

SUPPLEMENT TO REPAIR OPERATION MANUAL

INTRODUCTION

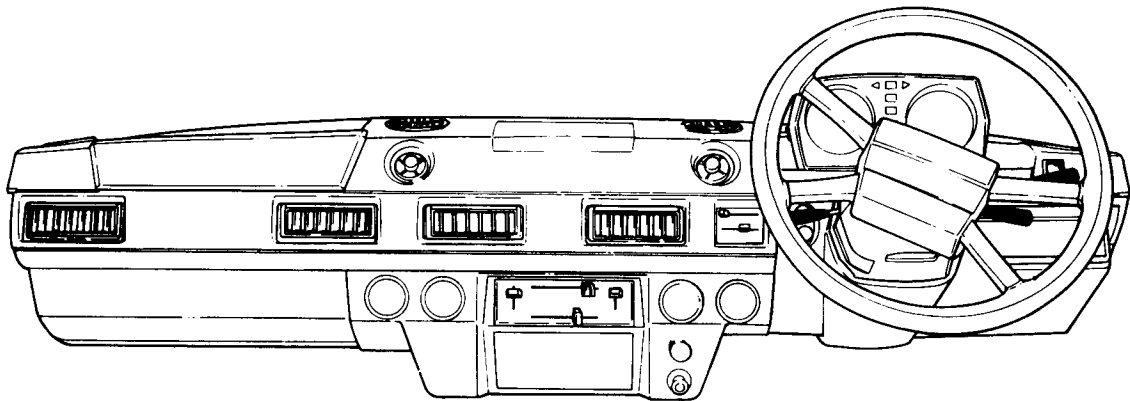
This supplement contains information on the Range Rover Five Speed manual gearbox, Transfer gearbox, Automatic gearbox and changes and additions to the Electrical equipment.

When seeking information, reference should first be made to this supplement, all other details are contained in the main Repair Operation Manual.

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FIVE SPEED GEARBOX



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WARNING LABEL FITTED TO VEHICLE

THE DIFFERENTIAL LOCK SHOULD ONLY BE ENGAGED WHEN TRACTION IS LIKELY TO BE LOST. WIDE THROTTLE OPENING SHOULD BE AVOIDED WHEN USED IN CONJUNCTION WITH 1st AND 2nd GEAR LOW RANGE. AS SOON AS THE DIFFICULT SURFACE HAS BEEN CROSSED THE DIFFERENTIAL LOCK MUST BE RELEASED. A SINGLE AXLE ROLLER RIG MAY BE USED FOR SPEEDS UP TO 5 km/h (3 m.p.h.). THE CENTRE DIFFERENTIAL LOCK MUST BE DISENGAGED. FOR ROLLER TESTS OVER 5 km/h (3 m.p.h.). EITHER ALL FOUR WHEELS MUST BE ROTATED AT THE SAME SPEED OR IF ONLY A SINGLE AXLE ROLLER RIG IS AVAILABLE, THE CENTRE DIFFERENTIAL MUST BE LOCKED AND THE PROPELLER SHAFT TO STATIONARY AXLE MUST BE REMOVED.

General Specification Data

Main gearbox

Model LT 77

Type Five speed, single helical constant mesh with synchromesh on all forward gears

Transfer box

Model LT 230R or LT 230T

Type Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential

Gear ratios

Main gearbox 5th 0.770:1
 4th 1.00:1
 3rd 1.397:1
 2nd 2.132:1
 1st 3.321:1
 Reverse 3.429:1

Transfer gearbox High 1.192:1
 Low 3.320:1

Overall ratio (final drive):	In high transfer	In low transfer
5th	3.25:1	9.05:1
4th	4.22:1	11.75:1
3rd	5.89:1	16.41:1
2nd	8.99:1	25.04:1
1st	14.01:1	39.02:1
Reverse	14.46:1	40.27:1

	Nm	lbf ft
CLUTCH		
Clutch cover bolts	27,5	20
Slave cylinder bolts	27,5	20
MAIN GEARBOX (FIVE-SPEED) –		
Oil pump body to extension case	7-10	5-7
Clip to clutch release lever	7-10	5-7
Attachment plate to gearcase	7-10	5-7
Attachment plate to remote housing	7-10	5-7
Extension case to gearcase	22-28	16-21
Pivot plate	22-28	16-21
Remote selector housing to extension case	22-28	16-21
Gear lever housing to remote housing	22-28	16-21
Guide clutch release sleeve	22-28	16-21
Slave cylinder to clutch housing	22-28	16-21
Front cover to gearcase	22-28	16-21
5th support bracket	22-28	16-21
Plunger housing to remote housing	22-28	16-21
Blanking plug extension case	7-10	5-7
Gear lever retainer	7-10	5-7
Yoke to selector shaft	22-28	16-21
Fixing gear lever assembly nut	47-54	35-40
Reverse pin to centre plate nut	47-54	35-40
Clutch housing to gearbox bolt	65-80	48-59
Plug – detent spring	22-28	16-21
Oil drain plug	25-35	19-26
Oil filler plug	25-35	19-26
Plug oil filler – remote housing	25-35	19-26
Breather	7-11	5-8
Oil level plug	25-35	19-26
Blanking plug – reverse switch hole	20-27	15-20
TRANSFER BOX		
Pinch bolt, operating arm	7-10	5-7
Gate plate to grommet plate	7-10	5-7
End cover	7-10	5-7
Speedometer cable retainer	7-10	5-7
Speedometer housing/rear output	See note	
Locating plate to gear change housing	5-7	4-5
Bottom cover to transfer case	22-28	16-21
Front output housing to transfer case	22-28	16-21
Cross shaft housing to front output housing	22-28	16-21
Gear change housing	22-28	16-21
Pivot shaft	22-28	16-21
Connecting rod	22-28	16-21
Retaining plate intermediate shaft	22-28	16-21
Front output housing cover	22-28	16-21
Gear change housing	22-28	16-21
Bracket to extension housing	22-28	16-21
Finger housing to front output housing	22-28	16-21
Mainshaft bearing housing	22-28	16-21

continued

Torque Wrench Settings

	Nm	lbf ft
Brake drum	22-28	16-21
Gearbox to transfer box	40-50	29-37
Bearing housing to transfer gearbox	40-50	29-37
Speedometer housing to transfer gearbox	40-50	29-37
Selector fork to cross shaft	40-50	29-37
Yoke to selector shaft high/low	22-28	16-21
Selector fork high/low to shaft	22-28	16-21
Operating arm high/low	22-28	16-21
Transmission brake	65-80	48-59
Gearbox to transfer case	40-50	29-37
Gearbox to transfer case	See note	
Oil drain plug	25-35	19-26
Differential case	55-64	40-47
Output flange	146-179	108-132
Link arm and cross shaft lever to ball joint	8-12	6-9
Oil filler/level plug	25-35	19-26
Transfer breather	7-11	5-8

NOTE:— Studs to be assembled into casings with sufficient torque to wind them fully home, but this torque must not exceed the maximum figure quoted for the associated nut on final assembly.

GEARBOX AND TRANSFER BOX

Bell housing to cylinder block bolts	36,6-44,8	27-33
Gearbox casing to bell housing 2 off	146,5-179	108-132
Gearbox casing to bell housing 2 off	85,4-104,4	63-77
Gearbox casing to bell housing nuts	85,4-104,4	63-77
Gearbox casing to bell housing stud and nuts	146,5-179	108-132
Output flange — rear — nut and bolts	43,4-51,5	32-38
Output shaft — rear — nut	146,5-179	108-132
Output shaft — front — nut	146,5-179	108-132
Gear selector spherical seat bolts	13,6-16,3	10-12
Propeller shaft to flange bolts	43,4-51,5	32-38
All other nuts and bolts:		
M6	9,9-11,9	7.3-8.7
M8	23,7-29,7	17.5-21.9
M10	48-58	35.4-42.8

Recommended Lubricants and fluids

These recommendations apply to temperate climates where operational temperatures may vary between
 -10°C (14°F) and 32°C (90°F)

COMPONENT	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	SHELL	TEXACO
5 speed Manual gearbox	BP Autran DX2D	Castrol TQ Dexron IID	Duckhams Fleetmatic CD or Duckhams D-Matic	Esso ATF Dexron IID	Mobil AFT 220 D	Fina Dexron IID	Shell AFT Dexron IID	Texamatic Fluid 9226
*Transfer box	BP Gear Oil SAE 90EP	Castrol Hypoy SAE 90EP	Duckhams Hypoid 90	Esso Gear Oil GX 85W/90	Mobil Mobilube HD 90	Fina Pontonic MP SAE 80W/90	Shell Spirax 90EP	Texaco Multigear Lubricant SAE 85W/90

* Either engine or gearbox oil may be used as an alternative to the specified gear oil for the transfer gearbox and can be mixed together.

All other climates and conditions

			-30	-20	-10	0	10	20	30
5 SPEED MANUAL GEARBOX	Dexron IID		←						→
*TRANSFER GEARBOX	API GL4 or MIL-L-2105A	90 EP 80W EP	←						→

Capacities

Component	Litres	Imperial Unit
Main gearbox oil	2.2	3.9 pints
Transfer gearbox oil	2.80	5 pints

MAINTENANCE SCHEDULES

Every
10 000 km
(6000 miles)
or 6 months

Every
20 000 km
(12 000 miles)
or 12 months

UNDERBODY

Check/top up gearbox and transfer box oil levels. _____ X _____ X

Renew gearbox and transfer box oils. _____ 40 000 km (24 000 miles)

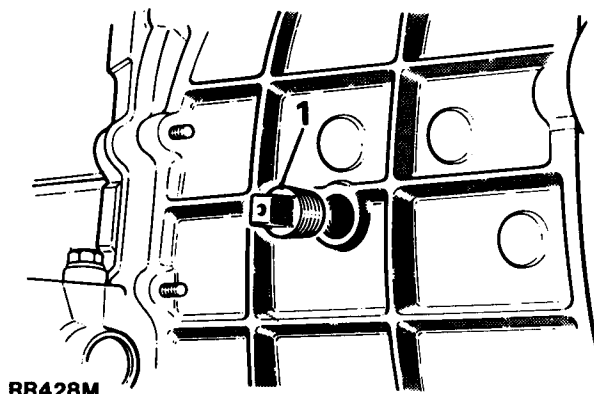
UNDERBODY

Check/top up gearbox oil

Main gearbox oil level

Check oil level daily or weekly when operating under severe wading conditions.

1. From beneath the vehicle remove the oil level/filler plug and top up, if necessary, to the bottom of the hole.
2. Replace the plug. If significant topping up is required check for oil leaks at the drain plug, all joint faces and through the drain hole in the bell housing.



Renew gearbox oil

Main gearbox oil

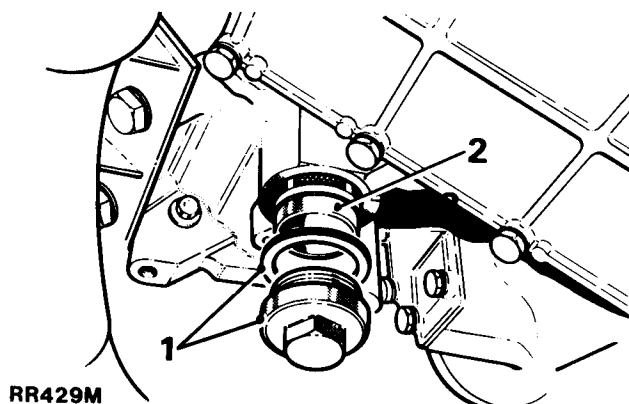
Drain and refill monthly when operating under severe wading conditions.

To change the gearbox oil proceed as follows:

1. Immediately after a run when the oil is warm, drain off the oil into a container by removing the drain plug and washer from the bottom of the gearbox casing.
2. Remove the oil filter.
3. Wash the filter in clean fuel; allow to dry and replace.
4. Refit drain plug and washer and refill gearbox through the oil level/filler plug, with the correct grade of oil, to the bottom of the oil level/filler hole. For capacity see Data, Section

Important: Do not overfill, otherwise leakage may occur.

NOTE:— For details of the transfer gearbox maintenance, refer to the Automatic gearbox section of this supplement.



GEARBOX/TRANSFER BOX ASSEMBLY

– Five speed manual

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Remove and refit**Removing**

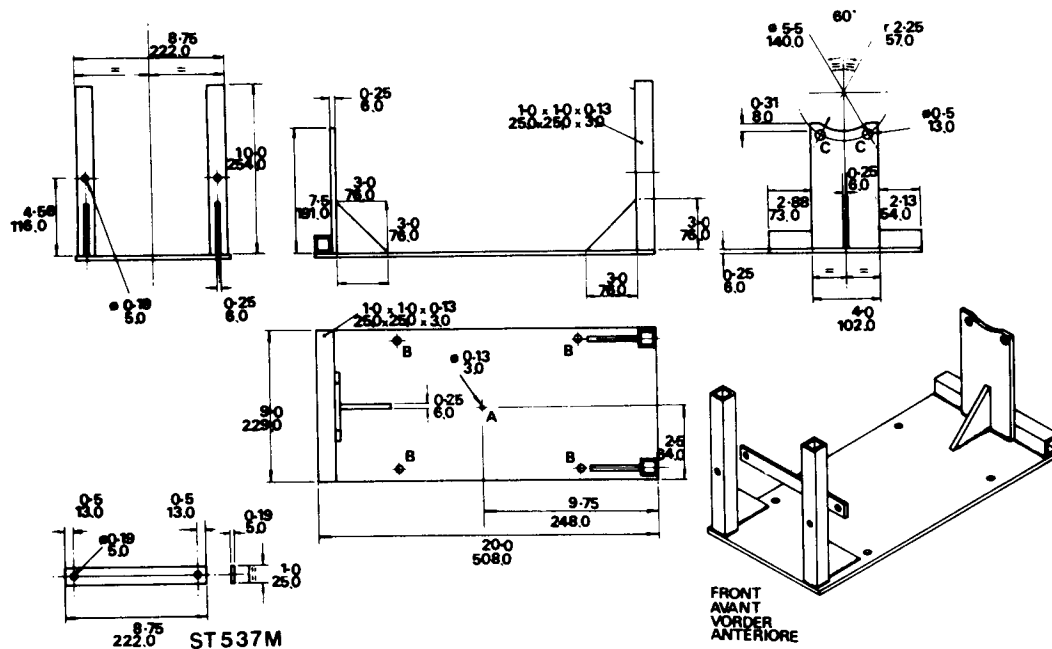
1. Drive the vehicle on a ramp.
2. Open the bonnet and disconnect the battery.
3. **From inside the vehicle** select low range transfer gear.
4. Pull off both main and transfer gear/differential lock knobs.
5. Unclip both ash trays from the centre console.
6. Remove the four self-tapping screws inside the ash tray bodies to release them and the rear of the console.
7. Slacken the two shouldered screws retaining the front of the console. If necessary press in the plastic diff lock instruction plate to gain access to the screw heads.
8. Lift out the complete console assembly.
9. Remove the four screws retaining the transfer gear/diff lock lever gaiter clamping plate to the selector housing underneath. Leave the clamp plate in position on the gaiter.
10. Remove the self-tapping screws to release the frame retaining the combined gaiter assembly which can then be removed.
11. Using a screwdriver displace the bias spring legs outwards from the main gear lever crosspin.
12. Remove the bolt and special lock washer retaining the gear lever assembly and lift out of the gearbox.
13. **From under the bonnet** remove the two bolts (plain washers, spring washer and nut each) securing the fan cowl to the brackets on the radiator top.
14. Disengage the fan cowl from the slots in the radiator bottom bracket and leave loosely in position.
15. Slacken the 'Jubilee' clips retaining the two elbows to the air cleaner.
16. Pull the other ends of the elbows off the carburettor flanges.
17. Remove the clip screw on top of the air temperature intake control and release the hose.
18. Release the hose from open clip, on the top of the right hand carburettor.
19. Pull off the short hose from the one-way breather valve. The other end is attached to the air cleaner.
20. Pull off the float chamber breather vent pipe and rubber right angle from the top of the right hand carburettor.
21. Raise the air cleaner from its mounting posts.
22. Pull off the engine breather hose from the base of the air cleaner.
23. Remove the air temperature intake sensor unit by lifting the front from its mounting peg and pulling the convoluted hose from the air cleaner.
24. Slacken the 'Jubilee' clips to release the 'Pulsair' hoses from both ends of the air rails.
25. Lift off the air cleaner.

continued

26. Release both main and transfer gearbox breather pipes. These are secured to the engine lifting eye on the rear of the right hand cylinder head by a bolt-on clip. Remove the bolt (spring and plain washers) and detach the clip from the breather pipes to prevent it sliding down the pipes.
27. Release the 'Fir tree' rubber clip which retains the harness and breather pipes to the lifting eye.
28. **Raise the vehicle on the ramp.**
29. Place a suitable container under the transmission, remove the three drain plugs, allow the oil to drain and refit the plugs. Clean filter on the extension housing plug before refitting.
30. Remove the chassis cross-member. This is secured to the chassis by eight nuts and bolts (two plain and one spring washer each).
WARNING:— Leave the two lower bolts loosely in position on each side as a safety measure before proceeding.
31. Spread the chassis with a suitable tool.
32. Remove the four loose bolts and lower the cross-member.
33. Remove the heat shield from the face of the right hand engine mounting bracket. This is retained by two bolts and nuts (with spring and plain washers).
34. Release both front exhaust pipes from the exhaust manifold flanges by removing the six nuts (with spring washers).
35. Release the branch pipe from the front silencer flange by removing the three bolts and nuts (with spring washers).
36. Release the 'U' bolt holding the front of the branch pipe to the gearbox mounting by removing the two nuts (with spring washers) and remove the front pipes and branch pipe assembly from the vehicle.
37. Remove the two nuts and bolts from the support bracket securing the twin rear pipes to the rear of the silencer.
38. Remove the flywheel housing bottom cover. This is secured by nine fixing bolts. The five lower bolts are fitted with nuts.
39. Remove the two bolts (with spring washers) to release the clutch slave cylinder.
40. Remove the single bolt (with spring washer) to release the slave cylinder pipe bracket from the left side of the bell housing. This is the lower bolt.
41. Move the slave cylinder (with its sealing shim) to one side.
42. Mark both pairs of front and rear prop shaft flanges with a punch to facilitate re-assembly.
43. Disconnect both prop shafts, by removing all eight Nyloc nuts and tie the shafts to the chassis.
44. Release the speedometer cable by slackening the Nyloc nut retaining the fork clip.
45. Remove the bolt (and spring washer) securing the cable clip to the transfer box. Remove the clip and replace the bolt and spring washer loosely.
46. Disconnect the speedometer cable and move aside.

continued

47. Manufacture a cradle to the dimensions given in the drawing and attach it to a transmission hoist. To achieve balance of the gearbox and transfer box assembly when mounted on the transmission hoist, it is essential that point A is situated over the centre of the lifting hoist ram. Drill fixing holes B to suit hoist table. Secure the assembly to the lifting bracket at point C, by means of the lower bolts retaining the transfer gearbox rear cover.



48. Remove the bottom two bolts from the transfer box rear cover and use them to attach the rear end of the cradle to the transfer box.
49. Raise the hoist just enough to take the weight of the gearbox and transfer box assembly.
50. Disconnect both gearbox mounting brackets from the chassis by removing the six nuts and bolts (spring and plain washers).
NOTE:— The left side upper rear bolt also retains a speedometer cable support clip.
51. Remove the nut (with spring and plain washers) and release the gearbox mounting bracket from the right side rubber mounting only.
52. Lower the hoist sufficiently to gain access to the handbrake fixings on the right side of the transfer box.
CAUTION:— Do not lower the hoist too far or the handbrake gaiter will be damaged by the handbrake grip.
53. Disconnect the handbrake connecting link from the linkage bracket by removing the split pin, plain and 'Thackery' washers and withdrawing the clevis pin.
54. Remove the three bolts (with spring washers) retaining the handbrake lever mounting bracket and tie it to the chassis.

continued

55. Disconnect the 'Lucar' electrical leads from the differential lock (one green, one black/blue tracer) and the reverse light (one green, one green/brown tracer).
56. Withdraw the reverse light cable from the clip attachment on the selector housing.
57. Release the 'Fir tree' rubber clips securing the cable to the breather pipes.
58. Support the engine with a jack across the ramp.
59. Unscrew the seven remaining bell housing bolts (with spring washers) noting that the third bolt up on the left side also holds a harness clip.
60. Draw the gearbox rearwards on the hoist to disengage it from the engine. At the same time ensure that all connections to the engine and vehicle are disconnected and clear of the gearbox.
61. Lower the hoist as necessary and remove from under the vehicle.

Refitting

62. Fit the cradle to the transmission hoist and the gearbox and transfer box assembly to the cradle, as described in instruction 47.
63. Grease the splines on the gearbox input shaft with Rocol MTS1000.
64. Smear Hylomar PL32 (or Loctite 290) on the bell housing mating face with the engine.
65. Engage third gear.
66. Engage the differential lock, to facilitate lining-up the gearbox input shaft.
67. Raise the gearbox assembly on the hoist whilst guiding the two breather pipes upwards.
68. Rotate the transmission brake drum as required to engage the gearbox input shaft splines and move the gearbox forward on the hoist.
69. Secure the gearbox assembly to the engine with seven of the eight bell housing retaining bolts (with spring washers). The third bolt up on the left side is also fitted with a harness clip. Leave out the lower bolt on the left side at this stage.
70. Locate the reverse light electrical leads (one green, one green/brown tracer) and feed through the harness clip on the left side of the selector housing, connecting the Lucars to the switch.
71. Locate the differential lock leads (one green, one black/blue tracer) and connect the Lucars to the switch on top of the selector housing.
72. Fit the 'Fir tree' rubber clips to secure the harness to the breather pipes in two places.
73. Release the handbrake mounting assembly (tied to chassis) and set in the off position. Apply grease as necessary.
74. Locate the handbrake lever mounting bracket on the side of the gearbox and secure with the three bolts (and spring washers).
NOTE:— The lower bolt is shorter.
75. Reconnect the handbrake connecting link to the linkage bracket by refitting the clevis pin, Thackery and plain washers and a new split pin.

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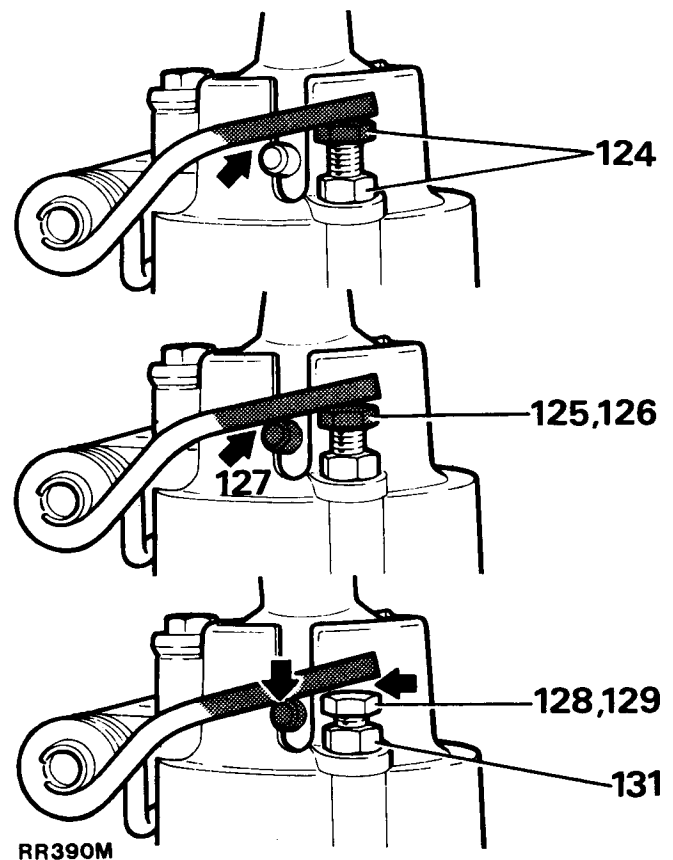
76. Loosely fit the right side gearbox mounting bracket to the rubber mounting (plain and spring washers and nut).
77. Check that there is no obstruction then raise the hoist until the two gear change levers pass upwards through their respective gaiters and the gearbox mounting brackets are in line with the chassis fixing points.
78. Loosely fit both gearbox mounting brackets to the chassis. Six bolts are inserted from the outer side of the chassis members (plain washers under heads) and retained by nuts (with spring washers).
NOTE:— The upper bolt on the left hand bracket also holds a speedometer cable support clip.
79. Tighten all six mounting bracket nuts.
80. Remove jack from under engine and lower hoist to allow the complete assembly to settle on the rubber mountings.
81. Tighten nut on right side bracket to secure the rubber mounting.
82. Remove the two bolts holding the hoist cradle to the rear of the transfer box and remove the hoist from under the vehicle.
83. Locate the speedometer cable in the transfer box. Fit the cable fork clip and tighten the Nyloc nut.
84. Apply Loctite 290 to the threads of the two bolts and refit to the transfer box rear cover, ensuring that the left bolt also carries the speedometer cable retaining clip.
85. Set gearbox in neutral gear.
86. Release ties from the rear prop shaft.
87. Line up the punch marks and fit rear prop shaft flange to the brake drum flange with four Nyloc nuts.
88. Release ties from the front prop shaft.
89. Line up the punch marks and fit the prop shaft flange to the front output shaft flange on the transfer box with four Nyloc nuts.
WARNING:— Nyloc nuts should only be used once.
90. Apply Hylasil, Hylomar PL32 or Loctite 290 to the spacing plate on the clutch slave cylinder.
91. Locate the slave cylinder in position and loosely retain with two bolts (with spring washers).
92. Align the slave cylinder pipe bracket and fit the eighth bolt through it into the bell housing.
93. Finally, tighten the two bolts to secure the slave cylinder in the casing.
94. Hylomar PL32 or Loctite 290 to the flywheel housing bottom cover.
95. Locate the bottom cover on the front of the gearbox casing and loosely fit the two large dowel bolts (with spring washers) to position it correctly and compress the rubber seal on the top of the cover.
96. Loosely fit the five lower bolts and nuts (with spring washers) from the rear side of the gearbox housing.
97. Loosely fit the two top bolts (with spring washers) from the front side of the gearbox housing.
98. Tighten all nine nuts and bolts.
99. Release ties from the front silencer.

continued

100. Align the rear of the silencer with the support bracket and from the top fit the two bolts and nuts (with spring washers) and tighten to secure the twin rear pipes to the silencer.
101. Locate the front exhaust pipes and branch assembly and loosely retain the rear end with the 'U' bolt on the gearbox mounting (with two nuts and spring washers).
102. Locate both front pipe flanges over the studs in the manifolds and loosely fit the six nuts (with spring washers).
103. Finally, tighten all exhaust pipe fixings.
104. Fit the heat shield to the face of the right hand engine mounting bracket. This is secured by two bolts and nuts (with spring washers).
105. To fit the chassis cross member, which is secured by eight nuts and bolts (with two plain and one spring washer each), first spread the chassis using a suitable tool.
106. Locate the cross member in the chassis and loosely fit two of the (shorter) bolts each side with their respective washers and nuts. Fit the remaining four bolts (with washers and nuts).
NOTE:— The two upper rear bolts must be fitted from the inside of the chassis.
107. Check that the three drain plugs are tight and remove the main gearbox and transfer box filler level plugs. Fill the main gearbox with approximately 1,76 litres (3 pints) of a recommended oil or until it begins to run out of the filler level hole. Fit and tighten the filler plug. Similarly remove the transfer box filler level plug and inject approximately 2,6 litres (4.5 pints) of recommended oil or until it runs out of the filler hole. Apply Hylosil, Hymolar PL32 or Loctite 290, to the threads and fit the plug and wipe away any surplus oil.
108. Lower the ramp.
109. **From under the bonnet** locate the fan cowl so that it engages in the two slots in the radiator bottom bracket.
110. Locate both bolts, with the (smaller) plain washers, under the heads, through the front of the two radiator top brackets. Fit the (larger) plain washers, spring washers and nuts to secure the fan cowl.
111. Fit the retaining clip over the top ends of the two gearbox breather pipes and secure it from the back with the bolt (spring and plain washers) to the engine lifting eye on the rear of the right hand cylinder head.
112. Retain the electrical harness to the breather pipes with a 'Fir tree' rubber clip.
113. Locate the air cleaner on the two pegs on the top of the inlet manifold.
114. Connect the engine breather pipe to the base of the air cleaner (push fit).
115. Connect the two hoses (one on each side of the air cleaner) to the Pulsair rails and secure with Jubilee clips.
116. Connect the float chamber breather vent pipe to the right hand carburettor (push fit).

continued

117. Locate the air hose attached to the air cleaner through the open clip on the right hand carburettor and the clip on top of the air temperature control connecting the hose to the air temperature control (push fit).
118. Connect the short tube from the air cleaner to the one-way breather valve on the inlet manifold.
119. Connect the air temperature intake sensor unit to the air cleaner with the large convoluted hose (push fit) and simultaneously engage the front in the mounting peg.
120. Connect the air cleaner to the carburettors with the two aluminium elbows. These are a push fit over the ends of the carburettor flanges and are retained in the air cleaner hoses by 'Jubilee' clips.
121. From inside the vehicle apply grease (Duckhams Q5848 or Shell Alvania R1) to the main gear lever ball end and locate the gear lever assembly in the gearbox and retain with the bolt and special lock washer.
122. Using a screwdriver lift the bias spring legs inwards over the gear lever crosspin.
123. To adjust the bias springs first engage third or fourth gear.
124. Slacken the locknuts on the two adjusting screws and screw them upwards until both spring legs are lifted clear of the gear lever cross pin. This should allow some slack radial movement of the gear lever in the engaged gear position.
125. Move the gear lever to the left until the slack is completely taken up and, retaining it in position, screw the right hand screw downwards sufficiently for the right hand spring leg to just make contact with the right hand end of the gear lever crosspin.
126. Repeat method 125 for the opposite gear lever position by adjusting the left hand spring leg.
127. At this stage no spring tension is involved and slack radial movement of the gear lever will be restricted at either extreme by contact of the crosspin with the opposite spring leg.
128. Screw both adjusting screws downwards by equal amounts until slack radial movement is just eliminated by spring contact (movement is more easily checked by holding the bottom of the gear lever).
129. Screw both adjusting screws downwards a further two flats to provide the correct spring tension.
130. Return the gear lever to the neutral position and move it across the gate several times. Upon release the gear lever should return to the third/fourth gear gate position.
131. Finally, tighten the respective lock nuts.
132. Fit the gaiter assembly over the main and transfer gearbox gear levers and locate in the rectangular aperture on the sound insulated tunnel cover.
133. Fit four screws (with plain washers) to secure the transfer box gear lever metal base plate to the selector housing underneath.
134. Fit the retaining frame over the combined gaiter assembly and secure with self-tapping screws.



continued

Five Speed Gearbox

135. Locate the complete console over the main and transfer box gear levers and pass the front slotted part under the two shouldered screws.
136. Fit both ashtray bodies in the slots provided (lids open outwards position) and retain with two self-tapping screws, through the base of each body into 'Spire' clips on the gearbox tunnel.
137. Clip the ashtrays into position (cigarette stubbers to the front).
138. Press on both main and transfer box gear lever knobs.
139. Reconnect the battery and drive the vehicle off the ramp.

GEARBOX ASSEMBLY

– Five speed manual

Overhaul

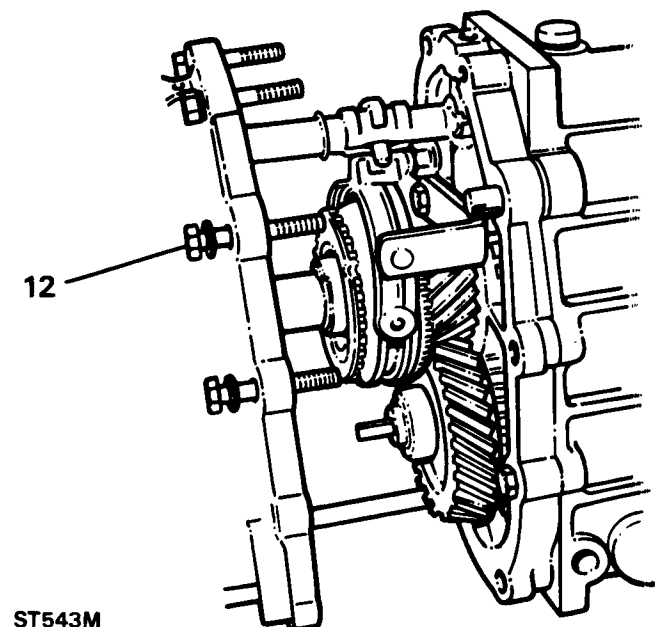
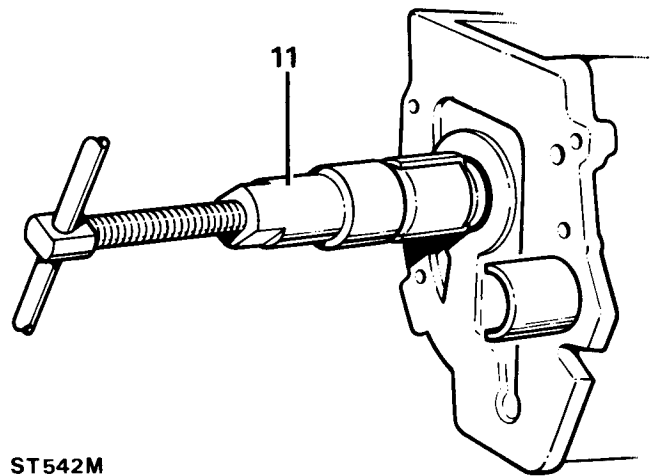
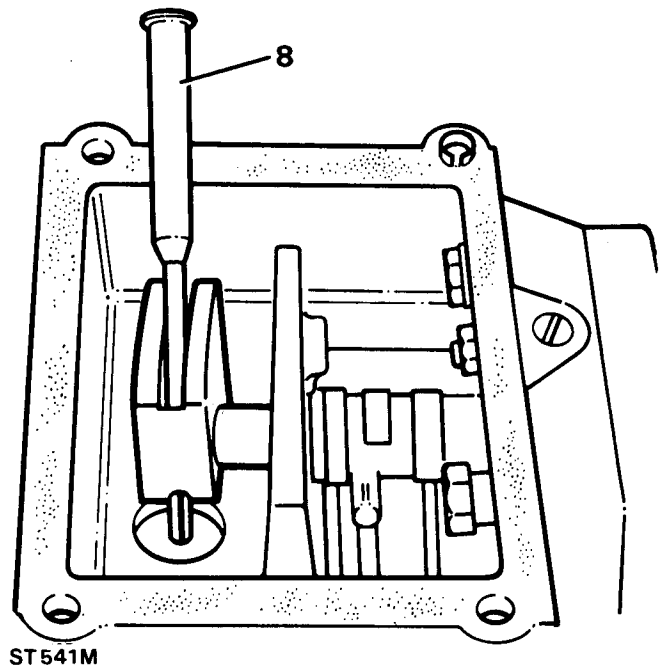
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Service Tools

18G705; 18G705-1A; 18G705-5; 18G1400; 18G1400-1;
MS47; 18G47BA; 18G47BA-X; 18G284; 18G284AAH;
18G1422 and 18G1431.

Dismantling

1. Place gearbox on a bench with the transfer gearbox removed, ensuring the oil is first drained.
2. Remove the clutch release bearing carrier clip.
3. Remove the clutch release bearing and carrier.
4. Remove the bolt and spring washer securing the clutch release lever clip and remove the clip.
5. Remove the clutch release lever and the slotted washer.
6. Remove the bolts and washers securing the bell housing and remove the bell housing.
7. Remove the three bolts and washers retaining the gear selector housing to the fifth gear extension case. Lift the housing from the case and discard the gasket.
8. Using a suitable pin punch, remove the roll pin retaining the selector yoke.
9. Push the selector shaft forward to engage a gear, and manoeuvre the selector yoke from the shaft. Return the selector shaft to neutral.
10. Remove the circlip which retains the mainshaft oil seal collar located at the rear of the gearbox.
11. Using tools 18G705 and 18G705-1A remove the oil seal collar.
12. Remove the ten bolts and spring washers securing the rear cover to the gearcase; withdraw the rear cover and discard the gasket.
13. Fit two dummy bolts (8 x 35mm) to the casing to retain the centre plate to the main case.
14. Remove the oil seal collar 'O' ring from the mainshaft.
15. Withdraw the oil pump drive shaft.
16. Remove the two bolts and spring washers securing the fifth gear selector fork and bracket.
17. Withdraw the fifth gear selector spool.
18. Withdraw the fifth gear selector fork and bracket.
19. Release the circlip retaining the fifth gear synchromesh assembly to the mainshaft.
20. Using tools 18G1400-1 and 18G1400 withdraw the selective washer, fifth gear synchromesh hub and cone, fifth gear (driven) and spacer from the mainshaft.
21. Remove the split roller bearing assembly from the mainshaft.
22. On early models, remove circlip retaining fifth gear (driving) from the layshaft. On later models, engage reverse gear by turning selector rail anti-clockwise and pulling rearwards. Move the fifth speed synchro hub into mesh with the fifth gear. De-stake the retaining nut securing the fifth gear layshaft and

continued

remove nut. Select neutral by pushing selector rail inwards and turning clockwise; and return fifth speed synchro hub to its out of mesh position.

23. Using tools 18G705 and 18G705-1A remove the layshaft spacer and layshaft fifth gear.
24. Remove the selector shaft circlip.
25. Fit suitable guide studs (measuring 8 x 60mm) to the main gearbox case.
26. Locate the gearbox to a suitable stand.
27. Remove the six bolts and spring washers from the front cover, withdraw the cover and discard the gasket.
28. Remove the input shaft and layshaft selective washers from the gearcase.
29. Remove the two bolts and washers securing the locating boss for the selector shaft front spool, withdraw the locating boss.
30. Withdraw the selector plug, spring and ball from the centre plate.
31. Remove the dummy bolts and carefully lift the gearcase, leaving the centre plate and gear assemblies in position. Discard the gasket.
32. Insert two slave bolts and nuts to retain the centre plate to the stand; and remove the circlip, pivot pin, reverse lever and slipper pad.
33. Slide the reverse shaft rearwards and lift off the thrust washer, reverse gear and reverse gear spacer.
34. Lift off the layshaft cluster.
35. Remove the input shaft and fourth gear synchromesh cone.
36. Rotate the fifth gear selector shaft clockwise (viewed from above) to align the fifth gear selector pin with the slot in the centre plate.
37. Remove the mainshaft and selector fork assemblies from the centre plate.
38. Detach the selector fork assembly from the mainshaft gear cluster.
39. Remove the slave bolts from the centre plate and lift the centre plate clear of the stand.

Front cover

40. Remove and discard the oil seal from the front cover. Do not fit a new oil seal at this stage.

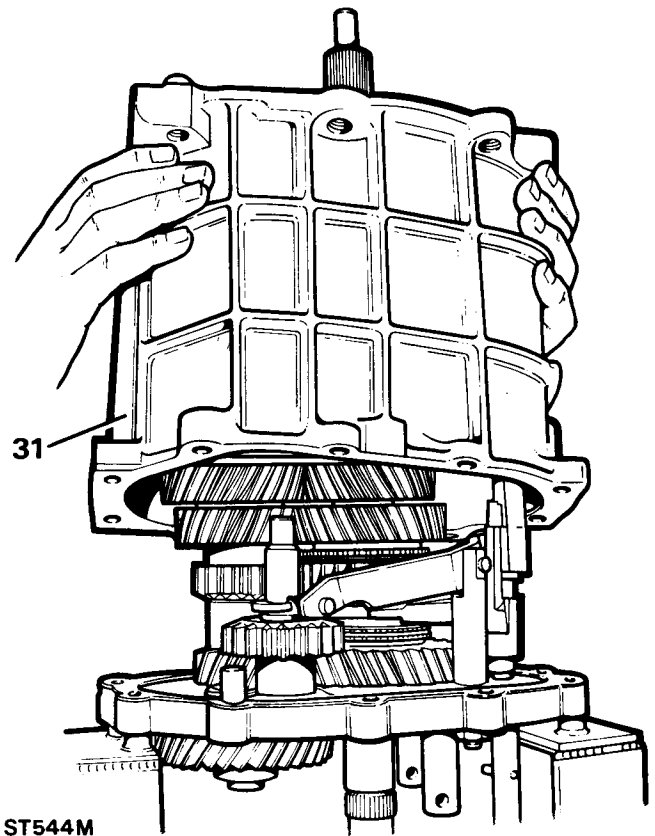
Layshaft

41. Using press 18G705 and tool 18G705-5 remove the layshaft bearings.

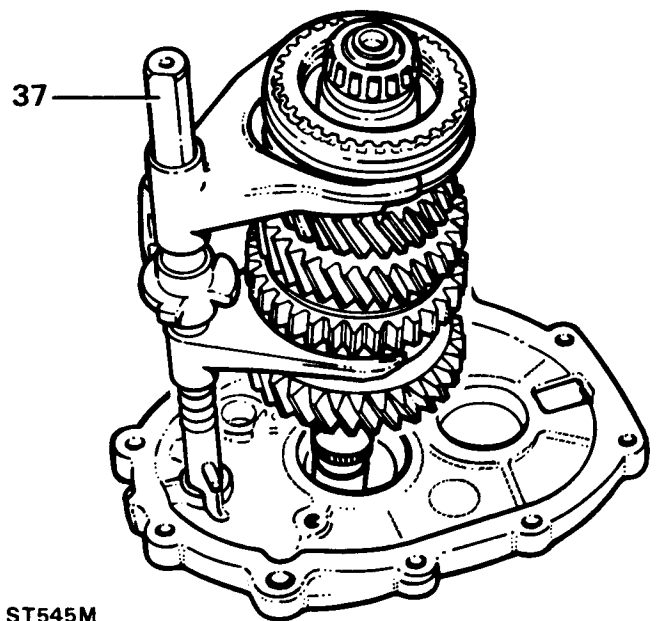
Mainshaft

42. Remove the centre bearing circlip.
43. Using press MS47 and any suitable metal bar, remove the centre bearing, first gear bush, first gear and needle bearings and first gear synchromesh cone.
44. Lift off the first and second gear synchromesh hub assembly, second gear and second gear needle bearing. If a difficulty is experienced in removing the first and second gear synchromesh hub, locate underneath the second gear with a suitable tool; and extract the complete synchromesh hub and second gear assemblies using a suitable press.

continued



ST544M



ST545M

45. Using press MS47 and extension, remove the pilot bearing, spacer, third and fourth synchromesh hub, third gear synchromesh cone, third gear and third gear needle roller bearing by pressing underneath the third gear.

First and second gear synchromesh assemblies

46. Remove the slipper rings from the front and rear of the first and second gear synchromesh assemblies.
47. Withdraw the slippers and hub from the sleeve.

Third and fourth gear synchromesh assemblies

48. Remove the slipper rings from the front and rear of the assembly.
49. Withdraw the slippers and hub from the sleeve.

Extension case

50. Remove the three oil pump housing bolts, spring washers and oil pump gears.
51. Withdraw the oil pick-up pipe.
52. Remove the plug, washer and filter.
53. Invert casing and extract the oil seal.
54. Press out the ferrobestos bush from the casing.

Input shaft

55. Using tools MS47 and 18G47BA, remove the input shaft bearing.
56. With the aid of tools 18G284AAH and 18G284, extract the pilot bearing track.

Reverse idler gear

57. Remove the circlip from the reverse idler gear.
58. Having noted their positions, remove both needle roller bearings and remaining circlip from the gear.

Fifth gear synchromesh assembly

59. Lever the backing plate off the fifth gear synchromesh assembly.
60. Remove the slipper rings from the front and rear of the assembly.
61. Release the slippers and slide the hub from the sleeve.

Centre plate

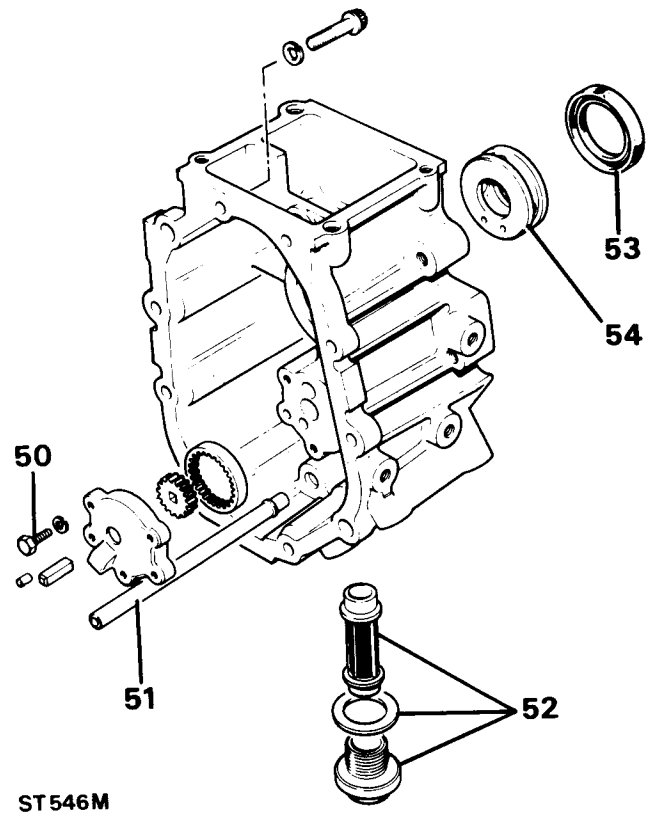
62. Remove the layshaft and mainshaft bearing tracks from the centre plate.

Main gearbox casing

63. Remove the mainshaft and layshaft bearing tracks from the main casing.
64. Remove the plastic oil trough from the front face of the casing.

Selector rail

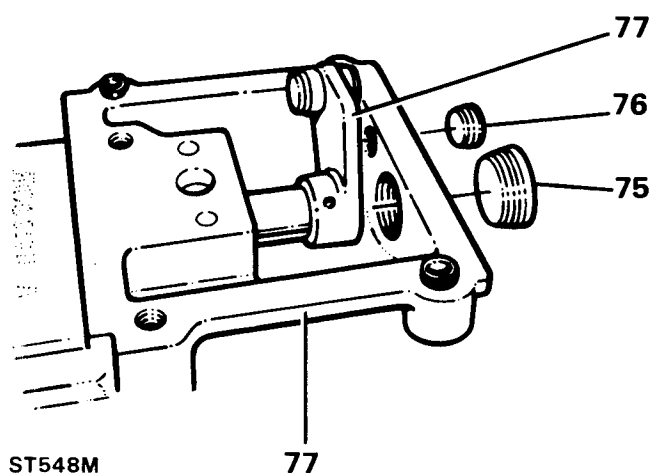
65. The selector rail is supplied complete with first and second selector fork, pin and fifth speed selector pin. The selector rail pins must NOT be removed.



continued

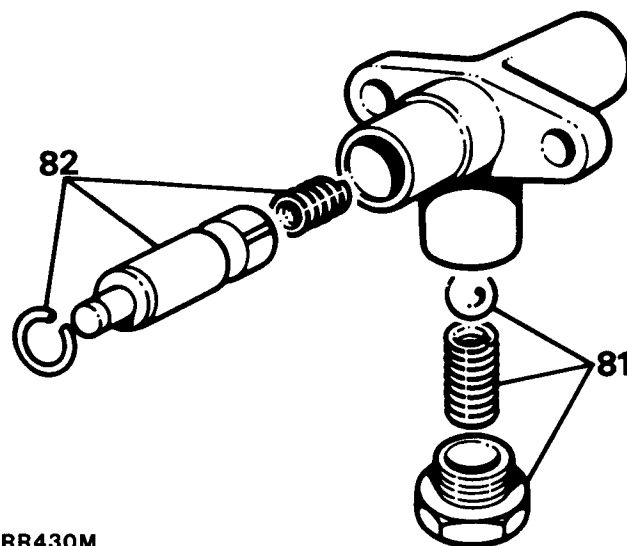
Gear selector housing

66. Remove the roll pin and release the bias springs.
67. Remove the two adjusting screws and locknuts.
68. Remove the gear lever extension, secured by a nut (with plain washer).
69. Remove the bolt and special lock washer to release the gear lever shaft from the trunnion housing.
70. Remove the four bolts and spring washers retaining the gear lever housing to the selector housing. Lift off the housing and discard the gasket.
71. Remove the bolts and washers retaining the reverse gear plunger assembly. Care must be taken not to lose the shims underneath the assembly casting. Detach from the selector housing and label components for identification.
72. Remove the locating bolt from the nylon trunnion housing. Pull the selector shaft rearwards and remove the trunnion housing.
73. Release the circlip and detach the nylon insert from the trunnion housing.
74. Invert the gear selector housing and remove the fifth gear spool retainer bolts and spring washers. Lift off the fifth gear spool retainer.
75. Remove the large blanking plug at the rear of the housing.
76. Remove the reverse switch blanking plug.
77. Place the gear selector housing into protected vice jaws, using a suitable pin punch, drift out the selector yoke roll pin. Push the selector shaft forwards and remove the selector yoke. Remove housing from vice.
78. Remove the selector yoke roller circlip and withdraw the pin and rollers.
79. Withdraw the gear selector housing shaft out through the large blanking plug orifice.
80. Remove and discard the gear selector shaft 'O' ring.



Reverse gear plunger assembly

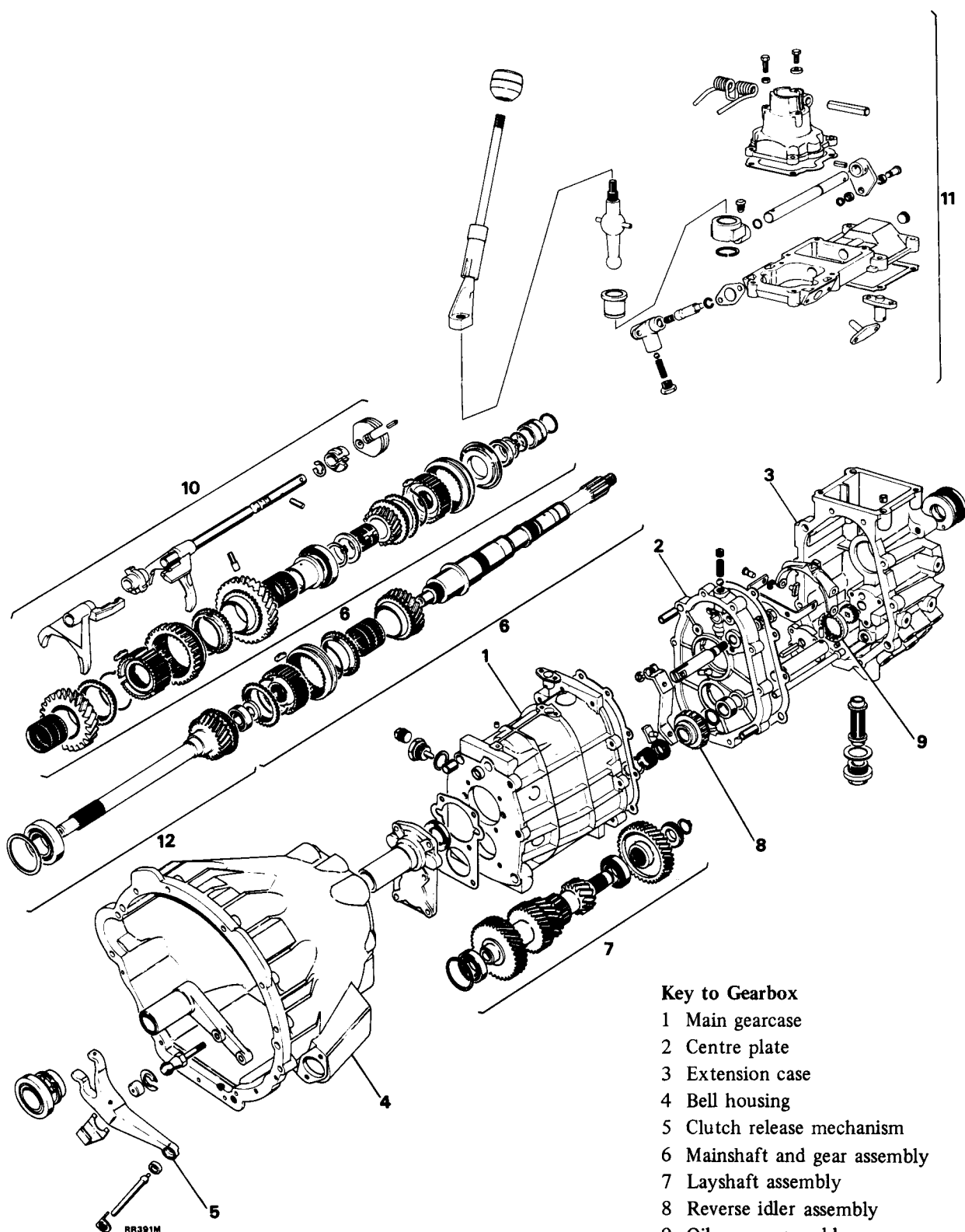
81. Remove the plug, long spring and detent ball from the reverse gear plunger assembly.
82. Detach the circlip which retains the reverse gear plunger, pull out the plunger followed by the short spring.



Cleaning and inspection

83. Clean gearcase thoroughly using a suitable solvent. Inspect case for cracks, stripped threads in the various bolt holes, and machined mating surfaces for burrs, nicks or any condition that would render the gearcase unfit for further service. If threads are stripped, install Helicoil, or equivalent inserts.
84. Inspect all gear teeth for chipped or broken teeth, or showing signs of excessive wear. Inspect all spline teeth on the synchromesh assemblies. If there is evidence of chipping or excessive wear, install new parts on reassembly. Check all slippers and slipper rings for wear or breakage. Replace with new parts if necessary.

continued



Key to Gearbox

- 1 Main gearcase
- 2 Centre plate
- 3 Extension case
- 4 Bell housing
- 5 Clutch release mechanism
- 6 Mainshaft and gear assembly
- 7 Layshaft assembly
- 8 Reverse idler assembly
- 9 Oil pump assembly
- 10 Gear selector assembly
- 11 Remote gear change housing assembly
- 12 Primary pinion assembly

Five Speed Gearbox

85. Inspect all circlip grooves for burred edges. If rough or burred, remove condition carefully using a fine file.
86. Ensure all oil outlets are clear of sludge or contamination especially the mainshaft oil ways. Clean with compressed air observing the necessary safety requirements.
87. During the rebuild operation, it is recommended that new roller and needle bearings are fitted.

ASSEMBLY

Layshaft

88. Using tools MS47 and a suitable tube, fit new bearing to the layshaft.

Synchromesh assemblies

NOTE: In later gearboxes, the baulk ring fitted towards the main shaft third gear on the third to fourth gear synchromesh assembly, has a molybdenum coated contact face and no internal horizontal grooves. Since this also applies to a replacement synchromesh assembly it is important to ensure that the molybdenum faced ring is indeed fitted towards the third gear. Also when fitting a new synchromesh assembly, with a molybdenum coated baulk ring, it must be matched with a new mainshaft third gear.

89. With the outer sleeve held, a push-through load applied to the outer face of the synchromesh hub should register 8,2-10 kgf/m (18-22 lbf/ft) to overcome the spring detent in either direction.
90. Assemble the first and second synchromesh assembly by locating the shorter splined face towards the second gear.
91. Refit the slippers and locate the slipper rings to each side of the assembly, ensuring that the hooked ends of both slipper rings are located in the same slipper; but running in opposite directions and finishing against the other two slippers.
92. Assemble the third and fourth synchromesh assembly and ensure the hooked ends are located in the same slipper; and run in opposing directions and finally locate against the other two slippers.
93. Refit the fifth synchromesh hub assembly again ensuring the hooked ends of the rings are located in the same slipper, but running in opposite directions. Fit the backplate on to the rear of the synchromesh hub assembly.
94. Check the wear between all the synchromesh cones and gears by pushing the cone against the gear and measuring the gap between the gear and cone. The minimum clearance is 0,64 mm (0.025 in). If this clearance is not met, fit new synchromesh cones.

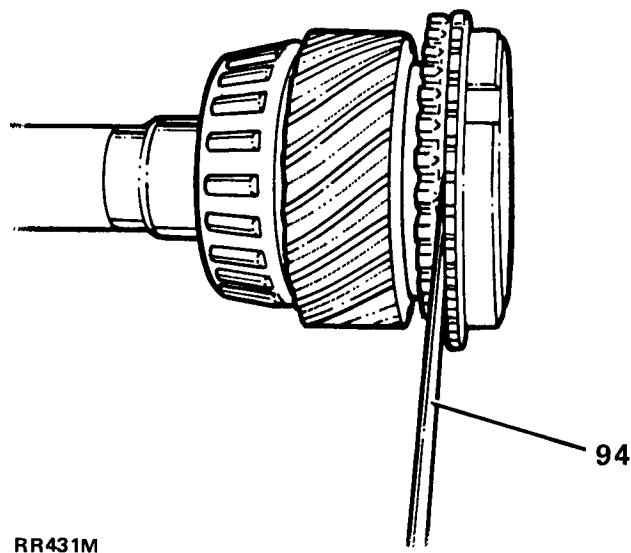
First gear bush end-float

95. Manufacture a spacer to the dimensions provided in the illustration, this will represent a slave bearing.
96. Lubricate the second gear needle bearing with a light oil and fit the bearing, second gear and synchromesh

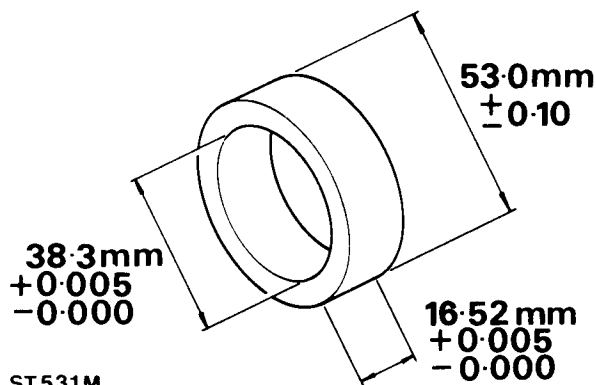
cone to the mainshaft. It should be noted that the second gear synchromesh cone has larger slipper slots than the other synchromesh cones.

97. Fit the first and second synchromesh hub assembly with the selector fork annulus to the rear of the mainshaft.
98. Fit the first gear bush and slave bearing spacer and a new circlip to the mainshaft. When fitting the circlip, care must be taken to ensure it is not opened (stretched) beyond the minimum necessary to pass over the shaft.

continued



RR431M

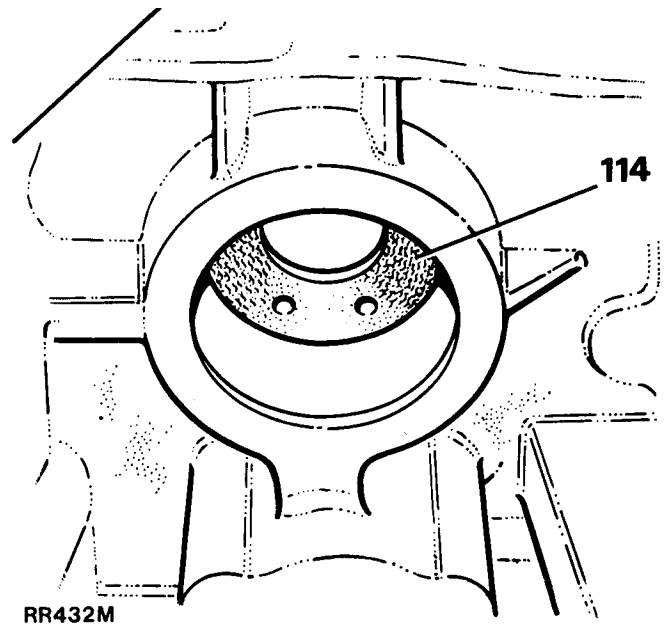


ST531M

99. Press the slave bearing spacer back against the circlip to allow the bush maximum end-float. Measure the clearance between the rear of the first gear bush and front face of the slave bearing spacer with a feeler gauge. The clearance should be within 0,005-0,055 mm. The first gear bush is available with collars of different thickness. Select a bush with a collar to give the required end-float. The bush must be free to rotate easily with the required end-float.
100. Remove the circlip, slave bearing spacer and first gear bush from the mainshaft.
101. First gear bushes are available in the following sizes:

Part No.	Thickness (mm)
FRC5242	40,11-40,16
FRC5243	40,16-40,21
FRC5244	40,21-40,26
FRC5245	40,26-40,31
FRC5246	40,31-40,36

102. Having selected a suitable first gear bush, lubricate the needle bearing and fit to the first gear.
103. Fit the selected bush to the first gear and place first gear synchromesh cone, followed by the first gear assembly to the mainshaft.
104. Using tools MS47, 18G47BA and 18G47BA-X refit the centre bearing and circlip to the mainshaft.
105. Invert the mainshaft, lubricate the third gear needle roller bearing with light oil, fit to the front end of the mainshaft.
106. Fit the third gear to the mainshaft; and locate the third gear synchromesh cone to the third gear.
107. Fit the third/fourth synchromesh assembly (with the longer box of the synchromesh hub to the front of the gearbox) to the mainshaft.
108. Fit the spacer and bearing to the front of the mainshaft.



Input shaft

109. Using tool MS47 and any suitable tube, refit a new pilot bearing track to the input shaft.
110. Fit the input shaft bearing using tools MS47, 18G47BA and 18G47BA-X.

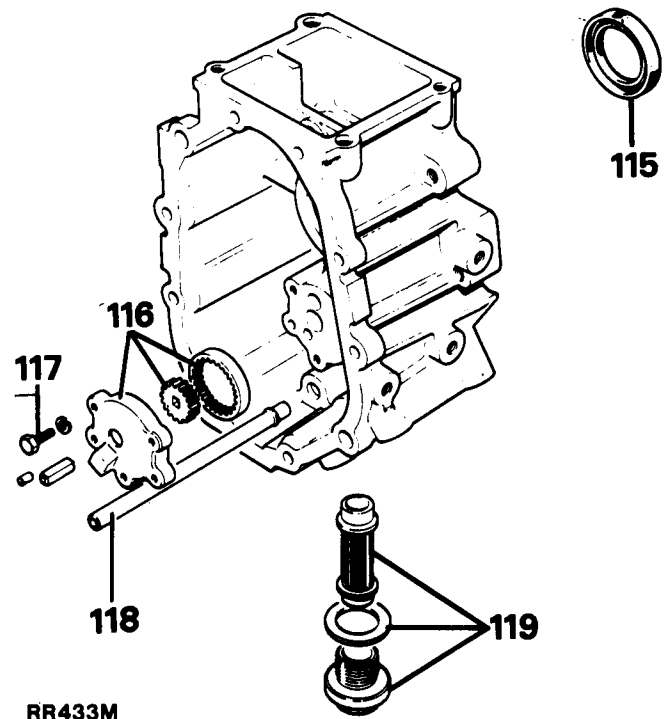
Reverse gear and shaft

111. Fit a new circlip to the rear of the reverse idler gear, ensuring that the circlip is not stretched beyond the minimum necessary to pass over the shaft.
112. Lubricate with light oil and fit both needle roller bearings. Fit the shorter needle bearing to the rear of the reverse idler gear.
113. Fit a new circlip to the front of the reverse idler gear.

Extension case

114. Using a suitable press, fit a new ferrobestos bush to the case, ensuring the two drain holes are towards the bottom of the case.
115. With the aid of tool 18G1422, fit a new oil seal to the rear of the extension case. Ensure the seal lips are towards the ferrobestos bush. Lubricate the seal lips with a suitable SAE 140 oil.

continued



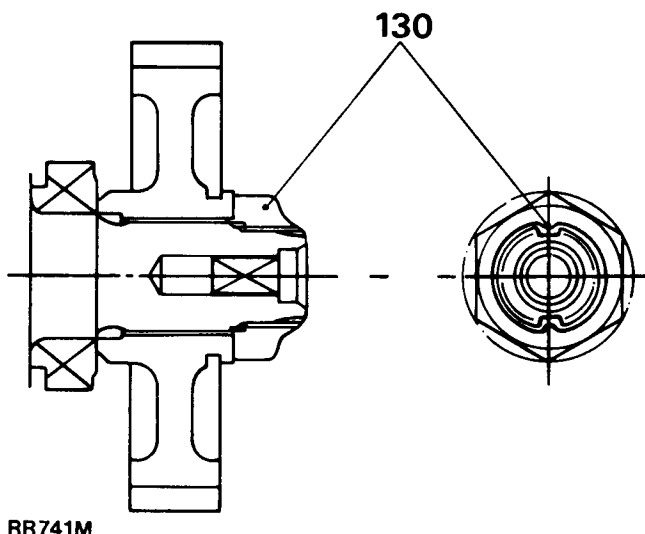
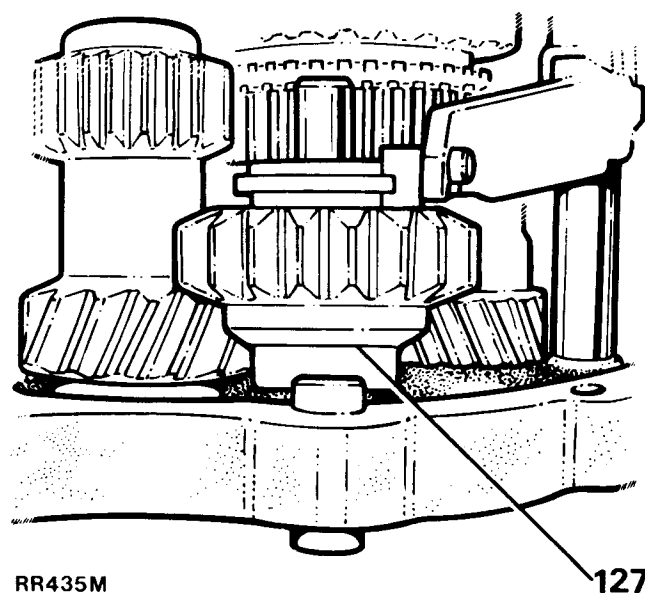
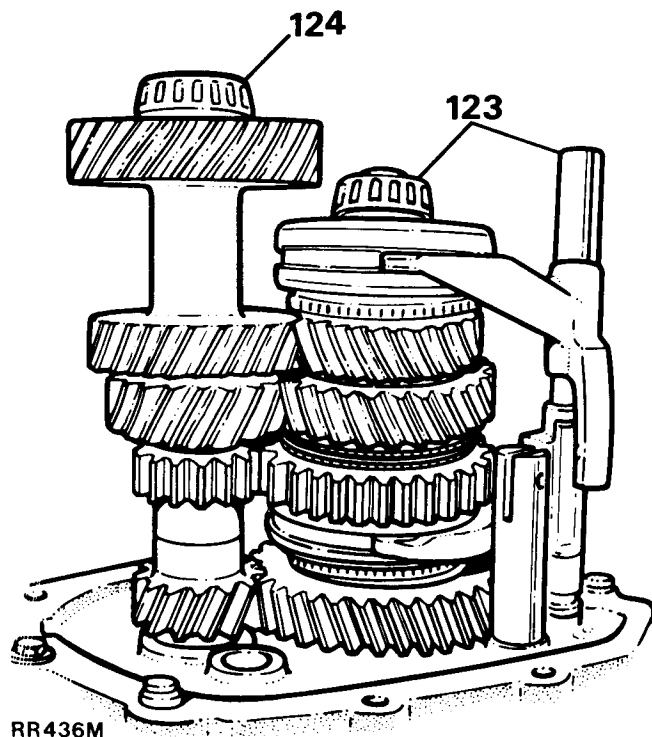
RR433M

116. Assemble and fit the fibre oil pump gears to the oil pump cover, whilst ensuring the centre rotor squared drive faces the layshaft.
117. Fit the three bolts and spring washers to secure the oil pump cover; and tighten to 7 Nm (5 lbf. ft.).
118. Refit the oil pick-up pipe to the extension casing, having ascertained it is free of blockages or contamination. Seal with Loctite 290.
119. Fit a new oil filter, fibre gasket and tighten plug to 25 Nm (19 lbf. ft.).

Centre plate

120. Fit the centre plate to a suitable stand and secure with two slave bolts.
121. Place the new mainshaft and layshaft bearing tracks to the centre plate.
122. Lightly lubricate the selector shaft with a light oil.
123. Take the selector shaft complete with the first and second selector fork, front spool and third and fourth selector fork; engage both selector forks in their respective synchromesh sleeves on the mainshaft, simultaneously engaging the selector shaft and mainshaft assemblies in the centre plate, whilst rotating the fifth gear selector pin to align with the slot in the centre plate.
124. Fit the layshaft to the centre plate.
125. Rotate the selector shaft and spool to enable the reverse crossover lever forks to correctly align to the reverse pivot shaft. Reposition the selector shaft and locate the lever between the fork on the reverse gear pivot shaft. Insert pivot pin and fit a new circlip, ensuring that it is not opened beyond the minimum necessary to pass over the shaft.
126. Fit the slipper pad to the reverse lever. If a new reverse lever pivot shaft has been fitted, it will be necessary to ascertain that its radial location is consistent with the reverse pad slipper engagement/clearance. The radial location is determined during initial assembly.
127. Fit the reverse gear spacer and reverse gear assembly, locating the slipper pad lip to the reverse gear groove. Engage the reverse gear shaft from the underside of the centre plate, ensuring the roll pin is aligned with the slot in the centre plate casing.
128. Prior to assembly lubricate the detent ball and spring with light oil, and fit to the top of centre plate. Smear Hylomar PL32 or Loctite 290 to the plug threads and screw the plug flush with the case. Stake the plug to prevent rotation using a suitable centre punch.
129. Release the slave bolts and remove the centre plate and gear assemblies from the stand.
130. Early models – Using a suitable press fit the fifth gear and collar to the layshaft. Fit a new circlip ensuring it is not expanded beyond the minimum necessary to obtain entry over the shaft.
Later models – Fit the fifth gear to the layshaft using a suitable press and loosely fit a NEW special nut. To tighten the nut, hold the gearbox firmly in a vice and if necessary use a flange holding wrench to restrain the gearbox. Tighten the nut to 204 to 231

continued



Nm (150 to 170 lb ft). To prevent damage to the adjacent bearings when deforming the nut locking collar, support the fifth gear with a block of timber. Using a round nose punch carefully form the collar into the layshaft grooves, as illustrated.

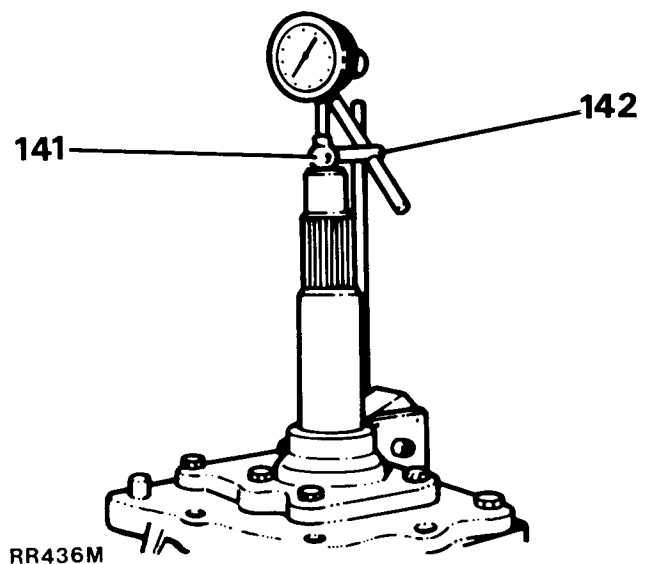
131. Locate the fourth gear synchromesh cone to the third/fourth synchromesh assembly.
132. Fit the input shaft to the mainshaft.
133. Fit the reverse gear spacer to the reverse gear shaft.
134. Fit a new gasket to the centre plate.

Main gearbox casing

135. Insert a new plastic oil trough to the back of the main gearbox casing, ensuring the open trough faces the top of the case.
136. Carefully lower the gearcase into position over the gear assemblies. **DO NOT USE FORCE.** Ensure the centre plate dowels and selector shaft are engaged in their respective locations.
137. Fit the layshaft and input shaft bearing outer tracks.
138. Using 8 x 35 mm slave bolts and plain washers to prevent damaging the rear face of the centre plate, evenly draw the gearcase into position on the plate.
139. Fit the locating shaft front spool to the top of the gearcase using Hylomar PL32 to seal between the spool and gearcase. Smear Loctite 290 or Hylomar PL32 to the bolt threads, tighten bolts and spring washers to 7 Nm (5 lbf. ft).

Mainshaft end-float

140. When ascertaining the mainshaft end-float care must be taken when checking the dial gauge readings to ensure that the end-float only, as distinct from side movement, is recorded. To overcome the difficulty in differentiating between end-float and side movement, wrap approximately ten turns of masking tape around the plain portion of the input shaft below the splines. Fit a new gasket and refit the front cover. Ascertain that the rise and fall of the input shaft is not restricted by the tape. Fit, secure and tighten the six bolts and spring washers to 22 Nm (16 lbf. ft).
141. Place a suitable ball bearing in the centre of the input shaft. This facilitates accurate checking of the mainshaft end-float.
142. Mount the dial gauge on the gearcase with the stylus resting on the ball bearing centre. Zero the gauge.
143. Check the end-float by a 'push-pull' action to the input shaft. The required end-float measurement should be between 0,06-0,01 mm. Having determined the end-float, select the required spacer as follows:
End-float obtained, minus, End-float required, equals, Spacer thickness required.
144. Fit the calculated spacer required and again check the end-float which must be between 0,06-0,01 mm.
145. Detach the dial gauge equipment and ball bearing, remove the front cover and all tape.



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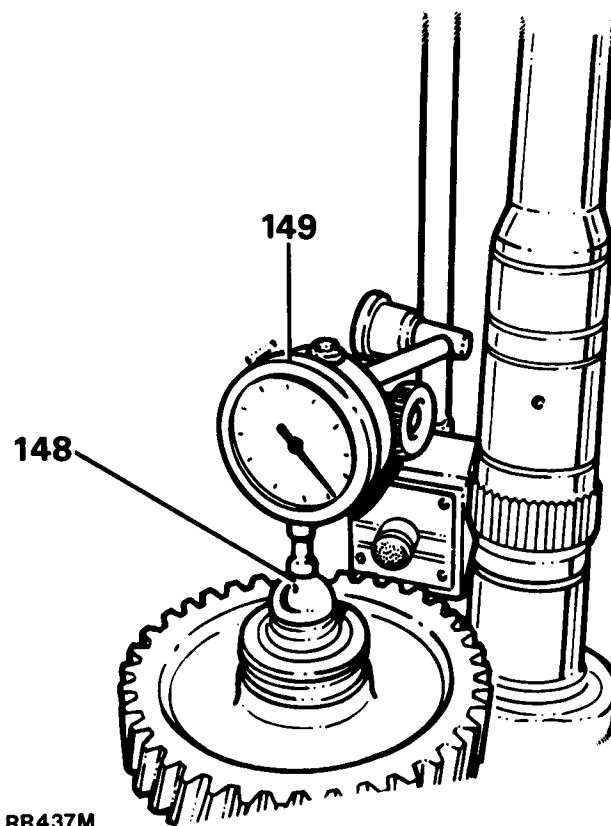
Five Speed Gearbox

146. Fit the required thickness spacer to the mainshaft bearing track. Selective spacers are available in a range of sizes to meet the previously mentioned clearance limits:

Part No.	Thickness (mm)	Part No.	Thickness (mm)
FRC4326	1,48	FRC4349	2,17
FRC4327	1,51	FRC4350	2,20
FRC4328	1,54	FRC4351	2,23
FRC4329	1,57	FRC4352	2,26
FRC4330	1,60	FRC4353	2,29
FRC4331	1,63	FRC4354	2,32
FRC4332	1,66	FRC4355	2,35
FRC4333	1,69	FRC4356	2,38
FRC4334	1,72	FRC4357	2,41
FRC4335	1,75	FRC4358	2,44
FRC4336	1,78	FRC4359	2,47
FRC4337	1,81	FRC4360	2,50
FRC4338	1,84	FRC4361	2,53
FRC4339	1,87	FRC4362	2,56
FRC4340	1,90	FRC4363	2,59
FRC4341	1,93	FRC4364	2,62
FRC4342	1,96	FRC4365	2,65
FRC4343	1,99	FRC4366	2,68
FRC4344	2,02	FRC4367	2,71
FRC4345	2,05	FRC4368	2,74
FRC4346	2,08	FRC4369	2,77
FRC4347	2,11	FRC4370	2,80
FRC4348	2,14		

Layshaft end-float

147. Place a layshaft spacer of nominal thickness 1,02 mm on the layshaft bearing track, fit the front cover and tighten the bolts and spring washers to 22 Nm (16 lbf. ft).
148. Invert the gearbox on the stand, place a suitable ball bearing in the layshaft centre and mount the dial gauge on the gearcase with the stylus resting on the ball bearing centre. Zero the gauge.
149. Check the end-float by a 'push-pull' action to the layshaft. The required layshaft setting is:
0,025 mm end-float,
0,025 mm preload.
Spacer thickness required equals:
Nominal thickness of spacer, plus, end-float obtained.



RR437M

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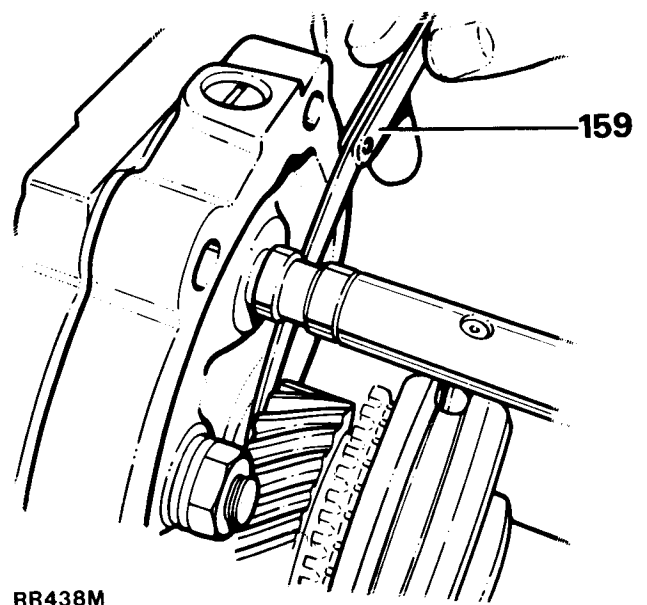
150. Having ascertained the end-float, select and fit the layshaft spacer of the appropriate thickness to the layshaft bearing track. Selective spacers are available in a range of sizes to meet the aforementioned clearance limits.

Part No.	Thickness (mm)	Part No.	Thickness (mm)
TKC4632	1,66	TKC4649	2,17
TKC4633	1,69	TKC4650	2,20
TKC4634	1,72	TKC4651	2,23
TKC4635	1,75	TKC4652	2,26
TKC4636	1,78	TKC4653	2,29
TKC4637	1,81	TKC4654	2,32
TKC4638	1,84	TKC4655	2,35
TKC4639	1,87	TKC4656	2,38
TKC4640	1,90	TKC4657	2,41
TKC4641	1,93	TKC4658	2,44
TKC4642	1,96	TKC4659	2,47
TKC4643	1,99	TKC4660	2,50
TKC4644	2,02	TKC4661	2,53
TKC4645	2,05	TKC4662	2,56
TKC4646	2,08	TKC4663	2,59
TKC4647	2,11	TKC4664	2,62
TKC4648	2,14		

151. Fit a new oil seal to the front cover, ensuring the seal lips face towards the gearbox. Lubricate the seal lips with SAE 140 gear oil.
152. Mask the splines with masking tape to protect the oil seal, refit the front cover and remove the spline masking tape.
153. Refit the bolts and spring washers having used Hylo-mar PL32 or Loctite 290 on the bolt threads. Torque tighten bolts to 22 Nm (16 lbf. ft).
154. Remove gearbox from the stand and place suitably supported on the bench.
155. Remove the guide studs fitted to the centre plate.

Fifth gear to mainshaft

156. Lubricate with light oil and fit a new needle roller bearing to the mainshaft.
157. Fit the front spacer, fifth gear (driven) and fifth gear synchromesh cone to the mainshaft.
158. Using tool 18G1431 fit the fifth gear synchromesh hub assembly, selective spacer and new circlip to the mainshaft. When fitting, care must be taken to ensure the hub assembly and selective spacer are NOT pushed too far on the mainshaft. Only fit with sufficient clearance to allow the circlip to engage in its groove.
159. Using a feeler gauge, measure the clearance between the front spacer and fifth gear (driven), which should be between 0,005-0,055 mm. Use a selective spacer which will provide the required clearance.



continued

Five Speed Gearbox

160. Selective spacers are available in a range of sizes to meet the aforementioned clearance limits:

Part No.	Thickness (mm)	Part No.	Thickness (mm)
FRC5294	5,40	FRC5284	5,10
FRC5295	5,43	FRC5285	5,13
FRC5296	5,46	FRC5286	5,16
FRC5297	5,49	FRC5287	5,19
FRC5298	5,52	FRC5288	5,22
FRC5299	5,55	FRC5289	5,25
FRC5300	5,58	FRC5290	5,28
FRC5301	5,61	FRC5291	5,31
FRC5302	5,64	FRC5292	5,34
FRC5303	5,67	FRC5293	5,37

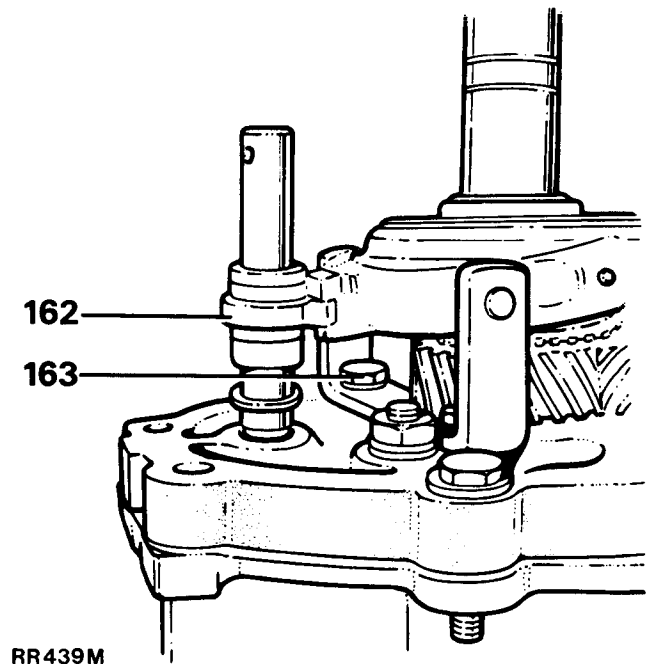
Fifth gear selector fork assembly

161. Fit the fifth speed selector fork and bracket to the fifth gear synchromesh hub assembly, ensuring that the largest groove lip is facing the rear of the gearbox.
162. Fit the fifth gear spool to the selector shaft, rotate and engage the selector fork into the groove. It should be noted that the longer shoulder of the spool is fitted towards the front of the gearbox.
163. Fit the fifth speed selector fork bracket bolts and spring washers. Tighten bolts to 22 Nm (16 lbf. ft).
164. Fit a new circlip to the selector shaft ensuring that it is not expanded beyond the minimum necessary to obtain entry.
165. Remove the six dummy bolts securing the centre plate to the main casing.
166. Insert the squared oil pump shaft into the centre of the layshaft.

Extension case

167. Fit a new gasket to the centre plate.
168. Rotate the oil pump to align with the oil pump drive shaft.
169. Carefully fit the extension case ensuring that the oil pump shaft engages the oil pump.
170. Fit the extension case bolts and spring washers; tighten to 22 Nm (16 lbf. ft).
171. Using a large screwdriver, ease the selector shaft forwards to select a gear. It may be found necessary to rotate the mainshaft to ease gear selection.
172. Fit the selector yoke to the selector shaft and secure with a new roll pin. Pull selector shaft rearwards to select a neutral position.
173. Cover the mainshaft splines with masking tape and fit a new oil seal collar 'O' ring. Remove the masking tape.
174. Using tool 18G1431 fit the oil seal collar to the mainshaft, ensuring the collar is NOT pushed too far on the shaft, fit only with sufficient clearance to allow the circlip to engage in its groove.
175. Fit a new gasket to the fifth gear extension case and engage the selection yoke rollers in the selector yoke. Fit the three bolts and spring washers; and tighten to 22 Nm (16 lbf. ft).

continued



Bell housing

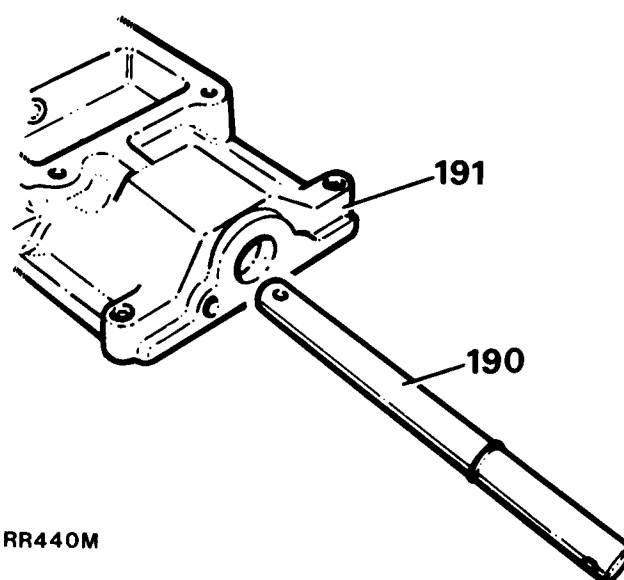
176. Locate the bell housing to the dowels and fit the two long bolts (12 x 45 mm) with spring and plain washers to the dowel positions. The remaining four bolts (12 x 30 mm) are fitted with spring washers only. Tighten all bolts to 65 Nm (48 lbf. ft).
177. Prior to reassembly, lubricate the following with Molykote FB180 grease:
 - (a) Clutch release lever fulcrum pivot socket.
 - (b) The clutch release lever and the faces.
 - (c) Ball end of the clutch operating push rod.
178. Locate the slotted washer on the pivot and fit the clutch release lever.
179. Fit the spring clip on the release lever and secure with the bolt and spring washer.
180. Lubricate the inner face of the clutch release bearing carrier with Molykote FB180 grease and fit to the front cover spigot, locating the clutch release lever to the carrier recesses.
181. Fit a new nylon clutch release carrier clip.
182. Refit the gearbox oil level plug, and tighten to 25 Nm (19 lbf. ft).
183. Refit the gearbox oil drain plug and fit new fibre washer. Tighten plug to 25 Nm (19 lbf. ft).

Reverse gear plunger assembly

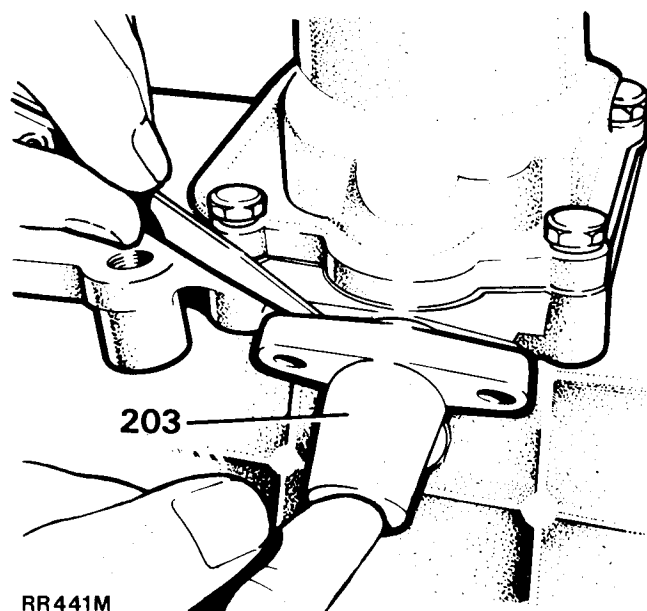
184. Lubricate the short spring and plunger with BP Energrease L2 or similar prior to assembly.
185. Fit the spring into the plunger base and slide the assembly into the reverse gear plunger housing. Fit a new circlip to retain the plunger.
186. Lubricate the detent ball with light oil and fit into the recess.
187. Refit the short spring and plug, coat the plug threads with Loctite 290 or Hylomar PL32, and tighten to 22 Nm (16 lbf. ft).

Gear selector housing

188. Lubricate the gear selector housing shaft with light oil and fit a new 'O' ring.
189. Refit the gear selector rollers, pin and new circlip ensuring the circlip is not expanded beyond minimum necessary to obtain entry.
190. Insert shaft through the large blanking plug orifice, ensuring the shaft indent is uppermost.
191. Place the gear selector housing into protected vice jaws and fit the selector yoke to the shaft, using a suitable pin punch and new roll pin. Remove the housing assembly from the vice on completion.
192. Fit the reverse switch and large blanking plugs. Coat plug threads with Loctite 290 and tighten to 22 Nm (16 lbf. ft).
193. Refit the fifth gear spool retainer and tighten the bolts and washers to 7 Nm (5 lbf. ft).
194. Fit a new nylon insert into the trunnion housing and secure with a new circlip.

continued**RR440M**

195. Invert the gear selector housing and fit the trunnion housing to the selector shaft, ensuring the locating bolt aligns with the shaft indent. Coat the bolt threads with Loctite 290. Tighten bolt to 22 Nm (16 lbf. ft).
196. Fit a new gear lever gasket and locate the gear lever housing, spring washers and bolts. Tighten bolts to 22 Nm (16 lbf. ft).
197. Coat the upper and lower balls of the gear lever shaft with BP Energrease L2 or similar. Push lever into the trunnion nylon bush and retain with the special lock-washer and bolt.
198. Fit the two bias spring adjusting screws and locknuts loosely.
199. Locate the bias springs and retain with the roll pin.
200. Using a screwdriver raise the spring legs on to the top of the respective spring adjusting screws.
201. Refit the gear lever extension and secure the nut and plain washer.
202. Select first or second gear. It may be necessary to rotate the mainshaft whilst manipulating the gear lever.
203. Locate the reverse gear plunger assembly until light contact with the gear lever yoke is felt. Whilst maintaining a light finger pressure, measure the clearance between the plunger assembly casting and gear selector casting. Select suitable thickness shim(s) to equal the gap.
204. Remove the reverse plunger assembly, fit the required thickness shim(s) refit the plunger assembly, spring washers and bolts. Apply Hylomar PL32 or Loctite 290 to the bolt threads and tighten to 22 Nm (16 lbf. ft).
205. Select third or fourth gear and adjust the gear lever bias springs as detailed in 'Remove and Refit of five speed manual gearbox with transfer box' from paragraph 123.



TRANSFER GEARBOX FOR FIVE SPEED MANUAL GEARBOX AND AUTOMATIC GEARBOX

Two types of Transfer gearbox are in use. The LT230R is fitted to early models and is described in the following pages.

NOTE: Automatic gearbox version is illustrated, manual gearbox version is similar.

A modified design, LT230T type, is fitted to later models and is described from page 101 onward.

All Transfer gearboxes have a serial number stamped on the left hand side. For identification, a suffix 'B' has been added to the LT230T serial number.

TRANSFER BOX

– Five Speed Manual and Automatic models

Overhaul

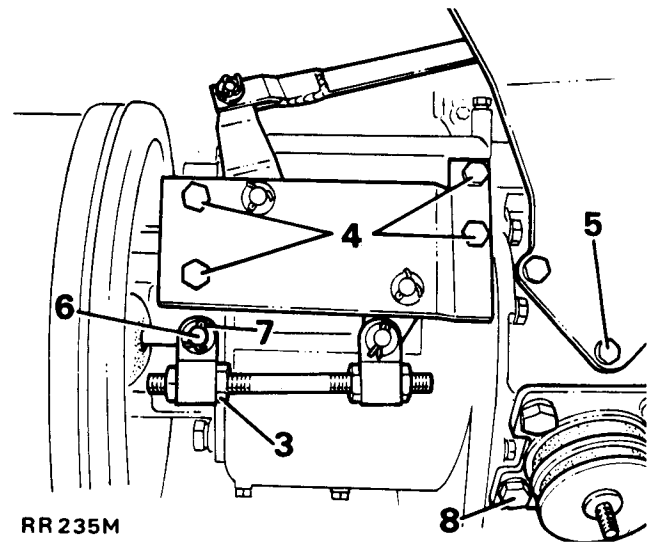
37.29.28

Dismantling

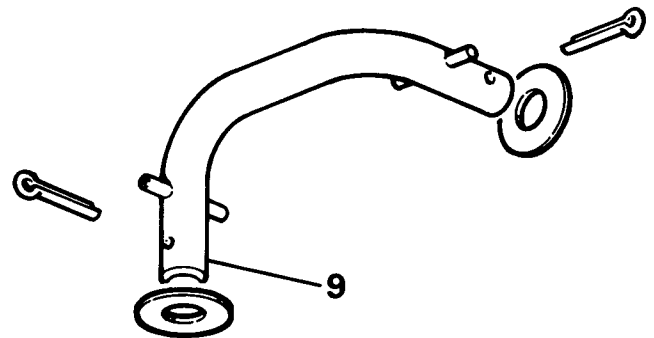
1. Remove transfer box from vehicle, operation 37.29.25 (Automatic models).
2. Alternatively, remove complete gearbox and transfer box assembly, operation 37.20.01 (Five speed manual) and 44.20.04 (Automatic). In this event the transfer box is separated from the gearbox on the work bench. The following items should be removed with the transfer box still attached to the hydraulic hoist.

Hand brake linkage removal

3. Slacken off the inner locknut on the hand brake adjuster link a few threads.
4. Remove the four bolts securing the hand brake lever mounting bracket.
5. Remove the remaining lower bolt securing the hand brake mounting. (The other mounting bolts were removed in situ when detaching the bell housing tie rod.)
6. Supporting the hand brake and linkage assembly allow it to pivot downwards on the clevis pin connected to the brake operating lever.
7. Finally remove the clevis pin to release the hand brake and linkage assembly.



RR 235M



RR 392M

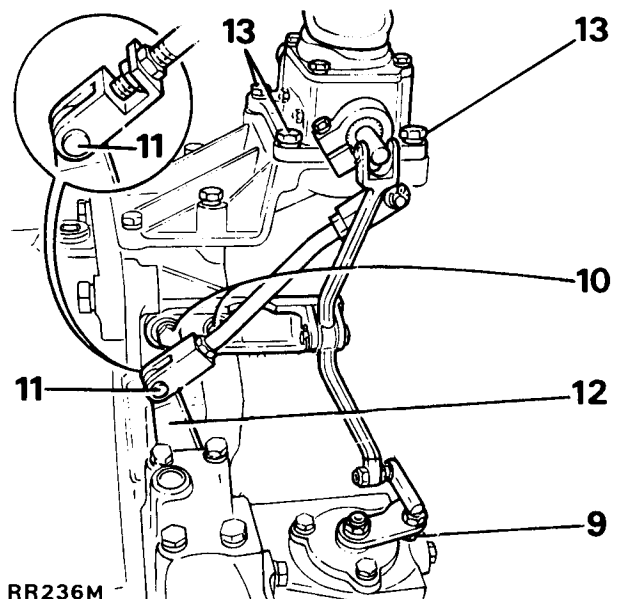
Transfer box mounting removal

8. Remove the bolts retaining the right hand rubber mounting plate.

Gear change housing removal

- * 9. Disconnect the bottom of the differential lock cross shaft lever with its short connecting link from the differential lock lever by removing the Nyloc nut. The latest cranked link is retained by a split pin at each end.
10. Remove the two bolts retaining the differential lock cross shaft lever pivot bracket.
11. Disconnect the bottom of the high/low connecting rod from the high/low operating arm by removing the clevis pin.
12. Remove the plastic bushes from the operating arm.
13. Remove the four bolts securing the gearchange housing and remove it complete with linkage.

- * The latest cranked short connecting link is retained by a split pin at each end.



RR 236M

Continued

Extension housing removal

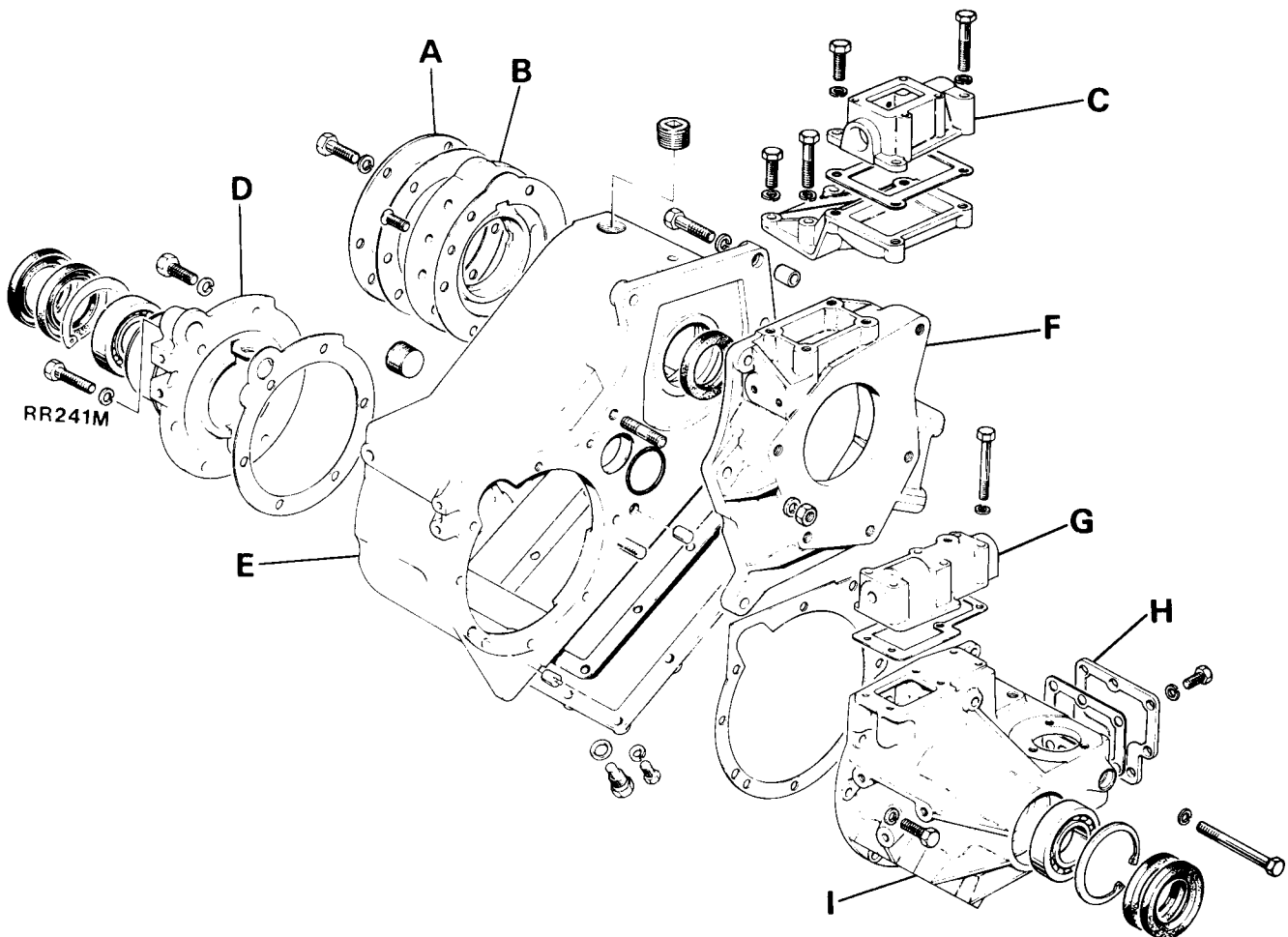
14. Remove the four bolts and two nuts securing the extension housing.

NOTE:— Having removed the extension housing remove the upper of the two locating dowels in the transfer box case, which is a loose fit.

Transmission brake removal

15. Remove the two countersunk brake drum retaining screws and pull off the drum.
16. Remove the four bolts securing the brake backplate, two of these also retain the oil drip plate.

Continued



- A Power take-off cover
- B Mainshaft rear bearing housing
- C Transfer gear change housing

- D Speedo/rear output shaft housing
- E Transfer box
- F Extension housing
- G High/low selector housing
- H Differential lock selector side cover
- I Front output shaft housing

Moving transfer box to work bench

17. Pass chain around the transfer box and using suitable lifting equipment support its weight.
18. Remove the four bolts retaining the transfer box to the hydraulic hoist (locally made) adaptor plate.
19. Lift the transfer box off the hydraulic hoist on to the work bench.

NOTE:— To facilitate removal of various items on the work bench, obtain suitable wooden blocks to enable the transfer box to be turned and propped up as required.

Bottom cover removal

20. Remove the six remaining bolts retaining the bottom cover, the outer four were removed with the adaptor plate (see item 18).

Intermediate shaft removal

21. Remove the shaft lock plate retained by a single bolt at the front face of the transfer box.
22. Withdraw the intermediate shaft, using a screw driver in the slotted end. Where the shaft cannot be easily withdrawn use extractor RO605862.
23. Lift out the intermediate gear train.
24. Remove the thrust washers.
25. Remove the 'O' ring from the intermediate shaft and the transfer box case.

Power take off cover removal

26. Remove the six bolts retaining the circular P.T.O. cover.
27. Remove the gasket.

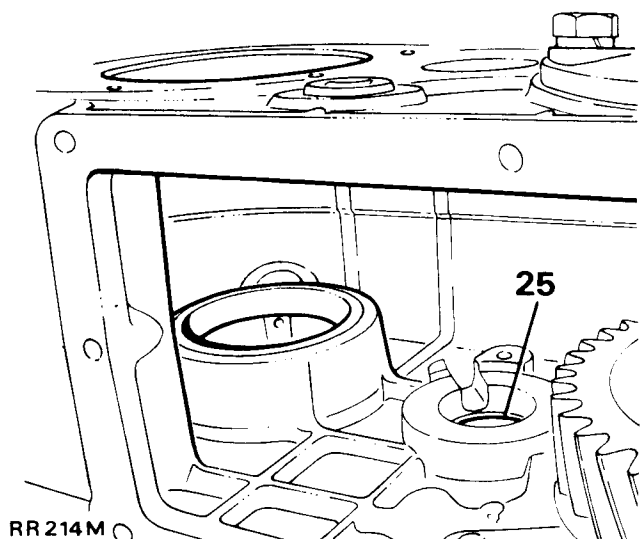
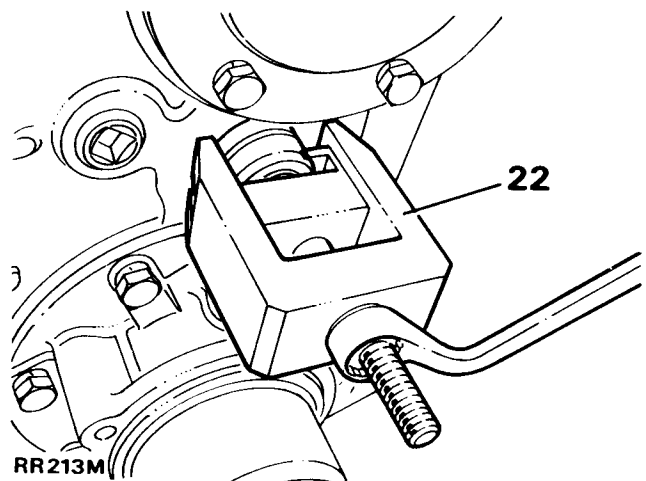
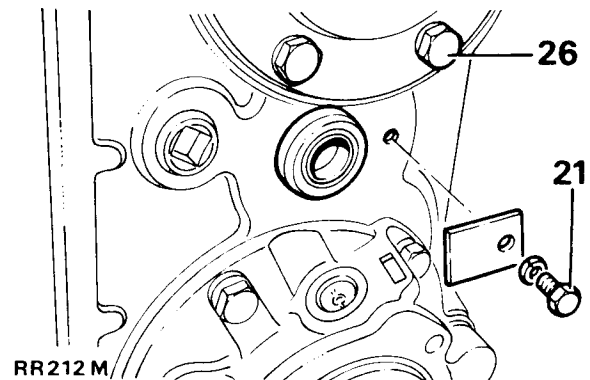
Input gear removal

28. Remove the two countersunk screws and release the mainshaft bearing housing.
29. Remove the gasket.
30. Remove the input gear assembly.
31. Prise out and discard the oil seal at the front of the transfer case using service tool 18G1271.
32. Drift out the input gear front bearing track.

High/low selector housing removal

33. Remove the six bolts to release the selector housing.
34. Remove the gasket.

Continued



Front output shaft housing removal

35. Slacken the set screw securing the yoke to the high/low selector shaft inside the high/low selector housing aperture.
36. If necessary use a screw driver to move the selector shaft rearwards and allow the yoke to be lifted out.
37. Remove the eight bolts to release the front output shaft housing assembly. The upper middle bolt is longer.

NOTE:— The 'radial' dowel in the transfer box face should not be disturbed.

Centre differential removal

38. Remove the high/low selector shaft detent plug, spring and ball.

NOTE:— The ball may be more easily retrieved from inside the transfer case after the selector shaft is taken out.

39. Remove the centre differential unit with the selector shaft/fork assembly.

Rear output shaft housing assembly removal

40. Remove the six screws to release the housing. The upper screw is longer.
41. Remove the gasket.

NOTE:— Removal of the above housing will reveal the centre differential rear bearing track in the transfer box casing. Before drifting out, either unscrew the two studs and radial dowel projecting from the transfer box front face or use suitable wooden blocks to support the box to avoid damage to these items.

42. Drift out the differential rear bearing track.

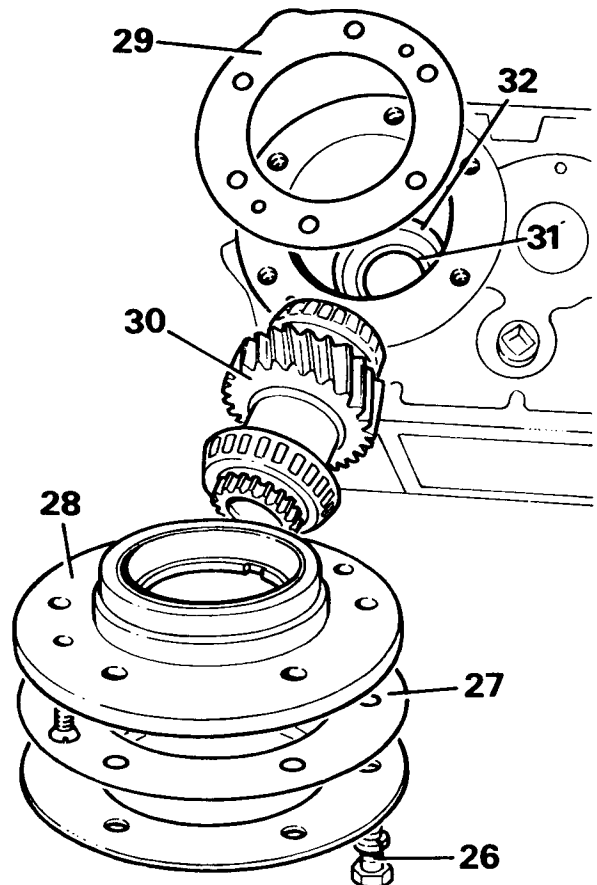
NOTE:— If it is required to completely strip down the transfer box to the basic casting, remove the level, filler and drain plugs.

IMPORTANT:— Clean all parts ensuring any traces of Loctite are removed from faces and threads. Renew oil seals and examine all other parts for wear or damage, renew as necessary.

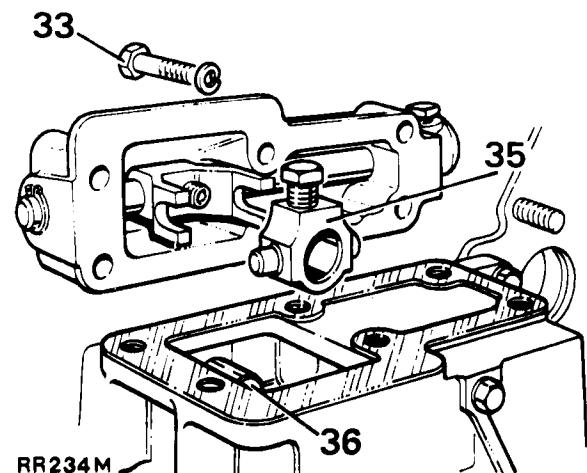
Reassembling

43. Ensure that all faces of the transfer box are clean.
44. Check that level filler and drain plugs are in position.
45. Fit the two studs which are used for part retention of the extension housing.
46. Screw in the 'radial' dowel. It is important that its projecting blade is set radially in line with the tapped fixing hole centres in the transfer box casing.

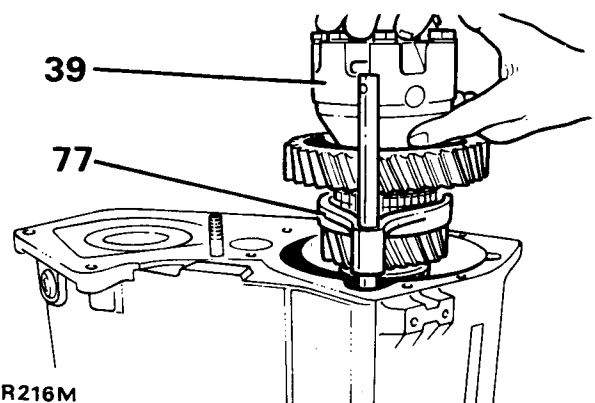
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RR242M



RR234M



RR216M

REAR OUTPUT SHAFT HOUSING – OVERHAUL

(Items 47 to 73)

Dismantling

47. Using flange wrench 18G1205 remove the flange nut, steel and felt washers.

NOTE:— Ensure flange bolts are fully engaged in the wrench.

48. Remove the output shaft flange with circlip attached.

NOTE:— The circlip need only be released if the flange bolts are to be renewed.

49. Remove the speedometer spindle housing. This can be prised out with a screw driver.
50. Drift the rear output shaft out of the housing from the flange end.
51. Carefully prise off the oil catch ring using a screw driver in the slot provided.
52. Prise out and discard the two oil seals using tool 18G1271.
53. Using circlip pliers 18G257 remove the circlip retaining the bearing.
54. Drift out the bearing from the back of the housing.
55. Remove the speedometer driven gear and spindle from the spindle housing.
56. Remove the 'O' ring and oil seal.
57. Slide off the spacer and speedometer drive gear from the output shaft.
58. Clean all parts, renew oil seals and Nyloc flange nut and examine all other parts for wear or damage, renew as necessary.

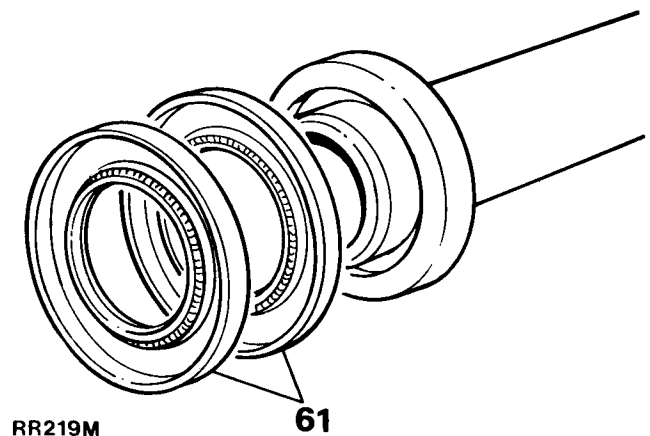
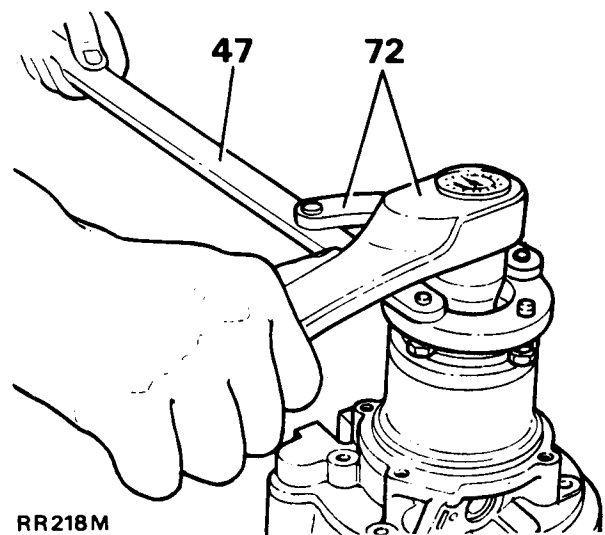
Reassembling

59. Fit the output bearing by drifting it in with a suitable tube.
60. Fit the bearing retaining circlip using circlip pliers 18G257.
61. Fit the two new oil seals simultaneously using replacer tool 18G1422. Fit the seals with both sealing lips inwards as illustrated.

NOTE:— On later production a single dual-lipped oil seal is fitted.

62. Charge the lips of both seals with grease.
63. Fit oil catcher ring on to housing.
64. Fit oil seal into speedometer spindle housing with a suitable tube.
65. Fit 'O' ring to speedometer spindle housing.
66. Lubricate seal and 'O' ring with oil.
67. Locate speedometer driven gear and spindle in spindle housing and push into position.
68. Slide speedometer drive gear and spacer on to output shaft.
69. Locate output shaft through back of housing.

Continued



70. Fit flange on to output shaft (with bolts in position).
71. Fit flange felt washer, plain washer and a new Nyloc nut.
72. Using flange wrench 18G1205 and a torque wrench pull up output shaft to correct position.

NOTE:— Ensure flange bolts are fully engaged in the wrench.

73. Locate speedometer spindle housing assembly in the output shaft housing and push in flush with housing face.

NOTE:— Before fitting the rear output shaft housing to the transfer box casing the centre differential rear bearing track must be fitted.

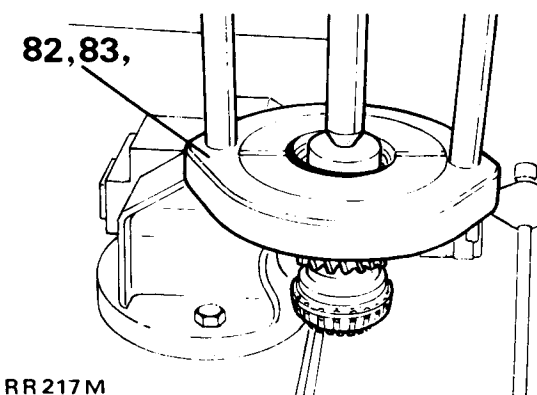
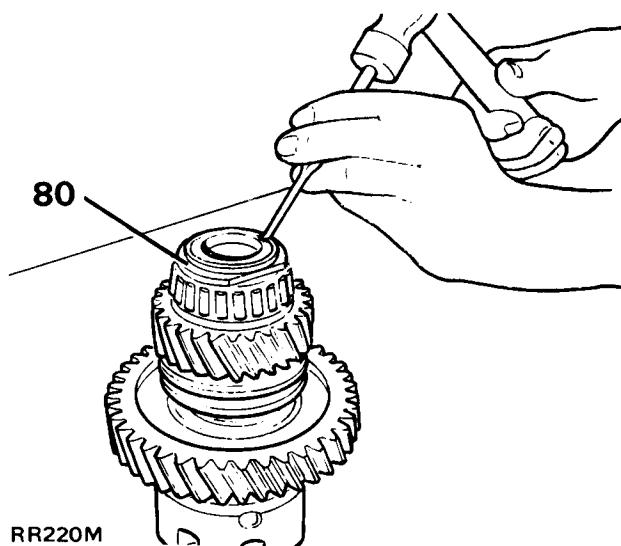
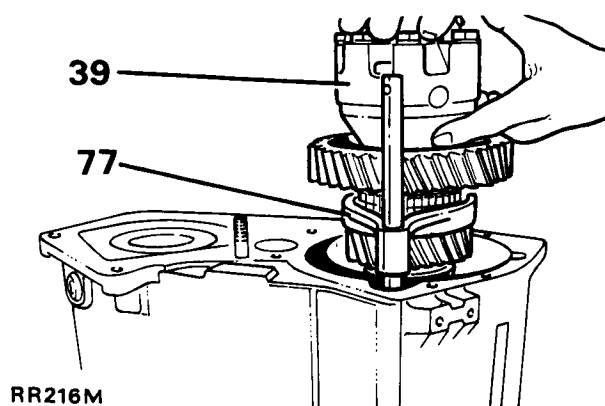
74. Drift the centre differential rear bearing track into the transfer box casing 3 mm (1/8 in) below the outer face of the casing. Check the depth before proceeding.

Fitting rear output shaft housing to transfer box

75. Grease and fit housing gasket and locate the housing in position on the transfer box.

NOTE:— If the differential rear main bearing track has been correctly fitted there will be a gap between the housing face and the gasket at this stage.

76. Apply Loctite Dri-loc 290 to the threads of the six housing securing screws, noting that the upper screw is longer. Fit the screws (with spring washers) evenly tightening them to the specified torque. This will press in the rear main bearing track to the correct position and seat the housing.



CENTRE DIFFERENTIAL UNIT – OVERHAUL (Items 77 to 130)

Dismantling

77. Detach the high/low selector assembly.
78. Secure the differential unit in a vice with the 'stake' nut uppermost.
79. Drill the 'stake' nut flange to facilitate removal of the nut.
80. Remove the 'stake' nut using tool 18G1423.
81. Remove the differential unit from the vice.
82. Secure hand press 47 in vice with collars 18G47BB/1 and using button 18G47BB/3 remove rear taper roller bearing.
83. Substituting collars 18G47BB/2 remove front taper roller bearing.
84. Remove the hand press from the vice.
85. Remove the high range (smallest) differential gear and its bush.
86. Remove the high/low selector sleeve.

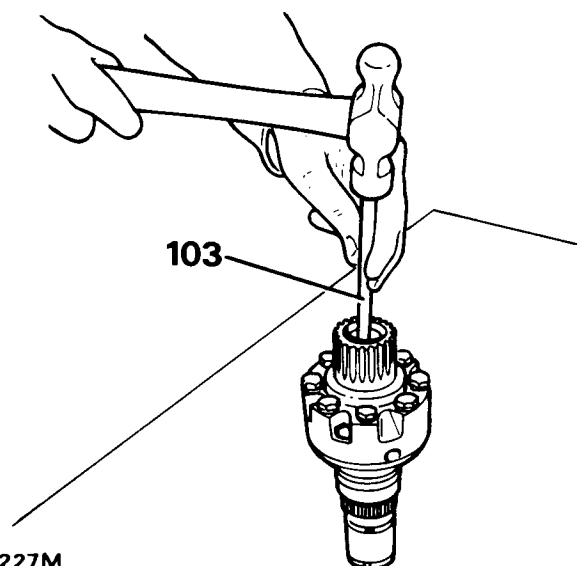
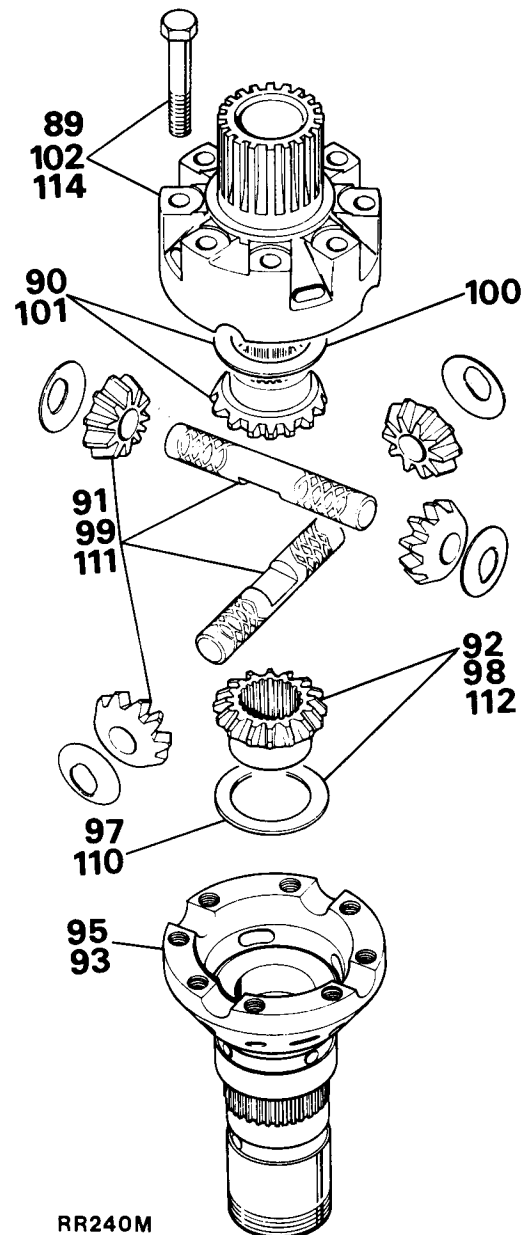
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87. Using a suitable press behind the low range (largest) gear carefully remove both high/low hub and low range gear together.
88. **Secure the differential unit in the vice.**
89. Remove the eight retaining bolts and lift off the front differential case.
90. Lift off the front (upper) bevel gear and thrust washer.
91. Remove both pairs of side gears with their respective shafts and dished washers together.
92. Lift out the remaining rear (lower) bevel gear and thrust washer.
93. **Remove the rear differential case from the vice.**
94. Clean all parts, examine for wear or damage, renew as necessary.

Obtaining differential backlash by checking bevel gear end float

95. **Secure the rear differential case in the vice.**
96. Ensure that all differential components are dry to assist in checking end float.
97. Using a micrometer measure one of the bevel gear thrust washers and note thickness.
98. Fit the thrust washer and bevel gear to the rear (lower) differential case.
99. Assemble the side gears and dished washers on their respective shafts and fit to the rear case.
100. Measure the remaining bevel gear thrust washer, noting its thickness.
101. Fit the thrust washer and bevel gear to the rear case.
102. Fit and align the front differential case tightening the eight securing bolts to the specified torque.
103. Ensure that the front bevel gear is fully in mesh by tapping it down, using a punch through the front differential case.
104. Measure the front bevel gear end float with feeler gauges through the slots provided in the front differential case. This must be between zero and $-0,07\text{mm}$ maximum (zero and 0.003 in.).
105. **Invert differential unit in vice** and repeat the above procedure (items 103 and 104) for the rear bevel gear in the rear differential case.
106. **Return the differential unit to its former position in the vice** i.e. with the front differential case uppermost.
107. Remove the eight securing bolts and lift off the front differential case.
108. Remove the bevel gears and thrust washers, and side gear assemblies.
109. Select correct thrust washers required for final reassembly.

Continued

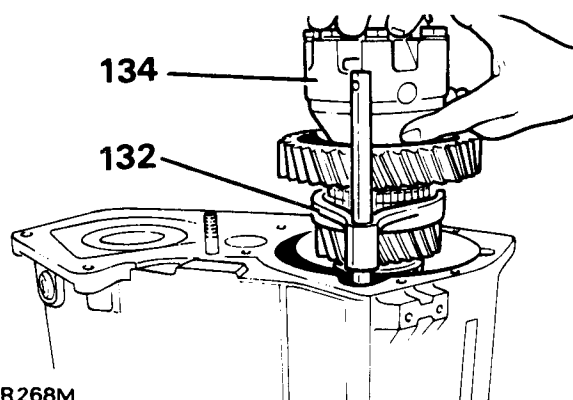
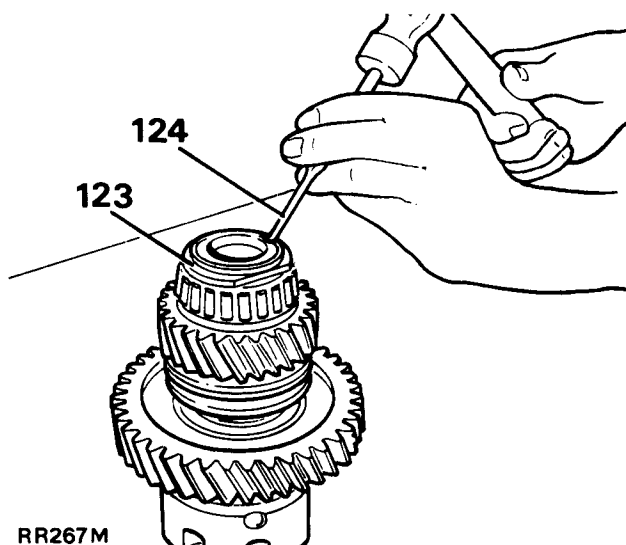
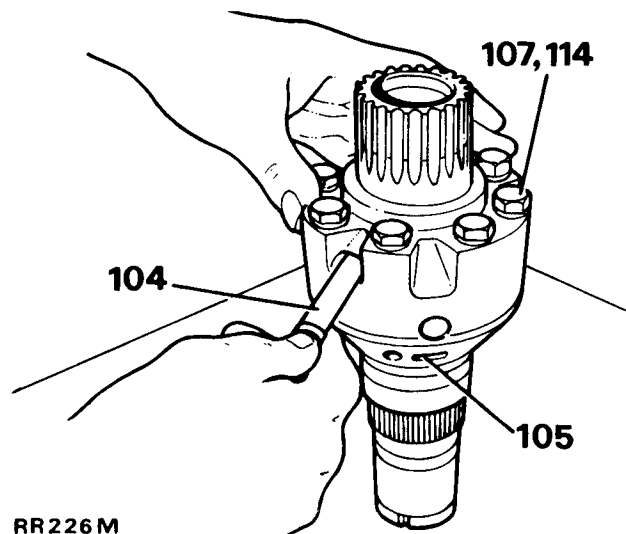


Reassembling

110. Fit the selected thrust washer and bevel gear to the rear (lower) differential case.
111. Assemble the side gears and dished washers on their respective shafts and fit to the rear case.
112. Fit the other selected thrust washer and bevel gear to the rear case.
113. Lubricate all parts with oil.
114. Fit and align the front differential case, locate the eight securing bolts and tighten to the specified torque.
115. Finally check that the differential gears revolve freely.
116. Place the front (outer) differential bearing on the front differential case and drift into position using larger end of tool 18G1424.
117. **Invert the differential unit in the vice.**
118. Fit the low range gear (largest) to the rear differential case (with its 'dog' teeth uppermost).
119. Drift the high/low hub on to the splined area of the case
*Check end float of low range gear.
120. Slide the high/low selector sleeve on to the hub outer splines.
121. Fit the bush into the high range (smallest) gear and slide the bushed gear on to the rear differential case.
*Check end float of high range gear and running clearance of gear on bush.
122. Place the rear (inner) differential bearing on the rear differential case and drift into position using the smaller end of tool 18G1424.
123. Fit the 'stake' nut using tool 18G1423 and tighten to the specified torque.
124. Peen the nut flange into the slot provided.
125. **Remove the differential unit from the vice.**
126. Lubricate gears, bearings, sleeve and bush with oil.
127. Clean and check the high/low selector fork assembly for wear and renew if necessary.
128. To renew the selector fork remove the set screw retaining it to the selector shaft and ensure any traces of Loctite are removed from the threads.
129. Refit the selector fork to the lower of the two blind holes in the selector shaft, i.e. nearest to the selector shaft detent grooves.
130. Apply Loctite Drilloc 290 to the set screw threads and fit the set screw.
131. **Prop up the transfer box so that its front side is uppermost.**
132. Fit the selector fork to the high/low selector sleeve in the differential assembly.
133. Fit the high/low selector shaft ball from inside the transfer case.
134. Locate the differential assembly and high/low selector fork assembly into the transfer case.
135. Fit the selector shaft spring, apply Loctite Drilloc 290 to the detent plug threads and fit the detent plug.

* See Technical Data, page 55.

Continued



FRONT OUTPUT SHAFT HOUSING – OVERHAUL

(Items 136 to 190)

Dismantling

136. Remove the seven screws securing the differential lock selector side cover and release the side cover and gasket.
137. Remove the three screws securing the differential lock finger housing and lift out the complete assembly.
138. Remove the 'O' ring from the assembly.
139. Slacken the lock nut retaining the differential lock switch and unscrew the switch.
140. Remove the detent plug from the top of the housing and lift out the spring and ball.
141. Compress the selector fork spring inside the housing and slide out the spring locating 'C' caps.
142. Slide the selector shaft out of the rear of the housing.
143. Remove the selector fork and spring through the side cover aperture.
144. Lift out dog sleeve from the back of the output shaft housing.
145. Using the flange wrench 18G1205 remove the flange nut, steel and felt washers.

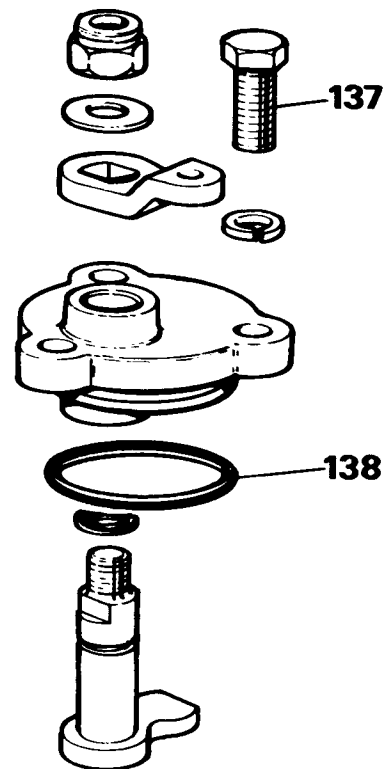
NOTE:— Ensure that flange bolts are fully engaged in the wrench.

146. Remove the output shaft flange with oil seal shield.

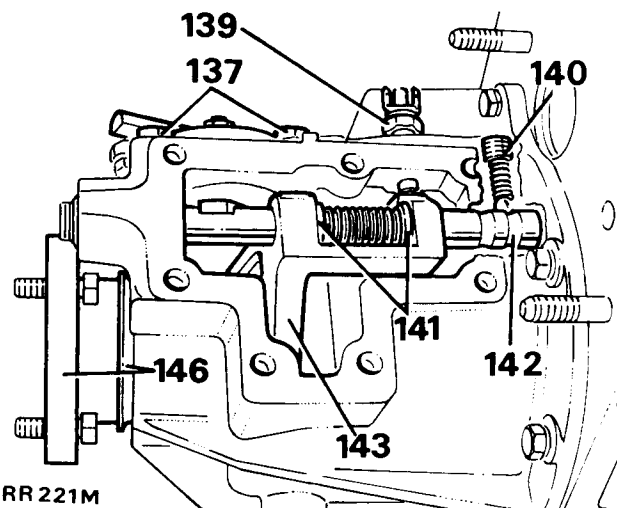
NOTE:— These parts need not be separated unless the flange bolts are to be renewed.

147. Drift the front output shaft rearwards out of the housing.
148. Slide off the collar from the output shaft.
149. Secure the front output shaft housing in the vice.
150. Prise out and discard the two oil seals, using service tool 18G1271.
151. Using circlip pliers 18G257 release the circlip and remove the bearing.
152. Remove the housing from the vice and drift out the bearing from inside.

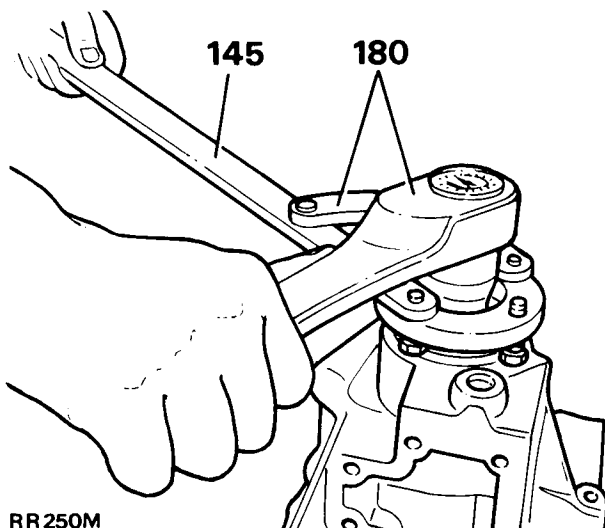
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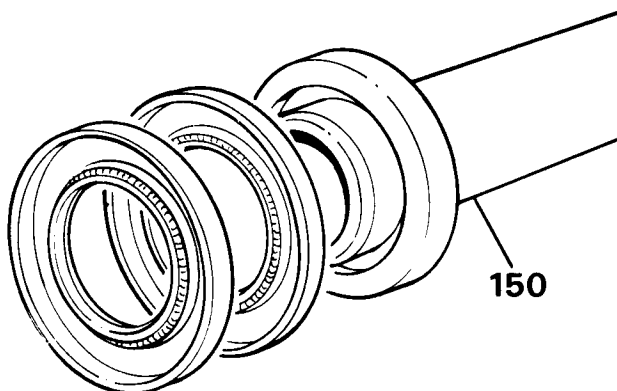
RR286M



RR221M



RR250M

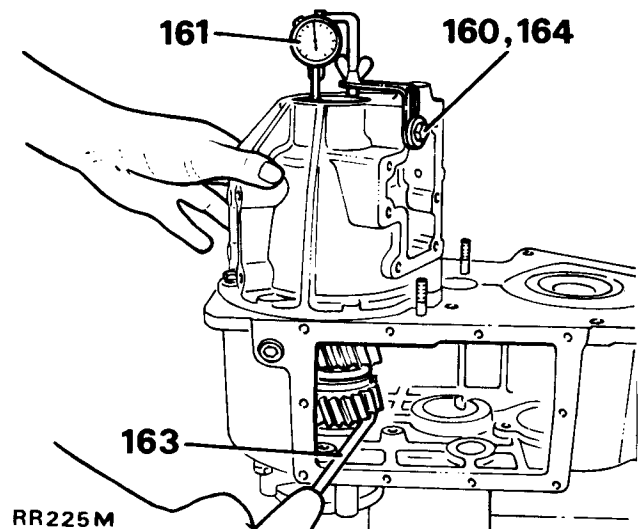


RR298M

153. Drift out the differential front bearing track and remove the shim behind it.
154. Clean all parts ensuring that any traces of Loctite are removed from faces and threads. Renew oil seals and examine all parts for wear or damage, renew as necessary.

Obtaining bearing pre-load

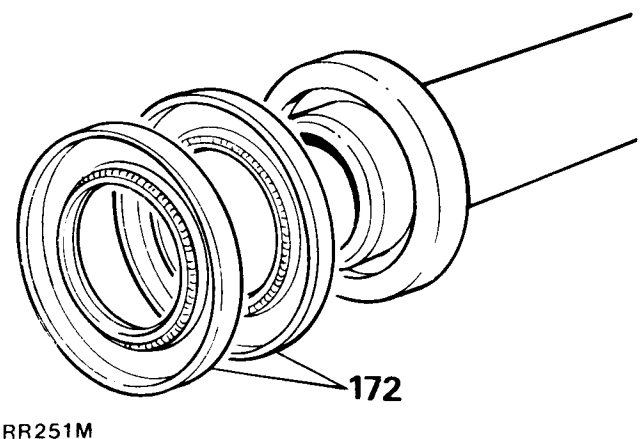
155. Measure the original differential front bearing track shim, noting its thickness.
156. Select a slightly thinner trial shim than the original in order to obtain an end float condition and fit to the housing.
157. Drift the differential front bearing track into the housing.
158. Grease and fit gasket and locate front output shaft housing on the transfer box.
159. Fit four of the seven securing bolts only and tighten to the specified torque.
160. Fit a dial gauge mounting bracket on to the housing, bolting it to one of the side cover fixing holes.
161. Fit a dial gauge with bracket RO530106 to the mounting bracket.
162. Align the gauge pointer on the end of the output shaft, setting the gauge to '0'.
163. Using a screwdriver via the bottom cover aperture, lift the gear assembly to record the end float.
164. Remove the dial gauge assembly and mounting bracket.
165. Remove the four bolts retaining the housing.
166. Drift out the differential front bearing track from inside the housing and remove and discard the trial shim.
167. Select and fit a shim of the required thickness to obtain the correct pre-load of 0,02–0,07 mm (0.001–0.003 in) on reassembly. This is achieved by adding the thickness of the trial shim and the end float obtained to the pre-load specified.
168. Finally drift the differential front bearing track into position.



Reassembling

169. Secure the front output shaft housing in the vice.
170. Drift the front bearing into the housing.
171. Fit the bearing retaining circlip, using circlip pliers 18G257.
172. Fit the two new oil seals simultaneously using replacer tool 18G1422. Fit the seals with both sealing lips inwards as illustrated.

NOTE:— On later production a single dual-lipped seal is fitted.



Continued

173. Charge the lips of both seals with grease.
174. **Remove the housing from the vice.**
175. Slide the collar on to the front of the output shaft with its chamfered edge to the front.
176. Fit the output shaft through the back of the housing.
177. Fit the flange/oil seal shield assembly on to the output shaft.
178. Fit the flange felt washer, plain washer and a new Nyloc nut.
179. **Refit the housing in the vice.**
180. Using flange wrench 18G1205 and a torque wrench pull up output shaft to correct position. Check that the oil seal shield does not foul the housing.

NOTE:— Ensure that flange bolts are fully engaged in the wrench.

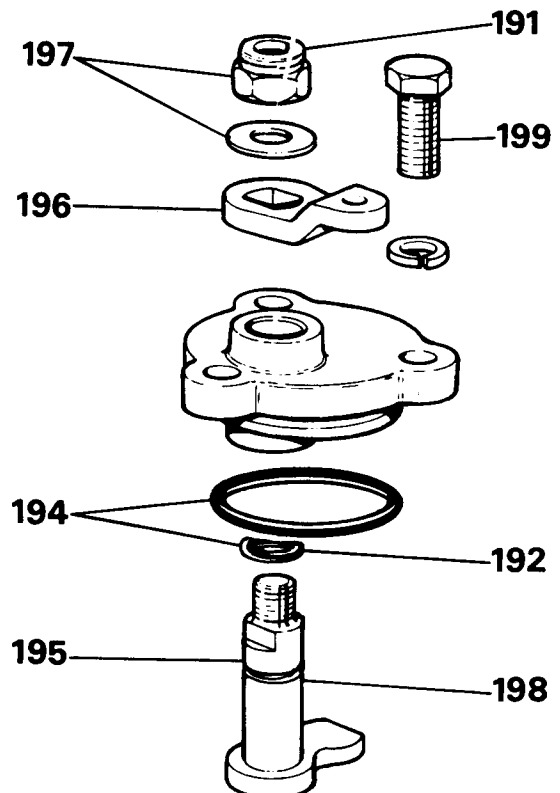
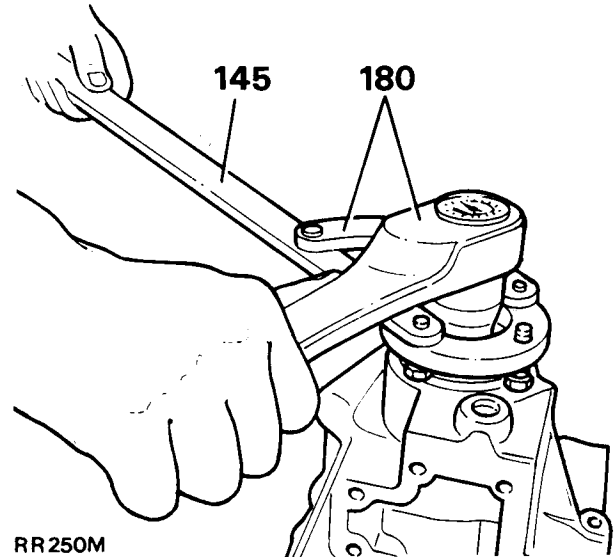
181. **Remove the housing from the vice.**
182. Slide the dog sleeve on to the rear of the output shaft ensuring that the groove in the dog sleeve is to the front.
183. Compress the differential lock selector shaft spring, and fit it between the selector fork lugs.
184. Locate the selector fork inside the side cover aperture in the housing engaging the groove in the dog sleeve on the output shaft.
185. Fit the differential lock selector shaft into the housing from the back, grooved (detents) end last, and pass it through the selector fork lugs and spring and into the front of the housing.
186. Rotate the selector shaft until the two flats are uppermost.
187. Compress the spring slightly between the fork lugs and fit the two locating 'C' caps.
188. Fit the detent ball and spring via the tapped hole in the top of the housing fully home.
189. Apply Loctite Driloc 290 to the detent plug threads and fit the detent plug.
190. Loosely fit the differential lock switch in the tapped hole on top of the housing, ready for adjustment.

DIFFERENTIAL LOCK FINGER HOUSING – OVERHAUL (Items 191 to 197)

Dismantling

191. Remove and discard the Nyloc nut securing the housing assembly and release the lock lever and selector 'finger' from the 'finger' housing.
192. Remove and discard the 'O' ring from the selector finger.
193. Clean remaining parts, examine for wear or damage, renew as necessary.

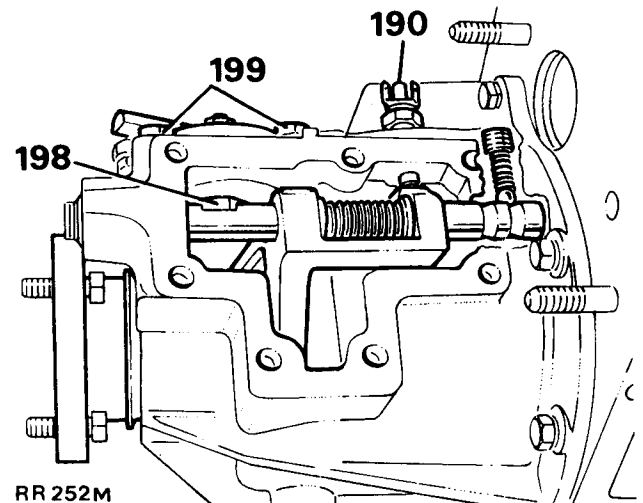
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Reassembly

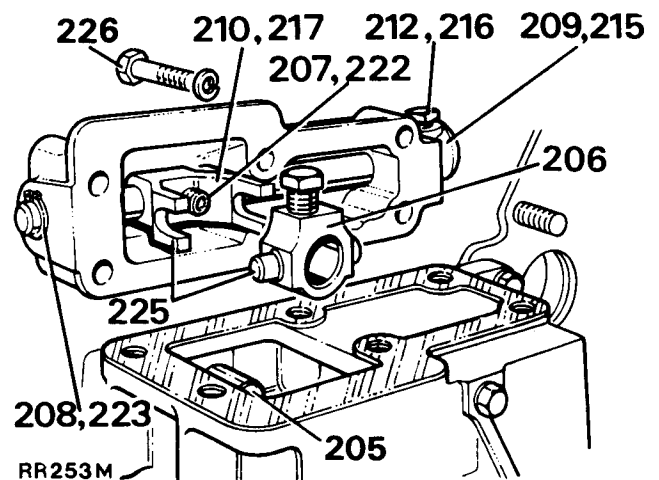
194. Fit new 'O' rings to the finger housing and selector finger and lubricate with oil.
195. Locate the selector finger in the finger housing.
196. Fit the differential lock lever over the flats on the selector finger so that it will face forward in the operating position.
197. Fit the plain washer and a new Nyloc nut.
198. Fit the differential lock 'finger' housing assembly into the round aperture in the front output shaft housing locating the selector 'finger' on the flat on the selector shaft inside the housing.
199. Apply Loctite Driloc 290 to the 'finger' housing screw threads and fit the three securing screws (with spring washers).
200. Grease and fit the differential lock selector side cover gasket and fit the side cover, securing it with the seven bolts (with spring washers).
201. **Prop up the transfer box on the bench with the front side uppermost.**
202. Grease and fit the front output shaft housing gasket and locate the housing on the transfer box.
203. Apply Loctite Driloc 290 to the threads of the housing securing bolts and fit the eight securing bolts (with spring washers). Note that the upper middle bolt is longer.
204. **Turn the transfer box into its normal operating position.**
205. Using a screwdriver inside the housing move the high/low selector shaft rearwards (i.e. into high range position) to provide access for fitting the yoke over the end of the selector shaft.
206. Locate the yoke on the selector shaft, apply Loctite Driloc 290 to the yoke set screw and fit the set screw to the specified torque.



HIGH/LOW SELECTOR HOUSING – OVERHAUL (Items 207 to 223)

Dismantling

207. Remove the selector fork grub screw **completely**.
208. Remove the cross shaft retaining circlip.
209. Withdraw the cross shaft from the selector housing with the operating arm attached.
210. Lift out the selector fork from the housing.
211. Remove the two 'O' rings from the cross shaft.
212. Remove the operating arm from the cross shaft by removing the retaining set screw.
213. Clean parts ensuring that all traces of Loctite are removed, examine for wear or damage, renew as necessary.

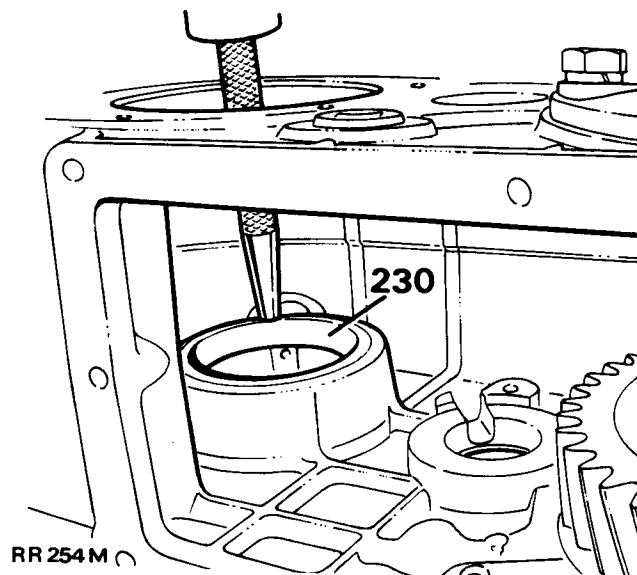


Continued

Transfer Gearbox

Reassembling

214. Fit the 'O' ring to the operating arm end of the cross shaft.
215. Locate operating arm on the shaft blind hole.
216. Apply Loctite Driloc 290 to the operating arm set screw threads and fit the set screw.
217. Locate the selector fork inside the housing.
218. Slide the cross shaft into the housing passing it through the selector fork.
219. Fit the 'O' ring to the fork end of the cross shaft (inside the housing) and lubricate both 'O' rings.
220. Position the cross shaft fully home.
221. Locate the selector fork on the shaft blind hole.
222. Apply Loctite Driloc 290 to the fork grub screw threads and fit the grub screw.
223. Fit the circlip on the end of the cross shaft.
224. Grease and fit the gasket to the high/low selector housing aperture on the front output shaft housing.
225. Position the high/low selector housing so that the projecting selector fork engages the yoke side pins inside the housing.
226. Fit the six selector housing retaining bolts (with plain washers).
227. **Prop up the transfer box on the bench with front side uppermost.**
228. Fit the oil seal into the front of the transfer box (seal lip to rear of case) using replacer tool 18G1422.
229. **Prop up the transfer box on the bench with rear side uppermost.**
230. Drift in the input gear front bearing track from inside the back of the transfer box, using a suitable punch.

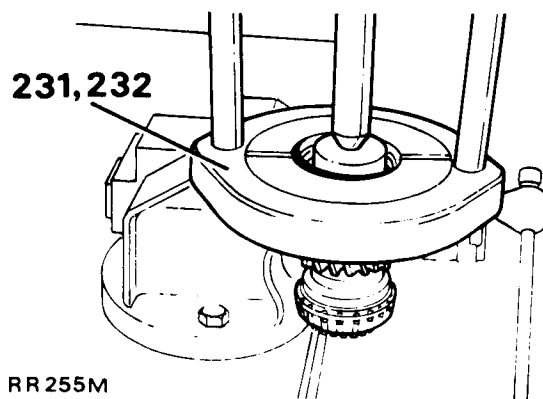


INPUT GEAR – OVERHAUL

(Items 231 to 237)

Dismantling

231. Secure hand press 47 in vice and using collars and buttons 18G47-7 remove the front taper roller bearing from the input gear assembly.
232. Reverse input gear assembly in hand press and remove the rear taper roller bearing.
233. Remove the hand press from the vice.
234. Clean all parts, examine for wear and damage, renew as necessary.



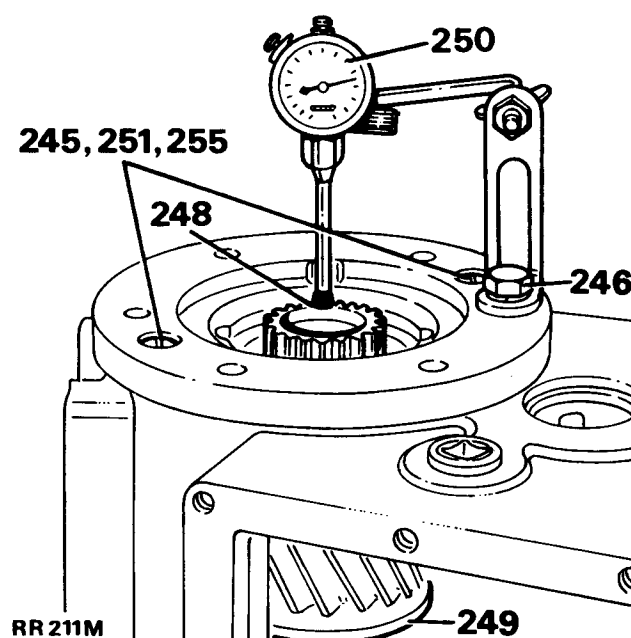
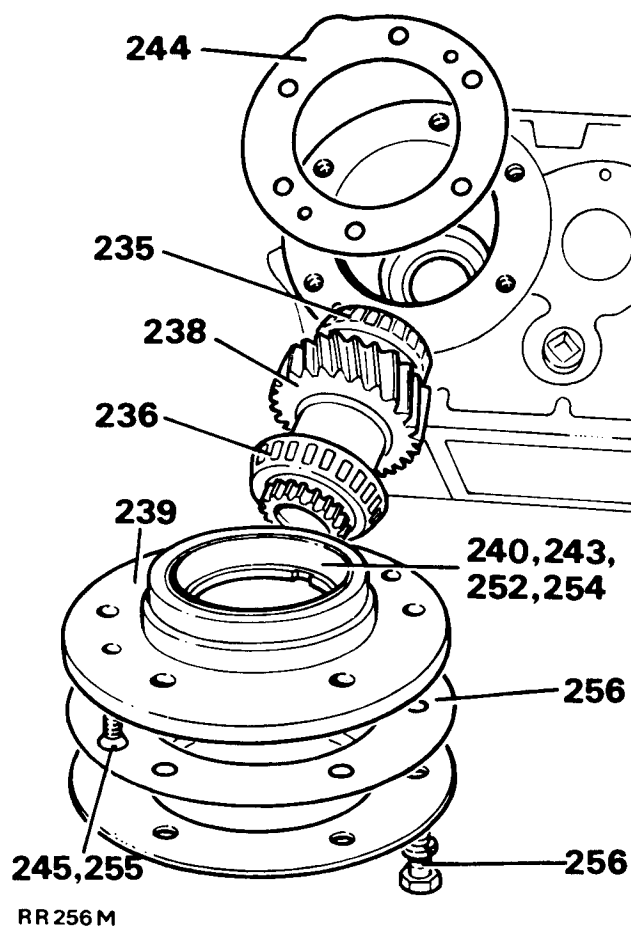
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Reassembly

235. Locate the **front** taper roller bearing on the input gear assembly and drift the bearing fully home.
236. Repeat above procedure and fit the **rear** taper roller bearing.
237. Lubricate both bearings with oil.
238. Fit input gear assembly into the transfer box. From the rear (larger gear to the front).

Obtaining bearing pre-load

239. **Secure the mainshaft bearing housing in the vice.**
240. Drift out the **rear** input gear bearing track and remove the shim behind it.
241. Clean the main bearing housing and measure original shim, noting its thickness.
242. Select a slightly thinner trial shim than the original in order to obtain an end float condition and fit to the main bearing housing.
243. Locate the **rear** bearing track on the main bearing housing and drift it fully home.
244. Apply grease to the gasket and fit on to the transfer box casing.
245. Fit the main bearing housing and tighten the two securing screws to the specified torque.
246. Fit a dial gauge mounting bracket on to the mainshaft bearing housing with a single bolt.
247. Fit a dial gauge with bracket RO530106 to the mounting bracket.
248. Align the gauge pointer on the end of the gear, setting the gauge to '0'.
249. Lift the large gear by hand to record the end float.
250. Remove the dial gauge assembly and mounting bracket.
251. Remove the two screws retaining the mainshaft bearing housing.
252. Drift out the rear bearing track from the bearing housing and remove and discard the trial shim.
253. Select a shim to the required thickness to obtain the correct pre-load of 0,02–0,07 mm (0.001–0.003 in) on reassembly. This is achieved by adding the thickness of the trial shim and the end float obtained to the pre-load specified.
254. Fit the shim to the main bearing housing and then drift the rear bearing track into position.
255. Fit the main bearing housing and tighten the two securing screws to the specified torque.
256. Grease and fit P.T.O. cover gasket and finally fit the P.T.O. cover securing it with six bolts (with spring washers) to the specified torque.

Continued

Intermediate gear assembly – reassembly

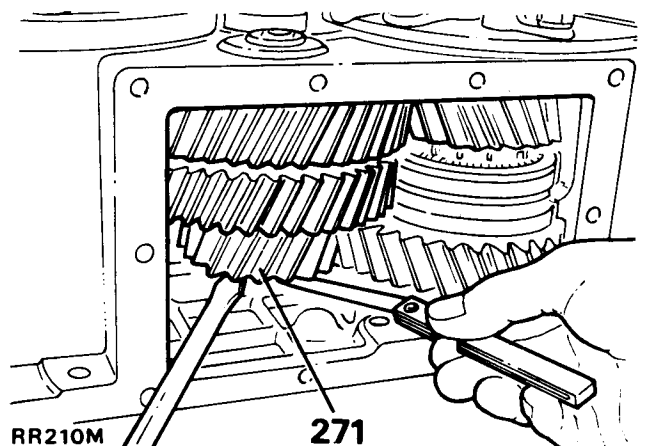
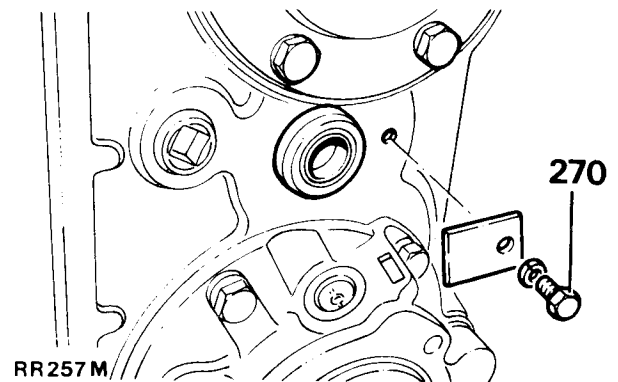
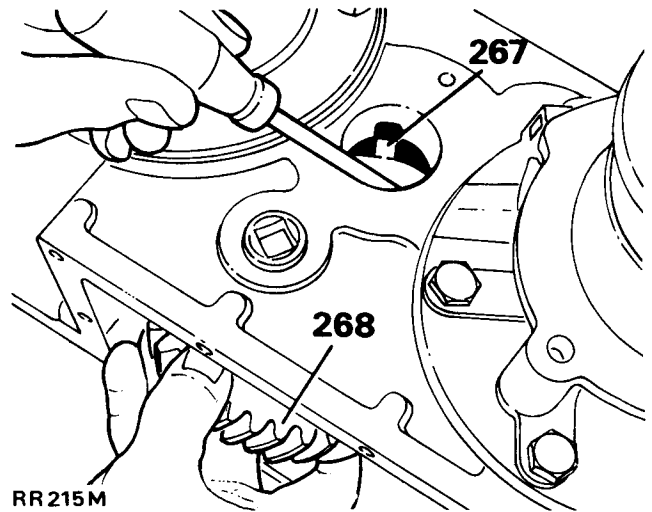
257. First remove the needle roller bearings and spacer from the gear assembly.
258. Clean the parts, including the thrust washers and lock plate and examine for wear or damage, renew as necessary.
259. Fit the 'O' ring to the intermediate shaft.
260. Fit the 'O' ring into the front of the transfer case.
261. Lubricate thrust washers, bearings, shaft and spacer.
262. Fit needle bearings with plain edge diameter outwards and spacer interposed.
263. Fit front thrust washer to slot in transfer case (plain side to case).
264. Locate gear assembly partially into the transfer case so that it rests on the front thrust washer.
265. Locate rear thrust washer (plain side uppermost) into slot in transfer case.
266. Gently push gear assembly into mesh.
267. Using a screwdriver through the intermediate shaft hole guide the locating tab on the rear thrust washer into the slot provided in the transfer case.
268. Align gear and thrust assembly and slide the intermediate shaft into the transfer box from the rear.
269. Align the shaft so that the lock plate slot in the end is on top.
270. Apply Loctite Drilloc 290 to the lock plate bolt threads. Locate lock plate into position and fit securing bolt (with spring washer).
271. Using a screwdriver via the bottom of the transfer case lift up the gear assembly and measure the end float with feeler gauges. This should be between 0,08 – 0,35 mm (0.003 – 0.014 in).
272. Grease and fit the bottom cover gasket.
273. Apply Loctite Drilloc 290 to six of the ten bottom cover fixing bolts only.
274. Clean and fit the bottom cover, using the six bolts (with spring washers) leaving the four centre holes free.

NOTE:— The remaining four bolts are used later to secure the transfer box assembly to the locally made adaptor plate on the hydraulic hoist.

Transmission brake assembly

275. Clean brake backplate and oil drip plate and locate the backplate on the rear output shaft/speedometer housing so that the brake operating lever is on the offside rear.
276. Fit the four Brako Durlok bolts, the lower two also retain the oil drip plate. Tighten to specified torque.
277. Clean and fit brake drum and fit the two countersunk retaining screws.

Continued



Differential Lock Switch Adjustment

278. Select differential locked position by moving the differential lock lever towards the right side of the transfer box.
279. Obtain a battery and connect a test lamp circuit to the differential lock switch.
280. Slacken the lock nut off and screw in the lock switch until the bulb is illuminated.
281. Turn the lock switch another half turn and tighten the lock nut against the housing.
282. Disconnect the battery and move the differential lock lever towards the left side of the transfer box to disengage the differential lock.

Extension Housing – refitting

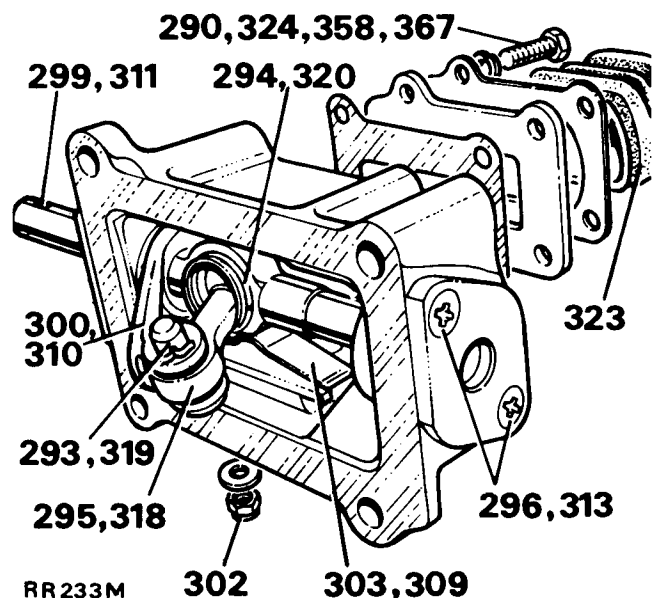
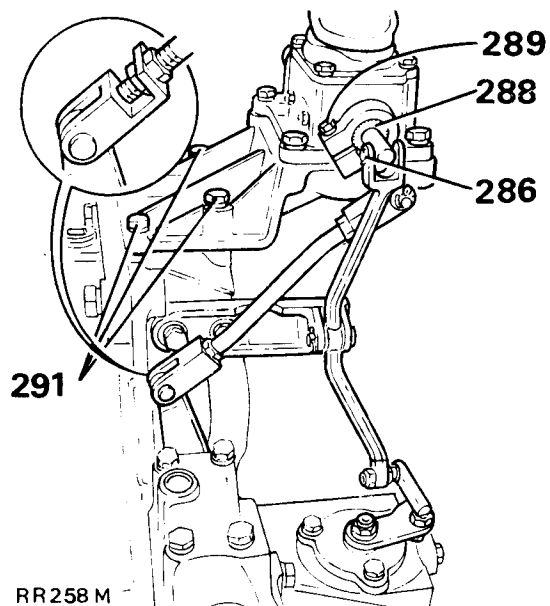
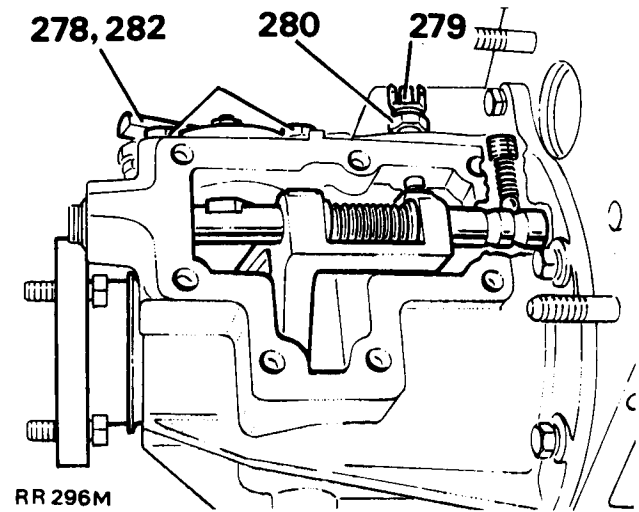
283. First ensure that the lower fixed dowel and the upper loose dowel are in position.
 284. Locate the extension housing over the two studs in the transfer box front casing.
 285. Secure the extension housing with two nuts (with spring washers) and four bolts (with spring washers).
- NOTE:**— The upper bolt on the left side of the transfer box is longer.

**HIGH/LOW GEAR CHANGE HOUSING – OVERHAUL
(Items 286 to 327)****Dismantling**

286. Remove the split pin from the clevis pin at the top of the differential lock cross shaft lever which secures it to the gear change cross shaft.
287. Remove the washer and clevis pin and the anti-rattle nylon strip.
288. Mark the position of the high/low gear change operating arm on the splined shaft of the gear change crank arm.
289. Slacken the clamp bolt and remove the operating arm.
- †290. Remove the four bolts from the top of the gear change housing and lift off the grommet plate, grommet, gate plate and gasket.
291. Remove the four lower gear change housing retaining bolts and the harness clip from the longer front bolt.
292. Remove the housing and gasket.
293. Remove the split pin from the gear change crank arm clevis pin and remove the clevis pin.
294. Remove the circlip from the high/low gear change lever bush.
295. Withdraw the gear change lever from the housing, with ball and socket bush.
296. Remove the two countersunk screws from the housing end cover.
297. Remove the housing end cover.

†On manual gearbox models the grommet and grommet plate illustrated are not used. The gate plate is retained to the housing by two screws. The four main bolts are fitted in-situ through a floor mounted gaiter assembly.

Continued



298. Remove the two 'O' rings from the end cover.
299. Remove the cross shaft from the housing.
300. Compress the detent spring and remove the gear change arm from inside the housing.
301. Remove the two 'O' rings from the crank arm.
302. Remove and discard the two Nyloc nuts retaining the detent plate.
303. Remove the detent plate and spring from the housing.
304. Clean all parts, examine for wear or damage, renew as necessary.

Reassembly

305. Fit the two 'O' rings to the housing end cover.
306. Fit the two 'O' rings to the gear change crank arm.
307. Lubricate 'O' rings with oil.
308. Clip the detent spring on to the detent plate.
309. Fit detent plate assembly into housing and retain from outside with two Nyloc nuts (with plain washers).
310. Compress the detent spring and fit the gear change crank arm in the housing.
311. Fit cross shaft into position locating one end in the crank arm (bush).
312. Fit the housing end cover (bush) to support the other end of the cross shaft.
313. Finally secure the housing end cover with the two countersunk screws.
314. Before refitting the gear change lever remove the clevis pin bushes and the Nylon socket bush and ball.
315. Clean all parts, examine for wear and damage, renew as necessary.
316. Fit and grease gear lever ball and Nylon socket bush to gear lever.
317. Fit and grease clevis pin bush.
318. Locate gear change lever assembly in cross shaft (do not fit socket bush retaining circlip at this stage).
319. Align gear change lever end with crank arm fork and fit clevis pin and split pin.
320. Finally secure Nylon socket bush with circlip.
321. Grease and fit gasket to gear change housing face.
- †322. Fit the gate plate.
- †323. Fit the grommet.
- †324. Fit the grommet plate and retain with the four securing bolts (with spring washers).

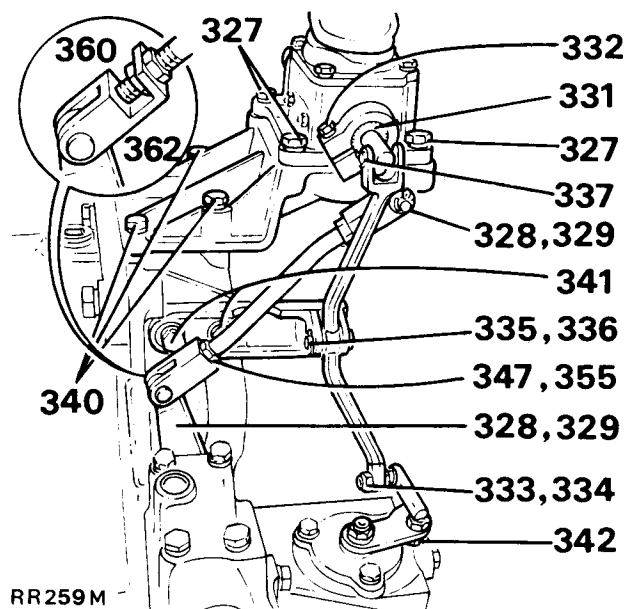
NOTE:— On earlier production where a different grommet and grommet plate are fitted, adhesive is used to keep the grommet positively seated.

325. Clean the lower gear change housing.
326. Grease and fit the gasket to the housing.
327. Fit the gear change housing to the lower gear change housing and secure with the four bolts (with spring washers). The longer front bolt also retains the harness clip.

NOTE:— Do not fit the lower gear change housing to the extension housing at this stage.

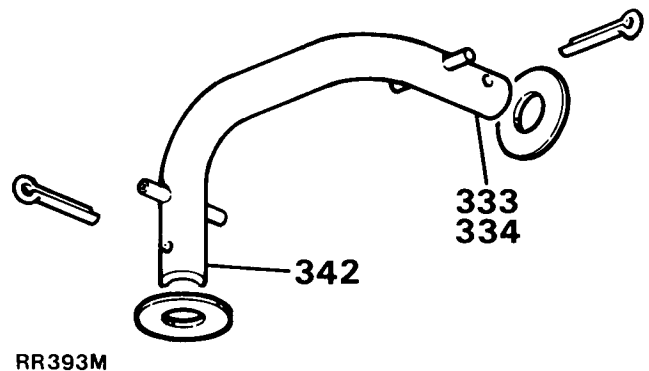
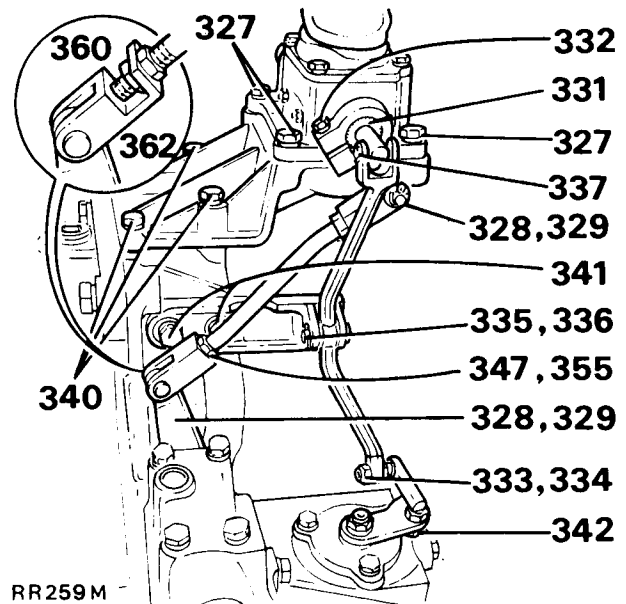
- †On manual gearbox models the grommet and grommet plate (illustrated on the previous page) are not used. The gate plate is retained to the housing by two screws. The four main bolts are fitted in-situ through a floor mounted gaiter assembly.

Continued



RR259M

328. Before refitting the high/low connecting rod and gear change operating arm remove the respective clevis pins and Nylon bushes. Clean and examine for wear or damage, renew as necessary.
329. Grease and fit the Nylon bushes to the high/low connecting rod and the gear change operating arm.
330. Assemble the operating arm to the connecting rod with clevis pin, plain washer and split pin.
331. Slacken the operating arm clamp bolt and fit the operating arm on to the splined shaft projecting from the high/low gear change housing, carefully aligning it to the marks on both components.
332. Tighten the clamp bolt to the specified torque.
- *333. Before refitting the differential lock cross shaft lever and pivot bracket remove the respective clevis pins and Nylon bushes. Also remove and discard the Nyloc nut retaining the short connecting link and pull off the link. Clean and examine for wear or damage, renew as necessary.
- *334. Fit the short connecting link to the **bottom** of the cross shaft lever and secure with a new NYLOC nut.
335. Grease and fit the Nylon bushes to the **middle** pivot of the cross shaft lever.
336. Fit the cross shaft lever to the (loose) pivot bracket with the clevis pin, washer and split pin.
337. Fit the cross shaft lever fork (top) to the gear change cross shaft.
338. Locate the anti-rattle Nylon strip and fit the clevis pin, plain washer and split pin.
339. Locate the complete gear change housing assembly in position on top of the extension housing with the high/low connecting rod and the differential lock cross shaft lever attached.
340. Fit the four bolts (with spring washers) to secure the lower gear change housing to the extension housing.
341. Fit the pivot bracket to the extension housing using the two securing bolts (with spring washers).
- *342. Fit the short connecting link at the bottom of the differential lock cross shaft lever to the lock lever and retain it with a new Nyloc nut.
343. Grease and fit the Nylon bushes to the operating arm on the selector housing cross shaft.



Adjustment of original high/low connecting rod (by fork rotation)

344. Align the high/low connecting rod to the operating arm and temporarily fit the clevis pin.
345. The gear lever grommet is retained by adhesive and can be immediately removed for checking that the gear lever does not foul the gate plate when high or low range is selected.
346. If adjustment is required the following procedure should be carried out.
347. Slacken the locknut on the operating arm fork.
348. Remove the loose clevis pin temporarily connecting the operating arm to the high/low connecting rod.

*The latest cranked short connecting link is retained by a split pin at each end.

Continued

- **349. Lift up the operating arm and rotate the fork to shorten or lengthen the connecting rod as required.
- 350. Refit the clevis pin temporarily.
- 351. Move gear change lever into high range (rearwards) and move the operating arm on the selector housing cross shaft into high range (forwards).
- 352. Check that the gear change lever does not foul the gate plate in this position.
- 353. Engage and check low range in the same way.
- 354. After adjustment return the gear change lever to the high range position.
- 355. Tighten the locknut on the connecting rod fork.
- 356. Finally fit the plain washer and split pin to the clevis pin to secure the connecting rod to the operating arm.

****Alternative method of adjusting original high/low connecting rod length**

Where difficulty is experienced in releasing or replacing the clevis pin and split pin securing the connecting rod fork end to the operating arm, due to its proximity to the transfer box casing, the following method may be substituted.

- (a) Disconnect the top of the differential lock cross shaft lever from the gear change cross shaft.
- (b) Remove the four bolts retaining the gear change housing.
- (c) Lift up the housing assembly (with the connecting rod attached) and rotate it as required to vary the length of the connecting rod.

Adjustment of latest type high/low connecting rod (in situ by locknuts)

- 357. Align the high/low connecting rod to the operating arm and fit the clevis pin, plain washer and split pin.
 - †358. Remove the four bolts from the top of the gear change housing and lift off the gear change lever grommet plate and the gear change lever grommet. Replace the four bolts temporarily to retain the gate plate in position.
 - 359. Check that the gear lever does not foul the gate plate when high or low range is selected. If adjustment is required carry out the following procedure.
 - 360. Slacken off the connecting rod locknuts.
 - 361. Move gear change lever into high range (rearwards) and move the operating arm on the selector housing cross shaft into high range (forwards).
 - 362. Tighten both locknuts.
 - 363. Check that the gear change lever does not foul the gate plate in this position.
 - 364. Engage and check low range in the same way.
 - 365. After adjustment return the gear change lever to the high range position.
 - †366. Remove the four bolts retaining the gate plate and refit the grommet and grommet plate.
 - †367. Refit the four bolts (with spring washers).
- †On manual gearbox models the grommet and grommet plate illustrated are not used. The gate plate is retained to the housing by two screws. The four main bolts are fitted in-situ through a floor mounted gaiter assembly.

Continued

Transfer box mounting – refitting

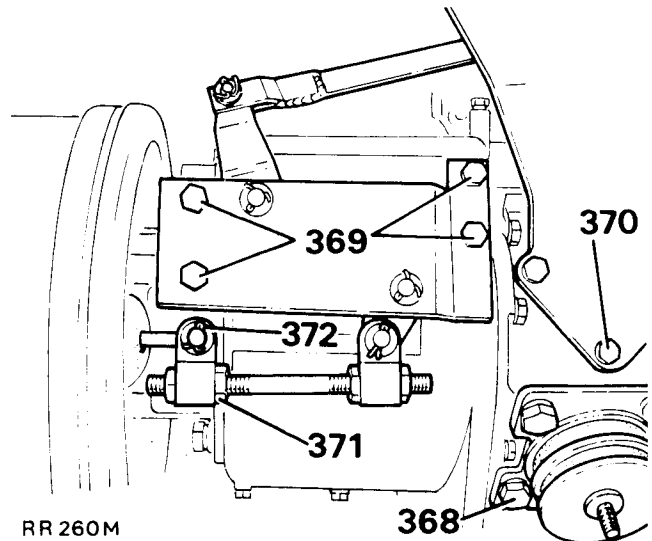
368. Fit the rubber mounting plate to the right side of the front output housing by fitting the four securing bolts (with spring washers).

Handbrake linkage – refitting

369. Locate the hand brake linkage bracket in position on the right hand side of the transfer box casing and secure with the two long and two short bolts (with spring washers).
370. Fit the hand brake lever mounting bracket on the right side of the front output shaft housing. It is secured by three bolts (with spring washers) but only the bottom bolt is fitted on the bench.

NOTE:– The remaining bolts are fitted on the vehicle when securing the bell housing tie-rod.

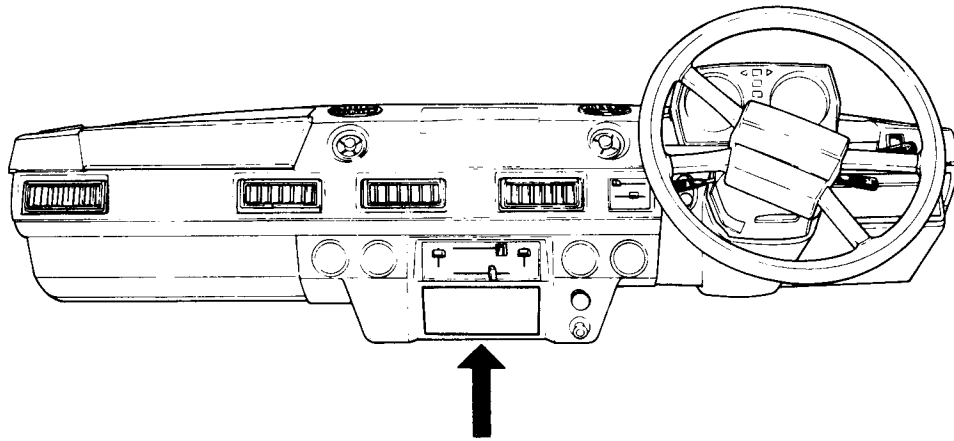
371. Align the handbrake adjustment linkage to the mounting position. If necessary the length of the operating link may be varied by slackening the appropriate locknuts.
372. Insert the clevis pin through the brake operating lever, fit the Thackeray (double spring) washer, hand-brake link, plain washer and split pin.
373. Ensure that adjusting link locknuts are tight.



TRANSFER GEARBOX LT230R**SPECIAL TOOLS**

TRANSFER GEARBOX REMOVE AND REFIT	Mounting plate for transmission hoist Local manufacture dimensions in workshop manual
INTERMEDIATE SHAFT REMOVE	Extractor for transfer box intermediate shaft RO605862
STAKE NUT REMOVE AND REFIT	Spanner centre differential stake nut 18G1423
DRIVE FLANGES REMOVE AND REFIT	Adjustable flange holding wrench 18G1205
OIL SEALS REMOVE	Input and output seals 18G1271
OIL SEAL REFIT	Drift Input and output seals 18G1422
CIRCLIP	Circlip pliers 18G257
PRE-LOAD BEARING CHECK	Centre differential and input bearings RO530106 bracket plus suitable dial gauge
LOCATE TRANSFER GEARBOX TO AUTO-TRANSMISSION	Guide studs to eliminate damage to input oil seal 18G1425
CENTRE DIFFERENTIAL BEARING) CONE REAR REMOVE) CENTRE DIFFERENTIAL BEARING) CONE FRONT REMOVE)	Tool 47 Hand press 18G47BB Bearing remover
CENTRE DIFFERENTIAL BEARINGS CONE REPLACE	Drift on bearings both ends of drift used due to different sized bearings 18G1424
INPUT GEAR ASSEMBLY BEARING) CONES REMOVE))	Tool 47 hand press 18G47-7
INPUT GEAR ASSEMBLY BEARING) CONES REFIT)	

AUTOMATIC GEARBOX



WARNING LABEL FITTED TO VEHICLE

WARNING

IN 'P' DO NOT IDLE FOR MORE THAN 10 MINUTES, OR RUN ENGINE ABOVE IDLE. USE 'N' FOR PROLONGED IDLING.

TO CHANGE TRANSFER RATIO REDUCE SPEED TO BELOW 8KPH (5MPH), SELECT AUTO '**N**', MOVE HIGH/LOW LEVER RAPIDLY TO REQUIRED POSITION. SELECT AUTO GEAR. ALTERNATIVELY, STOP VEHICLE, STOP ENGINE, MAKE SELECTION. IN CASE OF DIFFICULTY REFER TO HANDBOOK.

FOR OPTIMUM ENGINE BRAKING, SELECT AUTO '**1**', KEEP ENGINE RUNNING.

USE DIFF LOCK ONLY WHEN TRACTION IS LIKELY TO BE LOST.

SINGLE AXLE ROLLER RIGS MAY BE USED WITH DIFF LOCK DISENGAGED FOR SPEEDS UP TO 5KPH (3MPH). FOR OTHER CONDITIONS SEE HANDBOOK.

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AUTOMATIC GEARBOX

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TRANSFER GEARBOX

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SPECIAL TOOLS

Automatic gearbox		99
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TECHNICAL DATA

AUTOMATIC GEARBOX

Type	A727 Automatic three speed & reverse epicyclic gearbox with fluid torque converter.	
Lubrication	Pump (rotor type)	
Pump clearances:—		
Rotor side clearance	0,090 to 0,190mm (0.0035 to 0.0075 inch)	
Rotor tip clearance	0,120 to 0,240mm (0.0045 to 0.0095 inch)	
Rotor face clearance	0,030 to 0,063mm (0.0010 to 0.0025 inch)	
Gear train end play	0,300 to 0,630mm (0.0100 to 0.0250 inch)	
Input shaft end play	0,920 to 2,130mm (0.0360 to 0.0840 inch)	
Thrust washers, input shaft		
(Selective) Natural	1,550 to 1,600mm (0.0610 to 0.0630 inch)	
Red	2,140 to 2,180mm (0.0840 to 0.0860 inch)	
Yellow	2,600 to 2,640mm (0.1020 to 0.1040 inch)	
Snap rings:—		
Rear clutch snap ring		
(Selective)	1,530 to 1,570mm (0.0600 to 0.0620 inch)	
	1,880 to 1,930mm (0.0740 to 0.0760 inch)	
	2,240 to 2,280mm (0.0880 to 0.0900 inch)	
	2,700 to 2,740mm (0.1060 to 0.1080 inch)	
Output shaft (forward end)		
(Selective) Natural	1,220 to 1,320mm (0.0480 to 0.0520 inch)	
Blue	1,400 to 1,500mm (0.0550 to 0.0590 inch)	
Green	1,570 to 1,670mm (0.0620 to 0.0660 inch)	
Clutch plate clearance		
Front clutch	1,940 to 3,120mm (0.0760 to 0.1230 inch)	
Rear clutch	0,640 to 1,140mm (0.0250 to 0.0450 inch)	
Number of front clutch plates	3 (Plain)	
Number of front clutch discs	3 (With grooved friction faces)	
Number of front clutch springs	9	
Number of rear clutch plates	3 (Plain)	
Number of rear clutch discs	4 (With friction faces)	
Band adjustments		
Number of turns backed off from 8,1Nm (72 lbf·in)	2.50	

TRANSFER GEARBOX

Type	LT230R. Two speed reduction on main gearbox output. Front & rear drive permanently engaged via a lockable differential.	
Input gear	26 Teeth	
Intermediate gear	19 x 41 x 44 Teeth	
Output gear	40 x 28 Teeth	
Input shaft bearing pre-load	0,02 to 0,07mm (0.001 to 0.003 inch)	
Intermediate gear end float	0,08 to 0,35mm (0.003 to 0.014 inch)	
Differential pinions backlash	Zero to 0,07mm (Zero to 0.003 inch)	
Output shaft bearing pre-load	0,02 to 0,07mm (0.001 to 0.003 inch)	
Low range gear end-float)	0,05 to 0,15mm (0.002 to 0.006 inch)	
High range gear end-float)		
High range gear/bush running clearance diameter	0,03 to 0,09mm (0.0012 to 0.0035 inch)	

GEAR RATIOS

Automatic gearbox	Top	1.00:1	
	Second	1.45:1	
	First	2.45:1	
	Reverse	2.20:1	
Transfer gearbox	High	1.003:1	
	Low	3.320:1	
Overall ratio	In high transfer	In low transfer	
Top	3.55	11.75	
Second	5.15	17.04	
First	8.70	28.79	
Reverse	7.81	25.86	

AUTOMATIC SHIFT SPEEDS AND LINE PRESSURE CHARTS

Automatic shift speeds in high range transfer			
Automatic selector position	Throttle position and shift response	Approximate road speed	
		km/h	m.p.h.
	Kickdown range		
D	1 – 2 Upshift	55 to 74	34 to 46
D	2 – 3 Upshift	90 to 117	56 to 73
D	3 – 2 Downshift	82 to 106	51 to 66
D	3 – 1 Downshift	42 to 58	26 to 36
2	2 – 1 Downshift	40 to 51	25 to 32
	Part throttle		
D	3 – 2 Downshift	45 to 61	28 to 38
	Light throttle		
D	1 – 2 Upshift	10 to 18	6 to 11
D	2 – 3 Upshift	21 to 29	13 to 18
	Throttle closed		
D	3 – 1 Roll out	8	5
1	2 – 1 Roll out	37 to 53	23 to 33

Stall speed 2000 rev/min.

HYDRAULIC PRESSURES (Line pressure)		
Check with:— Transfer gearbox in neutral Automatic gearbox in 'D' Throttle linkage disconnected at gearbox Engine speed 1000 rev/min		
Throttle valve position (move manually)	lbf/in ²	kgf/cm ²
Throttle valve fully forward	54 to 60	3,8 to 4,2
Throttle valve fully rearward	90 to 96	6,3 to 6,7

TORQUE WRENCH SETTINGS – AUTOMATIC GEARBOX

COMPONENT	DESCRIPTION	QUANTITY	Nm	lbf ft
Adaptor ring to engine	3/8 UNC x 1.625 inch bolt		36 to 48	26 to 34
Gearbox to adaptor ring	1/2 inch UNF nut	2	56 to 70	40 to 50
Gearbox to adaptor ring	1/2 UNC x 1.250 inch screw	4	56 to 70	40 to 50
Cover plate to adaptor ring	6 x 25,0 mm screw	7	7 to 10	5 to 7
Cover plate to adaptor ring	screw	2	7 to 10	5 to 7
Tie plate to sump (engine sump)	8 x 20,0 mm screw	3	22 to 28	16 to 21
Tie plate to sump (engine sump)	8 x 16,0 mm screw	3	22 to 28	16 to 21
Kick down pivot bracket adaptor ring	8 x 16,0 mm screw	1	22 to 28	16 to 21
Lower gear change housing – adaptor housing	8 mm screw and bolts	2 of each	22 to 28	16 to 21
Spacer to crankshaft	7/16 UNF x 0.75 inch screw	6	77 to 90	55 to 65
Spigot aligner to spacer	10 x 25 mm screw	4	40 to 50	29 to 37
Starter ring to drive place	screw	10	30 to 37	22 to 27
Drive plate to torque converter	5/16 UNF x 1.125 inch screw	4	25 to 35	18 to 25
Oil filter extension	stud	3	3,5 to 4,5	2.5 to 3.2
Oil filter to spacer	10 UNF self lock nut	3	3,5 to 4,5	2.5 to 3.2
Breather connector to gearbox	6 x 16 mm screw	1	7 to 10	5 to 7
Breather pipe (metal) to connector block	sleeve nut and olive	1	8 to 10	5.7 to 7.2
Clamping plate to oil pump housing	5/16 inch UNC x 1.50 inch screw	2	21 to 28	15 to 20
Breather pipe to gearbox (external)	banjo bolt	1	7 to 11	5 to 8
Packer to torque converter housing	1/4 inch UNC x 0.875 inch screw	3	5,6 to 8,4	4 to 6
Sump to gearbox	5/16 inch UNC x 0.750 inch screw	14	21 to 28	15 to 20
Drain plug	16 mm	1	25 to 35	19 to 26
Mainshaft nut	special nut	1	126 to 154	90 to 110
Coupling shaft to mainshaft nut	12 x 120 mm bolt	1	65 to 80	48 to 59
Adaptor housing to gearbox	10 x 30 mm screw	1	40 to 50	29 to 37
Adaptor housing to gearbox	10 x 40 mm screw	3	40 to 50	29 to 37
Adaptor housing to gearbox	bolt (fitted)	1	40 to 50	29 to 37
Lower bracket to gearbox	1/2 inch UNF nut and screw	1	35 to 42	25 to 30
Bridge pipe for oil cooler	sleeve nuts	2	7 to 9	5 to 6.5
Tie plate to gearbox sump	8 x 20,0 mm screw	2	22 to 28	16 to 21
Torque connector housing sealing	grub screw	2	Top of thread to be flush with outer face of torque converter housing recess.	
Throttle lever clamping bolt	5 x 25 mm bolt	1	5 to 7	4 to 5
Gear change pivot retention	8 mm self lock nut	1	22 to 28	16 to 21
Oil cooler adaptors	1/8 inch taper thread	2	10 to 12	7.2 to 8.5
Oil cooler elbow to cooler adaptors	sleeve nut	2	10 to 12	7.2 to 8.5

Continued

TORQUE WRENCH SETTINGS – TRANSFER GEARBOX

COMPONENT	DESCRIPTION	QUANTITY	Nm	lbf ft
Pinch bolt, operating arm	6 x 25,0 mm bolt	1	7 to 10	5 to 7
Gate plate to grommet plate	6 x 20,0 mm screw	4	7 to 10	5 to 7
End cover	6 x 20,0 mm screw	2	7 to 10	5 to 7
Speedometer cable retainer	6 mm nut	1	7 to 10	5 to 7
Rear output/speedometer housing	6 x 30,0 mm stud	1	See note	
Locating plate to gear change housing	5 mm self lock nut	2	5 to 7	4 to 5
Bottom cover to transfer case	8 x 30,0 mm bolt	10	22 to 28	16 to 21
Front output housing to transfer case	8 x 30,0 mm bolt	7	22 to 28	16 to 21
Front output housing to transfer case	8 x 90,0 mm bolt	1	22 to 28	16 to 21
Cross shaft housing to front output housing	8 x 55,0 mm bolt	6	22 to 28	16 to 21
Gear change housing	8 x 55,0 mm	2	22 to 28	16 to 21
Pivot shaft	8 mm nut	1	22 to 28	16 to 21
Connecting rod	8 mm nut	1	22 to 28	16 to 21
Retaining plate intermediate shaft	8 x 20,0 mm screw	1	22 to 28	16 to 21
Front output housing cover	8 x 25,0 mm screw	7	22 to 28	16 to 21
Gear change housing	8 x 25,0 mm screw	2	22 to 28	16 to 21
Bracket to extension housing	8 x 25,0 mm screw	2	22 to 28	16 to 21
Finger housing to front output housing	8 x 25,0 mm screw	3	22 to 28	16 to 21
Mainshaft bearing housing	8 x 25,0 mm screw	2	22 to 28	16 to 21
Brake drum	8 x 20,0 mm screw	2	22 to 28	16 to 21
Gearbox to transfer box	10 x 40,0 mm bolt	3	40 to 50	29 to 37
Gearbox to transfer box	10 x 45,0 mm bolt	1	40 to 50	29 to 37
Bearing housing to transfer gearbox	10 x 35,0 mm bolt	6	40 to 50	29 to 37
Speedometer housing to transfer gearbox	10 x 30,0 mm screw	5	40 to 50	29 to 37
Speedometer housing to transfer gearbox	10 x 45 mm screw	1	40 to 50	29 to 37
Selector fork to cross shaft	10 x 16 mm grub screw	1	40 to 50	29 to 37
Yoke to selector shaft high/low	10 mm tapered screw	1	22 to 28	16 to 21
Selector fork, high/low to shaft	10 mm tapered screw	1	22 to 28	16 to 21
Operating arm high/low	10 mm tapered set screw	1	22 to 28	16 to 21
Transmission brake	10 x 25,0 mm bolt	4	65 to 80	48 to 59
Gearbox to transfer case	10 mm nut	2	40 to 50	29 to 37
Gearbox to transfer case	10 mm studs	2	See note	
Oil drain plug	12 x 14 mm hexagon head	1	25 to 35	19 to 26
Differential case	10 x 60 mm bolt	8	55 to 64	40 to 47
Output flange	20 mm self locking nut	2	146 to 179	108 to 132
Differential case rear and shaft main drive 2/4 wheel drive	50 mm nut	1	66 to 80	50 to 60
Link arm and cross shaft lever to ball joint	1/4 inch UNF self locking nut	2	8 to 12	6 to 9
Oil filler/level plug	3/4 inch taper thread	2	25 to 35	19 to 26
Transfer breather	1/8 inch B.S.P.		7 to 11	5 to 8

NOTE:— Studs to be assembled into casings with sufficient torque to wind them fully home, but this torque must not exceed the maximum figure quoted for the associated nut on final assembly.

RECOMMENDED LUBRICANTS AND FLUIDS

U.K. and EUROPE

COMPONENT	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	SHELL	TEXACO	PETROFINA
Automatic Gearbox	BP Autran DX2D	Castrol TQ DEXRON 11D	Duckhams Fleetmatic C/D or D-Matic	Esso ATF DEXRON 11D	Mobil ATF 22 OD	Shell ATF DEXRON 11D	Texamatic 9226 DEXRON 11D	DEXRON 11D
Transfer Gearbox	BP Gear Oil SAE 90 EP	Castrol Hypoy 90 EP	Duckhams Hypoid 90	Esso Gear Oil GX85W/90	Mobil Mobilube HD 90	Shell Spirax 90 EP	Texaco Multigear Lubricant 85W/90	FINA Pontonic MP SAE80W/90

ALL OTHER TERRITORIES

COMPONENT	Service Classification		Ambient Temperature Centigrade						
	Performance Level	SAE Viscosity	-30	-20	-10	0	10	20	30
Automatic Gearbox	DEXRON D 11		↔						↔
*Transfer Gearbox	MIL-L-2105A	90 EP 80 WEP	↔			↔			↔

***NOTE:** — Either engine or automatic gearbox oil may be used as an alternative to the specified gear oil for the transfer gearbox and can be mixed together.

CAPACITIES

	U.K. Pints	
	Litres	
Automatic Gearbox	8.52	15
Transfer Gearbox	2.80	5

***IMPORTANT:** — If gearbox is drained approx. 7 pints (up to 4 litres) of oil will remain in the torque converter. Initially refill gearbox with 8 pints (4,5 litres) only and check with dipstick to ensure correct level.

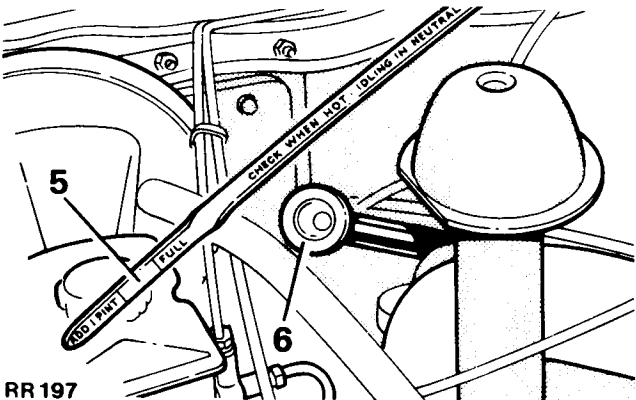
MAINTENANCE SCHEDULES

	Every 10 000 km (6000 miles) or 6 months	Every 20 000 km (12 000 miles) or 12 months
ENGINE COMPARTMENT		
Check/top up automatic gearbox oil level	X	X
UNDERBODY		
Drain converter housing if drain plug is fitted for wading	X	X
Renew automatic gearbox oil and change filter	Every 40 000 km (24 000 miles)	
Normal use		
Arduous use		X
Check/adjust automatic gearbox brake bands	Every 40 000 km (24 000 miles)	
Normal use		
Arduous use		X
Check/top up transfer gearbox oil level	X	X
Renew transfer gearbox oil	Every 40 000 km (24 000 miles)	
Check handbrake for security and operation: adjust if necessary	X	X
PASSENGER COMPARTMENT		
Check automatic gearbox parking pawl engagement	X	X

ENGINE COMPARTMENT

Automatic gearbox oil level

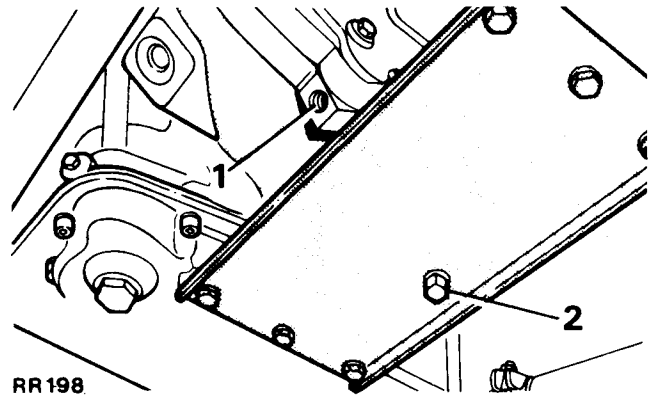
- Check oil level daily or weekly when operating under severe wading conditions.
- Always check the oil level with the vehicle standing on level ground and use the correct type of automatic gearbox fluid.
1. Apply the handbrake and select N (Neutral).
 2. Start and run the engine until normal operating temperature is reached.
 3. Still with the handbrake and footbrake applied, and with the engine idling, move the selector through all the gear positions, pausing momentarily in each position.
 4. Select N (Neutral) and with the engine still running at idling speed withdraw the dipstick from the filler tube and wipe the blade with a piece of clean paper or non-fluffy cloth.
 5. Re-insert the dipstick fully and withdraw it immediately and check the fluid level indication. This must be between the 'FULL' mark and the 'ADD ONE PINT' mark.
 6. Top up the gearbox with fluid through the filler tube, then repeat the procedure above until the fluid level is correct. **Do not overfill.**
 7. After checking fluid level be sure that the dipstick is resealed correctly to prevent dirt or water from entering the gearbox.



UNDERBODY

Drain converter housing if drain plug is fitted for wading

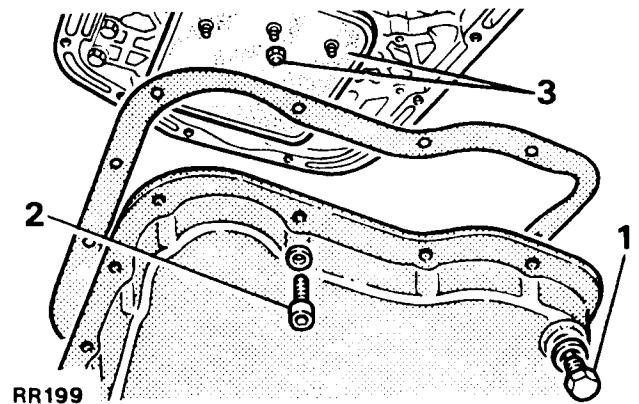
1. The converter housing can be completely sealed to exclude mud and water under severe wading conditions by means of a plug fitted in the bottom of the housing.
2. When not in use, the plug is screwed into the tie-plate between the gearbox and engine sumps, and should only be fitted when the vehicle is expected to do wading or very muddy work.
When the plug is in use it must be removed periodically and all oil allowed to drain off before the plug is replaced.



Renew automatic gearbox oil, change filter and adjust brake bands

Drain, renew filter and refill monthly when operating under severe wading conditions.

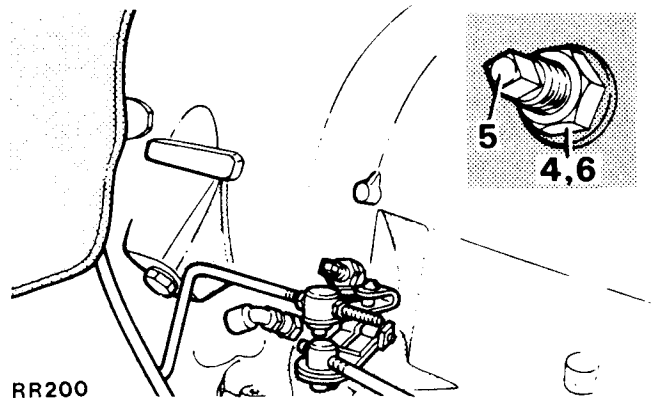
1. Immediately after a run when the fluid is warm, drain off the fluid into a container by removing the drain plug and washer from the transmission sump.
2. Slacken the sump bolts and tap the sump at one corner to break it loose, then remove the sump and gasket.
3. Remove and discard the filter from the bottom of the valve body.



Adjusting kickdown band

The kickdown band adjusting screw is located on the left side of the gearbox case.

4. Slacken the adjusting screw locknut and back off the nut approximately five turns. Check that the adjusting screw turns freely in the case.
5. Using a torque wrench, tighten the adjusting screw to 8 Nm (72 lbf in).
6. Back off the adjusting screw 2½ turns. Hold the adjusting screw in this position and tighten the locknut to 41 Nm (30 lbf ft).

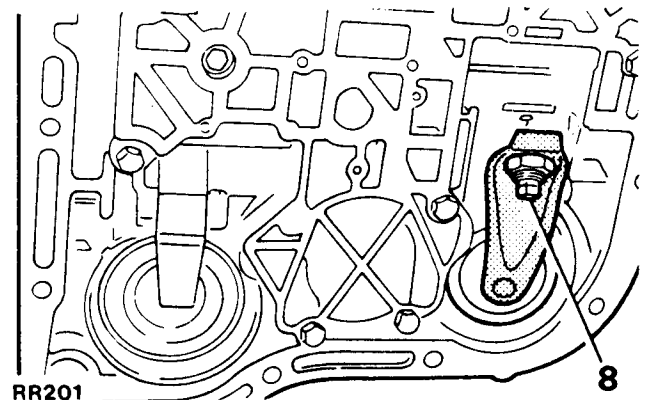


Adjusting low and reverse band

The low and reverse band adjusting screw is located inside the gearbox case at the bottom.

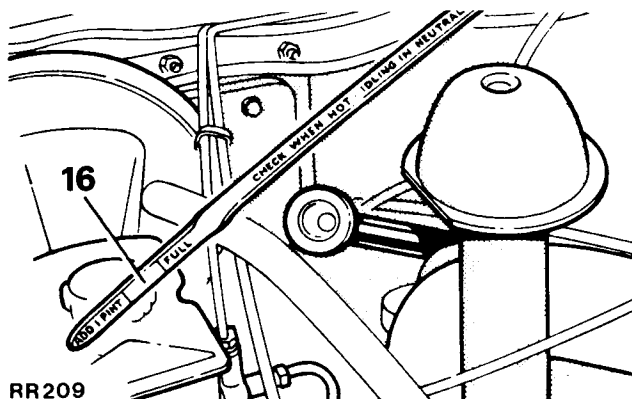
7. Slacken the adjusting screw locknut and back off the nut approximately five turns. Check that the adjusting screw turns freely in the lever.
8. Using a torque wrench, tighten the adjusting screw to 8 Nm (72 lbf in).
9. Back off the adjusting screw 2½ turns. Hold the adjusting screw in this position and tighten the locknut to 41 Nm (30 lbf ft).

continued



Reassembling and filling

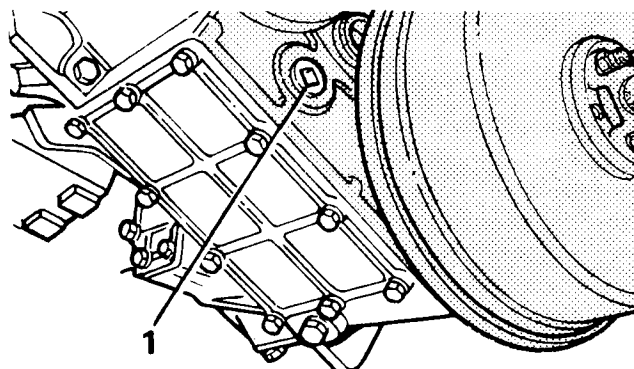
10. Install a new filter on the bottom of the valve body and tighten the retaining nuts to 11 Nm (100 lbf in).
11. Clean the gearbox sump and refit using a new gasket. Tighten the sump bolts to 18 Nm (160 lbf in).
12. Clean and refit the sump drain plug and washer.
13. Pour five litres (one gallon) of the correct type of automatic transmission fluid through the filler tube.
14. Start the engine and allow to idle for at least two minutes. Then, with the handbrake and footbrake firmly applied, move the selector through all the gear positions, pausing momentarily in each position, ending in the N (Neutral) position.
15. With the engine running at idle speed and Neutral selected, add sufficient fluid to bring the level to the 'ADD ONE PINT' mark on the dipstick.
16. With the engine idling, neutral still selected, check the fluid level after the transmission is at normal operating temperature. The level should be between the 'FULL' mark and 'ADD ONE PINT' mark. **DO NOT OVERFILL.**
17. After checking fluid level be sure that the dipstick is resealed correctly to prevent dirt or water from entering the gearbox.



Check/top up transfer gearbox oil level

Check oil level daily or weekly when operating under severe wading conditions.

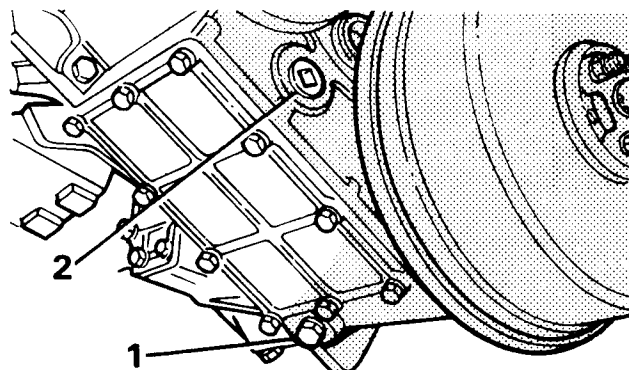
1. To check oil level: remove the oil level plug, located on the rear of the transfer box casing; oil should be level with the bottom of the hole.
2. If necessary, top up through the oil level plug hole using a pump type oil can. If significant topping up is required, check for oil leaks at drain and filler plugs.



Renew transfer gearbox oil

Drain and refill monthly when operating under severe wading conditions.

1. Immediately after a run when the oil is warm, drain off the oil into a container by removing the drain plug and washer from the bottom of the transfer box.
2. Replace the drain plug and washer and refill the transfer box through the oil level plug hole with the correct grade of oil, to the bottom of the oil level plug hole. For capacity see Data, Section

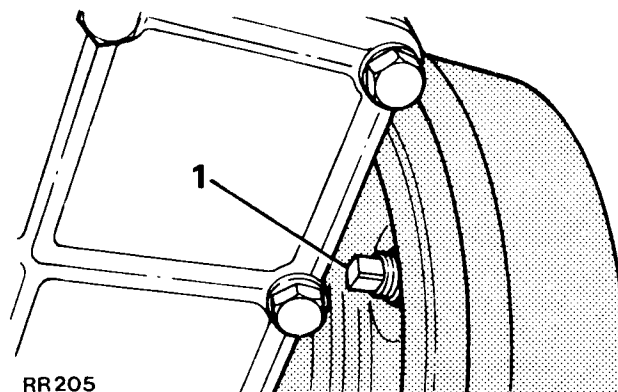


IMPORTANT: Do not overfill, otherwise leakage may occur.

Check/adjust transmission handbrake

If handbrake movement is excessive, adjust as follows:—

1. Release the handbrake. The adjuster protrudes from the front of the brake backplate.
2. During rotation of the adjuster a click will be felt and heard at each quarter revolution. Rotate adjuster in a clockwise direction until the brake shoes contact the drum. Then unscrew the adjuster two clicks and give the handbrake a firm application to centralise the shoes.

**PASSENGER COMPARTMENT****Check automatic gearbox parking pawl engagement**

1. Stand the vehicle on a level surface. Switch off the engine and release the handbrake.
2. Move the gear lever to P (Park).
3. Attempt to push the vehicle backwards and forwards; the parking pawl must hold. Consult your Distributor or Dealer should the pawl not hold.

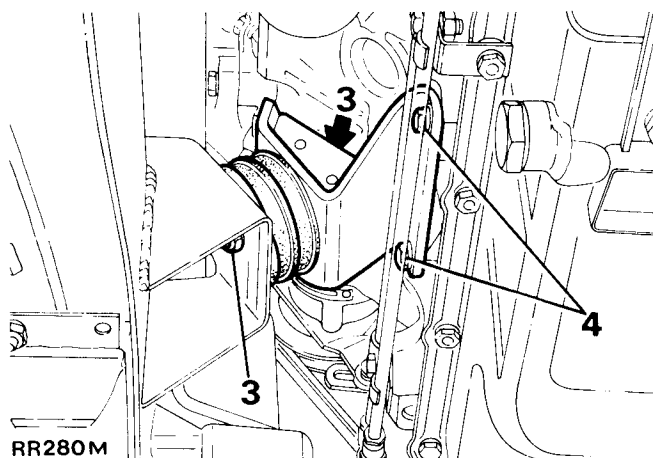
ENGINE MOUNTING FRONT

— Remove and refit

12.45.04

Removing

1. Remove the air cleaner to prevent it fouling the bulk-head when the engine is raised.
2. Raise the vehicle on a ramp or axle stands and support the engine under the sump with a jack.
3. Remove the rubber mounting nuts, top and bottom, on both sides.
4. Remove, from both sides, the three bolts securing the mounting brackets to the engine.
5. Raise the engine sufficiently to enable the rubber mountings to be removed.



Refitting

6. Loosely attach the rubber mountings to the engine brackets.
7. Secure the brackets to the engine.
8. Locate the rubber mounting studs into the chassis brackets and lower the engine.
9. Fit and tighten the rubber mounting lower nuts and tighten the top nuts.
10. Lower the vehicle and fit the air cleaner.

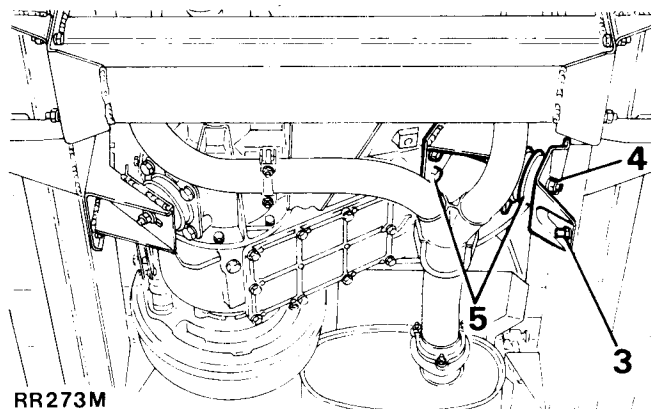
TRANSFER GEARBOX LH MOUNTING

— Remove and refit

12.45.07

Removing

1. Raise vehicle on ramp or axle stands.
2. Support the gearbox.
3. Remove the three bolts retaining the mounting bracket to the chassis.
4. Remove the single nut retaining the rubber mounting to the chassis bracket.
5. Remove the four bolts securing the bracket to the gearbox and remove the bracket and rubber.
6. Remove the single nut retaining the rubber mounting to the gearbox bracket.



Refitting

7. Loosely attach the rubber mounting to the gearbox bracket.
8. Loosely secure the rubber mountings, with the gearbox bracket attached, to the chassis bracket.
9. Secure the bracket to the chassis with the three nuts and bolts.
10. Secure the bracket to the gearbox with the four bolts.

NOTE:— To facilitate instructions 9 and 10 it may be an advantage to slacken the exhaust pipe attachment to the bracket adjacent to the gearbox mounting.

11. Remove the support from the gearbox and tighten the two rubber mounting retaining nuts.
12. Tighten the exhaust pipe attachment, if slackened.

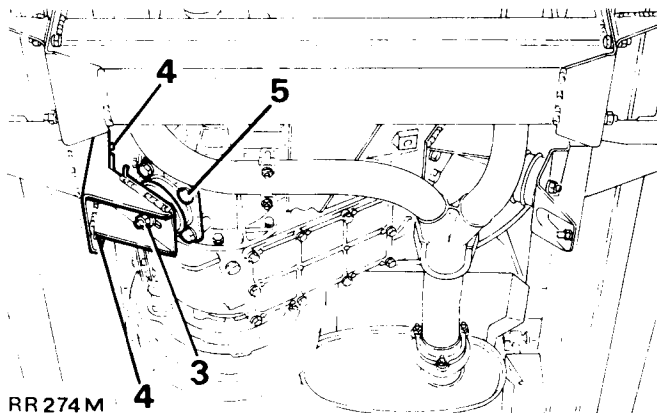
TRANSFER BOX RH MOUNTING

– Remove and refit

12.45.09

Removing

1. Raise the vehicle on a ramp or axle stands.
2. Support the gearbox.
3. Remove the single nut securing the mounting rubber to the chassis bracket.
4. Remove the three nuts and bolts securing the chassis bracket and remove the bracket.
5. Remove the four bolts holding the mounting plate to the gearbox and remove the plate complete with rubber mounting.
6. Remove the rubber mounting from the plate.



Refitting

7. Assemble the rubber mounting to the gearbox plate and fit to the gearbox with the four bolts.
8. Locate rubber mounting stud in chassis bracket and secure the bracket with the three nuts and bolts to the chassis.
9. Remove the gearbox support and secure rubber mounting to the chassis bracket.

TRANSFER GEARBOX

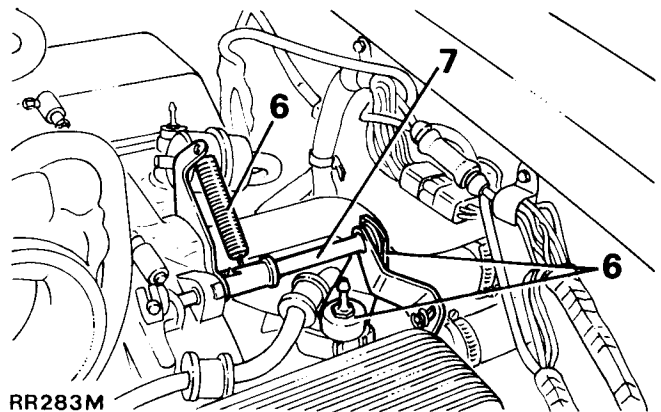
– Remove and refit

37.29.25

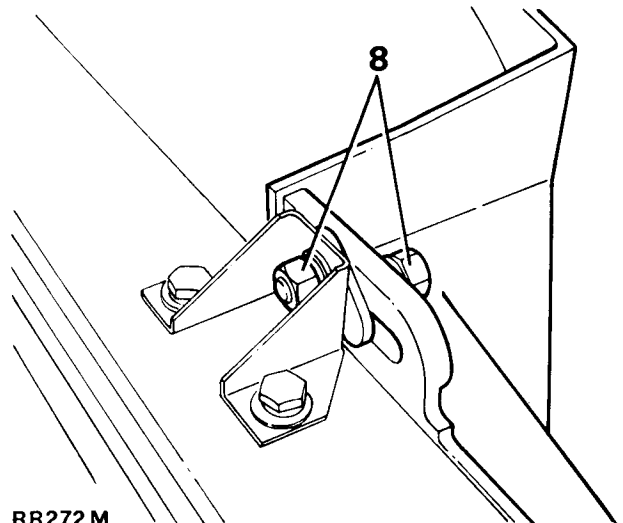
Special tools: Guide studs 18G1425

Removing

1. Drive vehicle on to a ramp and disconnect the battery.
2. Remove the ash trays and carpet covering the transmission tunnel.
3. Remove ten screws and withdraw the hand brake gaiter.
4. Remove high-low transfer knob and four screws and withdraw the gaiter.
5. Remove the air cleaner.



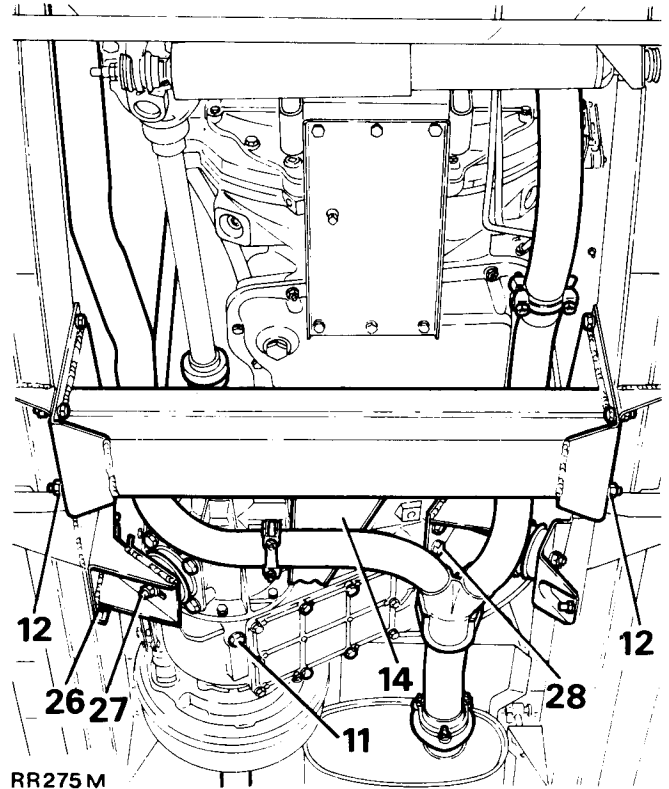
6. Unscrew the air cleaner LH mounting peg and remove the coupling shaft support bracket. Release the throttle valve linkage return spring.
7. Disconnect the throttle valve coupling shaft.



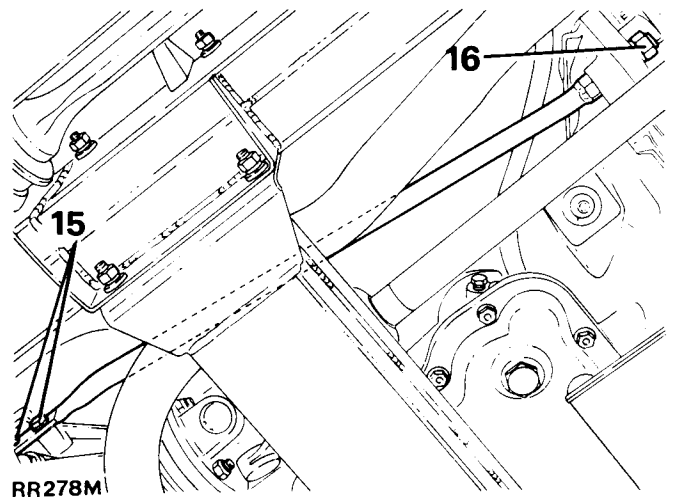
8. Slacken the two outboard nuts retaining the fan cowl and turn the two inboard nuts anticlockwise to raise the cowl sufficiently to prevent fouling when the engine is lowered.

Continued

9. Release the induction manifold to radiator hose clipped to the alternator bracket.
10. Raise the vehicle on the ramp.
11. Drain the transfer box and replace the plug.
12. Remove the eight nuts and bolts securing the chassis crossmember and using a suitable means of parting the chassis side members, remove the crossmember.
13. Remove the complete front exhaust pipe system.
14. Remove the steady plate between the gearbox and transfer box.

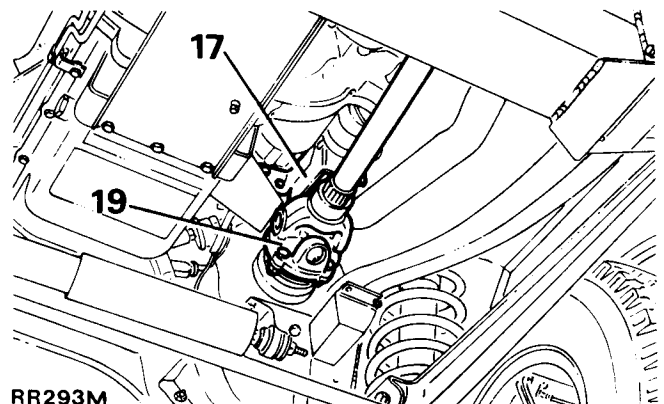


15. Remove the two bolts retaining the rear end of the tie bar to the transfer housing.
16. Remove the nut and washer securing the tie bar to the bell housing.



17. Remove the starter motor solenoid heat shield.
18. Release the speedometer cable from clamps and disconnect it from the transfer box.
19. Mark for reassembly and disconnect the front propeller shaft from the transfer box flange.

Continued

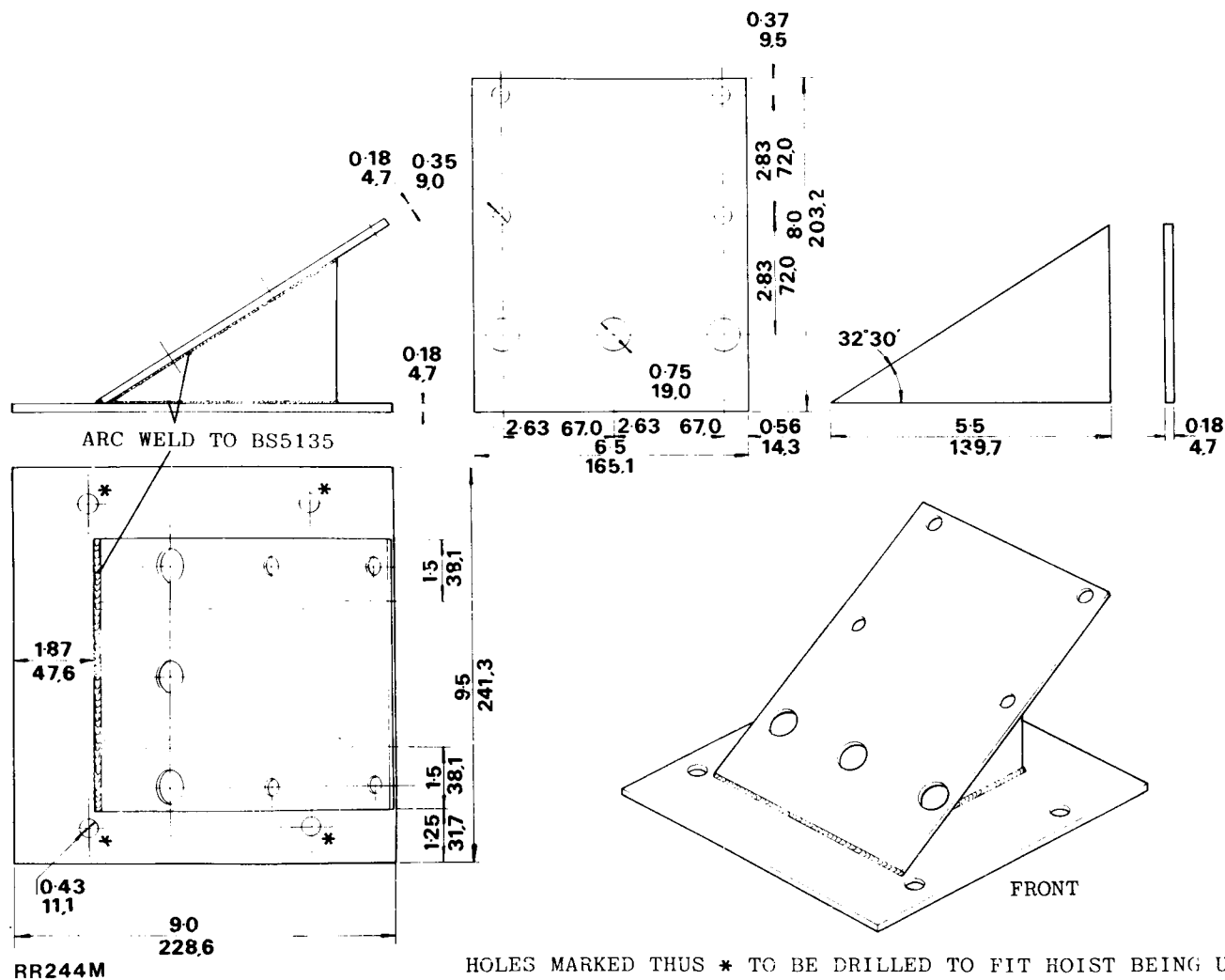
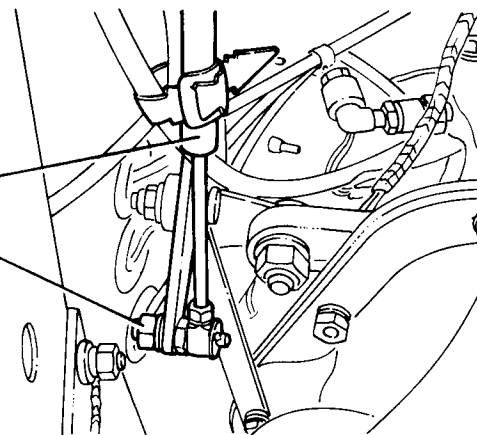


20. Mark for reassembly and disconnect the rear propeller shaft from the transmission brake drum flange.
21. Remove the nut retaining the gear selector cable to the fulcrum arm and release the cable. Also release outer cable from L.H. mounting bracket.
22. Manufacture an adaptor plate in accordance with the drawing to attach to the gearbox hoist and transfer box to facilitate removal.
23. Attach the adaptor plate to the gearbox hoist.
24. Remove four transfer box bottom cover bolts and move the hoist into position and attach the adaptor plate to the transfer box.
25. Adjust the hoist to take the weight of the transfer box.
26. Remove the six nuts and bolts (three each side) securing the transfer box mounting brackets to the chassis.
27. Remove the nuts retaining the R.H. mounting rubber to the bracket and remove the bracket leaving the rubber attached to the transfer box.
28. Remove the four bolts securing the L.H. mounting bracket to the transfer box and remove the bracket with rubber mounting attached.

Continued

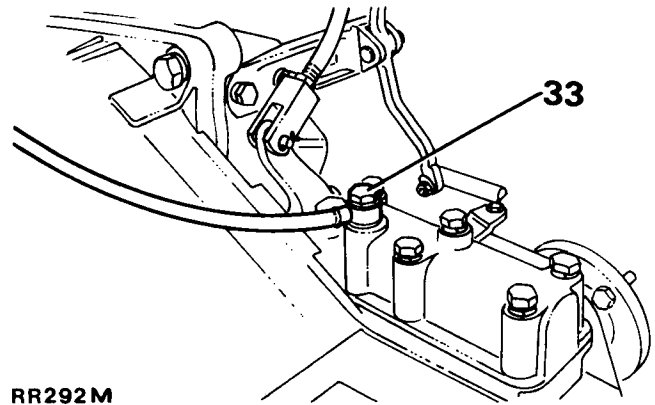
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RR291M

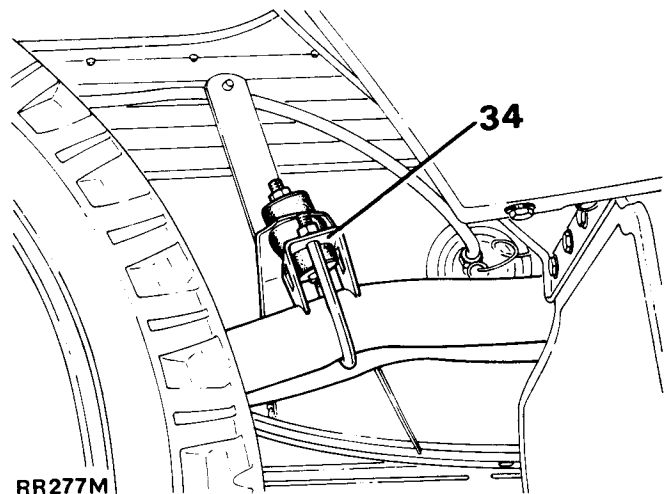


RR244M

29. Lower the complete transmission assembly so that high-low transfer lever is approximately 12 mm (0.5 ins) below the transmission tunnel.
30. Place a jack below the automatic gearbox with a piece of timber between the jack pad and under side of gearbox to prevent damage.
31. Separate the two snap connectors for the gear selector illumination.
32. Release the differential lock harness from the clips and disconnect the leads from the switch on the transfer box.
33. Disconnect the transfer box breather banjo union.



34. Support the front silencer and release the rear exhaust system from the hanger bracket below the rear wheel arch. Also release the attachment at the rear of the front silencer and move the assembly aside.

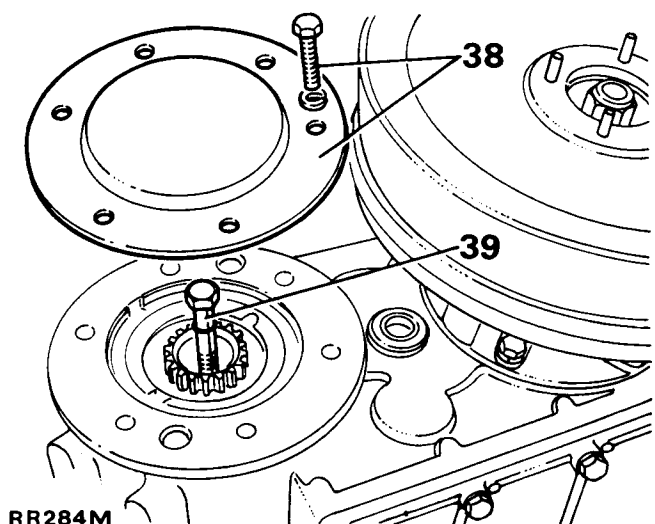


35. Move the selector lever to PARK on the automatic gearbox.
36. Remove the five bolts securing the transfer box to the automatic gearbox.
37. Withdraw the transfer box rearwards from the vehicle.

NOTE:— If the transfer box will not release, proceed as follows.

38. Remove the six bolts retaining the rear cover plate and remove the cover to expose the coupling shaft bolt.
39. Remove the coupling shaft retaining bolt and 'O' ring and withdraw the transfer box.

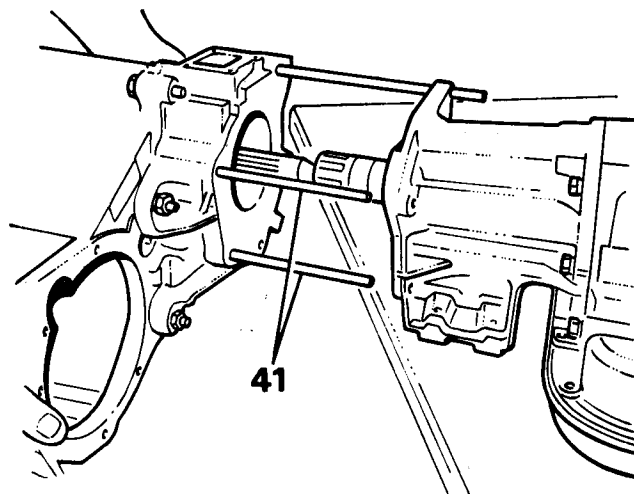
NOTE:— If the coupling shaft remains attached to the automatic gearbox it must be extracted ready for fitment to the transfer box input gear. Damage to the oil seals could occur if it is attempted to fit the transfer box with the coupling shaft fitted to the automatic gearbox main-shaft.



Continued

Refitting

40. Fit the transfer box to the adaptor plate on the transmission hoist.
41. Clean the transfer box and automatic gearbox mating faces and fit the guide rods to the transfer casing, as illustrated, to facilitate the fitting of the transfer box and to prevent damage to the oil seal.
42. Slide the transfer box into position on the automatic gearbox and secure with the five bolts.
43. Move the gear selector lever into the neutral position.
44. Raise the rear exhaust system into position and secure the assembly to the hanger bracket at the rear of the front silencer. Secure the assembly to the rear hanger bracket under the rear wheel arch.
45. Fit breather pipe banjo union to transfer box.
46. Secure wiring harness with the clips.
47. Connect differential lock leads to the switch on the transfer box.
48. Connect the two snap connectors for the gear selector illumination.
49. Raise the transfer box into position and remove the jack in support of the automatic gearbox.
50. Fit the L.H. mounting bracket to the transfer gearbox and secure with the four bolts.
51. Fit the R.H. mounting bracket to the rubber mounting with the single nut.
52. Fit the L.H. and R.H. mounting brackets to the chassis and secure with the six nuts and bolts (three each side).
53. Remove the bolts securing the adaptor plate to the transfer box and remove the transmission hoist. Refit the lower cover bolts.
54. Fit the selector cable to the fulcrum arm and secure the outer cable to the clamp on the L.H. mounting bracket.
55. Fit the rear propeller shaft to the transmission brake drum flange ensuring that the reassembly marks coincide.
56. Line up the reassembly marks and fit the front propeller shaft.
57. Fit the speedometer cable to transfer box and fasten the outer cable securing clips.
58. Fit the tie bar to the bell housing but leave nut slack.
59. Fit the rear end of the tie bar to the transfer box and secure with the two bolts and tighten the bell housing nut.
60. Fit the steady plate between the automatic gearbox and transfer box.
61. Refit the front exhaust pipe system.
62. Fit the starter motor solenoid heat shield.
63. Expand the chassis side members and fit the cross-member and secure with the eight nuts and bolts.
64. Remove the transfer box filler level plug and fill the gearbox with oil of the correct grade as specified in the lubrication chart and refit the level plug.
65. Lower the vehicle.
66. Reposition the radiator cowl, reversing the procedure in instruction 8.
67. Secure the induction manifold to radiator hose in the clip attached to the alternator bracket.



RR 232 M

68. Fit the throttle valve coupling shaft support bracket and shaft.
69. Connect the coupling shaft to the counter shaft.
70. Secure the assembly with the air cleaner L.H. mounting peg.
71. Connect the return spring to the coupling shaft lever.
72. Fit the air cleaner assembly.
73. Fit the hand brake lever gaiter.
74. Fit the high-low transfer knob and gaiter.
75. Fit the ash trays and transmission tunnel carpet. Reconnect the battery.

AUTOMATIC GEARBOX

General

44.00.00

The automatic gearbox combines a torque convertor and a fully automatic three speed system. The gearbox comprises two multiple disc clutches, an overrunning clutch, two servos and bands; and two planetary gear sets to provide three forward ratios and a reverse ratio. A common sun gear of the planetary gear set is connected to the front clutch by a driving shell which is splined to the sun gear and to the front clutch retainer. The hydraulic system consists of an oil pump and a valve body. Gearbox venting is accomplished by a passage through the upper part of the oil pump housing.

The torque convertor is a non-serviceable sealed unit, the cooling of which is accomplished by circulating the transmission fluid (DEXRON D 11) through an oil cooler, located on the front of the vehicle. Transmission fluid is filtered by an internal "Dacron type" filter attached to the lower side of the valve body assembly. Engine torque is transmitted through the input shaft to the multiple disc clutches in the gearbox. The power flow is dependant upon the application of the clutches and bands.

Service requirements

- (a) For all operations, whether dismantling, inspecting or reassembling operations, high standards of cleanliness are essential.
- (b) Cloths used in wiping and cleaning components must be lint free, nylon cloths are preferable.
- (c) Prior to dismantling the gearbox, thoroughly wash the exterior of the casing with a suitable solvent.
- (d) During dismantling and inspection operations, all components must be cleaned thoroughly with a suitable industrial solvent.
- (e) All defective items must be replaced.
- (f) New joint washers should be used during reassembly operations.
- (g) All screws, washers and nuts must be tightened to the recommended torque figure.
- (h) Thrust washers and bearings should only be coated with petroleum jelly to facilitate retaining them in position during assembly operations. Unless specified grease should not be used as it may be insoluble in the transmission fluid, causing blockage of the fluid passages and contamination of the brake bands and clutch facings.
- (i) Use only the recommended transmission fluid of the correct grade and type. Other grades of fluid although the same proprietary brand, could cause damage to the gearbox.

TORQUE CONVERTOR

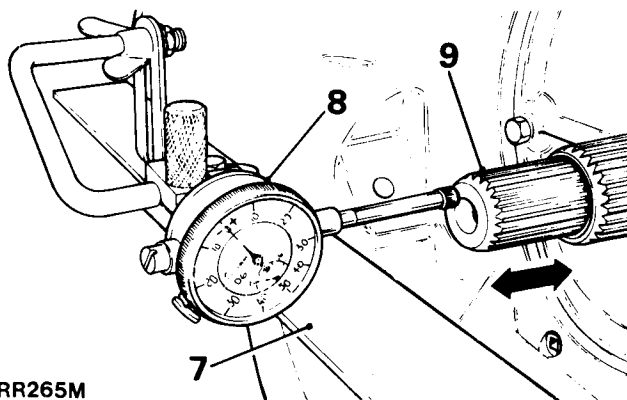
NOTE:— Following an automatic gearbox failure, debris from a burnt out clutch or brake band material will have probably been deposited in the transmission fluid. It is virtually impossible to ensure that some particles are not left inside the torque convertor, causing contamination of the gearbox, even after flushing. It is strongly recommended that a new torque convertor is fitted and under no circumstances should old transmission fluid be used.

GEARBOX ASSEMBLY OVERHAUL

44.02.06

Dismantling

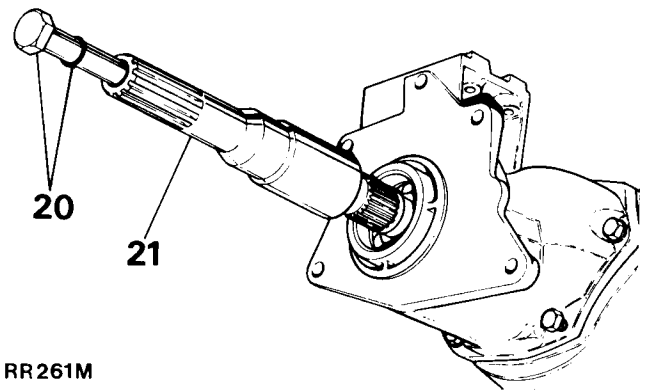
1. Remove transmission unit and transfer gearbox assembly, see operation 44.20.04.
2. Remove transfer gearbox, see operation 44.20.04.
3. Release the bolts and remove the torque convertor retaining strap.
4. Remove torque convertor assembly.
5. Release and remove the bolt securing the angle stop bracket fitted to the torque convertor retaining strap.
6. Refit the torque convertor retaining strap to the gearbox casing.
7. Measure the input shaft end play before proceeding further, this will indicate when the thrust washer is worn and requires changing. The thrust washer is located between the reaction shaft support and front clutch retainer.
8. Attach the dial gauge brackets (and dial gauge) to the torque convertor retaining strap with the dial plunger seated against the end of the input shaft.
9. Move the shaft in and out to obtain the end float readings. The end float should be between 0,914 mm to 2,133 mm (0.036 to 0.084 in). Any variation outside these measurements should be rectified by changing the thrust washer. Three thrust washer thicknesses are available to bring the end float to specification. 1,549 mm – 1,8 mm (0.061 in – 0.063 in) – natural. 2,133 mm – 2,184 mm (0.084 in – 0.063 in) – red. 2,59 mm – 2,641 mm (0.102 in – 0.104 in) – yellow. Note the end float measurement for future reference when reassembling the transmission.



RR265M

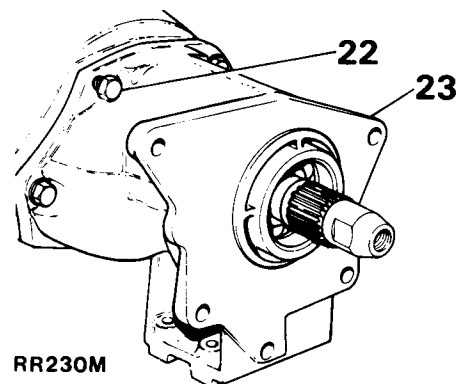
10. Remove the dial gauge assembly, brackets and torque convertor retaining strap.
11. With suitable spanner slacken the throttle valve lever pinch bolts.
12. Slacken the selector lever clamp bolt.
13. Detach the selector pivot bracket pinch bolt.

14. Remove the main nut and bolt which secures the selector pivot bracket.
15. Remove all the linkages.
16. Detach the breather junction box bolt and washer fitted to the exterior of the gearbox casing.
17. Detach the breather block and pipe away from the inside of the gearbox bell housing.
18. Unscrew the two bolts securing the breather pipe clamp and remove the breather assembly from the pump housing.
19. Turn the gearbox around, suitably supported, with the fluid pan uppermost.
20. Select park and remove the coupling shaft bolt and 'O' ring.
21. Withdraw the coupling shafts.



RR261M

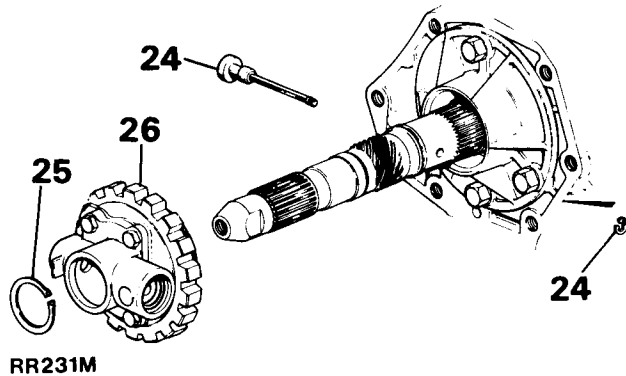
22. Release and remove the extension case bolts.
23. Carefully detach the extension case housing and gasket.



RR230M

continued

24. Remove small circlip from the weight end of the governor valve shaft and detach.
25. Remove the large circlip which retains the governor and parking gear to the output shaft.
26. Slide the governor and parking gear off the output shaft.



27. Release and remove the sump pan bolts and lift off the sump cover gasket.
28. Remove the three 'Nyloc' nuts which hold the filter pad in position.
29. Remove the filter pad and spacer block.
30. Unscrew and remove the inhibitor switch and seal. When refitting use a new seal.
31. Release and remove the ten bolts which hold the valve block to the gearbox casing. Hold the valve body in position whilst removing the bolts.
32. Whilst removing the valve block from the casing, it may be found necessary to manoeuvre the valve block and parking brake rod forward out of the casing.
33. Remove the spring and accumulator piston.
34. Slacken the front band adjuster lock nut.
35. Lightly tighten the front band nuts using adaptor number CBW 547A-50-2A. This prevents the clutch retainer from coming out with the pump, and possibly damaging the clutches.
36. Remove the five remaining oil pump housing bolts.
37. Locate the impulse hammers tool number 18G1387 to the threaded holes in the pump housing flange.
38. Bump outward evenly with the two weights to withdraw the pump and reaction shaft support assembly from the case.
39. Lift the pump and reaction shaft support clear, remove gasket and detach impulse hammers.
40. Using tool CBW 547A-50-2A, slacken the front band adjuster.
41. Remove the front band anchor and strut.
42. Slide the band strut out of the case.
43. Slide the front clutch assembly out of the case.
44. Grasp the input shaft and slide the input shaft and rear clutch assembly out of the casing. Care should be taken not to lose the thrust washer located between the rear end of the input shaft and the forward end of the output shaft.

45. Whilst supporting the output shaft, carefully remove the output shaft assembly comprising the planetary gear and driving shaft.
46. Remove the low and reverse drum.
47. Push the low and reverse band linkage shaft out towards the rear of the gearbox.
48. Remove the 'O' rings from the shaft.
49. Lift out the rear servo lever and strut.
50. Remove the rear band, link and anchor.
51. At the opposite end of the gearbox unscrew the four bolts and remove the output shaft support.
52. Prior to removal, note the position of the overrunning clutch rollers and springs. Carefully slide out the clutch hub.
53. Remove the 6,3 mm (1/4 in) square plug.
54. Slide out the kickdown lever shaft towards the front of the casing and withdraw shaft.
55. Lift out the kickdown servo lever.
56. Compress the kickdown servo spring and remove circlip, allow piston to lift under controlled spring pressure. Take care not to damage the piston rod or guide.
57. Lift out the kickdown servo piston taking care not to break the rings.
58. Compress the low and reverse servo spring and remove circlip, allow piston to rise under controlled spring pressure.
59. Remove the spring retainer, spring, servo piston and plug assembly from the casing.

Inspection

60. Clean casing thoroughly using a suitable solvent, dry with compressed air. Inspect case for cracks, stripped threads in various bolt holes, and machined mating surfaces for burrs, nicks, or any condition that would render the case unfit for further service. The front mating surface should be smooth, any burrs present should be removed using a fine mill file. If threads are stripped, install Helicoil, or equivalent inserts.

continued

EXTENSION HOUSING OVERHAUL**Dismantling**

61. Fit the extension housing in a vice.
62. Remove the parking pawl shaft.
63. Detach the parking pawl and spring.
64. Release and remove reaction plug circlip.
65. Lift out reaction plug and pin from the casing.
66. Remove the bearing retaining circlip.
67. Release housing from vice and using a suitable press, extract the bearing.
68. Remove the oil seal.

Inspection

69. Inspect the parking pawl shaft for scores and free movement in the housing.
70. Check the spring for distortion.
71. Inspect the square lug on the parking pawl for broken edges.
72. Replace parts that are damaged.

Reassembly

73. Replace oil seal using tool 18G1421.
74. Using a press, refit new bearing.
75. Fit housing in vice and replace the bearing retaining circlip. Ensure that the circlip ends do not obstruct the oil return passage.
76. Refit reaction plug, pin and circlip. Locate the parking pawl and spring ensuring the spring is positioned so that it moves the pawl away from the gear.
77. Remove extension housing from vice.

GOVERNOR AND PARKING GEAR OVERHAUL**Dismantling**

NOTE:— Although the governor and parking gear had been partially dismantled during the gearbox dismantling procedures, an asterisk denotes where the information is repeated for sequential clarity.

- *78. Remove the small circlip from the weight end of the governor valve shaft.
- *79. Slide the valve and shaft assembly out of the governor body.
- *80. Remove the large circlip from the weight end of the governor body, lift out the governor weight assembly.
81. Carefully prise the circlip from inside the governor weight.
82. Remove the inner weight and spring from the outer weight.
83. Detach and remove the circlip from behind the governor body, then slide the governor and support assembly off the output shaft.
84. Remove the four bolts and separate the governor body and screen from the parking gear.

Inspection

85. Thoroughly clean all parts in a suitable solvent.
86. Inspect all parts for damage and wear.
87. Check the inner weight for free movement in the outer weight.
88. Verify that the weights and valve fall freely in the bores when clean and dry.
89. Wash the governor screen in a suitable solvent.
90. Inspect the governor seal rings for wear on their sides and outer diameter.
91. Check the governor weight spring for distortion.
92. Inspect the lugs on the support gear for broken edges or other damage.

Reassembly

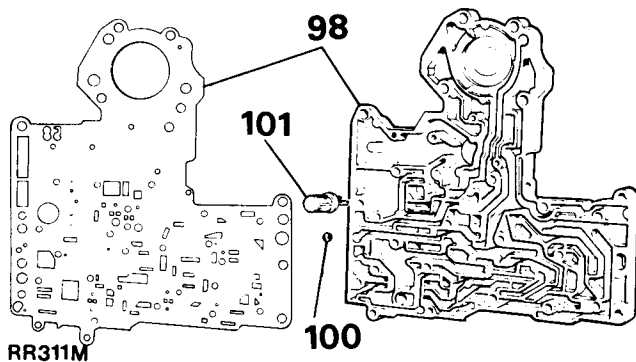
93. Reverse procedures 84–81 noting that Loctite 290 is applied to the four bolt threads prior to torque tightening the bolts to 11,29 Nm (100 lbf. in). Procedures 80–78 are not implemented until the gearbox is reassembled.

Continued

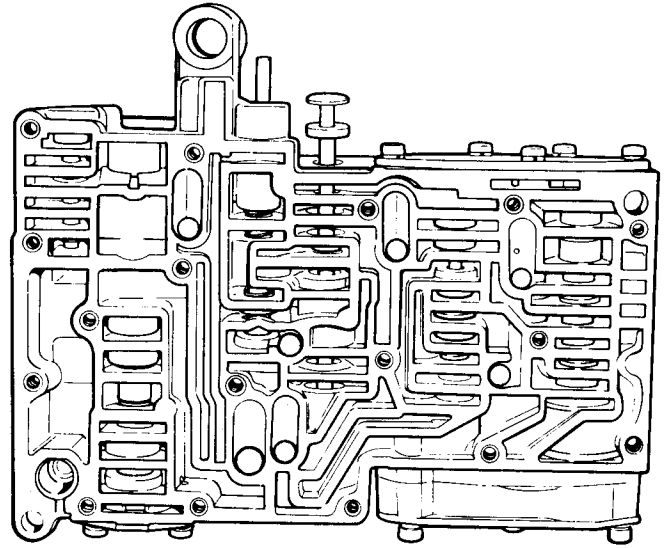
VALVE BODY OVERHAUL

Dismantling

94. Do not clamp any portion of the valve body or transfer plate in a vice. Any slight distortion of the aluminium body or transfer plate will result in sticking valves and/or excessive leakage. When removing or installing valves or plugs, slide them in or out carefully. Do not use force.
95. Remove the top and bottom screws from the spring retainer and adjustment screw bracket. Hold the spring retainer firmly against the spring pressure whilst removing the screw from the side of the valve body.
96. Without disturbing the setting, remove the spring retainer complete with the line and the throttle pressure adjusting screws and the line pressure and torque convertor regulator springs.
97. Slide the torque convertor and line pressure valves out of their bores.
98. Remove the transfer plate retaining screws and lift off the transfer plate and separator plate assemblies.
99. Undo the two stiffener plate retaining screws and the three screws holding the separator plate. Remove plate for cleaning.
100. Remove the rear clutch ball check valve from the transfer plate.
101. Release the valve screen filter from the separator plate for cleaning.



102. Remove the seven balls from the valve body.
103. Turn over the valve body and undo the six screws from the shuttle valve cover plate.
104. Remove the governor plug end plate and slide out the shuttle valve throttle plug and spring, the 1-2 shift valve governor plug and 2-3 shift valve governor plug.
105. Detach the circlip and slide the shuttle valve out of its bore, in addition to the secondary springs and guides which were retained by the circlip.
106. Remove the circlip from the park control rod.
107. Remove the circlip and washer from the throttle lever shaft.



108. Whilst holding the manual lever detent ball and spring in their bore, slide the manual lever off the throttle shaft and remove the seal.
109. Remove the detent ball and spring.
110. Slide the manual lever out of its bore.
111. Slide out the kickdown detent, kickdown valve, throttle valve spring and throttle valve.
112. Remove the line pressure regulator valve end plate and slide out the regulator valve sleeve, line pressure and throttle pressure plugs and spring.
113. Remove the end plate and downshift housing assembly and detach the throttle plug from the housing.
114. Slide the retainer from the housing and remove the limit valve and spring.
115. Remove the springs and 1-2 shift control valve, 1-2 shift valve and 2-3 shift valve.

Inspection

116. Allow all parts to soak in suitable clean solvent. Wash thoroughly and blow dry using compressed air. Ensure all passages are clean and free from obstructions.
117. Inspect all mating surfaces for burrs, distortion and warping. Slight distortion may be corrected using a surface plate.
118. Check all valve springs for distortion and collapsed coils.
119. When the bores, valves and plugs are clean and dry, the valves and plugs should fall freely in the bores. The valve bores do not change dimensionally with use. Therefore, a valve body that was functioning properly when the vehicle was new, will operate correctly if it is properly and thoroughly cleaned. There is no need to replace the valve body unless it is damaged.

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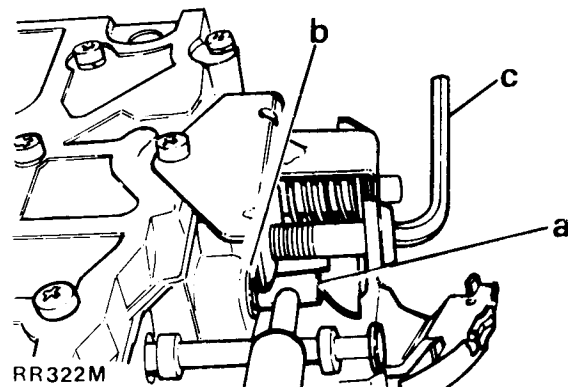
Reassembly

120. Slide the shift valves and springs into their appropriate bores.
121. Sub-assemble the down shift housing as follows:—
 - (a) Install the limit valve and spring into the housing.
 - (b) Slide the spring retainer into the groove in the housing.
 - (c) Insert the throttle plug in the housing bore and position the whole assembly against the shift valve springs.
122. Install the end plate and tighten the screws to 3,95 Nm (35 lbf. in).
123. Fit the throttle pressure plug, line pressure plug and sleeve; and refit end plate to valve body. Tighten screws to 3,95 Nm (35 lbf. in).
124. Install the throttle valve and spring, kickdown valve and kickdown detent.
125. Slide the manual valve into its bore.
126. Install the throttle lever assembly on the valve body.
127. Insert the detent spring and ball in its bore on the valve body. Depress the ball and spring and slide the manual lever over the throttle shaft, so that it engages the manual valve and detent bore. Fit a new seal, retaining washer and circlip on the throttle shaft.
128. Place the 1–2 and 2–3 shift valve governor plugs in their respective bores.
129. Fit the shuttle valve and hold it in the bore whilst installing on the opposite end of the secondary spring with guides and retaining circlip.
130. Install the primary shuttle valve spring and throttle plug and refit the governor plug end plate. Tighten the five remaining screws to 3,95 Nm (35 lbf. in).
131. Replace the shuttle valve cover plate and tighten the six retaining screws to 3,95 Nm (35 lbf. in).
132. Fit the seven balls in the valve body in the positions noted during dismantling.
133. Replace the rear clutch ball check valve in the transfer plate and regulator valve screen in the separator plate.
134. Refit and tighten the screws in the stiffener and separator plate to 3,95 Nm (35 lbf. in).
135. Place the transfer plate assembly on the valve body. Care should be exercised to align the filter screen. Fit the smaller screws to the transfer plate, tighten to 3,95 Nm (35 lbf. in).
136. Fit and tighten the longer screws starting at the centre and working outwards, to 3,95 Nm (35 lbf. in).
137. Slide the torque convertor and line pressure valves and springs into their bores.
138. Install the pressure adjusting screw and bracket assembly on the springs and tighten the screws to 3,95 Nm (35 lbf. in).

139. Using the gauge block tool 18G1385, measure the throttle pressure.

- (a) Insert gauge pin of tool between the throttle lever cam and kickdown valve.
- (b) By pushing in on tool compress the kickdown valve against its spring so that the throttle valve is completely bottomed inside the valve body.
- (c) As force is being exerted to compress the spring, turn the throttle lever stop screw with a suitable allen key, until the head of the screw touches the throttle lever tag with the throttle lever cam touching the tool and the throttle valve bottomed.

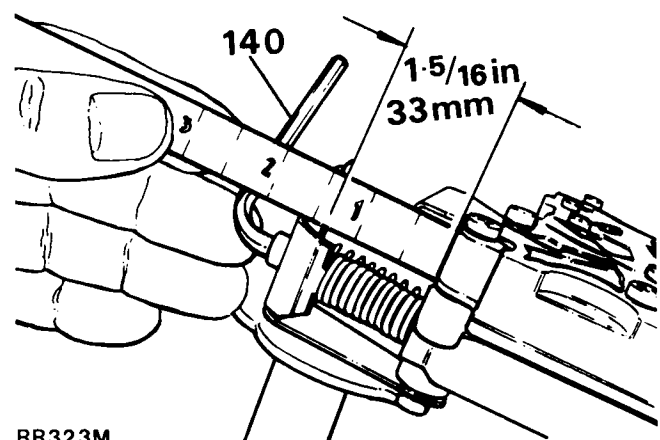
NOTE:— The throttle pressure setting must be accurate otherwise a wrong setting will cause an incorrect line pressure reading, despite the line pressure being correct.



140. To obtain the correct line pressure adjustments measure from the valve body to the inner edge of the adjusting plate. The correct measurement is 33,3 mm (1.5/16 in) however this measurement may be varied to obtain the specified line pressure.

- (a) Turn the adjusting screw with a suitable allen key, one complete turn of the screw will alter the closed throttle line pressure by approximately 0,1167 Kg/cm² (1.66 lbf. in²). Turning the adjusting screw clockwise decreases the pressure and anti-clockwise increases the pressure.

141. Refit the parking lock rod and circlip to the manual lever.



RR323M

Continued

OIL PUMP AND REACTION SHAFT SUPPORT OVERHAUL

Dismantling

142. Remove the six reaction shaft support retaining bolts and lift the support off the pump.
143. Slide the inner and outer rotors from the pump body.
144. Remove the rubber seal ring from pump body flange.
145. Drive out the oil seal with a blunt punch.
146. Carefully remove the two interlocking seal rings fitted to the shaft support.
147. Remove the selective thrust washer.

Inspection

148. Inspect the interlocking seal rings for wear or broken locks. When reassembled, ascertain they rotate freely in their grooves.
149. Check the machined surfaces on the pump body and reaction shaft support for damage.
150. Inspect the pump rotors for scoring or pitting.

Reassembly

151. Install the outer and inner rotors in the oil pump body. Place a straight edge across the face of the rotors and pump body. Use a feeler gauge to measure the clearance between the straight edge and the face of the rotors. The clearance limits are 0,025 mm to 0,05 mm (0.001 in to 0.002 in).

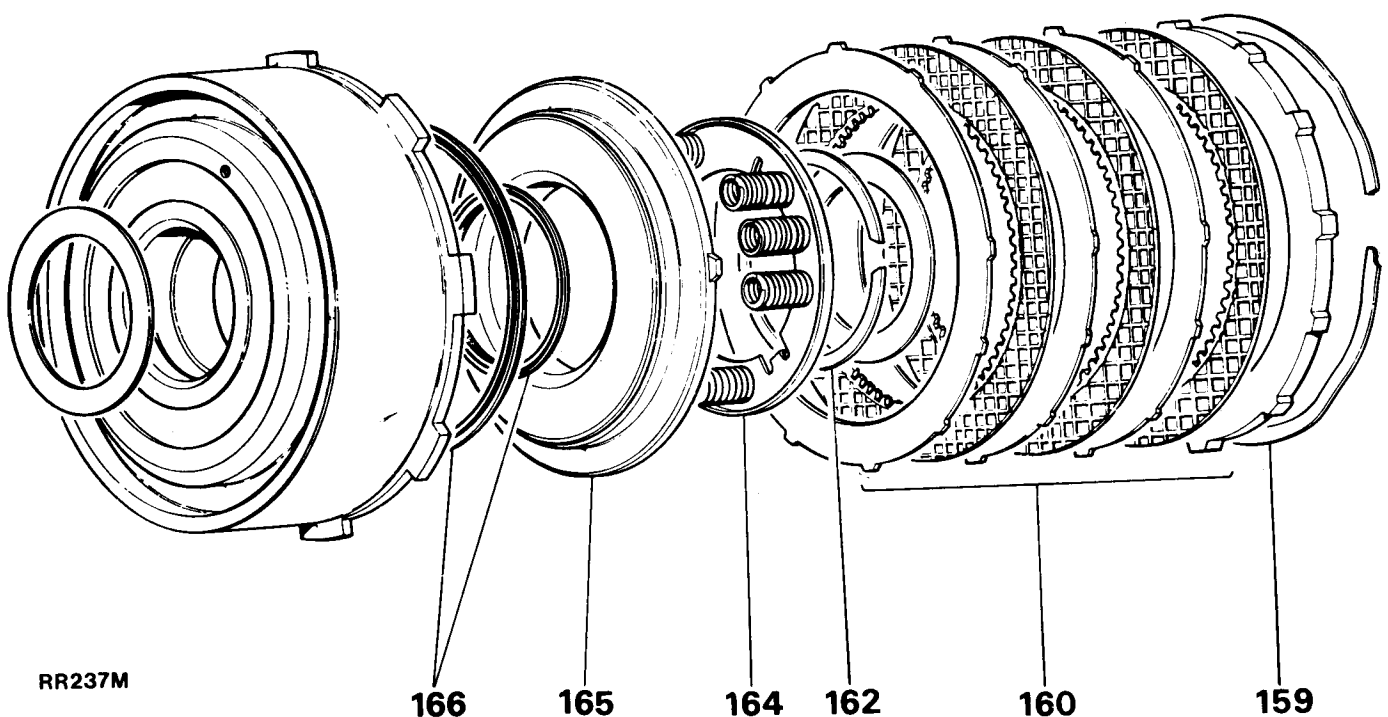
152. Measure the rotor tip clearance between the inner and outer teeth. The clearance limits are between 0,127 mm to 0,254 mm (0.005 in to 0.01 in).
153. The clearance permitted between the rotor and its bore in the oil pump body should be 0,101 mm to 0,203 mm (0.004 in to 0.008 in).
154. Fit a new rubber sealing ring to the pump body.
155. Refit the reaction shaft support. Install the six retaining bolts and tighten to 18,07 Nm (160 lbf.in).
156. Fit a new oil seal into the opening of the pump body, ensuring the oil seal lips face inwards, using tools 18G134-3 and 18G134.
157. Replace the thrust washer or one of the appropriate thickness depending upon the initial end float measurement.
158. Refit the interlocking seal rings.

FRONT CLUTCH OVERHAUL

Dismantling

159. Remove the large waved circlip that secures the pressure plate in the clutch retainer.
160. Lift the pressure plate and clutch plates out of the retainer.

Continued



161. Fit the spring compressor tool 18G1386 over the piston ring retainer.
162. Compress the ring and remove the circlip.
163. Slowly release the spring tool until the spring retainer is free of the hub.
164. Remove the tool, retainer and springs.
165. Invert the piston retainer assembly and bump it on a wood block to dislodge the piston.
166. Remove the seals from the piston retainer hub.

Inspection

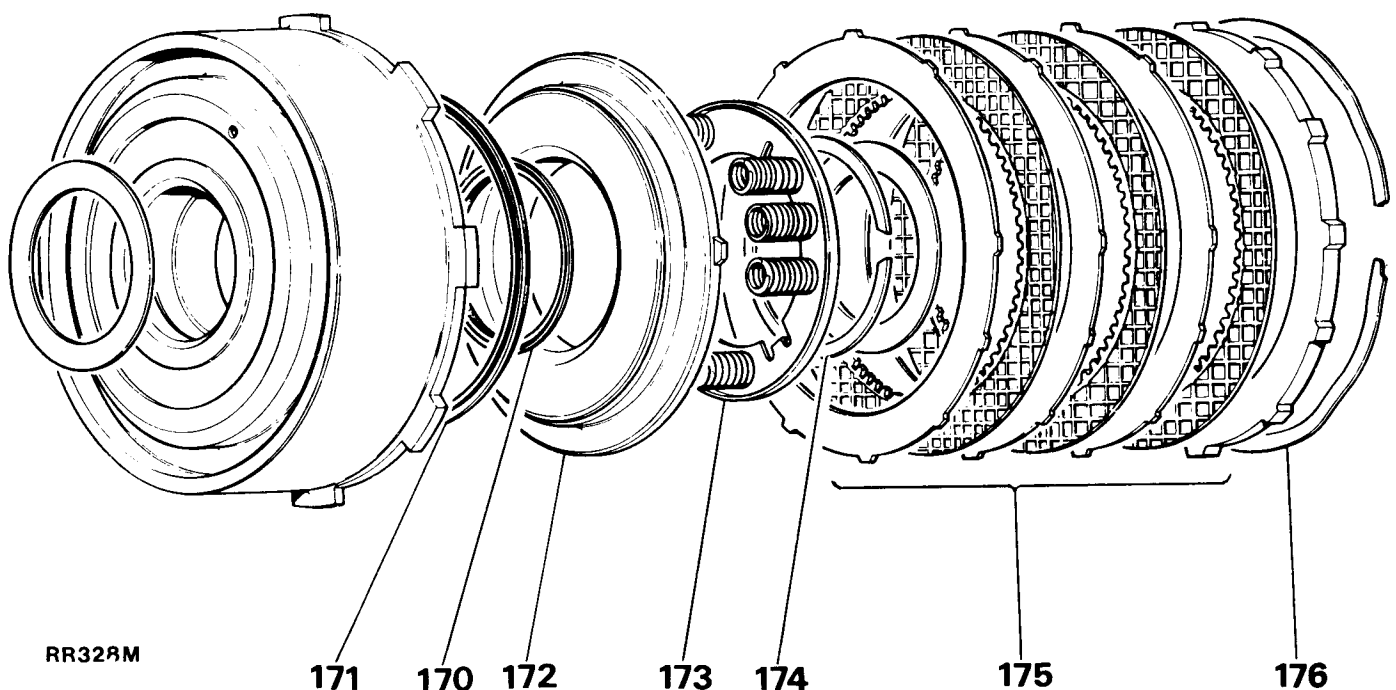
167. Check the clutch plate and disc for flatness and facing material on all driving discs. Change all discs, plates that are charred, glazed or heavily pitted.
168. Inspect the disc splines for wear or damage and check the steel plate lug grooves for smoothness. The plates must be able to travel freely in the grooves.
169. Examine the inside bore of the piston for score marks, if light scoring is apparent, it can be removed by the use of extra fine wet and dry paper.

Reassembly

170. Lubricate and install new inner seal on the hub of the clutch retainer, using tool 18G1421. Ensure the seal lip faces down and is properly seated.

171. Fit new outer seal on the clutch piston, ensuring the seal lip is towards the bottom of the clutch retainer.
172. Apply a coating of transmission fluid to the outer edge of seal and press seal to the bottom of its groove around the piston diameter. Place piston assembly in retainer and carefully seat the piston into the bottom of retainer.
173. Fit springs on to piston.
174. Position spring retainer and circlip over springs, compress springs using tool 18G1386 and seat circlip in hub groove. Remove tool 18G1386.
175. Lubricate all clutch plates with transmission fluid and locate one steel plate followed by a lined disc until all plates are correctly located.
176. Install pressure plate and circlip, ensuring the circlip is correctly seated.
177. Insert a feeler gauge between the pressure plate and waved circlip to measure the maximum clearance where the circlip is waved away from the pressure plate. The clearance should be between 1,77 mm to 3,27 mm (0.070 in to 0.129 in).

Continued



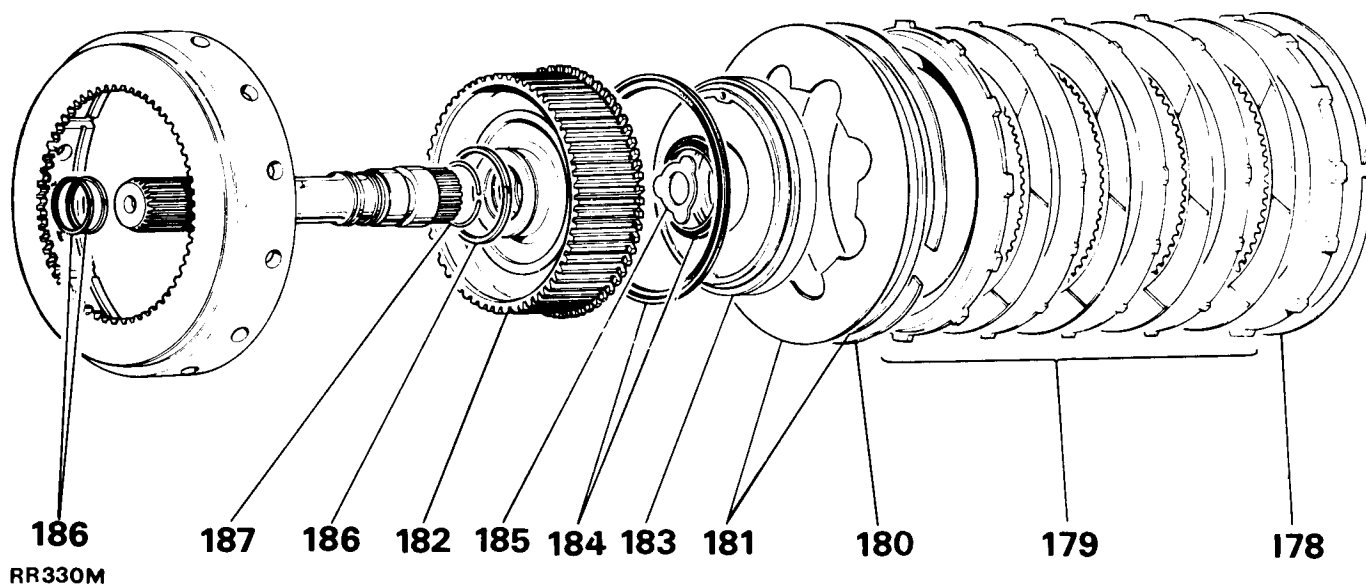
REAR CLUTCH OVERHAUL

Dismantling

178. Remove the large selective circlip that secures the pressure plate in the clutch retainer.
179. Lift off the pressure plate, four clutch plates and inner pressure plate out of the clutch retainer.
180. Carefully prise one end of the wave spring out of the groove and remove the spring.
181. Remove the nylon spacer ring and clutch piston spring out of the retainer.
182. Slide the clutch retainer off the piston retainer.
183. Invert the clutch piston retainer assembly and bump it on a suitable wood block to dislodge the piston. Remove piston.
184. Remove the inner and outer seals from the piston.
185. Remove the thrust washer.
186. Detach the three interlocking sealing rings and tabbed thrust washer from the input shaft.
187. If necessary, remove the circlip and press input shaft from the clutch piston retainer.

Inspection

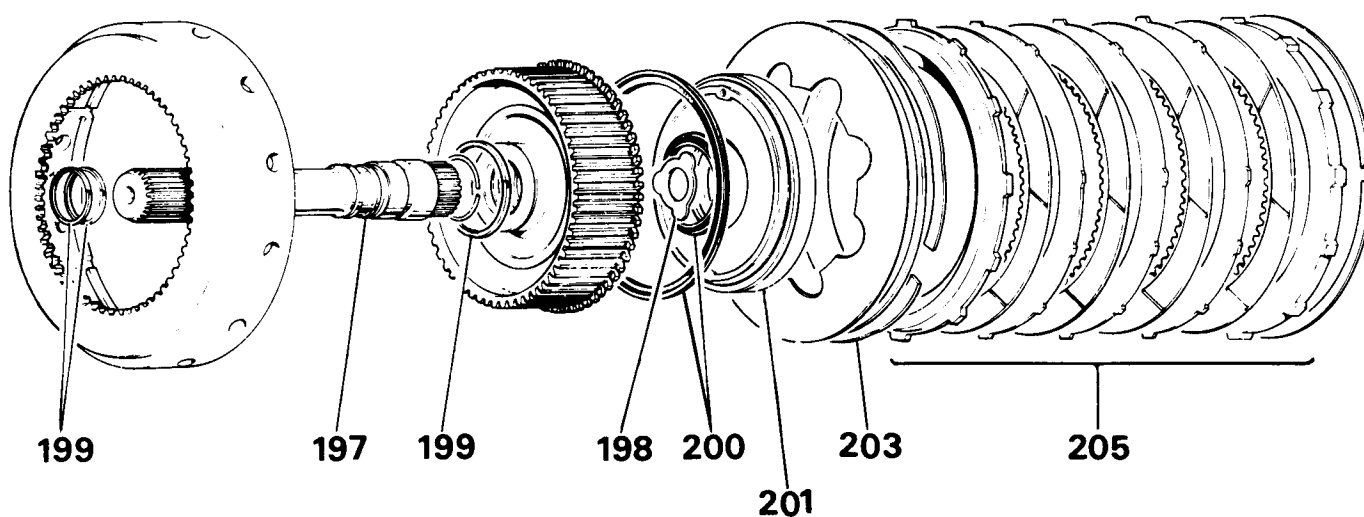
188. Examine the clutch plates and driving discs for flatness. They must not be warped or cone shaped.
189. Inspect the facing material on all driving discs. Replace if charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily.
190. Verify the steel plates and pressure plate surfaces are not scored, burnt or have damaged driving lugs, replace if necessary.
191. Inspect steel plate lug grooves in the clutch retainer for smooth surfaces, the plates must travel freely in the grooves.
192. Verify the ball check in the piston moves freely.
193. Inspect the seal surfaces in the clutch retainer for nicks or deep scratches. Light scratches will not interfere with the sealing of the seals.
194. Examine the piston spring, wave spring and spacer for distortion or breakage.
195. Inspect the interlocking seal rings for wear and broken locks, and turn freely in their grooves when refitted.
196. The rear clutch to front clutch thrust washer should be measured for wear. Washer thickness should be 1,54 mm to 1,6 mm (0.061 in to 0.063 in) replace if necessary.

Continued

Reassembly

197. If removed, press input shaft into the clutch piston retainer.
198. Refit tabbed washer, using petroleum jelly to hold in place.
199. Replace the interlocking seal rings and ensure they turn freely in their grooves.
200. Fit new inner and outer seals on the clutch piston and install seals on clutch piston. Make sure the seal lips face towards the head of the clutch retainer, and are properly seated in the piston grooves.
201. Place piston assembly in the retainer and with twisting motion seat the piston in the bottom of the retainer.
202. Position the clutch retainer over the piston retainer splines and support the assembly so that the clutch retainer remains in place.
203. Place the clutch piston spring and spacer ring on top of the piston in the clutch retainer, ensuring the spring and spacer ring are positioned in the retainer recess. Start one end of the wave spring in the retainer groove and progressively tap or push spring into place, making sure it is fully seated in the groove.
204. Install inner pressure plate in the clutch retainer with the raised portion of the plate resting on the spring.
205. Lubricate all clutch plates in transmission fluid, install one lined disc followed by a steel plate until all plates are installed. Install outer pressure plate and selective circlip.
206. Measure the rear clutch plate clearance by pressing down firmly on the outer pressure plate to seat the plates, insert a feeler gauge between the plate and the circlip. The permitted clearance is 0,63 mm – 1,14 mm (0.025 in – 0.045 in). If necessary, install a new selective circlip of the proper thickness to obtain the specified thickness. Low limit clearance is desirable.
207. The rear clutch plate clearance is very important in obtaining the proper clutch operation. The clearance can be adjusted by the use of various thickness outer circlips, which are available in the following thicknesses

1,52 mm (0.060 in)
1,87 mm (0.074 in)
2,23 mm (0.088 in)
2,69 mm (0.106 in)

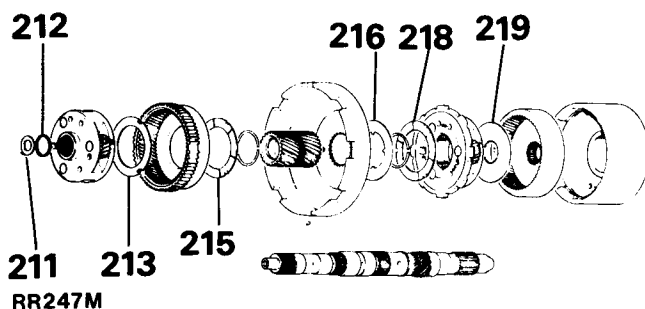
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RR331M

PLANETARY GEAR TRAIN OVERHAUL

Dismantling

208. Measure the end play of the planetary gear assemblies, sun gear and driving shell prior to removing these parts from the output shaft.
209. Support assembly upright with the forward end of output shaft on a wood block so that all parts will move forward against the selective circlip at the front of the shaft.
210. Insert a feeler gauge between the rear annulus gear hub support and shoulder on the output shaft. The clearance should be 0,3 mm – 0,63 mm (0.01 – 0.025 in). If the clearance exceeds the specification replace the thrust washers.
211. Remove the thrust washer from the forward end of the output shaft.
212. Detach the selective circlip from the shaft, and slide the front planetary assembly off the shaft.
213. Slide front annulus gear off the planetary gear set. Remove the thrust washer from the rear side of the planetary gear set.
214. Lift sun gear, driving shaft and rear planetary assembly off the output shaft.
215. Lift the sun gear and driving shell off the rear planetary gear assembly. Remove the thrust washer from inside the driving shell.
216. Remove the circlip and thrust washer from the sun gear (rear side of the driving shell) and slide the sun gear out of the shell.
217. Remove the front snap ring from the sun gear. It should be noted that the front end of the sun gear is longer than the rear.
218. Remove the thrust washer from the forward side of the rear planetary gear assembly.
219. Remove the planetary gear set and thrust plate from the annulus gear.



Inspection

220. Inspect the bearing surfaces on the output shaft for nicks, burrs, scores or other damage. Light scratches nicks or burrs can be removed with extra fine wet and dry paper or a fine stone.
221. Ensure all oil passages in the shaft are open and clean.
222. Measure the thrust washers and replace if worn below specification. Thrust washer numbers refer to the paragraphs mentioned.
 No 211. 1,57–1,62mm (0.062–0.064in)
 No 213. 1,49–1,57mm (0.059–0.062in)
 No 215. 1,52–1,57mm (0.060–0.062in)
 No 216. 0,86–0,91mm (0.034–0.036in)
 No 218. 1,49–1,57mm (0.059–0.062in)
 No 219. 0,86–0,91mm (0.034–0.036in)
223. Inspect the thrust faces of the planetary gear carriers for wear, scoring or other damage.
224. Check the planetary gear carrier for cracks and pinions for broken pinion shaft lock pins.
225. Inspect annulus gear and driving gear teeth for damage, replace unit if damaged.

Reassembly

226. Install the rear annulus gear on the output shaft.
227. Apply a thin coat of petroleum jelly to the thrust plate, place plate on the shaft and in the annulus gear, ensuring the plate teeth are correctly located over the shaft splines.
228. Position the rear planetary gear assembly in the rear annulus gear.
229. Place the thrust washer on the front side of the planetary gear assembly.
230. Install the circlip in the front groove (long end) of the sun gear. Fit the sun gear through the front side of the driving shell.
231. Fit the rear thrust plate and circlip.
232. Carefully slide the driving shell and sun gear assembly on to the output shaft, engaging the sun gear teeth with the rear planetary pinion teeth.
233. Position the thrust washer inside the front driving shell.
234. Place the thrust washer on the rear hub of the front planetary gear set, then slide the assembly into the front annulus gear.
235. Carefully install the front planetary and annulus gear assembly to the output shaft, meshing the planetary pinions with the sun gear teeth.
236. With all the components properly positioned, install the selective snap ring on the front end of the output shaft. Remeasure the end play of the assembly.
237. If the end play tolerance of 0,22 mm – 1,11 mm (0.009 in – 0.044 in) is not met, and the thrust washers have been measured and found to be within the required specification, then the end float clearance can be adjusted by the use of various thickness circlips. Circlips are in the following thicknesses:—
 1,21 mm (0.048 in)
 1,39 mm (0.055 in)
 1,57 mm (0.062 in)

Continued

OVERRUNNING CLUTCH OVERHAUL**Inspection**

- 238. Inspect the clutch rollers for smooth round surfaces, they must be free of flat spots and chipped edges. Replace if damaged.
- 239. Check roller contacting surfaces in the cam and race for brinelling.
- 240. Inspect the roller springs for distortion, wear or other damage. Replace if damaged.
- 241. Inspect the cam set screw for tightness.

KICKDOWN SERVO AND BAND OVERHAUL**Dismantling**

- 242. Remove the sealing ring from the piston rod guide.
- 243. Remove the small circlip which retains the piston rod to the servo piston.
- 244. Remove the washer, springs, piston rod.
- 245. Withdraw the piston rod from the servo piston.
- 246. Remove the 'O' ring from the piston rod and piston rings from the servo piston.

Inspection

- 247. Examine all piston and guide seal rings for wear, and during reassembly ensure they turn freely in the grooves.
- 248. Inspect the piston and piston bore for cracks, scores or wear.
- 249. Examine the fit of guide on the piston rod and inspect the piston spring for distortion.
- 250. Inspect the band lining for wear and bond of lining to band.
- 251. Examine the lining for black burn marks, glazing, a non uniform wear pattern and flaking. If the band lining is worn so that the grooves are not visible at the ends, or any portion of the bands, replace the band.
- 252. Inspect band for distortion or cracked ends.

Reassembly

- 253. Grease the new 'O' ring and install on piston rod, use petroleum jelly as a greasing agent.
- 254. Install piston rod into the servo piston.
- 255. Locate inner spring, flat washer, outer spring, piston rod guide and secure assembly with the circlip.
- 256. Refit the piston rings to the servo piston and piston rod guide.

LOW/REVERSE SERVO AND BAND OVERHAUL**Dismantling**

NOTE:— Although the low/reverse servo had been partially dismantled during the gearbox dismantling procedures, an asterisk denotes where the information is repeated for sequential clarity.

- *257. Remove the circlip, retainer and spring.
- *258. Lift out the piston plug and spring assembly.
- 259. Compress the spring and remove the circlip fitted to the rear of the piston.
- 260. Release the spring slowly and dismantle the piston assembly, comprising piston plug, spring and piston.

Inspection

- 261. Inspect the seal for deterioration, wear and hardness.
- 262. Check piston plug and piston for cracks and burrs.
- 263. The piston plug must operate freely in the piston.
- 264. Inspect the piston bore for damage and springs for distortion.
- 265. Inspect the band lining for wear and the condition of the bond of lining to the band. If lining is worn so that the grooves are not visible at the ends of any portion of the band, replace the band.

Reassembly

- 266. Lubricate and insert piston plug and spring into the piston, compress spring and secure with small circlip.
- 267. Renew the seal around the piston.

ACCUMULATOR PISTON OVERHAUL**Inspection**

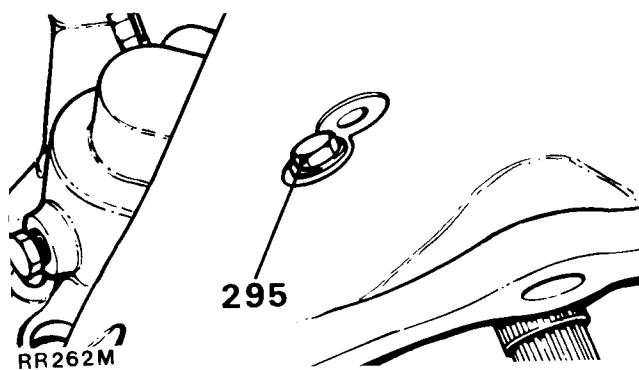
- 268. Remove the sealing rings from the piston and inspect for damage.
- 269. Inspect spring for distortion.

Continued

GEARBOX ASSEMBLY OVERHAUL

Reassembling

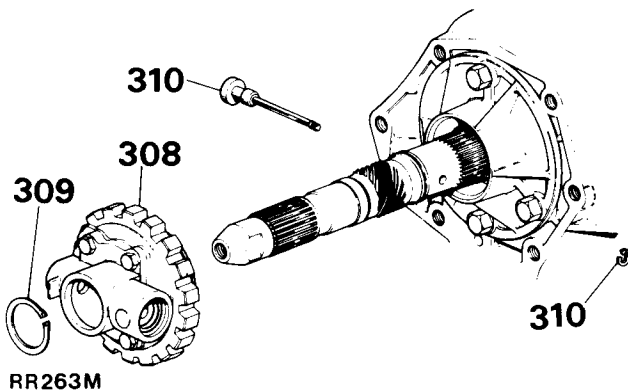
270. Fit a new manual lever oil seal into the gearbox casing and ensure the front band adjuster is free.
271. Refit the low and reverse servo assembly to the casing.
272. Fit the kickdown servo assembly to the casing.
273. Replace the kickdown servo lever and shaft. Apply Loctite 290 to threads of the 6,35 mm (1/4 in) squared plug. Tighten to 16,94 Nm (150 lb.in).
274. With the gearbox casing in the upright position, insert the clutch hub inside the cam. Install the overrunning clutch rollers and springs exactly as noted during the dismantling operation. On completion rotate the inner hub to verify the rollers and springs are correctly located.
275. Fit new 'O' rings to the rear band shaft. Engage the shaft in the casing.
276. Assemble the short lever, link and anchor prior to refitting. Locate the assembly into the casing and slide shaft across to engage and hold the assembly in position.
277. Refit the rear band in the case. Ensure that the rear band strut lever is located against the link and anchor. This is to provide clearance for the low and reverse drum.
278. Fit the low and reverse drum.
279. Fit the thrust washer to the output shaft and lower output shaft with planetary gear assembly into casing.
280. Refit the output shaft supports and tighten the four bolts to 16,94 Nm (150 lb.in).
281. Lubricate the new thrust washer with petroleum jelly and install on the front end of the output shaft. This washer must be installed in the notches on the rear clutch retainer with petroleum jelly to hold it into position.
282. Align the rear clutch plate inner splines, then refit the rear clutch and input shaft assembly. Rotate the clutch retainer whilst fitting to ensure correct location.
283. Fit the fibre thrust washer having ascertained that it is of the correct tolerance, which is 1,54 to 1,6 mm (0.061 to 0.063 in).
284. Align the front clutch plate inner splines and fit the front clutch assembly. Rotate the clutch retainer to ensure correct location.
285. Refit the front clutch band, noting that the cut away is towards the front. Slide the band over the front clutch assembly.
286. Install the band strut, screw in the adjuster just enough to hold the strut and anchor in place.
287. Locate the guide studs tool 18G1384 to the casing, enabling the pump housing and reaction shaft support assembly to be fitted.
288. Fit a new gasket over the guide studs.
289. If the input shaft end float was not to within the specified tolerances, replace the thrust washer on the reaction shaft support with one of the appropriate thickness.
290. Place a new rubber seal ring in the groove on the outer flange of the pump housing. Ensure the seal ring is not twisted. Coat the seal with petroleum jelly to assist installation.
291. Locate and fit the pump housing and reaction shaft support assembly in the casing. Lightly tap into position using a soft mallet, if necessary. Remove the guide studs 18G1384.
292. Loosely locate the lower five bolts into the pump housing.
293. Fit a new grommet to the end of the breather pipe. Add Silcoset 152 sealant between the breather retaining plate and captive washer, and loosely locate the retaining plate bolts.
294. Smear Silcoset 152 sealant to the underside of the breather block and align the block to the casing.
295. Fit and tighten the breather block retaining bolts. Tighten to 8,13 Nm (6 ft.lb).



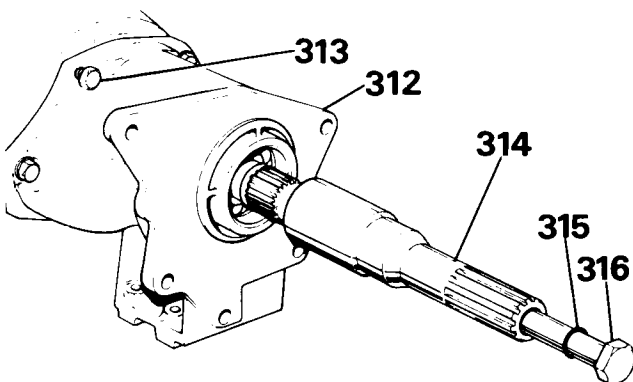
296. Fully tighten all the servo pump housing bolts to 18,07 Nm (160 lb.in).
297. Refit the accumulator piston assembly, comprising spring and piston to the casing.
298. Align valve body in position, manoeuvre the park rod through the opening and install the retaining bolts finger tight.
299. Fit a new seal and install the start inhibit and reverse switch. Tighten to 20,33 Nm (15 lb.ft).
300. Place the manual lever in the neutral position. Shift the valve body if necessary to centralise the neutral finger of the neutral switch plunger. Tighten the valve retaining bolts to 11,29 Nm (100 lb.in).
301. Slacken the kickdown; and low and reverse band locknuts.
302. Tighten the kickdown band adjuster to 8,13 Nm (6 lb.ft), then back off the adjusting screw two and one half turns.

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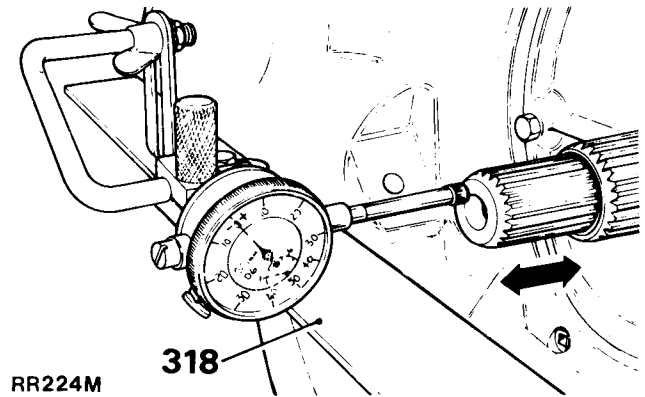
303. Tighten the low and reverse band adjuster to 8,13 Nm (6 lb.ft), then back off the adjusting screw two turns.
304. Retighten the kickdown; and low and reverse band locknuts.
305. Refit the spacer to the valve block.
306. Fit a new filter and Nyloc nuts, tighten the nuts to 4 Nm (2.95 lb.ft).
307. Using a new sump gasket, replace the sump. Tighten sump bolts within the specified tolerance of 21 to 28 Nm (15 to 20 lb.ft).
308. Position the parking gear and governor body on to the output shaft. Ensure the hole in the output shaft aligns with the valve shaft hole.
309. Slide assembly into position and fit the circlip.
310. Refit the governor valve and shaft, and fit the small circlip.



311. Fit new extension housing gasket.
312. With the parking nut fully rearwards (low selected), hold the park pawl aside and guide the park rod into the extension housing.
313. Refit the extension housing bolts. Tighten to 2,71 Nm (24 lb.in).
314. Smear transmission fluid on the front of the coupling shaft and refit to the output shaft.
315. Fit a new 'O' ring to the coupling shaft retaining bolt.
316. Apply Loctite 290 to the threads of the bolt and tighten bolt to within specified tolerance 65 to 80 Nm (48 to 59 lb.ft).



317. Select park to lock up the output shaft by turning the manual lever at the side of the gearbox casing fully rearwards.
318. Refit the torque converter retaining strap and mount the dial gauge and brackets to the strap. Measure the end float to ascertain it is still within the tolerance of 0,914 to 1,219 mm (0.036 to 0.084 in).

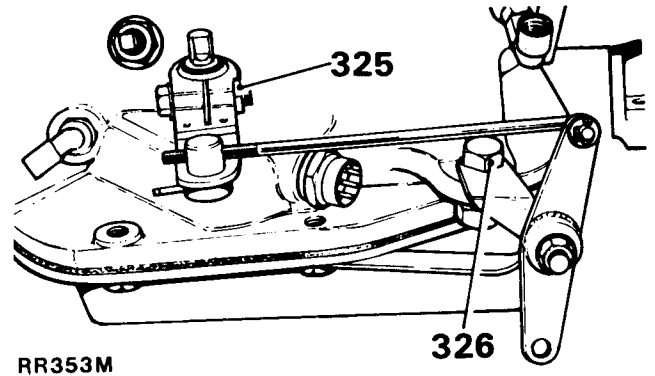


319. Remove the retaining strap and dial gauge assembly.
320. With a suitable tool, a thin screwdriver or a length of 3,17 mm (1/8 in) welding rod or similar, align the lugs on the inner pump rotor through the pump housing oil seals. Care must be taken not to damage the oil seal.
321. Refit the torque converter to the input shaft. Ensure the converter hub slots are vertical to fully engage the pump inner rotor lugs. To assist the fitting operation, a thin film of transmission oil may be applied to the converter hub.
322. Test for full engagement by placing a straight edge on the face of the case. The surface of the converter front cover lug should be at least 12,5 mm (1/2 in) to the rear of the straight edge, when the converter is pushed fully into the gearbox.
323. Coat the converter hub hole with a suitable multi-purpose grease.
324. Fit the angled stop bracket to the torque converter retaining strap, and attach the strap to the housing.

Continued

Automatic Gearbox

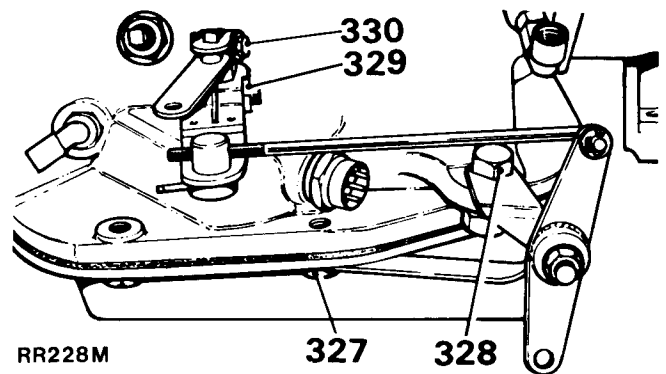
325. Locate the linkage to the manual lever.
326. Fit the pivot and bracket bolt to the casing, but do not tighten.
327. Remove the sump bolt adjacent to the linkage, fit linkage plate and tighten sump bolt to within the specified tolerances of 21 to 28 Nm (15 to 25 lb.ft).
328. Tighten the pivot bracket nut to 34 to 41 Nm (25 to 30 lb.ft).
329. Tighten the pinch bolt fitted to the selector linkage to 7 to 10 Nm (5 to 7 lb.ft).
330. Replace the throttle valve lever to the throttle valve shaft and tighten bolts to 5 to 7 Nm (4 to 5 lb.ft).



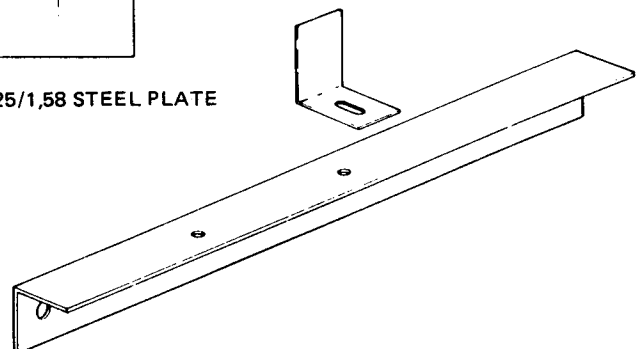
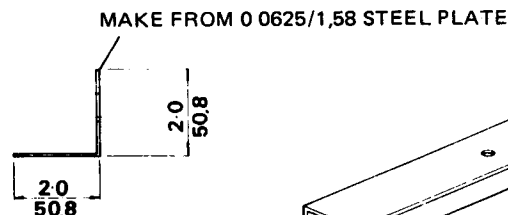
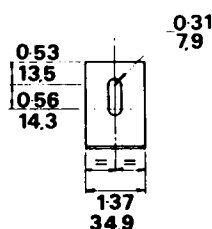
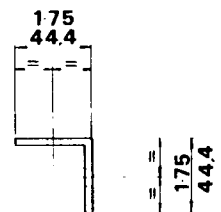
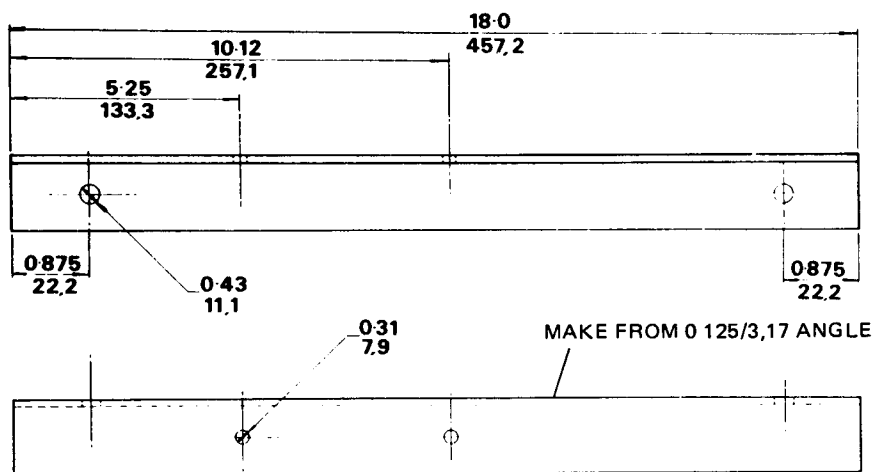
RR353M

OIL COOLER AND TUBES – FLUSHING

331. When an automatic gearbox failure has contaminated the fluid, the oil cooler should be flushed to ensure that metal particles or sludged oil are not later transferred back into the reconditioned gearbox.
332. Place a length of hose over the end of the oil cooler input, insert hose securely into a waste oil container.
333. Apply very short sharp blasts of clean dry compressed air to the output connector tube.
334. Pump approximately 0,6 litre (1 pint) of DEXRON D11 transmission fluid into the oil cooler and apply compressed air in short blasts.
335. Remove tube and reconnect oil cooler to gearbox.



RR228M



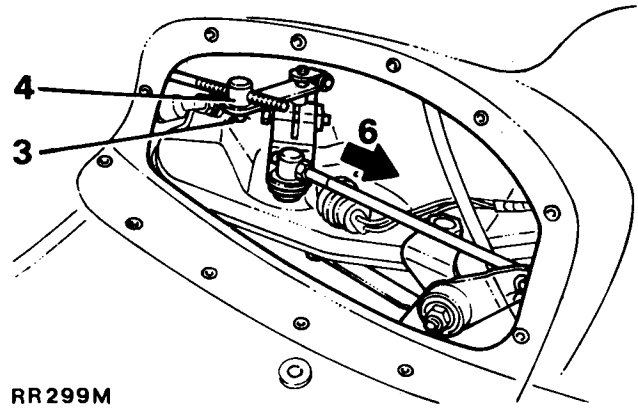
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THROTTLE VALVE LINKAGE

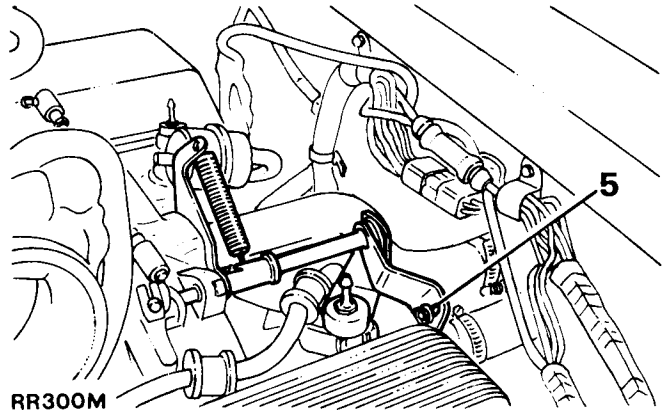
– Adjust

44.15.03

1. Remove the air cleaner to gain access to the throttle valve upper linkage.
2. Remove the twelve screws and withdraw the gear box tunnel side plate.
3. Remove the split pin and washers securing the trunnion to the throttle valve lever.
4. Remove the trunnion from the throttle valve lever.
5. With assistance, depress the accelerator pedal to give full throttle position and check that the down link is at the bottom of the slot in the coupling shaft lever.
6. Whilst holding full throttle, move the throttle valve lever on the gearbox fully rearwards and adjust the position of the trunnion on the rod so that it drops into the throttle valve lever hole.
7. Temporarily fit the trunnion to the throttle valve lever. Release the accelerator pedal then depress it again to full throttle. If the adjustment is correct, the throttle lever should still be in the fully rearward position such that it cannot be moved back any further. If further rearward movement is possible, repeat the adjustment procedure.
8. Release the accelerator and secure the trunnion with the washer and a new split pin.
9. Fit the side cover ensuring that the sealant is evenly distributed round the aperture to prevent ingress of water.
10. Fit the air cleaner.



RR299M



RR300M

GEAR SELECTOR ASSEMBLY

– Remove and refit

44.15.04

Removing

1. Remove the gear box tunnel top cover assembly.
2. Remove the two socket headed nuts and bolts securing the cable clamp to the selector assembly quadrant.
3. Remove the split pin and washer retaining the inner cable to the cross shaft lever.
4. Disconnect at the bullet connection, the feed wire to the illumination bulb.
5. Withdraw the selector assembly.

Refitting

6. Fit the outer cable to the selector assembly quadrant with the clamp and two bolts.
7. Connect the inner cable to the cross shaft lever with washer and split pin.
8. Connect the illumination feed wire.
9. Fit the top cover assembly.

Continued

REVERSE STARTER SWITCH

– Test

44.15.17

1. Remove the gearbox tunnel side plate.
2. Disconnect the multi plug from the switch.
3. Obtain a slave battery and test lamp.
4. Connect the negative terminal of the battery to the transmission case (earth).
5. Connect the test lamp circuit to the battery positive terminal and the other end to the switch centre pin.
6. Move the gear selector to 'P' (Park) to check continuity, which is evident if the lamp illuminates.
7. Select 'N' (Neutral) and check continuity.
8. Connect the earth lead from the battery to one of the outer pins on the switch and the test lamp to the other outer pin.
9. Select Reverse to establish continuity.
10. Remove test equipment, connect the multi plug to switch and refit gear box tunnel side plate.

AUTOMATIC GEARBOX AND TRANSFER BOX

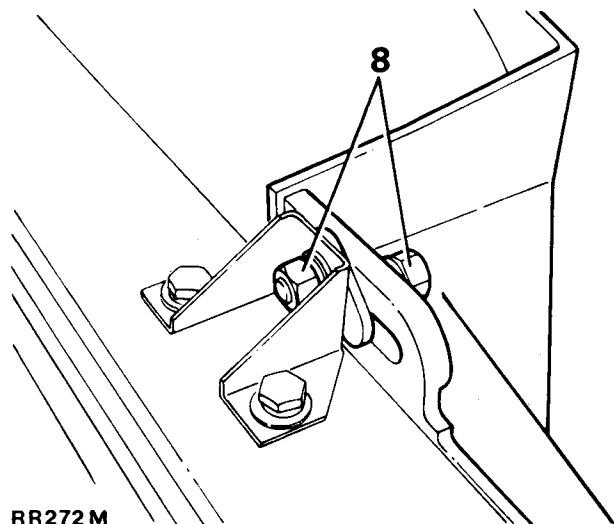
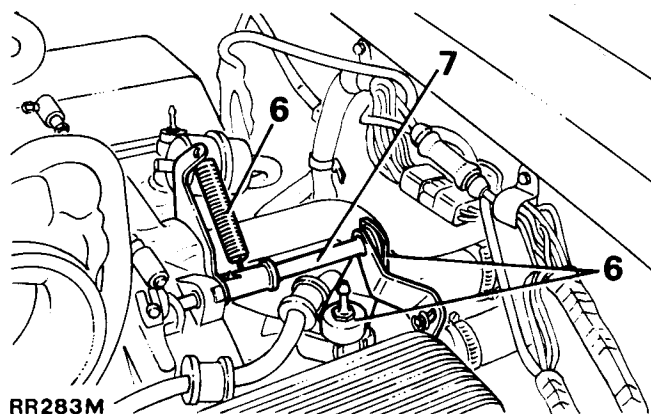
– Remove and refit

44.20.04

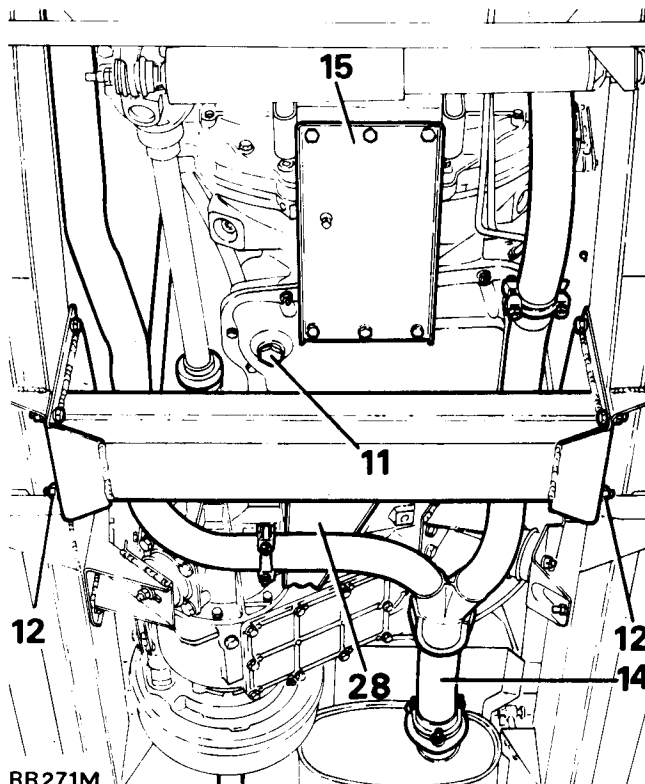
Removing

1. Drive vehicle on to a ramp and disconnect the battery.
2. Remove the ashtrays and carpet covering the transmission tunnel.
3. Remove ten screws and withdraw handbrake gaiter.
4. Remove high/low transfer knob and four screws and withdraw the gaiter.
5. Remove air cleaner.
6. Unscrew the air cleaner L.H. mounting peg and remove the coupling shaft support bracket. Release the throttle valve linkage return spring.
7. Disconnect the throttle valve coupling shaft.
8. Slacken the two outboard nuts retaining the fan cowl and turn the two inboard nuts anti-clockwise to raise the cowl sufficiently to prevent fouling when the engine is lowered.
9. Release the hose from the clip attached to the alternator bracket.

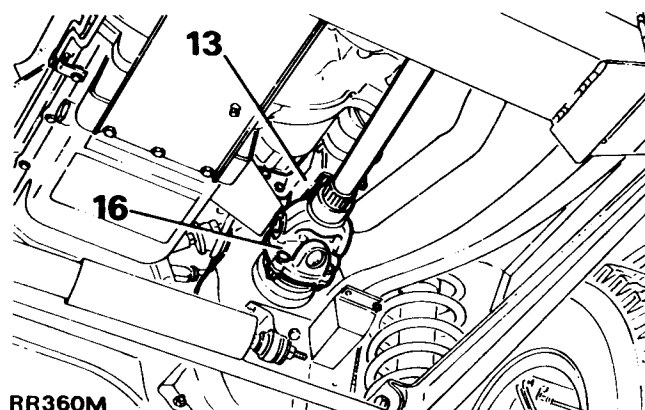
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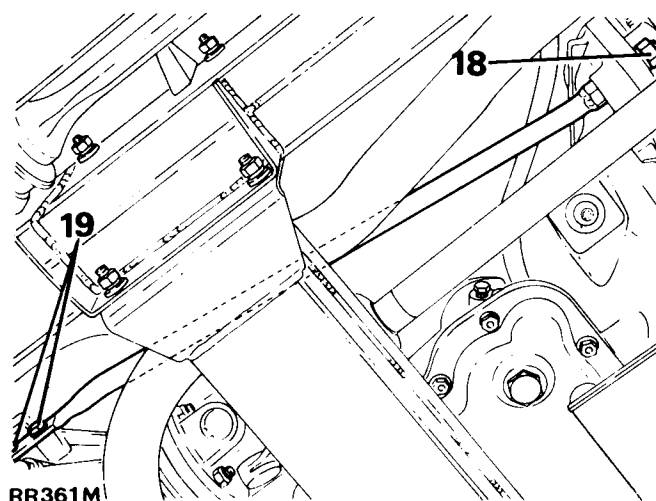
10. Raise the vehicle on the ramp.
11. Place a suitable container beneath the gear box sump, remove the drain plug and allow the fluid to drain. Refit the drain plug.
12. Remove the eight nuts and bolts securing the chassis cross member and using a suitable means of parting the chassis side member, remove the cross member.



13. Remove the starter motor solenoid heat shield.
14. Remove the front exhaust pipe system complete.
15. Remove the tie-plate between engine and gear box.
16. Mark for reassembly and disconnect the front propellor shaft from the transfer box flange.

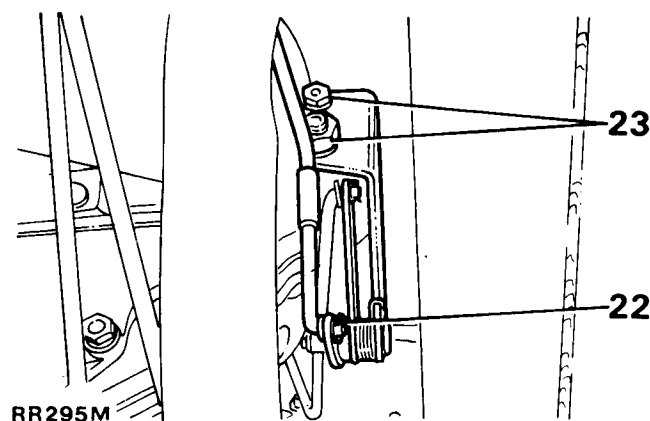
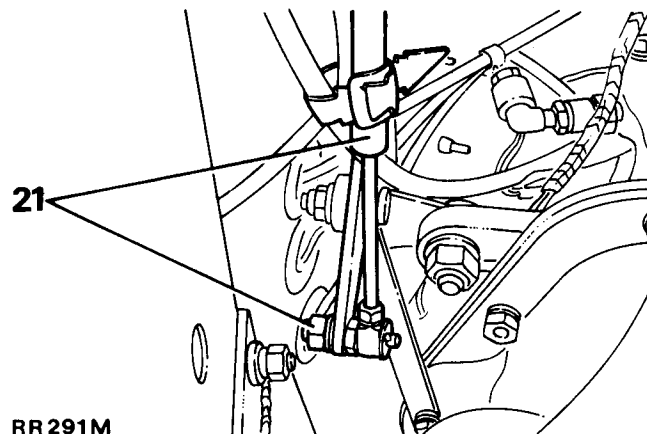


17. Mark for reassembly and disconnect the rear propellor shaft from the transmission brake drum.
18. Remove the nut and washer securing the tie bar to the bell housing.
19. Remove the two bolts retaining the rear end of the tie bar to the transfer housing.
20. Disconnect the speedometer cable from the transfer box and release the outer cable from its retaining clip.



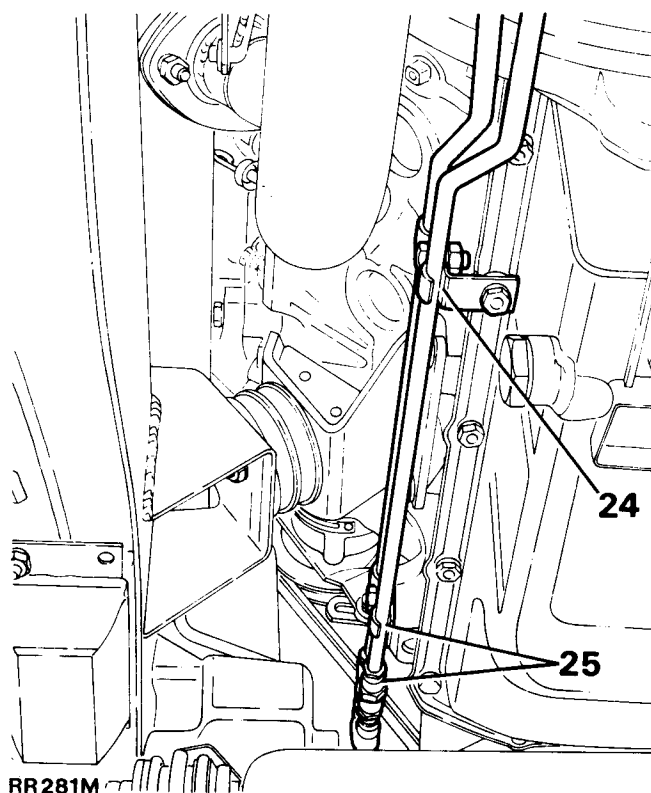
Continued

21. Remove the nut retaining the gear selector cable from the fulcrum arm and release the outer cable from the securing clamp and move the cable aside.
22. Remove the split pin and disconnect the vertical rod linking the upper and lower throttle valve linkage.
23. Remove the bell housing nut and bolt that retains the throttle valve linkage bracket and move the assembly aside.

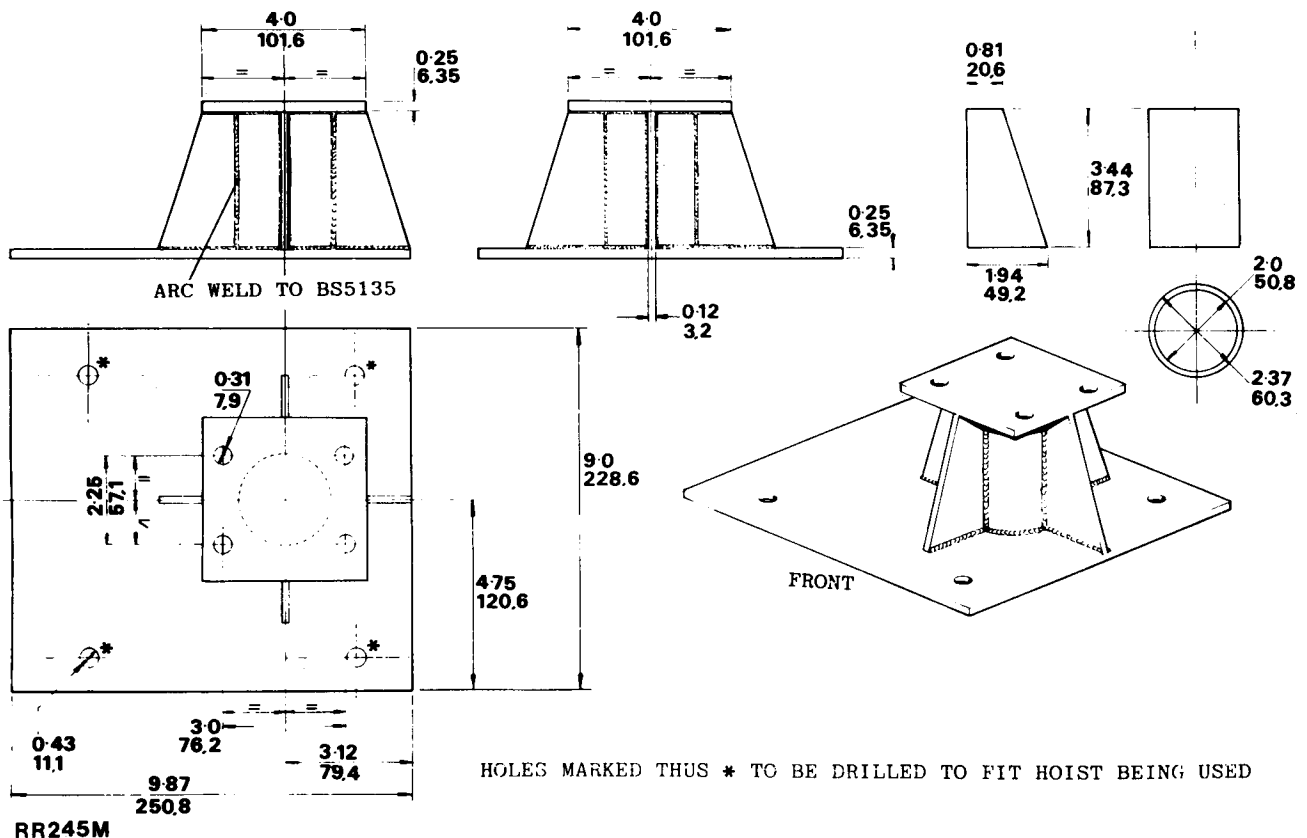
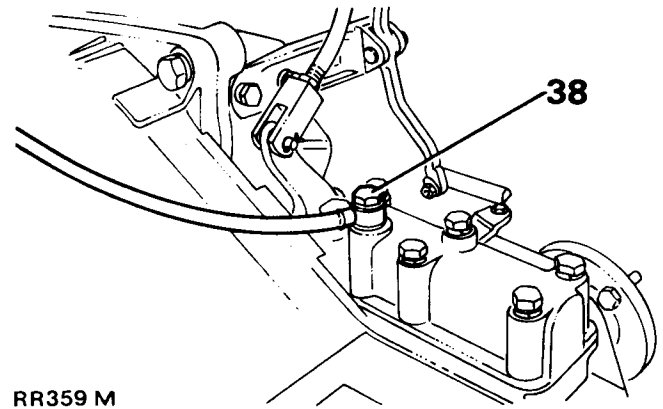


24. Disconnect the oil cooler pipes from unions at L.H. side of engine sump and release the steel pipes from the clamps.
25. Disconnect the oil pipes from the gear box unions and remove the complete pipe assembly from the vehicle. Cover all exposed pipe ends to prevent entry of dirt.
26. Withdraw the nine bolts and remove the bell housing cover plate.
27. Working through the bell housing aperture, remove the four bolts securing the torque converter to the drive plate. After removing the last bolt mark the hole in the drive plate and torque converter relative to the drive plate housing and bell housing to facilitate reassembly.
28. Remove the tie-plate between the gear box and transfer box.

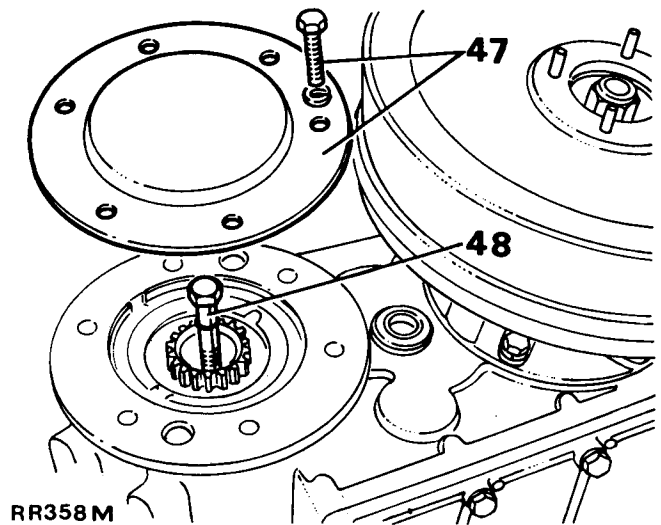
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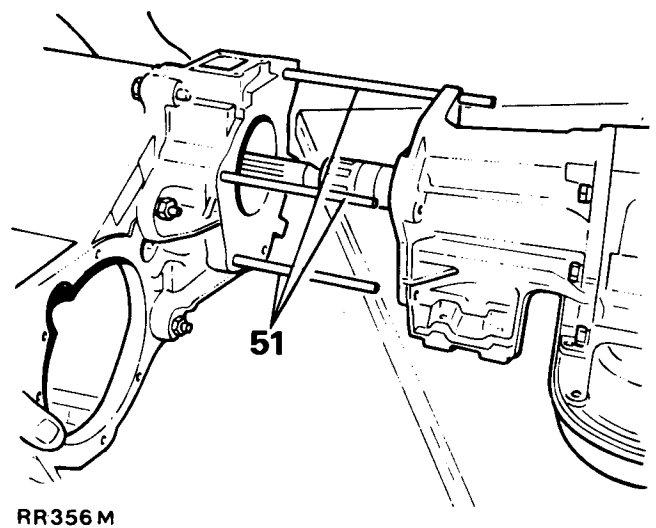


41. Support the engine with a suitable jack.
42. Remove the three remaining bell housing bolts.
43. Lower the gear box and transfer box from the vehicle, whilst checking that all connections to the chassis and engine are clear.
44. To separate the transfer box from the gear box proceed as follows:—
45. Remove the five bolts retaining the transfer box to the gear box and withdraw the transfer box.
46. Should difficulty be experienced in separating the two nuts at this stage, continue as follows:—
47. Remove the six bolts retaining the cover plate and remove the cover to expose the coupling shaft bolt.
48. Remove the coupling shaft bolt.
49. Withdraw the transfer box from the gear box leaving the extension casing attached to the transfer box.



Refitting

50. Clean the transfer box and automatic gear box mating faces.
51. To prevent damage to the oil seal and to facilitate the fitting of the transfer box, fit the three guide studs to the transfer gear box extension casing, as illustrated, noting that one stud is longer and must be fitted on the left hand side of the casing. See operation 37.29.25.
52. Place the automatic gear box into PARK and slide the transfer box into position passing the guide studs through the corresponding holes in the automatic gearbox.
53. Secure the transfer box with two bolts, remove the guide studs and fit the remaining bolts and tighten.
54. Fit the adaptor plate to the transmission and mount the assembly on the transmission lift.
55. If the same torque converter is being used line up the marked hole with the mark made on the bell housing and check that the marked hole in the drive plate still coincides with the one made on the drive plate housing.
56. Offer up the transmission to the engine and locate the dowels in the bell housing to the corresponding holes in the drive plate housing.
57. Place in position, with the head towards the rear, the bolt also used to secure the throttle valve linkage lower bracket.
58. Fit the gear box fluid filler tube.
59. Fit and tighten the remaining bell housing bolts.
60. Remove the support from the engine.
61. Connect the multi plug connector to the combined inhibitor and reverse light switch.
62. Connect the two differential lock warning light leads to the transfer box switch and secure with cable clips.
63. Fit the banjo breather connection for the gear box.
64. Fit the banjo breather connection for the transfer box. Tighten both banjo bolts to 7–11 Nm (5–8 lb.ft).



Continued

65. Connect the gear selector illumination leads.
66. Raise the transmission to enable the mounting bracket bolts to be fitted. Note that the speedometer cable clip is attached to the top L.H. forward bolt.
67. Remove the bolts securing the adaptor to the transmission and remove the lift.
68. Fit the four bolts securing the torque convertor to the drive plate and tighten to 30.5 Nm (22.5 lb.ft).
69. Fit the transmission fluid cooler pipes to the flexible connections at the front of the engine and to the unions on the gearbox. Secure the pipes with the clamps to the engine.
70. Fit the throttle valve linkage lower bracket to the bell housing bolt and tighten the nut, see torque settings.
71. Using a new split pin connect the throttle valve vertical control rod to the lower linkage.
72. Secure the gear selector outer cable with the clip to the L.H. rear mounting brackets.
73. Connect gear selector inner cable to the fulcrum lever.
74. Fit the speedometer cable to the transfer box.
75. Fit the tie-rod to the bell housing but do not tighten the nut.
76. Secure the rear end of the tie-rod to the transfer box with the two bolts.
77. Tighten the nut at the bell housing end of the tie rod.
78. Line up the marks and connect the front propellor shaft to the transfer box flange.
79. Connect the rear propellor shaft to the transmission brake drum flange.
80. Fit the steady plate between the gear box and transfer box.
81. Fit the steady plate between the engine and gear box.
82. Fit the front exhaust pipe system to the engine manifold flanges and front silencer.
83. Fit the starter motor solenoid heat shield.
84. Using a suitable means to expand the chassis, fit the cross member and secure with the eight nuts and bolts.
85. Lower the ramp.
86. Fit the throttle valve coupling shaft support bracket to the shaft.
87. Connect the coupling shaft to the outer shaft.
88. Secure the assembly with the air cleaner L.H. mounting peg.
89. Connect the return spring to the coupling shaft lever.
90. Fit the air cleaner.
91. Reposition the fan cowl, reversing the procedure in instruction 8.
92. Secure the water hose to clip on alternator bracket.
93. Fit the handbrake gaiter.
94. Fit the high/low transfer gaiter and knob.
95. Fit the ash trays and the carpet to the transmission tunnel.
96. Refill the automatic gearbox with new clean fluid of the recommended type and specification as described in operation 44.24.02.

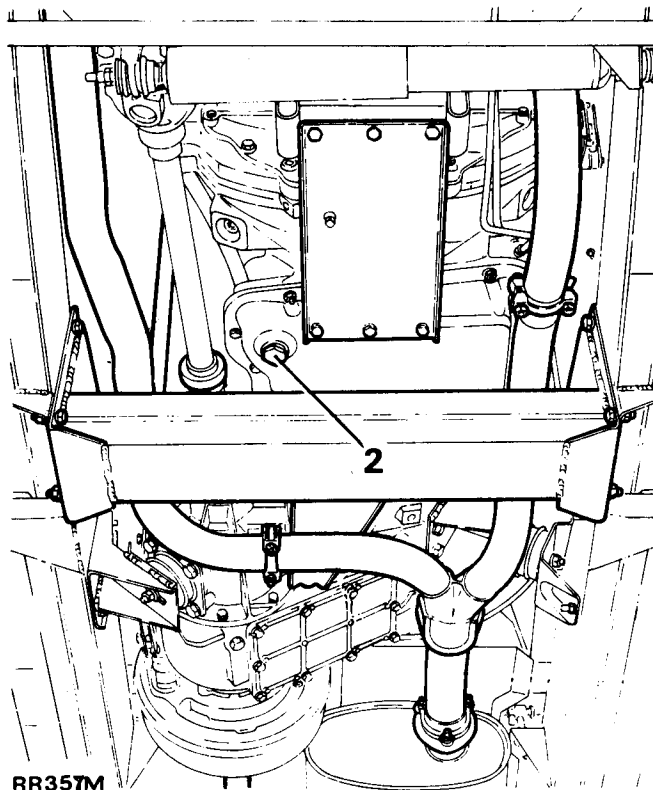
AUTOMATIC GEARBOX FLUID

– Drain and refill

44.24.02

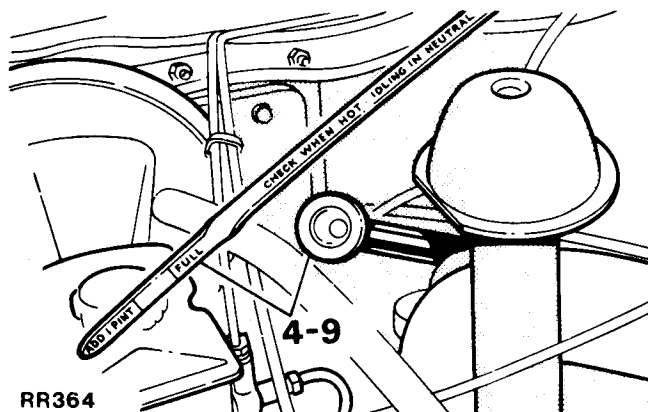
Drain

1. Raise vehicle and place a suitable container beneath the gearbox sump.
2. Remove the drain plug and allow time for the fluid to completely drain.
3. Refit drain plug and tighten to 25 – 35 Nm (19 – 26 lb.ft).



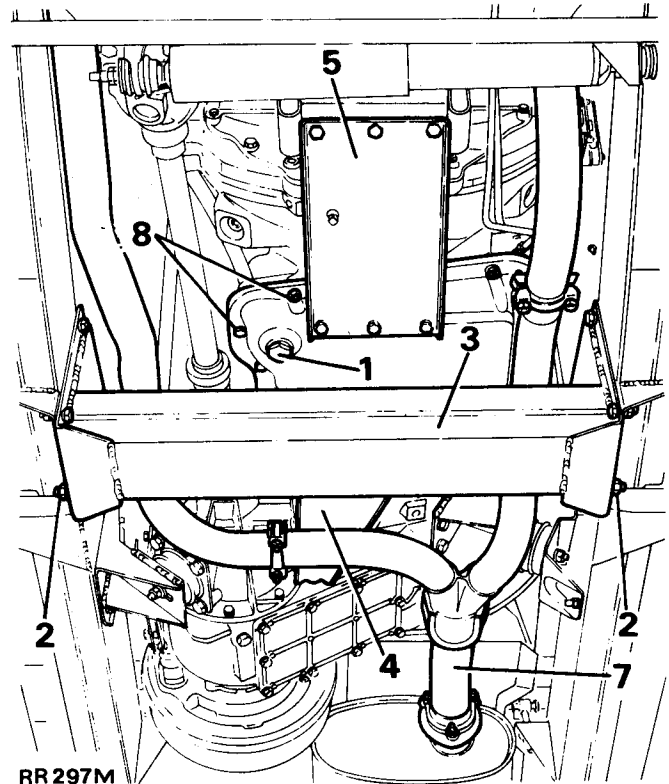
Refill

4. Remove the dipstick and fit a filling funnel.
5. Fill with 5 litres (9 pints) of transmission fluid of the correct make and grade, see data section.
6. Remove the funnel and fit the dipstick.
7. Select 'N' and start the engine and run for two minutes at 600 r.p.m.
8. Apply the handbrake and move the transmission lever to each gear in turn, including 'P' (Park), pausing momentarily in each position and finishing in 'N'.
9. With the engine still running remove the dipstick and clean. Replace the dipstick and check the level.
10. Using the funnel, carefully add more fluid while continually checking the level as in instruction 9 until it reaches the "add one more pint" mark. DO NOT OVERFILL.
11. Drive the vehicle on the road and when the normal operating temperature of the transmission is reached recheck the fluid level and top up if necessary.



AUTOMATIC GEARBOX FLUID SUMP**– Remove and refit****44.24.04****Removing**

1. Raise the vehicle on a ramp or axle stands and drain the gearbox fluid, and refit the plug.
2. Remove the eight bolts securing the chassis cross-member.
3. Using a suitable spreader, prise apart the chassis side members sufficiently to enable the crossmember to be removed.
4. Remove the steady plate between the gearbox and transfer box.
5. Remove the steady plate between the engine and gearbox.
6. Disconnect the fluid temperature sensor lead.
7. Release the front exhaust pipe from the two manifold connections and from the flange connection forward of the front silencer. Also remove the 'U' bolt and disconnect the system from the exhaust hanger bracket adjacent to the gearbox L.H. mounting. Allow the system to drop sufficiently to permit access to the sump bolts.
8. Remove the twelve bolts and remove the sump. Take precautions against the entry of foreign matter into the gearbox whilst the sump is removed.



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Refitting

9. Ensure that the sump is clean and that the gearbox and sump mating faces are free from old joint washer material.
10. Secure the sump to gearbox, evenly tightening the bolts, noting that the two hexagon headed bolts are fitted on the L.H. side of the sump. Torque 20 – 28 Nm (15 – 20 lb.ft).
11. Fit the exhaust pipe assembly.
12. Fit the front and rear stiffener plates.
13. Fit the electrical connection to the fluid temperature sensor.
14. Spread the chassis members apart to enable the cross-member to be fitted. Note that the hole in the centre of the crossmember should be to the rear and welded seam to the front. Secure with the four nuts and bolts.
15. Refit the transmission with new clean fluid of the recommended type and specification as described in operation 44.24.02.

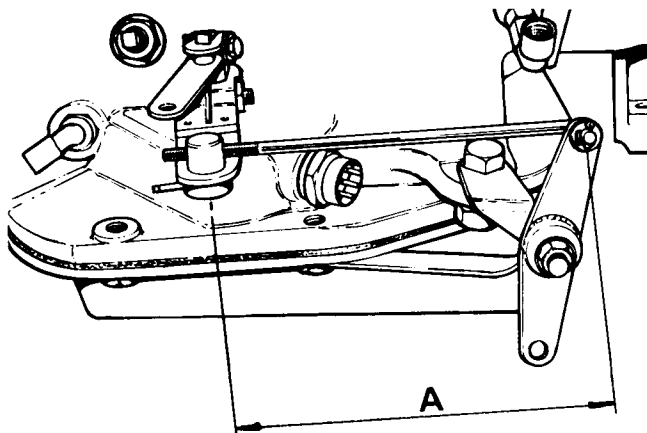
GEARBOX SELECTOR ROD AND CABLE

– Adjust

44.30.04

Selector rod

1. Remove the transfer lever knob and gaiter.
2. Move the gear selector to 'N' (Neutral) and maintain it in this position throughout the following instructions.
3. Remove the screws retaining the gearbox tunnel cover and lift the cover from the front sufficiently to expose the cable attachment to the gear selector quadrant.
4. Remove the spring clip retaining the cable trunnion to the quadrant and remove the trunnion from the quadrant.
5. Remove the gearbox tunnel side plate.
6. Ensure that the gear selector lever on the side of the gearbox has not moved from its previously set neutral position.
7. Check that the dimension 'A' between the centre of the trunnion and the centre of the gear selector rod is 159 to 161 mm.



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8. If adjustment is required remove the split pin and washer from the selector rod and remove the rod from the arm. Adjust the rod in the trunnion until the correct dimension is achieved.
9. Secure the selector rod to the arm with the washer and a new split pin.

Selector cable

10. Check that the gear selector is still in 'N' (Neutral).
11. If necessary adjust the position of the trunnion along the thread of the cable until the trunnion fits cleanly into the corresponding hole in the gear selector quadrant.
12. Fit the trunnion retaining spring clip and temporarily fit the gearbox top cover with a few screws.

13. Move the gear selector lever through the full range of gear positions whilst checking that the cable attachment to the link arm does not foul the support bracket.
14. Apply the handbrake and switch on the ignition and check the engine can be started in both 'N' (Neutral) and 'P' (Park) positions.
15. If the engine cannot be started in either or both positions repeat the selector rod and cable adjustment instructions and set the rod dimension to another figure within the tolerance.
16. Finally fit the gearbox top cover.
17. Fit the transfer lever and gaiter knob.
18. Fit the gearbox side cover.

FRONT BRAKE BAND

– Adjust

44.30.07

1. Remove the gearbox tunnel side plate.
2. Slacken the brake band adjuster locknut.
3. Using a square socket tighten the brake band adjuster clockwise to 13 Kg/cm (72 lb.in) torque and back off the adjuster two and a half turns.
4. Tighten the locknut.
5. Fit the tunnel side plate.

REAR BRAKE BAND

– Adjust

44.30.10

1. Raise the vehicle on a ramp.
2. Remove the automatic gearbox sump, see operation 44.24.04.
3. Slacken the band adjuster and tighten the adjuster to 13 Kg/cm (72 lb.in) and back off two turns and tighten the locknut.
4. Using a new joint washer fit the gearbox sump and evenly tighten the retaining bolts to 21 – 28 Nm (15 – 20 lb.ft).
5. Fit the engine to gearbox steady plate.
6. Fit the automatic gearbox to transfer box steady plate.
7. Fit the front exhaust pipe system.
8. Fit the chassis crossmember.
9. Fill the transmission with new fluid of the correct make and grade as described in operation 44.24.04.

HYDRAULIC PRESSURES

– Test

44.30.15

Special equipment:

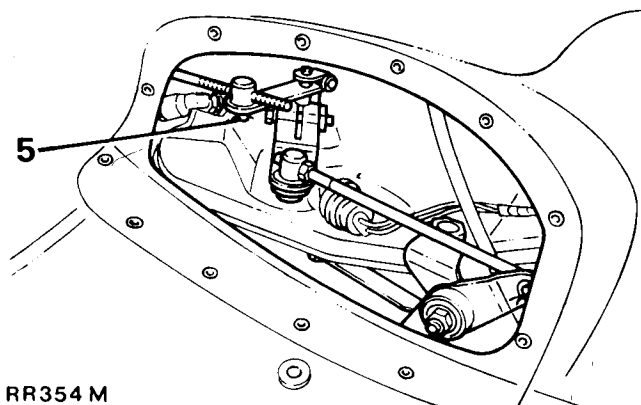
- Tachometer
- Pressure gauge and adaptors plus long hose CBWIC (18G502) 0 to 300 psi (0 – 21 kgf/cm²)
- Gauge and adaptors plus long hose (18G1427) 0 – 100 psi (0 – 7 kgf/cm²)
- Adaptor hose (18G677-2)
- Hose (long) (18G502K)

WARNING:– The 0 to 100 psi (0 – 7 kgf/cm²) pressure gauge must only be used for the governor test. It is dangerous to use it for other tests or at speeds in excess of 70 m.p.h. (110 km/h).

Pressure testing is an important part of determining the condition of the gearbox and diagnosing of faults. Before commencing the following tests, check the condition and fluid level in the gearbox. If the fluid condition is unknown or suspect, take a sample for examination. If necessary drain and refill with new fluid of the correct make and grade described in operation 44.24.02.

All the following tests must be carried out with the fluid at normal operating temperature of 80 degrees C (175 degrees F).

1. Drive vehicle on to a ramp.
2. Place automatic gearbox and transfer box in 'N' (Neutral).
3. Block front and rear wheels for safety.
4. Remove the transmission tunnel side plate.
5. Remove the split pin and washer from the throttle valve trunnion and disconnect the trunnion from the lever.
6. Connect the tachometer to the engine.
7. Raise the ramp.



RR354 M

Line pressure

Test 1

8. Fit the 0 – 300 psi (0 – 21 kgf/cm²) gauge to the line pressure port and fasten the hose clear of exhaust.
9. Start the engine and run at 1000 r.p.m.
10. Position the throttle valve lever on the side of the gearbox, fully forward.
11. Move the gear lever to '1' and note the pressure which should be 54–60 psi (3,73 – 4,22 kgf/cm²)
12. Move the throttle valve lever, by hand, to fully rearward position and the pressure should gradually increase to 90–96 psi (6,33 – 6,75 kgf/cm²)
13. Stop engine, select 'N' and move throttle lever to forward position.

Test 2

14. Start the engine and run at 1000 r.p.m.
15. Select '2'.
16. With the throttle lever fully forward the pressure should be 54–60 psi (3,73 – 4,22 kgf/cm²)
17. Move the throttle lever fully rearward and a gradual increase in pressure to 90–96 psi (6,33 – 6,75 kgf/cm²) should be observed.
18. Stop engine, select 'N', and move throttle lever fully forward.

Test 3

19. Start engine and run at 1000 r.p.m.
20. Move gear lever to 'D'.
21. The pressure should be 54–60 psi (3,73–4,22 kgf/cm²) with the throttle lever fully forward.
22. Move the throttle lever fully rearward and the pressure should gradually increase to 90–96 psi (6,33–6,75 kgf/cm²)
23. Select 'N', stop engine and move throttle lever forward.

Front servo

24. Remove the gauge connection from the line pressure port to the front servo port.

Test 4

25. Start engine and run at 1000 r.p.m.
26. Select 'D'.
27. With the throttle lever forward the pressure should read 54–60 psi (3,73 – 4,22 kgf/cm²)
28. Move throttle lever fully rearward and up to the downshift point the pressure should gradually increase to 90–96 psi (6,33 – 6,75 kgf/cm²)
29. Select 'N' move throttle lever forward and stop engine.

Continued

Rear servo

30. Remove the steady plate between automatic gearbox and transfer box.
31. Remove the gauge connection from the front servo port.
32. Fit the gauge connection to the rear servo port and fasten clear of the exhaust system.

Test 5

33. With 'N' selected start the engine and run at 1600 r.p.m.
34. Select 'R'.
35. Move the throttle lever fully rearward and the pressure should gradually increase to 235–270 psi (16,52–18,98 kgf/cm²)
36. Select 'D' and with the engine at 1600 r.p.m. the pressure should remain at zero with the throttle lever forward and rearward.
37. Select 'N' stop engine and move throttle forward.

Test 6

38. With 'N' selected start the engine and run at 1000 r.p.m.
39. Select '1'.
40. With the throttle lever fully forward the pressure should read 54–60 psi. (3,73 – 4,22 kgf/cm²)
41. Move the throttle lever fully rearward and the pressure should increase to 90–96 psi. (6,33 – 6,75 kgf/cm²).

NOTE:— The figures obtained in test 6 should be the same as those in test 1 within 3 psi (0,21 kgf/cm²)

42. Select 'N' and stop engine.

Governor pressure

43. Disconnect tachometer.
44. Fit trunnion to throttle valve lever and secure with the washer and new split pin.
45. Fit the tunnel side plate.
46. Disconnect the gauge connection from the rear servo port.
47. Connect a 0 to 100 psi (0 – 7 kgf/cm²) pressure gauge to the governor port and fasten the hose clear of the exhaust system.
48. Refit the steady plate.
49. Position the pressure gauge in the driving compartment so that it can be read whilst driving.
50. Remove blocks from wheels and drive vehicle from ramp.

Test 7

51. Select high range in the transfer box.
52. Check the pressure figures against the following chart.

Governor pressure related to speeds

km/h	bar
15	0,1
25	0,7
30	1,4
40	1,7
50	2
55	2,4
65	2,75
72	3,1
80	3,5
88	3,7
100	3,8
105	3,9
110	3,9

53. Remove the pressure gauge connector from the governor port.

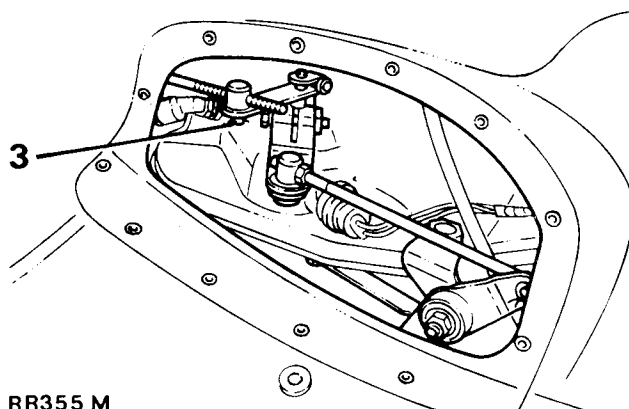
THROTTLE PRESSURE

— Adjust

44.30.25

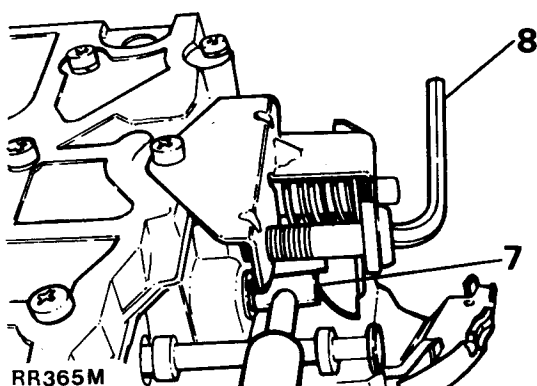
Special tools: Throttle pressure gauge

1. Drive the vehicle on to a ramp.
2. Remove the gearbox tunnel side plate.
3. Remove the split pin and washer from the throttle valve trunnion and remove it from the lever.



continued

4. Raise the vehicle and drain the transmission fluid and refit the drain plug tightening to 25–35 Nm (19–26 lb.ft).
5. Remove the automatic gearbox sump, see operation 44.24.04.
6. Remove the nuts and withdraw the filter and spacer.
7. Insert the throttle pressure gauge tool between the throttle lever cam and kickdown valve and move the tool sideways (in direction of arrow) towards the centre of the valve block thus compressing the kick-down valve rod to its fullest extent.
8. Whilst compressing the valve turn the throttle lever stop screw, using an allen key, until the underside of the screw head touches the tag on the throttle lever and the cam is hard against the gauge tool with zero clearance. Remove the gauge.



9. Fit the spacer and fluid filter using new Nyloc nuts and tighten evenly to 3.5 to 4.5 Nm (2.5 to 3.2 lb.ft).
10. Using a new joint washer fit the gearbox sump and evenly tighten the retaining bolts to 21–28 Nm (15–20 lb.ft).
11. Fit the engine to gearbox steady plate.
12. Fit the automatic gearbox to transfer box steady plate.
13. Fit the front exhaust pipe system.
14. Fit the chassis crossmember.
15. Fill the transmission with new fluid of the correct make and grade as described in operation 44.24.04.

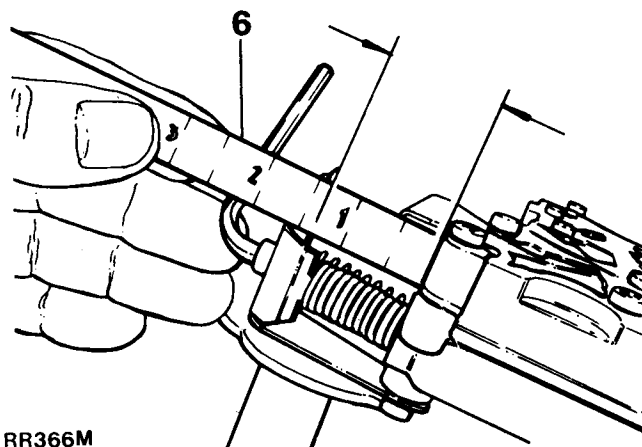
LINE PRESSURE

– Adjust

44.30.26

NOTE:— An incorrect throttle pressure setting and throttle valve linkage adjustment will cause incorrect line pressure readings. Always check these adjustments before adjusting the pressure.

1. Drive the vehicle on to a ramp.
2. Raise the vehicle and drain the transmission fluid and refit the drain plug.
3. Remove the automatic gearbox sump, see operation 44.24.04.
4. Remove three nuts and withdraw the filter and spacer.
5. To adjust the line pressure, turn the line pressure regulation valve adjusting screw, with an allen key, clockwise to decrease the pressure and anti-clockwise to increase the pressure. One complete turn of the screw alters the closed throttle line pressure approximately 1.2/3 psi (0,075 kgf/cm²). Therefore the direction and amount of turn of the screw depends on the pressure gauge reading.
6. As a guide, the approximate adjustment of the regulation valve is 25.5 mm (1.5/16 in) measured from the valve body to the inner edge of the adjusting plate, as illustrated.



7. Fit the spacer and fluid filter using new Nyloc nuts and tighten evenly to 3,5 to 4,5 Nm (2.5 to 3.2 lb.ft).
8. Using a new joint washer fit the gearbox sump and evenly tighten the retaining bolts to 21–28 Nm (15–20 lb.ft).
9. Fit the engine to gearbox steady plate.
10. Fit the automatic gearbox to transfer box steady plate.
11. Fit the front exhaust pipe system.
12. Fit the chassis crossmember.
13. Fill the transmission with new fluid of the correct make and grade as described in operation 44.24.04.

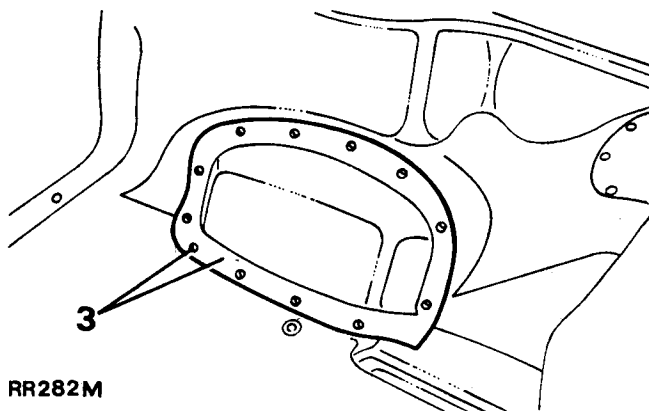
GEARBOX TUNNEL SIDE COVER

– Remove and refit

76.10.93

Removing

1. Fold back L.H. front footwell rubber mat.
2. Fold back gearbox tunnel carpet to expose plate.
3. Remove the twelve cover retaining bolts and remove the cover.



Refitting

4. Scrape off sealant from tunnel and cover plate and re-disperse it round the cover plate.
5. Fit the cover plate and evenly tighten the retaining bolts.
6. Fit the tunnel carpet and footwell mats.

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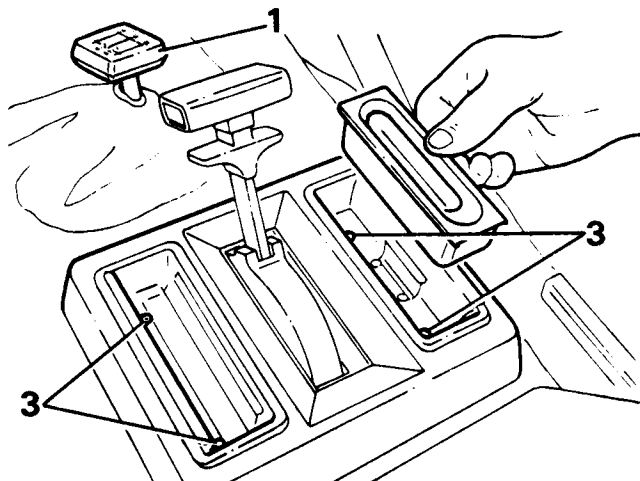
GEARBOX TUNNEL TOP COVER

– Remove and refit

76.25.07

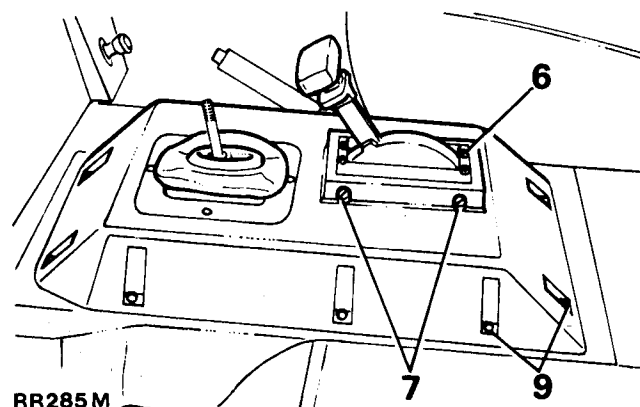
Removing

1. Unscrew the high/low transfer differential lock knob.
2. Lift out the ash trays.
3. Remove the four screws retaining the ash tray frame.
4. Remove the three screws beneath the cubby box carpet and remove the cubby box.
5. Lift out the carpet and sound deadening material.
6. Remove the four screws retaining the gear selector bezel and remove plate and trim.
7. Remove the four bolts securing the gear selector assembly to the top cover.
8. Push the selector assembly downwards to release it from the top cover.
9. Remove the fixing bolts retaining the top cover.



Refitting

10. Scrape off the sealant from the tunnel and cover and re-disperse it round the tunnel aperture.
11. Fit and secure the cover with the fixing bolts.
12. Secure the selector assembly to the cover with the four bolts.
13. Fit the plate and trim and secure the selector bezel with the four screws.
14. Fit the high/low differential lock knob.
15. Fit the tunnel carpet and sound deadening material.



AUTOMATIC GEARBOX

SPECIAL TOOLS

AUTOMATIC GEARBOX AND TRANSFER GEARBOX ASSEMBLY – REMOVE AND REFIT	Mounting plate for gearbox hoist Dimensions in workshop manual
TORQUE CONVERTOR	Retaining strap for torque convertor Dimensions in workshop manual
INPUT SHAFT END FLOAT – CHECK	Use torque convertor retaining strap (as above) and mounting bracket RO530106 plus suitable dial gauge
PUMP HOUSING AND REACTION SHAFT SUPPORT – REMOVAL	Use impulse hammers (2 off) 18G1387
PUMP HOUSING AND REACTION SHAFT SUPPORT – REFIT	Use guide studs (2 off) 18G1384
FRONT CLUTCH SPRINGS REMOVE/REFIT	Use spring compressor 18G1386
THROTTLE PRESSURE SETTING	Use gauge block 18G1385
PUMP HOUSING OIL SEAL REFITTING	Use drift 18G134-3 plus 18G134 (MS 550)
REAR EXTENSION HOUSING OIL SEAL – REFITTING	Use drift 18G1421
BAND ADJUSTMENT – FRONT AND REAR	Use socket CBW 547 A50-2A plus 3/8 x 6 in. extension bar
GOVERNOR PRESSURE TEST EQUIPMENT 0–100 psi GAUGE (0 – 7 kgf/cm ²)	18G1427
LINE PRESSURE TEST EQUIPMENT 0–300 psi GAUGE (0 – 21 kgf/cm ²)	18G502A
HOSE AND ADAPTORS	18G502K
TACHOMETER	Any suitable type of Tachometer

LT230T TRANSFER GEARBOX FOR FIVE SPEED MANUAL GEARBOX AND AUTOMATIC GEARBOX

**NOTE: TWO TYPES OF TRANSFER GEARBOX ARE IN USE.
SEE PAGE 31 OF THIS SUPPLEMENT FOR AN EXPLANATION.**

TORQUE WRENCH SETTINGS

DESCRIPTION	TYPE OF FIXING AND SIZE (METRIC)	SPECIFIED TORQUE		QUANTITY
LT230T Transfer Gearbox				
Fixings securing mounting brackets to gearbox		80-100	59-73	
Pinch bolt operating arm	M6 x 25.0 Bolt	7-10	5-7	1
Gate plate to grommet plate	M6 x 20.0 Screw	7-10	5-7	4
Bearing housing to transfer case	M6 x 20 C/sunk head screw	7-10	5-7	2
Speedometer cable retainer	M6 nut	7-10	5-7	1
Speedometer housing	M6 x 30.0 Stud	■ See note		1
Locating plate to gear change	M5 Nut Nyloc	5-7	4-5	2
Bottom cover to transfer	M8 x 30.0 bolt	22-28	16-21	10
Front output housing to transfer	M8 x 30.0 bolt	22-28	16-21	7
Front output housing to transfer	M8 x 90.0 bolt	22-28	16-21	1
Cross shaft housing to front output housing	M8 x 55.0 bolt	22-28	16-21	6
Gear change	M8 x 55.0 bolt	22-28	16-21	1
Gear change	M8 x 25.0 screw	22-28	16-21	3
Cross shaft to high/low lever	M8 nut	22-28	16-21	1
Pivot shaft to link arm	M8 nut	22-28	16-21	1
Connecting rod	M8 nut (locknut)	22-28	16-21	2
Anti-rotation plate intermediate shaft	M8 x 20.0 screw	22-28	16-21	1
Front output housing cover	M8 x 25.0 screw	22-28	16-21	7
Pivot bracket to extension housing	M8 x 25.0 screw	22-28	16-21	2
Finger housing to front output housing	M8 x 25.0	22-28	16-21	3
Mainshaft bearing housing to transfer case	M8 x 25.0 C/sunk head screw	22-28	16-21	2
Brake drum to coupling flange	M8 x 20.0 C/sunk head screw	22-28	16-21	2
Gearbox to transfer case	M10 x 40.0 bolt	40-50	29-37	3
Gearbox to transfer case	M10 x 45.0 bolt	40-50	29-37	1
End cover bearing housing to transfer case	M10 x 35.0 bolt	40-50	29-37	6
Speedometer housing to transfer	M10 x 30.0 screw	40-50	29-37	5
Speedometer housing to transfer	M10 x 45.0 bolt	40-50	29-37	1
Selector finger to cross shaft (high/low)	M10 grub screw	22-28	16-21	1
Selector fork high/low to shaft	M10 grub screw	22-28	16-21	1
Transmission brake to speedometer housing	M10 x 25.0 bolt	65-80	48-59	4
Gearbox to transfer case	M10 nut	40-50	29-37	2
Transfer case assembly	M10 stud	■ See note		2
Oil drain plug	M12 x 14—1.5 Pitch hex head A/F 17.0	25-35	19-26	1
Detent plug	M12 x 10.0 plug	Plus to be coated with Hylomar and peened. Screw plug fully in (spring solid) then turn two complete turns back		2
Differential casings	M10 x 60.0 bolt	55-64	40-47	8
Front and rear out flange	Nyloc nut M20	146-179	108-132	2
Differential case rear	M50 nut — 1.5 pitch	66-80	50-59	1
Oil filler and level plug transfer	Plug-R ¾in taper thread	25-35	19-26	1
Transfer breather	1/8 B.S.P. bolt	7-11	5-8	
Inter shaft stake nut	M20 nut A/F 30.0	130-140	96-104	1

■ Studs to be assembled into casing with sufficient torque to wind them fully home, but this torque must not exceed the maximum figure quoted for the associated nut on final assembly.

RECOMMENDED LUBRICANTS AND FLUIDS

Service instructions for temperate climates – ambient temperature range –10°C to 35°C

COMPONENTS	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	SHELL	TEXACO
LT230/T transfer box (used with five-speed gearbox)	BP Autran DX2D or BP Visco 2000 15W/40 or BP Visco Nova 10W/30 or BP Vanellus C3 Multigrade 15W/40 or BP Gear Oil SAE 90EP	Castrol TQ Dexron IID or Castrol GTX 15W/50 or Castrol Hypoy SAE 90EP	Duckhams Fleetmatic CD or Duckhams D-Matic or Duckhams 15W/50 Hypergrade Motor Oil or Duckhams Hypoid 90	Esso ATF Dexron IID or Esso Superlube 15W/40 or Esso Gear Oil GX 85W/90	Mobil ATF220 D or Mobil Super 15W/40 or Mobil Mobilube HD 90	Fina Dexron IID or Fina Supergrade Motor Oil 15W/40 or 20W/50 Fina Pontonic MP SAE 80W/90	Shell ATF Dexron IID or Shell Super Motor Oil 15W/40 or Shell Spirax 90 EP	Texamatic Fluid 9226 or Havoline Motor Oil 15W/40 or Texaco Multigear Lubricant EP 85W/90

Capacities

Litres

Imperial Unit

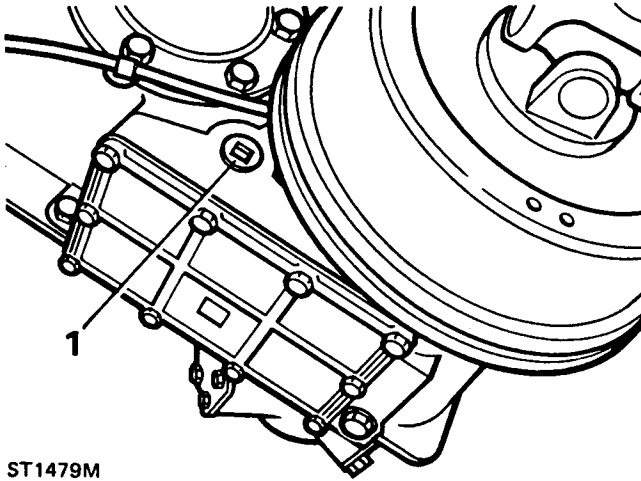
LT230T Transfer gearbox 2,80

4.9 pints

Check/top up oil level (LT230T Transfer gearbox)

Check oil level daily or weekly when operating under severe wading conditions.

1. To check oil level: remove the oil level plug, located on the rear of the transfer box casing; oil should be level with the bottom of the hole.
2. If necessary, top up through the oil level plug hole using a pump type oil can. If significant topping up is required, check for oil leaks at drain and filler plugs.



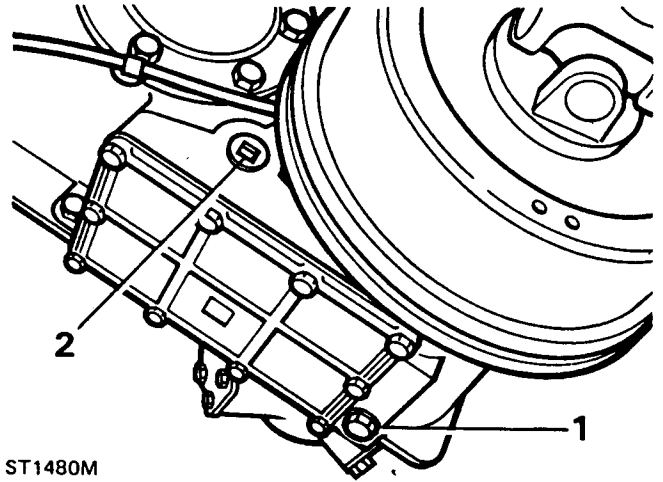
ST1479M

Renew oil (LT230T Transfer gearbox)

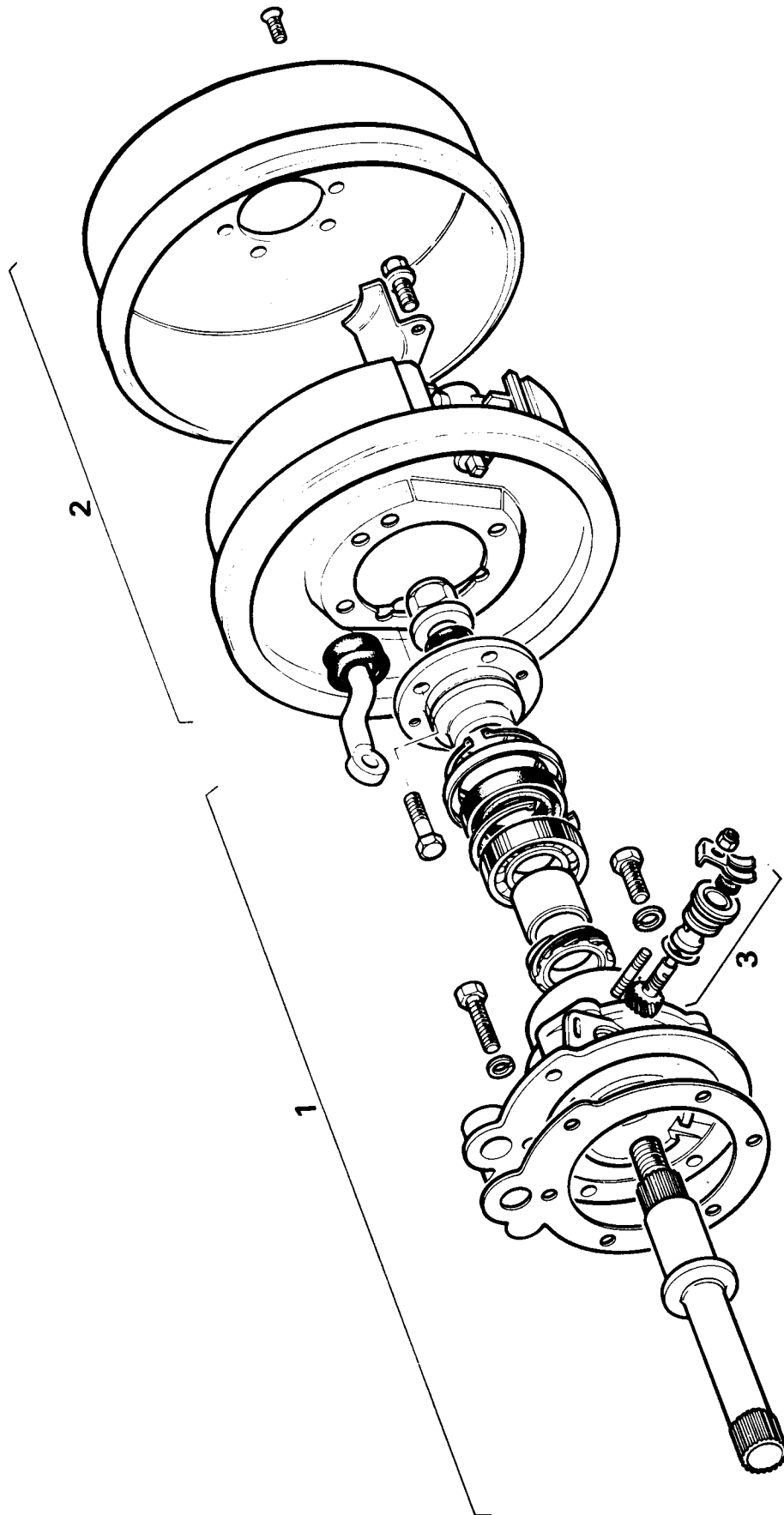
Drain and refill monthly when operating under severe wading conditions.

1. Immediately after a run when the oil is warm, drain off the oil into a container by removing the drain plug and washer from the bottom of the transfer box.
2. Replace the drain plug and washer and refill the transfer box through the oil level plug hole with the correct grade of oil, to the bottom of the oil level plug hole. For capacity see Data Section.

IMPORTANT: Do not overfill, otherwise leakage may occur.

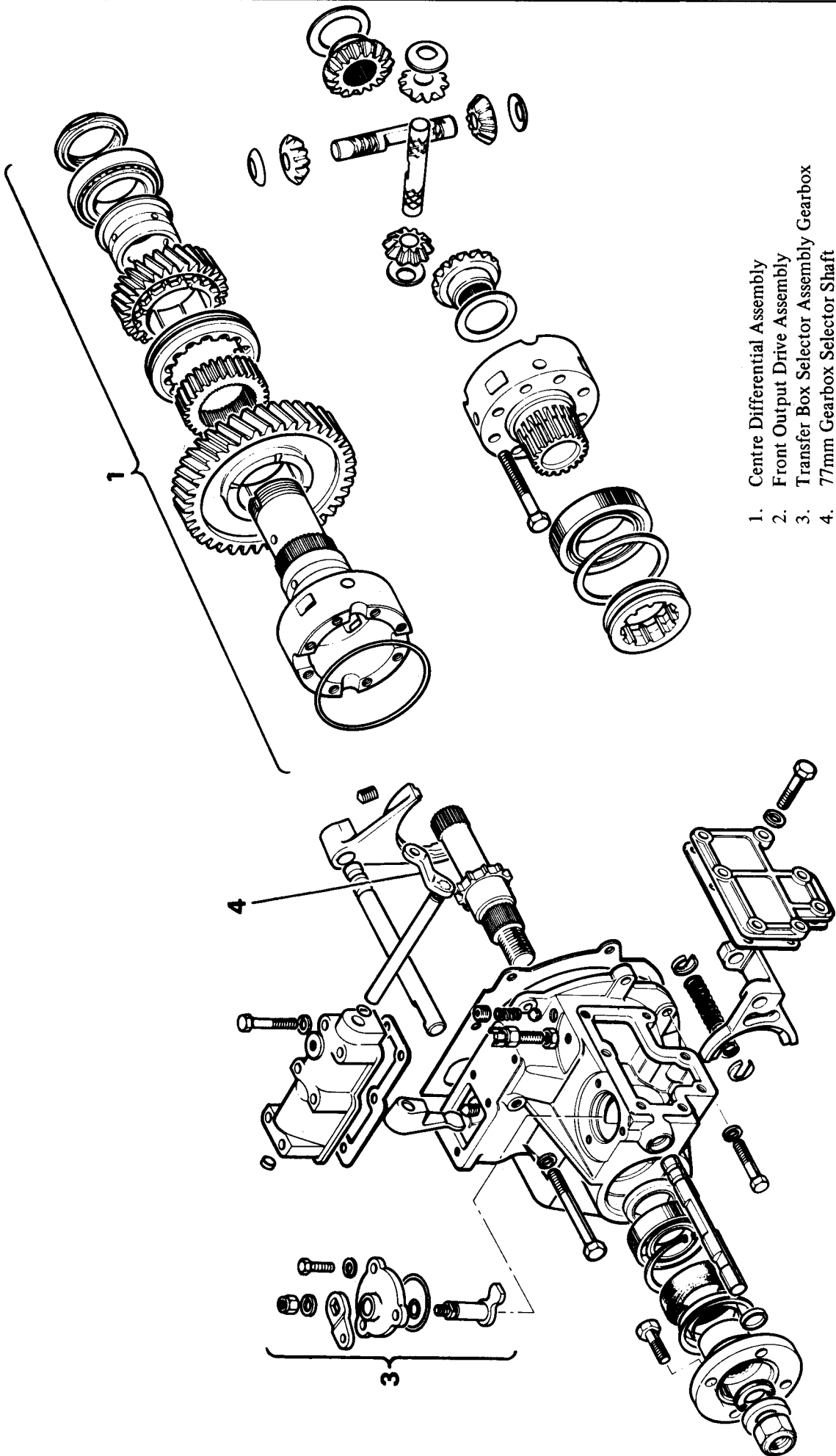


ST1480M



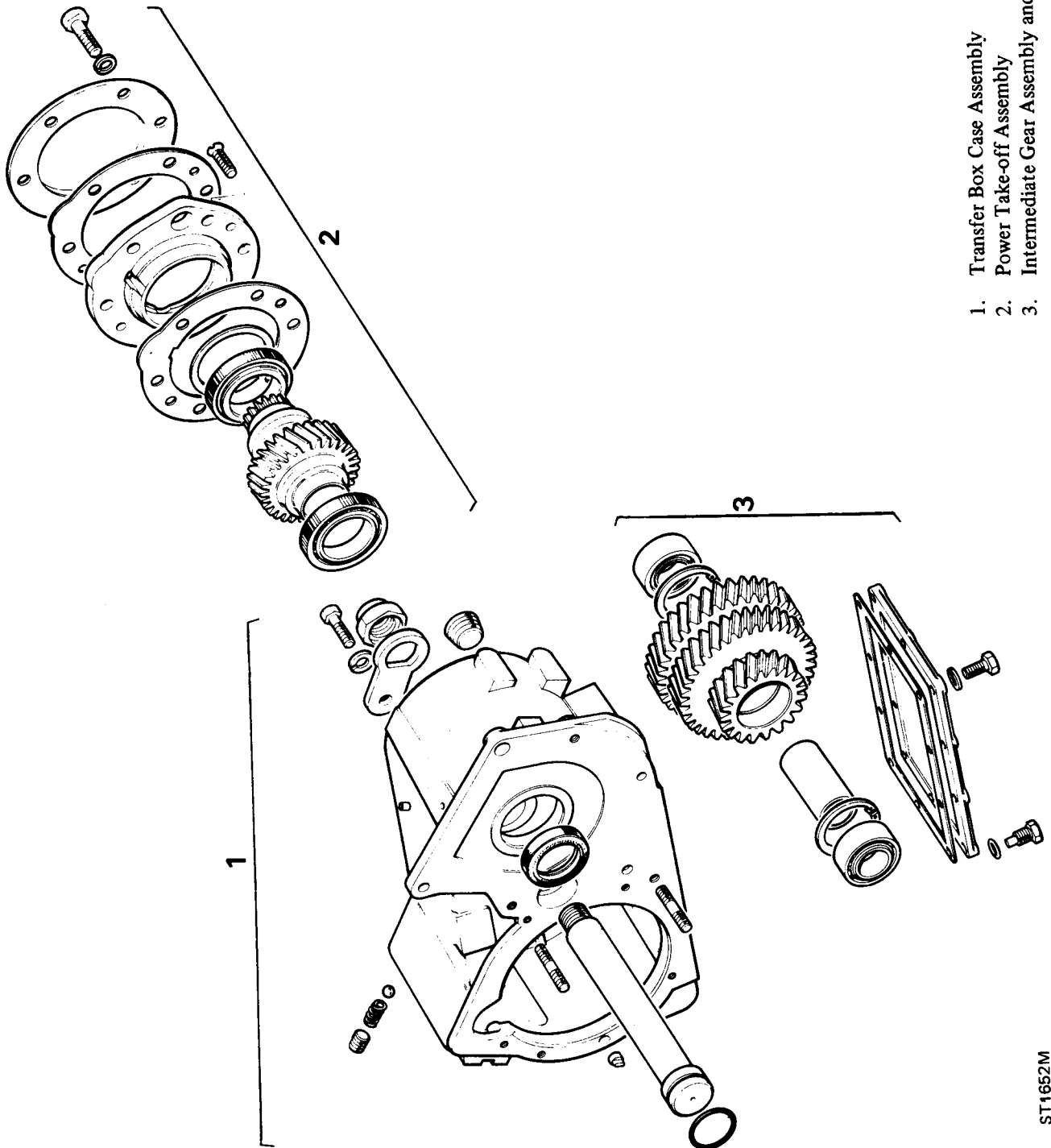
1. Rear Output Drive Assembly
2. Transmission Brake Drum Assembly
3. Speedo Housing Assembly

ST1650M



- 1. Centre Differential Assembly
- 2. Front Output Drive Assembly
- 3. Transfer Box Selector Assembly Gearbox
- 4. 77mm Gearbox Selector Shaft

RR948M



1. Transfer Box Case Assembly
2. Power Take-off Assembly
3. Intermediate Gear Assembly and Bottom Cover

ST1652M

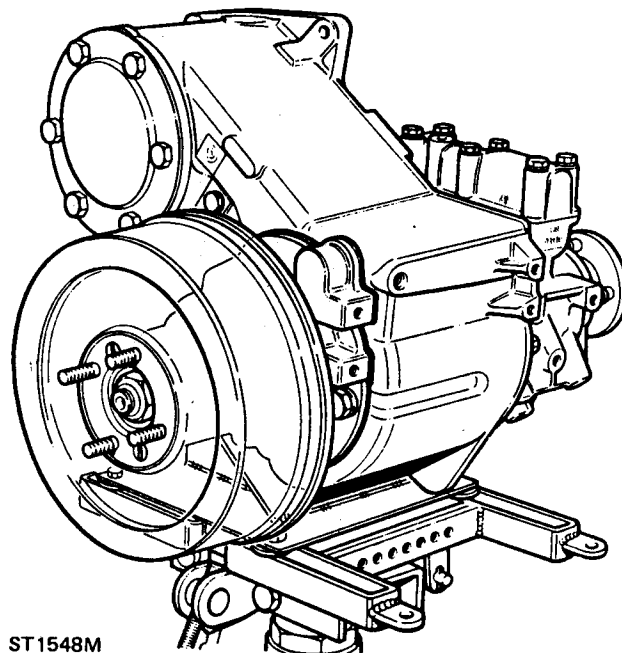
REMOVE LT230T TRANSFER GEARBOX

Special tool: 18G 1425 – Guide studs (3)

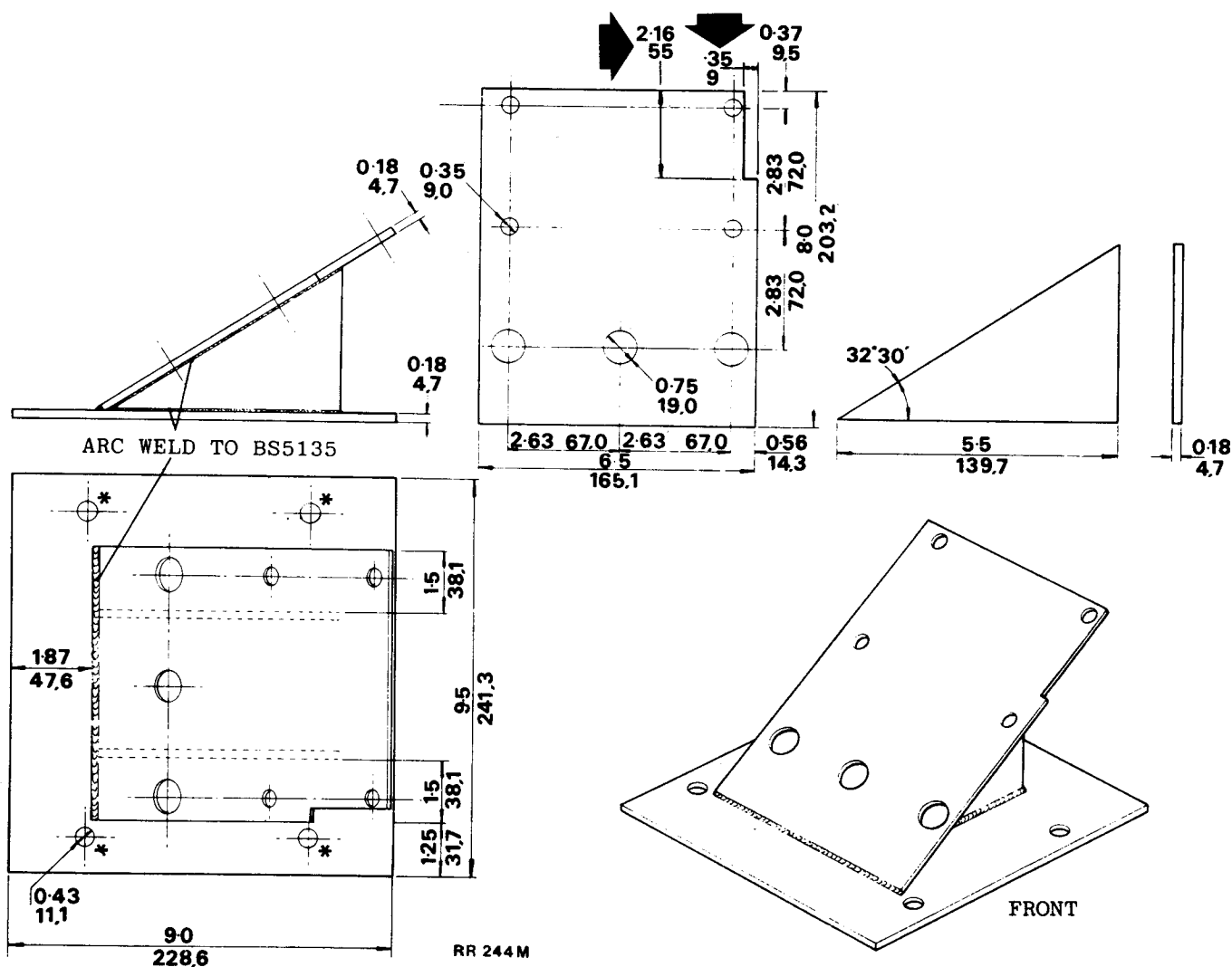
Also, locally manufactured adaptor plate, see below.

Adaptor for removing transfer gearbox

The transfer gearbox should be removed from underneath the vehicle, using a hydraulic hoist. An adaptor plate for locating the transfer gearbox on to the hoist can be manufactured locally to the drawing below. If a similar adaptor plate was made for the LT230R transfer gearbox, it can be modified to suit both the LT230R and LT230T gearboxes by making the modifications shown by the large arrows.



ST1548M



Material. Steel plate BS 1449 Grade 4 or 14

Holes marked thus * to be drilled to fit hoist being used.

◆ = MODIFICATION

LT230T TRANSFER GEARBOX OVERHAUL

Service Tools:

18G47-7 – Input gear cluster bearing cones remover/
replacer
18G47BB-1 – Adaptor centre differential bearing remover
18G47BB-3 – Adaptor centre differential bearing remover
button
18G257 – Circlip pliers
18G1205 – Prop flange wrench
18G1271 – Oil seal remover

18G1422 – Mainshaft rear oil seal replacer
18G1423 – Adaptor/socket centre differential stake nut
remover/replacer
18G1424 – Centre differential bearing replacer
MS47 – Hand press
MS550 – Bearing and oil seal replacer handle
LST47-1 – Adaptor centre differential bearing remover
LST104 – Intermediate gear dummy shaft
LST105 – Input gear mandrel
LST550-4 – Intermediate gear bearing replacer

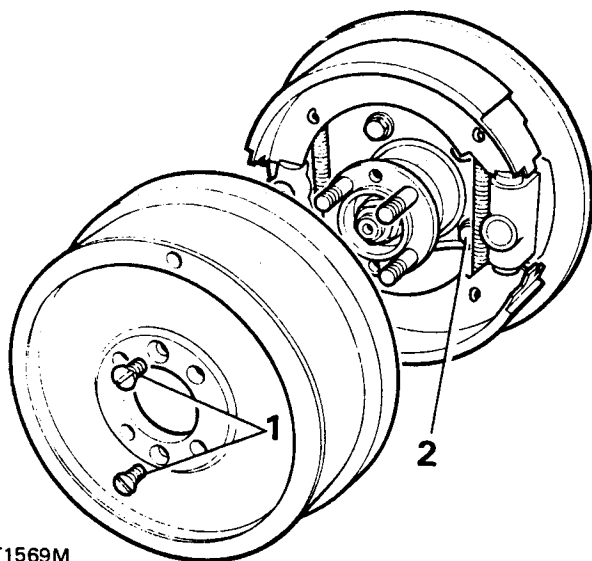
TRANSFER BOX DATA

Front bevel gear end-float	0,025 to 0,075mm (0.001 to 0.003in)
Rear bevel gear end-float	0,025 to 0,075mm (0.001 to 0.003in)
Rear output housing clearance	1,00mm (0.039in)
High range gear end-float	0,05 to 0,15mm (0.002 to 0.006in)
Front differential bearing pre-load	1,36 to 4,53 kg (3 to 10 lbs)
Input gear bearing pre-load	2,26 to 6,80 kg (5 to 15 lbs)
Intermediate shaft bearing pre-load	1,81 to 4,53 kg (4 to 10 lbs)

Transmission brake removal

1. Remove two countersunk screws and withdraw brake drum.
2. Remove four bolts securing the brake back-plate; the two bottom fixings retain the oil catcher.

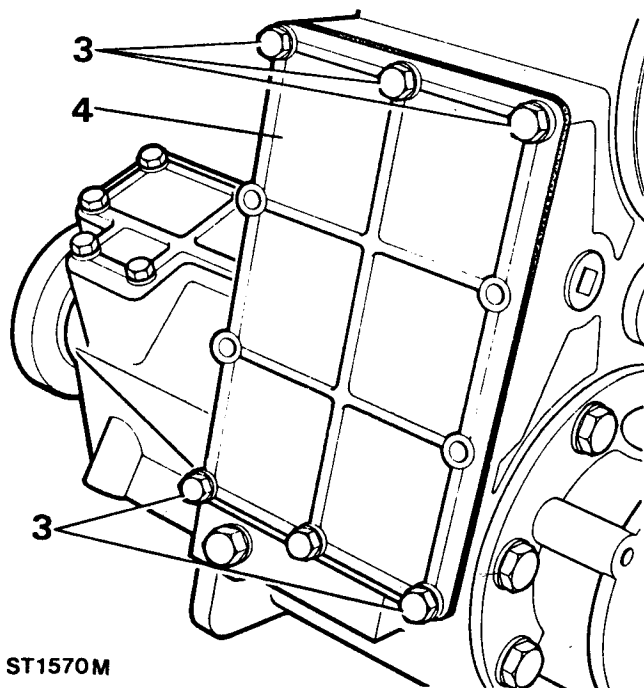
NOTE: An hexagonal type socket should be used for these bolts.



ST1569M

Bottom cover removal

3. Remove the six bolts and washers retaining the bottom cover.
4. Remove the gasket and bottom cover.

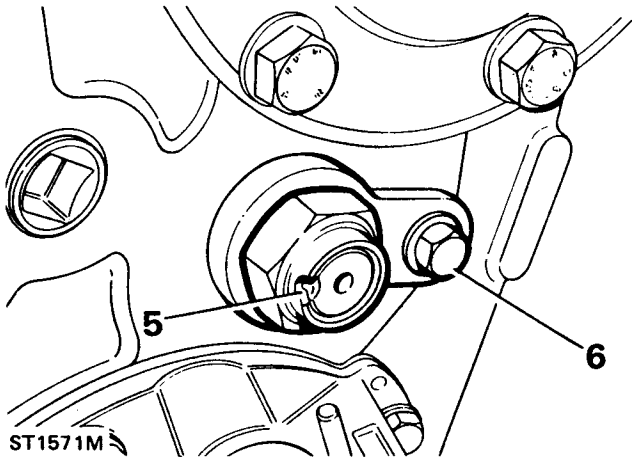


ST1570M

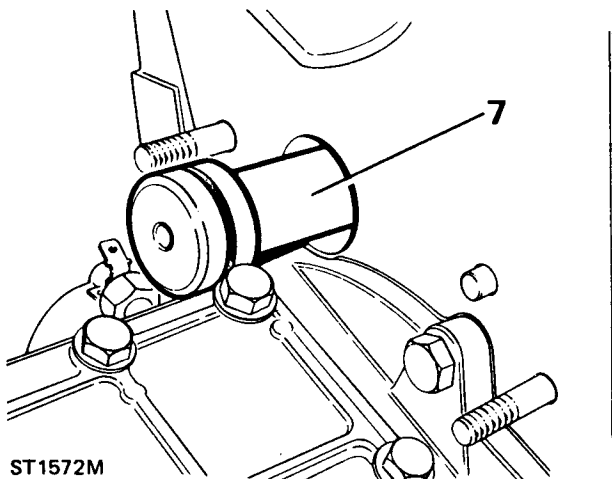
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Intermediate shaft and gear cluster removal

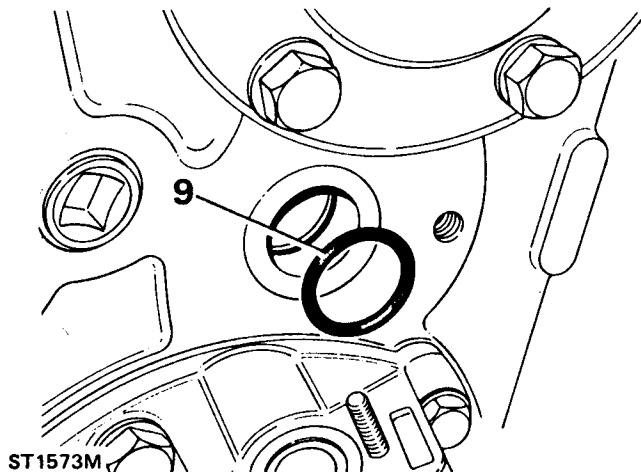
5. Release stake nut from recess in intermediate shaft and remove stake nut and discard.
6. Unscrew the single bolt and remove anti-rotation plate at the rear face of the transfer box.



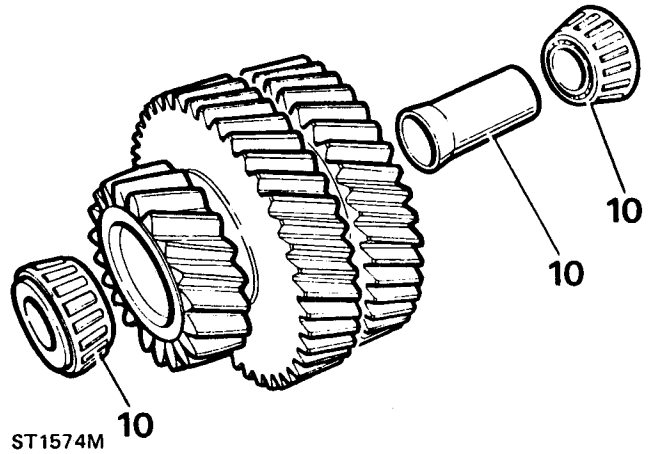
7. Tap the intermediate gear shaft from the transfer box.



8. Lift out the intermediate gear cluster and bearing assembly.
9. Remove the 'O' rings from the intermediate gear shaft and from inside the transfer box.

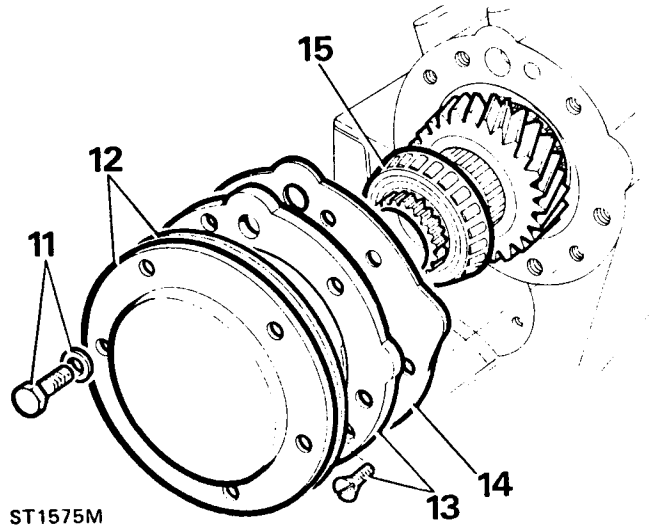


10. Remove taper roller bearings and bearing spacer from the intermediate gear cluster assembly.



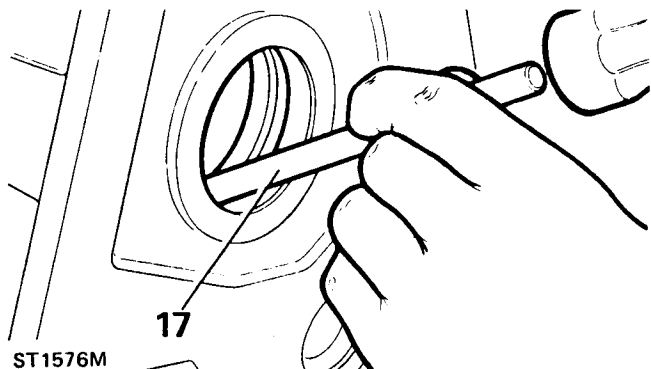
Power take-off cover removal

11. Remove six bolts and washers retaining the take-off cover and speedo cable clips.
12. Remove the gasket and cover.



Input gear removal

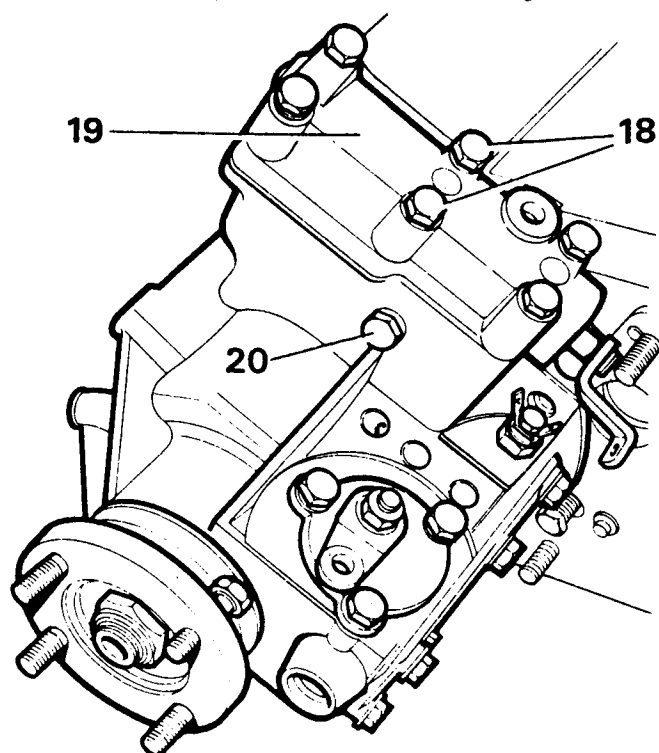
13. Remove the two countersunk screws and detach the main shaft bearing housing.
14. Remove the gasket.
15. Withdraw the input gear assembly.
16. Prise out and discard the oil seal at the front of the transfer box casing using service tool 18G1271.
17. Drift out the input gear front bearing track.



Continued

High/low cross-shaft housing removal

18. Remove the six bolts and washers retaining the cross-shaft housing and earth lead.
19. Remove the gasket and cross-shaft housing.



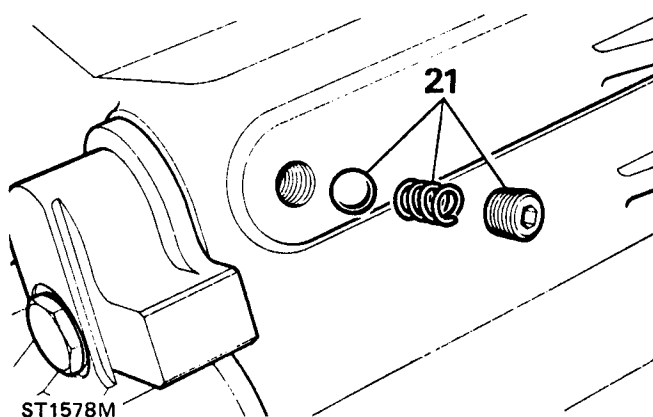
ST1577M

Front output housing removal

20. Remove the eight bolts and washers and detach the output housing from the transfer box casing, taking care not to mislay the dowel.

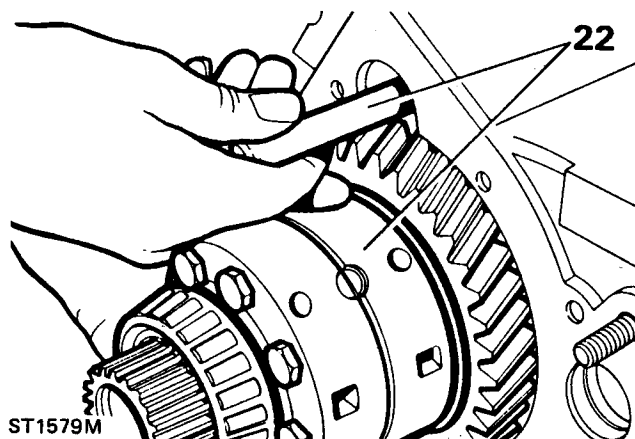
Centre differential removal

21. Remove high/low selector shaft detent plug, spring and retrieve the ball with a suitable magnet.



ST1578M

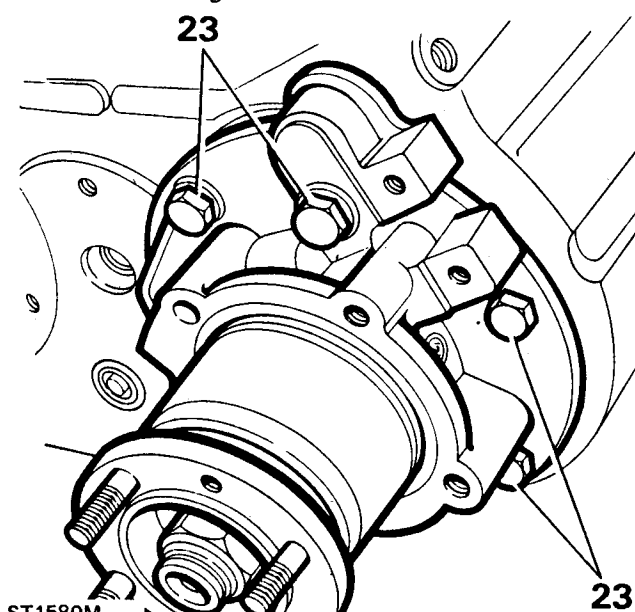
22. Withdraw the centre differential and selector shaft/fork assembly.



ST1579M

Rear output housing removal

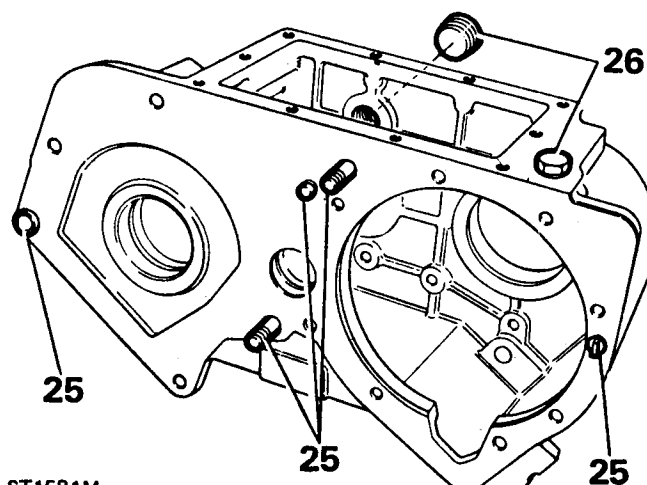
23. Remove six bolts and washers and detach the rear output housing and shaft assembly from the transfer casing.
24. Remove the gasket.



ST1580M

Transfer case overhaul – dismantling

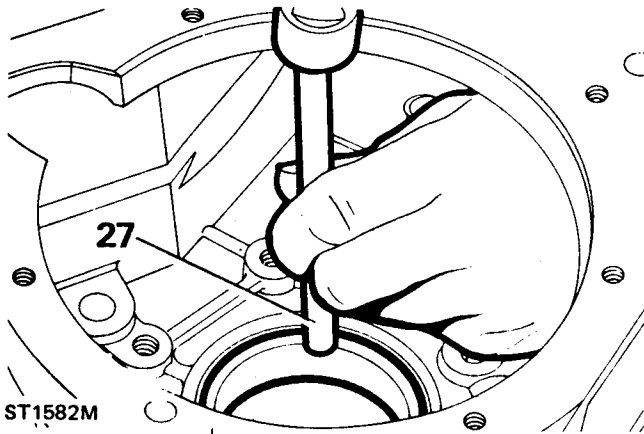
25. Remove the studs and dowels.
26. Remove the magnetic drain plug and filler/level plug.



ST1581M

Continued

27. Drift out differential rear bearing track.
28. Clean all areas of the transfer casing ensuring all traces of "Loctite" are removed from faces and threads.

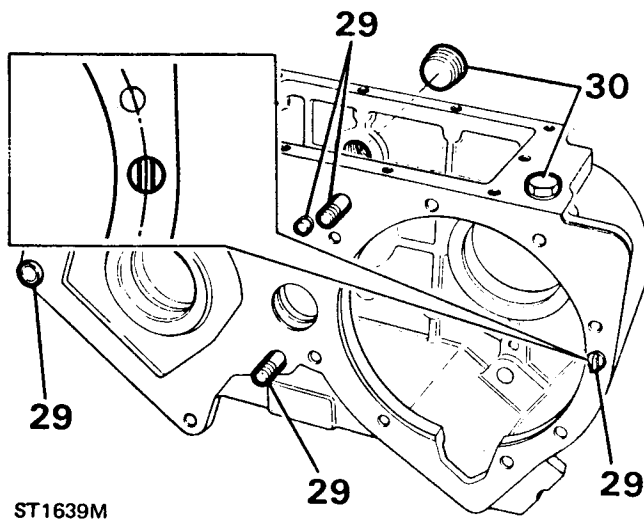


Transfer case overhaul – re-assembling

29. Fit studs and dowels to front face of the transfer casing.

NOTE: The position of the radial dowel blade is set in line with the circle which is formed by the front output housing fixing holes.

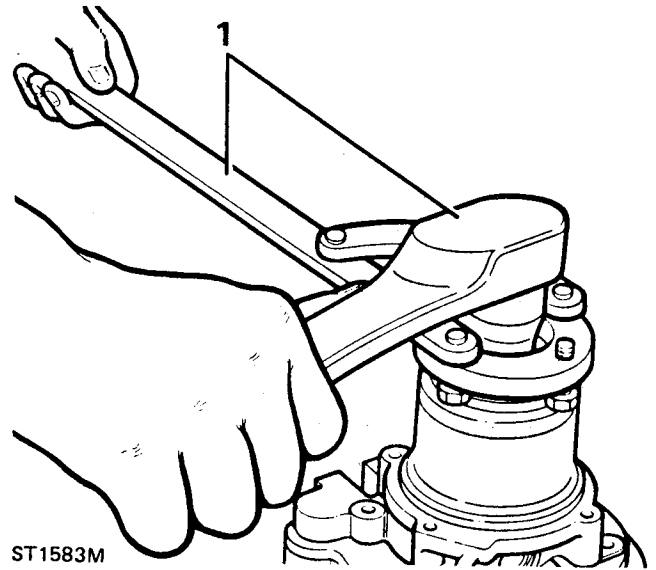
30. Refit magnetic drain plug with new copper washer and tighten to the specified torque, loosely fit the filler/level plug.



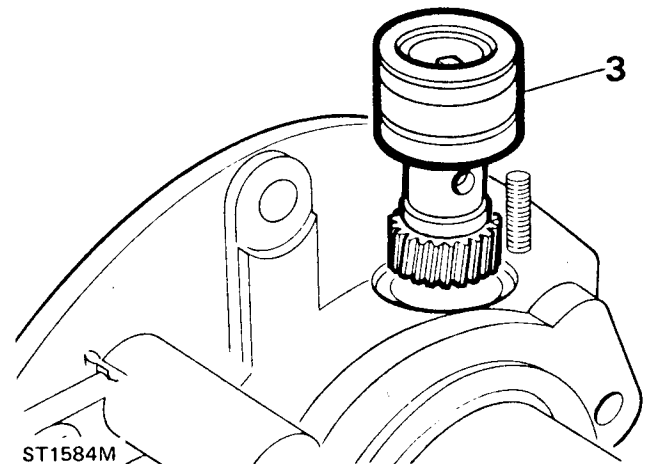
Rear output housing overhaul – dismantling

1. Using flange wrench 18G1205 and socket spanner, remove the flange nut, steel and felt washers. Ensure flange bolts are fully engaged in the wrench.
2. Remove output flange with circlips attached. If necessary, use a two-legged puller.

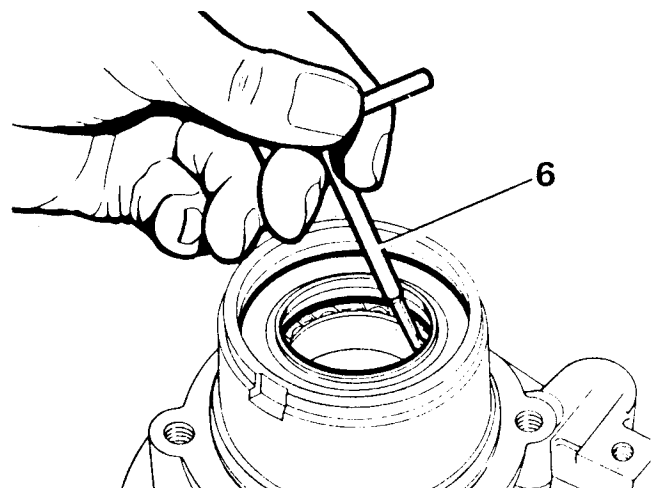
NOTE: The circlip need only be released if the flange bolts are to be renewed.



3. Remove speedo-drive housing. This can be prised out with a screwdriver.
4. Remove housing from the vice and drift out the output shaft, by striking the flange end of the shaft.
5. Carefully prise off the oil catch ring using a screwdriver in the slot provided.

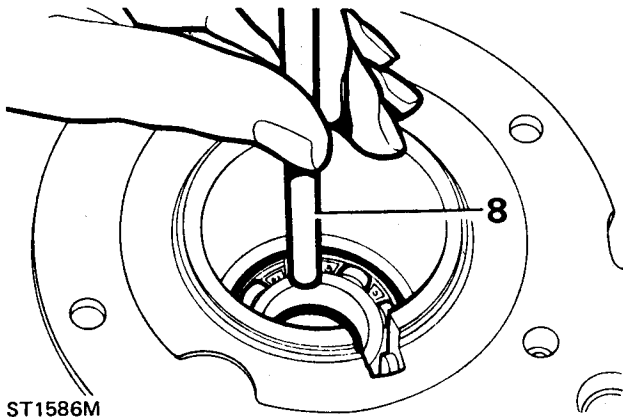


6. Prise out and discard the seal from the output housing using tool 18G1271.
7. Using circlip pliers 18G257, remove the circlip retaining the bearing.

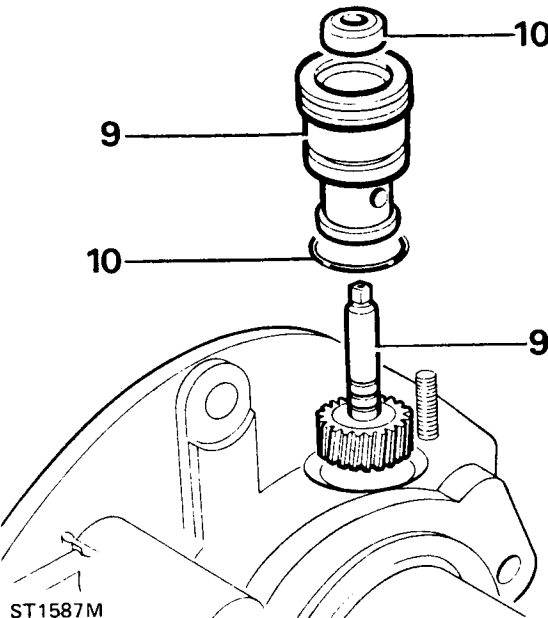


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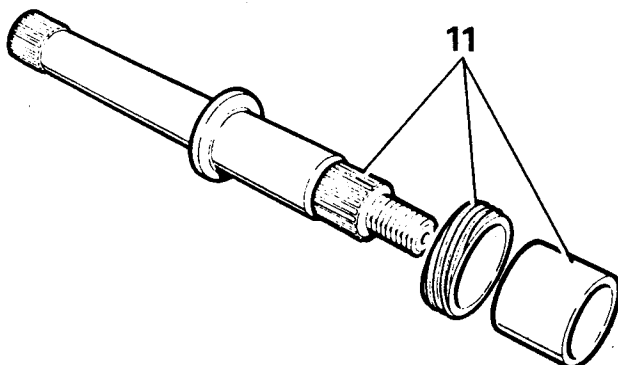
8. Drift out the bearing from the rear of the housing.



9. Remove speedometer gear (driven) from its housing.
10. Remove the 'O' ring and oil seal and discard.

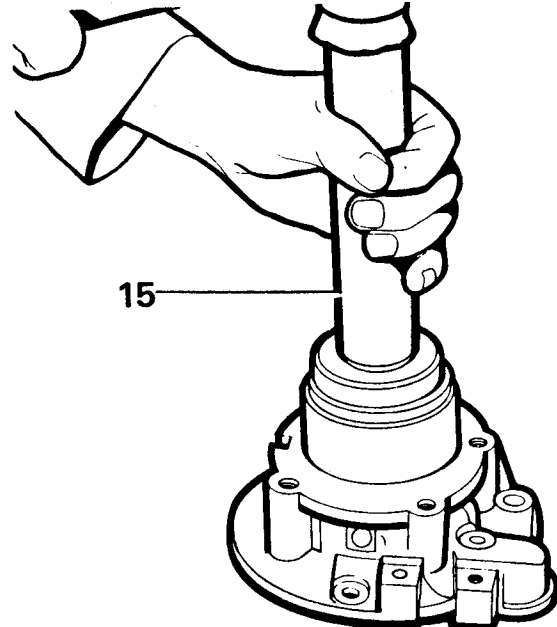


11. Slide off spacer and speedometer drive gear from output shaft.
12. Clean all parts, renew the 'O' ring, oil seals, felt seal and flange nut. Examine all other parts for wear or damage and renew, if necessary.

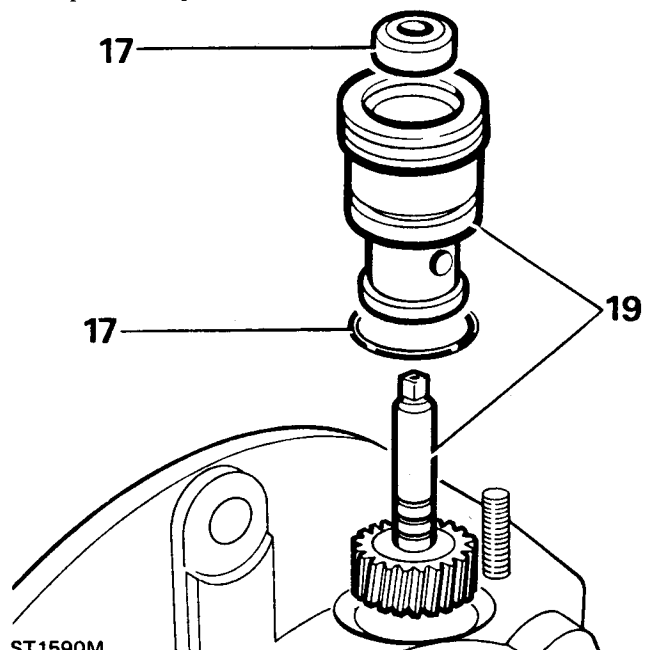


Reassembling

13. Press output bearing into the housing. Do not use excessive force. To facilitate fitting the bearing, heat the output housing case. (This is not to exceed 100°C).
14. Retain bearing with circlip, using circlip pliers 18G257.
15. Fit new seal (open side inwards) using tool 18G1422. The seal should just make contact with the bearing circlip.
16. Carefully charge the lips of the seal with clean grease and refit oil catch ring on to output housing.

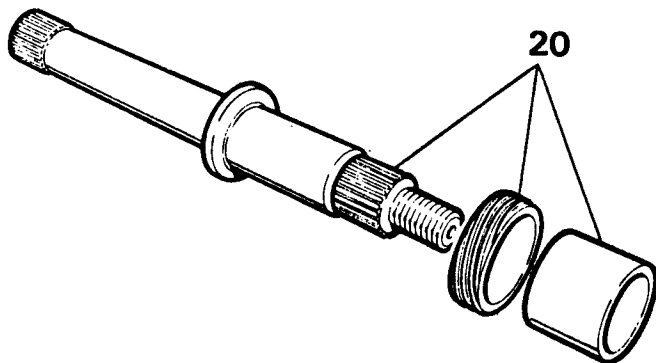


17. Fit the 'O' ring and oil seal (open side inwards) to speedometer housing.
18. Lubricate the 'O' ring and seal with oil.
19. Locate speedometer gear (driven) in housing and press into position.



Continued

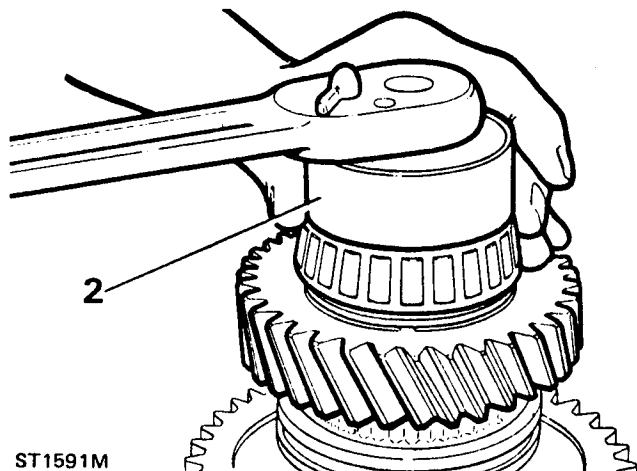
20. Slide drive gear and spacer on to the output shaft.
21. Locate output shaft into the bearing in the housing and drift into position.
22. Locate speedometer gear (driven) housing assembly into the output housing and press in until flush with the housing face.



ST1640M

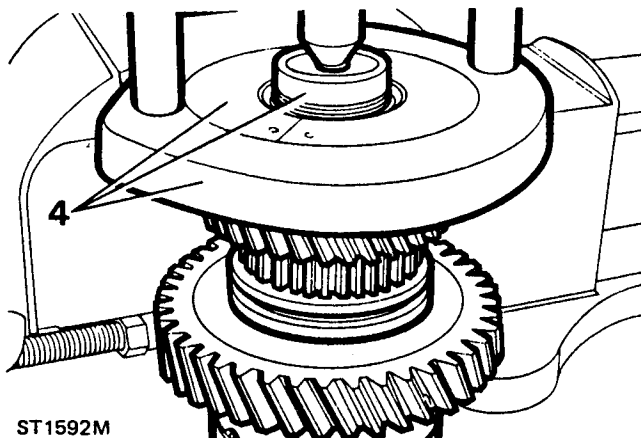
Centre differential unit overhaul – dismantling

1. Secure centre differential unit to a vice fitted with soft jaws, and release stake nut from recess.
2. Remove stake nut using tool 18G1423 and suitable socket wrench.
3. Remove the differential unit from the vice.



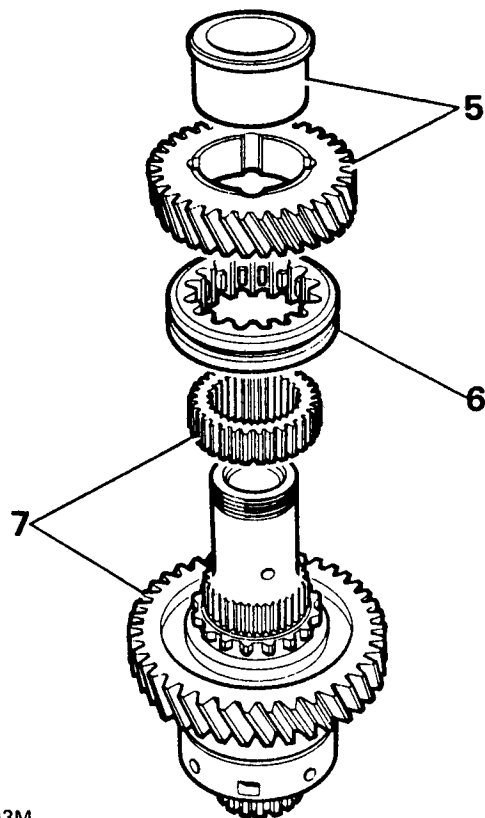
ST1591M

4. Secure hand press MS47 in vice with collars 18G47BB/1 and using button 1847BB/3 remove the rear taper bearing and collars.



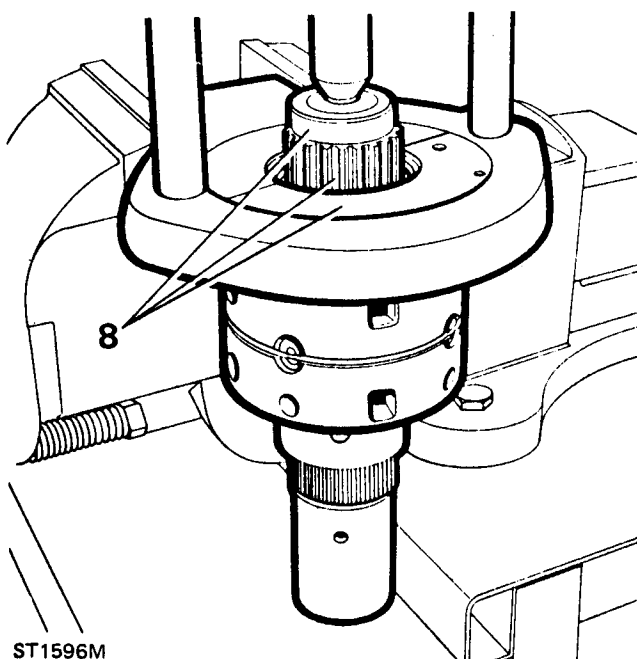
ST1592M

5. Remove the high range gear and bush, taking care not to disturb the high/low sleeve.
6. Mark the relationship of the high/low sleeve to the hub and then remove the sleeve.
7. Using a suitable press behind the low range gear carefully remove the high/low hub and low range gear.



ST1593M

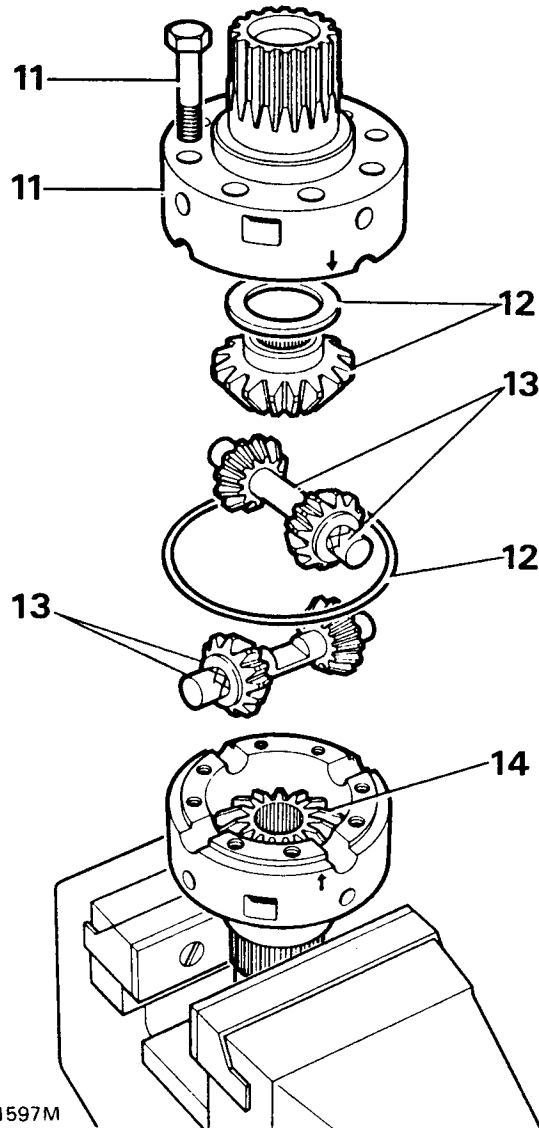
8. Substituting collar LST47-1 remove front taper roller bearing.
9. Remove hand press from the vice.
10. Using soft jaws secure the differential unit in the vice by gripping the hub splines.



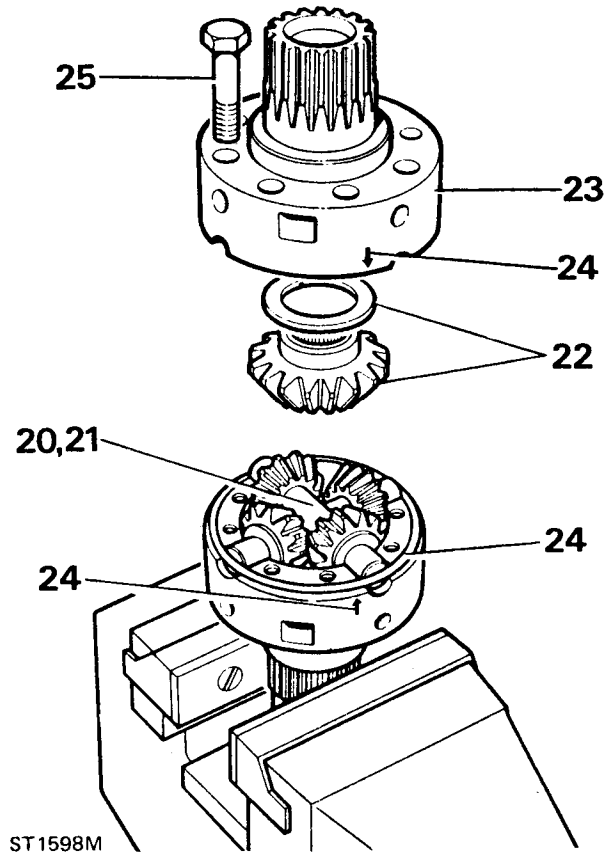
ST1596M

Continued

11. Remove the eight retaining bolts and lift off the front part of the differential unit.
12. Release the retaining ring and remove front upper bevel gear and thrust washer.
13. Remove the pinion gears and dished washers along with the cross shafts.
14. Remove the rear lower bevel gear and thrust washer from the rear part of the differential unit.

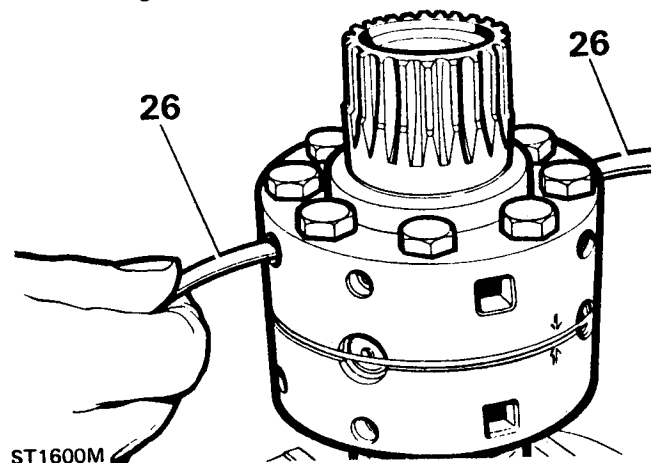


22. Measure the front upper bevel gear thrust washer and note the thickness.
23. Fit the thrust washer and bevel gear to the front unit.
24. Refit the retaining ring and front differential unit, aligning the two engraved arrows marked on both halves of the unit.
25. Fit four bolts equi-spaced and torque to the correct figure.



15. Remove the rear differential unit from the vice and clean all components; examine for wear or damage and renew if necessary.
16. Clean all components; examine for wear or damage and renew if necessary.
17. Using soft jaws secure the rear differential unit in the vice by gripping the hub splines.
18. Ensure that all differential components are dry to assist in checking end-float.
19. Using a micrometer, measure one of the bevel gear thrust washers and note the thickness.
20. Fit the thrust washer and bevel gear to the rear lower differential unit.
21. Assemble both pinion assemblies and dished washers on to their respective shafts and fit to the rear differential unit.

26. Measure the front bevel gear end-float with feeler gauges through the slots provided in the front differential unit. The end-float must be 0,025 to 0,075mm (0.001 to 0.003in) maximum. When measuring use two sets of feeler gauges, one on each side of the front differential unit. This will give a true reading of the end-float.

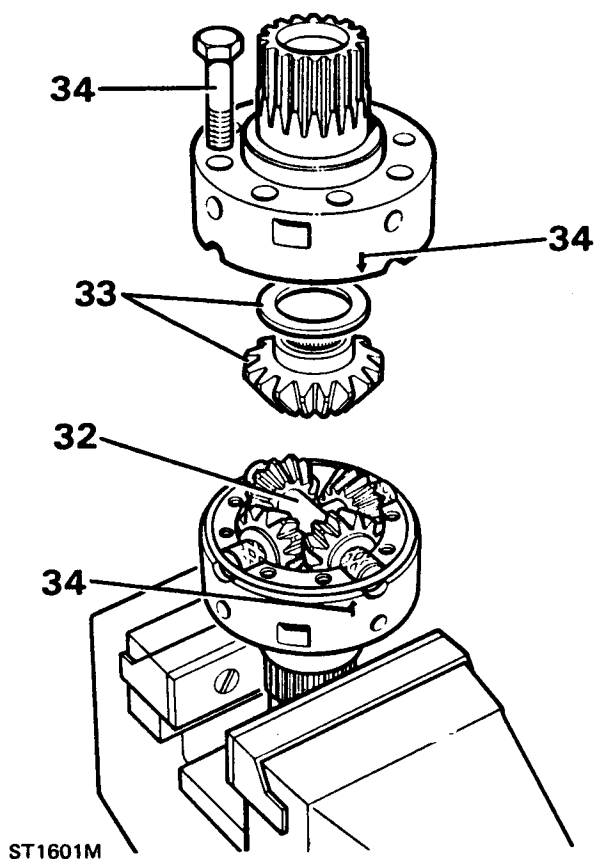


Continued

27. Invert the differential unit and repeat operation 26 for the rear bevel gear end-float.
28. Invert the differential unit and secure in vice and remove the four bolts and lift off the front differential unit.
29. Remove the retaining ring, bevel gear and the washer and both pinion assemblies.
30. Select the correct thrust washers required for final assembly.

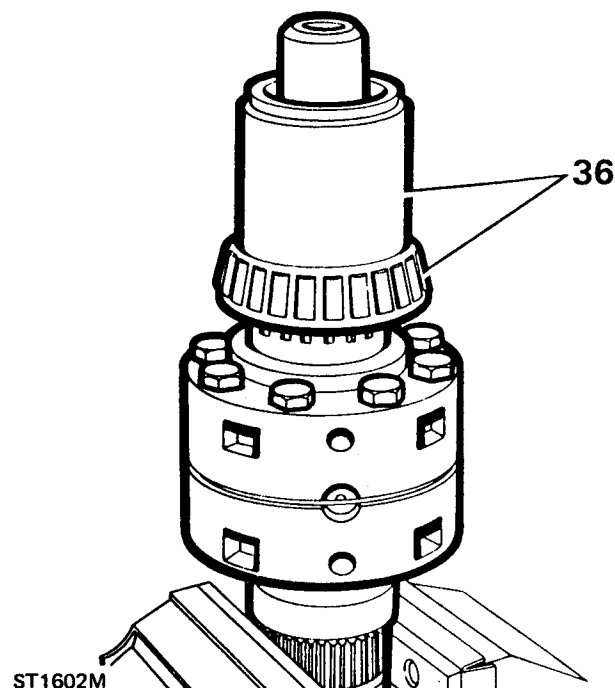
Reassembling

31. Fit the selected thrust washer and bevel gear into the rear lower differential unit.
32. Assemble both pinion assemblies and dished washers on to their respective shafts and fit the rear differential unit. Secure the assemblies with the retaining ring.
33. Lubricate all the components.
34. Fit the selected thrust washer and bevel gear into the front upper differential unit.

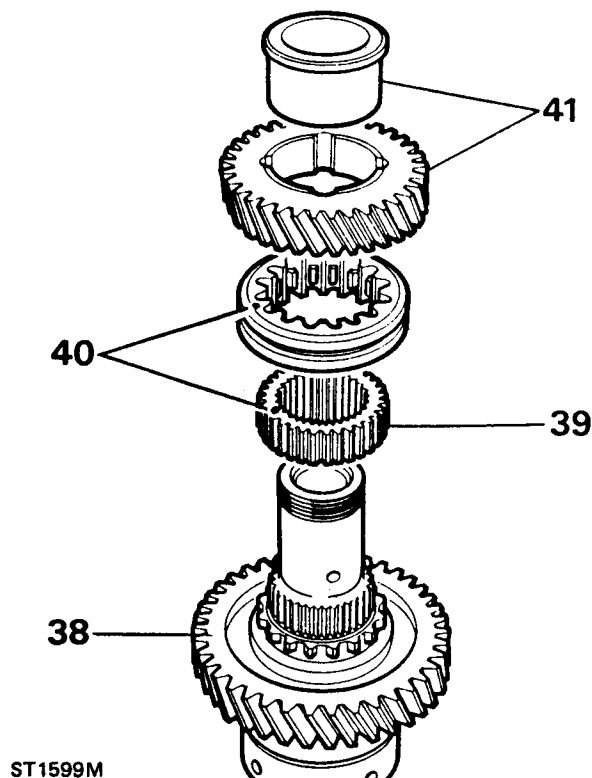


35. Align both units as previously described and secure with the eight bolts to the specified torque.
36. Finally check that the differential gears rotate freely. Locate the front differential bearing on to the front, upper differential shaft and press into position using larger end of tool 18G1424 as shown.
37. Invert the differential unit and secure in the vice.

NOTE: During the following sequences all parts should be lubricated as they are fitted.



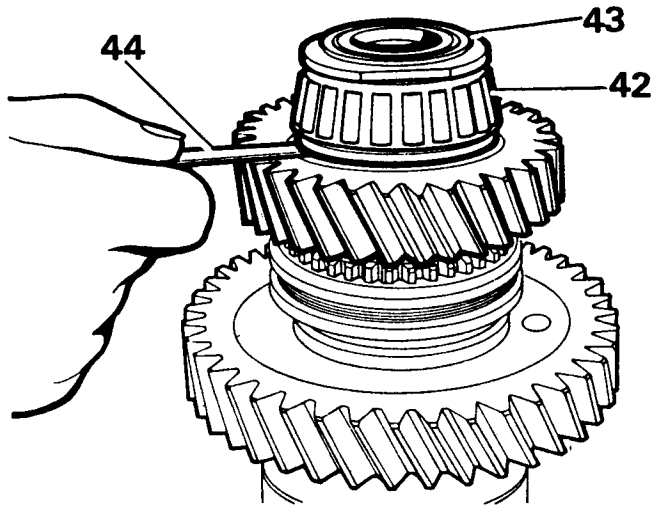
38. Fit the low range gear, with its dog teeth uppermost to the differential assembly.
39. Press the high/low hub on to the differential splines.
40. Slide the high/low selector sleeve on to the high/low hub ensuring that the alignment marks are opposite each other.
41. Fit the bush into the high range gear so that the flange is fitted on the opposite side of the gear to the dog teeth. Slide the bushed gear on to the differential assembly with the dog teeth down.



Continued

42. Locate the rear differential bearing on to the hub and press it into position using the smaller end of tool 18G1424.
43. Fit the stake nut and tighten to the specified torque using tool 18G1423.
44. Check the end float of the high and low range gears 0,05 to 0,15mm (0.002 to 0.005in).

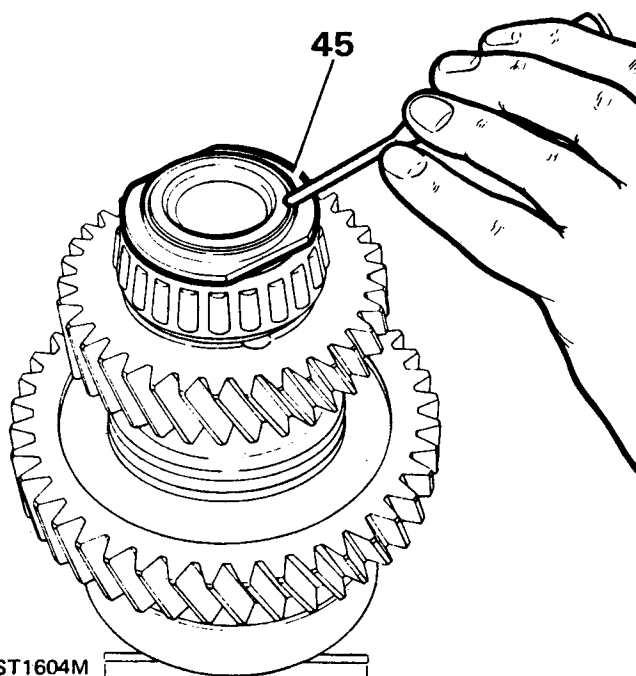
NOTE: If the clearances vary from those specified in the data, the assembly must be rebuilt using the relevant new parts.



ST1603M

45. Peen the stake nut collar by carefully forming the collar of the nut into the slot as illustrated.

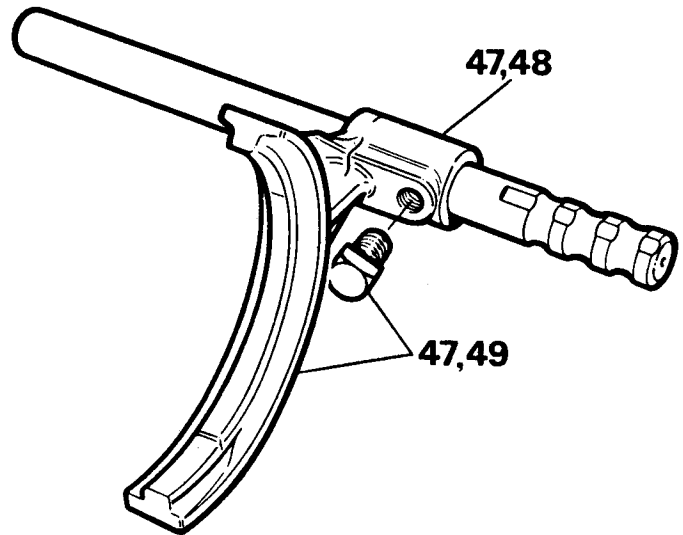
CAUTION: A round nose tool must be used for this operation to avoid splitting the collar of the nut.



ST1604M

46. Clean and check high/low selector fork assembly for wear and renew if necessary.
47. To renew the selector fork remove the square set screw and slide the fork from the shaft.

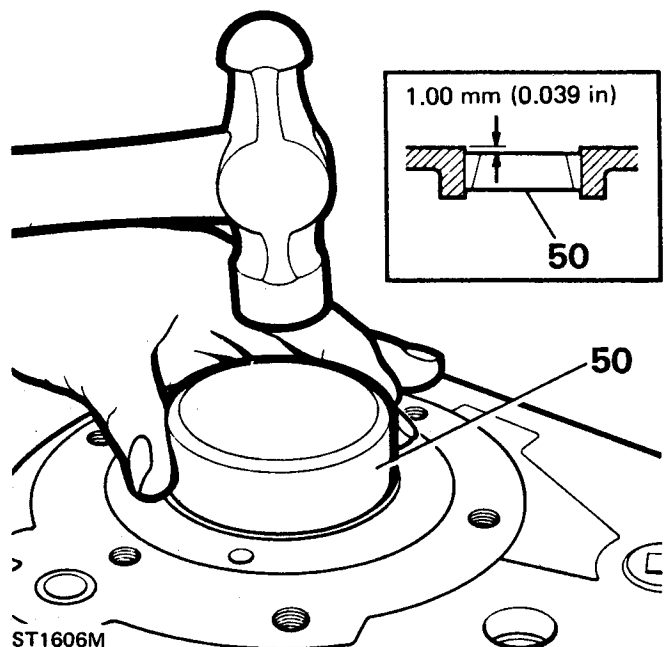
48. Fit the new selector fork with its boss towards the three detent grooves. Align the tapped hole in the fork boss with the indent in the shaft nearest to the detent grooves.
49. Apply Loctite 290 to the set screw threads and fit the set screw and tighten to the specified torque.



ST1605M

Centre differential rear bearing track

50. Fit the differential rear bearing track 1,00mm (0.039 in) below the outer face of casing using a suitable tool as shown.



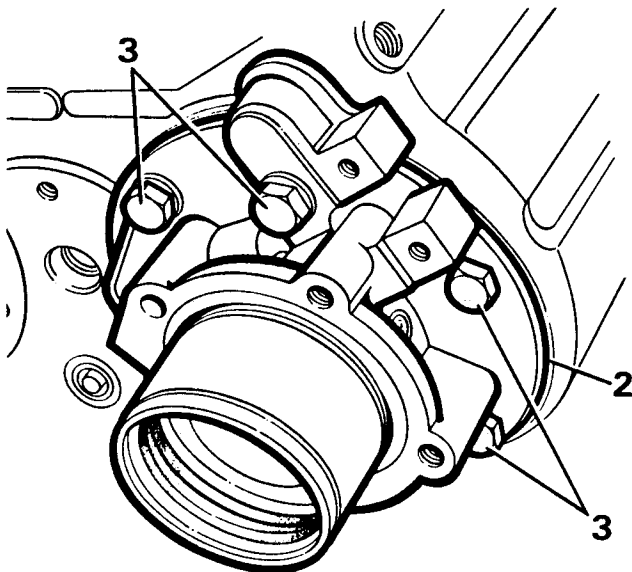
ST1606M

Rear output housing – refit

1. Grease output housing gasket and position on to the rear face of the transfer box casing.

Continued

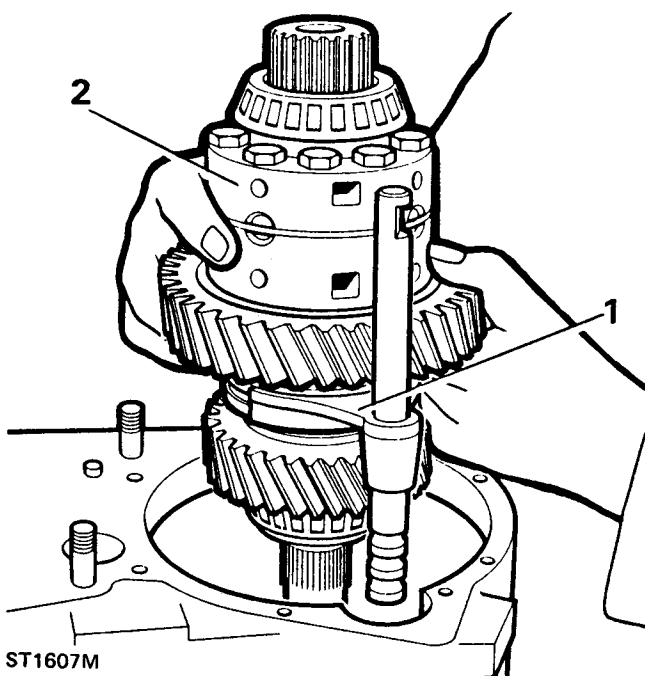
2. Fit output housing and ensure clearance of 1,00mm (0.039in) between housing face and gasket.
3. Fit the six output housing bolts with Loctite 290 on the threads, with washers and tighten evenly to the correct torque, which will pull the rear bearing into position.



ST1594M

Centre differential unit refit

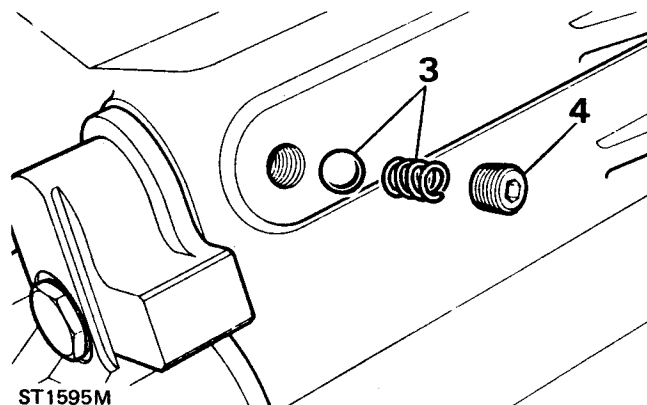
1. Fit the selector fork/shaft assembly to the high/low selector sleeve on the differential assembly, with detent groove to the rear of the differential assembly.
2. Locate the differential assembly complete with selector fork into the transfer box casing. It may be necessary to rotate the output shaft to ease fitment, and engage selector shaft into its hole.



ST1607M

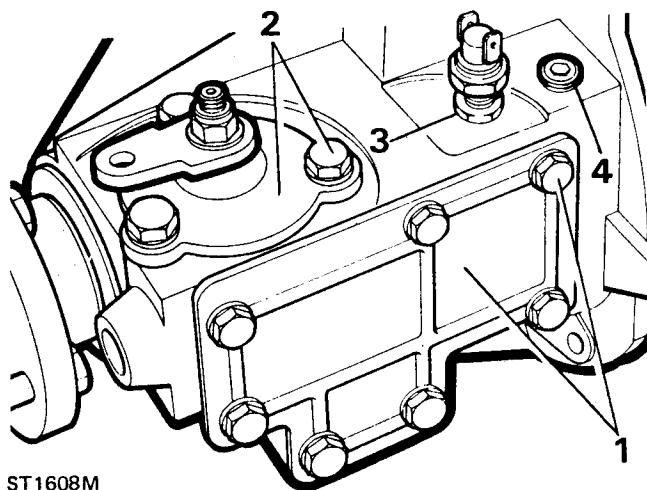
3. Fit selector shaft ball and spring through the side of the transfer box casing.

4. Apply Loctite 290 to detent plug; fit and locate, by screwing gently fully home and then unscrewing two turns.



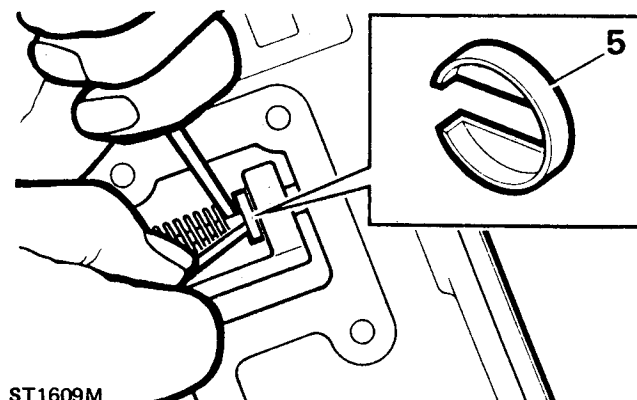
Front output housing overhaul – dismantling

1. Unscrew seven retaining bolts and washers and remove the differential lock selector side cover and gasket.
2. Unscrew three retaining bolts and washers and lift the differential lock finger housing and actuator assembly from the front output housing.
3. Slacken the locknut and unscrew the differential lock warning light switch.
4. Remove selector shaft detent plug, spring and ball using a suitable magnet.



ST1608M

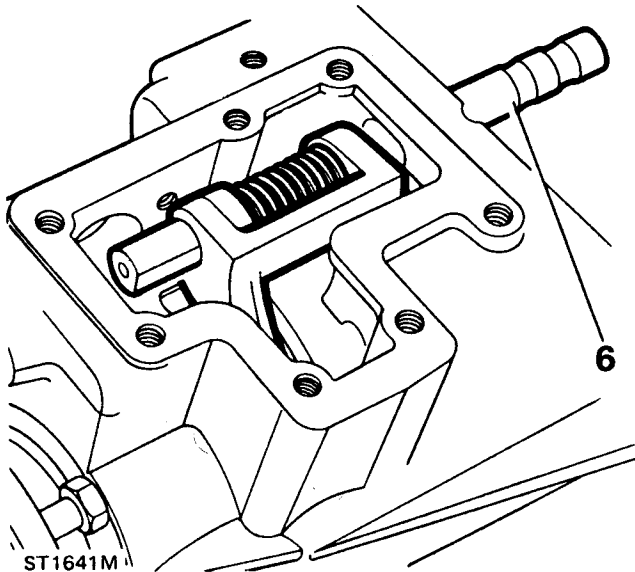
5. Compress the selector fork spring and remove the two spring retaining caps.



ST1609M

Continued

6. Withdraw the selector shaft from the rear of the output housing.
7. Remove the selector fork and spring through the side cover aperture.
8. Remove lock-up sleeve from the rear of the output housing.



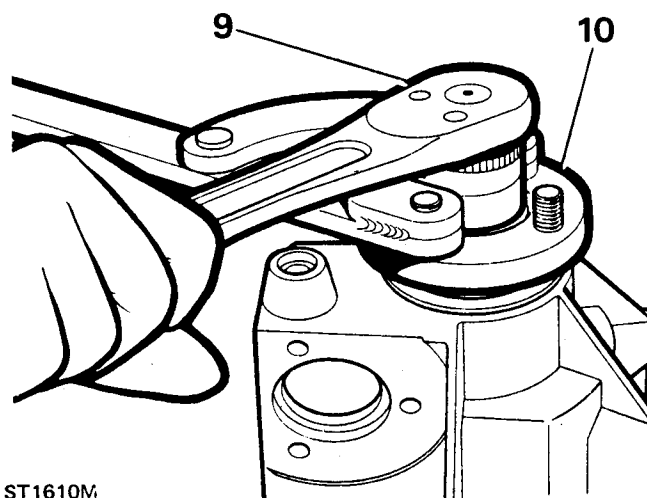
9. Using flange wrench 18G1205 and socket wrench, remove the flange nut, steel and felt washers.

NOTE: Ensure that flange bolts are fully engaged in the wrench.

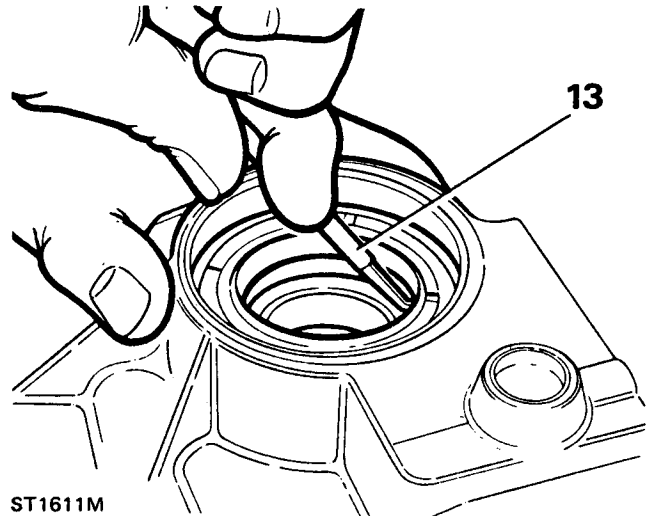
10. Remove the output flange with oil seal shield.

NOTE: These parts need not be separated unless the flange bolts are to be renewed.

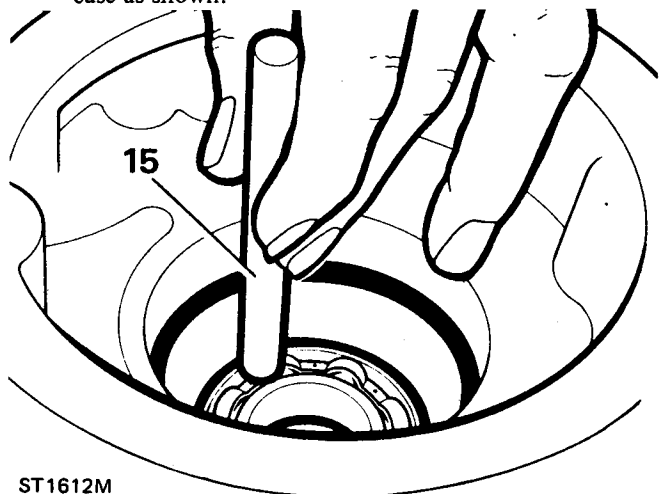
11. Drift output shaft rearwards from housing using a soft headed mallet.
12. Slide off the collar from the output shaft.



13. Prise out and discard oil seal from output housing using service tool 18G1271.
14. Remove circlip with circlip pliers 18G257.

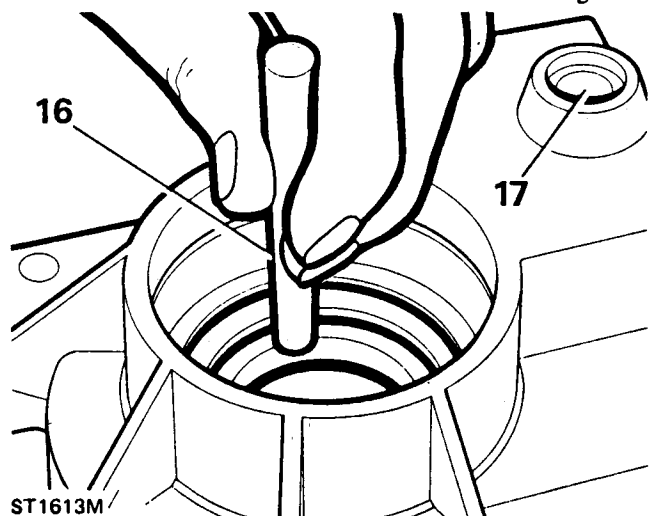


15. Invert housing and drift out bearing from inside the case as shown.



16. Drift out centre differential front taper roller bearing track and shim.
17. Drift out selector shaft cup plug from housing.
18. Clean all components ensuring all traces of "Loctite" are removed from faces and threads.
19. Examine components for wear or damage and renew if necessary.

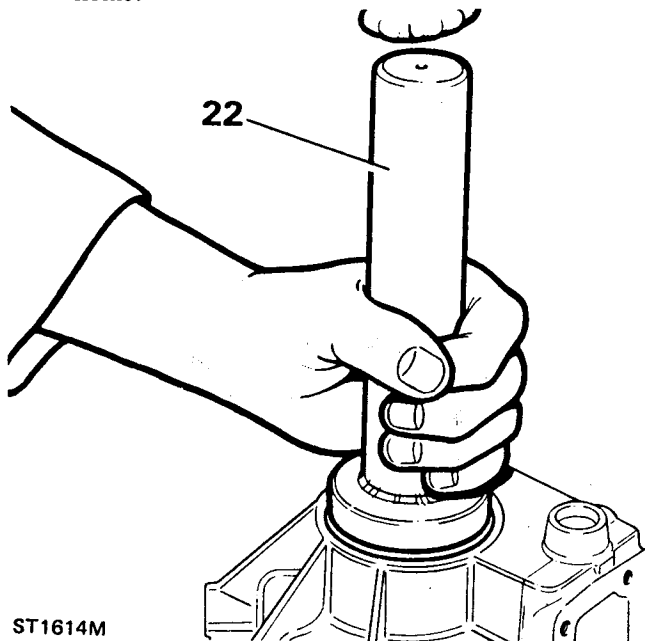
NOTE: Renew oil seal and felt seal and flange nut.



Continued

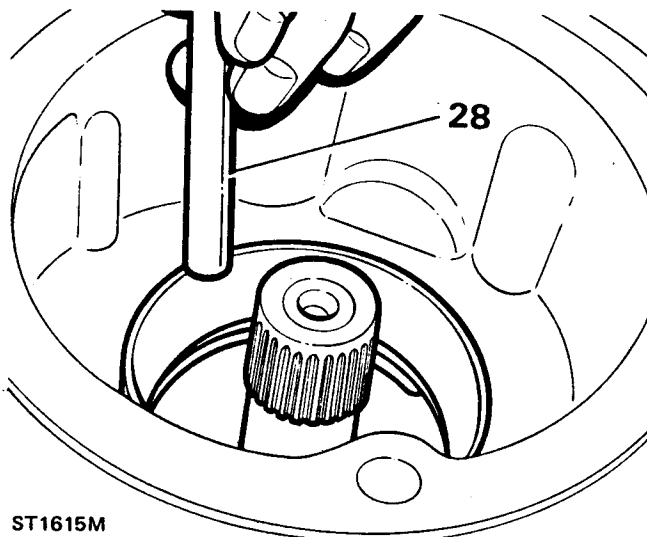
Reassembling

20. Press the bearing into the housing; do not use excessive force. To facilitate fitting the bearing, heat the front output housing. (This is not to exceed 100°C).
21. Using circlip pliers 18G257, fit the bearing retaining clips.
22. Fit a new oil seal (open side inwards) using replacer tool 18G1422, until the seal just makes contact with the circlip.
23. Carefully charge the lips of the seal with clean grease.
24. Slide collar on to the output shaft, with its chamfered edge towards the dog teeth.
25. Fit the output shaft through the bearing and drift home.

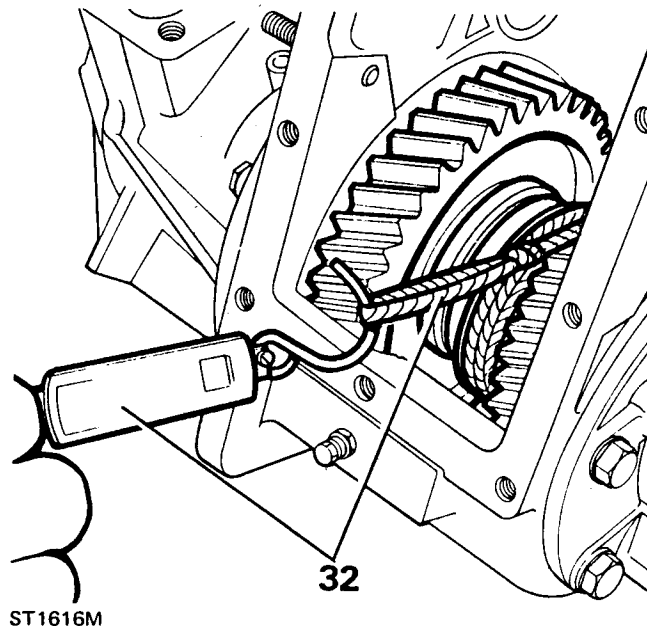


Adjusting front differential bearing pre-load

26. Measure original differential front bearing track shim.
27. Refit original shim into input housing.
28. Drift differential front bearing track into the housing.



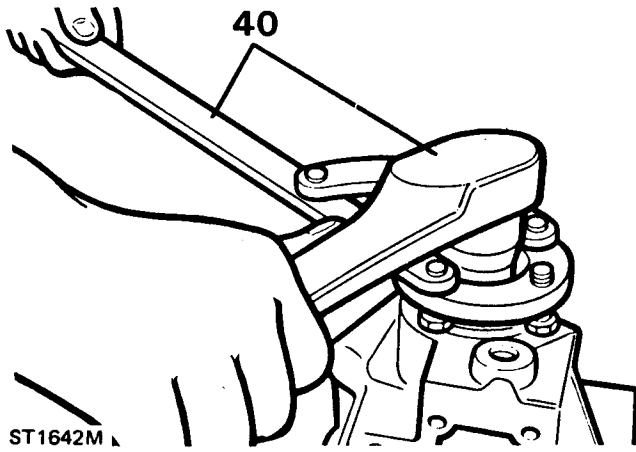
29. Grease and fit new gasket and locate the front output housing on the transfer box casing.
30. Secure housing with the eight retaining bolts and washers, the upper middle bolt being longer than the rest. Do not tighten the bolts at this stage.
31. Engage high or low gear.
32. Check the rolling resistance of the differential using a spring balance and a length of string wound around the exposed splines of the high/low hub.



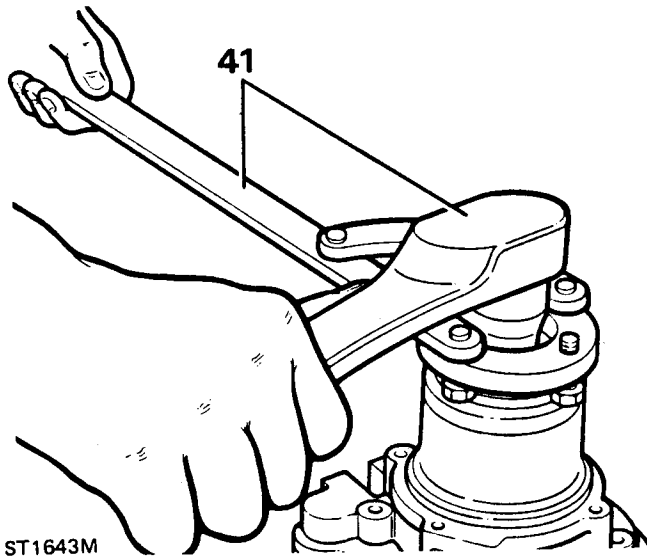
33. With the correct shim fitted the load to turn should be 1,36 kg to 4,53 kg (3 lbs to 10 lbs). This applies to new or used bearings. (New bearings will register at the top end and used bearings will register at the low end.)
34. If the reading is in excess of the above measurements, remove the front output housing assembly from the transfer box casing.
35. Using a suitable extractor, withdraw the centre differential bearing track and change the shim for one of a suitable thickness. (A thinner shim will reduce the rolling resistance.)
36. Fit the new shim and drift the differential bearing track back into its housing until fully home.
37. Having obtained the load to turn prop-up the transfer box casing on the bench with the front face uppermost.
38. Apply Loctite 290 to the threads of the housing retaining bolts and fit the eight bolts and washers into the front output housing and secure to transfer box casing.
39. Fit front output flange, felt washers, steel washers and flange nut.
40. Using flange wrench 18G1205 and torque wrench pull the output shaft up to the correct position. Check that the oil seal shield does not foul the housing.

NOTE: Ensure that the flange bolts are fully engaged in the wrench.

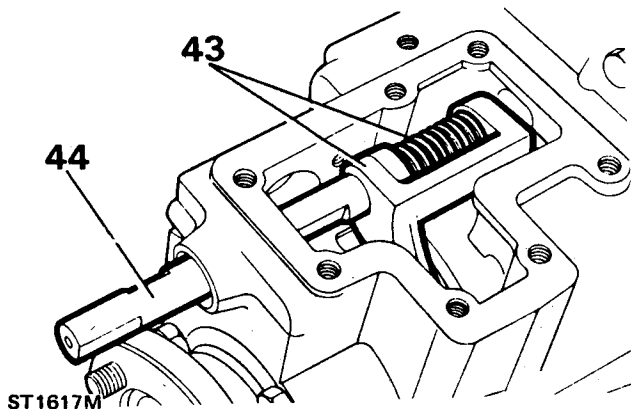
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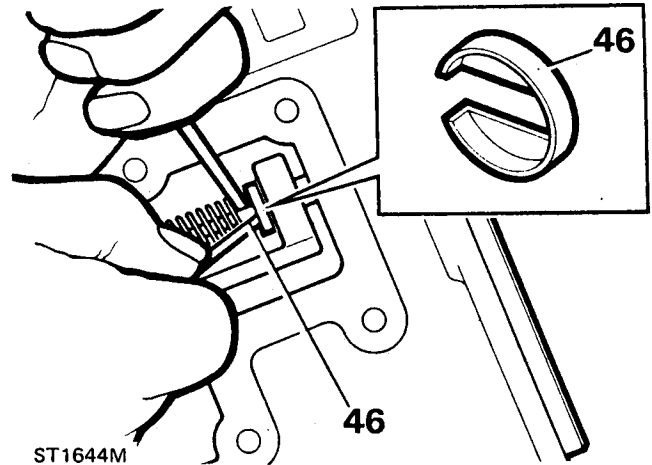
41. Repeat the above operation for the rear output flange.



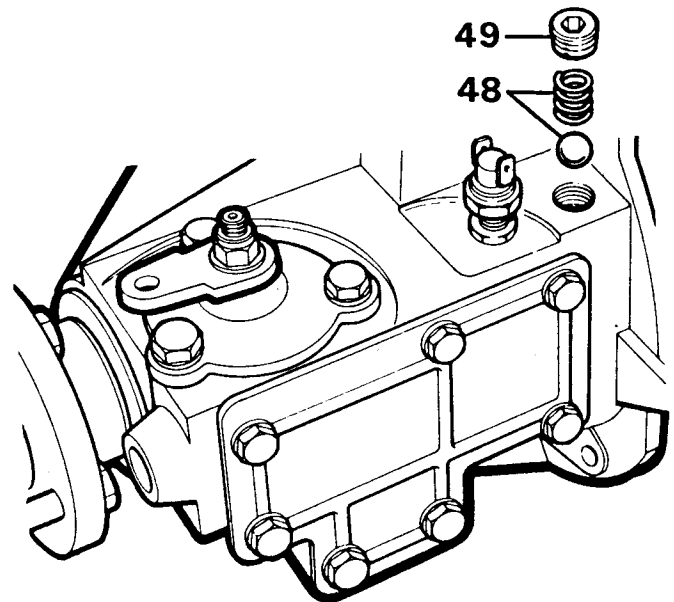
42. Compress the selector shaft spring and fit to the selector fork.
43. Locate selector fork through front output housing side cover aperture, ensuring that the fork engages in the groove of the lock-up sleeve.
44. Fit selector shaft through the aperture in the front of the output housing and pass it through the selector fork lugs and spring into the rear part of the housing.
45. Rotate the selector shaft until the two flats for the spring retaining caps are at right angles to the side cover plate face.



46. Compress the spring between the fork lugs and slide the retaining caps on to the shaft ensuring the spring is captured with the "cupped" side of the caps.
47. Drift selector shaft seal cup into position.



48. Fit selector shaft detent ball and spring in the tapped hole on top of the output housing.
49. Apply Loctite 290 to detent plug threads. Screw detent plug gently home and then unscrew two turns.



ST1645M

Differential lock finger housing overhaul – dismantling

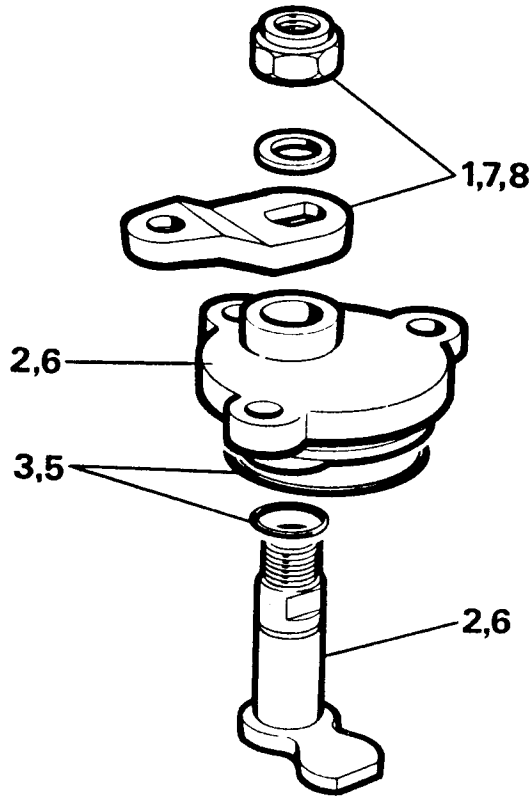
1. Unscrew and discard the "nyloc" nut and remove the operating lever and washer.
2. Remove the pivot shaft from lock finger housing.
3. Remove the 'O' rings from the pivot shaft and housing and discard.
4. Clean all components; examine for wear or damage and renew if necessary.

Reassembling

5. Fit new 'O' rings on to pivot shaft and lock finger housing and lubricate with oil.
6. Locate the pivot shaft in the housing.

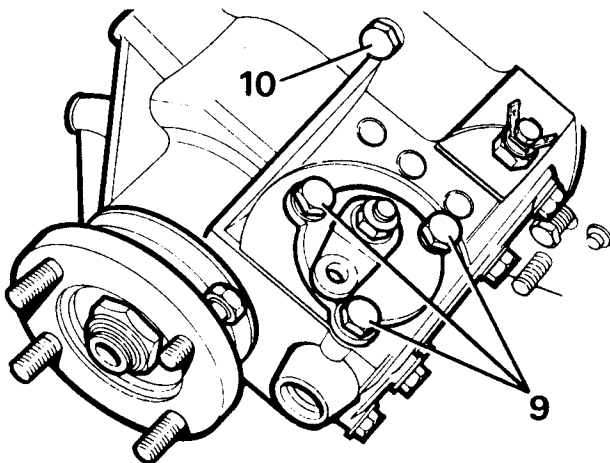
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7. Fit the differential lock lever over the pivot shaft so that the lever will face forward to the bend upwards. This lever is then in the correct operating position.
8. Retain the lever with a plain washer and new nyloc nut.



ST1618M

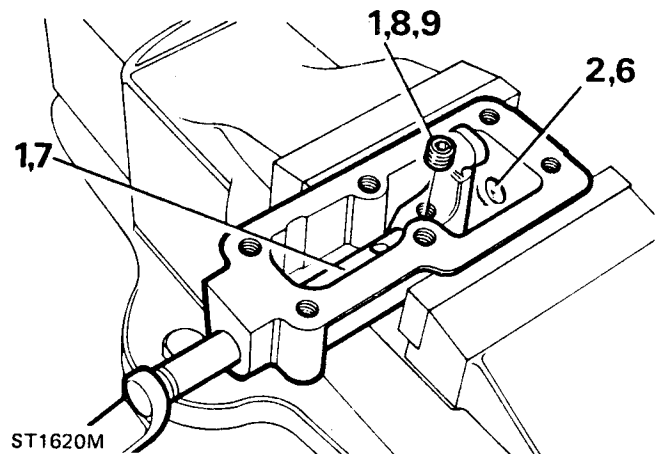
9. Fit the differential lock finger housing into its seating on the front output housing, ensuring that the selector finger is located in the flat of the selector shaft.
10. Apply Loctite 290 to the bolt threads and retain the lock finger housing with the three bolts and washers to the specified torque.



ST1619M

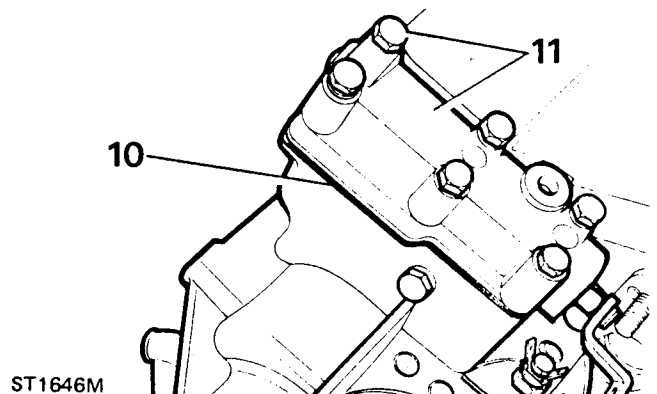
High/low cross-shaft housing overhaul

1. Remove the selector finger grub screw and withdraw the cross-shaft from the cross-shaft housing and remove the selector finger.
2. Remove the 'O' ring from the cross-shaft.
3. Drift out selector housing cup plug if necessary.
4. Clean all the components and check for damage or wear, replace if necessary.
5. Apply sealant to a new cup plug and fit so that the cup is just below the chamfer for the cross-shaft bore.
6. Fit new 'O' ring to cross-shaft.
7. Lubricate the shaft and insert into the cross-shaft housing.
8. Fit selector finger ensuring that it aligns with the recess in the cross-shaft.
9. Apply Loctite 290 to the grub screw and secure the selector finger to the cross-shaft and fully tighten to the specified torque.



ST1620M

10. Grease and fit the high/low selector housing gasket on the front output housing.
11. Fit high/low cross-shaft housing, ensuring that the selector finger locates in the slot of the selector shaft, and secure with six bolts and washers to the specified torque.



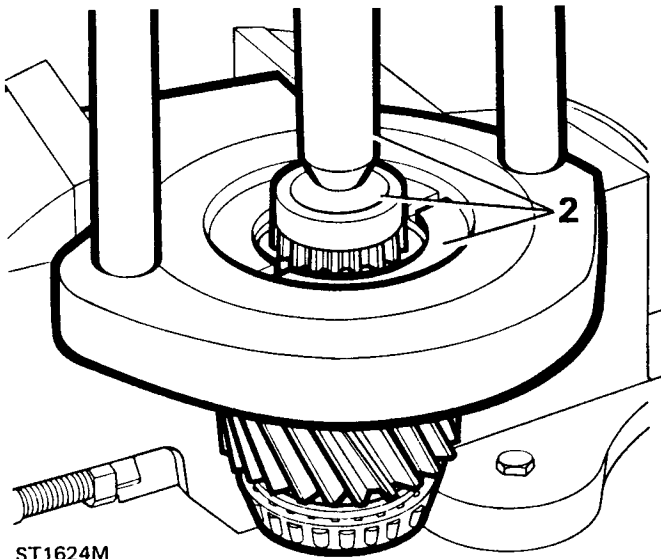
ST1646M

Input gear overhaul – dismantling

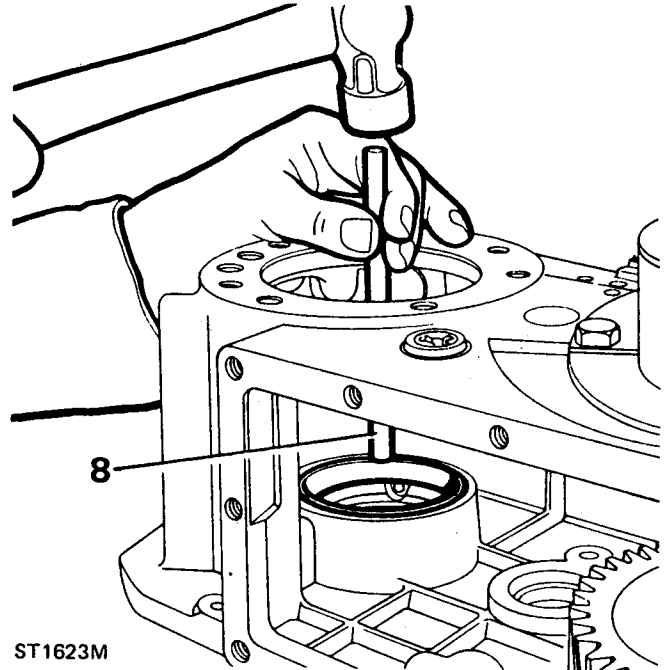
1. Clean the input gear assembly and examine for wear or damage. Remove the bearings only if they are to be renewed.

Continued

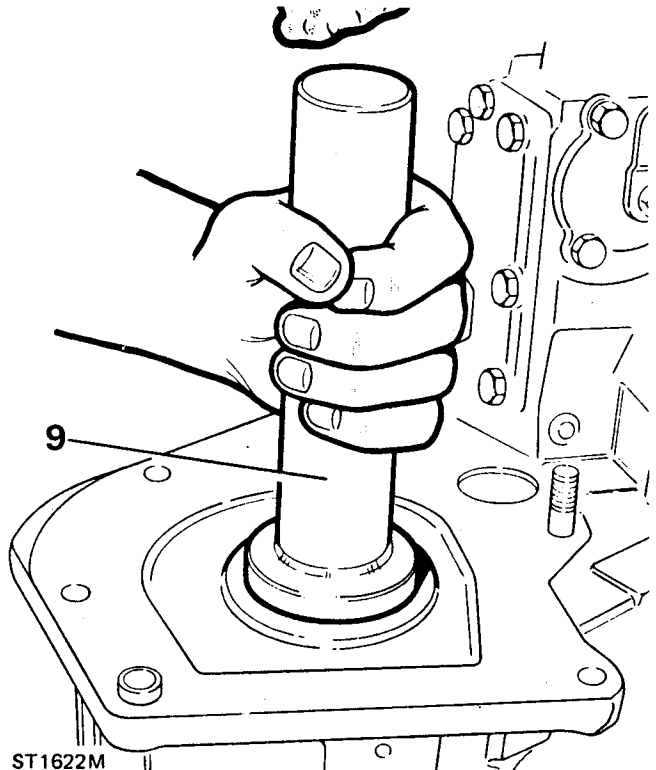
2. Secure hand press MS47 in the vice and using collars 18G47-7 and button 18G47-BB/3, remove rear taper roller bearing from input gear assembly.
3. Invert input gear assembly in hand press and remove front taper roller bearing.
4. Clean input gear.



7. Prop up the transfer box casing on the bench with the rear face uppermost.
8. Drift in the front taper bearing track.

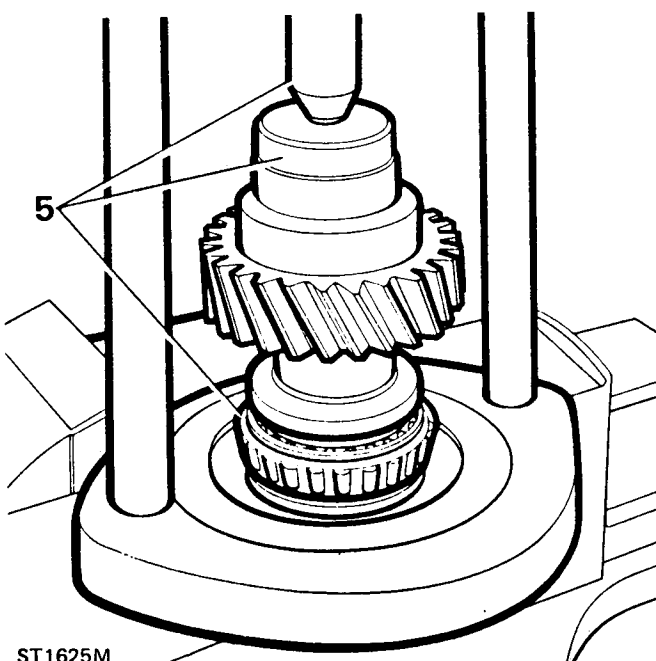


9. Reposition transfer box casing so the front face is uppermost and fit oil seal (open side inwards) using replacer tool 18G1422.



Reassembling

5. Position rear taper roller bearing on input gear and using hand press MS47 and collars 18G47-7 press the bearing fully home.
6. Invert input gear and fit the front taper roller bearing using the press and collars.

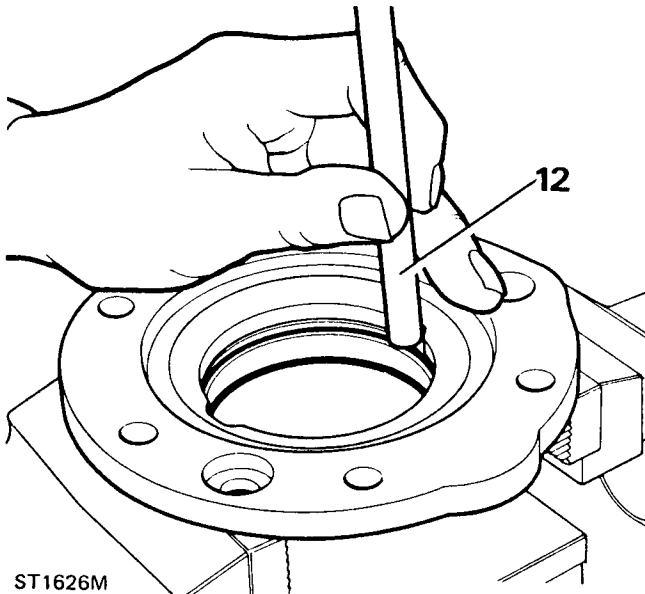


10. Lubricate both bearings with clean oil.
11. Fit the input gear assembly into the transfer box casing with the dog teeth uppermost.

Continued

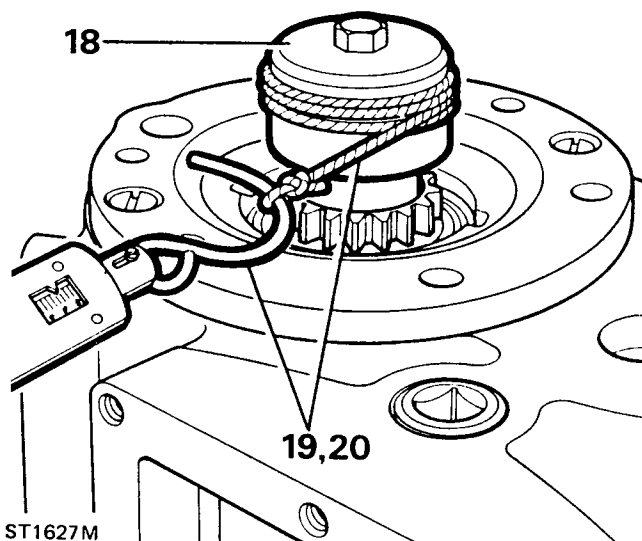
Checking input gear bearing pre-load

12. Secure bearing support plate in the vice. Drift out input gear bearing track, and remove shim.
13. Clean bearing support plate and shim. Measure original shim and note its thickness.
14. Fit the original shim to the support plate.
15. Locate the bearing track in the support plate and press fully home.



ST1626M

16. Apply grease to the gasket and fit on to the transfer box casing.
17. Fit the bearing support plate on to the transfer box casing and secure with the six bolts, but do not tighten.
18. Fit the service tool LST105 to input gear and engage the spline.
19. Tie a length of string to the split pin and fit it to the service tool as shown.
20. Attach a spring balance to the string and carefully tension the spring until a load to turn the input gear is obtained. A pull of 2,26 kg to 6,80 kg (5 lbs to 15 lbs) is required.
21. If the reading obtained is outside the above limits, the original shim must be changed.

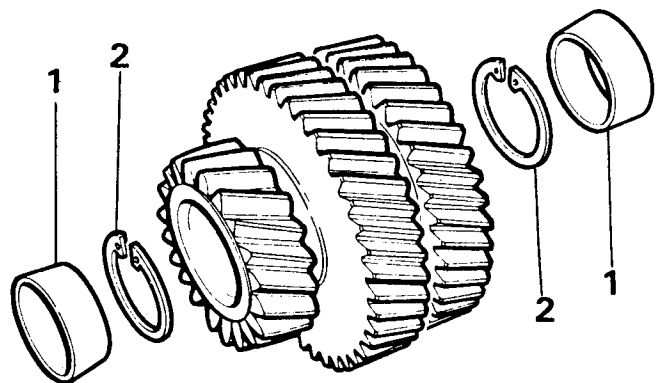


ST1627M

22. Remove the spring balance, string and service tool.
23. Remove the six bolts and the bearing support plate.
24. Drift out the input gear bearing track from the support plate and discard original shim.
25. Select the correct size shim to obtain a load to turn of 2,26 kg to 6,80 kg (5 lbs to 15 lbs).
26. Fit shim to support plate, locate bearing track and press home.
27. Fit bearing support plate and secure to transfer box casing with the six bolts (do not tighten).
28. Repeat the rolling resistance check as previously described, and note the value obtained.

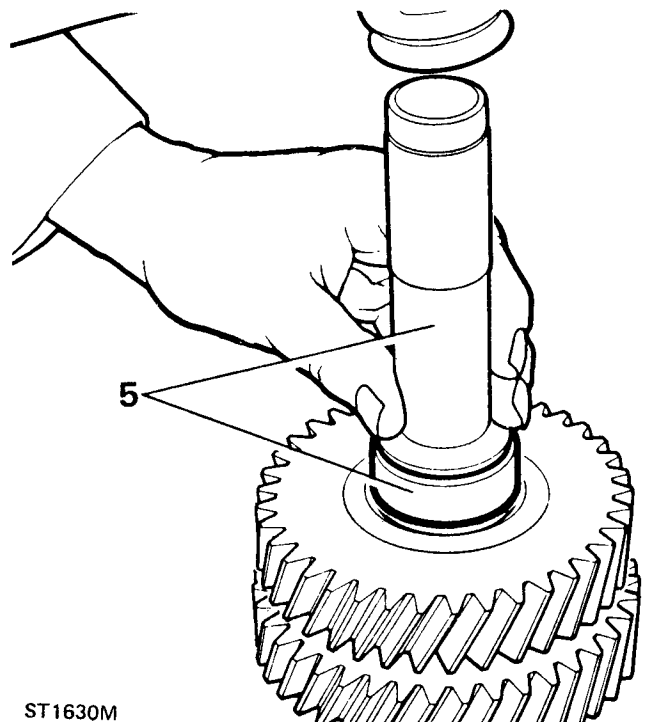
Intermediate gear assembly overhaul

1. Drift out intermediate gear bearing tracks.
2. Remove circlips.



ST1628M

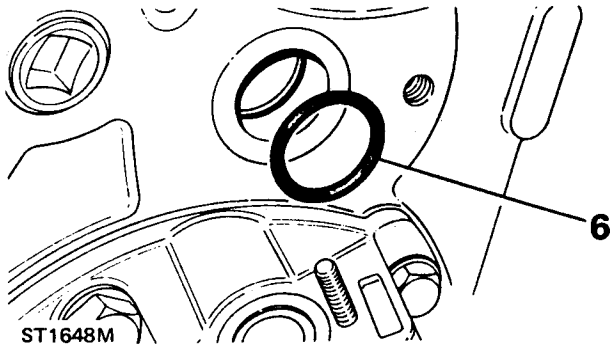
3. Clean all intermediate gear components and lock plate. Check for damage or wear and replace as necessary.
4. Fit new circlips into the intermediate gear cluster.
5. Using tools LST550-4 and MS550 fit bearing tracks into the intermediate gear cluster.



ST1630M

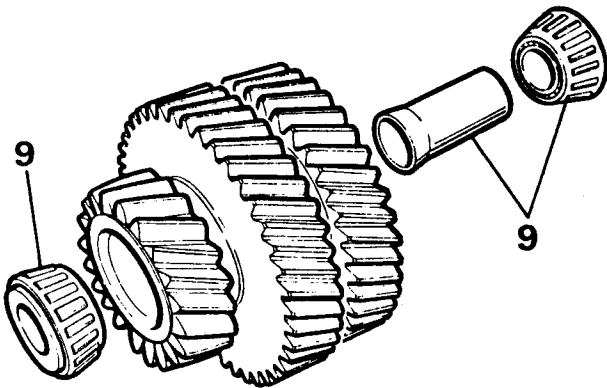
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6. Fit the 'O' rings to the intermediate shaft and into the intermediate shaft bore at the front of the transfer box casing.



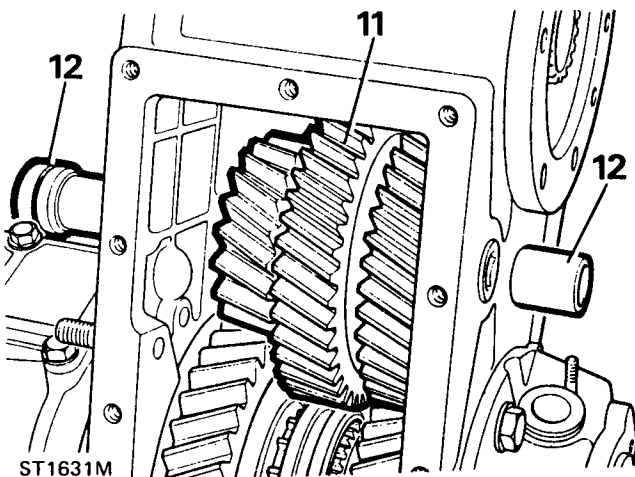
Intermediate gear reassembly

7. Check for damage to the intermediate shaft thread and if necessary clean up with a fine file or stone.
8. Lubricate the taper roller bearings and intermediate gear shaft.
9. Insert new bearing spacer to gear assembly, followed by the taper roller bearings.



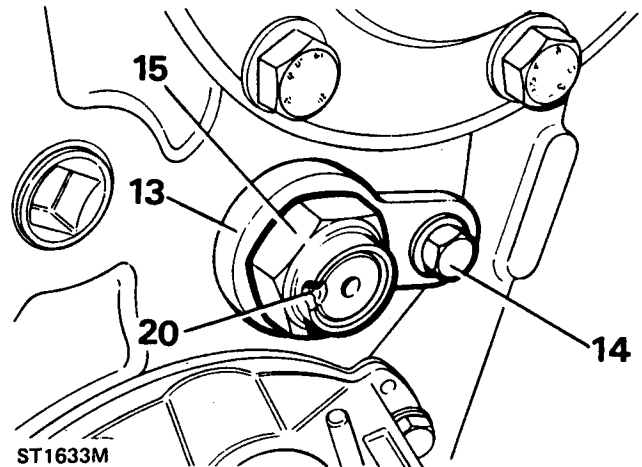
ST1649M

10. Fit dummy shaft LST104 into the intermediate gear cluster.
11. Locate the gear assembly into the transfer box casing from the bottom cover aperture.
12. Insert intermediate shaft from the front of the transfer box casing, pushing the dummy shaft right through as shown and remove. (Making sure that the intermediate gear cluster meshes with the input gear and high range and low range gears).



ST1631M

13. Turn the intermediate shaft to allow fitting of retaining plate.
14. Fit retaining plate and secure with retaining bolt and washer.
15. Fit the intermediate gear shaft retaining stake nut.

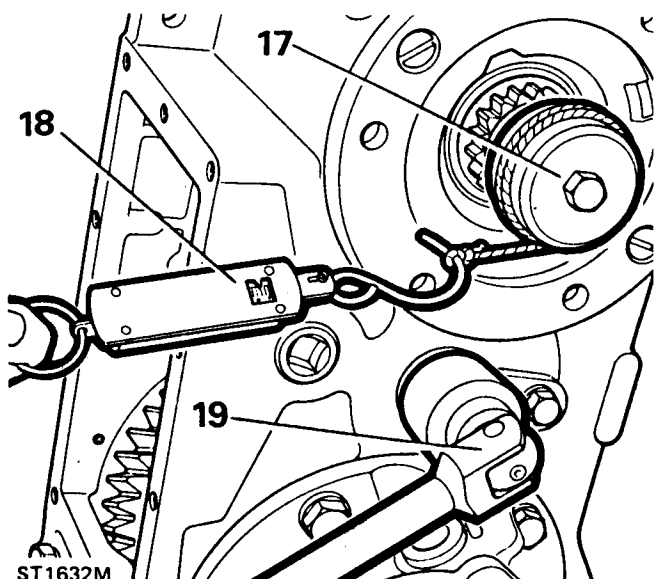


ST1633M

Adjusting intermediate gear torque-to-turn

16. Select neutral.
17. Fit service tool LST105 to input gear and engage spline.
18. Tie a length of string to a split pin and fit to the service tool as shown. Attach the spring balance to the string.
19. To obtain the correct figures and to collapse the spacer within the intermediate gear cluster, tighten the intermediate shaft nut until the load-to-turn has increased by 3,7 kg (7 lbs) $\pm$ 1,63 kg ($\pm$ 3 lbs) on that noted when checking input shaft load-to-turn. The torque to tighten the retaining nut will be approximately 203 Nm (150 lb ft).
20. Peen the stake nut by carefully forming the collar of the nut into the intermediate shaft recess, as illustrated.

CAUTION: A round nose tool must be used for this operation to avoid splitting the collar of the nut.



ST1632M

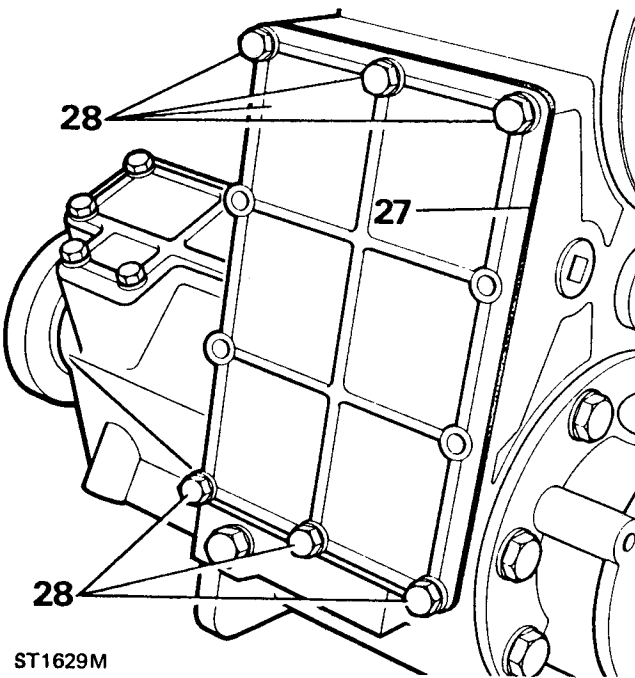
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Power take-off cover – reassemble

21. Clean power take-off cover and gasket face.
22. Fit the two countersunk screws and tighten.
23. Remove the six bolts from the bearing support plate.
24. Apply sealant to the cover plate gasket and fit it to the bearing support plate.
25. Apply Loctite 290 to bolt threads and secure the power take-off cover with the six bolts and washers.

Bottom cover – reassemble

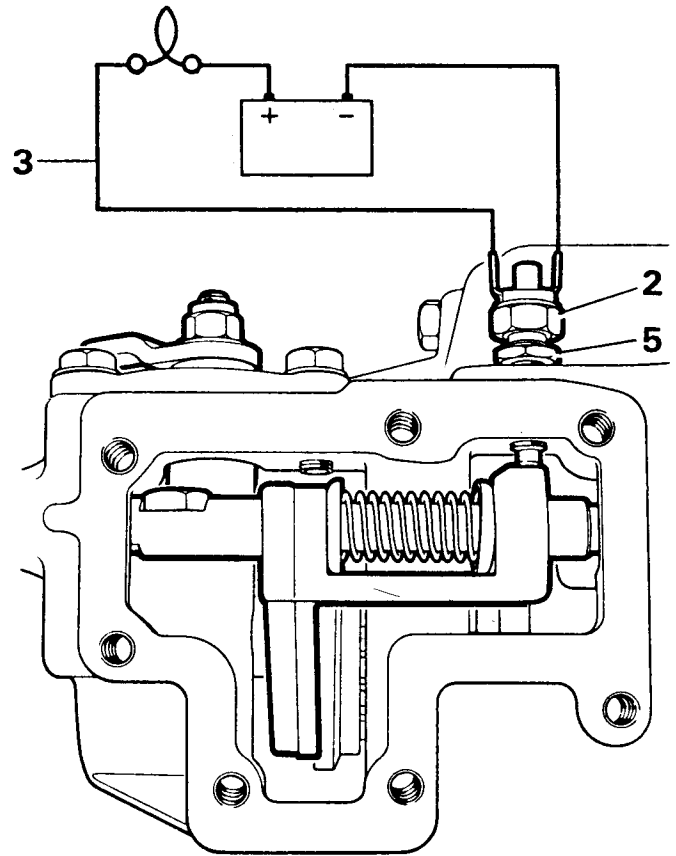
26. Clean bottom cover and gasket face.
27. Apply sealant to cover gasket and fit to transfer box casing.
28. Apply Loctite 290 to bolt threads and secure the bottom cover with six bolts and washers.



ST1629M

Differential lock switch adjustment

1. Select differential locked position by moving the lock taper towards the right side of the transfer box casing.
2. Apply sealant to the differential lock warning light switch and fit to the top of the front output housing.
3. Connect a test lamp circuit to the differential lock switch.
4. Screw in the lock switch until the bulb is illuminated.
5. Turn in the switch another half a turn and tighten with the locknut against the housing.



ST1634M

6. Disconnect the battery and move the differential lock lever to the left to disengage differential lock.
7. Clean the front output housing side cover.
8. Grease and fit side cover gasket.
9. Apply Loctite 290 to bolt threads, fit side cover and secure with seven bolts and washers.

Transmission brake – reassemble

1. Clean brake backplate and oil catcher and apply sealant to the catcher joint face.
2. Locate brake backplate on the rear output housing with the brake operating lever on the right side of the transfer box casing.
3. Secure the backplate (including the oil catcher) with the four special bolts and tighten using a hexagonal socket to the specified torque.
4. Clean and fit brake drum and secure with two countersunk screws.

ELECTRICAL

This section of the manual contains information on important changes that have been made to the electrical equipment fitted to Range Rovers. The changes were introduced in two main groups, as follows:—

1982 to mid 1984

New circuit diagram for automatic gearbox models

New ignition distributor and timing procedure for 9.35:1 high compression engine

Central door locking on four-door models

Mid 1984 to 1985

New circuit diagrams for all models

New instrument binnacle, auxiliary switch panel and fuse box

Electrically operated exterior mirrors – Option

Electrically operated side window lifts – Option

New central door locking on four-door models, controlled by driver's door only

Electronic ignition

CONTENTS

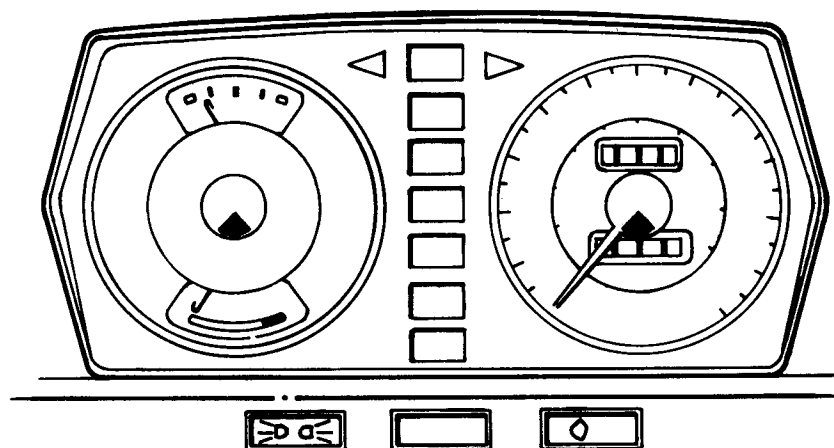
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– Side repeater	167
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Mirrors – Exterior, electric and manual	179
Relays	169
Side door windows – electrically operated	183
Speedometer drive cable	178
Switches – Choke warning light	164
– Hand brake warning light	163
– Hazard warning	158
– Heated rear screen	158
– Interior roof light	168
– Ignition/starter	161
– Instrument illumination	160
– Main lighting	161
– Rear fog guard	166
– Rear screen wash/wipe	163
– Reverse light – automatic gearbox	162
– Stop light	163
– Window lift	165
– Windscreen wash/wipe	162
Split charge facility	188
Trailer socket	179



**FOR ALL MODELS WITH THE ABOVE TYPE OF INSTRUMENT BINNACLE
FROM 1982 TO 1984**

KEY TO CIRCUIT DIAGRAM – AUTOMATIC GEARBOX MODELS – 1982 to 1984

- 1 Oil temperature transmitter
- 2 LH Front fog lamp
- 3 RH Front fog lamp
- 4 Automatic gearbox oil cooler temperature switch
- 5 Automatic gearbox graphics illumination
- 6 Battery voltmeter illumination
- 7 Oil temperature gauge illumination
- 8 Cigar lighter illumination
- 9 Clock illumination
- 10 Oil pressure indicator
- 11 LH Front side lamp
- 12 RH Front side lamp
- 13 Number plate illumination
- 14 Number plate illumination
- 15 LH Rear tail lamp
- 16 RH Rear tail lamp
- 17 Underbonnet illumination (where fitted)
- 18 LH Direction indicator side repeater
- 19 LH Front indicator lamp
- 20 Horns
- 21 RH Headlamp main beam
- 22 LH Headlamp main beam
- 23 RH Headlamp dipped beam
- 24 LH Headlamp dipped beam
- 25 LH Rear indicator lamp
- 26 RH Direction indicator side repeater
- 27 RH Front indicator lamp
- 28 RH Rear indicator lamp
- 29 LH Reverse lamp
- 30 RH Reverse lamp
- 31 Front fog lamps pick-up point
- 32 Oil cooler temperature warning light
- 33 Oil temperature gauge
- 34 Rear fog lamp switch
- 35 Panel lighting switch
- 36 Direction indicator switch
- 37 Underbonnet lamps (one lamp or two, according to specification)
- 38 Trailer warning light
- 39 Panel illumination
- 40 Panel illumination
- 41 Differential lock warning light
- 42 Main beam warning light
- 43 LH indicator warning light
- 44 RH indicator warning light
- 45 Neutral, Start & Reverse lighting switch
- 46 Voltage stabiliser
- 47 Rear fog warning light
- 48 Side lamps warning light
- 49 Lighting switch
- 50 Indicator, headlamp dip and horn switch
- 51 Clock
- 52 Differential lock warning light switch
- 53 Water indicator
- 54 Fuel indicator
- 55 Choke warning light
- 56 Oil warning light

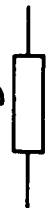
- 57 Ignition warning light
- 58 Brake warning light
- 59 Fuel warning light
- 60 Cigar lighter
- 61 Hazard warning switch
- 62 Radio fuse (when fitted)
- 63 Radio (when fitted)
- 64 Fuse unit
- 65 Hazard unit
- 66 Battery voltmeter
- 67 Ignition switch
- 68 Oil pressure indicator
- 69 Trailer socket connection
- 70 Interior lights
- 71 Brake fluid check switch
- 72 Choke switch
- 73 Heated rear screen switch
- 74 Heater fuse
- 75 Stop lamp switch
- 76 Alternator
- 77 Starter relay
- 78 Resistive wire
- 79 Coil
- 80 Oil pressure transmitter
- 81 Courtesy light delay unit (when fitted)
- 82 Park brake warning light (when fitted)
- 83 Rear screen fuse
- 84 Front wash/wiper switch
- 85 Programmed wash/wipe control unit
- 86 Rear wash/wiper switch
- 87 Starter motor
- 88 Electric fuel pump
- 89 Distributor
- 90 Inspection sockets
- 91 Courtesy light switch (4 door only)
- 92 Courtesy light switch
- 93 Interior light switch
- 94 Courtesy light switch
- 95 Courtesy light switch (4 door only)
- 96 Brake circuit check relay
- 97 Oil pressure switch
- 98 Park brake pick up point
- 99 Park brake switch (if fitted)
- 100 Fuel gauge transmitter
- 101 Water temperature transmitter
- 102 Heated rear screen relay
- 103 Heated rear screen element
- 104 Front screen washer motor
- 105 Front screen wiper motor
- 106 Rear screen washer motor
- 107 Rear screen wiper motor
- 108 Heater motor
- 109 LH Stop lamp
- 110 RH Stop lamp
- 111 LH Rear fog lamp
- 112 RH Rear fog lamp
- 113 Battery

Key to circuit diagram

Connections via plug and socket



Snap connectors



Permanent in-line connections



Earth connections via cables



Earth connections via fixing bolts

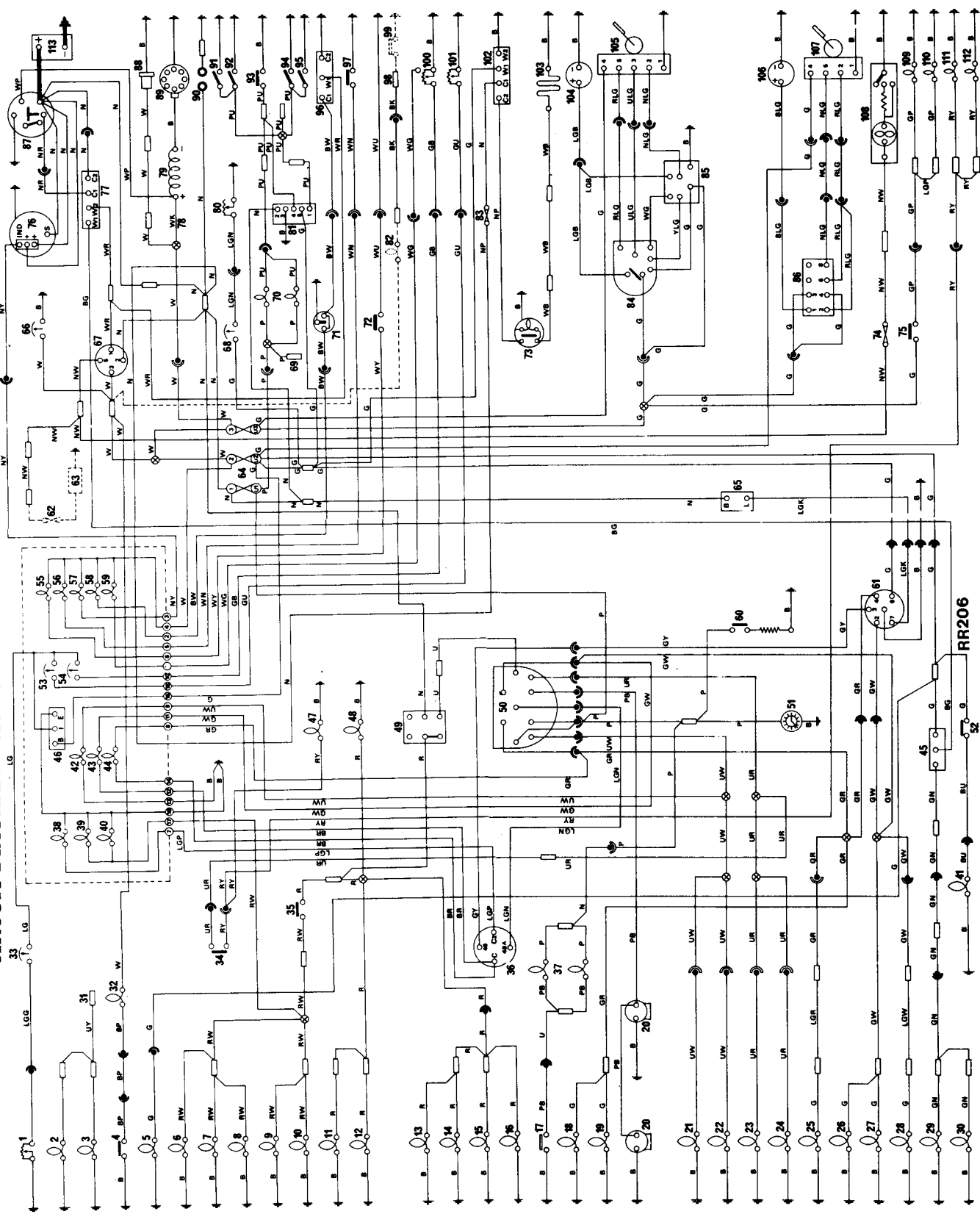


Key to cable colours

- B Black
- G Green
- K Pink
- L Light
- N Brown
- O Orange
- P Purple
- R Red
- S Slate
- U Blue
- W White
- Y Yellow

The last letter of a colour code denotes the tracer colour.

CIRCUIT DIAGRAM – AUTOMATIC GEARBOX MODELS – 1982 to 1984



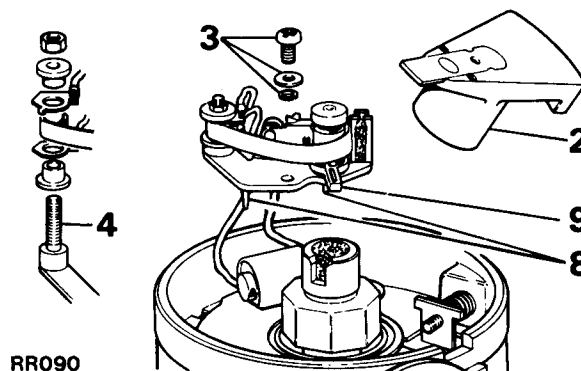
**DISTRIBUTOR AND IGNITION TIMING
FOR HIGH COMPRESSION ENGINE – 1982 to 1984**

Renew distributor contact breaker points

Sliding contact type

To obtain satisfactory engine performance it is most important that the contact points are adjusted to the correct dwell angle, see Data Section using suitable workshop equipment. This work should be carried out by your local Land Rover Distributor or Dealer.

1. Release the clips and remove the distributor cap.
2. Remove the rotor arm from the cam spindle.
3. Remove the retaining screw and washers and lift the complete contact breaker assembly from the moveable plate.
4. Remove the nut and plastic bushes from the terminal post to release the leads and spring.
5. Discard the old contact breaker assembly.
6. Clean the new points with petrol to remove the protective coating.
7. Connect the leads to the terminal post in the following sequence:
 - (a) lower plastic bush
 - (b) red lead tab
 - (c) contact breaker spring eye
 - (d) black lead tab
 - (e) upper plastic bush
 - (f) retaining nut
8. Fit the contact breaker assembly to the moveable plate ensuring that the pegs underneath locate in the holes in the moveable plate.
9. The sliding contact actuating fork must also be located over the fixed peg in the adjustable base plate.
10. Fit the retaining screw plain and spring washer to secure the contact breaker assembly to the moveable plate.
11. When new contact points have been fitted, the dwell angle must be checked after a further 1,500 km (1,000 miles) running.



RR090

Check security of distributor vacuum unit line and operation of vacuum unit (9.35:1 compression ratio engines)

To ensure that the vacuum capsule is functioning correctly, it is important that the following procedure is carried out: Remove the vacuum retard pipe from the distributor (this will increase the idle speed). If the vacuum capsule is functioning correctly, an advance to between 6 to 14 degrees B.T.D.C. should be noted.

continued

Check/adjust dwell angle and ignition timing using electronic equipment – 1982 to 1984 – High and Low compression engines

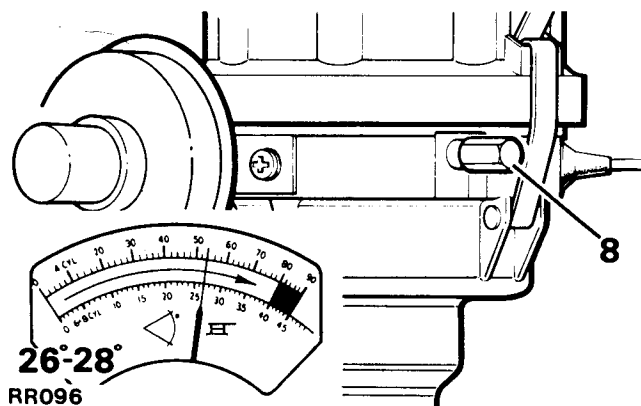
1. The accurate setting of ignition timing is of extreme importance, and the correct functioning of the emission control system relies to a large extent on its accuracy. It is necessary to set the ignition timing dynamically with the engine at idling speed. This requires the use of a suitable tachometer, for determining the engine speed, and a stroboscopic lamp for determining the points in the engine cycle at which the ignition sparks occur. It is obvious therefore that this work should be carried out by a Land Rover Distributor or Dealer.
2. Engines with emission control have a special ignition distributor included in the specification. The distributor provides a retarded ignition setting at the lower speed range whilst maintaining the normal advance characteristics at higher engine speeds. The distributor, together with the other modifications embodied, reduces exhaust emissions to an acceptable level. Failure to set ignition timing correctly, as subsequently described, will almost certainly result in the vehicle failing to comply with emission control regulations and can also lead to engine damage and increase fuel consumption.
3. Set the contact breaker gap to 0,35 mm (0.014 in). See Data Section engine details for ignition timing for the various engine versions.
Carry out item 4 only if distributor has been disturbed.
4. Set ignition timing statically as specified in Data Section prior to the engine being run, by the basic timing lamp method. (This sequence is to give only an approximation in order that the engine may be run. The engine must not be started after distributor replacement until this check has been carried out.)
5. Start and run the engine until it is at normal operating temperature, that is, warm water flowing through the radiator top hose.
6. **8.13:1 Compression ratio engines**
Set the idle speed to 600 to 650 rev/min with distributor vacuum pipes connected.
7. **Emission engines (9.35:1 compression ratio)**
 - (a) Set the idle speed to 550 to 650 rev/min. with vacuum pipes connected.
 - (b) Disconnect both vacuum pipes from the distributor.
 - (c) The idle speed will increase with the vacuum pipes disconnected and must be reduced to below 750 rev/min. as follows.
 - (d) Disconnect one of the breather pipes from a carburetter. The idle speed should now be below 750 rev/min., if not, reduce the idle speed by progressively altering (equally) both idle adjustment screws.
8. Set dwell angle as follows.
9. Set selector knob to 'calibrate' position on the tach/dwell meter. Adjust calibration knob to give a zero reading on the meter.

continued

10. Couple meter to engine following manufacturer's instructions.
11. Set selector knob to 8 cylinder position and tach/dwell selector knob to 'dwell'. The dwell angle should be 26 degrees to 28 degrees. If the dwell angle is outside the limits of 24 degrees to 30 degrees repeat the foregoing procedure from item 3 but with a contact breaker setting of 0,3 mm (0.012 in). If the dwell angle is still outside the limits of 24 degrees to 30 degrees the distributor must be renewed or overhauled.
12. Uncouple tach/dwell meter.

Set ignition timing as follows:

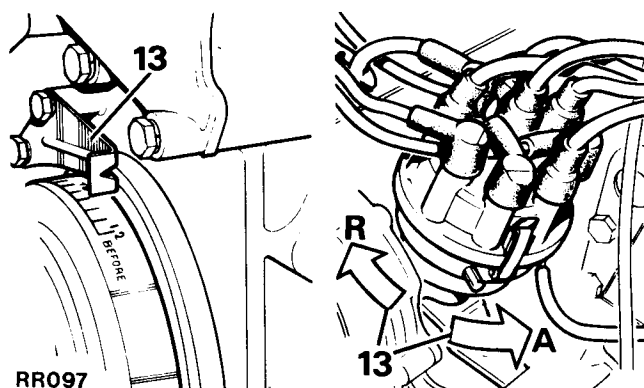
13. Couple a stroboscopic timing lamp to the engine following the manufacturer's instructions, with the high tension lead attached into No. 1 cylinder plug lead.
 - (a) Slacken distributor clamping bolt.
 - (b) Turn the distributor body until the stroboscopic lamp synchronises the timing pointer and the applicable timing mark on the vibration damper rim.
 - (c) Arrow (R) indicates direction to retard ignition. Arrow (A) indicates direction to advance ignition.
 - (d) Re-tighten the distributor clamping bolt.



14. **Emission engines (9.35:1 compression ratio)**
 - (a) Reconnect the carburettor breather and vacuum retard pipes.
 - (b) Check the engine idle speed and reset (equally) as necessary, see Data Section and re-seal the carburetters.
 - (c) Check the dynamic ignition timing with the vacuum retard pipe connected, it should be 4 degrees to 8 degrees A.T.D.C., otherwise there is a fault in the vacuum system.

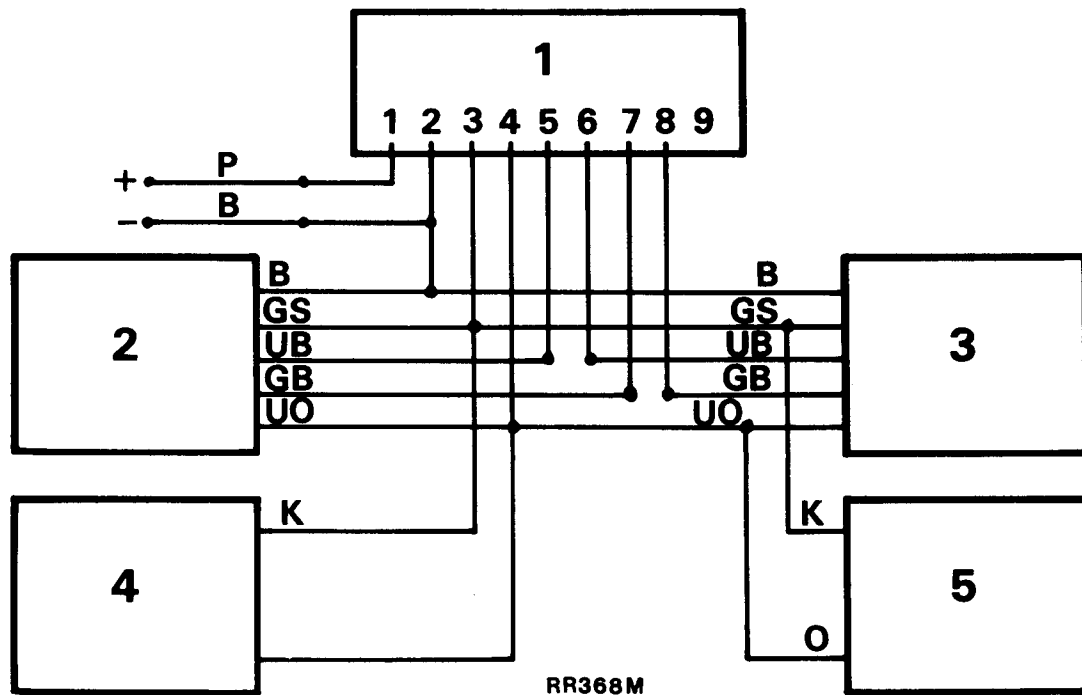
15. **All engines**
Switch off the engine and disconnect stroboscopic timing lamp and tachometer.

NOTE:— Engine speed accuracy during ignition timing is of paramount importance. Any variation from the specified idle speed, particularly in an upward direction, will lead to wrongly set ignition timing.



CENTRAL DOOR LOCKING (4 door only) – 1982 to 1984

An electrically driven central door locking system is fitted as standard to four door vehicles. The system is activated from either front door by operation of the exterior key lock or the interior locking button and is effective on all four passenger doors; tailgate locking arrangements are unchanged. In the event of electrical failure manual locking remains operative.

**Key to cable colours**

B – Black G – Green K – Pink O – Orange
 P – Purple S – Slate U – Blue
 The last letter of a colour code denotes the tracer colour

- | | |
|---|-------------------------|
| 1. Door lock electrical control unit (multi-plug connector) | |
| 2. Driver's front door lock actuator | Five pin plug connector |
| 3. Passenger's front door lock actuator | |
| 4. Passenger's rear door lock actuator | Two pin plug connector |
| 5. Passenger's rear door lock actuator | |

The circuit shown is connected into the main vehicle circuit protected by No. 1 fuse (35 amp). The purple (+) wire is connected to an existing connector and the black earth (–) wire to an existing earthing point. Both connections are located behind the lower fascia panel adjacent to the door lock electrical control unit on the outer side of the steering column support.

Both front door actuator motor drive units incorporate an integral master switch. Either switch will control all four door locks when operated by the key from outside or by the sill locking control inside the vehicle.

Independent manual operation of rear door sill locking controls will be over-ridden by subsequent electrical switching.

continued

Failure of an actuator will not affect the electric locking of the remaining three doors. The door with the inoperative actuator can still be unlocked or locked manually.

NOTE:— The door lock electrical control unit and door lock actuator units contain non-serviceable parts. If a fault should occur replace the unit concerned with a new one. Before carrying out any maintenance work disconnect the battery.

DOOR LOCK ELECTRICAL CONTROL UNIT

— Remove and refit

86.26.08

Removing

1. Release the lower fascia panel by removing the five self-tapping screws.
2. Disconnect the electrical leads by releasing the multi-plug from the bottom end of the control unit.
3. Remove the two self-tapping screws securing the control unit to the outer side of the steering column support bracket and remove the control unit.

Refitting

4. Reverse instructions 1 to 3.

FRONT DOOR ACTUATOR UNITS

Remove and refit

Removing

1. Remove the two screws holding the armrest to the inner door panel.
2. Wind the glass up into the fully closed position, then remove the single screw retaining the window regulator handle.
3. Carefully prise out the upper and lower halves of the inside door release handle bezel by depressing the trim pad slightly.
4. Unscrew the sill locking knob.
5. Release the door trim pad by inserting a screwdriver between the trim pad and the inner door panel, gently prising out the plastic clips from their respective holes around the edges of the trim pad.
6. Unplug the two speaker connections inside the door and remove the door trim pad complete with speaker.
7. Peel back the top of the plastic weather sheet at the rear of the inner door panel to expose the lock actuator unit.
8. Remove the four screws securing the lock actuator mounting plate to the inner door panel.
9. Release the clip retaining the electrical cable.
10. Manoeuvre the actuator assembly to detach the operating rod 'eye' from the hooked end of the actuator link on the door lock.
11. Withdraw the actuator assembly from the door until the electrical cable is pulled out of its channel sufficiently to expose the connectors which can then be detached.
12. Remove the actuator assembly from the door.
13. The actuator unit may be changed if necessary by

removing the two rubber mounted screws which secure it to the mounting plate.

Refitting

14. Locate the actuator assembly in the inner door panel and fit the electrical cable connectors. The cable, and connectors, are pulled back into the channel from the front end and the cable clip refitted.
15. Manoeuvre the actuator assembly to engage the operating rod 'eye' on the hooked actuator link.
16. Loosely fit the actuator mounting plate to the inner door panel with the four screws, setting the mounting plate in the centre of the slotted holes.
17. Ensure that manual operation of the sill locking control is not restricted by the operation of the actuator operating rod and vice versa, resetting the mounting plate as necessary.
18. Reconnect the vehicle battery.
19. Check that electrical operation of the door lock occurs when the sill locking control is moved through half of its total movement. Reset the mounting plate if necessary and tighten the four screws.

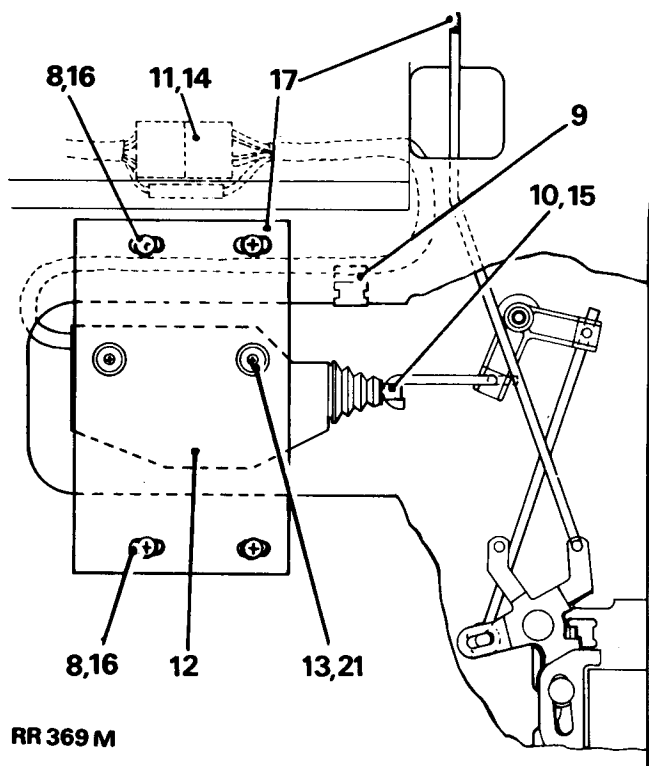
NOTE:— The above adjustment ensures that the full tolerance on the switching operation is utilised.

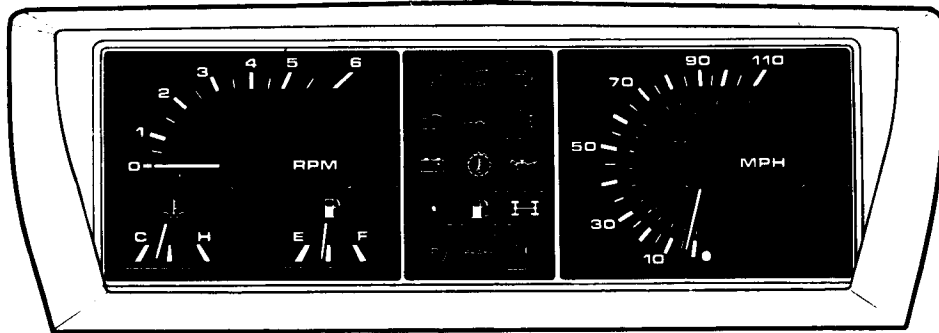
REAR DOOR ACTUATOR UNITS

Remove and refit

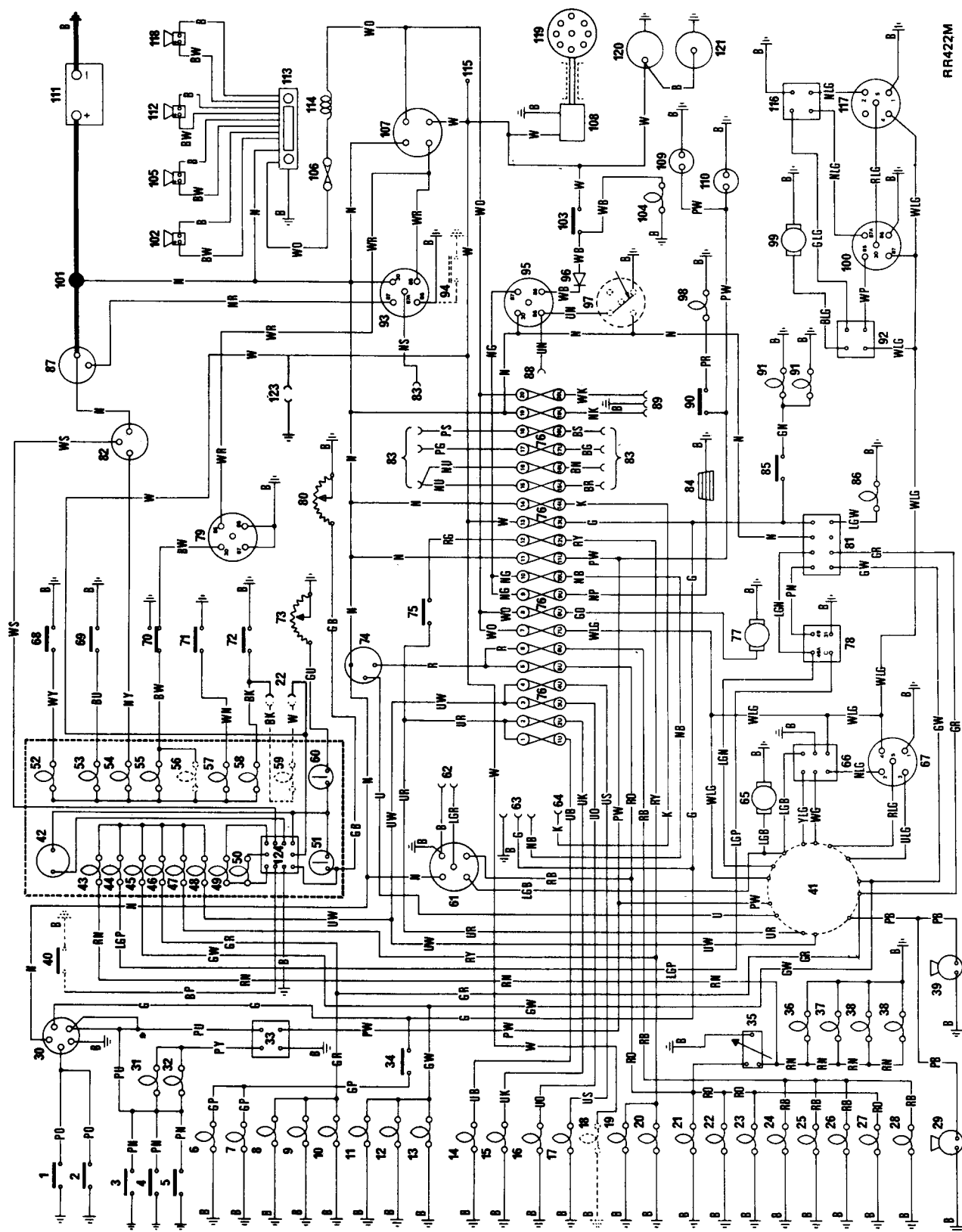
Instructions as for front doors with the following exceptions:

20. No radio speaker is involved.
21. No mounting plate is used, the rear actuator is secured directly to the inner door panel by the two actuator rubber mounted screws.
22. The electrical cable and plug is retained to the inner door panel by two spring clips and is immediately accessible through the large aperture in the door.
23. Instruction 19 does not apply to rear actuator units which are not fitted with switches.





**FOR ALL MODELS WITH NEW INSTRUMENT BINNACLE
FROM MID 1984 TO 1985**



MAIN CIRCUIT DIAGRAM – ALL MODELS – MID 1984 TO 1985

1	Left hand front door switch	44	Trailer warning light	88	Split charge relay (Option)
2	Right hand front door switch	45	Right hand indicator	89	Electric windows and central door locking (Options)
3	Tailgate switch	46	Left hand indicator	90	Hood switch
4	Left hand rear door switch	47	Rear fog warning light	91	Reverse lamps
5	Right hand rear door switch	48	Head lamp warning light	92	Rear wipe wash switch
6	Right hand stop lamp	49	High transfer oil temperature warning light	93	Starter solenoid relay
7	Left hand stop lamp	50	Low fuel warning light	94	Start inhibitor switch (automatic)
8	Left hand front indicator lamp	51	Fuel indicator gauge	95	Heated rear window relay
9	Left hand rear indicator lamp	52	Cold start warning light	96	Diode
10	Left hand side repeater lamp	53	Differential lock warning light	97	Voltage switch (Option) to fit, remove (arrowed) link first
11	Right hand front indicator lamp	54	Ignition warning light	98	Bonnet lamp
12	Right hand rear indicator lamp	55	Brake failure warning light	99	Rear screen wash motor
13	Right hand side repeater lamp	56	Brake failure warning light (Australia)	100	Rear wiper relay
14	Right hand head lamp dip	57	Oil pressure warning light	101	Terminal post
15	Left hand head lamp dip	58	Park brake warning light	102	Left hand rear speaker (Option)
16	Right hand head lamp main	59	Park brake warning light (Australia)	103	Heated rear window switch
17	Left hand head lamp main	60	Water temperature gauge	104	Heated rear window warning lamp
18	Automatic gear selector graphics illumination	61	Head lamp wash timer (Option)	105	Right hand rear speaker (Option)
19	Right hand rear fog lamp	62	Head lamp wash pump (Option)	106	Radio fuse
20	Right hand number plate lamp	63	Heated electric mirrors (Option)	107	Ignition/heat start switch
21	Right hand side lamp	64	Trailer socket (Option)	108	Constant energy ignition unit
22	Right hand tail lamp	65	Front screen wash	109	Cigar lighter
23	Right hand tail lamp	66	Wiper delay	110	Clock
24	Left hand number plate lamp	67	Wiper motor	111	Battery
25	Left hand side lamp	68	Cold start warning lamp switch	112	Left hand front speaker
26	Left hand tail lamp	69	Differential lock switch	113	Radio (Option)
27	Radio illumination	70	Brake failure switch	114	Radio choke
28	Switch illumination	71	Oil pressure switch	115	Split charge relay (Option)
29	Right hand horn	72	Park brake switch	116	Rear wiper delay
30	Interior lamp delay	73	Water temperature transducer	117	Rear wiper motor
31	Front interior lamp	74	Light switch	118	Right hand front speaker
32	Rear interior lamp	75	Rear fog lamp switch	119	Distributor
33	Interior lamp switch	76	Fuses	120	Fuel pump
34	Stop lamp switch	77	Heater motor switch	121	Fuel pump capacitor
35	Rheostat	78	Flasher unit	122	Pick-up point (2 pin plug) for Australian park brake warning light lead (right hand drive vehicles only)
36	Cigar lighter illumination	79	Brake failure warning lamp check relay	123	Pick-up point (2 pin plug) for high speed sensor and front seat belt buzzer circuit (left hand drive vehicles only)
37	Clock illumination	80	Fuel tank unit	124	Multi-function unit in instrument case (chain dotted area)
38	Heater illumination	81	Hazard switch		
39	Left hand horn	82	Alternator		
40	Transfer oil temperature switch	83	Air conditioning (Option)		
41	Steering column switches	84	Heated rear screen		
42	Tachometer	85	Reverse lamp switch		
43	Instrument illumination	86	Hazard warning lamp		
		87	Starter solenoid		

Key to cable colours

B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

The last letter of a colour code denotes the tracer colour



Connectors via plug and socket



Snap connectors



Permanent in-line connections



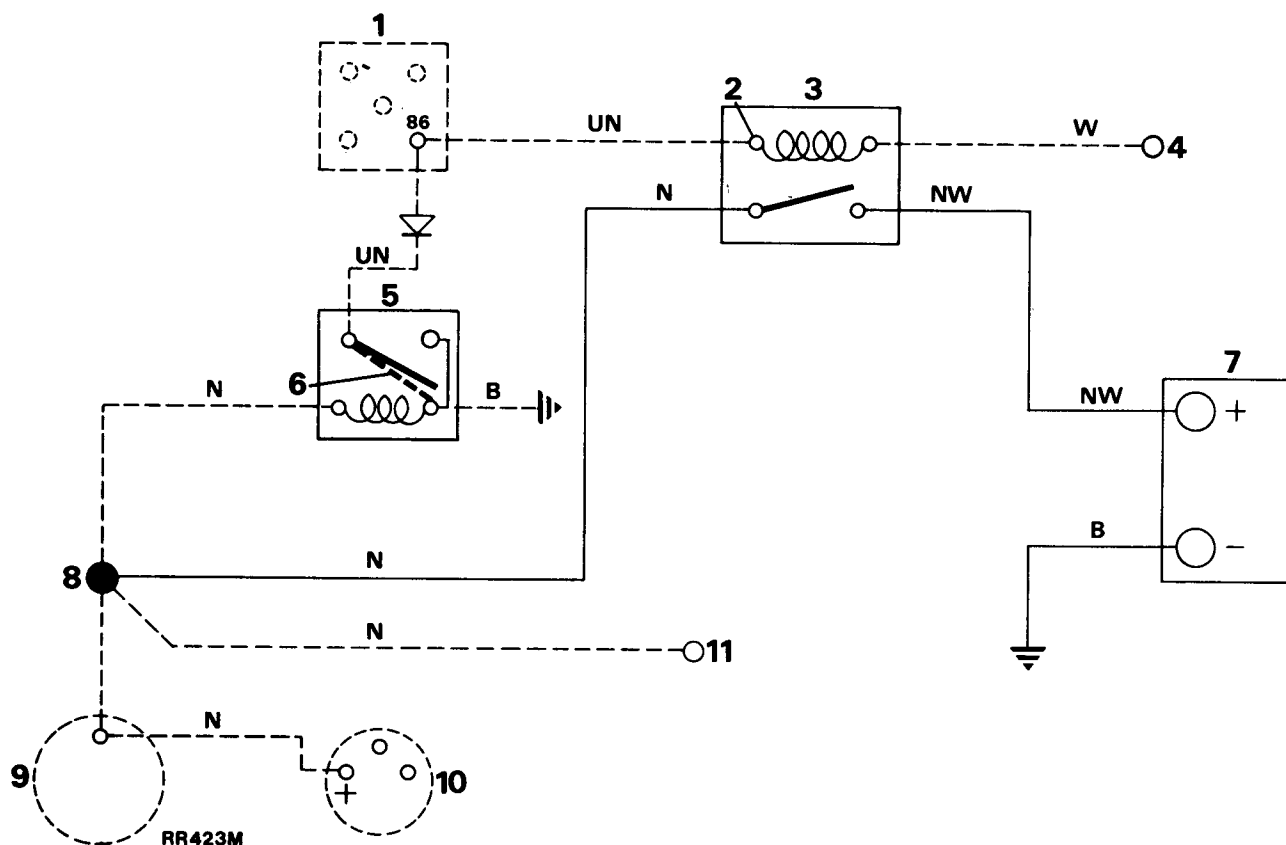
Earth connections via cables



Earth connections via fixing bolts

OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 2 AND 4 DOOR MODELS
– MID 1984 TO 1985

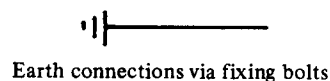
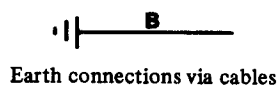
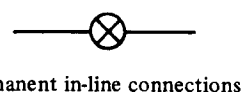
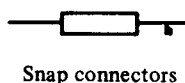
SPLIT CHARGE CIRCUIT DIAGRAM



Key to cable colours

B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

The last letter of a colour code denotes the tracer colour

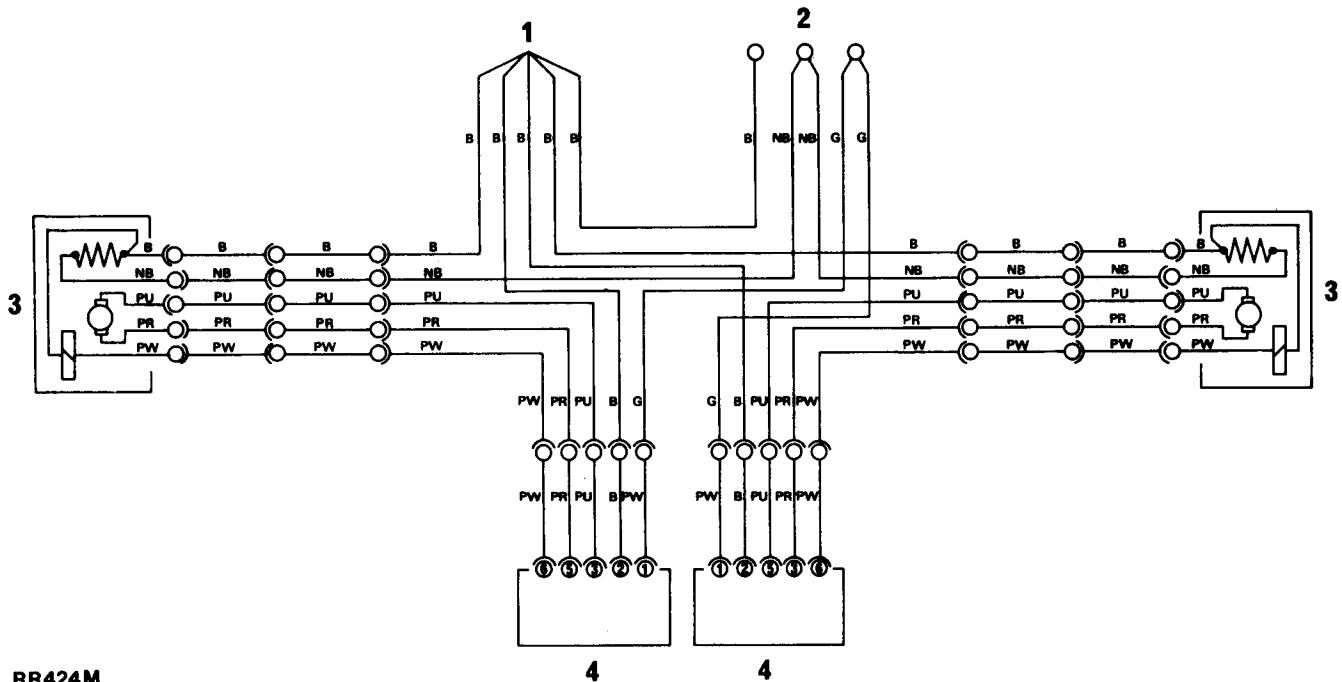


- 1 • Heated rear window relay
- 2 Pick-up point for split charge relay (Item 88 on main circuit diagram)
- 3 Split charge relay
- 4 Fuse box
- 5 Voltage sensitive switch
- 6 Link wire (Removed from plug when voltage sensitive switch is fitted)
- 7 Terminal box auxiliary battery
- 8 Terminal post
- 9 Starter motor
- 10 Alternator
- 11 Vehicle battery

NOTE:— Chain dotted lines indicate existing parts.

**OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 4 DOOR MODELS
– MID 1984 TO 1985**

ELECTRIC MIRRORS CIRCUIT DIAGRAM

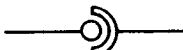


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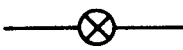
Key to cable colours

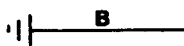
B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

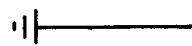
The last letter of a colour code denotes the tracer colour


Connectors via plug and socket


Snap connectors


Permanent in-line connections

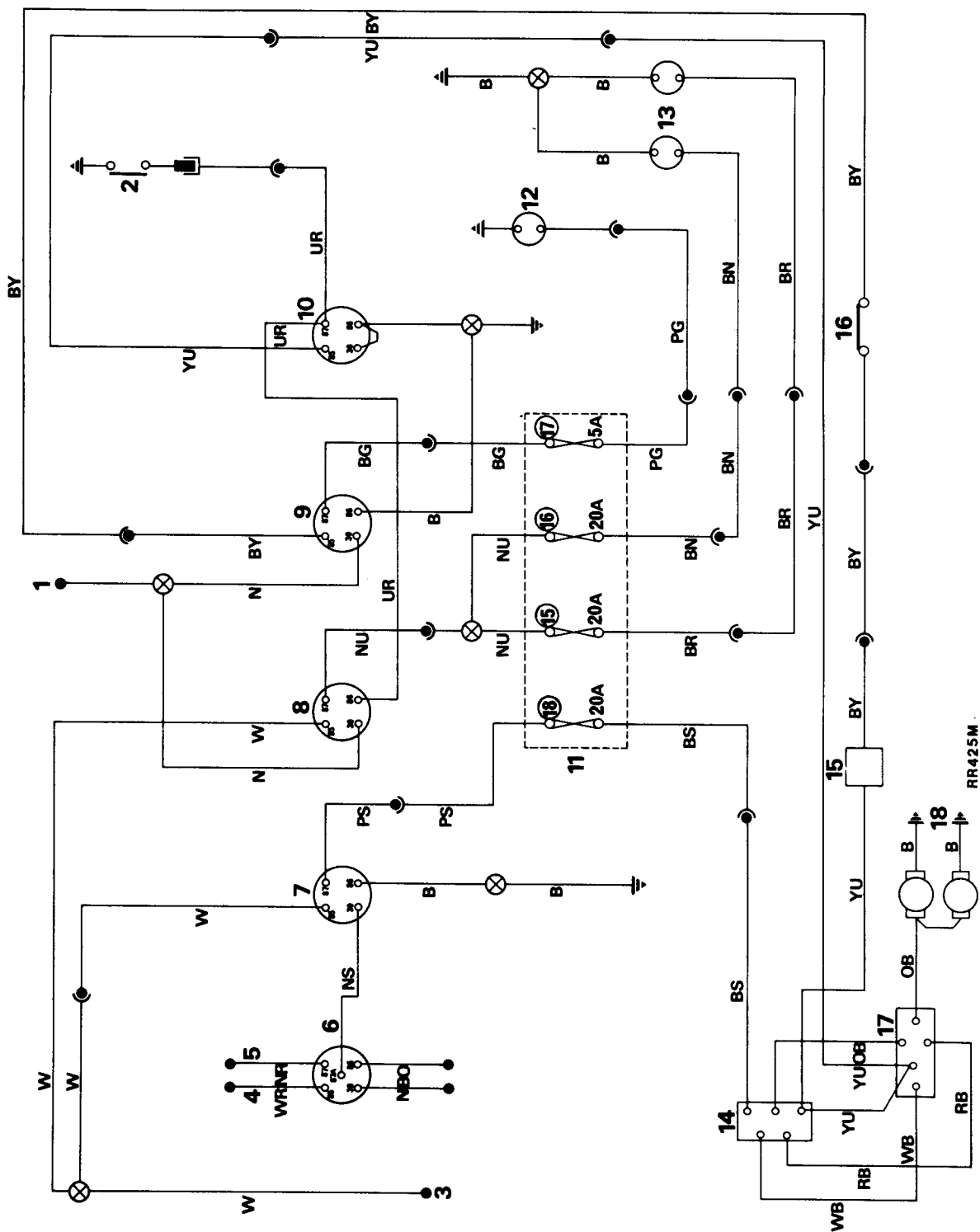

Earth connections via cables


Earth connections via fixing bolts

- 1 Clinch
- 2 Main cable connections (Item 63 on main circuit diagram)
- 3 Mirrors
- 4 Mirror switches

OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 2 AND 4 DOOR MODELS
– MID 1984 TO 1985

RECIRCULATORY AIR CONDITIONING CIRCUIT DIAGRAM



OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 2 AND 4 DOOR MODELS – MID 1984 TO 1985

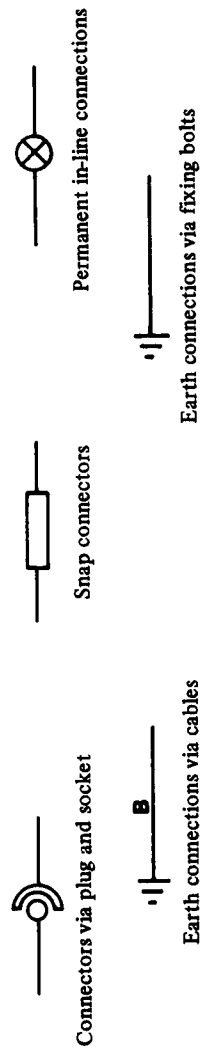
RECIRCULATORY AIR CONDITIONING CIRCUIT DIAGRAM

- | | |
|----|--|
| 1 | Terminal post |
| 2 | Engine water temperature switch (Automatic only) |
| 3 | Ignition feed |
| 4 | Crank feed |
| 5 | Starter solenoid |
| 6 | Starter relay (Item 33, air conditioning inhibited supply, main circuit diagram) |
| 7 | Air conditioning relay (ignition controlled) |
| 8 | Fan relay |
| 9 | Compressor clutch relay |
| 10 | Air conditioning controlled fan relay |
| 11 | Fuse box |
| 12 | Compressor clutch |
| 13 | Fans |
| 14 | Control switch |
| 15 | Thermostat |
| 16 | High pressure switch |
| 17 | Resistor |
| 18 | Blower motors |

Key to cable colours

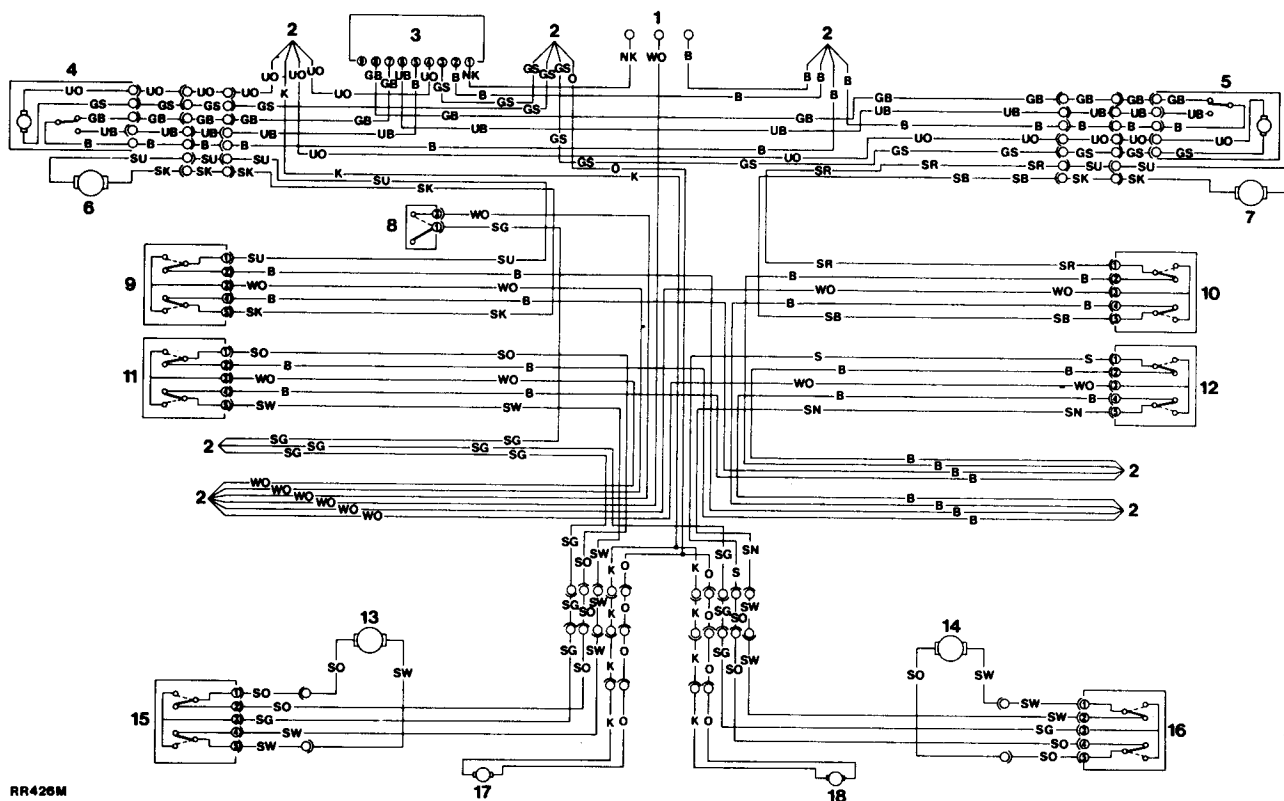
B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

The last letter of a colour code denotes the tracer colour



OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 4 DOOR MODELS – MID 1984 TO 1985

WINDOW LIFTS AND DOOR LOCKS CIRCUIT DIAGRAM (DOOR LOCKING CONTROLLED BY EITHER FRONT SIDE DOOR SWITCH)

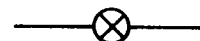
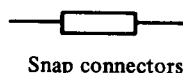


- 1 Main cable connections (Item 89 NK, WK, B on main circuit diagram)
- 2 Clinches
- 3 Control box central door locking
- 4 Switch unit central door locking left hand front
- 5 Switch unit central door locking right hand front
- 6 Window lift motor left hand front
- 7 Window lift motor right hand front
- 8 Isolator switch
- 9 Window lift switch left hand front
- 10 Window lift switch right hand front
- 11 Window lift switch left hand rear
- 12 Window lift switch right hand rear
- 13 Window lift motor left hand rear
- 14 Window lift motor right hand rear
- 15 Window lift switch left hand rear door
- 16 Window lift switch right hand rear door
- 17 Lock unit central door locking left hand rear
- 18 Lock unit central door locking right hand rear

Key to cable colours

B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

The last letter of a colour code denotes the tracer colour



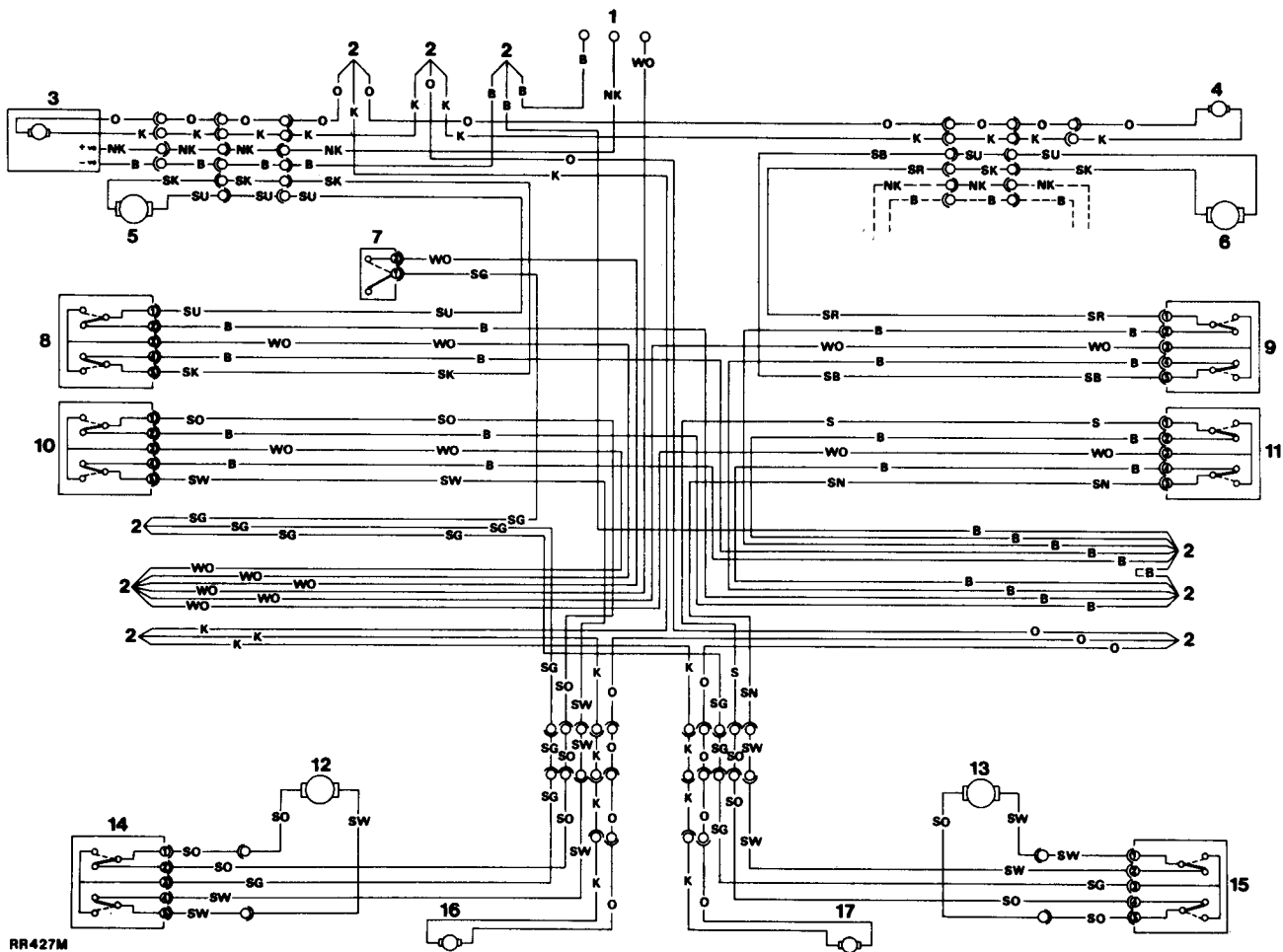
Earth connections via cables



Earth connections via fixing bolts

OPTIONAL ELECTRICAL EQUIPMENT – RANGE ROVER 4 DOOR MODELS – MID 1984 TO 1985

WINDOW LIFTS AND DOOR LOCKS CIRCUIT DIAGRAM (DOOR LOCKING CONTROLLED BY FRONT DRIVERS DOOR SWITCH ONLY)



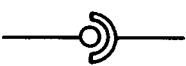
RR427M

- 1 Main cable connections (Item 89 NK, WK, B on main circuit diagram)
- 2 Clinches
- 3 Switch unit central door locking (drivers door)
- 4 Lock unit central door locking (front passenger door)
- 5 Window lift motor left hand front
- 6 Window lift motor right hand front
- 7 Isolator switch
- 8 Window lift switch left hand front
- 9 Window lift switch right hand front
- 10 Window lift switch left hand rear
- 11 Window lift switch right hand rear
- 12 Window lift motor left hand rear
- 13 Window lift motor right hand rear
- 14 Window lift switch left hand rear door
- 15 Window lift switch right hand rear door
- 16 Lock unit central door locking left hand rear
- 17 Lock unit central door locking right hand rear

Key to cable colours

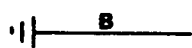
B Black G Green K Pink L Light N Brown O Orange P Purple R Red S Slate U Blue W White Y Yellow

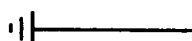
The last letter of a colour code denotes the tracer colour


Connectors via plug and socket


Snap connectors


Permanent in-line connections


Earth connections via cables


Earth connections via fixing bolts

FAULT DIAGNOSIS

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE</i>	<i>CURE</i>
A– Battery in low state of charge	1. Broken or loose connection in alternator circuit 2. Current voltage regulator not functioning correctly 3. Slip rings greasy or dirty 4. Brushes worn not fitted correctly or wrong type	1. Examine the charging and field circuit wiring. Tighten any loose connections and renew any broken leads. Examine the battery connection 2. Adjust or renew 3. Clean 4. Renew
B– Battery overcharging, leading to burnt-out bulbs and frequent need for topping-up	1. Current voltage regulator not functioning correctly	1. Renew
C– Lamps giving insufficient illumination	1. Battery discharged 2. Bulbs discoloured through prolonged use	1. Charge the battery from an independent supply or by a long period of daylight running 2. Renew
D– Lamps light when switched on but gradually fade out	1. Battery discharged	1. Charge the battery from an independent supply or by a long period of daylight running
E– Lights flicker	1. Loose connection	1. Tighten
F– Failure of lights	1. Battery discharged 2. Loose or broken connection	1. Charge the battery from an independent supply or by a long period of daylight running 2. Locate and rectify
G– Starter motor lacks power or fails to turn engine	1. Stiff engine 2. Battery discharged 3. Broken or loose connection in starter circuit 4. Greasy or dirty slip rings 5. Brushes worn not fitted correctly or wrong type 6. Brushes sticking in holders or incorrectly tensioned 7. Starter pinion jammed in mesh with flywheel	1. Locate cause and remedy 2. Charge the battery either by a long period of daytime running or from an independent electrical supply 3. Check and tighten all battery, starter and starter switch connections and check the cables connecting these units for damage 4. Clean 5. Renew 6. Rectify 7. Remove starter motor and investigate
H– Starter noisy	1. Starter pinion or flywheel teeth chipped or damaged 2. Starter motor loose on engine 3. Armature shaft bearing	1. Renew 2. Rectify, checking pinion and the flywheel for damage 3. Renew
J– Starter operates but does not crank the engine	1. Pinion of starter does not engage with the flywheel	1. Check operation of starter solenoid. If correct, remove starter motor and investigate
K– Starter pinion will not disengage from the flywheel when the engine is running	1. Starter pinion jammed in mesh with the flywheel	1. Remove starter motor and investigate

FAULT DIAGNOSIS

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE</i>	<i>CURE</i>
L— Engine will not start	1. The starter will not turn the engine due to a discharged battery 2. Sparking plugs faulty, dirty or incorrect plug gaps 3. Defective coil or distributor 4. Fault in the low tension wiring circuit 5. Faulty amplifier 6. Air gap out of adjustment 7. Controls not set correctly or trouble other than ignition	1. The battery should be recharged by running the car for a long period during daylight or from an independent electrical supply 2. Rectify or renew 3. Remove the lead from the centre distributor terminal and hold it approximately 6mm ($\frac{1}{4}$in) from some metal part of the engine while the engine is being turned over. If the sparks jump the gap regularly, the coil and distributor are functioning correctly. Renew a defective coil or distributor 4. Examine all the ignition cables and check that the bottom terminals are secure and not corroded 5. Check or renew 6. Adjust 7. See Starting Procedure in the Owner's Instruction Manual
M— Engine misfires	1. Distributor incorrectly set 2. Faulty coil or reluctor 3. Faulty sparking plugs 4. Faulty carburetter	1. Adjust 2. Renew 3. Rectify 4. Check and rectify
N— Frequent recharging of the battery necessary	1. Alternator inoperative 2. Loose or corroded connections 3. Slipping fan belt 4. Voltage control out of adjustment 5. Excessive use of the starter motor 6. Vehicle operation confined largely to night driving 7. Abnormal accessory load 8. Internal discharge of the battery	1. Check the brushes, cables and connections or renew the alternator 2. Examine all connections, especially the battery terminals and earthing straps 3. Adjust 4. Renew 5. In the hands of the operator 6. In the hands of the operator 7. Superfluous electrical fittings such as extra lamps, etc. 8. Renew
P— Alternator not charging correctly	1. Slipping fan belt 2. Voltage control not operating correctly 3. Greasy, charred or glazed slip rings 4. Brushes worn, sticking or oily 5. Shorted, open or burnt-out field coils	1. Adjust 2. Rectify or renew 3. Clean 4. Rectify or renew 5. Renew
Q— Alternator noisy	1. Worn, damaged or defective bearings 2. Cracked or damaged pulley 3. Alternator out of alignment 4. Alternator loose in mounting 5. Excessive brush noise	1. Renew 2. Renew 3. Rectify 4. Rectify 5. Check for rough or dirty slip rings, badly seated brushes, incorrect brush tension, loose brushes and loose field magnets. Rectify or renew
R— Defective distributor (refer to distributor overhaul and test procedure)	1. Air gap incorrectly set 2. Distributor cap cracked 3. Faulty pick-up or reluctor 4. Excessive wear in distributor shaft bushes, etc. 5. Rotor arm and flash shield cracked or showing signs of tracking	1. Adjust 2. Renew 3. Renew 4. Renew 5. Renew

FAULT DIAGNOSIS

<i>SYMPTOM</i>	<i>POSSIBLE CAUSE</i>	<i>CURE</i>
S– Mixture control warning light fails to appear when engine reaches running temperature	1. Mixture control already pushed in 2. Broken connection in warning light circuit 3. Blown bulb 4. Faulty thermostat switch (at cylinder head) 5. Faulty manual switch (at mixture control) 6. Broken operating mechanism at manual switch	1. In the hands of the operator 2. Rectify 3. Renew 4. Renew 5. Renew 6. Rectify
T– Mixture control warning light remains on with engine at running temperature	1. Mixture control out 2. Faulty manual switch 3. Broken operating mechanism at manual switch	1. Push control right in 2. Renew 3. Rectify
U– Poor performance of horns	1. Low voltage due to discharged battery 2. Bad connections in wiring 3. Loose fixing bolt 4. A faulty horn	1. Recharge 2. Carefully inspect all connections and horn push 3. Rectify 4. Adjust or renew
V– Central door locking does not operate (on all four doors)	1. Battery discharged 2. Control unit in drivers door lock actuator faulty 3. Loose or broken connection in drivers door 4. Blown fuse	1. Recharge 2. Renew 3. Locate and rectify 4. Rectify
W– Central door locking does not operate (on one door only)	1. Loose or broken connection 2. Lock actuator failure 3. Faulty lock 4. Mechanical linkages disconnected	1. Locate and rectify 2. Renew 3. Rectify 4. Locate and rectify
X– Window lift will not operate	1. Motor failure 2. Loose or broken connection 3. Faulty switch 4. Mechanical linkage faulty	1. Renew 2. Locate and rectify 3. Renew 4. Rectify
Y– Exterior mirrors fail to operate	1. Loose or broken connection 2. Faulty switch 3. Mirror motor failure	1. Locate and rectify 2. Renew 3. Renew

ELECTRONIC IGNITION – MID 1984 TO 1985

A Lucas model 35DM8 distributor is employed. This has a conventional advance/retard vacuum unit and centrifugal automatic advance mechanism.

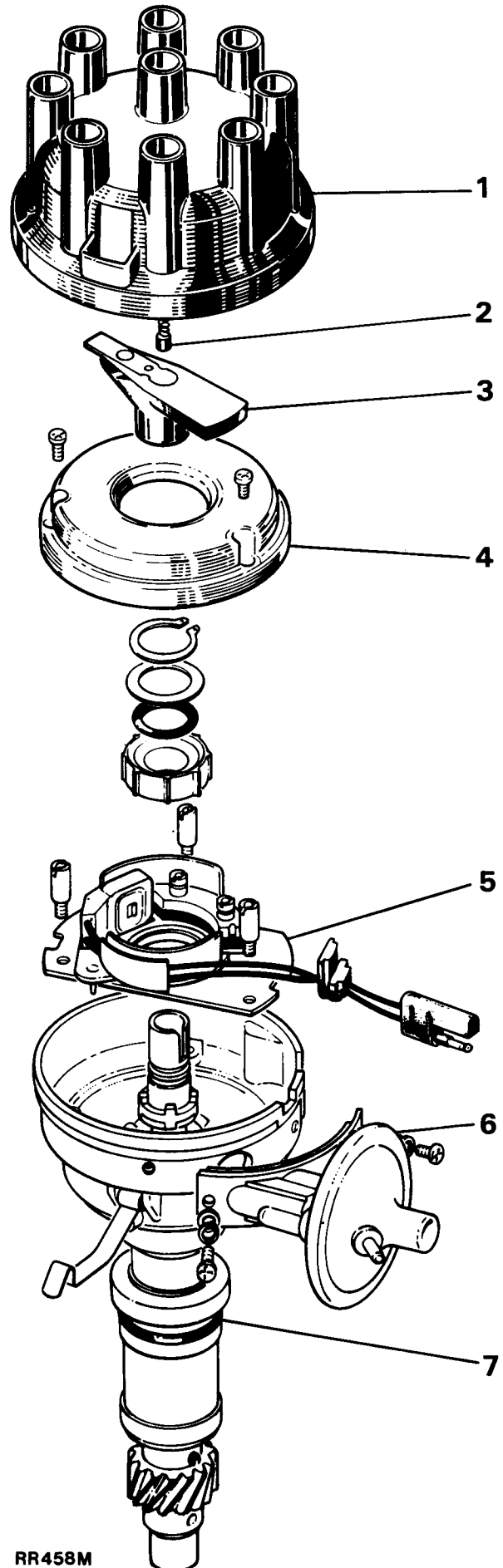
A pick-up module, in conjunction with a rotating timing retractor inside the distributor body, generates timing signals. These are applied to an electronic ignition amplifier unit fitted under the ignition coil mounted on top of the left front wing valance.

MAINTENANCE

80,000 km (48,000 miles)

Remove the distributor cap and rotor arm and wipe inside with a nap-free cloth.

DO NOT DISTURB the clear plastic insulating cover which protects the magnetic pick up module.



RR458M

1. Cap
2. HT Brush and spring
3. Rotor arm
4. Insulation cover (Flash shield)
5. Pick-up and base plate assembly
6. Vacuum unit
7. 'O' ring oil seal

LUCAS CONSTANT ENERGY IGNITION SYSTEM 35DM8 PRELIMINARY CHECKS

Inspect battery cables and connections to ensure they are clean and tight. Check battery state of charge if in doubt as to its condition.

Inspect all LT connections to ensure that they are clean and tight. Check the HT leads are correctly positioned and not shorting to earth against any engine components. The wiring harness and individual cables should be firmly fastened to prevent chafing.

PICK-UP MODULE AIR GAP SETTINGS

Air gap settings vary according to vehicle application.

NOTE:— The gap is set initially at the factory and will only require adjusting if tampered with or when the pick-up module is replaced.

Test Notes

- (i) The ignition must be switched on for all checks.
- (ii) Key to symbols used in the charts for Tests 2.



Correct Reading



High Reading



Low Reading

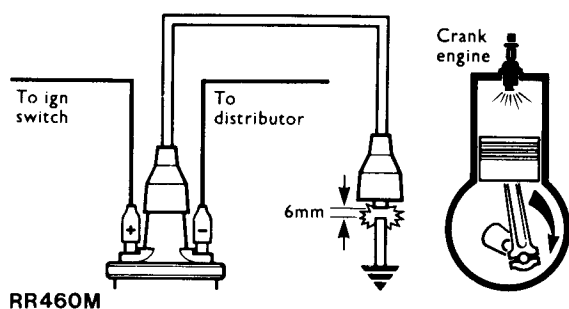
- (iii) Use feeler gauges manufactured from a non-magnetic material when setting air gaps.

TEST 1:

Check HT Sparking

Remove coil/distributor HT lead from distributor cover and hold approximately 6mm (0.25in) from the engine block. Switch the ignition 'on' and operate the starter. If regular sparking occurs, proceed to Test 6. If no sparking proceed to Test 2.

Test 1



TEST 2:

Amplifier Static Checks

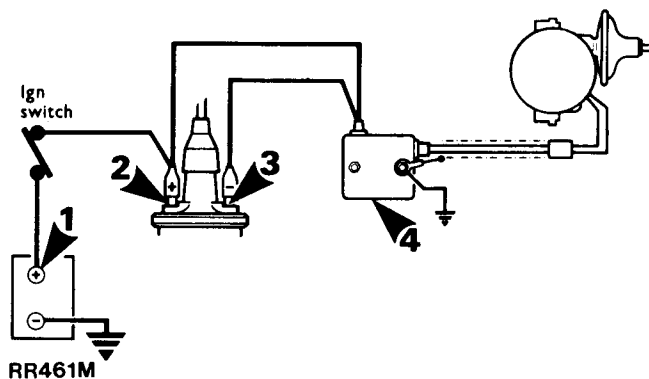
Switch the ignition 'on'.

- (a) Connect voltmeter to points in the circuit indicated by the arrow heads and make a note of the voltage readings.

NOTE: Only move the voltmeter positive lead during tests 2, 3 and 4.

- (b) Compare voltages obtained with the specified values listed below:—

Test 2



EXPECTED READINGS

- 1 More than 11.5 volts
- 2 1 volt max below volts at point 1 in test circuit
- 3 1 volt max below volts at point 1 in test circuit
- 4 0 volt — 0.1 volt

- (c) If all readings are correct proceed to Test 3.
- (d) Check incorrect reading(s) with chart to identify area of possible faults, i.e. faults listed under heading "Suspect".

1	2	3	4	SUSPECT
L	✓	✓	✓	Discharged battery
✓	L	L	✓	Ign. switch and/or wiring
✓	✓	L	✓	Coil or amplifier
✓	✓	✓	H	Amplifier earth

TEST 3:

Check Amplifier Switching

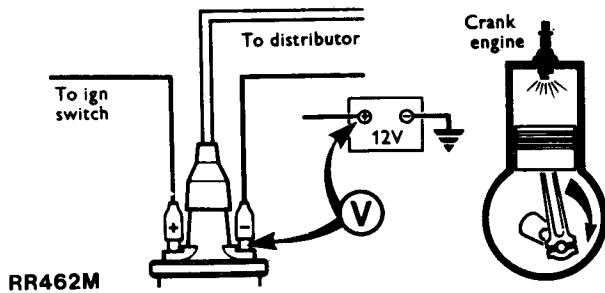
Disconnect the High Tension lead between the coil and distributor.

Connect the voltmeter between battery positive (+ve) terminal and HT coil negative (–ve) terminal: the voltmeter should register zero volts. Switch the ignition 'on' and crank the engine: the voltmeter reading should increase just above zero, in which case proceed with Test 5.

If there is no increase in voltage during cranking proceed to Test 4.

continued

Test 3



TEST 4:

Pick-up Coil Resistance

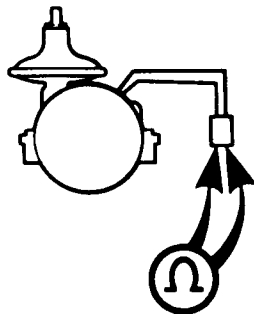
Applications with Separate Amplifier

Disconnect the pick-up leads at the harness connector. Connect the ohmmeter leads to the two pick-up leads in the plug.

The ohmmeter should register between 2k and 5k ohms if pick-up is satisfactory. Change the amplifier if ohmmeter reading is correct. If the engine still does not start carry out Test 5.

Change the pick-up if ohmmeter reading is incorrect. If the engine still does not start proceed to Test 5.

Test 4



TEST 5:

Check HT Sparking

Remove existing coil/distributor HT lead and fit test HT lead to coil chimney. Hold free end about 6mm (0.25in) from the engine block and crank the engine.

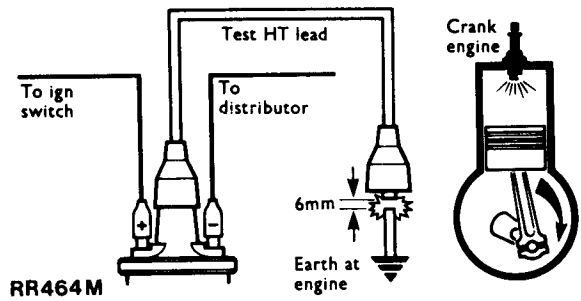
HT sparking good, repeat test with original HT lead, if then no sparking, change HT lead. If sparking is good but engine will not start, proceed to Test 6.

If no sparking, replace coil.

If engine will not start carry out Test 6.

continued

Test 5



TEST 6:

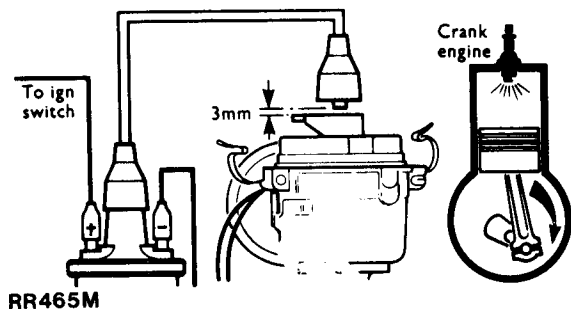
Check Rotor Arm

Remove distributor cover. Disconnect coil HT lead from cover and hold about 3mm (0.13in) above rotor arm electrode and crank the engine. There should be no HT sparking between rotor and HT lead. If satisfactory carry out Test 7.

HT sparking, replace rotor arm.

If engine will not start carry out Test 7.

Test 6



TEST 7:

Visual and HT Cable Checks

Examine:

1. Distributor Cover
 2. Coil Top
 3. HT Cable
Insulation
 4. HT Cable
Continuity
 5. Sparking Plugs
- NOTE:**
1. Reluctor
 2. Rotor and Flash
Shield

Should be:

- Clean, dry, no tracking marks.
- Clean, dry, no tracking marks.
- Must not be cracked chafed or perished.
- Must not be open circuit.
- Clean, dry, and set to correct gap.
- Must not foul pick-up or leads.
- Must not be cracked or show signs of tracking marks.

DISTRIBUTOR

– Remove and refit

Removing

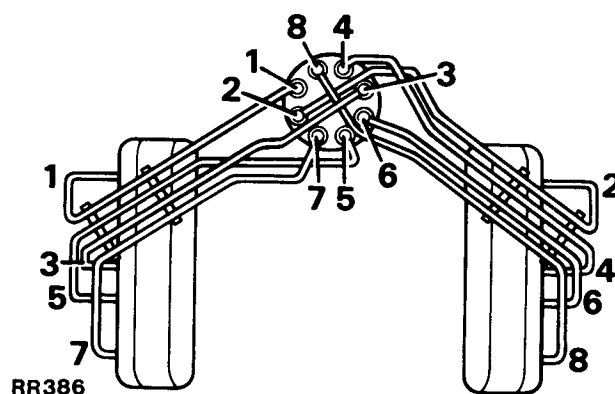
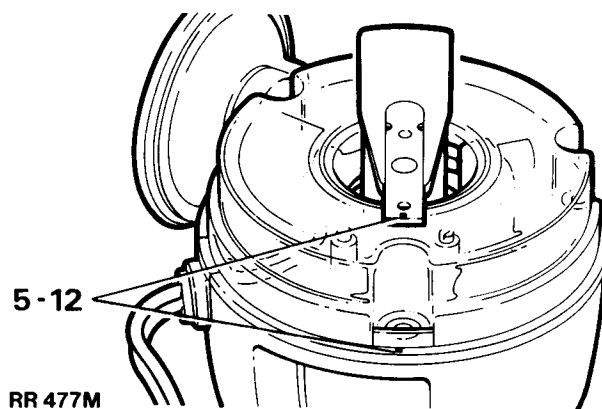
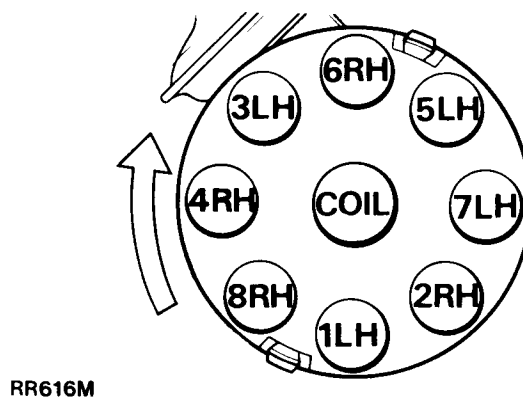
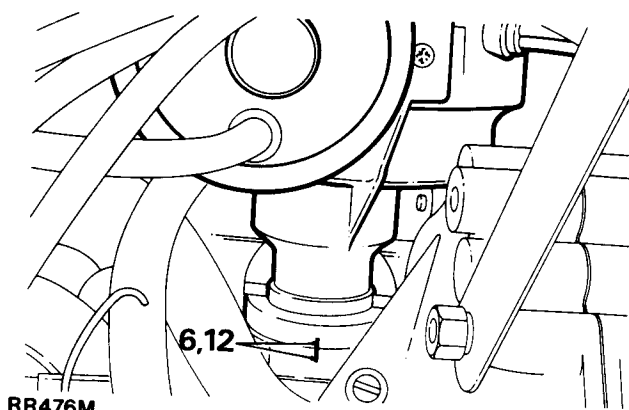
1. Disconnect battery.
2. Disconnect vacuum pipe(s).
3. Remove distributor cap.
4. Disconnect low tension lead from coil.
5. Mark distributor body in relation to centre line of rotor arm.
6. Add alignment marks to distributor and front cover.
NOTE: Marking distributor enables refitting in exact original position, but if engine is turned while distributor is removed, complete ignition timing procedure must be followed.
7. Release the distributor clamp and remove the distributor.

Refitting

NOTE: If a new distributor is being fitted, mark body in same relative position as distributor removed.

8. Leads for distributor cap should be connected as illustrated.
Figures 1 to 8 inclusive indicate plug lead numbers.
RH – Right hand side of engine, when viewed from the rear.
LH – Left hand side of engine, when viewed from the rear.
9. If engine has not been turned whilst distributor has been removed, proceed as follows (items 10 to 17).
10. Fit new 'O' ring seal to distributor housing.
11. Turn distributor drive until centre line of rotor arm is 30° anti-clockwise from mark made on top edge of distributor body.
12. Fit distributor in accordance with alignment markings.
NOTE: It may be necessary to align oil pump drive shaft to enable distributor drive shaft to engage in slot.
13. Fit clamp and bolt. Secure distributor in exact original position.
14. Connect vacuum pipe to distributor and low tension lead to coil.
15. Fit distributor cap and check that the plug leads are fitted in the order illustrated, or the engine will mis-fire.

continued



16. Reconnect battery.
17. Using suitable electronic equipment, set ignition timing as follows.
18. If, with distributor removed, engine has been turned it will be necessary to carry out the following procedure.
19. Set engine – No. 1 piston to static ignition timing figure (see section 05) on compression stroke.
20. Turn distributor drive until rotor arm is approximately 30° anti-clockwise from number one sparking plug lead position on cap.
21. Fit distributor to engine.
22. Check that centre line of rotor arm is now in line with number one sparking plug lead on cap. Reposition distributor if necessary.
23. If distributor does not seat correctly in front cover, oil pump drive is not engaged. Engage by lightly pressing down distributor while turning engine.
24. Fit clamp and bolt leaving both loose at this stage.
25. Set the timing statically to within $2-3^\circ$ of T.D.C.
26. Connect vacuum pipe(s) to distributor.
27. Fit low tension lead to coil.
28. Fit distributor cap.
29. Reconnect battery.
30. Using suitable electronic equipment, set the ignition timing.

IGNITION COIL

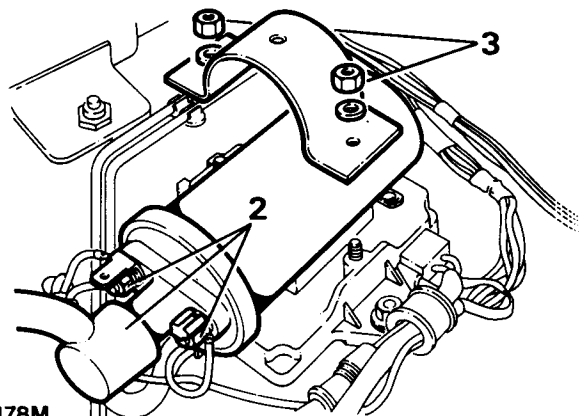
– Remove and refit

Removing

1. Disconnect the battery.
2. Disconnect the electrical leads from the coil.
3. Remove the two retaining bolts with washers securing the coil to the amplifier.
4. Lift the coil off the amplifier.

Refitting

5. Reverse the removal procedure.



RR478M

DISTRIBUTOR – LUCAS 35DM8

– Overhaul

Distributor Cap

1. Unclip and remove cap.
2. Renew cap if known to be faulty.
3. Clean cap with a nap-free cloth.

Rotor Arm

4. Pull rotor arm from keyed shaft.
5. Renew rotor arm if known to be faulty.

Insulation Cover (Flash Shield)

6. Remove cover, secured by three screws.
7. Renew cover if known to be faulty.

Vacuum Unit

8. Remove two screws from vacuum unit securing bracket, disengage vacuum unit connecting rod from pick-up base plate connecting peg, and withdraw vacuum unit from distributor body.

Pick-up & Base Plate Assembly

9. Use circlip pliers to remove the circlip retaining the reluctor on rotor shaft.
10. Remove the flat washer and then the 'O' ring recessed in the top of the reluctor.
11. Insert the blade of a small screwdriver beneath the reluctor and prise it partially along the shaft, sufficient to enable it to be gripped between the fingers and withdrawn from the shaft.
NOTE: Coupling ring fitted beneath reluctor.
12. Remove pick-up and base plate assembly, secured by 3 support pillars.
NOTE: Do not disturb the 2 barrel nuts securing the pick-up module, otherwise the air gap will need re-adjustment.
13. Renew pick-up and base plate assembly if module is known to be faulty, otherwise check pick-up winding resistance (2k–5k ohms).

Re-assembly

14. This is mainly a reversal of the dismantling procedure, noting the following points.

Lubrication

Apply clean engine oil:

- (a) 3 drops to felt pad reservoir in rotor shaft.

Apply Chevron SR1 (or equivalent) grease

- (b) Auto advance mechanism.
- (c) Pick-up plate centre bearing.
- (d) Pre-tilt spring and its rubbing area (pick-up and base plate assembly).
- (e) Vacuum unit connecting peg (pick-up and base plate assembly) and
- (f) The connecting peg hole in vacuum unit connecting rod.

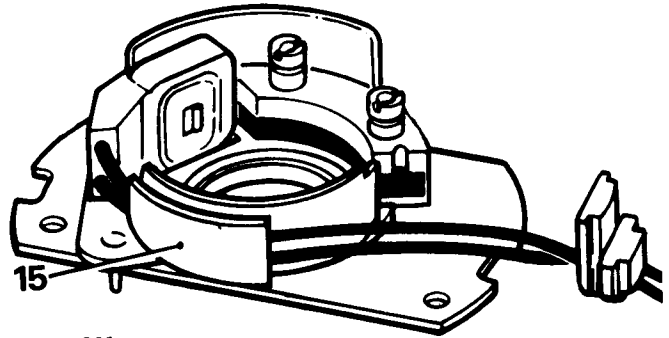
Apply Rocal MHT (or equivalent) grease

- (g) Vacuum unit connecting rod seal (located in vacuum unit where connecting rod protrudes).

NOTE: Applicable only to double acting vacuum units.

Fitting Pick-up & Base Plate Assembly

15. Pick-up leads must be prevented from fouling the rotating reluctor. Both leads should be located in plastic carrier as illustrated. Check during re-assembly.

**Refitting Reluctor**

16. Slide reluctor as far as it will go on rotor shaft, then rotate reluctor until it engages with the coupling ring beneath the pick-up base plate. The distributor shaft, coupling ring and reluctor are 'keyed' and rotate together.

Pick-up Air Gap Adjustment

17. The air gap between the pick-up limb and reluctor teeth must be set within the specified limits, using a non-ferrous feeler gauge.

NOTE: When the original pick-up and base plate assembly has been refitted the air gap should not normally require resetting as it is pre-set at the factory. When renewing the assembly the air gap will require adjusting to within the specified limits. See technical data section. Refer to 'Engine Tuning Data' for ignition timing data.

TECHNICAL DATA

Firing angles

0–45–90° etc. $\pm 1^\circ$

Application

12V Negative earth

Pick up air gap adjustment

0.20mm–0.35mm (0.008in–0.014in)

(Pick up limb/reluctor tooth)

Pick up winding resistance

2k–5k ohms

TIGHTENING TORQUES

Pick up bearing plate support pillars

1.0–1.2 Nm (9–11 lb in)

Pick up barrel nuts

1.1–1.5 Nm (10–12 lb in)

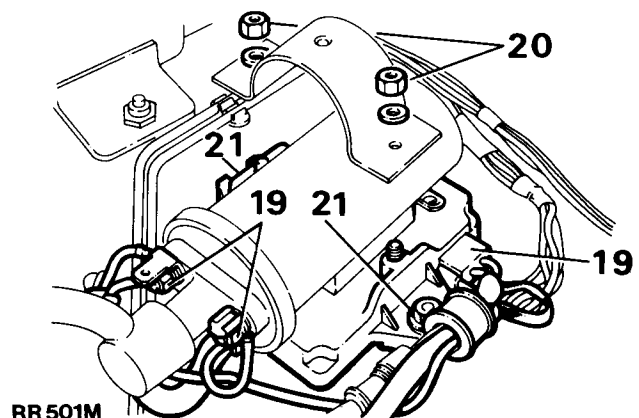
AMPLIFIER**– Remove and refit****Removing**

18. Disconnect the battery.
19. Disconnect the electrical leads from the amplifier and coil.
20. Remove the two retaining bolts with washers securing the coil to the amplifier.
21. Remove the two bolts, nuts, spring washers and plain washers securing the amplifier to the valance.
22. Remove the amplifier from the valance.

Refitting

23. Reverse the removal procedure, ensuring that all electrical leads are correctly reconnected.

NOTE: The amplifier is not serviceable, in the event of a fault a new amplifier must be fitted.



Ignition Timing

1. It is essential that the following procedures are adhered to. Inaccurate timing can lead to serious engine damage and additionally create failure to comply with the emission regulations applying to the country of destination. If the engine is being checked in the vehicle and is fitted with an air conditioning unit the compressor must be isolated.
2. On initial engine build, or if the distributor has been disturbed for any reason, the ignition timing must be set statically to within 2–3° of T.D.C. (This sequence is to give only an approximation in order that the engine may be started). **ON NO ACCOUNT MUST THE ENGINE BE STARTED BEFORE THIS OPERATION IS CARRIED OUT.**

Equipment required

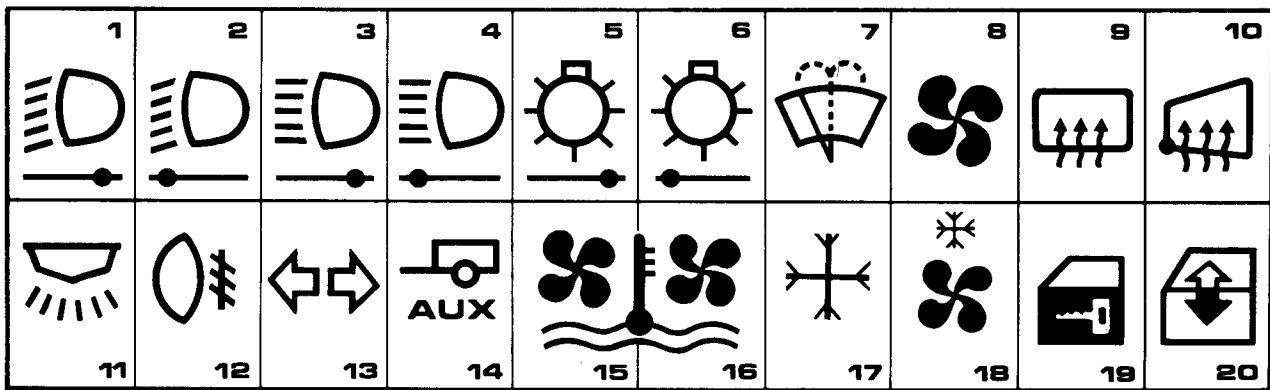
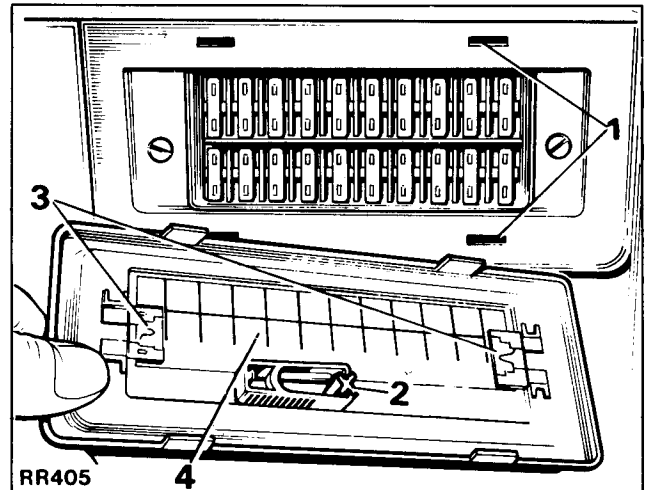
Calibrated Tachometer

Stroboscopic lamp

3. Couple stroboscopic timing lamp and tachometer to engine following the manufacturers instructions.
4. Disconnect the vacuum pipes from the distributor.
5. Start engine, with no load and not exceeding 3,000 rpm, run engine until normal operating temperature is reached. (Thermostat open). Check that the normal idling speed falls within the tolerance specified in Engine Tuning Data.
6. Idle speed for timing purposes must not exceed 750 rpm, and this speed should be achieved by removing a breather hose **NOT BY ADJUSTING CARBURETTER IDLE SETTING SCREWS.**
7. With the distributor clamping bolt slackened, turn distributor until the timing flash coincides with the timing pointer and the correct timing mark on the rim of the torsional vibration damper as shown in the Engine Tuning Data.
8. Retighten the distributor clamping bolt securely. Recheck timing in the event that retightening has disturbed the distributor position.
9. Refit vacuum pipes.
10. Disconnect stroboscopic timing lamp and tachometer from engine.

FUSE BOX – MID 1984 TO 1985

1. The fuse box on the lower fascia contains twenty 'Autofuse' type fuses. To gain access remove the clip-on cover.
2. The cover contains a clip-in fuse extractor to facilitate fuse removal.
3. A spare 10 amp and 20 amp fuse are also clipped into the cover.
4. A label identifying the position and values of the twenty fuses is attached to the cover recess for easy reference. Each fuse is colour coded and continuous current rating is specified on the fuse box.



RR413

Key to fuse box circuits

FUSE NO.	COLOUR CODE	FUSE VALUE	CIRCUIT SERVED	IGNITION KEY CONTROLLED
1	Brown	7.5 amp	RH headlamp dipped beam	—
2	Brown	7.5 amp	LH headlamp dipped beam	—
3	Brown	7.5 amp	RH headlamp main beam	—
4	Brown	7.5 amp	LH headlamp main beam	—
5	Tan	5 amp	RH side and panel lights	—
6	Tan	5 amp	LH side lights	—
7	Light Blue	15 amp	Front and rear wiper motors	AUX
8	Yellow	20 amp	Heater motor	AUX
9	Light Blue	15 amp	Heated rear screen	IGN
10	Violet	3 amp	Electric mirror heating elements – option	IGN
11	Light Blue	15 amp	Interior lights, under bonnet illumination, clock, cigar lighter, headlamp flash, horns	—
			Cigar lighter (Australia only)	IGN
12	Red	10 amp	Rear fog guard (from dipped headlamps)	—
13	Light Blue	15 amp	Directional indicators, stop lights, reverse lights, and electric mirror motors	IGN
14	Light Blue	15 amp	Auxiliary circuit to trailer	—
15	Yellow	20 amp	Air conditioning fan – option	IGN
16	Yellow	20 amp	Air conditioning fan – option	IGN
17	Tan	5 amp	Air conditioning compressor clutch – option	IGN
18	Yellow	20 amp	Air conditioning blower motor – option	IGN
19	Red	10 amp	Central door locking – option	—
20	White	25 amp	Electric window lifts – option	AUX

NOTE: Radio/cassette combination – option. An in-line type 7 amp fuse is incorporated in the power input lead of the unit.

FUSE BOX – MID 1984 TO 1985

– Remove and refit

Removing

1. Disconnect the battery.
2. Unclip the fuse box cover.
3. Remove the two screws retaining the fuse box body to the lower fascia.
4. Manoeuvre the fuse box body to enable it to be withdrawn through the fuse box aperture. Withdraw only as far as the leads will permit.
5. Remove all the fuses from the fuse box.
6. Remove the leads from the fuse box, by inserting a small screwdriver into each fuse socket to depress the small retaining tab on the back of the lucar connectors, withdraw the leads from the rear of the fuse box.

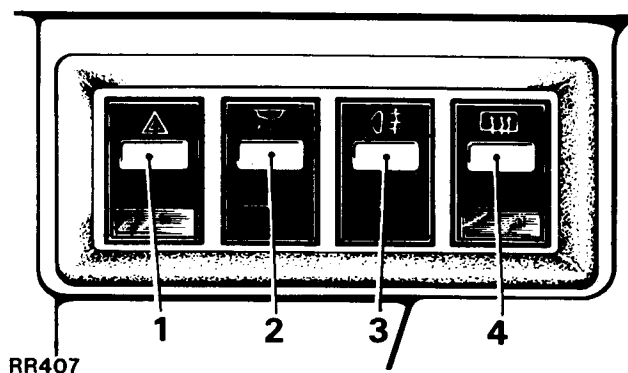
Refitting

7. This is a reversal of the removal instructions 1 to 6. Ensure that all leads are refitted to the correct fuse socket, (refer to main circuit diagram).
NOTE: When refitting the leads to the fuse box, the retaining tabs on the back of the lucar connectors must be in their raised position to prevent the leads being pushed out of the rear of the fuse box when the fuse is refitted.

AUXILIARY SWITCH PANEL – MID 1984 TO 1985

The auxiliary switch panel on the centre console contains four 'paddle' type switches which incorporate integral symbols for identification. The symbols are illuminated by a fibre optic light source which becomes operational when the vehicle lights are on.

The hazard warning and heated rear screen switches (1 and 4) are also provided with individual warning lights, illuminated when the switches are operated.



1. Hazard warning
2. Interior roof and tailgate lights
3. Rear fog guard lamps
4. Heated rear screen

Auxiliary switch panel warning lights – bulb replacement (switches 1 and 4)

To replace either bulb:

1. Disconnect the battery.
2. Carefully prise out the auxiliary switch panel from the fascia panel.
3. Remove the warning light bulb holder located in the bottom of the appropriate light guide clip moulding (see remove and refit Item 4).
4. Pull the bulb from the holder.
5. Renew the bulb and refit the holder.
6. Press the auxiliary switch panel back into the fascia.
7. Reconnect the battery.

The correct bulb type is a 1.2 watt 'wedge' base.

Auxiliary switch panel illumination

A fibre optic light source is employed to illuminate the four switch symbols.

To replace the single bulb:

8. Disconnect the battery.
9. Remove the lower fascia panel by releasing the six screws.
10. Pull the bulb holder from the rear of the optic light source unit. This unit is attached to the bottom of the central console moulding (see Remove and Refit Item 11 for full details).
11. Remove the bayonet type bulb from the holder.
12. Fit new bulb and refit holder.
13. Replace the lower fascia panel and retaining screws.

The correct bulb type is a 5 watt bayonet fitting.

AUXILIARY SWITCH PANEL – MID 1984 TO 1985

– Remove and refit

Removing

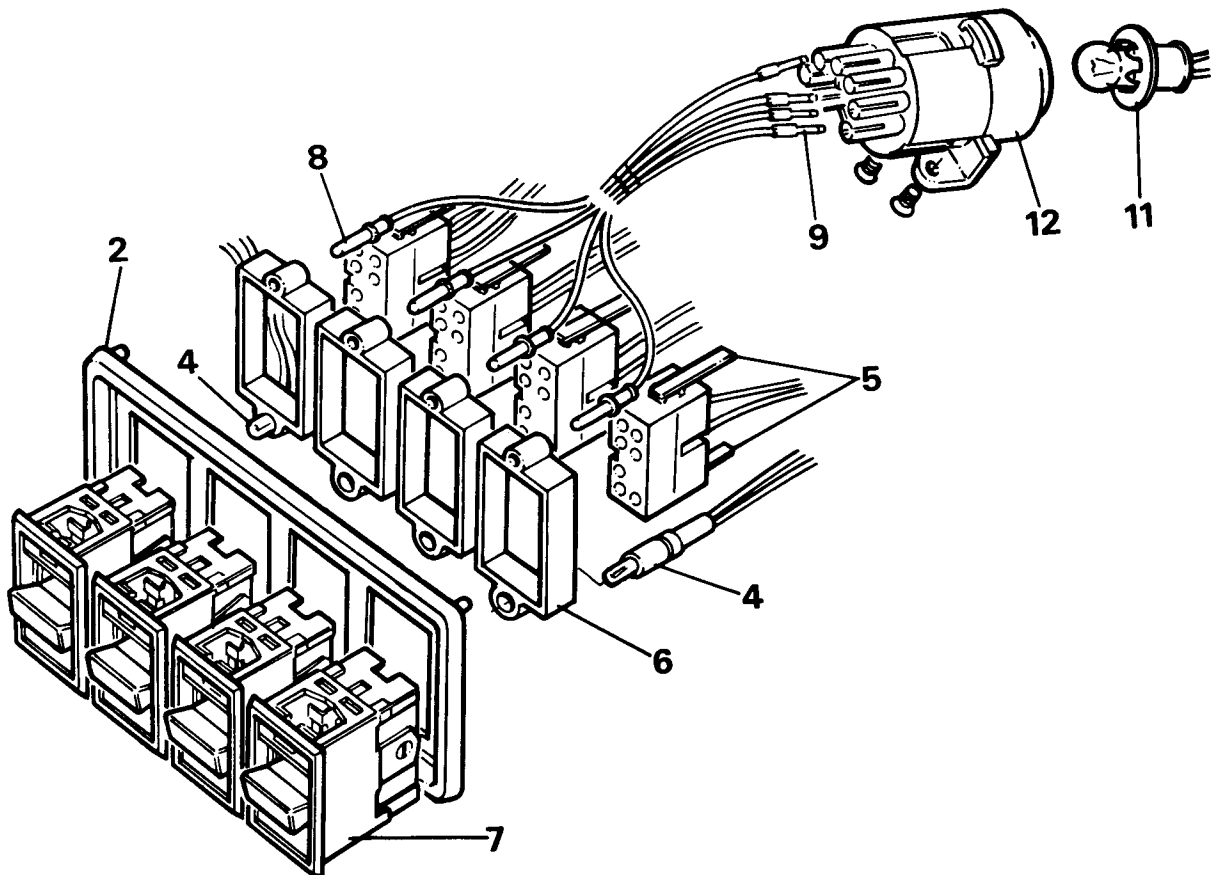
1. Disconnect the battery.
2. Carefully prise the switch panel surround from the centre console.
3. Withdraw the auxiliary switch panel assembly from the console to gain access to the connections at the rear of the switch panel.
4. If necessary the two warning light bulbs (switches 1 and 4 illustrated) can be removed at this stage.
5. Disconnect the multi-plugs at the rear of the switches by depressing the retaining lugs at the top and bottom of the plugs to release them from their sockets.
6. Remove the four fibre optic light guide clip mouldings from their intermediate positions on the rear of the switches. The fibre optic tubes and the two warning light leads will still be attached. The auxiliary panel can then be released from the centre console.
7. To remove each individual switch from the auxiliary panel surround, apply a little pressure to the rear of the switch, releasing the four retaining lugs. The switch can then be removed from the front of the surround.

NOTE: If it is necessary to renew the fibre optic light tubes and the optic light source unit, these may be removed as follows.

8. Pull the light tubes from their respective light guide clip mouldings.
 9. Similarly, release the other end of the light tubes from the optic light source unit and withdraw them through the auxiliary switch panel aperture.
- NOTE:** To refit the light tubes to the optic light source unit, it is necessary to remove the unit from the back of the centre console in order to refit the light tubes.
10. Remove the lower fascia panel by releasing the six self tapping screws.
 11. Pull the bulb from the rear of the optic light source unit. This is located forward of the auxiliary panel aperture attached to the bottom of the central console moulding.
 12. Remove the two self tapping screws securing the optic light source unit and withdraw it from the central console.

Refitting

13. Reverse operations 1 to 11. Ensure that when refitting the optic light source unit (items 8 to 11) the optic light tubes are connected prior to locating the unit in the central console.
14. The light guide clips must be refitted in their intermediate position (registered) on the switch body.
15. It is important that the multi-plugs are reconnected to their respective sockets (see main circuit diagram).



INSTRUMENT ILLUMINATION

ELECTRONIC DIMMING CONTROL – MID 1984 TO 1985

The electronic dimming control switch is located on the lower fascia panel adjacent to the steering column. Rotate the control upwards to fully illuminate the instruments and downwards to reduce intensity.

The dimming control unit also controls the clock, heater and cigar lighter illumination.

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the lower fascia panel by releasing the six securing screws.
3. Disconnect the dimming control multi-plug.
4. Remove the two screws securing the dimmer control switch to the underside of the lower fascia panel.

Refitting

Reverse operations 1 to 4.

IGNITION/STARTER SWITCH**– Remove and refit****Removing**

1. Disconnect the battery.
2. Remove the steering wheel centre cover.
3. Remove the lower fascia panel.
4. Remove the four screws securing bottom shroud to top shroud.
5. Remove the single screw securing top shroud to switch housing bracket.
6. Remove top shroud and lower the bottom shroud.
7. Disconnect the ignition switch cables at the multi-plug.
8. Remove the rubber cover protecting the switch.
9. Remove the single screw securing the ignition/starter switch to the housing.
10. Withdraw the switch.

Refitting

11. Reverse the removal procedure.
12. Locate the lugs on the sides of the switch with the grooves on the inside of the housing.

The steering column switch layout has been standardised for left and right hand drive vehicles and is as follows:–

LEFT HAND CONTROLS

Lower switch – Main lighting switch

Upper switch – Main and dipped beam, direction indicators and horn.

RIGHT HAND CONTROLS

Lower switch – Rear screen programmed wash/wipe

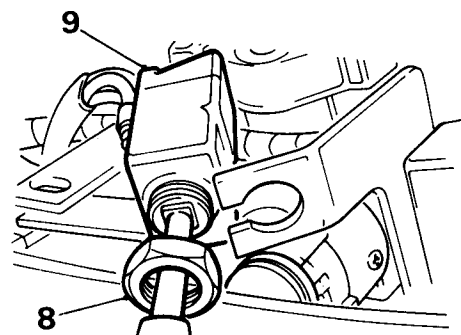
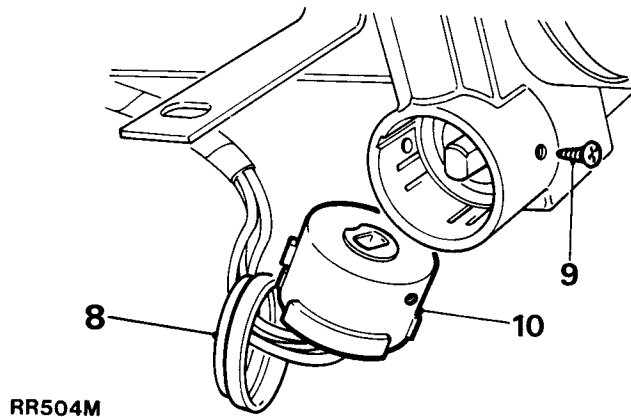
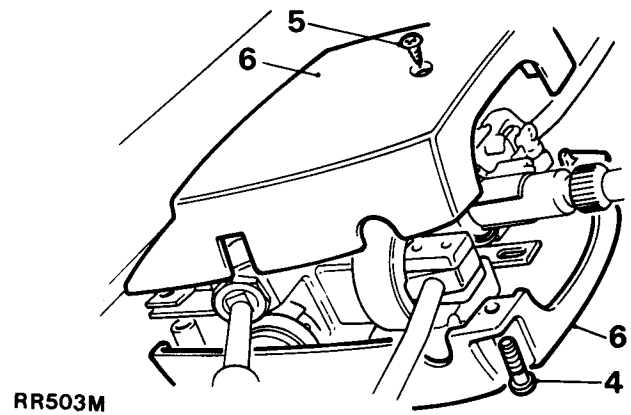
Upper switch – Windscreen programmed wash/wipe.

MAIN LIGHTING SWITCH**– Remove and refit****Removing**

1. Disconnect the battery.
2. Remove the steering wheel centre cover.
3. Remove the lower fascia panel.
4. Remove the four screws securing bottom shroud to top shroud.
5. Remove the single screw securing top shroud to switch housing bracket.
6. Remove top shroud, and lower the bottom shroud.
7. Disconnect cables at snap connectors.
8. Loosen the switch retaining lock-nut.
9. Slide switch unit away from its bracket.

Refitting

10. Reverse the removal procedure.



REVERSE LIGHT SWITCH – Automatic gearbox

– Remove and refit

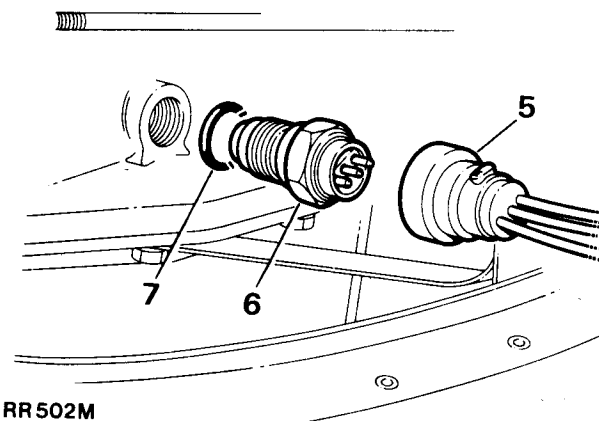
Removing

The reverse light switch is an integral part of the start inhibitor switch and is located on the left hand side of the gearbox, accessible from inside the vehicle through the gearbox tunnel side aperture.

1. Disconnect the battery.
2. Fold back the LH front footwell rubber mat.
3. Fold back the gearbox tunnel carpet to expose the cover plate.
4. Remove the twelve retaining bolts and remove the cover.
5. Disconnect the plug from the inhibitor switch.
6. Unscrew the switch and remove complete with 'O' ring.
7. Remove the 'O' ring.

Refitting

8. Reverse the removal procedure, fitting a new 'O' ring.



WINDSCREEN PROGRAMMED WASH/WIPE SWITCH

MAIN AND DIPPED BEAM, DIRECTION INDICATORS AND HORN SWITCH

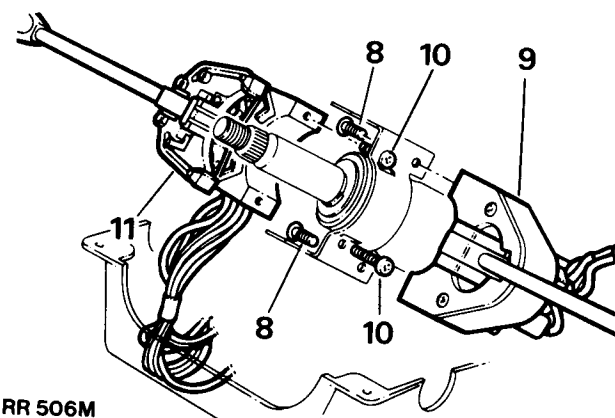
– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the steering wheel centre cover.
3. Remove the lower fascia panel.
4. Remove the four screws securing the bottom shroud to the top shroud.
5. Remove the single screw securing the top shroud to the switch housing bracket.
6. Remove the top shroud and lower the bottom shroud.
7. Disconnect the electrical leads at the multi-plugs.
8. Remove the two screws securing the windscreen wash/wipe switch to the column switch bracket.
9. Remove the switch to give access to the screws securing the main and dipped beam switch.
10. Release the two screws securing the upper switch to the switch bracket.
11. Slide the switch and bracket off the steering column.

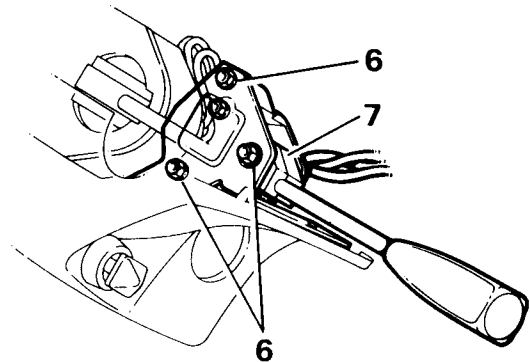
Refitting

12. Reverse the removal procedure.



REAR SCREEN PROGRAMMED WASH/WIPE SWITCH**– Remove and refit****Removing**

1. Disconnect the battery.
2. Remove the steering wheel centre cover.
3. Remove the lower fascia panel.
4. Remove the top and bottom shroud (refer to main and dipped beam switch remove and refit – items 4 to 7).
5. Disconnect the electrical leads at the multi-plug.
6. Remove the four small bolts securing the switch to the switch mounting bracket.
7. Remove the switch from the bracket.



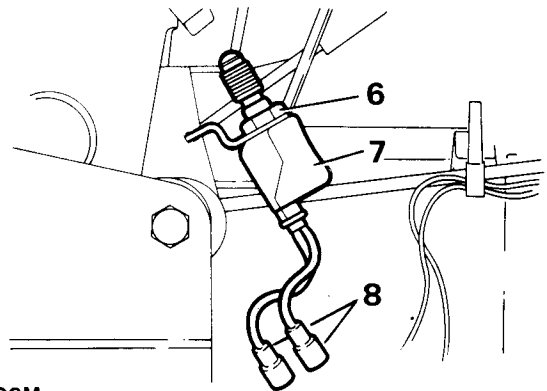
RR 507M

Refitting

8. Reverse the removal procedure.

HANDBRAKE WARNING SWITCH**– Remove and refit****Removing**

1. Disconnect the battery.
2. Apply the handbrake.
3. Fold back the gearbox tunnel carpet and sound deadening pads to reveal the screws securing the rubber gaiter.
4. Remove the screws securing the bottom of the rubber gaiter.
5. Peel back the gaiter to give access to the handbrake switch.
6. Release the locknut securing the switch to the mounting bracket and remove the switch from the bracket.
7. Pull the switch through the handbrake aperture to reveal the electrical connections.
8. Disconnect the two leads and withdraw the switch.



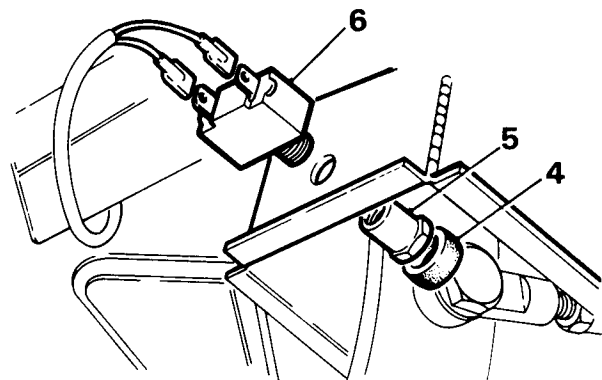
RR 508M

Refitting

9. Reverse the removal procedure.
- NOTE:** On Left Hand Drive vehicle the switch is removed from underneath the vehicle.

STOP LIGHT SWITCH**– Remove and refit****Removing**

1. Disconnect the battery.
2. Remove the lower fascia panel.
3. Depress the foot brake.
4. Remove the rubber protector from switch (where fitted).
5. Remove the hexagon nut.
6. Withdraw the switch.
7. Disconnect the electrical leads.



RR509M

Refitting

8. Reverse the removal procedure.

CHOKE WARNING LIGHT SWITCH

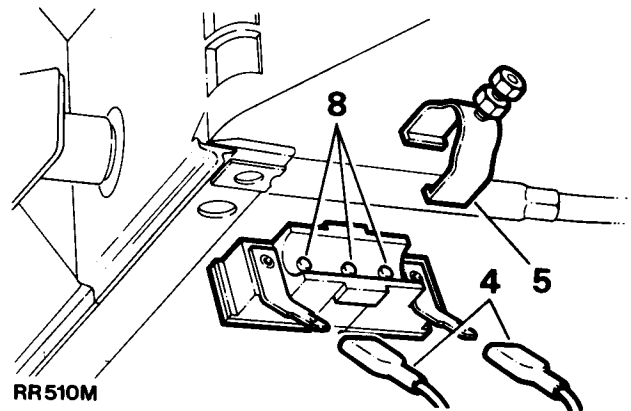
– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the six screws securing the lower fascia panel.
3. Remove the lower fascia panel to give access to the rear of the upper fascia.
4. Remove the two electrical leads from the switch.
5. Remove the screw and clip securing the switch to the choke cable and slide the clip off the switch.
6. Remove the switch.

Refitting

7. Reverse the removal operations.
8. Ensure that the three pegs on the switch locate in the corresponding hole on the choke outer cable.

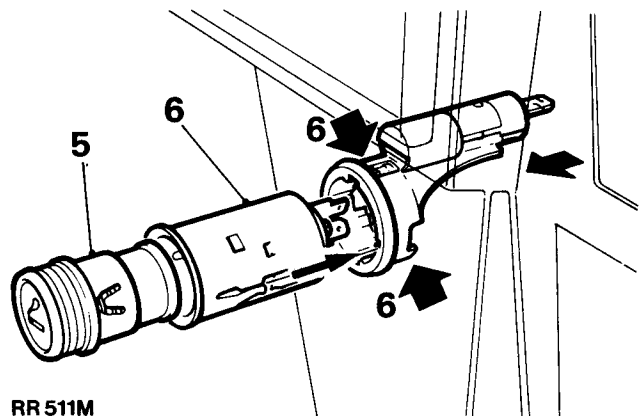


CIGAR LIGHTER

– Remove and refit

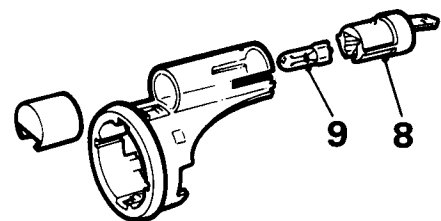
Removing

1. Disconnect the battery.
2. Carefully prise out the auxiliary switch panel from the centre console to gain access to the rear of the cigar lighter.
3. Pull the switch panel forward as far as the electrical leads will permit.
4. Remove the electrical leads at the rear of the cigar lighter.
5. Remove the push in switch from the lighter outer body.
6. Supporting the front of the console, and applying pressure to the plastic surround (shown by the two arrows) push the outer body through the plastic surround.
7. Manoeuvre the body and outer plastic surround to enable it to be withdrawn from the console complete with bulb holder.
8. Pull the bulb holder out of the plastic surround.
9. Pull the 1.2 watt 'wedge' type bulb from the bulb holder.



Refitting

10. Reverse the removal procedure.
11. Fit the bulb holder to the surround and reconnect the electrical lead.
12. Push the plastic surround into the console and pull the remaining two leads through the surround.
13. Push the lighter outer body into the surround ensuring that the raised positioning tab is located in either of the two small keyways in the plastic surround.
14. Push the outer body into the surround until fully secured.



WINDOW LIFT SWITCHES

– Remove and refit

Removing

1. Disconnect the battery.
2. Carefully prise the switch(es) out of the centre floor mounted cover.
3. Disconnect the multi-plug at the rear of the switch(es).
4. Remove the switch(es).

NOTE: If the multi-plugs are difficult to remove from the rear of the switches it may be necessary to remove the cubby box to disconnect the plugs from behind the floor mounted cover.

Refitting

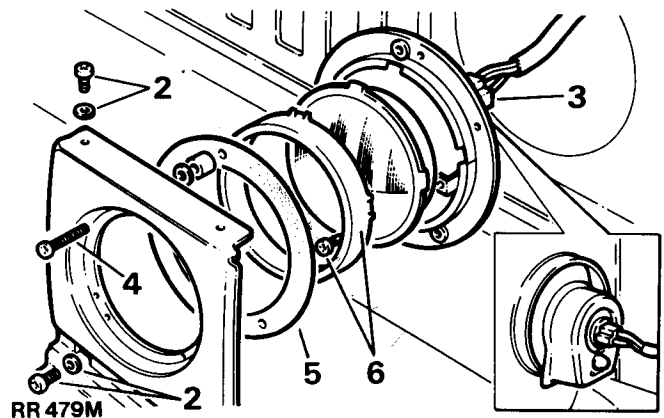
5. Reverse the removal procedure items 1 to 4.

HEADLAMP ASSEMBLY

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove screws and washers securing the headlamp frame to the body.
3. Ease the headlamp assembly forward and disconnect.
4. Remove the two adjusting screws and one clamp to separate lamp unit from the frame.
5. Remove the rubber seal.
6. Separate the lamp unit from rim by loosening the three retaining screws.



Refitting

7. Reverse removal procedure.

HEADLAMP BULB REPLACEMENT

– Remove and refit (Halogen)

Removing

1. Prop open the bonnet. Two large clearance holes are provided, one on each side of the front valance, to give access to the respective bulb holders in the headlamp reflectors.

NOTE: To obtain access to the right-hand clearance hole it will be necessary to remove the battery from the vehicle.

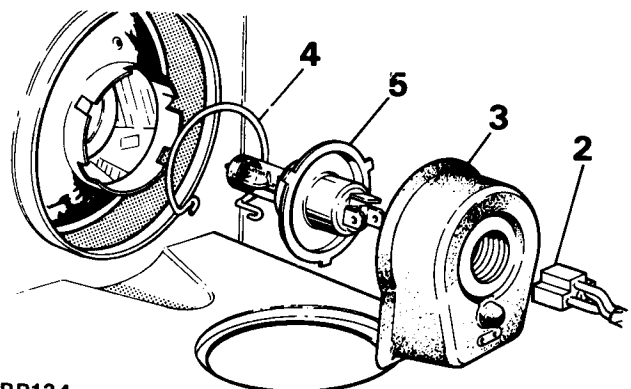
2. Disconnect the multi-plug lead.
3. Remove the rubber dust cover.
4. Release the bulb retaining spring clip.
5. Remove the faulty bulb.

Refitting

6. Fit the correct 'Halogen' type. The bulb holder is keyed to facilitate fitting.

IMPORTANT: Do not touch the quartz envelope of the bulb with the fingers. If contact is accidentally made wipe gently with methylated spirits.

7. Refit the bulb retaining spring clip rubber dust cover and multi-plug lead.
8. In the case of right-hand bulb replacement, refit the battery.
9. Reverse remaining removal procedure.

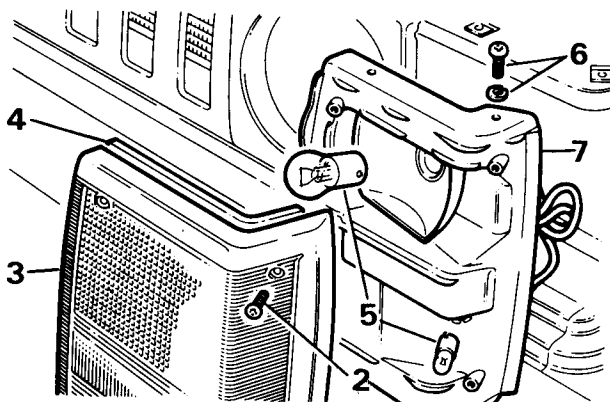


SIDE LIGHT AND FLASHER LAMP ASSEMBLY RH AND LH AND BULB REPLACEMENT

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the four screws securing the lamp lens.
3. Release the lamp lens from the lamp body.
4. Remove the foam rubber seal.
5. Remove the two bayonet fitting bulbs.
6. Remove the two screws securing the lamp body.
7. Ease the lamp body forward to reveal the electrical connection.
8. Disconnect the electrical plug at the rear of the lamp beds.
9. Remove the lamp body.



RR480M

Refitting

10. Reverse the removal procedure.

REFLECTORS

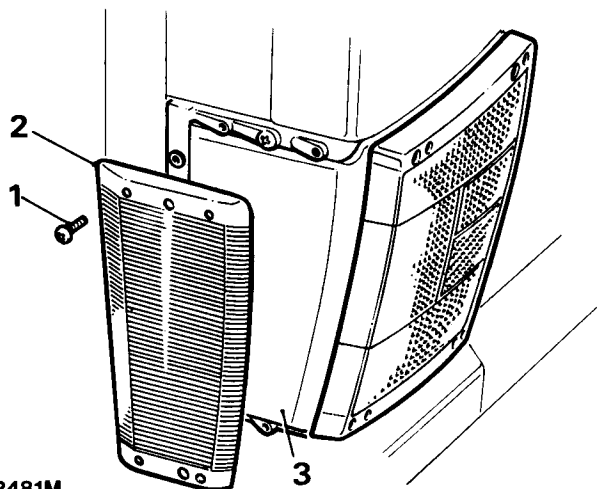
– Remove and refit

Removing

1. Remove the four screws securing reflector.
2. Remove reflector.
3. Remove rubber seal.

Refitting

4. Reverse the removal procedure.



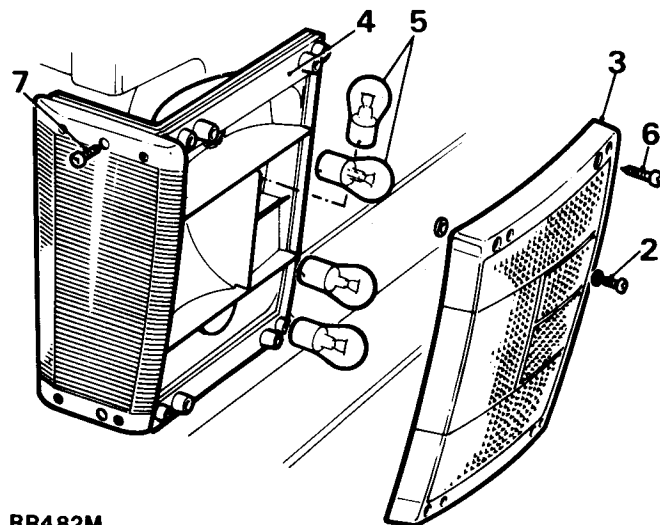
RR481M

TAIL, STOP, REVERSE, FOG GUARD AND FLASHER LAMP ASSEMBLY RH AND LH

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the four lens retaining screws.
3. Remove lens.
4. Remove sealing rubber.
5. Remove the bulbs.
6. Remove the four screws securing the lamp unit to the body.
7. Remove the two through-screws from the reflector side, which also secure the lamp unit to the body.
8. Ease the lamp unit forward and disconnect leads at moulded connections.



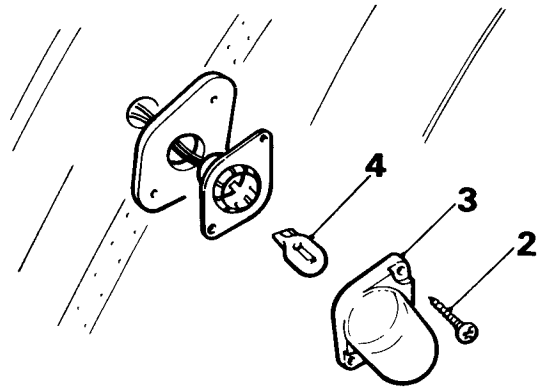
RR482M

Refitting

9. Reverse the removal procedure.

ENGINE COMPARTMENT LAMP ASSEMBLY**– Remove and refit****Removing**

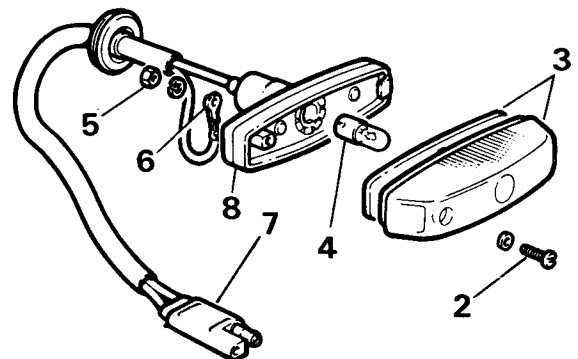
1. Disconnect the battery.
2. Remove the two securing screws.
3. Remove the lamp glass.
4. Pull the 5 watt 'wedge' type bulb from the bulb holder.
5. Disconnect the electrical leads located below the bonnet lamp switch attached to the inner wing.
6. Pull the rubber grommet off the leads and pull the lamp and leads up through the bonnet stiffener channel.

**RR483M****Refitting**

7. Reverse operations 1 to 6.
- NOTE:** A piece of bent wire will be needed to pull the electrical leads out of the channel exit hole when fitting a new lamp assembly.

SIDE REPEATER LAMPS**– Remove and refit****Removing**

1. Disconnect the battery.
2. Remove the single screw retaining the lamp lens.
3. Remove the lamp lens and rubber seal.
4. Remove the 4 watt bayonet fitting bulb.
5. Remove the two nuts and spring washers from the rear of the lamp body accessible from behind the front wing.
6. Remove the earth wire from the rear of the lamp.
7. Disconnect the twin snap connector from within the engine compartment located directly behind the lamp.
8. Remove the lamp body from the outer wing.

**RR457M****Refitting**

9. Reverse the removal procedure.

NUMBER PLATE LAMP ASSEMBLY AND BULB REPLACEMENT

– Remove and refit

Removing

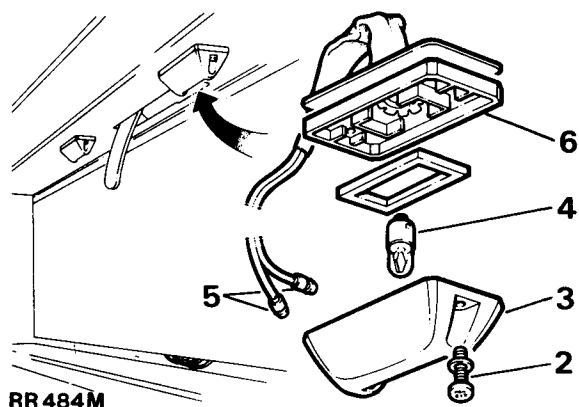
1. Disconnect the battery.
2. Remove the two self-tapping screws and fibre washers.
3. Detach the lens surround and lamp lens.
4. Remove the bulb.

NOTE: Carefully pull the electrical leads out of the bottom of the lower tailgate panel to reveal the snap connectors.

5. Disconnect the electrical connections located at the bottom of the lower tailgate.
6. Remove the bulb holder surround.
7. Carefully pull the electrical leads up through the inside of the lower tailgate panels.

Refitting

8. Reverse the removal procedure.



INTERIOR ROOF LAMPS

– Remove and refit

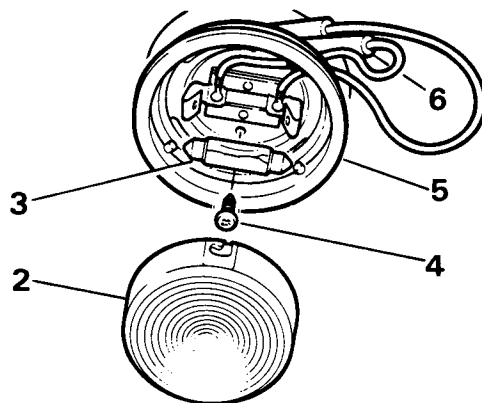
The interior roof lamps are operated automatically via the side door and tailgate courtesy switches or by independent switch located on the auxiliary switch panel.

Removing

1. Disconnect the battery.
2. Remove the lens from the courtesy lamp by pressing upward and turning it anti-clockwise.
3. Withdraw bulb from spring clip holder.
4. Remove screws securing lamp base to roof panel.
5. Lower the lamp to reveal the cable snap connections.
6. Disconnect the electrical connections.

Refitting

7. Reverse the removal procedure.



INTERIOR ROOF LAMPS CIRCUIT DELAY

– Remove and refit

The roof lamp circuit incorporates a delay function which is designed to allow the lamps to remain on for 12 to 18 seconds after either of the front doors are closed.

NOTE: Switching on the ignition (with both doors closed) will immediately override this feature, switching the interior lamps off.

continued

Removing

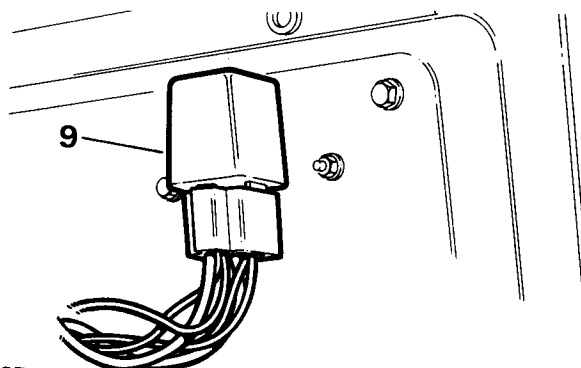
1. Disconnect the battery.
2. Remove the six screws securing the lower fascia panel.
3. Lower the fascia panel to gain access to the red delay unit attached to the steering column support bracket.
4. Remove the delay unit by pushing the unit up off its retaining bracket, to clear the steering column support bracket.
5. Pull the red multi-plug off the delay unit.

Refitting

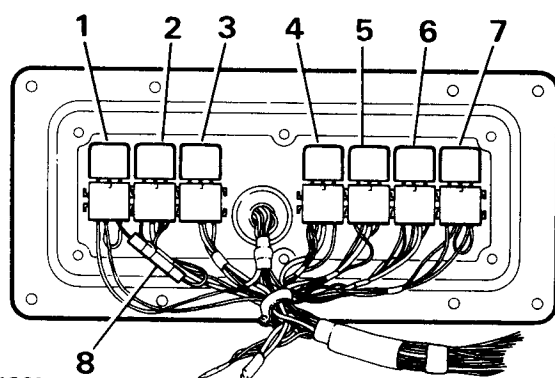
6. Reverse the removal operations.

RELAYS

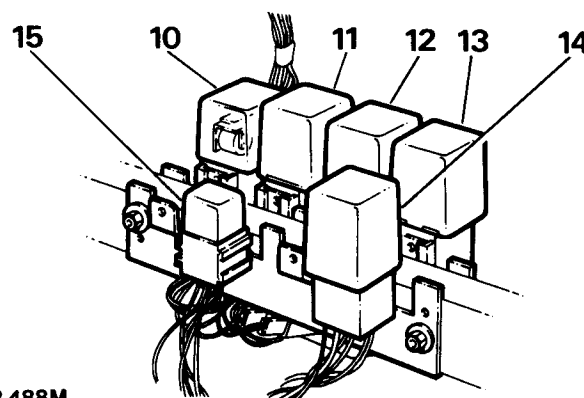
Incorporated into the vehicle electrical circuits are several relays some of which are located on the front and rear of the engine compartment closure panel, on the opposite side of the vehicle to the steering column. The remaining relays are located behind the lower fascia panel attached to the steering column support bracket.

**RR 487M**

Closure panel viewed from the engine compartment.

**RR 486M**

Closure panel viewed from inside the vehicle.

**RR 488M**

Viewed from inside the vehicle.

- | | | |
|--|--|-------------------------|
| 1. Brake failure warning check relay | (79 on main circuit diagram) | (Metal case) |
| 2. Heated rear window relay | (95 on main circuit diagram) | (Metal case) |
| 3. Starter solenoid relay | (93 on main circuit diagram) | (Metal case) |
| 4. Fan relay | (8 on optional Air con circuit diagram) | (Metal case) |
| 5. Compressor clutch relay | (9 on optional Air con circuit diagram) | (Metal case) |
| 6. Air conditioning relay (ignition controlled) | (7 on optional Air con circuit diagram) | (Metal case) |
| 7. Air conditioning controlled fan relay | (10 on optional Air con circuit diagram) | (Metal case) |
| 8. Diode | (96 on main circuit diagram) | |
| 9. Headlamp wash timer relay | (61 on main circuit diagram) | (Black case) |
| 10. Hazard and flasher relay | (81 on main circuit diagram) | (Transparent blue case) |
| 11. Rear wiper delay | (116 on main circuit diagram) | (Black case) |
| 12. Interior light delay | (30 on main circuit diagram) | (Red case) |
| 13. Voltage sensitive switch (option – fitted to vehicles which will split charge or air conditioning) | (5 on split charge circuit diagram) | (Yellow case) |
| 14. Overspeed relay (Saudi only) | (14 on air conditioning circuit diagram) | |
| 15. Rear wiper relay | (97 on main circuit diagram) | (Green case) |
| | (100 on main circuit diagram) | (Metal case) |

continued

RELAYS – (mounted on the steering column support bracket)

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the lower fascia panel to give access to the relays attached to the steering column support bracket.
3. Pull the appropriate relay multi-plug off the retaining bracket.
4. Pull the relay off the multi-plug.

Refitting

5. Reverse the removal procedure.

NOTE: The windscreen wiper delay unit is fitted to the inside of the bulkhead on the drivers side of the vehicle. To gain access to the black control box remove the lower fascia panel. To remove the control box, disconnect the electrical leads and remove the two screws securing the unit to the bulkhead.

RELAYS – (mounted on engine compartment closure plate)

– Remove and refit

Removing

6. Disconnect the battery.
7. Remove the washer bottle reservoir.
8. Remove the six bolts securing the closure plate.
9. Detach the closure plate from the surround to give access to the seven relays located on the inside of the plate.
10. Pull the appropriate relay from the multi-plug.

Refitting

11. Reverse the removal procedure.

INSTRUMENT BINNACLE – MID 1984 TO 1985**Description**

The electro-mechanical instrument pack contains four gauges, a tachometer, temperature indicator, fuel indicator and a speedometer with odometer and trip mileage recorder. It also includes a control warning light panel.

Tachometer

The tachometer trigger lead is connected to the alternator 'phase tap' terminal. The multi-function unit receives the pulses and sends them on to the tachometer.

Temperature Gauge

The engine temperature thermistor (sensor) is located in the front of the inlet manifold and provides a resistance, varying with the engine temperature, to operate the gauge. The multi-function unit contains the stabilised 10 volt supply system.

Fuel Gauge

The variable resistance type fuel level sensor, fitted inside the fuel tank, is controlled by a float. The gauge senses the level of fuel in the tank by the resistance in the circuit. The multi-function unit contains the stabilised 10V supply system and controls the circuit of the low fuel warning light in the warning light panel.

Speedometer

The speedometer with odometer and trip mileage recording is a purely mechanical instrument driven by a jointed (two-piece) cable. The bottom of the lower part of the cable is fitted to the transfer gearbox speedometer housing on the rear output shaft housing.

Warning Light Panel

The central panel incorporates fifteen warning light symbols, as listed in the following chart, including two alternatives to meet Australian brake symbol requirements and an additional warning light symbol for high gearbox oil temperature in automatic models.

WARNING LIGHT SYMBOLS



Direction indicator – left turn (green)



Direction indicator – right turn (green)



Park brake on – Australia only (red)



Headlamp main beam on (blue)



Trailer connected – flashes with direction indicators (green)



Rear fog guard lamps on (amber)



Ignition on (red)



Automatic gearbox oil temperature – high (red)



Engine oil pressure, low (red)



Cold start, engaged (amber)



Fuel indicator, low (amber)



Differential lock engaged (amber)



Transmission handbrake on – except Australia (red)



Brake fluid pressure, failure – Australia only (red)



Brake fluid pressure, failure – except Australia (red)

Direction indicator arrow warning lights



Connected to the direction indicator switch. The appropriate green arrow flashes in conjunction with the selected set of indicator and side repeater lights. In addition the flasher unit is audible while the lights are flashing.

Should an indicator bulb fail, the warning lights will not function and the flasher unit will not be heard.

NOTE: The above warning lights will all flash together when the hazard warning switch on the auxiliary switch panel is operating.

Park (differential) brake warning light (Australia only)



Connected to a switch mounted on the park brake operating linkage the warning light is illuminated when the park brake is applied with the ignition switched on.

Main beam warning light



This warning light is connected to the dip switch and will be illuminated when the main beams are switched on.

The warning light will also be illuminated when the headlamp flasher switch is used.

Trailer warning light



When a trailer is connected to the vehicle via a seven-pin socket – option.

It will flash in conjunction with the vehicle indicator warning lights, thus ensuring that the trailer indicator lamps are functioning correctly. In the event of an indicator bulb failure on the trailer, the trailer warning light will NOT be illuminated.

Rear fog guard lamps warning light



Operated by the rear fog guard switch in the auxiliary switch panel. This is connected to the dip beam circuit.

Ignition/No charge warning light



This warning light is connected to the alternator field winding and will be illuminated when the ignition is switched on and extinguished when the engine is running.

High oil temperature warning light – automatic gearbox only



This warning light operates when the thermal switch in the oil cooler reaches a pre-set temperature.

Low engine oil pressure warning light



Connected to the oil pressure switch in the cylinder block, this warning light will be illuminated when the ignition is switched on and extinguished when the engine is running.

NOTE: The ignition and engine oil pressure symbols will be automatically illuminated when the ignition is switched on and extinguished when the engine is running. The brake fluid pressure symbol will also be illuminated while the ignition key is being held over to actuate the starter, confirming that the warning circuit is functioning correctly.

continued

Cold start warning light

The warning light is connected to a switch on the cold start control and will be illuminated while the control remains out in the operating position.

Low fuel indicator warning light

The warning light is connected to the fuel gauge circuit and will be illuminated when there are approximately 9 litres (2 gallons) of fuel remaining in the tank.

Differential lock warning light

Positive engagement of the differential lock actuates a switch in the transfer gearbox which illuminates the warning light.

Transmission hand brake (except Australia)

Connected to a switch mounted on the hand-brake linkage the warning light is illuminated when the handbrake is applied with the ignition switched on.

Brake failure warning light (Australia only)

The warning light is illuminated when the pressure differential warning actuator switch in the brake reservoir body operates, due to loss of pressure in one of the two brake systems.

Brake failure warning light (except Australia)

The warning light is illuminated when the P.D.W.A. switch in the brake reservoir body operates, due to loss of pressure in one of the two brake systems.

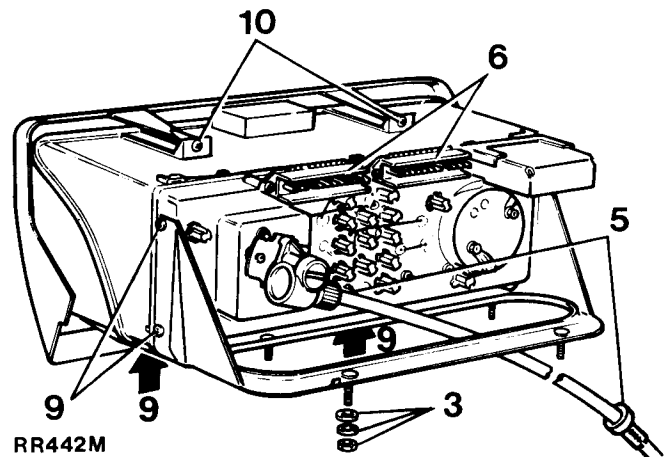
RENEWAL OF PANEL AND WARNING LIGHT BULBS

1. Disconnect the battery.
2. Unclip the back of the cowl from the instrument binnacle to give access to the panel and warning light bulbs in the back of the instrument case.
3. Remove the appropriate bulb holder unit by rotating it anti-clockwise and withdrawing it.
NOTE: The No charge ignition warning light, identified by its red coloured bulb holder, is of a higher wattage and is the only bulb which can be pulled from its holder and replaced independently.
4. Fit a new bulb holder unit and rotate clockwise to lock in position. The correct bulb type is a 1.2 watt bulb/holder unit, except the ignition bulb which is 2 watt wedge base type.
5. Refit the cowl and reconnect the battery.

NOTE: If difficulty is experienced in changing bulbs, due to the limited space available the instrument binnacle fixings should be removed to enable the binnacle to be raised above the fascia as far as other connections permit. See 'Instrument Binnacle removal' for details of binnacle mounting bracket fixing.

INSTRUMENT BINNACLE – MID 1984 TO 1985**Removing from vehicle**

1. Disconnect the battery.
2. Remove the lower fascia by releasing the six retaining screws.
3. Remove the four nuts (with spring and plain washers) from under the top fascia rail which secure the instrument binnacle to the vehicle.
4. Unclip the binnacle cowl, from the rear, to provide access to the two-part speedometer cable.
5. Disconnect the two-part speedometer cable from the speedometer drive on the back of the instrument case. Alternatively, from under the top fascia rail, release the cable connector ring at the intermediate clamped connection. This is located some 470mm (18.5in) from the speedometer drive. This connection is provided to facilitate separate renewal of either the upper or lower part of the cable in service.
6. Disconnect the two multi-plugs from the printed circuit connectors.
7. Lift the instrument binnacle from the top fascia rail and transfer it to the workbench.



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Refitting to vehicle

8. Reverse the removal instructions 1 to 7.
NOTE: On LHD vehicles, where an over-speed buzzer is fitted, the intermediate speedometer cable connections are threaded and retain a sensor unit between the two parts of the cable.
A lead from the sensor unit is connected to a black two-pin socket (black and white leads) below the binnacle, above the steering column area. The adjacent buzzer will be audible at approximately 120 kph (75 mph).

Removing Instrument Pack

9. Having removed the instrument binnacle from the vehicle, detach the binnacle mounting bracket. This is secured to the instrument case by two screws and to the bottom of the binnacle bezel by two similar screws.

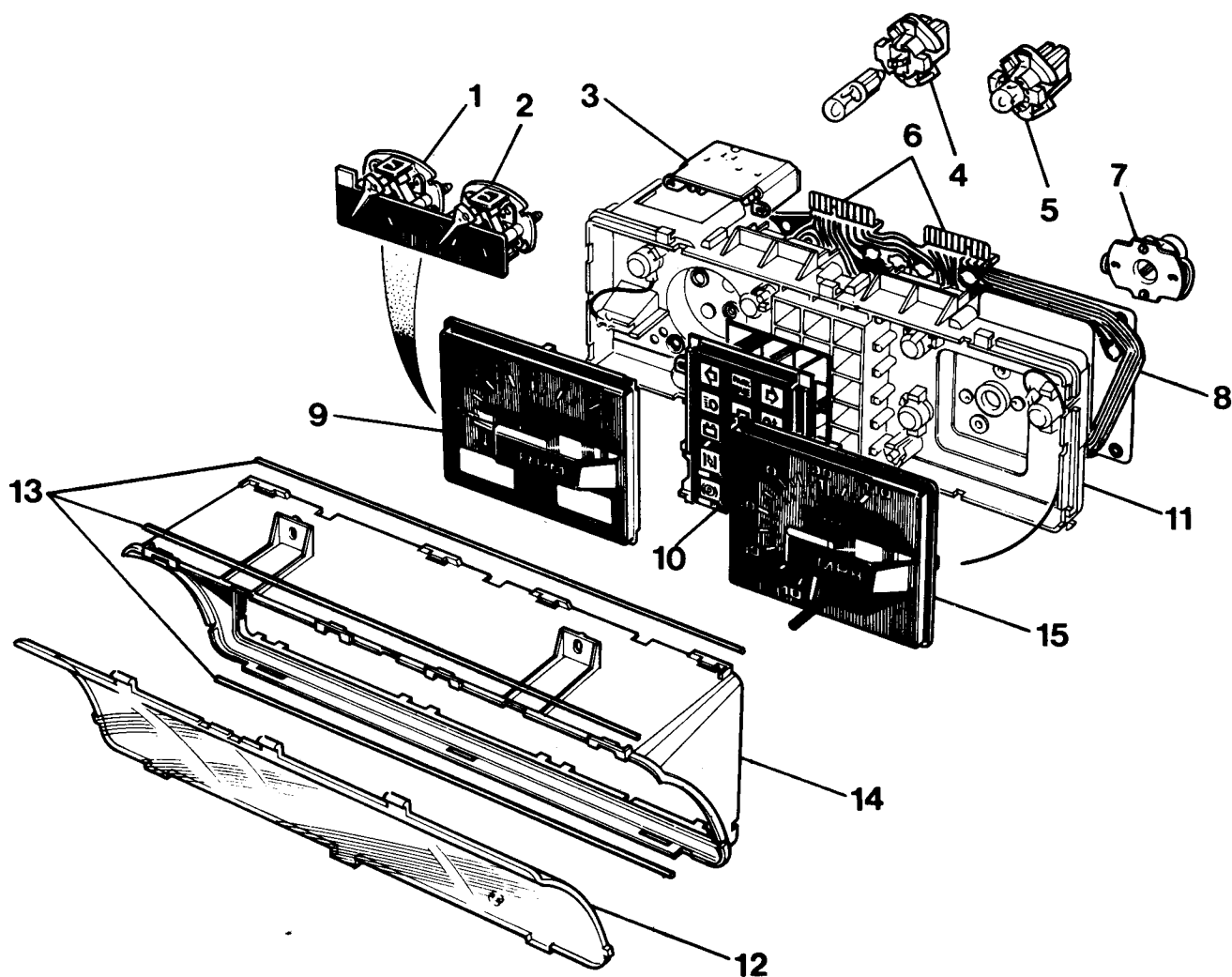
continued

10. Remove the two screws retaining the top of the bezel to the front housing and detach the bezel.
11. Separate the instrument case from the binnacle housing by releasing the two wire clips.
12. Detach the curved lens from the binnacle housing by releasing the wire clip at the top.

Refitting Instrument Pack to Binnacle

13. Reverse removal instructions 9 to 12.

continued



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Instrument Pack

1. Fuel gauge
2. Temperature gauge
3. Voltage stabiliser
4. Ignition warning bulb (with separate red holder unit)
5. Panel/warning lights bulb/holder
6. Printed circuit input tags (for harness connection)
7. Speedometer drive unit
8. Printed circuit
9. Tachometer
10. Warning lights panel
11. Instrument case (front)
12. Curved lens
13. Wire connecting clips
14. Binnacle housing
15. Speedometer

Renewing panel and warning lamp bulbs

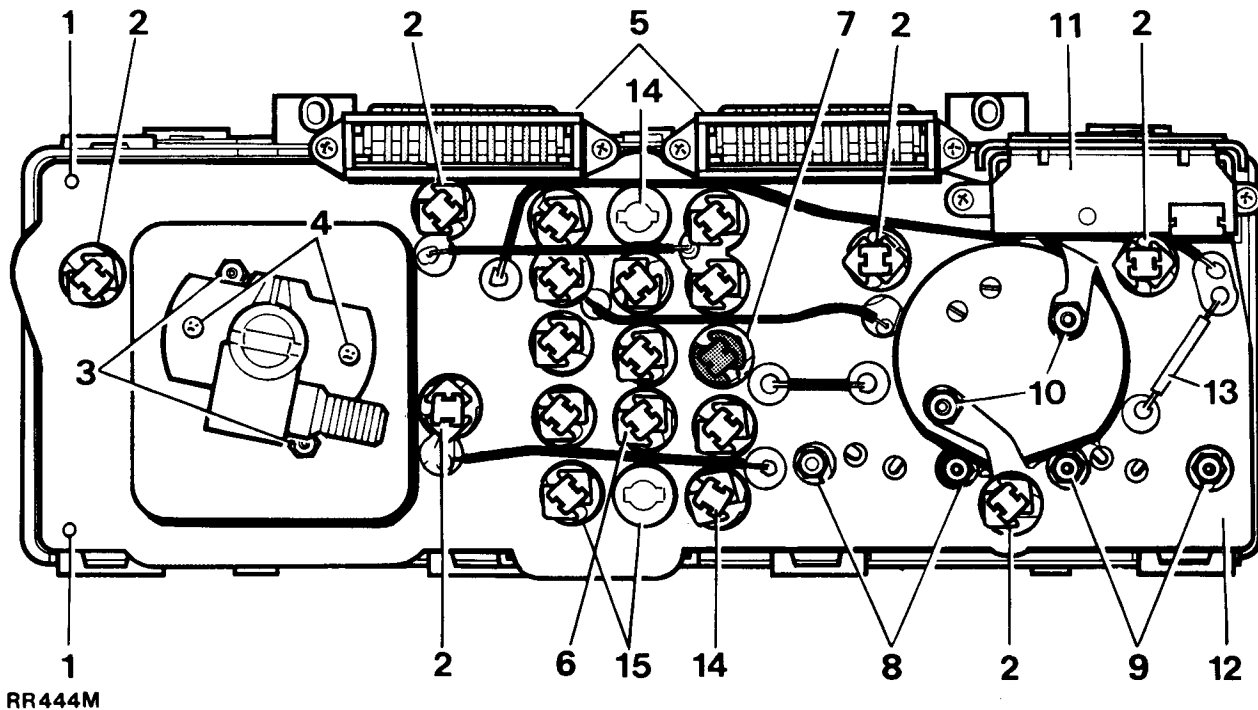
14. Remove the appropriate bulb holder unit from the back of the instrument case by rotating the bulb holder anti-clockwise and withdrawing it.

NOTE: The No charge ignition warning light, identified by its red coloured bulb holder is of a higher wattage and is the only bulb which can be separated from its holder and replaced independently.

15. Fit a new bulb holder unit to the printed circuit and rotate clockwise to lock in position.

The correct bulb type is a 1.2 watt bulb/holder unit, except the ignition bulb which is 2 watt wedge base type.

continued



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Instrument case (back)

1. Locating pegs
2. Panel light bulbs
3. Speedometer securing screws
4. Speedometer drive securing screws
5. Harness connectors
6. Warning light bulbs
7. No charge warning light bulb (red holder)
8. Temperature gauge securing nuts
9. Fuel gauge securing nuts
10. Tachometer securing nuts
11. Multi-function unit
12. Printed circuit
13. Pull-up resistor – high temperature gearbox oil
14. Alternative symbols – park/hand brake
15. Alternative symbols – brake failure

Removing printed circuit

16. Remove the two tachometer nuts (with washers) to release the printed circuit connecting tags.
17. Remove the four nuts (with washers) securing the fuel and temperature gauges to release the printed circuit from the fixing studs.
18. Release the two screws retaining the multi-function unit and lift off to release the printed circuit connecting tag.
19. Remove the two harness connectors, retained by four screws, to release the printed circuit tags.
20. Carefully ease the printed circuit from its four locating pegs.

Refitting the Printed Circuit

21. Reverse the removal procedure, items 16 to 20.
22. Ensure that the fuel and temperature gauge mounting studs are correctly located before pressing the printed circuit on to its four locating pegs.

Removing Tachometer

23. Carefully prise the needle shroud from the tachometer and disconnect the fibre optic element underneath the shroud.
24. Remove the two nuts (with washers) at the back of the instrument case which retains the tachometer and release the printed circuit tags.
25. Slacken the four nuts retaining the fuel and temperature gauges and carefully manoeuvre the tachometer from the front of the instrument case.

Refitting the Tachometer

26. Reverse the removal procedure, items 23 to 25.

Removing Fuel and Temperature Gauge Unit

27. Carefully prise the needle shroud from the tachometer and disconnect the fibre optic element underneath the shroud.
28. Remove the two nuts (with washers) retaining the tachometer and release the printed circuit tags.
29. Remove the four nuts (with washers) retaining the fuel and temperature gauges and carefully manoeuvre the tachometer, fuel and temperature gauge unit from the front of the instrument case.

Refitting the Fuel and Temperature Gauges

30. Locate the fuel and temperature gauge unit in the instrument panel but DO NOT fit the washers and nuts at this stage.
31. Feed the fibre optic element through the aperture in the tachometer then locate the tachometer in the instrument panel.
32. Position the printed circuit tags over the two tachometer studs, fit the washers and fit and tighten the retaining nuts.
33. Fit the washers to the four fuel and temperature gauge studs and fit and tighten the retaining nuts.

Removing Fuel Gauge Tank Unit

34. Disconnect the battery.

35. Chock the front wheels, raise the rear wheels clear of the ground and support the vehicle on stands.
36. Remove the left side rear wheel to provide easy access to the gauge unit which is fitted in the side of the fuel tank.
37. Disconnect the electrical leads from the gauge unit.
38. Release the fuel feed pipe from the gauge unit by unscrewing the hexagon nut.
39. Using tool 18G 1001 release the tank unit locking ring.
40. Remove the gauge unit and sealing washer.

Refitting the Fuel Gauge Tank Unit

41. Locate the fuel gauge unit in the tank, with a new seal.
42. Using tool 18G 1001 secure the locking ring.
43. Connect the green/black lead to the white terminal and the black earth lead to the centre terminal on the gauge unit.
NOTE: The red terminal is not used.
44. Connect the fuel feed pipe to the gauge unit.
45. Refit the rear wheel and lower the vehicle.
46. Connect the battery.
47. Fill the fuel tank.

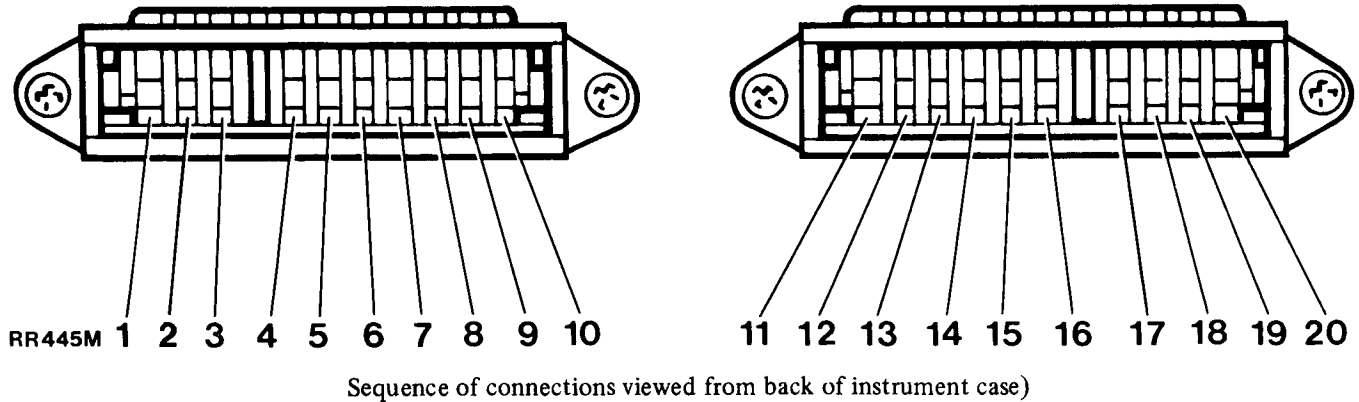
Removing the Speedometer and Speedometer Drive Unit

48. Carefully prise the needle shroud from the speedometer and disconnect the fibre optic element underneath the shroud.
49. Remove the two hexagonal headed screws (with washers) at the back of the instrument case which retain the speedometer.
50. Carefully remove the speedometer from the front of the instrument case.
51. To release the speedometer drive unit, remove the two self-tapping screws securing it to the back of the instrument case.

Refitting the Speedometer and Speedometer Drive Unit

52. Reverse the removal procedure items 48 to 51 ensuring that the rubber gasket is fitted behind the speedometer drive unit.

PRINTED CIRCUIT HARNESS CONNECTIONS



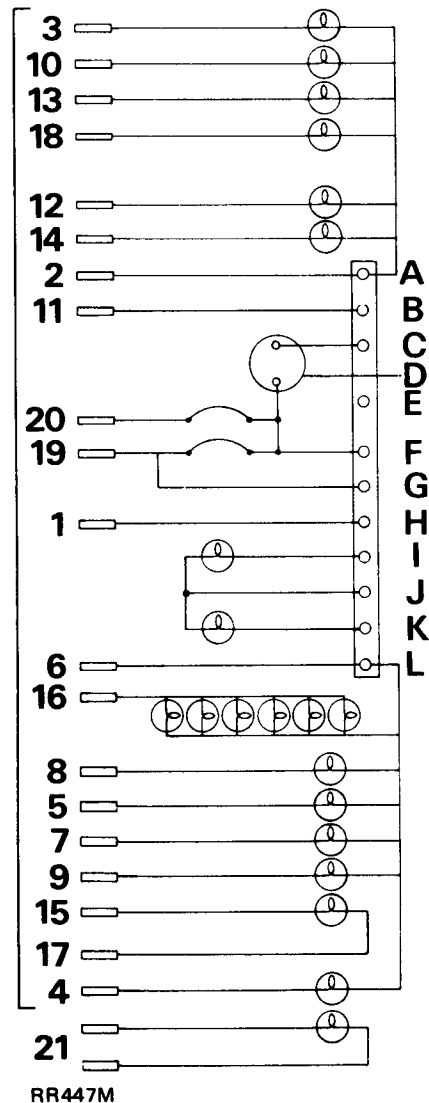
CIRCUIT SERVED

Tacho signal	1
Ignition switch 12V+	2
Ignition warning light	3
Trailer warning light	4
Main beam warning light	5
Earth	6
Direction indicators left hand	7
Rear fog warning light	8
Direction indicators right hand	9
Oil pressure warning light	10
High oil temperature warning light (Auto gearbox)	11
Cold start warning light	12
Differential lock warning light	13
Brake failure warning light	14
Brake failure warning light (Australia only)	15
Panel illumination warning light	16
Brake failure warning light (Australia only)	17
Park brake warning light	18
Fuel tank gauge	19
Coolant temperature gauge	20

Additional wired circuit on RHD vehicles for alternative Australian park brake warning light symbol. Connected to a black two-pin socket 21 (white & black/pink leads) located under the binnacle, above the steering column area

MULTI-FUNCTION UNIT CONNECTIONS

A . . . 12V+ supply
B . . . Input to high oil temp warning light circuit
C . . . Tacho drive
D . . . Tachometer
E . . . Spare
F . . . 10V+ stabilised
G . . . Input to low fuel warning light circuit
H . . . Tacho signal
I . . . Low fuel warning light
J . . . 12V+ protected
K . . . High oil temperature warning light
L . . . Earth



CLOCK

– Remove and refit

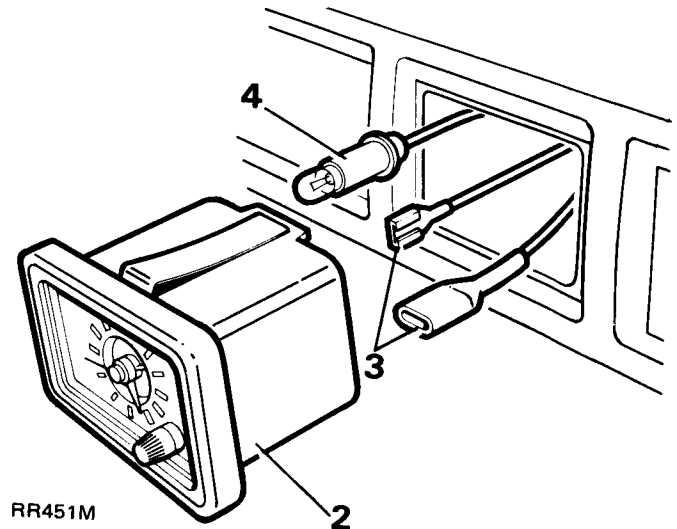
Removing

1. Disconnect the battery.
2. Carefully prise the clock out of the fascia panel to reveal the electrical connections.
3. Disconnect the two electrical leads.
4. Remove the illumination lead complete with holder and bulb.

NOTE: The clock is illuminated by a 2 watt bayonet type bulb.

Refitting

5. Reverse the removal procedure.



SPEEDOMETER CABLE ASSEMBLY

The speedometer cable is a two part assembly, consisting of an upper cable, connected to the rear of the binnacle and a lower cable connected to the speedometer drive housing at the rear of the transfer gearbox. The two cables are joined by a connector ring behind the lower fascia, this connection is provided to facilitate separate renewal of either the upper or lower part of the cable in service.

To remove the upper cable refer to instrument binnacle removal.

LOWER SPEEDOMETER CABLE

– Remove and refit

Removing

1. Disconnect the battery.
2. Remove the lower fascia panel by releasing the six retaining screws.
3. Release the cable connector ring between the upper and lower cables and withdraw the cable and grommet from the bulkhead.
4. Remove the single nyloc nut and clamp securing the cable to the speedometer drive housing at the rear of the transfer gearbox.
5. Release the cable from the two retaining clips.
NOTE: On left hand drive vehicles with automatic gearbox the speedometer cable is secured by a further two clips located above the cross-member attached to the chassis side-member.
6. Withdraw the cable from the speed drive housing.

Refitting

7. Reverse the removal procedure.

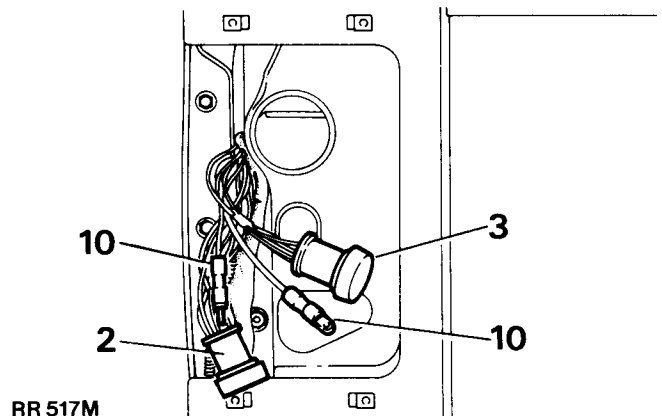
TRAILER SOCKET – OPTION

Incorporated in the vehicle electrical circuit is a facility for fitting a seven pin trailer lighting socket.

The pick up point is located behind the left hand rear tail light cluster and is accessible by removing the tail light assembly.

The pick up point consists of a seven pin pre-wired plug, a separate auxiliary fused live feed and reverse light lead.

1. Disconnect the battery.
2. Remove the rear tail light assembly and disconnect the electrical plug.
3. Remove the protective cap from the trailer pick up point plug.
4. Feed a seven core cable (fitted with a pre-wired plug to one end – suitable for connection to pick up point) down between the inner and outer body panels through the rear light aperture.
5. Feed the cable alongside the existing rear lighting harness.
6. Pull the cable through the aperture between the chassis side member and fuel tank.
7. Fit two retaining clips to the cable and secure it to the rear end cross member.
8. Connect the electrical leads to the vehicle trailer socket (refer to current trailer wiring regulations).
9. Secure trailer socket to the tow bar.
10. If it is necessary to provide a live feed and reverse light feed, provision is made for this by the presence of two extra leads in the rear light aperture. Means of identification are as follows.
Fused auxiliary live feed – PINK LEAD
Reverse light feed – GREEN/BROWN LEAD
11. Refit rear tail light.
12. Reconnect the battery.

**EXTERIOR DRIVING MIRRORS – 4 DOOR ONLY – MID 1984 TO 1985**

1. The mirror housing is hinged vertically and should be set in one of the two fixed angle positions provided to suit the respective left or right side mirror location.
2. Additionally, for safety and convenience, the mirror housing is designed to fold completely forwards or rearwards against the vehicle body.

NOTE: Flat mirrors are fitted to Australian vehicles.

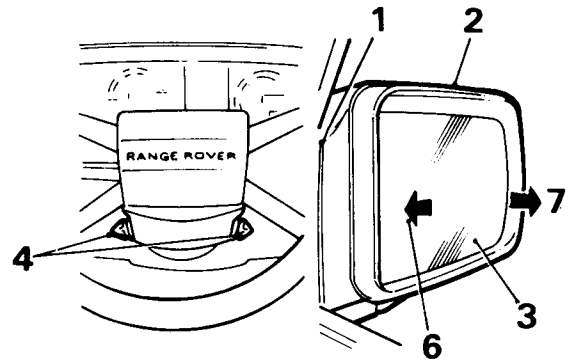
Setting the Mirror – Manual Version

3. The glass angle is finely adjusted by moving it vertically or horizontally as required.

continued

Setting the Mirror – Electrical-operated

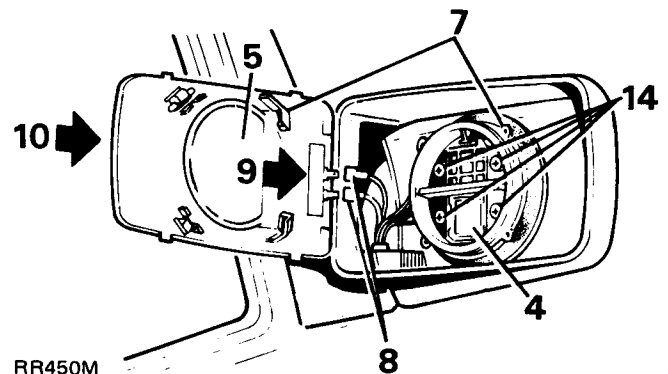
4. Fine adjustment is controlled by an electric motor inside the mirror housing. This is operated by individual finger-tip operated controls fitted on either side of the steering column lower cover. To adjust, move the head of the appropriate control to the left, right, up or down as required. The mirror selected will respond accordingly.
5. The mirror also incorporates a demist facility, activated by operation of the rear window demist switch.



Renewing the Mirror Glass – Manual and Electric Versions

6. Press the inner (wider) end of the glass inwards to its full extent.
7. Insert the fingers under the outer (narrower) end of the glass, and pull outwards until the glass is released from its four retaining clips.
8. On electrical versions disconnect the two demister leads attached to back of the glass unit.
9. To replace the glass, locate the inner (wider) end of the glass in the mirror housing first.
10. Carefully press the outer (narrower) end of the glass inwards until it is safely held by its four retaining clips.
11. Reset the fine adjustment as required.

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EXTERIOR DRIVING MIRRORS – MID 1984 TO 1985

ELECTRIC MOTORS

– Remove and refit

Removing

12. Disconnect the battery.
13. Remove the mirror glass, as described in items 6 to 8.
14. Remove the four self-tapping screws securing the motor assembly to the mirror body.
15. Manoeuvre the motor assembly to reveal the electrical connections at the rear of the motor.
16. Pull the leads from the rear of the motor assembly.

Refitting

17. Reverse operations 12 to 16, ensuring that the electrical leads are correctly refitted (see electric mirrors, circuit diagram).

EXTERIOR DRIVING MIRRORS – FINGER TIP CONTROLLED SWITCHES

– Remove and refit

Service Tool: 18G 1014 Extractor for Steering Wheel
18G 1014-2 Adaptor pins

Removing

18. Disconnect the battery.

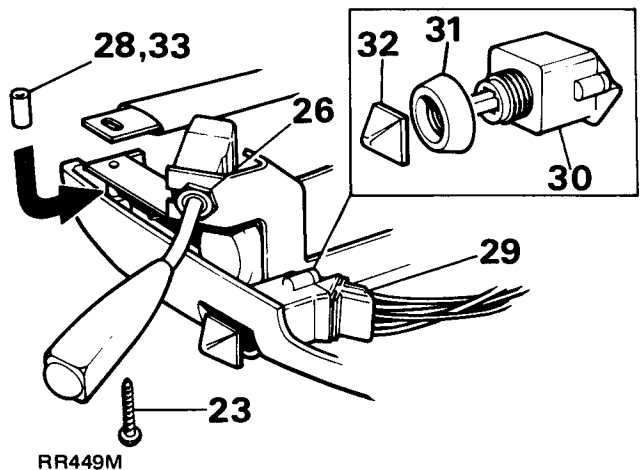
continued

19. Release the screw retaining the centre cover to the steering wheel and remove the cover.
20. Remove the retaining nut and washer securing the steering wheel.
21. Remove the steering wheel using the correct service tool.
22. Remove the lower fascia panel by releasing the six securing screws.
23. Remove the four screws securing the bottom shroud to the top shroud.
24. Remove the single screw securing the top shroud to the switch housing bracket.
25. Remove the top shroud.
26. Release the light switch locknut and remove the switch from the mounting bracket.
27. Manoeuvre the bottom shroud to clear the ignition switch/steering lock assembly.
28. Retrieve the small spacing collar located on the forward left hand side of the bottom shroud.
NOTE: It is important that the spacing collar is refitted on assembly.
29. Pull the multi-plug from the rear of the finger tip controlled mirror switch.
30. Carefully prise off the finger tip button at the operating end of the switch.
31. Unscrew the black plastic retaining collar securing the switch to the bottom shroud.
32. Remove the switch from the shroud.

Refitting

33. Reverse operations 18 to 32, ensuring that the black spacing collar is refitted.
NOTE: To prevent damage occurring to the electrical wiring within the top and bottom shrouds, the leads should be arranged carefully to avoid contact with mating faces on re-assembly.

continued



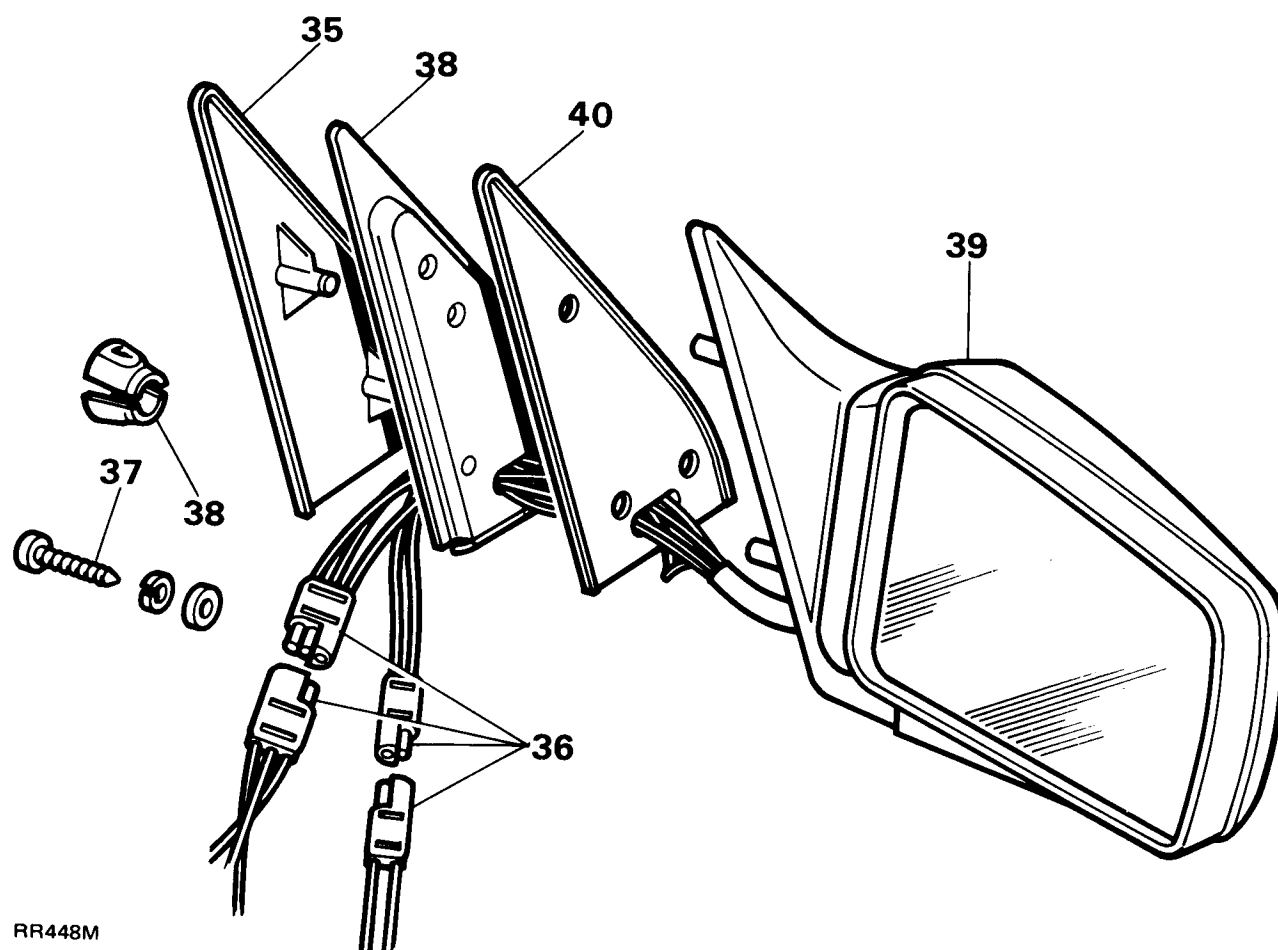
EXTERIOR DRIVING MIRRORS

COMPLETE ASSEMBLY

– Remove and refit

Removing

34. Disconnect the battery.
35. Carefully prise off the interior finisher plate to reveal the three securing screws and electrical wiring.
36. Disconnect the two electrical plugs (one two pin, one three pin).
37. Supporting the exterior mirror assembly remove the three securing screws (with plain and spring washers).
38. Pull the inner mounting plate away from the inner door frame complete with the two retaining clips.
39. Detach the mirror assembly from the outer door frame.
40. Remove the sealing rubber.



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Refitting

41. Reverse operations 34 to 40.
NOTE: To prevent damage occurring to the electrical wiring, do not push the leads down inside the door casing.

ELECTRICALLY OPERATED SIDE DOOR WINDOWS – MID 1984 TO 1985

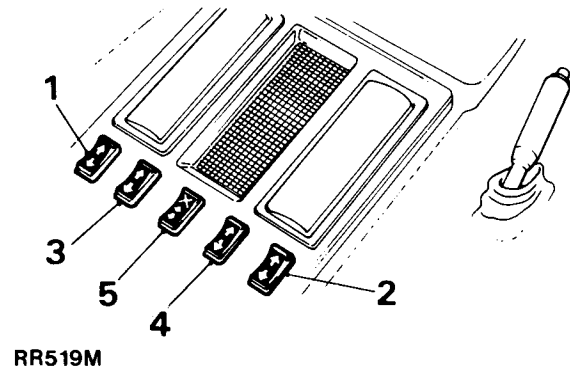
All side windows are operated from either front seat by four rocker switches fitted in the centre floor-mounted cover which control individual electric motors in each door. Additionally, for the convenience of rear seat passengers, both rear side doors are also fitted with a rocker switch, integral with the door pull handles, which provides independent rear side window control.

If required, these additional switch controls can be rendered inoperative, or restored by operation of an isolating rocker switch, also fitted in the centre floor-mounted cover.

The electrical circuit is directed through the fuse box and is protected by a 25 amp fuse (No. 20 in fuse box).

NOTE: Windows are only operative whilst the ignition is switched on.

1. Left side, front window
 2. Right side, front window
 3. Left side, rear window
 4. Right side, rear window
- } operating switches
5. Isolating switch – door fitted switches, rear windows.



Operating switches (1 to 4)

To lower glass depress rear of switch, to raise glass depress front of switch.

Release switch as soon as window is fully open or closed.

Isolating switch (5)

To isolate door fitted switches on rear windows depress front of the central switch in the floor mounted cover.

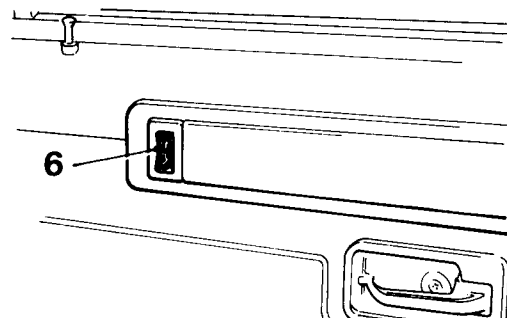
To restore independent rear passenger control depress rear of switch.

Rear side door switches (6)

Depress switch as indicated to lower or raise the glass.

CAUTION: Do not attempt to raise or lower a window when it is jammed by ice. Should a window be obstructed, when being raised or lowered, a thermal cut-out will render the window inoperative. In this event, release the switch and remove the obstruction. The window can be re-operated after two seconds. In the event of a motor failure, the window involved will become inoperative necessitating the renewal of the motor unit.

WARNING: Particular care should be taken that children are kept away from windows when raising or lowering is in progress.



WINDOW LIFT MOTOR – FRONT DOORS

– Remove and refit

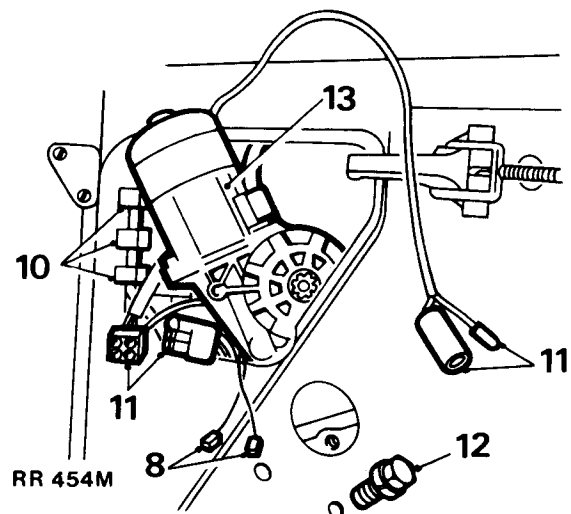
Removing

1. Ensure the window is in its fully closed position and secure it with adhesive tape to prevent the window dropping down.
2. Disconnect the battery.
3. Detach the armrest/door pull finisher to reveal the two securing screws.
4. Remove the two securing screws (with plain washers) to enable the armrest/door pull to be detached from the inner door panel.
5. Remove the interior door handle finisher button to reveal the screw retaining the handle surround.
6. Remove the screw and detach the handle surround from the inner door panel.
7. Detach the inner door trim pad by inserting a screwdriver between the trim pad and inner door panel gently prising out the nine plastic securing clips from their respective holes in the inner door panel.
8. Disconnect the two speaker connections inside the door and remove the door trim pad complete with speaker.
NOTE: At this stage the speaker can be removed by releasing the four nuts (with plain washers) located on the back of the trim pad.
9. Peel back the front top corner of the plastic weather sheet to reveal the window lift motor
10. Release the window lift motor harness from the three retaining clips to allow the harness to be pulled out of the aperture at the front of the inner door panel.
11. Disconnect the window lift motor multi-plug from the main door harness.
12. Supporting the motor, remove the three securing bolts.
13. Withdraw the motor through the top front aperture of the door.

Refitting

14. Reverse operations 1 to 13.
NOTE: Ensure the drive gear is engaged and correctly aligned with the window lift linkage before proceeding.

continued

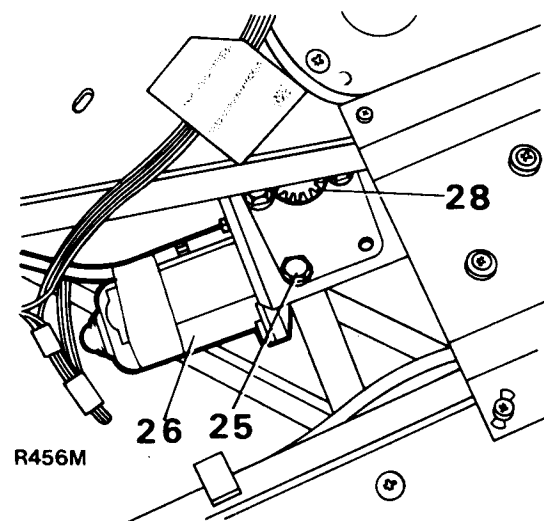
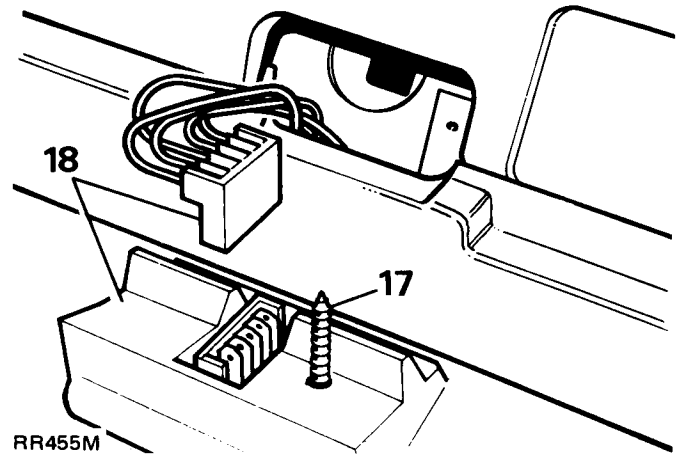


WINDOW LIFT MOTOR – REAR**– Remove and refit****Removing**

15. Ensure the window is in its fully closed position, and secure it with adhesive tape over the top of the door to prevent the window dropping down.
16. Disconnect the battery.
17. Remove the armrest/door pull finisher to reveal the two securing screws.
18. Remove the two securing screws (with plain washers) detach the armrest/door pull from the inner door panel. Disconnect the multi-plug at the rear of the window lift switch.
- NOTE:** At this stage the window lift switch can be removed by applying pressure to the rear of the switch, pushing it through the door pull moulding.
19. Remove the interior handle finisher button to reveal the screw retaining the handle surround.
20. Remove the screw and detach the handle surround from the door trim pad.
21. Detach the door trim pad by inserting a screwdriver between the trim pad and inner door panel, gently prising out the six plastic securing clips from their respective holes in the inner door panel.
22. Displace the bottom half of the plastic weather sheet to reveal the window lift motor.
23. Release the lift motor harness from the retaining clips.
24. Disconnect the lift motor harness snap connections from the main door harness.
25. Supporting the lift motor release the three bolts securing the motor to the inner door panel.
26. Withdraw the lift motor from the lower aperture in the inner door panel.

Refitting

27. Reverse operations 15 to 26.
28. Ensure the lift motor drive gear is engaged and correctly aligned with the window lift linkage before proceeding.



ELECTRICALLY OPERATED CENTRAL DOOR LOCKING SYSTEM – MID 1984 TO 1985

An electrically operated central door locking system is fitted as an option on four door models.

Locking or unlocking the drivers door from outside by key operation, or from inside by sill knob automatically locks or unlocks all four doors.

Rear doors can be independently locked or unlocked from inside by sill knob operation but can be overridden by further operation of the drivers door locking control.

On earlier models the central door locking system is controlled by either front door as shown in circuit diagram Number 1. This system incorporated a control box, located under the fascia adjacent to the steering column.

On later models the locking system is controlled by the drivers door lock actuator as detailed in circuit diagram Number 2.

The circuit is directed through the fuse box and is protected by a 10 amp fuse (No. 19 in fuse box).

On rear doors only a childrens safety lock is provided which can be mechanically preset to render the interior door release handles inoperative.

NOTE: Circuit diagrams have been previously released in Workshop Bulletin 01/85.

Failure of an actuator will not affect the electric locking of the remaining three doors. The door with the inoperative actuator can still be unlocked or locked manually.

NOTE: The door lock actuator units contain non-serviceable parts. If a fault should occur replace the unit concerned with a new one. Before carrying out any maintenance work disconnect the battery.

DOOR LOCK ELECTRICAL CONTROL UNIT

– Fitted to vehicles with two-door locking control only

– Remove and refit

Removing

1. Release the lower fascia panel by removing the six self-tapping screws.
2. Disconnect the electrical leads by releasing the multi-plug from the bottom end of the control unit.
3. Remove the two self-tapping screws securing the control unit to the outer side of the steering column support bracket and remove the control unit.

Refitting

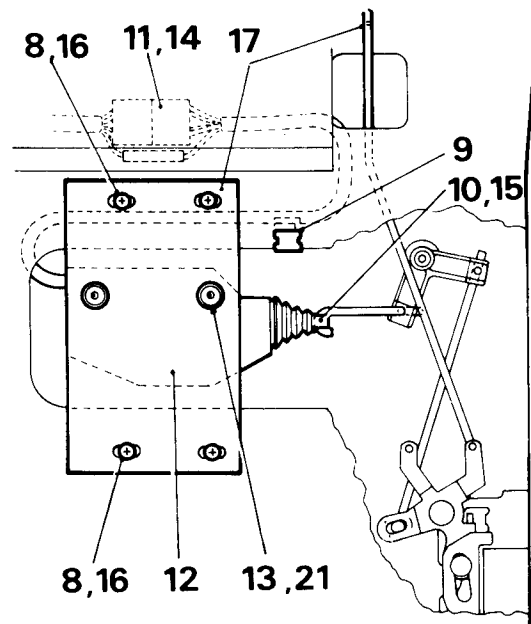
4. Reverse instructions 1 to 3.

FRONT DOOR ACTUATOR UNITS

– Remove and refit

Removing

1. Ensure the window is in its fully closed position.
2. Remove the armrest/door pull finisher to reveal the two retaining screws securing the armrest door pull to the inner door panel.
3. Remove the interior door handle finisher button to reveal the screw retaining the handle surround.
4. Release the screw and remove the handle surround from the interior door trim pad.
- NOTE:** On earlier models with manually operated side windows it is necessary to remove the window regulator handle to enable the trim pad to be removed.
5. Release the door trim pad by inserting a screwdriver between the trim pad and the inner door panel, gently prising out the nine plastic clips from their respective holes around the edges of the trim pad.
6. Disconnect the two speaker connections inside the door and remove the door trim pad complete with speaker.
7. Peel back the top of the plastic weather sheet at the rear of the inner door panel to expose the lock actuator unit.
8. Remove the four screws and plain washers securing the lock actuator mounting plate to the inner door panel.
9. Release the clip retaining the electrical cable.
10. Manoeuvre the actuator assembly to detach the operating rod 'eye' from the hooked end of the actuator link on the door lock.
11. Withdraw the actuator assembly from the door until the electrical cable is pulled out of its channel sufficiently to expose the connectors which can then be detached.
12. Remove the actuator assembly from the door.
13. The actuator unit may be changed if necessary by removing the two rubber mounted screws which secure it to the mounting plate.



RR369M

Refitting

14. Locate the actuator assembly in the inner door panel and fit the electrical cable connectors. The cable, and connectors, are pulled back into the channel from the front end and the cable clip refitted.
15. Manoeuvre the actuator assembly to engage the operating rod 'eye' on the hooked actuator link.
16. Loosely fit the actuator mounting plate to the inner door panel with the four screws, setting the mounting plate in the centre of the slotted holes.
17. Ensure that manual operation of the sill locking control is not restricted by the operation of the actuator operating rod and vice versa, resetting the mounting plate as necessary.
18. Reconnect the vehicle battery.

continued

19. Check that electrical operation of the door lock occurs when the sill locking control is moved through half of its total movement. Reset the mounting plate if necessary and tighten the four screws.

NOTE: The above adjustment ensures that the full tolerance on the switching operation is utilised.

REAR DOOR ACTUATOR UNITS

Remove and refit

Instructions as for front doors with the following exceptions:

20. No radio speaker is involved.
21. The electrical cable and plug is retained to the inner door panel by two spring clips and is immediately accessible through the large aperture in the door.
22. Instruction 19 does not apply to rear actuator units which are not fitted with switches.

NOTE: If necessary the lock actuator may be detached from its mounting plate to facilitate the removal of the lock actuator from the connector rod inside the door panel.

SPLIT CHARGING FACILITY – OPTION

The circuit provides an additional source of electrical supply allowing separate charging and discharging of an additional battery for auxiliary equipment without affecting the charge state of the vehicle's main battery.

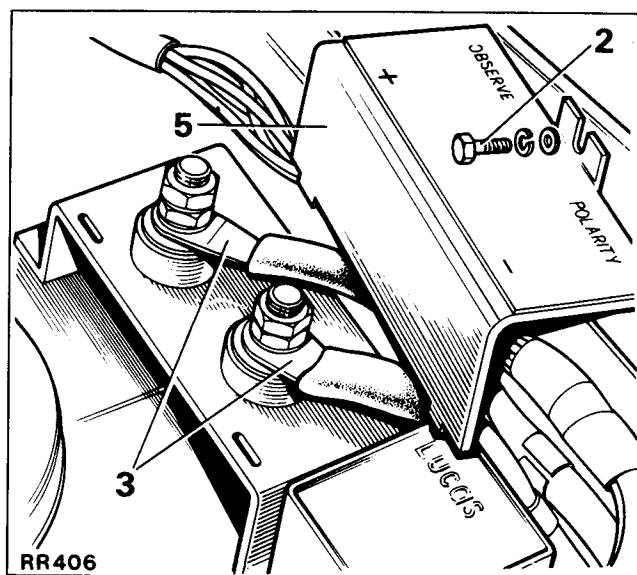
A terminal bracket, heavy duty relay and cables are fitted on the left hand front wing valance.

The additional battery, leads and fixing clamps are NOT included in the option.

The split charging system is controlled by a voltage sensitive switch which energises the relay when the ignition voltage exceeds a pre-set level, thus supplying current to the positive terminal on the terminal bracket. Conversely, if the ignition voltage falls below the pre-set level the split charging circuit will cut-out.

To operate split charging system

1. Install the additional battery.
2. Remove the fixing bolt securing the terminal bracket cover.
3. Ensure that the positive and negative leads are correctly connected to the terminals and the battery in accordance with the markings on the terminal bracket cover.
4. Start the engine. As soon as the alternator is charging the vehicle battery and the voltage exceeds the pre-set level the split charge function will operate.
5. After charging replace the terminal bracket cover.



General service information

1. Introduction

Before any component of the air conditioning system is removed the system must be depressurised. When the component is replaced the system must be evacuated to remove all traces of old refrigerant and moisture. Then the system must be recharged with new refrigerant.

Any service work that requires loosening of a refrigerant line connection should be performed only by qualified service personnel. Refrigerant and/or oil will escape whenever a hose or pipe is disconnected.

All work involving the handling of refrigerant requires special equipment, a knowledge of its proper use and attention to safety measures.

2. Servicing equipment

The following equipment is required for full servicing of air conditioning.

Charging trolley.

Service valve adaptors.

Valve core removers.

Leak detector.

Tachometer.

Lock ring spanner.

Valve key.

Safety goggles.

Refrigerant charging line gaskets.

Compressor dip stick.

5/8in. UNC bolt or Union nut (Part Number 534127) for extraction of the compressor pulley.

Thermometer -20°C to -60°C (0°F to -120°F).

3. Servicing materials

Refrigerant: Freon R12.

Nominal charge weight:

RHD vehicles – 1.25 kg (44 oz)

LHD vehicles – 1.08 kg (38 oz)

CAUTION: Methychloride refrigerants must not be used.

Compressor oil: See Recommended Lubricants, Section 09, alternatives.

4. Precautions in handling refrigerant

Refrigerant 12 is transparent and colourless in both the gaseous and liquid state. It has a boiling point of -30°C (-22°F) and at all normal pressures and temperatures it is a vapour. The vapour is heavier than air, non-flammable and non-explosive. It is non-poisonous except when in contact with an open flame, and non-corrosive until it comes into contact with water.

The following precautions in handling refrigerant 12 should be observed at all times:

- Do not leave a drum of refrigerant without its heavy metal cap fitted.
- Do not carry a drum in the passenger compartment of a car.
- Do not subject drums to a high temperature.
- Do not weld or steam clean near an air conditioning system.
- Do not discharge refrigerant vapour into an area with an exposed flame, or into the engine air intake. Heavy concentrations of refrigerant in contact with a live flame will produce a toxic gas that will also attack metal.
- Do not expose the eyes to liquid refrigerant. ALWAYS wear safety goggles.

5. Precautions in handling refrigerant lines

WARNING: Always wear safety goggles when opening refrigerant connections.

- When disconnecting any pipe or flexible connection the system must be discharged of all pressure. Proceed cautiously, regardless of gauge readings. Open connections slowly, keeping hands and face well clear, so that no injury occurs if there is liquid in the line. If pressure is noticed allow it to bleed off slowly.
- Lines, flexible end connections and components must be capped immediately they are opened to prevent the entrance of moisture and dirt.
- Any dirt or grease on fittings must be wiped off with a clean alcohol dampened cloth. Do not use chlorinated solvents such as trichloroethylene. If dirt, grease or moisture cannot be removed from inside pipes, they must be replaced with new.
- All replacement components and flexible end connections are sealed, and should only be opened immediately prior to making the connection. (They must be at room temperature before uncapping to prevent condensation of moisture from the air that enters.)
- Components must not remain uncapped longer than 15 minutes. In the event of delay the caps must be replaced.
- Receiver driers must never be left uncapped as they contain Silica Gel which will absorb moisture from the atmosphere. A receiver drier left uncapped must be replaced, and not used.
- A new compressor contains an initial charge of 11 UK fluid ozs (312.5 ml) of oil when received, part of which is distributed throughout the system when it has been run. The compressor contains a holding charge of gas when received which should be retained until the hoses are connected.
- The compressor shaft must not be rotated until the system is entirely assembled and contains a charge of refrigerant.

CONDENSER FANS AND MOTORS (TWIN FAN SYSTEM)

— Remove and refit

82.15.01

Removing fans and motors

1. Open the bonnet and disconnect the battery.
2. Remove the six screws and withdraw the grille panel.
3. Remove the insulation tape from the wiring harness to expose snap connectors. Make a note of the wiring colours to facilitate reconnection and disconnect snap connector.
4. Disconnect earth wiring retaining bolt.
5. Remove wiring securing clip.
6. Slacken the two upper bolts securing the left hand and right hand bonnet striker support stays.
7. Remove the lower bolts securing the lower ends of the stays and pivot both stays forward.
8. Remove the two upper bolts securing the fans (one for each fan).
9. Remove the four lower bolts securing the fans (two for each fan).
10. Turn each fan and motor assembly in an anti-clockwise direction and carefully remove from the vehicle.

NOTE: Later models have fan motor assemblies mounted on two bars across the front of the condenser. Follow instructions 1 to 7 above, then remove two nuts and washers securing each fan motor and withdraw the assembly.

To dismantle fan motor and cowl assembly

NOTE: The fan cowl is deleted on later models.

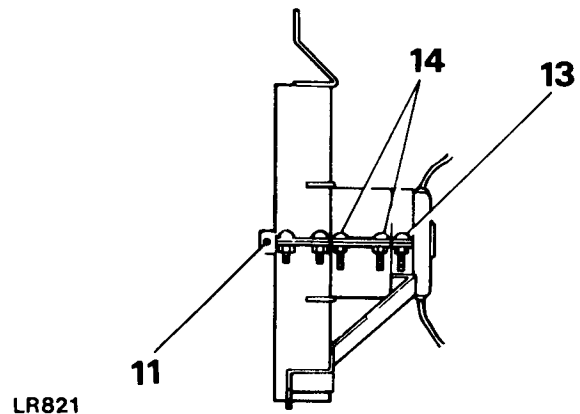
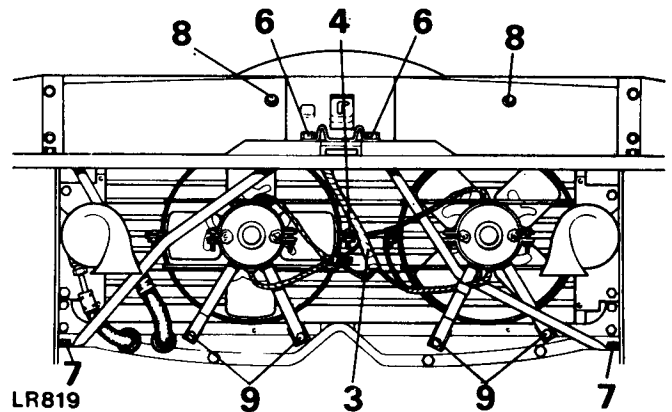
11. Slacken the fan blade grub screw and withdraw the fan blades from the motor drive shaft. Make a note of the exact location of the fan blades on the shaft to facilitate reassembly.
12. Remove the wiring securing clip.
13. Slacken the fan cowl clamp screws.
14. Slacken the stay bracket clamp screws and remove the fan cowl and stay bracket.

To reassemble fan motor and cowl assembly

15. Fit stay bracket to fan motor.
16. Fit the fan cowl.
17. Correctly position fan motor and tighten clamp screws.
18. Locate fan in correct position on drive shaft and secure with grub screw. Check that the fan blade rotates freely.
19. Fit cable securing clip.

To fit fans and motors to vehicle

20. Offer up each assembly into its mounting position.
21. Fit the upper securing bolts (one for each assembly) but leave slack for the time being.
22. Fit the four lower securing bolts (two for each assembly).
23. Tighten all the securing bolts.
24. Secure earth wire.
25. Fit and tighten the bonnet striker support stays.
26. Fasten snap connector and apply insulation tape to the harness.
27. Fit the front grille and secure with the six screws.



CONDENSER (TWIN FAN SYSTEM)**– Remove and refit****82.15.07****Removing**

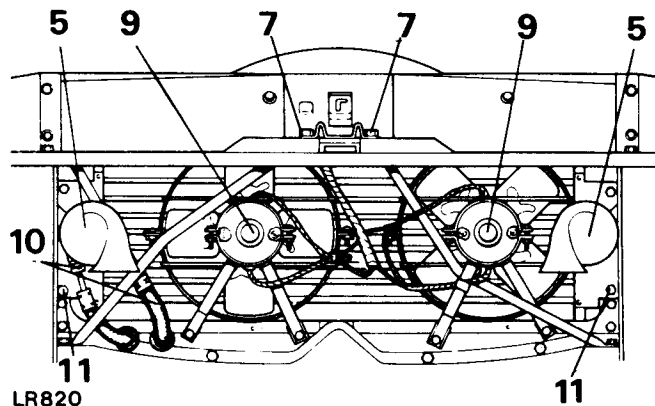
NOTE: On later models it is not possible to withdraw the condenser through the grille aperture.

Ignore instructions 4 to 9 below. Remove radiator 26.40.04. Remove six condenser mounting bolts and withdraw condenser complete with fan motor assemblies.

1. Open the bonnet and disconnect the battery.
2. Depressurise the air condition system – refer to operation 82.30.05.
3. Remove six screws and withdraw the front grille panel.
4. Disconnect the left-hand and right-hand horn electrical leads.
5. Remove the horn bracket securing bolts and remove both horns.
6. Mark the position of the bonnet striker plate.
7. Remove the two bolts securing the striker plate and striker plate diagonal support stays.
8. Move the support stays aside to gain access to the condenser.
9. Remove the fan and motor assemblies, see operation 82.15.01 instructions 8 to 10.

CAUTION: Before carrying out instruction 10 protect the eyes with safety goggles and wear protective gloves.

10. Using two spanners on each union, carefully disconnect the pipes at the condenser end. Fit blanks to the exposed ends of the pipes.
11. Remove the six bolts retaining the condenser and withdraw the condenser, from the vehicle, through the grille aperture.

**Refitting**

12. Place the condenser into position and secure with the six bolts.
13. Remove the blanks from the pipes and fit new 'O' rings to the pipes.
14. Apply refrigerant oil to the pipe threads to aid sealing.
15. Connect the pipes to the condenser and tighten to the correct torque:–
Compressor hose 3.4 to 3.9 kgf.m (24 to 29 lbf.ft)
Receiver drier hose 1.4 to 21. kgf.m (10 to 15 lbf.ft)
16. Fit the fan and motor assemblies.
17. Locate the bonnet striker support stays and align striker to previously made marks and tighten the retaining bolts.
18. Tighten the striker plate diagonal support stay lower bolts.
19. Refit the two horns, and connect the electrical leads.
20. Connect the battery and test the horns.
21. To compensate the oil loss, add 2 UK fluid ozs (56.8 ml) of the correct oil to the compressor.
22. Evacuate the system, operation 82.30.06.
23. Charge the system, operation 82.30.08.
24. Carry out a leak test on the disturbed joints, see operation 82.30.09.
25. Check the complete system as described in operation 82.30.16.
26. Fit the grille panel.

AIR CONDITIONING SYSTEM

– Charge

82.30.08

CAUTION: Do not charge liquid refrigerant into the compressor. Liquid cannot be compressed, and if liquid refrigerant enters the compressor inlet valve severe damage is possible. In addition, the oil charge may be absorbed, with consequent damage when the compressor is operated.

NOTE: Nominal charge weight:

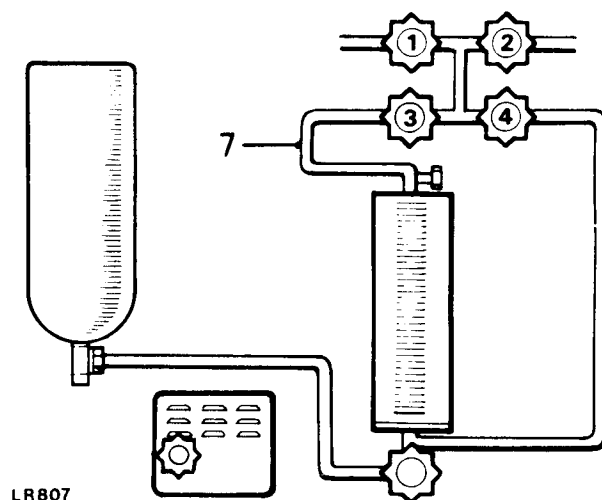
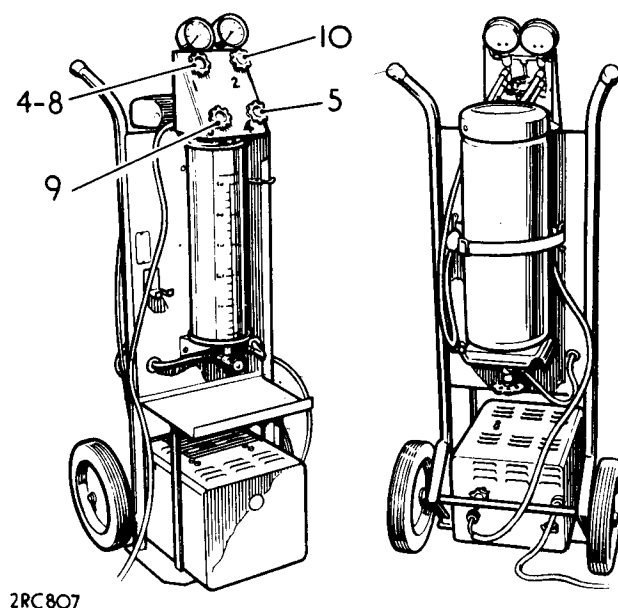
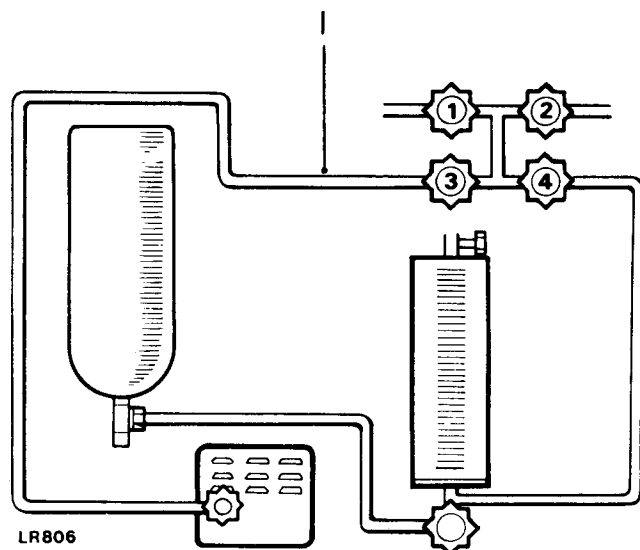
RHD vehicles 1.25 kg (44 oz)

LHD vehicles 1.08 kg (38 oz)

Charging

1. Fit the charging and testing equipment, 82.30.01, as described for evacuating.
2. Evacuate the air conditioning system, 82.30.06, allowing 1.37 kg (3 lb) of refrigerant to enter the charging cylinder.
3. Put on safety goggles.
4. Close the low pressure valve (No. 1).
5. Open the refrigerant control valve (No. 4) and release liquid refrigerant into the system through the compressor discharge valve. The pressure in the system will eventually balance.
6. If the full charge of liquid refrigerant will not enter the system, proceed with items 7 to 12.
7. Reconnect the charging and testing equipment as described for charging with gaseous refrigerant, 82.30.01.
8. Open the low pressure valve (No. 1).
9. Open valve No. 3.
10. Close the high pressure valve (No. 2).
11. Start and run the engine at 1000 to 1500 rev/min and allow refrigerant to be drawn through the low pressure valve (No. 1) until the full charge has been drawn into the system.
12. Close valve number 1 and 3.
13. Close valve No. 4.
14. Check that the air conditioning system is operating satisfactorily by carrying out a pressure test 82.30.10.

CAUTION: Do not overcharge the air conditioning system as this will cause excessive head pressure.



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