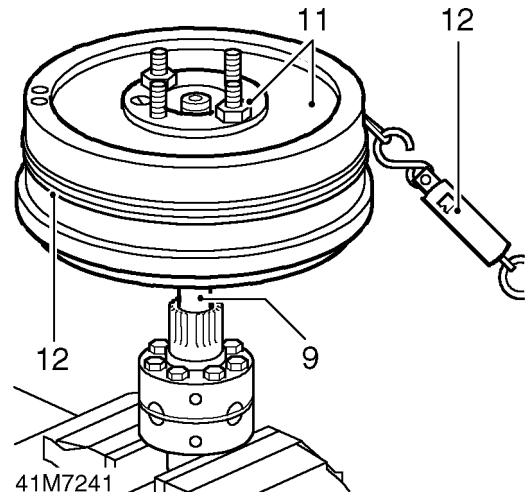
2. Secure rear half of differential carrier in a soft-jawed vice.
3. Fit each planet gear to its respective cross-shaft, fit new dished thrust washer to each gear.
4. Fit cross-shafts, planet gears and dished thrust washers in rear half carrier.

**CAUTION:** Ensure that cross-shafts are in their correct fitted position in rear half carrier. Do not fit sun gear into rear half carrier at this stage.

5. Fit retaining ring.
6. Fit a 1.05 mm (0.04 in) thick thrust washer to front half carrier sun gear, position gear in front half carrier.

**NOTE:** This is the thinnest of the thrust washers available.

7. Fit front half carrier to rear ensuring that alignment marks are together.
8. Fit bolts and tighten by diagonal selection to 60 Nm (44 lbf.ft).



9. Insert front output shaft into front half carrier, check that gears rotate freely.
10. Fit output flange on to splines of output shaft, do not fit flange nut at this stage.
11. Fit transmission brake drum to output flange, secure drum using 2 nuts.
12. Secure a length of cord around brake drum, attach one end of cord to a spring balance.
13. Tension cord and note load to turn figure recorded on spring balance when brake drum rotates.

**NOTE:** Used gears should rotate smoothly whilst new gears will have a 'notchy' feel as they rotate.

14. Check figure obtained against specified load to turn figure:

Used gears = 0.45 kg (1.0 lb)

New gears = 1.72 kg (3.8 lb)

15. If load to turn figure is below that specified, proceed as follows.
16. Remove front output shaft together with brake drum.
17. Remove 8 bolts securing front half differential carrier.
18. Remove front half differential carrier.
19. Remove front half carrier sun gear and thrust washer.
20. Select a thicker thrust washer from the range available.



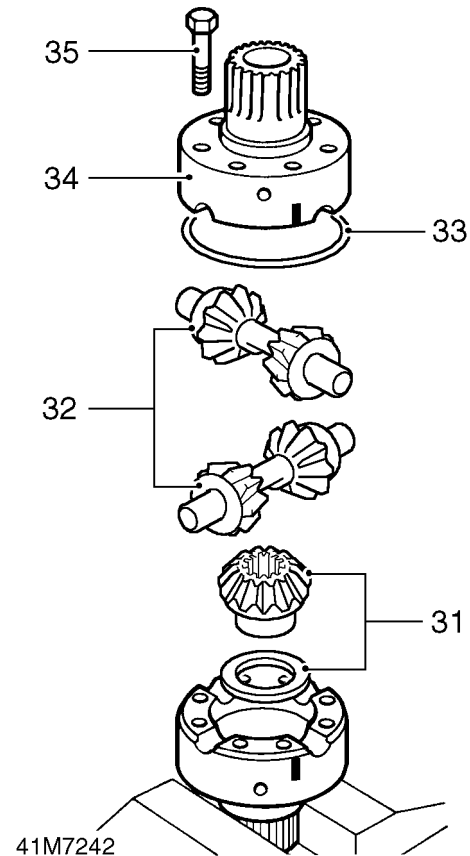
**NOTE: 5 thicknesses of thrust washers are available rising in increments of 0.10 mm (0.004 in) from 1.05 to 1.45 mm (0.04 to 0.06 in).**

21. Position selected thrust washer and sun gear in front half carrier.
22. Fit front half carrier to rear ensuring that alignment marks are together.
23. Fit bolts and tighten by diagonal selection to 60 Nm (44 lbf.ft).
24. Fit front output shaft and brake drum and repeat load to turn check.
25. Repeat above procedures as necessary until load to turn figure is as specified; record final figure obtained.
26. Remove brake drum from front output shaft, remove output shaft.
27. Remove bolts securing front half carrier.
28. Remove front half carrier, remove sun gear and thrust washer.



**CAUTION: Keep selected thrust washer with sun gear.**

29. Remove retaining ring.
30. Remove planet gears and cross shafts.



31. Fit a 1.05 mm (0.04 in) thick thrust washer to rear half carrier sun gear, position gear in rear half carrier.
32. Fit planet gears, cross shafts and dished thrust washers in rear half carrier.



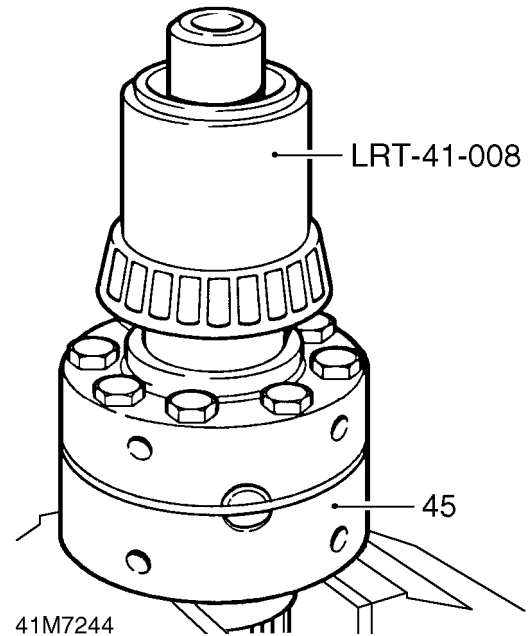
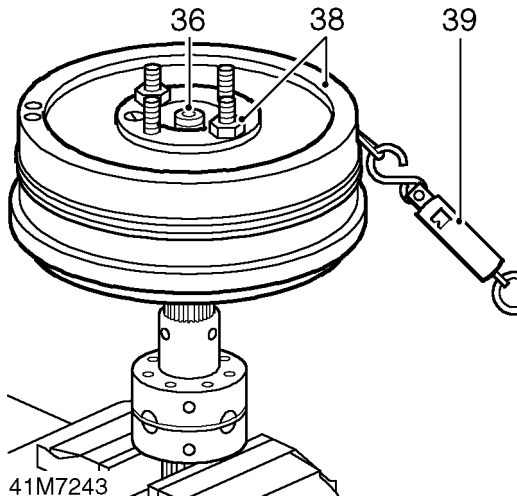
**CAUTION: Ensure that planet gears are fitted to their respective cross-shafts and cross-shafts are fitted in their correct location in half carrier.**

33. Fit retaining ring.
34. Fit front half carrier to rear ensuring that alignment marks are together.



**CAUTION: Do not fit sun gear and thrust washer into front half carrier.**

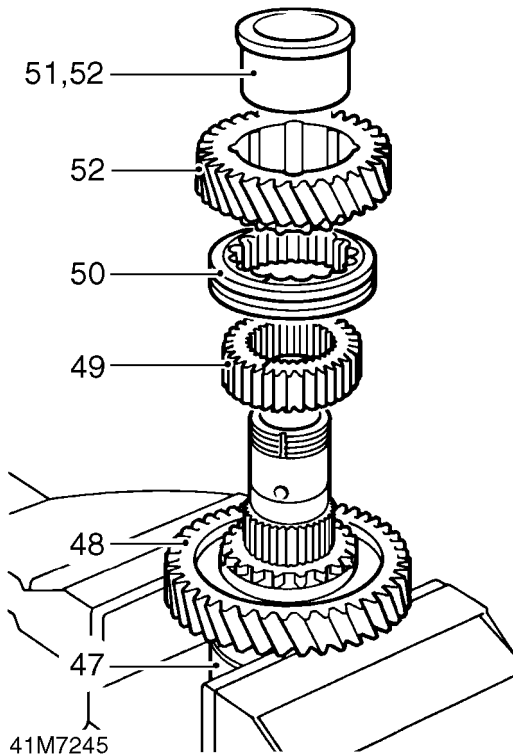
35. Fit bolts and tighten by diagonal selection to 60 Nm (44 lbf.ft).



36. Invert assembly in vice and then insert rear output shaft into rear half carrier, check that gears rotate freely.
37. Fit output flange on to splines of output shaft, do not fit flange nut at this stage.
38. Fit transmission brake drum to output flange, secure with 2 nuts.
39. Carry out load to turn check using same method as for front half carrier.
40. When load to turn figure is correct, record final figure.
41. Upon completion, fit sun gear and selected thrust washer to front half carrier.
42. Fit front half carrier ensuring that alignment marks are together.
43. Fit bolts and tighten by diagonal selection to 60 Nm (44 lbf.ft).
44. With differential assembled, fit rear output shaft and brake drum and check overall load to turn. This should be approximately equal to total load to turn figure of both front and rear half carriers added together:  
Used gears = 0.90 kg (2.0 lb)  
New gears = 3.44 kg (7.6 lb)

45. Secure rear half carrier in a soft-jawed vice.
46. Fit a new front bearing using tool **LRT-41-008**.

## TRANSFER BOX

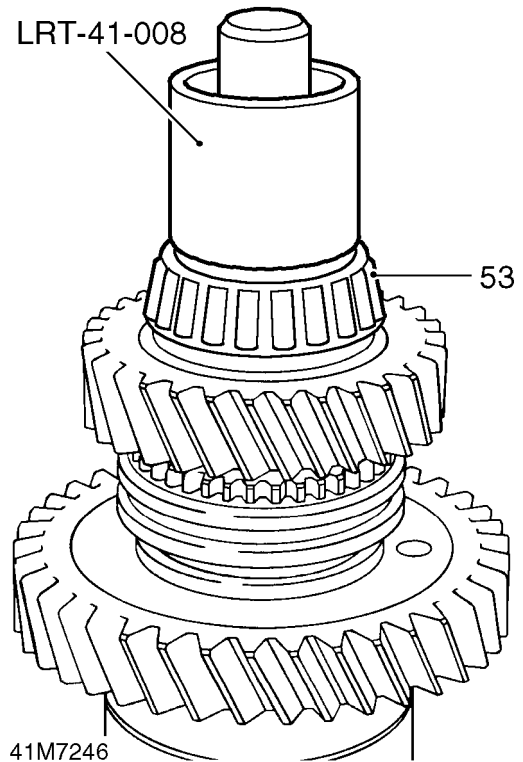


- 47. Support front half carrier in a soft-jawed vice.
- 48. Fit low range gear ensuring that dog teeth on gear are towards threaded end of shaft.

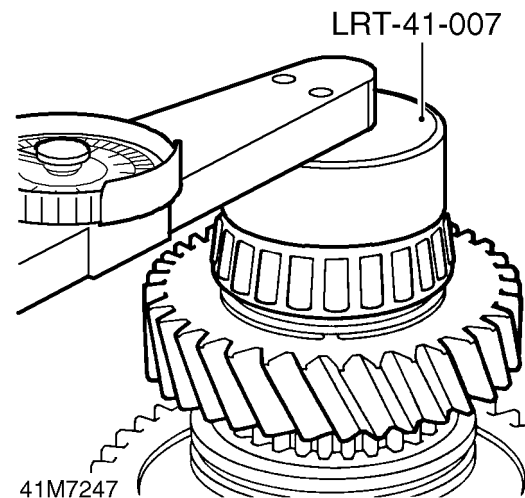


**NOTE:** Use a suitable hollow mandrel to fit gear if it is tight on splines.

- 49. Fit high/low hub ensuring that alignment mark made during dismantling is towards threaded end of shaft.
- 50. Fit high/low selector sleeve ensuring that alignment marks on hub and sleeve are together.
- 51. Fit bush to high range gear ensuring that collar on bush is on opposite side of gear to the dog teeth.
- 52. Fit high range gear and bush ensuring that collar on bush is towards threaded end of shaft.



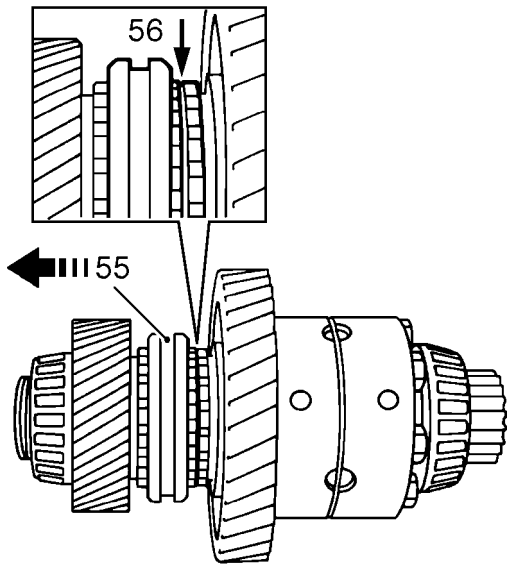
- 53. Fit a new rear bearing using tool **LRT-41-008**.



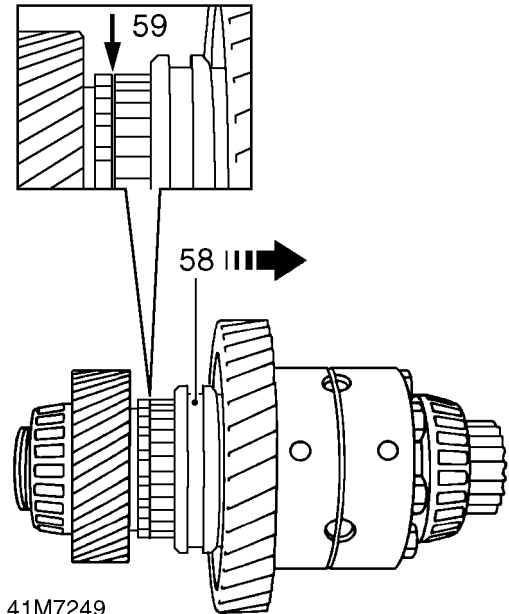
- 54. Fit a new bearing retainer nut, tighten to 72 Nm (53 lbf.ft) using tool **LRT-41-007**.



**CAUTION:** Do not stake nut at this stage.



41M7248

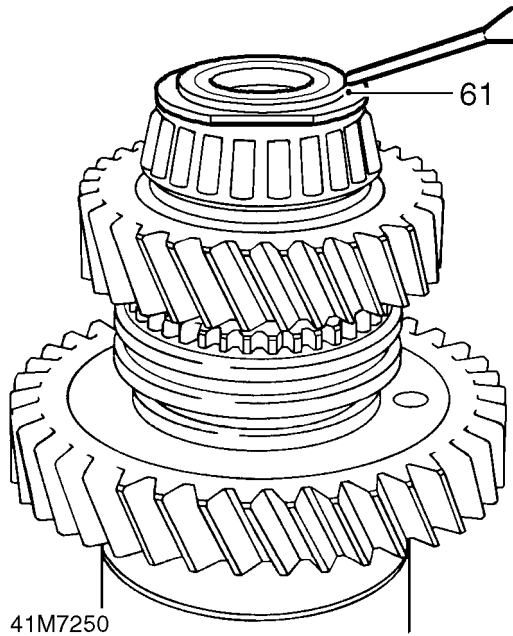


41M7249

- 55. Slide high/low selector sleeve and hub away from low range gear.
- 56. Using feeler gauges, determine clearance between low range gear and high/low hub:  
Clearance = 0.05 to 0.15 mm (0.002 to 0.006 in)
- 57. If clearance is not as specified, fit a new low range gear and high/low hub and re-check.

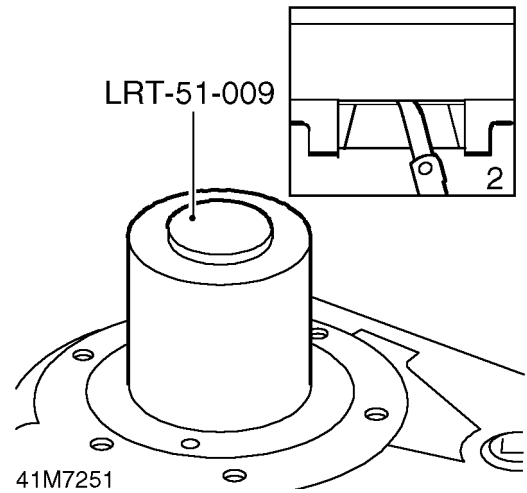
- 58. Slide high/low selector sleeve and hub away from high range gear.
- 59. Using feeler gauges, determine clearance between high range gear and high/low hub:  
Clearance = 0.05 to 0.15 mm (0.002 to 0.006 in)
- 60. If clearance is not as specified, fit new high range gear and high/low hub and re-check.



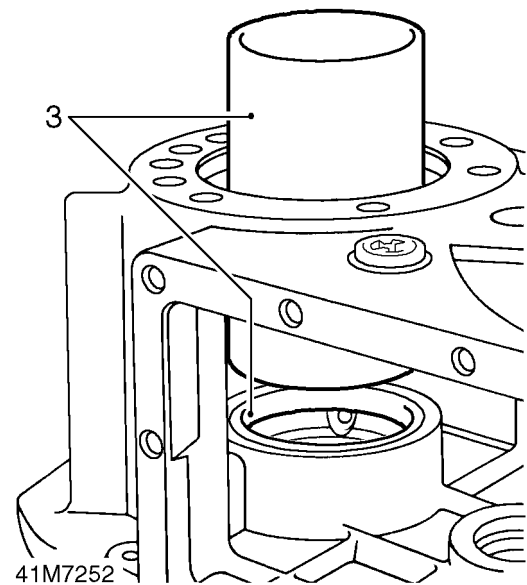


61. Using a round nosed punch, stake collar of nut into recess in differential shaft.

## Main casing



1. Fit a new differential rear bearing track using tool **LRT-51-009**.
2. Using a straight edge and feeler gauges, check that bearing track is recessed 1.0 mm (0.04 in) below outer face of main casing.



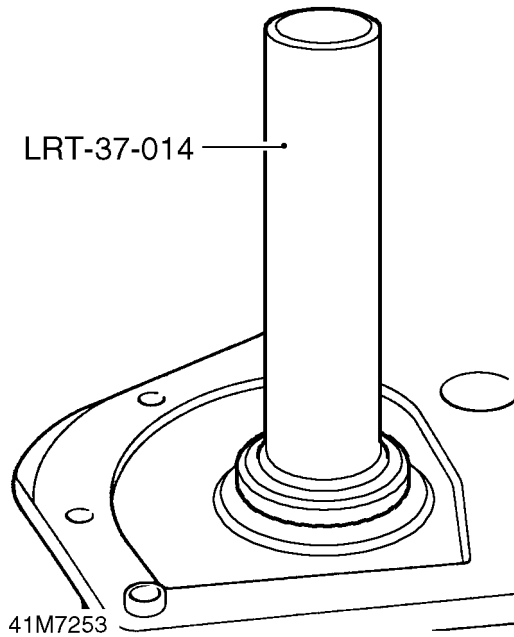
3. Using a suitable mandrel, fit a new mainshaft input gear bearing track.



**CAUTION: Ensure bearing tracks are seated squarely in recesses.**



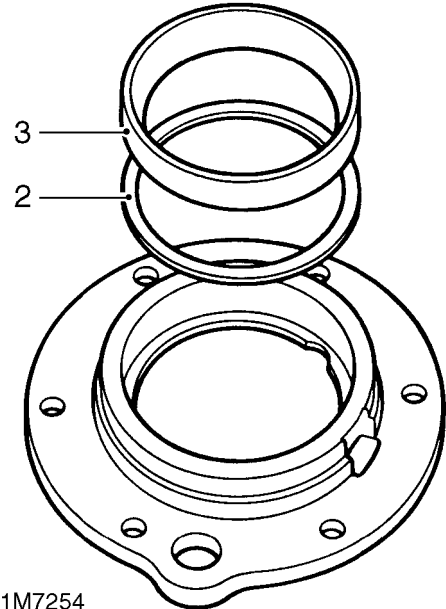
- Lubricate a new mainshaft oil seal with recommended oil.



- Invert main casing and fit oil seal, lip side facing inwards, using tool **LRT-37-014**.

### Mainshaft input gear bearing housing

- Ensure bearing track recess in housing is clean.



- Position a 3.15 mm (0.12 in) thick shim in bearing housing.



**NOTE: This is the thinnest of the shims available.**

- Using a suitable mandrel, fit new mainshaft input gear bearing track.

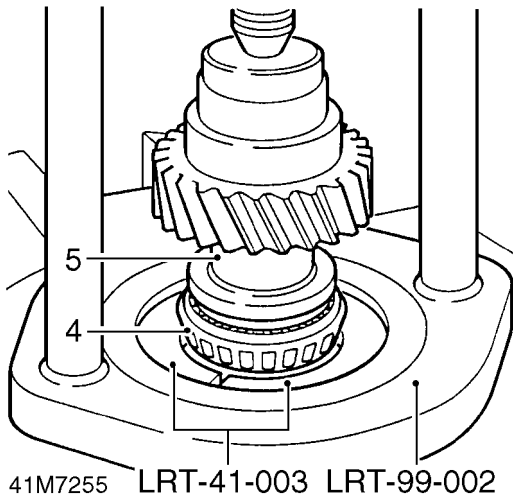


**CAUTION: Ensure bearing track is seated squarely in recess.**

# TRANSFER BOX

## Mainshaft input gear assembly

1. Lubricate new bearings with recommended oil.



2. Secure hand press **LRT-99-002** in a vice.
3. Position collars **LRT-41-003** in hand press.
4. Position new bearing on collars.

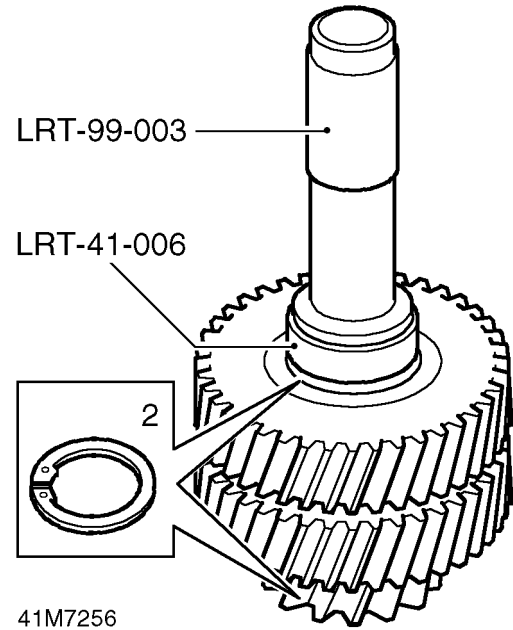


**NOTE: Smallest diameter of bearing must be towards collars.**

5. Locate end of mainshaft in bearing, press mainshaft through bearing.
6. Repeat above procedure for remaining bearing.

## Intermediate gears.

1. Lubricate new bearings and bearing tracks with recommended oil.



2. Fit new circlips into intermediate gears.



**CAUTION: Ensure that circlips are correctly seated.**

3. Fit new bearing tracks using tools **LRT-41-006** and **LRT-99-003**.



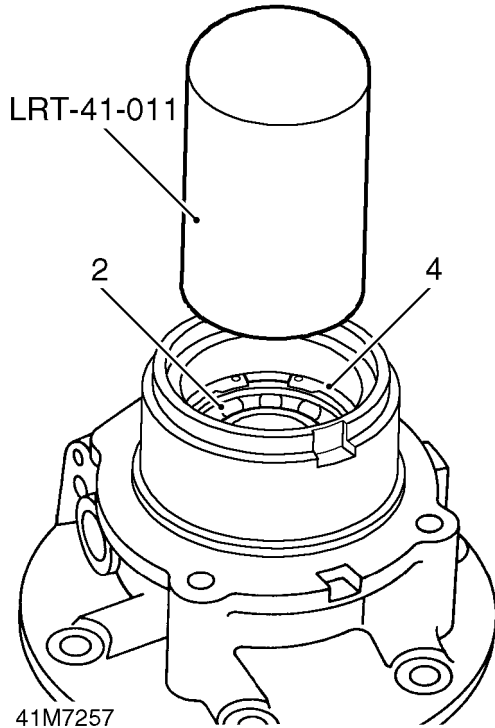
**CAUTION: Ensure bearing tracks are fully seated against circlips.**

4. Retain bearings with intermediate gears.



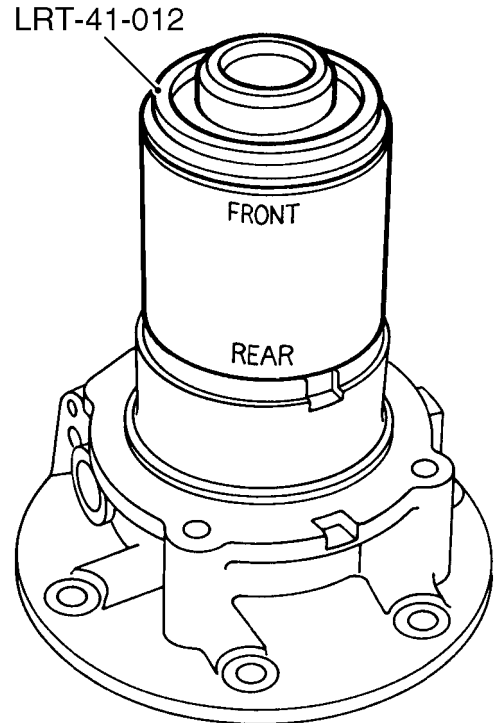
### Rear output housing

1. Heat rear output housing to 100 °C (210 °F).



2. Fit new output shaft bearing using tool **LRT-41-011**.
3. Allow housing to air cool.
4. Fit new bearing retaining circlip ensuring it is seated in groove.

5. Lubricate a new output shaft oil seal with recommended oil.

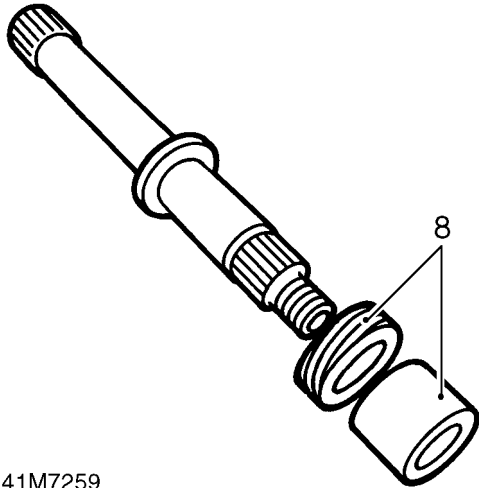


6. Fit oil seal using tool **LRT-41-012**.

 **NOTE: Use end of tool marked 'REAR' to fit oil seal.**

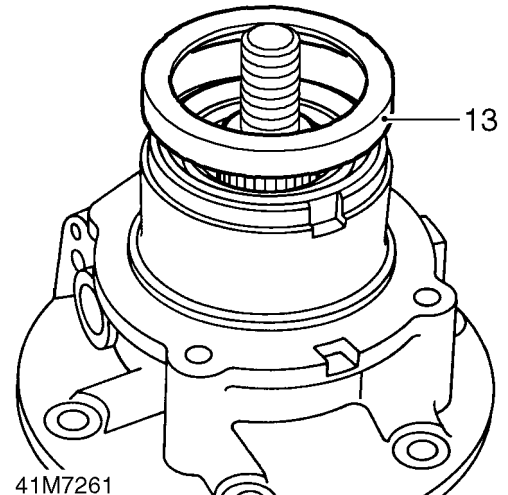
7. Check that oil seal is just contacting circlip.

## TRANSFER BOX



41M7259

8. Slide speedometer drive gear and spacer on to output shaft.

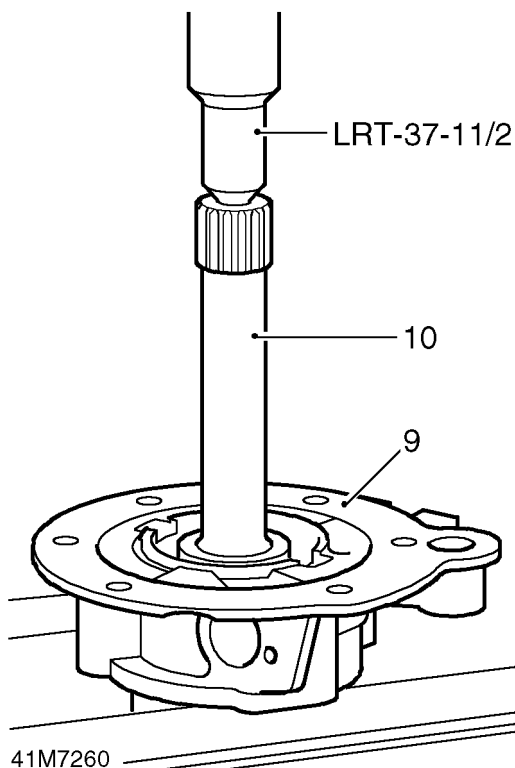


41M7261

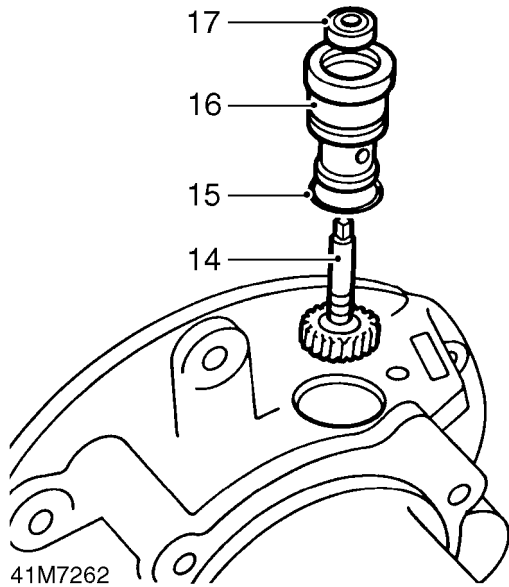
13. Fit mud shield with open face of shield towards oil seal.



**CAUTION: Do not fit output shaft flange at this stage.**



9. Position rear output housing on bed of hand press.  
10. Locate threaded end of output shaft in bearing.  
11. Position thrust button **LRT-37-11/2** between end of output shaft and press mandrel.  
12. Press output shaft into bearing.

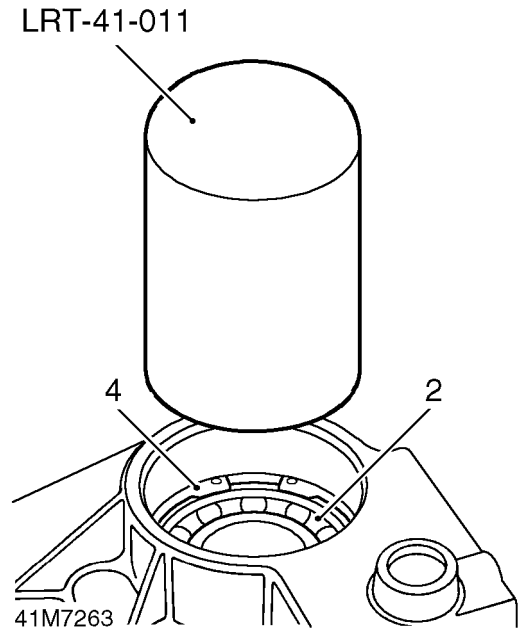


14. Fit speedometer driven gear into rear output housing ensuring that gear teeth are engaged with drive gear.
15. Lubricate a new 'O' ring with recommended oil and fit to driven gear housing.
16. Fit driven gear housing.
17. Lubricate a new oil seal with recommended oil, fit seal with lip towards driven gear housing.

## Front output housing

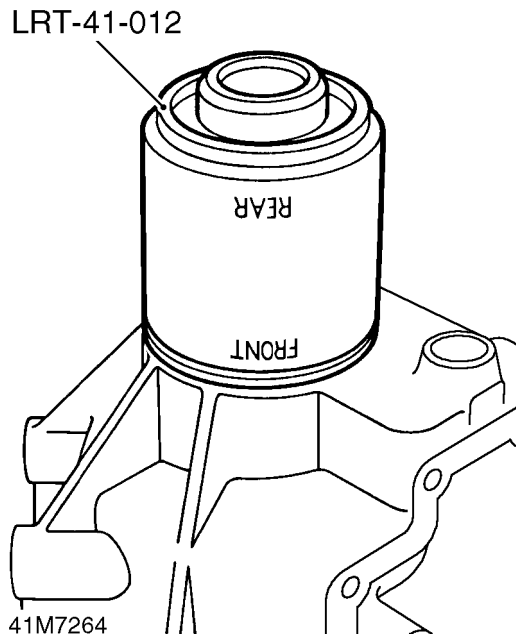
**CAUTION:** Do not carry out assembly operations until differential bearing pre-load has been determined - See *differential bearing pre-load*.

1. Heat front output housing to 100 °C (210 °F).



2. Fit new output shaft bearing using tool **LRT-41-011**.
3. Allow housing to air cool.
4. Fit new bearing retaining circlip ensuring it is fully seated in groove.

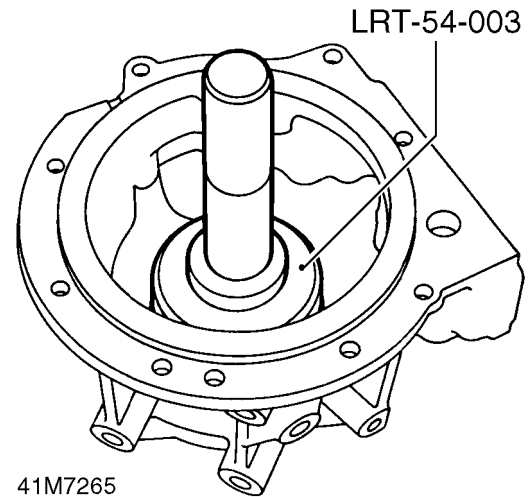
- Lubricate a new output shaft oil seal with recommended oil.



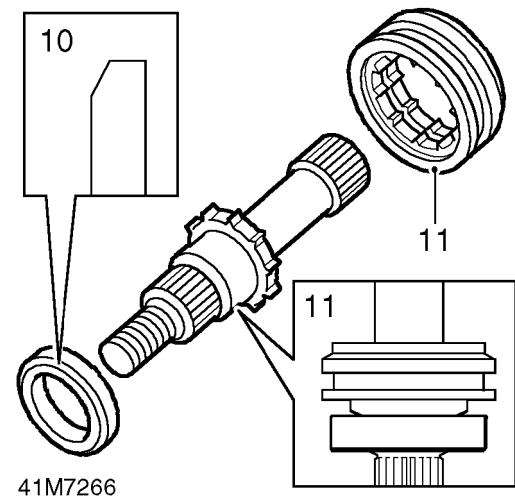
- Fit oil seal using tool **LRT-41-012**.

**NOTE:** Use end of tool marked 'FRONT' to fit oil seal.

- Check that oil seal is just contacting circlip.
- Position selected shim in front output housing.



- Fit differential front bearing track using tool **LRT-54-003**.

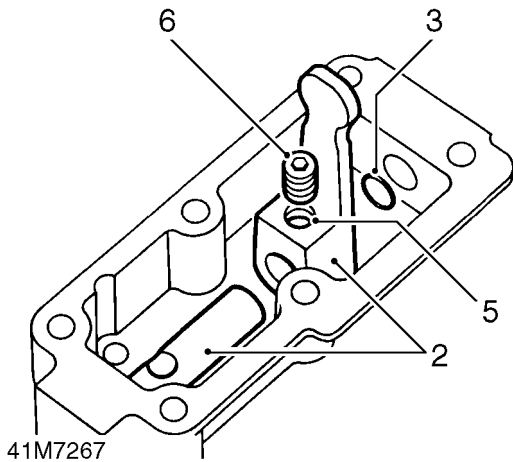


- Fit bearing spacer to output shaft ensuring that chamfer on spacer is towards threaded end of shaft.
- Fit dog clutch ensuring that flange on clutch is towards splined end of shaft.
- Using a mallet, drive output shaft into bearing.



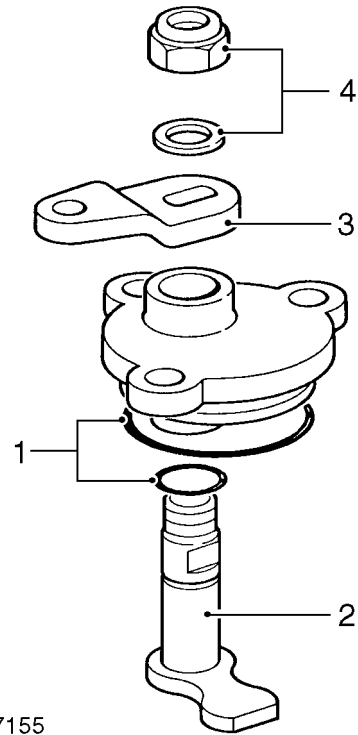
**High/low cross shaft housing**

1. Lubricate cross shaft and new 'O' ring with recommended oil.



2. Insert cross shaft into housing, position high/low selector finger on shaft.
3. Fit 'O' ring to shaft, locate end of shaft in hollow plug.
4. Slide 'O' ring to end of shaft.
5. Align hole in high/low selector finger with recess in cross shaft.
6. Apply Loctite 290 to threads of setscrew, fit and tighten screw.

**Differential lock selector**



1. Lubricate new 'O' rings with recommended oil, fit to selector finger shaft and housing.
2. Insert selector finger shaft into housing.
3. Fit selector lever ensuring that relative positions of lever and finger are as shown.
4. Fit washer and new self-locking nut, tighten nut to 15 Nm (11 lbf.ft).

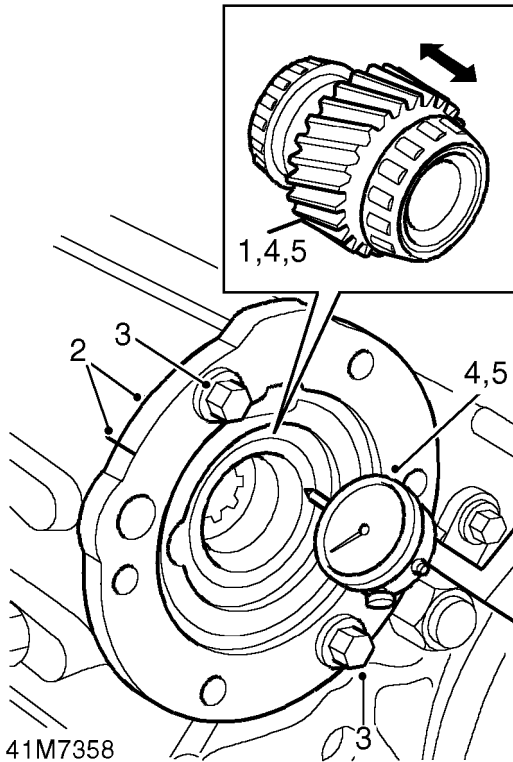


# TRANSFER BOX


## TRANSFER BOX ASSEMBLING

1. Lubricate all components with recommended oil.


### Mainshaft input gear bearing pre-load



1. Position mainshaft input gear assembly in main casing.
2. Fit mainshaft input gear bearing housing ensuring that reference marks are aligned.
3. Fit 2 M10 x 25 mm bolts and tighten to 25 Nm (18 lbf.ft).
4. Position suitable DTI with stylus of gauge contacting end of mainshaft, push mainshaft rearwards and zero gauge.
5. Push mainshaft forwards and note gauge reading.
6. Calculate thickness of shim required using the formula  $A + B + C = D$  where:  
A = Thickness of installed shim - 3.15 mm (0.12 in)  
B = Recorded end-float  
C = Required pre-load - 0.05 mm (0.002 in)  
D = Thickness of shim required
7. If an alternative shim is required to establish correct end-float, proceed as follows:

 **NOTE: Do not remove mainshaft input gear bearing housing if bearing pre-load is correct.**

8. Remove 2 bolts, remove mainshaft input gear bearing housing.
9. Using a soft metal drift, carefully drive input gear bearing track out of bearing housing, remove shim.

 **CAUTION: If bearing track is damaged during this operation, a new track must be fitted.**

10. Select required shim from the range available.

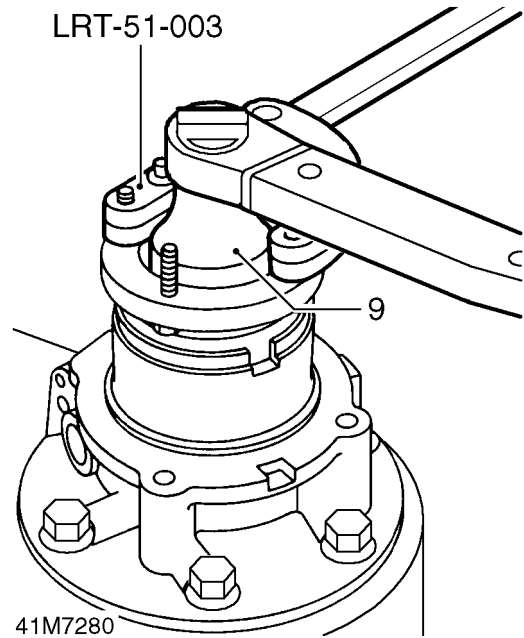
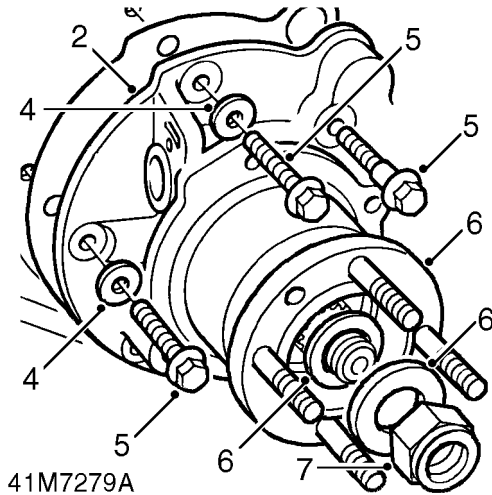
 **NOTE: Shims are available from 3.15 to 4.00 mm (0.12 to 0.16 in) thickness rising in increments of 0.5 mm (0.002 in).**

11. Fit selected shim and using a suitable mandrel, fit input gear bearing track.
12. Fit mainshaft input gear bearing housing and temporarily secure using 2 M10 x 25 mm bolts tightened to 25 Nm (18 lbf.ft) .



Rear output housing

1. Apply Hylosil RTV 102 sealant to mating flange of rear output housing.



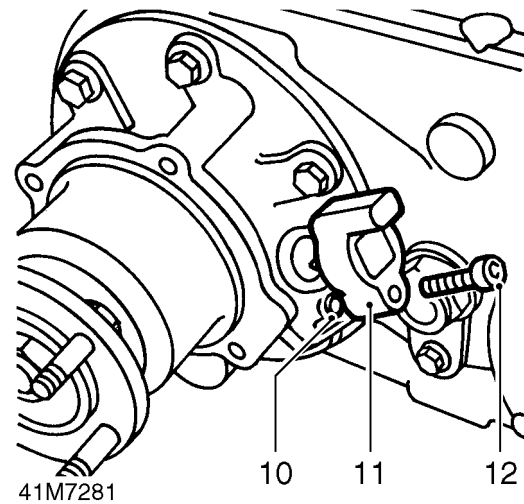
2. Fit rear output housing to main casing.

**NOTE: Dowel located.**



3. Apply Loctite 290 to threads of bolts and shoulder bolt.
4. Fit washers to 2 bolts.
5. Fit bolts and tighten by diagonal selection to 25 Nm (18 lbf.ft).
6. Fit output flange, new felt and steel washers to output shaft.
7. Fit a new self-locking nut.

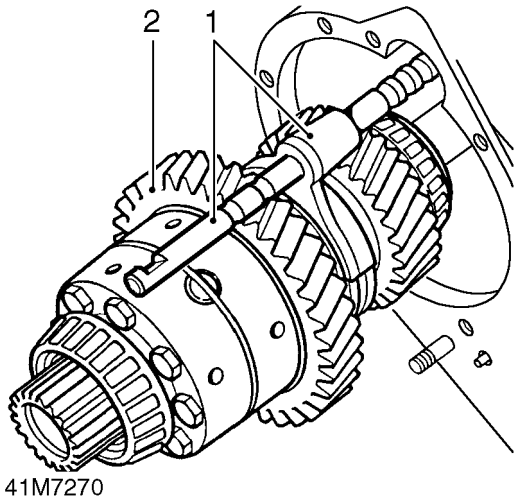
8. Position propeller shaft flange holding tool **LRT-51-003** to output flange.
9. Restrain flange, tighten nut to 162 Nm (120 lbf.ft).



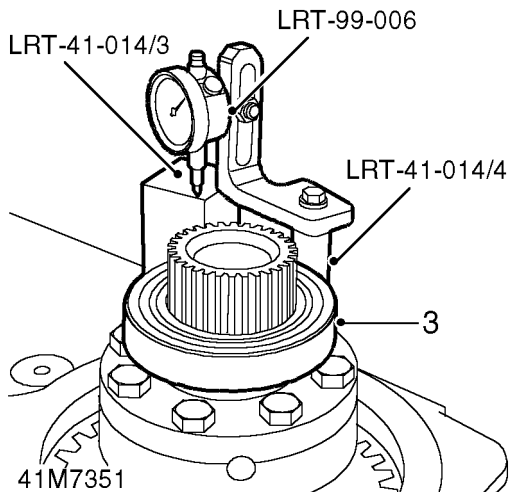
10. Lubricate a new 'O' ring with recommended oil and fit to vehicle speed sensor - if fitted.
11. Fit vehicle speed sensor - if fitted.
12. Fit and tighten Allen screw.

# TRANSFER BOX

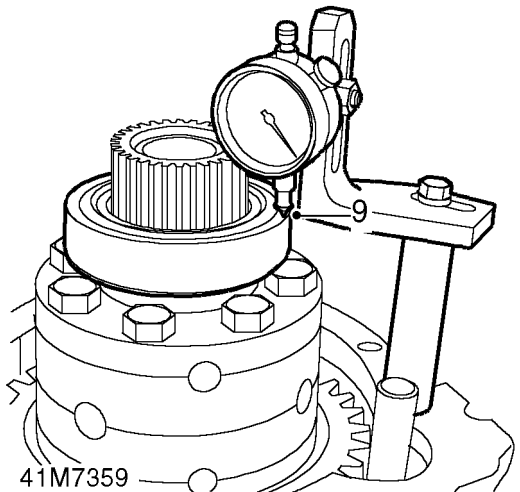
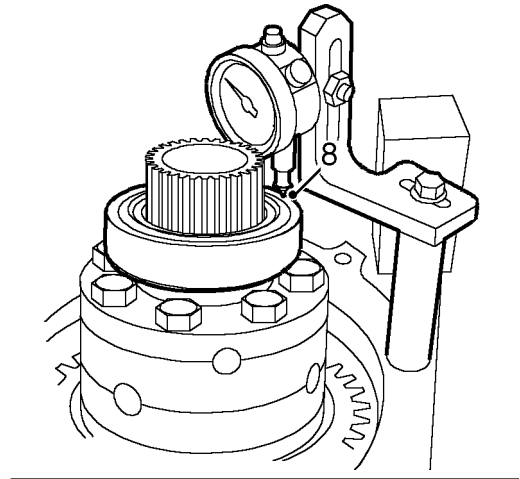
## Differential bearing pre-load



1. Position high/low selector shaft and fork to differential ensuring that fingers of selector fork are located in high/low selector sleeve.
2. Position high/low selector shaft and differential in main casing ensuring that splines of rear output shaft are engaged in differential.



3. Position new differential front bearing outer track on bearing ensuring that track is seated squarely.
4. Position setting block, tool **LRT-41-014/3** on main casing.
5. Screw pillar **LRT-41-014/4** into tapped hole in main casing.
6. Assemble DTI **LRT-99-006** to pillar.
7. Position stylus of DTI to setting block, zero gauge.



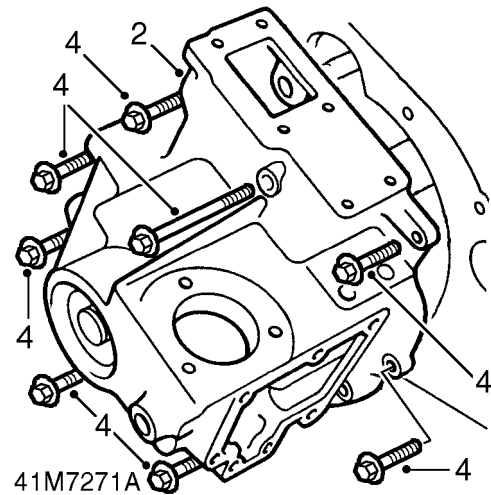
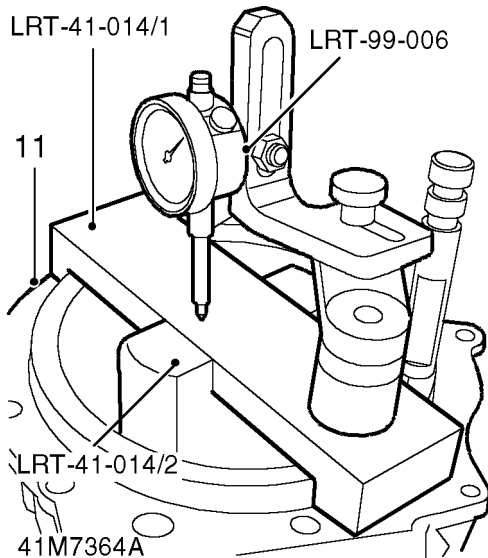
8. Position stylus of gauge on front bearing outer track, record reading obtained.
9. Position stylus of gauge on opposite side of bearing track, record reading obtained.

**CAUTION:** Ensure that bearing track is not disturbed when carrying out above operations.

10. Establish average of the 2 readings, record figure obtained.



## Front output housing



11. Position front output housing as shown.
12. Position depth block, tool **LRT-41-014/2** and cross-bar **LRT-41-014/1** on front output housing.
13. Position DTI **LRT-99-006** on cross-bar **LRT-41-014/1**.
14. Zero DTI on depth block **LRT-41-014/2**.
15. Position DTI to cross-bar **LRT-41-014/1**, record reading obtained.
16. Remove tools.
17. Using the formula:  
 $3.05 \text{ mm (0.120 in)} + B - A = D$  where:  
 B = Height difference recorded between depth block and cross bar  
 A = Average of readings to differential front bearing outer track  
 D - Thickness of shim required to give differential bearing pre-load of 0.05 mm (0.002 in)
18. From resultant figure obtained, select appropriate thickness shim from the range available.

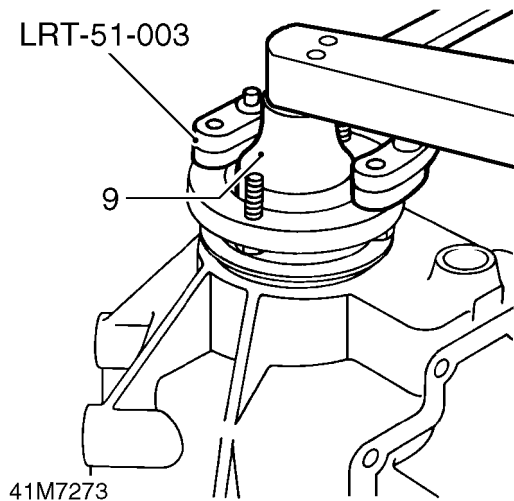


**NOTE: Shims are available from 2.00 to 3.25 mm (0.08 to 0.13 in) thickness, rising in increments of 0.05 mm (0.002 in).**

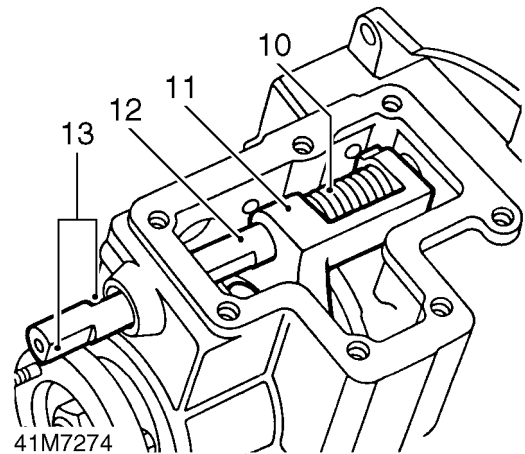
19. Retain selected shim and differential front bearing outer track with front output housing.
20. Carry out assembly of front output housing-  
*See Component assembling.*

1. Apply Hylosil RTV 102 sealant to mating flange of front output housing.
2. Fit front output housing ensuring that splines of output shaft are engaged in differential and that internal splines of dog clutch are engaged with teeth of output shaft.
3. Apply Loctite 290 to threads of bolts.
4. Fit bolts noting that longest bolt is inserted through high/low selector finger housing.
5. Tighten bolts by diagonal selection to 25 Nm (18 lbf.ft).
6. Fit output flange, new felt and steel washers.
7. Fit a new self-locking nut.

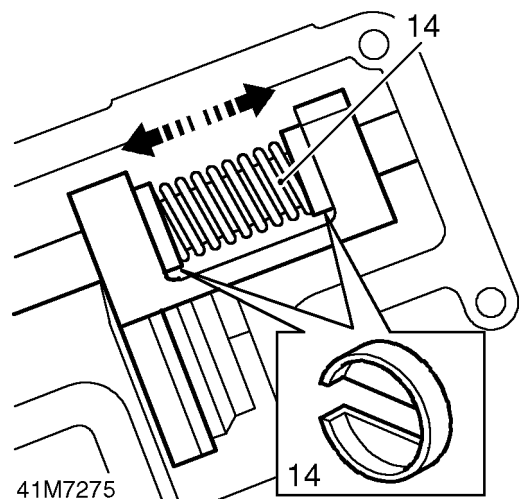
## TRANSFER BOX




8. Position propeller shaft flange holding tool **LRT-51-003** to output flange.
9. Restrain flange, tighten nut to 162 Nm (120 lbf.ft).

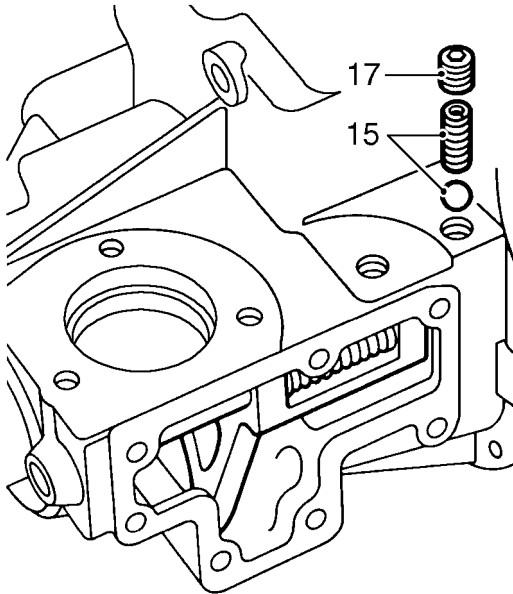


10. Compress differential lock selector spring and fit to selector fork.
11. Locate fingers of selector fork in groove in dog clutch.
12. Fit differential lock selector shaft ensuring end of shaft is located in recess in rear of housing.
13. Rotate selector shaft until the two flats for the retaining clips are at right angles to the cover plate mating face.



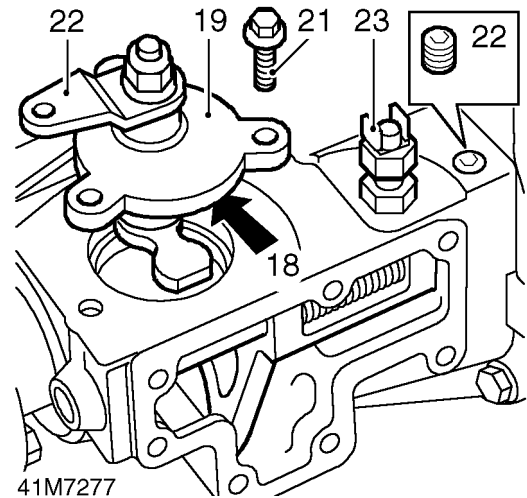
14. Compress selector spring and fit retaining clips at each end of spring.

 **CAUTION: Ensure ends of spring are fully seated in recess in clips.**



41M7276

15. Fit differential lock detent ball and spring.
16. Apply Loctite 290 to threads of detent plug.
17. Fit and tighten detent plug then unscrew 2 full turns.



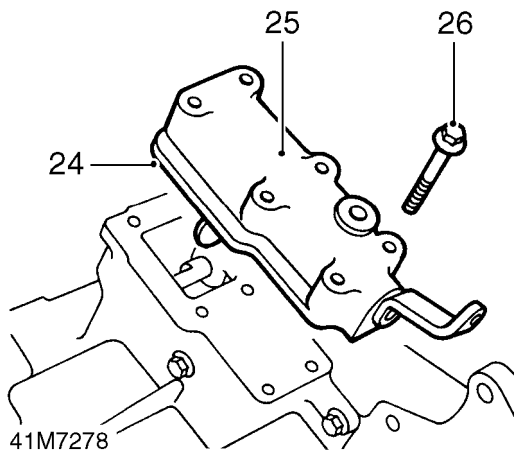
41M7277

18. Ensure 'O' ring is correctly located on differential lock selector housing.
19. Fit differential lock selector assembly ensuring that selector finger is located in recess in differential lock selector shaft.
20. Apply Loctite 290 to threads of bolts.
21. Fit bolts and tighten to 25 Nm (18 lbf.ft).
22. Operate differential lock selector lever and check that differential lock detent ball can be felt to positively engage and disengage with grooves in selector shaft; screw detent plug in or out until setting is correct.
23. Apply Hylomar PL32 sealant to threads of differential lock warning lamp switch, fit switch.



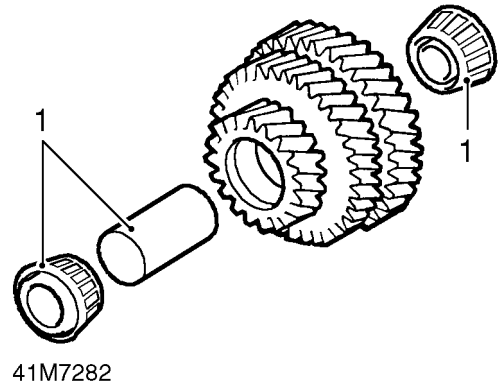
**CAUTION: Do not allow sealant to contact switch plunger. Do not tighten locknut or fit differential lock side cover until switch has been adjusted.**

## TRANSFER BOX

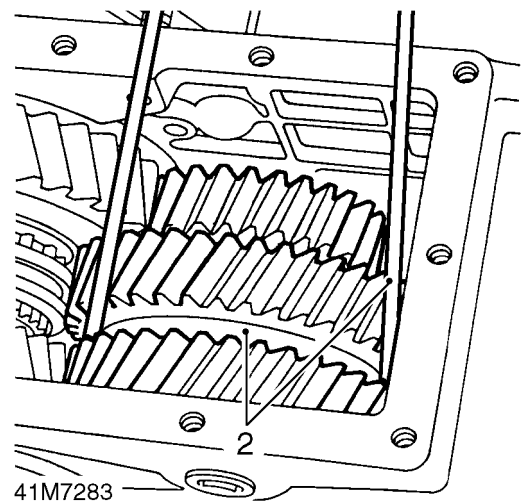


24. Apply Hylosil RTV 102 sealant to mating flange of high/low selector housing.
25. Fit housing ensuring that high/low selector finger is located in recess in high/low selector shaft.
26. Fit 6 bolts and tighten to 25 Nm (18 lbf.ft).

## Intermediate gears



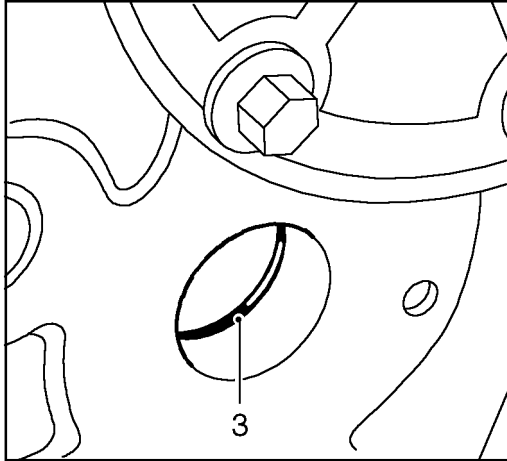
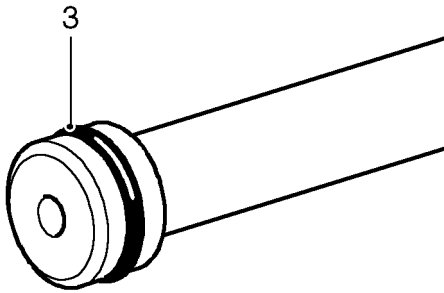
1. Insert a new collapsible spacer into intermediate gears, fit bearings into bearing tracks.



2. Wrap a suitable length of wire around intermediate gears and using assistance, lower gears into main casing ensuring that they are meshing with input and differential gears.

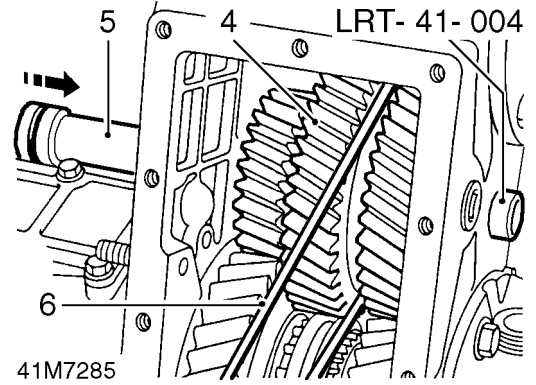


**CAUTION: Do not remove wire at this stage.**



41M7171

3. Lubricate new 'O' rings with recommended oil and fit to intermediate shaft and main casing.



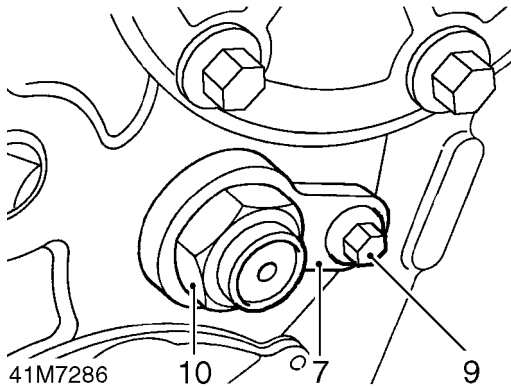
4. Raise intermediate gears until dummy shaft **LRT-41-004** can be inserted from front output housing side of main casing.
5. Fit intermediate shaft, drift shaft into position whilst at the same time expelling dummy shaft **LRT-41-004**.



**CAUTION: Ensure 'O' ring is not displaced from main casing.**



- Remove wire from around intermediate gears.



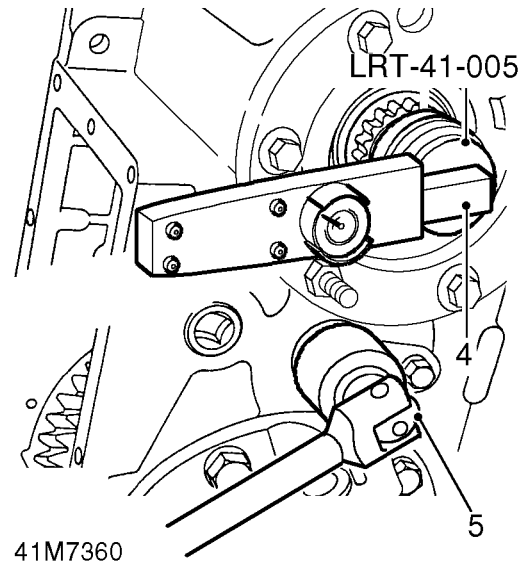
- Rotate intermediate shaft until retaining plate can be located on flat on shaft.
- Apply Loctite 290 to threads of retaining plate bolt.
- Fit bolt and tighten to 25 Nm (18 lbf.ft).
- Fit a new intermediate shaft nut.
- Tighten intermediate shaft nut in small stages until all end-float is just removed from intermediate gears.

**CAUTION:** Check end-float of intermediate gears between each stage, do not continue tightening nut after end-float is removed. Do not stake nut at this stage.

- Set intermediate gear bearing pre-load - See *Intermediate gear bearing pre-load*.

## Intermediate gear bearing pre-load

- Select neutral.
- Screw a suitable bolt into tapped hole in end of tool **LRT-41-005**.

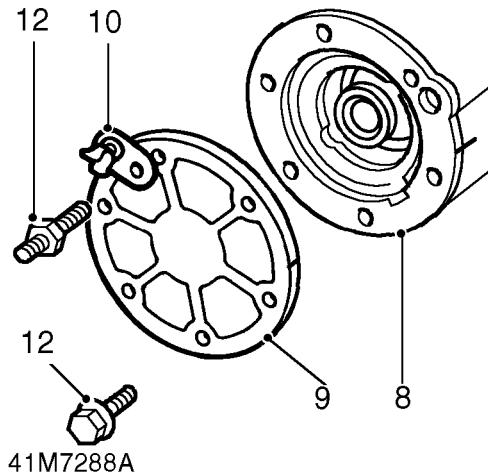


- Insert tool **LRT-41-005** in end of mainshaft.
- Using a suitable torque meter on tool **LRT-41-005**, check and record torque to turn mainshaft input gears.
- Tighten the intermediate shaft nut in small stages checking the torque to turn the gears until the mainshaft input gear torque to turn figure recorded in operation 4 has increased by 1.25 Nm (10 lbf.in ).

**CAUTION:** Take great care not to overtighten nut as this will cause excessive bearing pre-load. If torque to turn figure is inadvertently exceeded, a new collapsible spacer must be fitted.



6. When torque to turn figure - intermediate gear bearing pre-load is correct, stake flange of intermediate shaft nut into recess in intermediate shaft.
7. Remove tool **LRT-41-005**.



**NOTE: Discovery cover plate illustrated.**



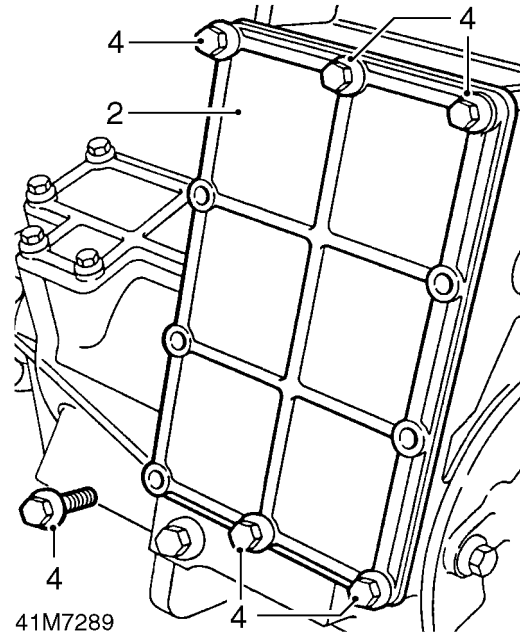
8. Remove 2 bolts used to temporarily secure mainshaft input gear bearing housing, remove housing. Apply Hylosil 2000 sealant to main casing mating face of bearing housing, position housing on main casing ensuring reference marks are aligned.
9. Apply Hylosil RTV 102 sealant to mating face of cover plate/power take-off cover, position plate/cover on bearing housing ensuring that reference marks are aligned.
10. Position clip to stud nut.
11. Apply Loctite 290 to threads of bolts and stud nut.
12. Fit 5 bolts and stud nut and tighten by diagonal selection to 25 Nm (18 lbf.ft).

**NOTE: These bolts are threaded to head.**



## Bottom cover

1. Apply Hylosil RTV 102 sealant to mating face of bottom cover.



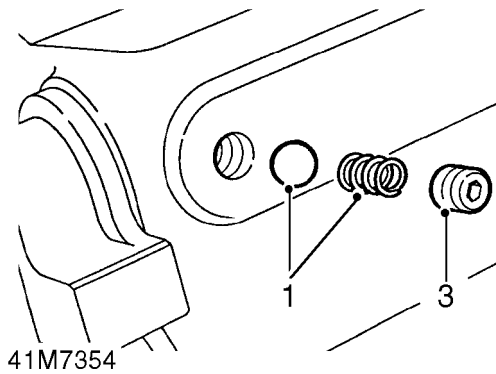
2. Fit bottom cover.
3. Apply Loctite 290 to threads of bottom cover securing bolts
4. Fit bolts in positions shown and tighten by diagonal selection to 25 Nm (18 lbf.ft).

# TRANSFER BOX

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## High/low selector shaft detent

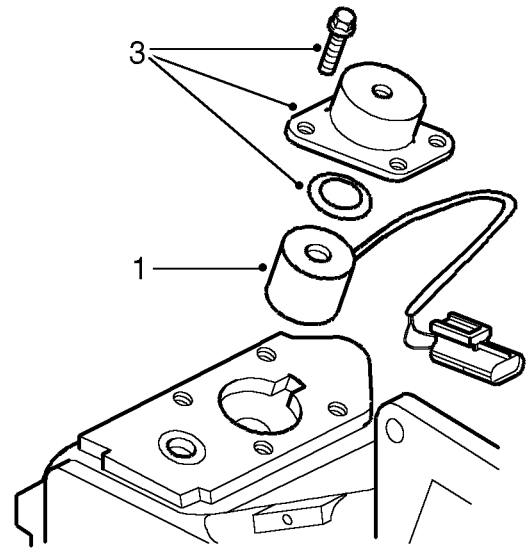
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1. Fit detent ball and spring.
2. Apply Loctite 290 to threads of detent plug.
3. Fit and tighten plug then unscrew 2 full turns.
4. Operate high/low selector lever and check that detent ball can be felt to positively engage and disengage with grooves in selector shaft; screw plug in or out until setting is correct.

## Interlock solenoid - if fitted

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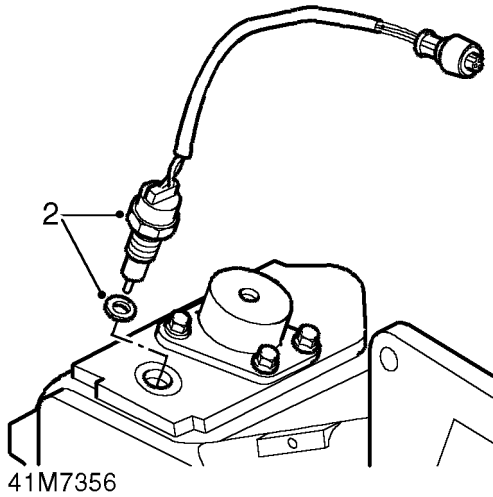


41M7355

1. Position solenoid in main casing.
2. Apply Hylosil RTV 102 to mating face of solenoid cover.
3. Fit solenoid cover and Belleville washer, fit bolts and tighten to 10 Nm (8 lbf.ft).

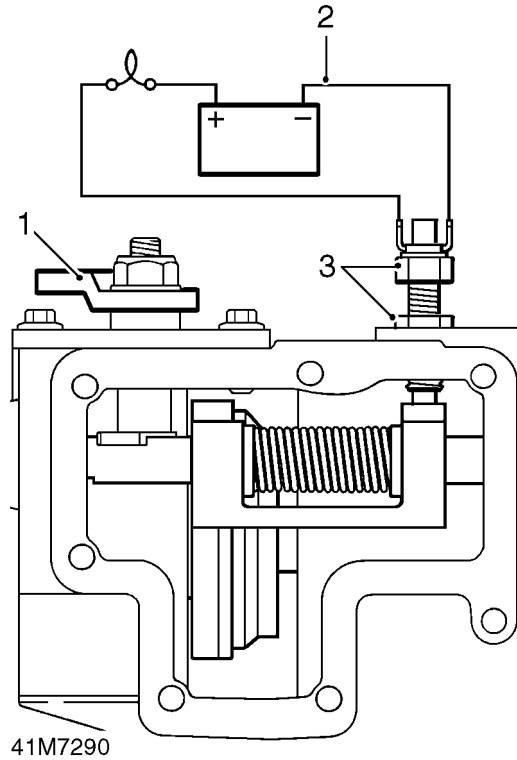


## Neutral warning lamp switch - if fitted



1. Apply Hylosil PL 32 sealant to threads of switch.
2. Fit washer, fit and tighten switch.

## Differential lock warning lamp switch - adjust



1. Move differential lock selector fork to differential locked position.
2. Connect a 12V test lamp and battery to differential lock switch.
3. Screw switch in until test lamp is illuminated then screw switch in a further 1/2 turn; tighten locknut.
4. Disengage differential lock, check that test lamp is extinguished.
5. Remove test lamp.
6. Apply sealant from kit to mating face of differential lock side cover.
7. Fit side cover, fit bolts and tighten to 25 Nm (18 lbf.ft).

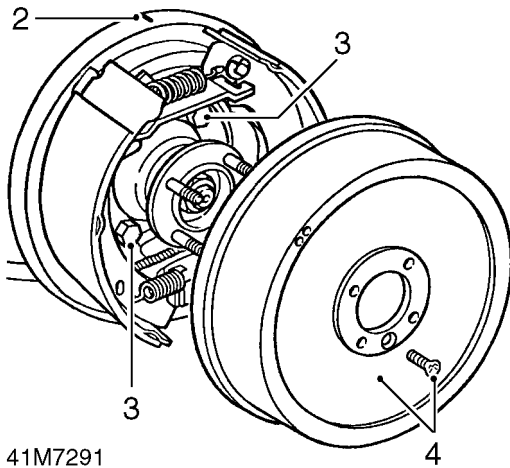
# TRANSFER BOX

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## Transmission brake

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1. Apply Hylosil RTV 102 sealant to mating face of rear output housing.



2. Position brake backplate on rear output housing ensuring that alignment marks are together.
3. Fit 4 bolts and tighten to 70 Nm (52 lbf.ft).
4. Fit transmission brake drum, fit countersunk screw and tighten.



**DATA**

High/low selector finger width . . . . .	15.90 to 15.95 mm	0.625 to 0.627 in
High/low selector fork finger width . . . . .	7.37 to 7.47 mm	0.290 to 0.294 in
High/low selector shaft groove width . . . . .	16.0 to 16.1 mm	0.63 to 0.64 in
High/low selector hub groove width . . . . .	7.5 to 7.6 mm	0.295 to 0.30 in
Differential lock selector finger width . . . . .	15.90 to 15.95 mm	0.625 to 0.627 in
Differential lock selector shaft groove width . . . . .	16.0 to 16.1 mm	0.63 to 0.64 in
Differential lock selector fork finger width . . . . .	7.92 to 7.97 mm	0.311 to 0.313 in
Differential lock selector spring free length . . . . .	84.58 mm	3.33 in
Dog clutch selector fork groove width . . . . .	8.05 to 8.20 mm	0.32 to 0.33 in
Differential front and rear half carrier gears load to turn:		
Used gears . . . . .	0.45 kg	1.0 lb
New gears . . . . .	1.72 kg	3.8 lb
Thrust washer thicknesses available . . . . .	1.05 to 1.45 mm	0.04 to 0.06 in
In increments of: . . . . .	0.10 mm	0.004 in
Total load to turn - both sun gears fitted:		
Used gears . . . . .	0.90 kg	2.0 lb
New gears . . . . .	3.44 kg	7.6 lb
Low range gear to high range hub clearance . . . . .	0.05 to 0.15 mm	0.002 to 0.006 in
High range gear to high/low hub clearance . . . . .	0.05 to 0.15 mm	0.002 to 0.006 in
Mainshaft input gear bearing pre-load . . . . .	0.05 mm	0.002 in
Mainshaft input bearing shim thicknesses available . . . . .	3.15 to 4.00 mm	0.12 to 0.16 in
In increments of: . . . . .	0.05 mm	0.002 in
Differential bearing pre-load . . . . .	0.05	0.002 in
Differential bearing shim thicknesses available . . . . .	2.00 to 3.25 mm	0.08 to 0.13 in
In increments of: . . . . .	0.05 mm	0.002 in
Intermediate gear bearing pre-load - An increase on mainshaft input gear initial torque to turn of . . . . .	1.25 Nm	10 lbf.in

# TRANSFER BOX

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## TORQUE FIGURES

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Drain plug . . . . .	30 Nm	22 lbf.ft
Differential carrier bolts . . . . .	60 Nm	44 lbf.ft
Differential bearing nut . . . . .	72 Nm	53 lbf.ft
Differential lock selector lever nut . . . . .	15 Nm	11 lbf.ft
* Front and rear output housing bolts . . . . .	25 Nm	18 lbf.ft
Output flange nuts . . . . .	162 Nm	120 lbf.ft
* Differential lock selector housing bolts . . . . .	25 Nm	18 lbf.ft
High/low selector housing bolts . . . . .	25 Nm	18 lbf.ft
* Intermediate shaft retaining plate bolt . . . . .	25 Nm	18 lbf.ft
* Bottom cover bolts . . . . .	25 Nm	18 lbf.ft
* Bearing housing cover plate bolts and stud nut . . . . .	25 Nm	18 lbf.ft
Transmission brake backplate bolts . . . . .	70 Nm	52 lbf.ft
Interlock solenoid cover bolts - if fitted . . . . .	10 Nm	8 lbf.ft

\* Apply Loctite 290 to threads



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**SERVICE TOOLS**

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LRT-37-11/2	Thrust button
LRT-37-014	Mainshaft oil seal replacer
LRT-41-001	Collars - differential rear bearing
LRT-41-001	Thrust button
LRT-41-002	Collars - differential front bearing
LRT-41-003	Mainshaft input gear bearing remover/replacer
LRT-41-004	Intermediate gear dummy shaft
LRT-41-005	Input gear mandrel
LRT-41-006	Intermediate gear bearing track replacer
LRT-41-007	Differential bearing nut remover/replacer
LRT-41-008	Differential bearing replacer
LRT-41-011	Output shaft bearing replacer
LRT-41-012	Output shaft oil seal replacer
LRT-41-014/1	Cross-bar
LRT-41-014/2	Depth block
LRT-41-014/3	Setting block
LRT-41-014/4	Pillar
LRT-51-003	Propeller shaft flange holding tool
LRT-51-009	Differential rear bearing track replacer
LRT-54-003	Differential front bearing track replacer
LRT-99-002	Hand press
LRT-99-003	Driver handle
LRT-99-006	Dial test indicator (DTI)