

REPAIR OPERATIONS

The following operations can be carried out with the gearbox in the vehicle. For ease of working, the vehicle should be raised on a ramp or placed over a pit. Also, the battery should be disconnected for safety.

Renew speedometer drive pinion

1. Raise the vehicle on a ramp.
2. Remove the speedometer drive clamp and nut and withdraw the cable.
3. Prise out the drive pinion assembly.
4. Push in a new assembly and fit the speedometer cable and secure with the clamp and nut.

Renew rear output shaft oil seal**Special tool: 18G1422**

1. Disconnect the battery for safety.
2. Disconnect the rear propshaft from the output flange.
3. Remove the brake drum retaining screws and withdraw the drum.
4. Remove the two back plate bolts that also retain the oil catcher and remove the catcher.

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

5. Remove the output shaft nut and washer and withdraw the flange.
6. Using the slot provided, lever off the dust cover.
7. Prise out the output shaft oil seal(s).
8. Using special tool 18G1422 fit the double-lipped oil seal, open side inwards, with the seal in contact with the bearing circlip, taking care not to touch the seal lips.

NOTE: The double-lipped oil seal supersedes the two oil seals used on early production.

9. Fit the dust cover.
10. Lubricate the surface of the flange which runs in the seal and carefully fit the flange.

NOTE: To renew the flange bolts first remove the circlip before fitting the flange.

11. Secure the flange with the nut and washer and tighten to 146 to 179 Nm.
12. Fit the oil catcher to the back plate using silicone rubber sealant and secure with the two back plate bolts (with plain washers).
13. Fit the brake drum and retain with the two screws.
14. Reconnect the propeller shaft.

Renew front output shaft oil seal**Special tool: 18G1422**

1. Disconnect the front propeller shaft from the flange and move to one side.
2. Remove the output shaft nut and washer and withdraw the flange.
3. Remove the oil seal shield.
4. Prise out the oil seal(s).

NOTE: The double-lipped oil seal supersedes the two oil seals used on early production.

5. Using special oil seal replacer tool 18G1422 fit the double-lipped oil seal, open side inwards, with the seal in contact with the bearing circlip, taking care not to touch the seal lip.
6. Lubricate the running surface of the flange and fit it together with the oil seal shield.
7. Secure the flange with the nut and washer and tighten to 146 to 179 Nm.
8. Refit the propeller shaft.

Remove intermediate shaft and gears**Special tool: RO605862**

1. Drain the transfer gearbox oil.
2. Disconnect the rear propshaft from the output flange.
3. Remove the two screws and withdraw the brake drum.
4. Remove the four bolts securing the brake back plate and withdraw the back plate and oil catcher.

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

5. Remove the intermediate shaft keeper plate, retained by a single bolt.
6. Remove the ten bolts and remove the bottom cover plate.
7. Using service tool RO605862 withdraw the intermediate shaft whilst holding the gear cluster. Collect the bearings and thrust washers from both ends of the cluster.
8. Remove the two 'O' rings, one from the shaft, the other from the casing.

Fit intermediate shaft gears

9. Fit the 'O' ring to the intermediate shaft.
10. Fit the 'O' ring into the front of the transfer case.
11. Lubricate thrust washers, bearings, shaft and spacer.
12. Fit needle bearings with spacer interposed.
13. Fit front thrust washer to slot in transfer case (plain side to case).

14. Locate gear assembly partially into the transfer case so that it rests on the front thrust washer.
15. Locate rear thrust washer (plain side uppermost) into slot in transfer case.
16. Gently push gear assembly into mesh.
17. 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.
18. Align gear and thrust assembly and slide the intermediate shaft into the transfer box from the rear.
19. Align the shaft so that the lock plate in the end is on top.
20. Apply Loctite 290 to the lock plate bolt threads. Locate lock plate into position and fit securing bolt with spring washer.
21. Lever the gear assembly to one side and measure the end-float with feeler gauges. This should be between 0,08 and 0,35 mm.
22. Grease and fit the bottom cover joint washer.
23. Apply Loctite 290 to the ten bolts and evenly tighten to 22 to 28 Nm.
24. Fit the oil catcher to the brake plate, using silicone rubber sealant and secure the backplate with the four bolts. The two bolts securing the oil catcher are fitted with plain washers.
25. Fit the brake drum and retain with the two screws.
26. Connect the rear prop shaft.
27. Refill the transfer box with the correct oil.

OVERHAUL LT230R TRANSFER GEARBOX**Service tools:**

RO605862/LRT-41-501-Intermediate shaft removal
 18G1271-Seal remover
 18G1205/LRT-51-003-Flange wrench
 18G257-Circlip pliers
 18G1422/LRT-37-014-Oil seal replacer
 18G1423/LRT-41-007-Stake nut remover
 MS47/LRT-99-002-Hand press
 18G47BB/1/LRT-41-001-Collars
 18G47BB/3/LRT-41-001-Button
 18G47BB/2/LRT-41-001-Collars
 18G1424/LRT-41-008-Differential centre bearing drift
 18G47-7/LRT-41-003-Collars and buttons
 LST47-1/LRT-41-002-Collars

REMOVE ASSEMBLIES FOR OVERHAUL

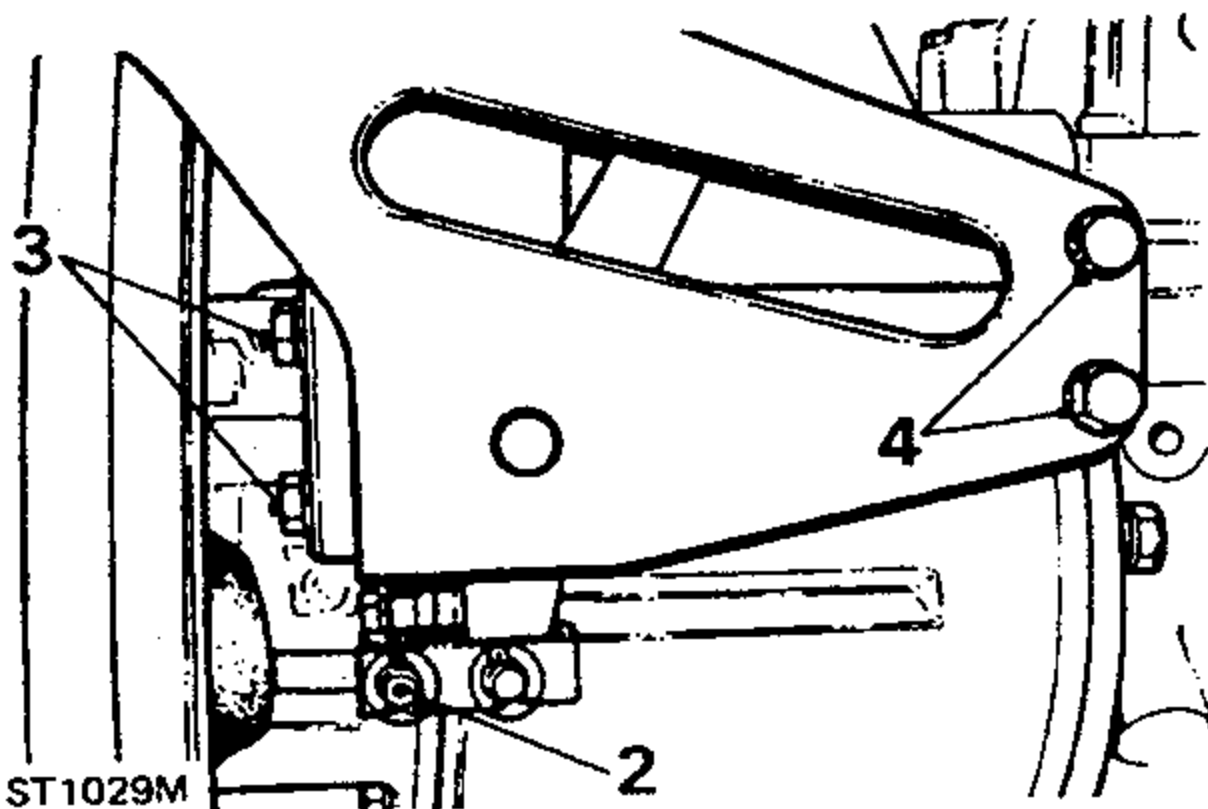
(Instructions 1 to 33)

1. Having removed the complete gearbox and transfer box assembly. The transfer box is separated from the gearbox on the work bench.

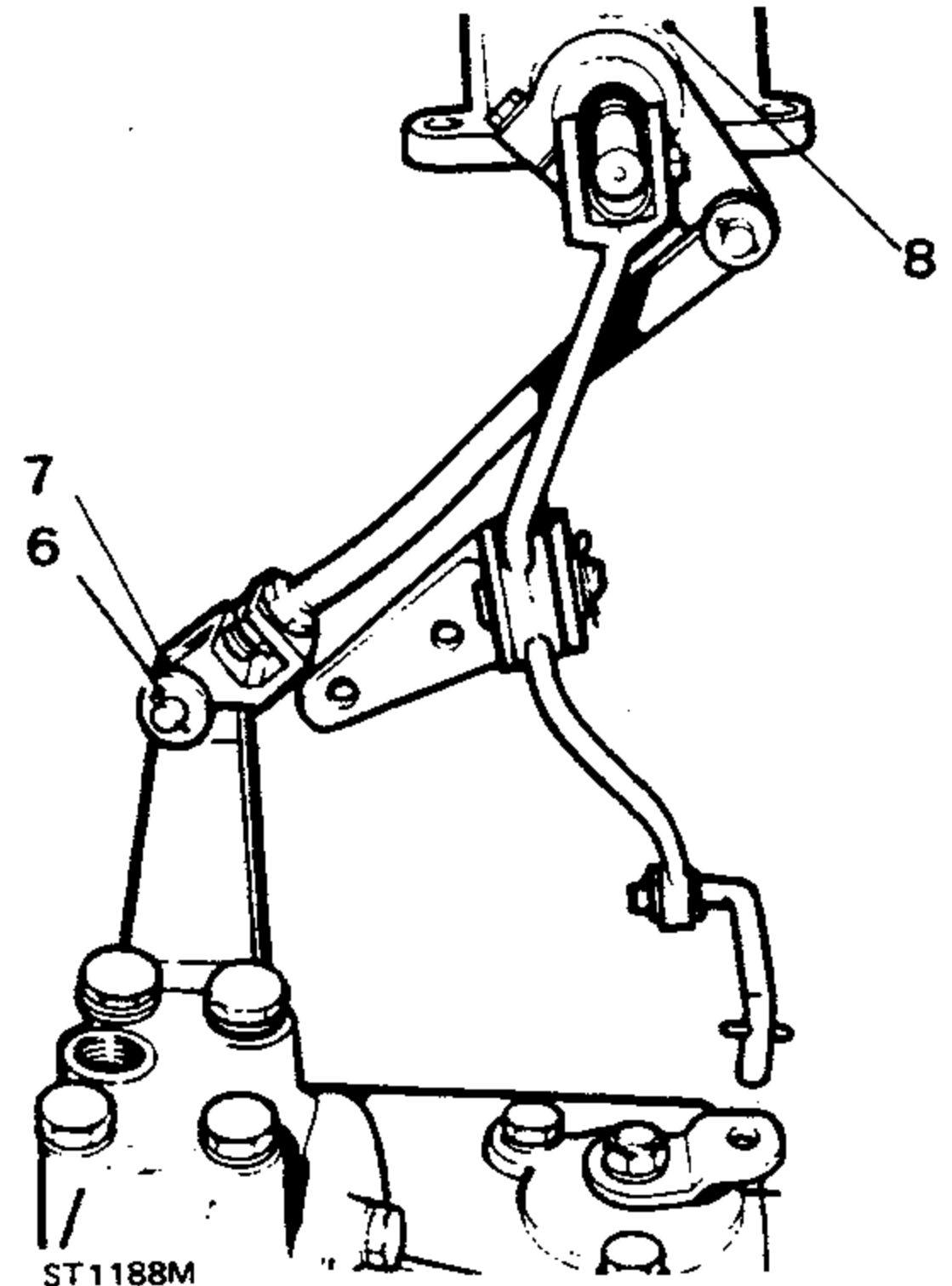
NOTE: To facilitate removal of various items on the work bench, obtain suitable wooden blocks to enable the transfer box to be dismantled in a safe and efficient manner.

Hand brake linkage removal

2. Remove the split pin and clevis pin to release the handbrake linkage from the brake operating lever.
3. Remove the two bolts (with spring washers) securing the rear end of the handbrake mounting bracket to the casing, the lower bolt is shorter.
4. Remove the two bolts (with spring washers and distance pieces) securing the front side of the handbrake mounting bracket and remove from the transfer box.

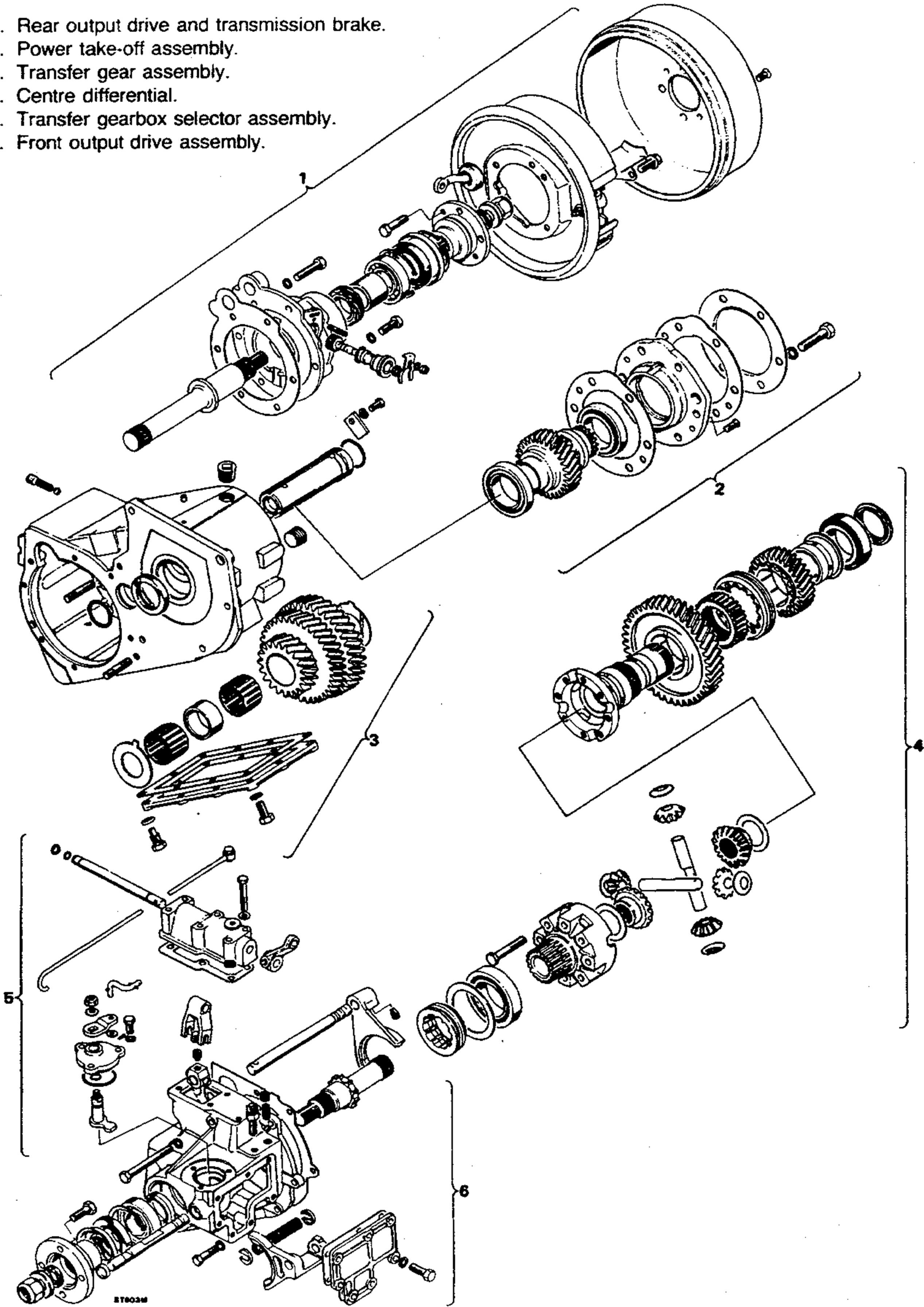
**Transfer box mounting removal**

5. Remove the bolts retaining the right hand rubber mounting plate.
6. Disconnect the bottom of the high/low connecting rod from the high/low operating arm by removing the split pin and clevis pin.
7. Remove the plastic bushes from the operating arm.
8. Remove the gearchange housing complete with linkage.



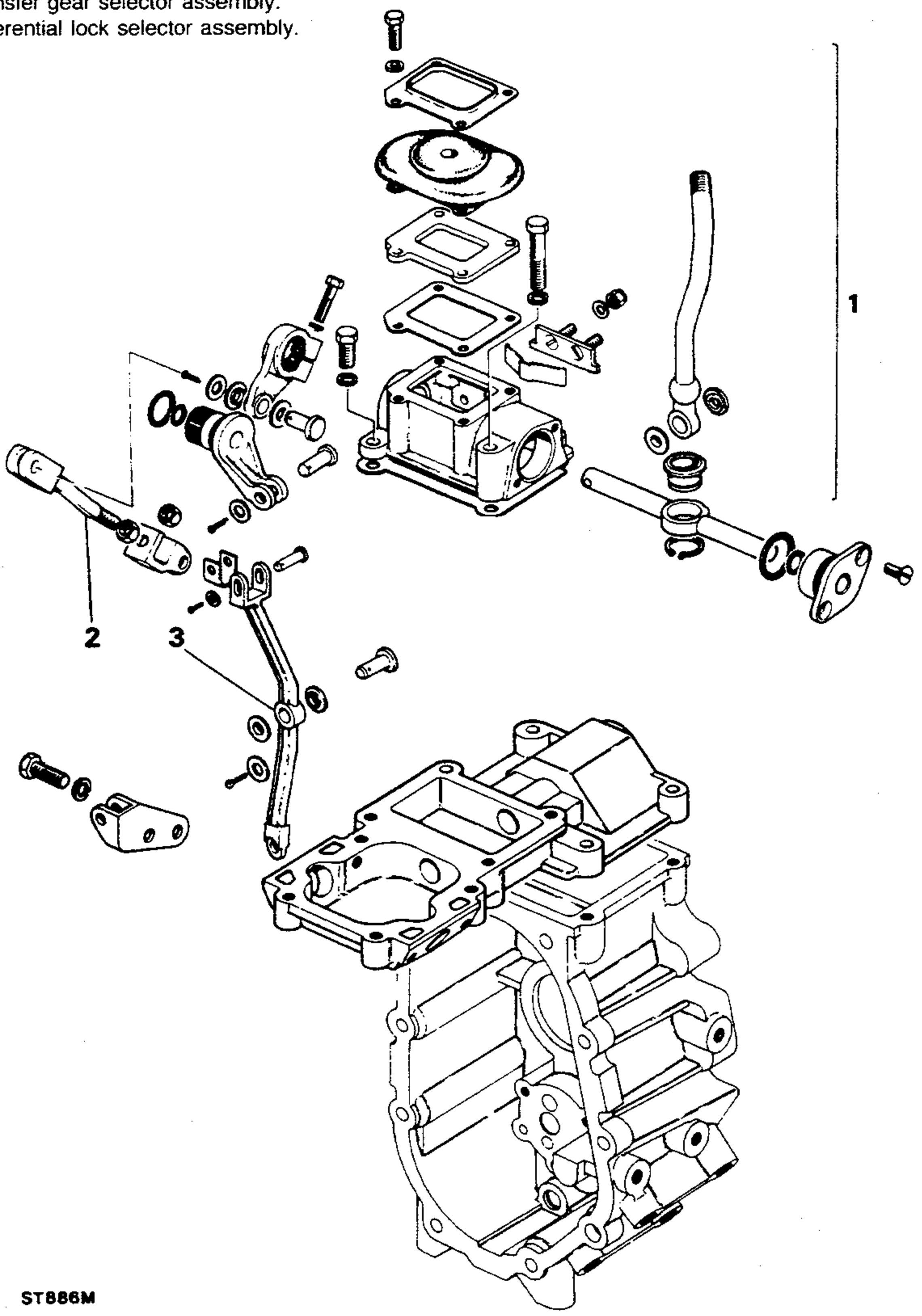
GENERAL ARRANGEMENT OF LT230R TRANSFER GEARBOX

- 1. Rear output drive and transmission brake.
- 2. Power take-off assembly.
- 3. Transfer gear assembly.
- 4. Centre differential.
- 5. Transfer gearbox selector assembly.
- 6. Front output drive assembly.



GENERAL ARRANGEMENT OF TRANSFER GEARCHANGE HOUSING

- 1. Main selector lever.
- 2. Transfer gear selector assembly.
- 3. Differential lock selector assembly.



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Transmission brake removal

9. Remove the two countersunk brake drum retaining screws and pull off the drum.
10. Remove the four bolts securing the brake backplate, two of these also retain the oil catcher.

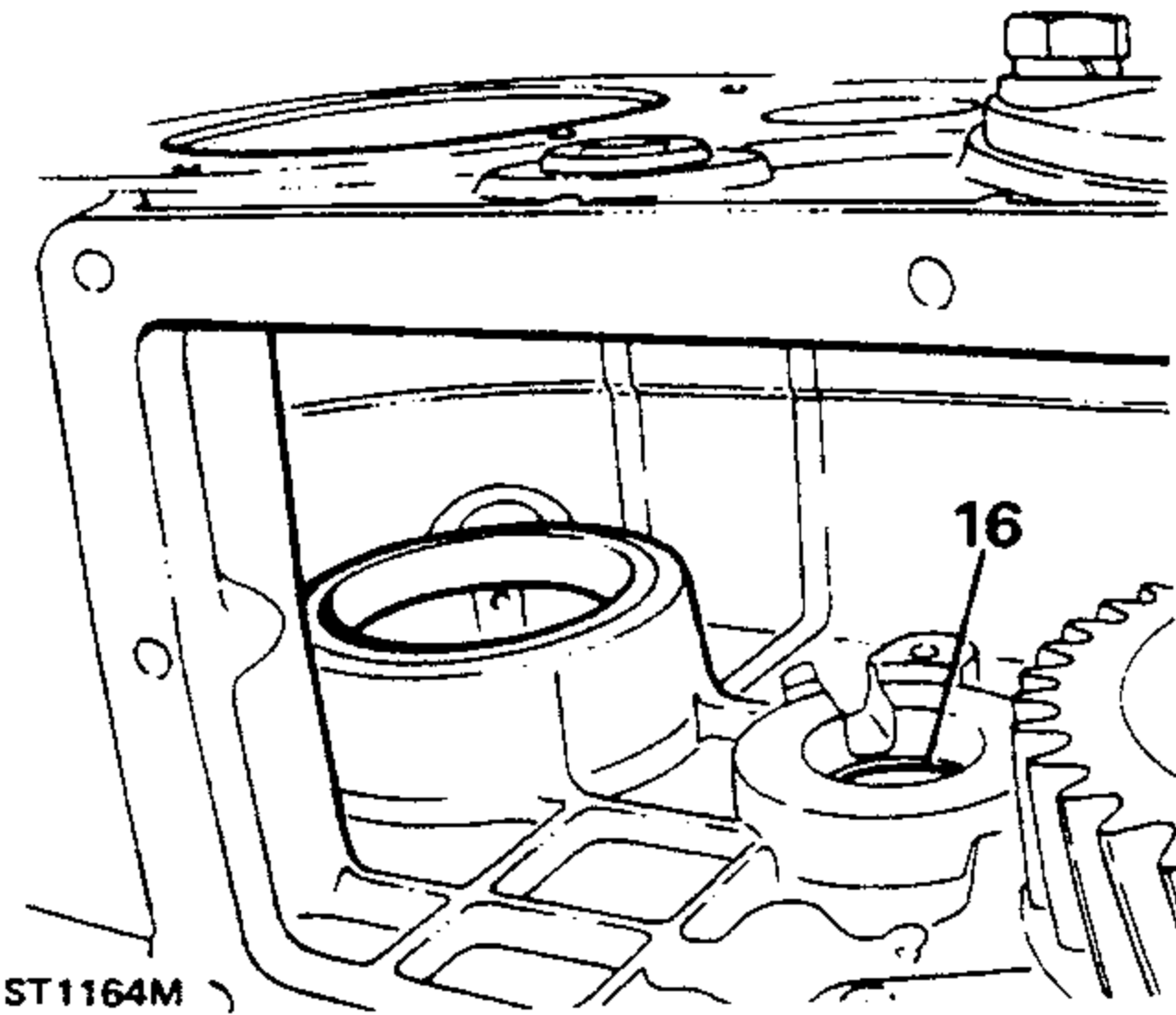
NOTE: An hexagonal type socket should be used for these bolts.

Bottom cover removal

11. Remove the ten bolts retaining the bottom cover.

Intermediate shaft removal

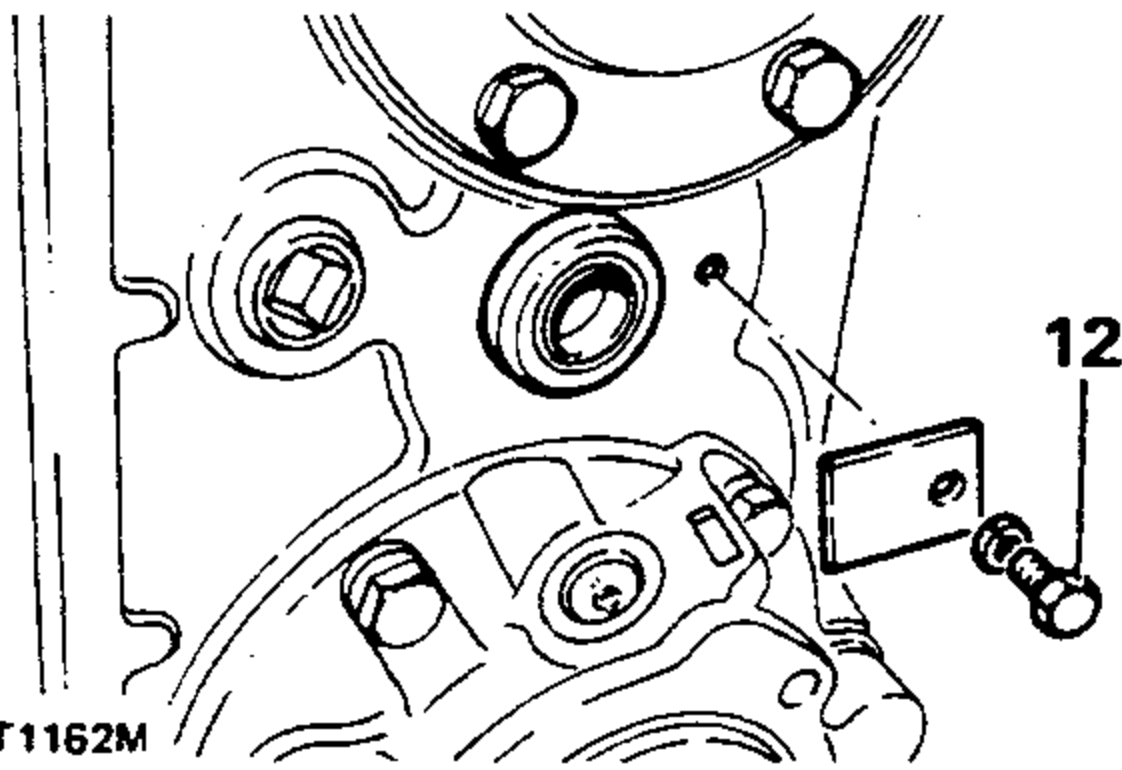
12. Remove the shaft lock plate retained by a single bolt at the rear face of the transfer box.



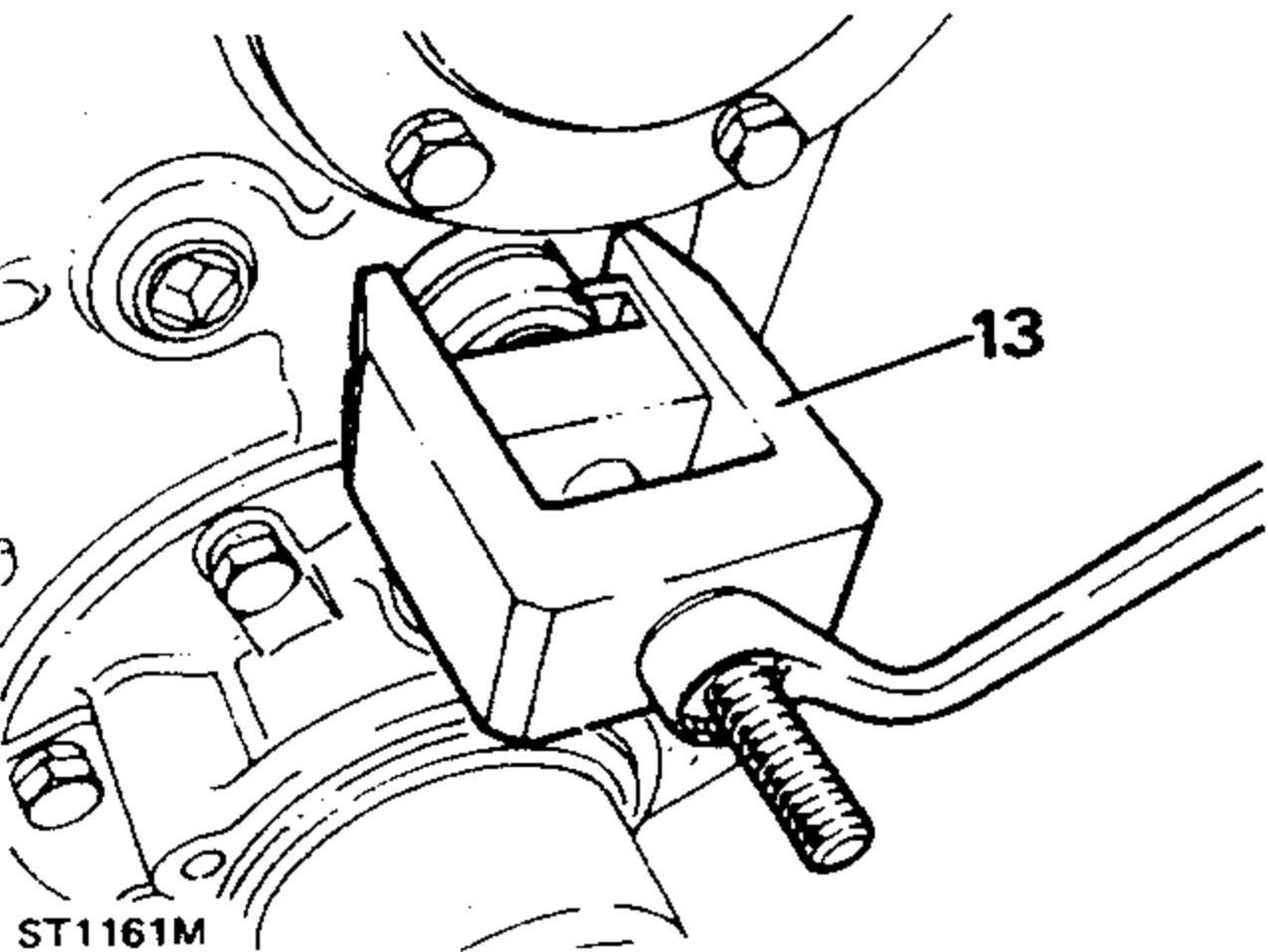
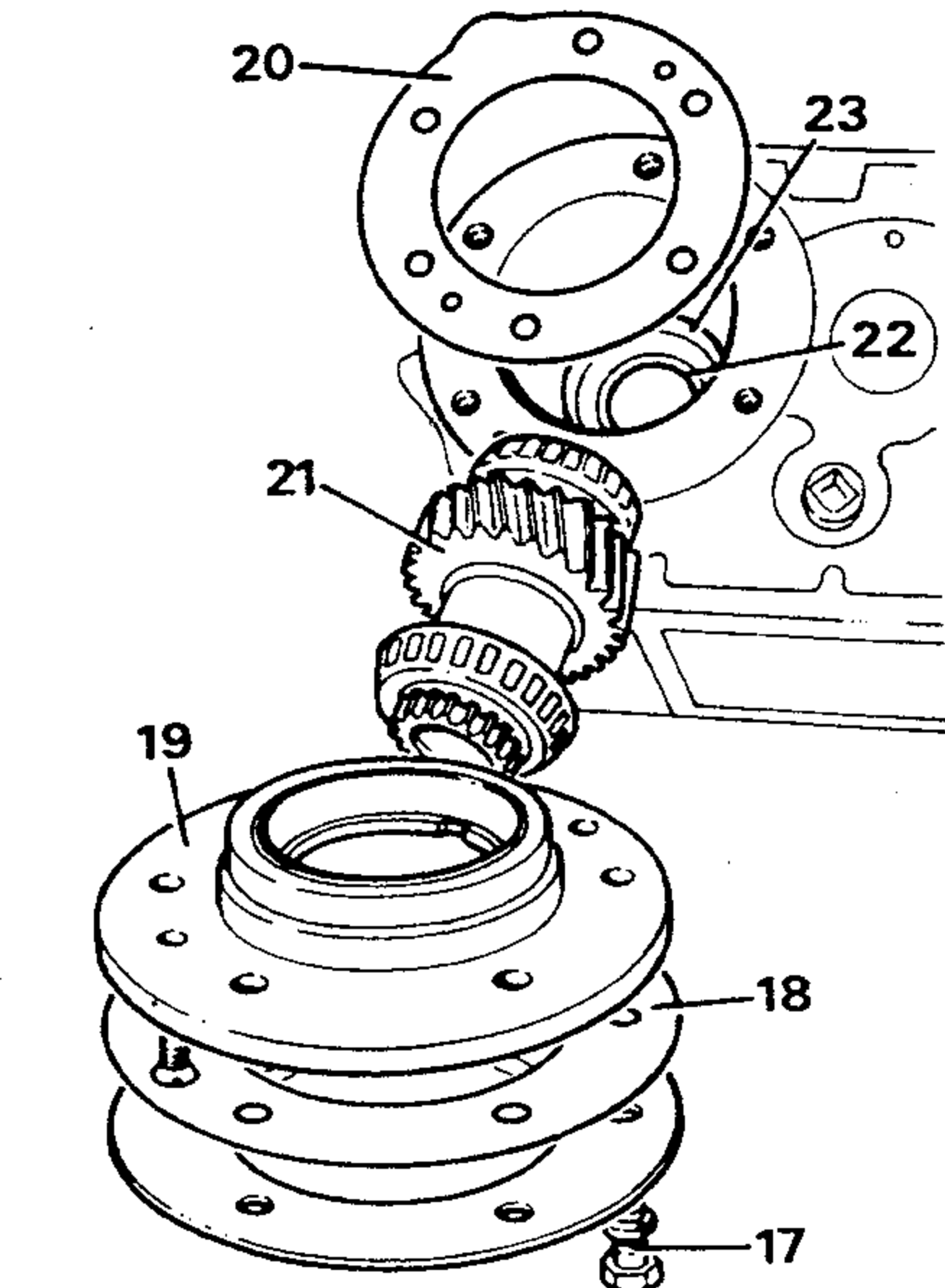
Power take off cover removal

17. Remove the four bolts retaining the circular P.T.O. cover and the speedometer cable clip plate.
18. Remove the gasket.

NOTE: The other two bolts were removed with the gearbox assembly cradle.



13. Withdraw the intermediate shaft, using a screw driver in the slotted end. Where the shaft cannot be easily withdrawn use extractor RO605862.



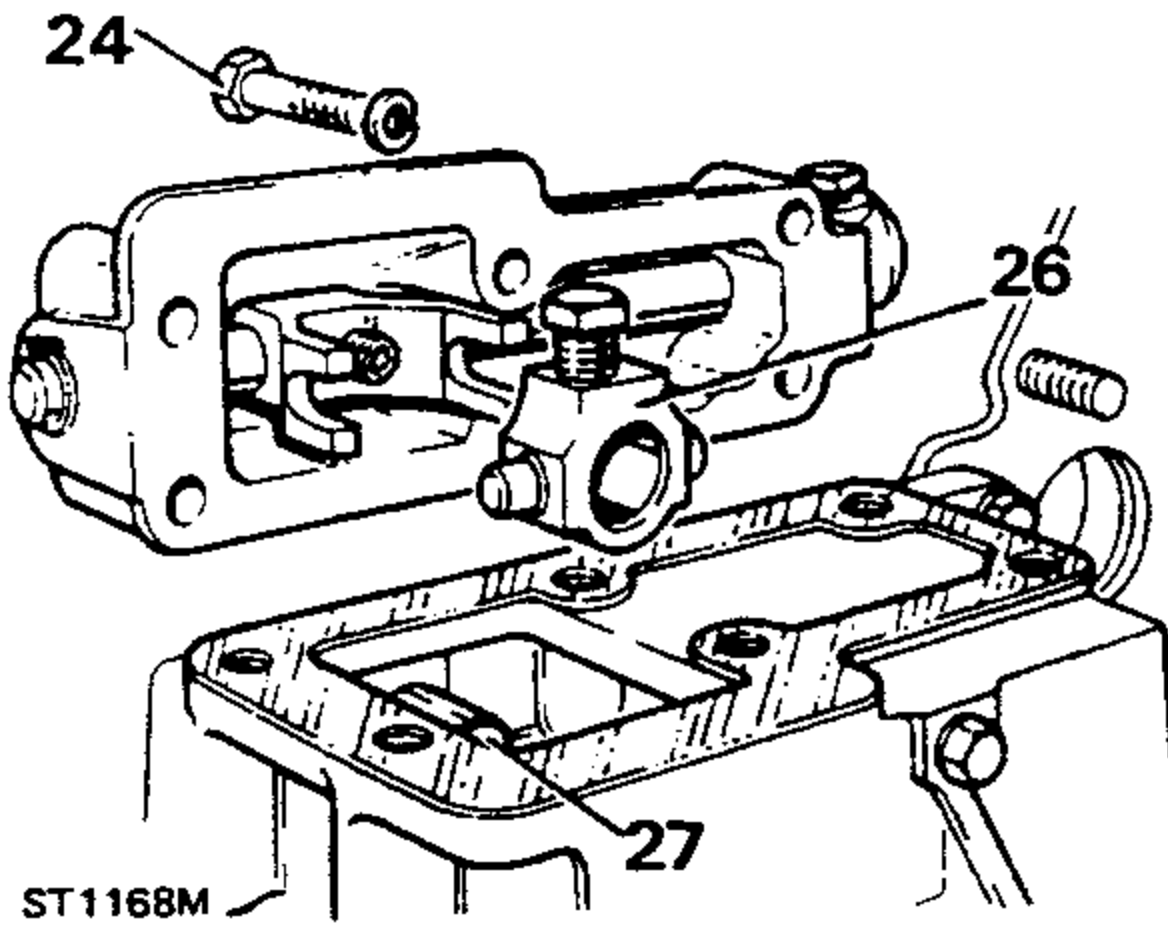
14. Lift out the intermediate gear cluster, roller bearings and spacer.
15. Remove the thrust washers.
16. Remove the 'O' ring from the intermediate shaft and the transfer box case.

Input gear removal

19. Remove the two countersunk screws and release the mainshaft bearing housing.
20. Remove the gasket.
21. Remove the input gear assembly.
22. Prise out and discard the oil seal at the front of the transfer case using service tool 18G1271.
23. Drift out the input gear front bearing track.

High/low selector housing removal

24. Remove the six bolts to release the selector housing.
25. Remove the gasket.

**Front output shaft housing removal**

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

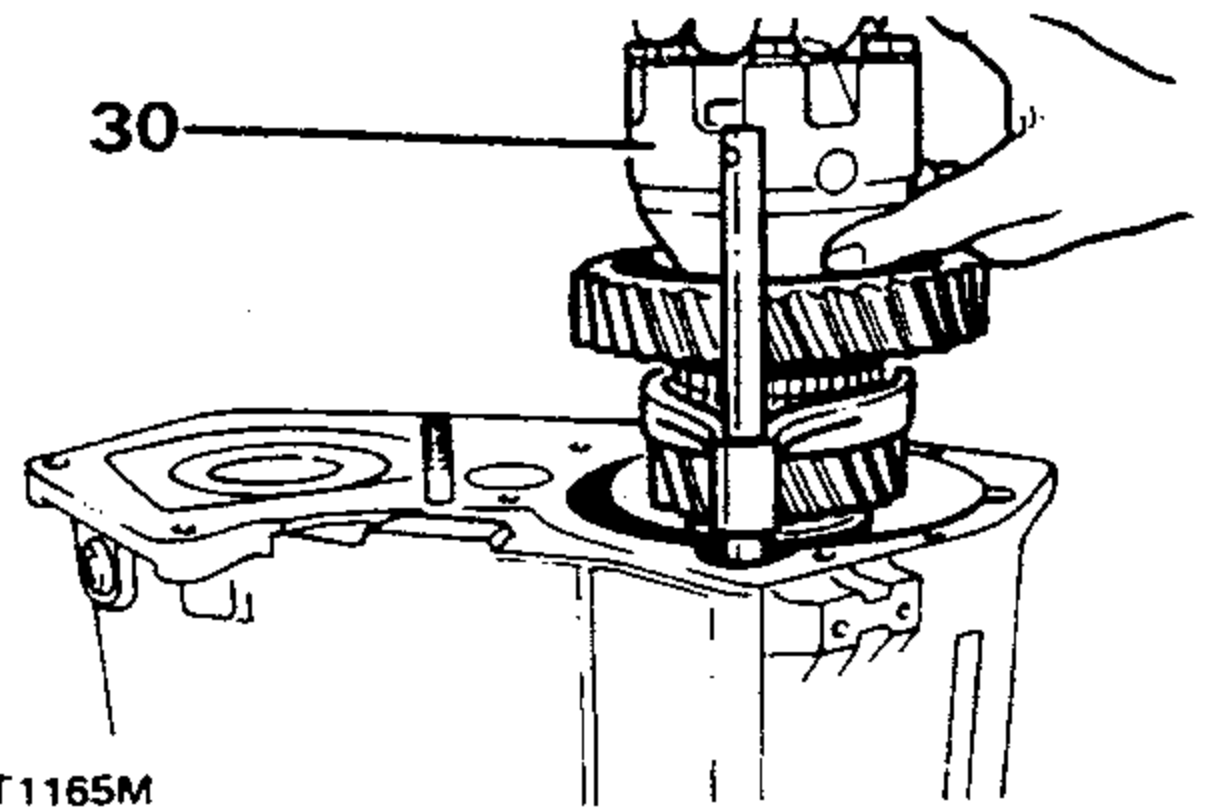
NOTE: The 'radial' dowel in the transfer box face should not be disturbed.

Centre differential removal

29. 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.

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

**Rear output shaft housing assembly removal**

31. Remove the six screws to release the housing. The upper screw is longer.
32. 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.

33. 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. Ensure that the magnetic drain plug is thoroughly cleaned. Renew oil seals and examine all other parts for wear or damage, renew as necessary.

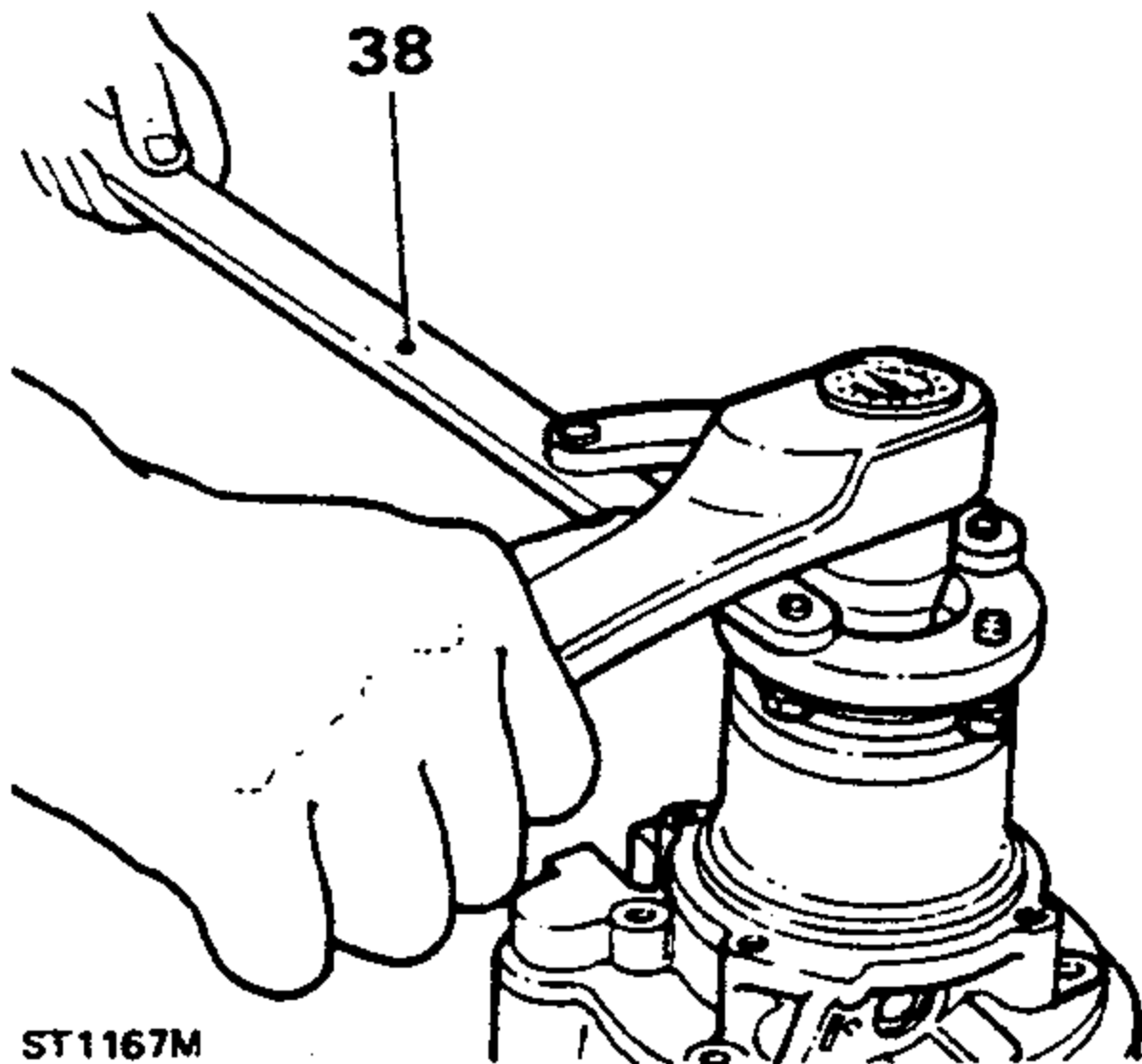
Reassembling

34. Ensure that all faces of the transfer box are clean.
35. Check that level/filler and drain plugs are in position.
36. Fit the two studs which are used for part retention of the extension housing.
37. 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.

Rear output shaft housing - Overhaul**Dismantling**

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

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

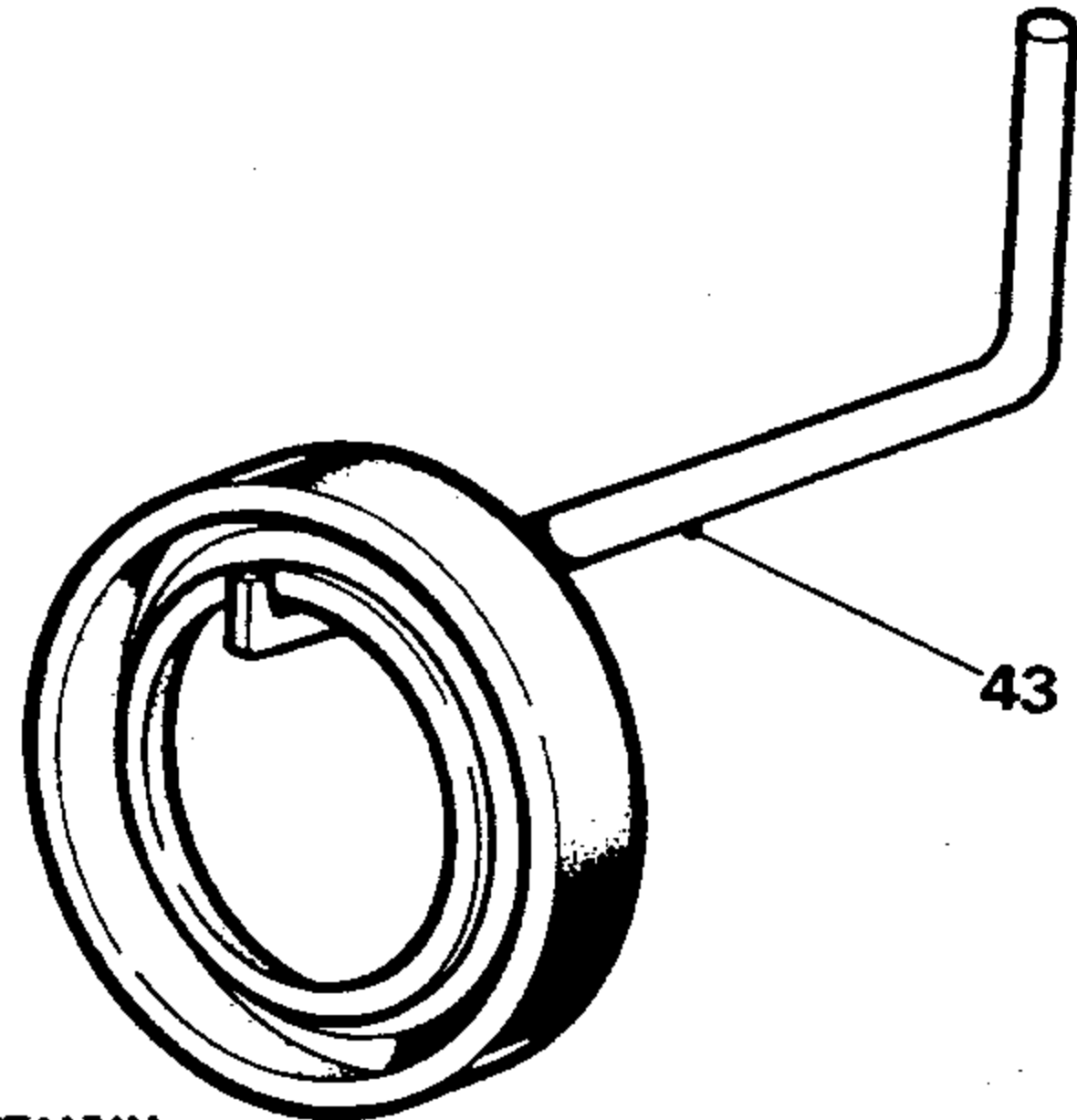


39. Remove the output shaft flange with circlip attached. If necessary, use a two-legged puller.

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

40. Remove the speedometer spindle housing. This can be prised out with a screw driver.
41. Remove assembly from vice and support the housing to allow removal of the shaft, drifting it out by striking the flange end of the shaft.
42. Carefully prise off the oil catch ring using a screw driver in the slot provided.
43. Prise out and discard the seal(s) using tool 18G1271.
44. Using circlip pliers 18G257 remove the circlip retaining the bearing.
45. Drift out the bearing from the back of the housing.

46. Remove the speedometer driven gear and spindle from the spindle housing.
47. Remove the 'O' ring and oil seal.



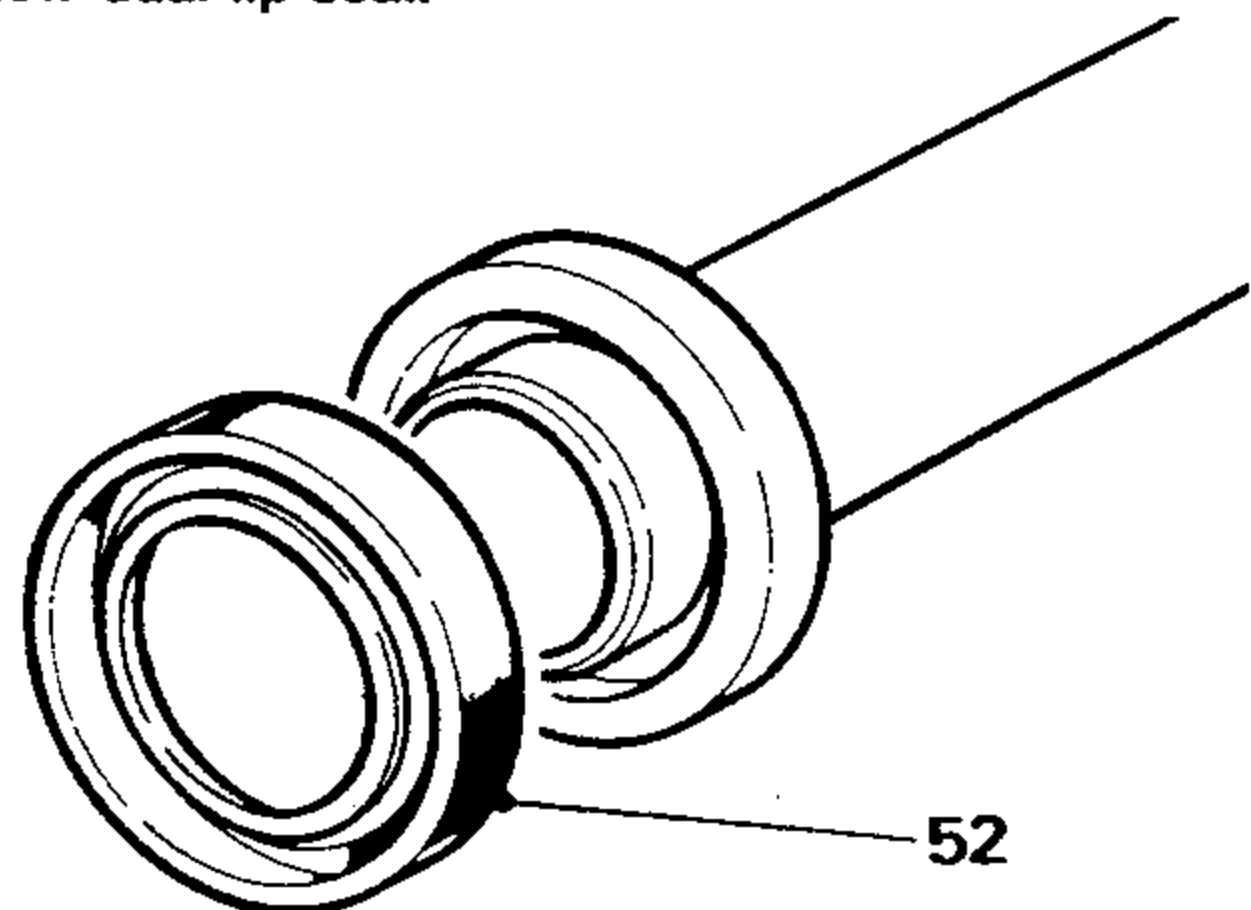
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48. Slide off the spacer and speedometer drive gear from the output shaft.
49. Clean all parts, renew oil seals and Nyloc flange nut and examine all other parts for wear or damage, renew as necessary.

Reassembling

50. Press the output bearing into the housing. Do not use excessive force. If necessary warm the housing and case.
51. Fit the bearing retaining circlip using circlip pliers 18G257.
52. Fit a new dual lip oil seal (open side inward), with the seal in contact with the bearing circlip it is essential to use replacer tool 18G1422.

NOTE: On early production two separate seals were used, these should be replaced with the new dual lip seal.



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53. Carefully charge the lips of the seal with grease.
54. Fit oil catch ring on to housing.
55. Fit oil seal into speedometer spindle housing (open side inwards) with a suitable tube.
56. Fit 'O' ring to speedometer spindle housing.
57. Lubricate seal and 'O' ring with oil.
58. Locate speedometer driven gear and spindle in spindle housing and push into position.
59. Slide speedometer drive gear and spacer onto output shaft.
60. Fit output shaft to the bearing in the rear output shaft housing.
61. Examine the flange seal track to check for any damage that may harm the seal. Retain for fitting later.
62. 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.

63. Drift the centre differential rear bearing track into the transfer box casing 1,5 mm below the outer face of the casing. Check the depth before proceeding.

Fitting rear output shaft housing to transfer box

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

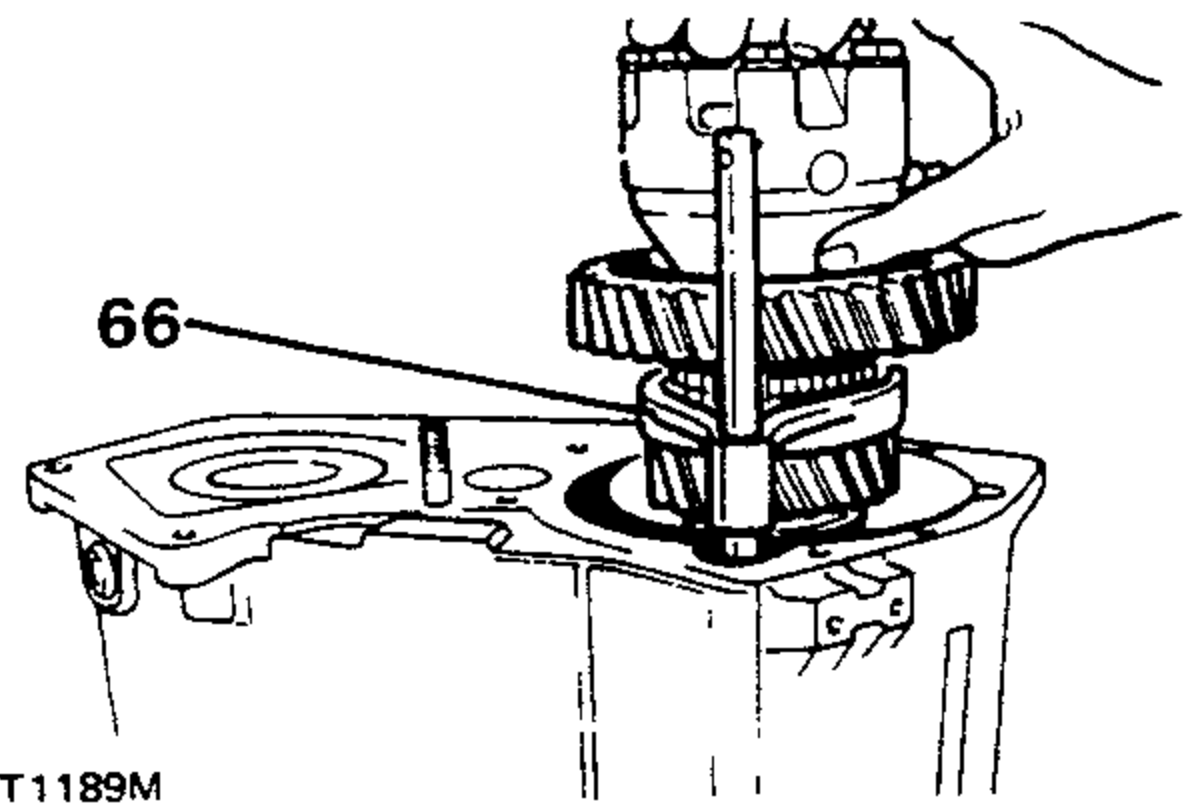
NOTE: If the differential rear main bearing track has been correctly fitted there will be a gap between the housing face and the gasket at this stage.

65. Apply Loctite 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.

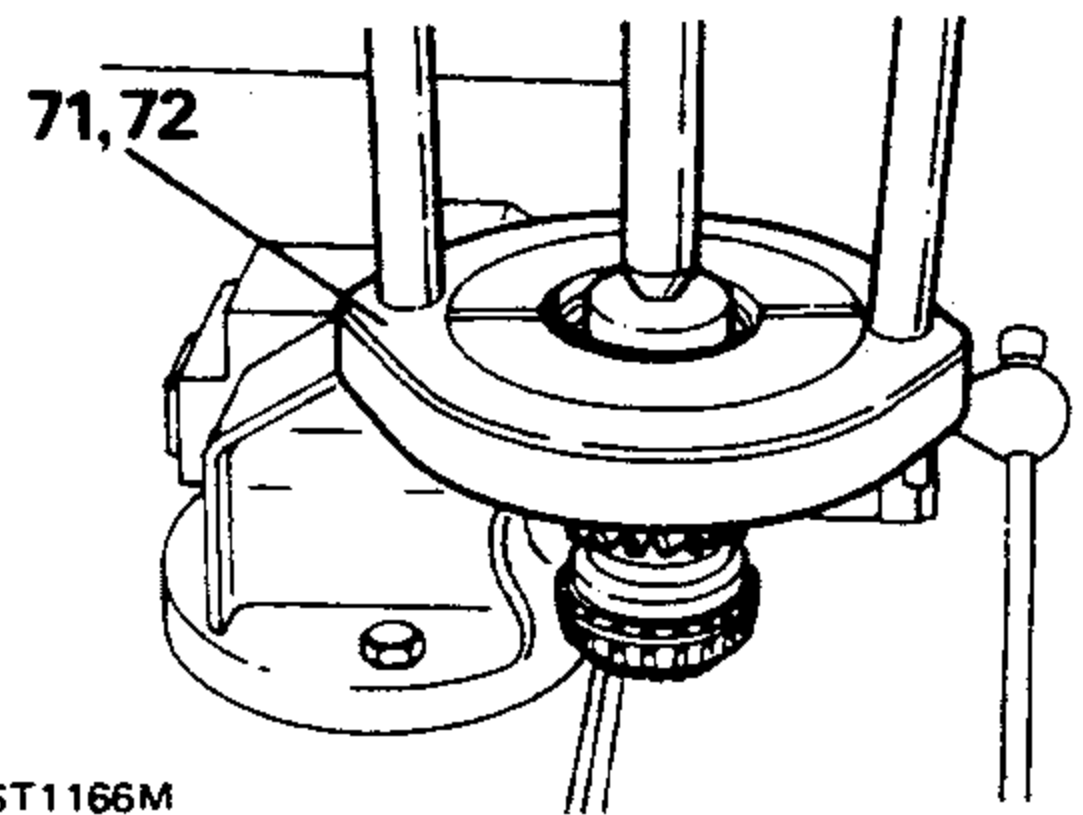
Centre differential unit - Overhaul

Dismantling

66. Detach the high/low selector shaft and fork.

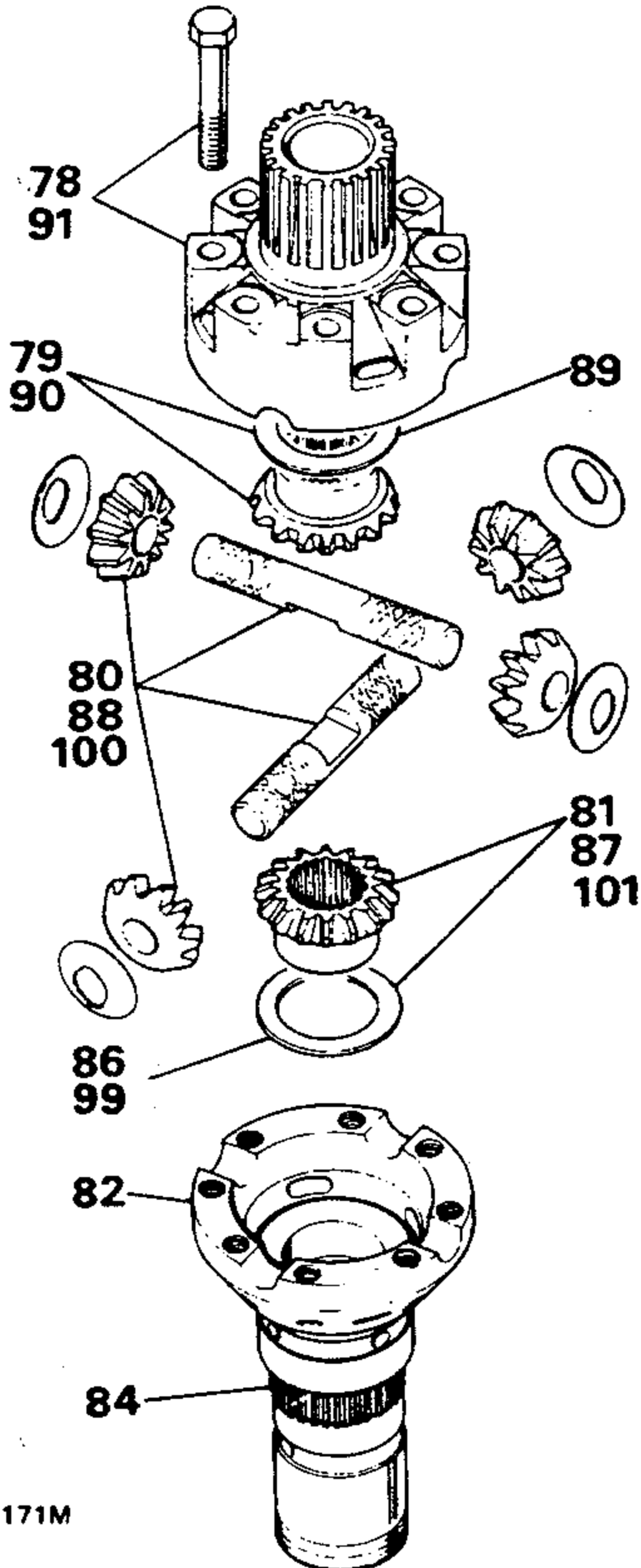


67. Using soft jaws secure the differential unit in a vice with the 'stake' nut uppermost.
68. Remove the peened-over metal to facilitate removal of the nut.
69. Remove the 'stake' nut using tool 18G1423.
70. Remove the differential unit from the vice.
71. Secure hand press MS47 in vice with collars 18G47BB/1 and using button 18G47BB/3 remove rear taper (twenty-four) roller bearing and collars LST 47-1 for latest (twenty-three) roller bearing.
72. Substituting collars 18G47BB/2 remove front taper roller bearing.
73. Remove the hand press from the vice.



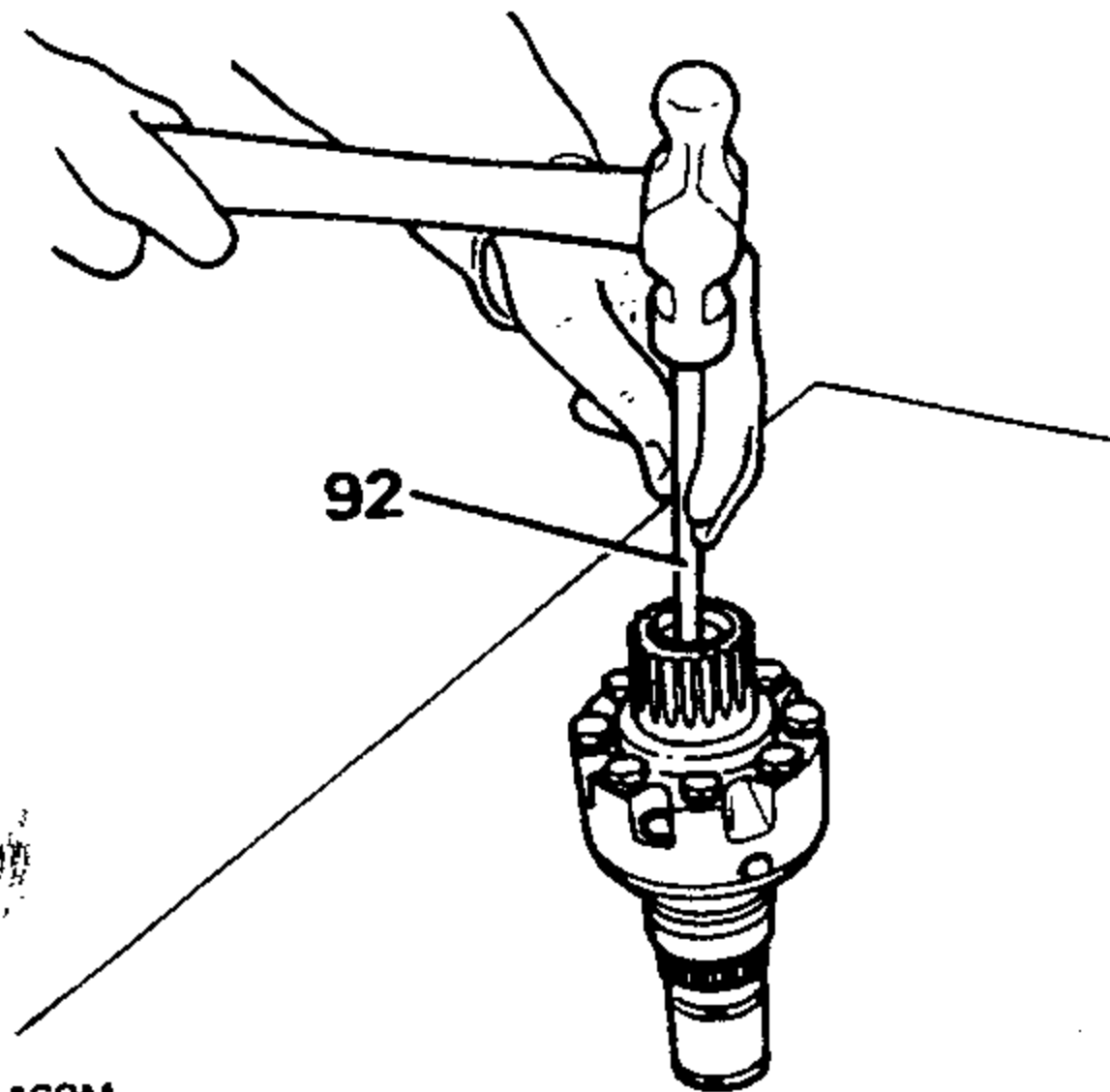
74. Remove the high range (smallest) differential gear and its bush.
75. Mark the relationship of the high/low selector sleeve to the hub and remove the sleeve.
76. Using a suitable press behind the low range (largest) gear, carefully remove both high/low hub and low range gear together. Alternatively, the rear carrier bearing, high output gear and bush, high/low hub and sleeve and low output gear can be pressed off in one operation by supporting the differential side of the low gear.

77. Using soft jaws secure the differential unit in the vice by gripping the inner hub splines.
78. Remove the eight retaining bolts and lift off the front differential case.
79. Lift off the front (upper) bevel gear and thrust washer.
80. Remove both pairs of side gears with their respective shafts and dished washers together.
81. Lift out the remaining rear (lower) bevel gear and thrust washer.
82. Remove the rear differential case from the vice.
83. Clean all parts, examine for wear or damage, renew as necessary.



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85. Ensure that all differential components are dry to assist in checking end-float.
86. Using a micrometer measure one of the bevel gear thrust washers and note thickness.
87. Fit the thrust washer and bevel gear to the rear (lower) differential case.
88. Assemble the side gears and dished washers on their respective shafts and fit to the rear case.
89. Measure the remaining bevel gear thrust washer, noting its thickness.
90. Fit the thrust washer and bevel gear to the front case.
91. Fit and align the front differential case tightening the eight securing bolts to the specified torque.

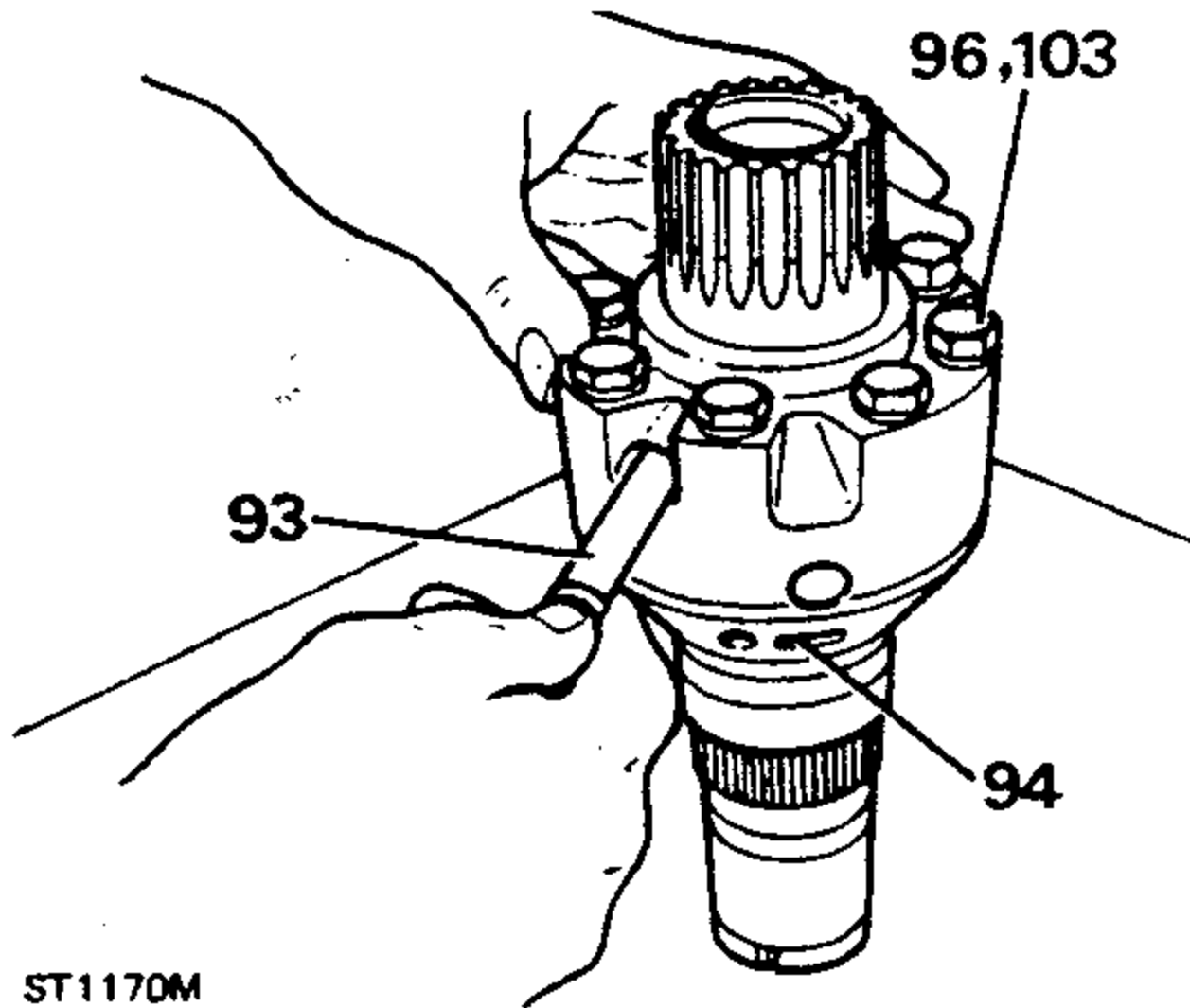


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92. Ensure that the front bevel gear is fully in mesh by tapping it down, using a punch through the front differential case.
93. Measure the front bevel gear end-float with feeler gauges through the slots provided in the front differential case. This must be between 0,025 to 0,075 mm maximum.
94. Invert differential unit in vice and repeat the above procedure (items 92 and 93) for the rear bevel gear in the rear differential case.
95. Return the differential unit to its former position in the vice i.e. with the front differential case uppermost.
96. Remove the eight securing bolts and lift off the front differential case.
97. Remove the bevel gears and thrust washers, and side gear assemblies.
98. Select correct thrust washers required for final reassembly.

Obtaining differential backlash by checking bevel gear end-float

84. Using soft jaws secure the rear differential case in the vice by gripping the inner hub splines.



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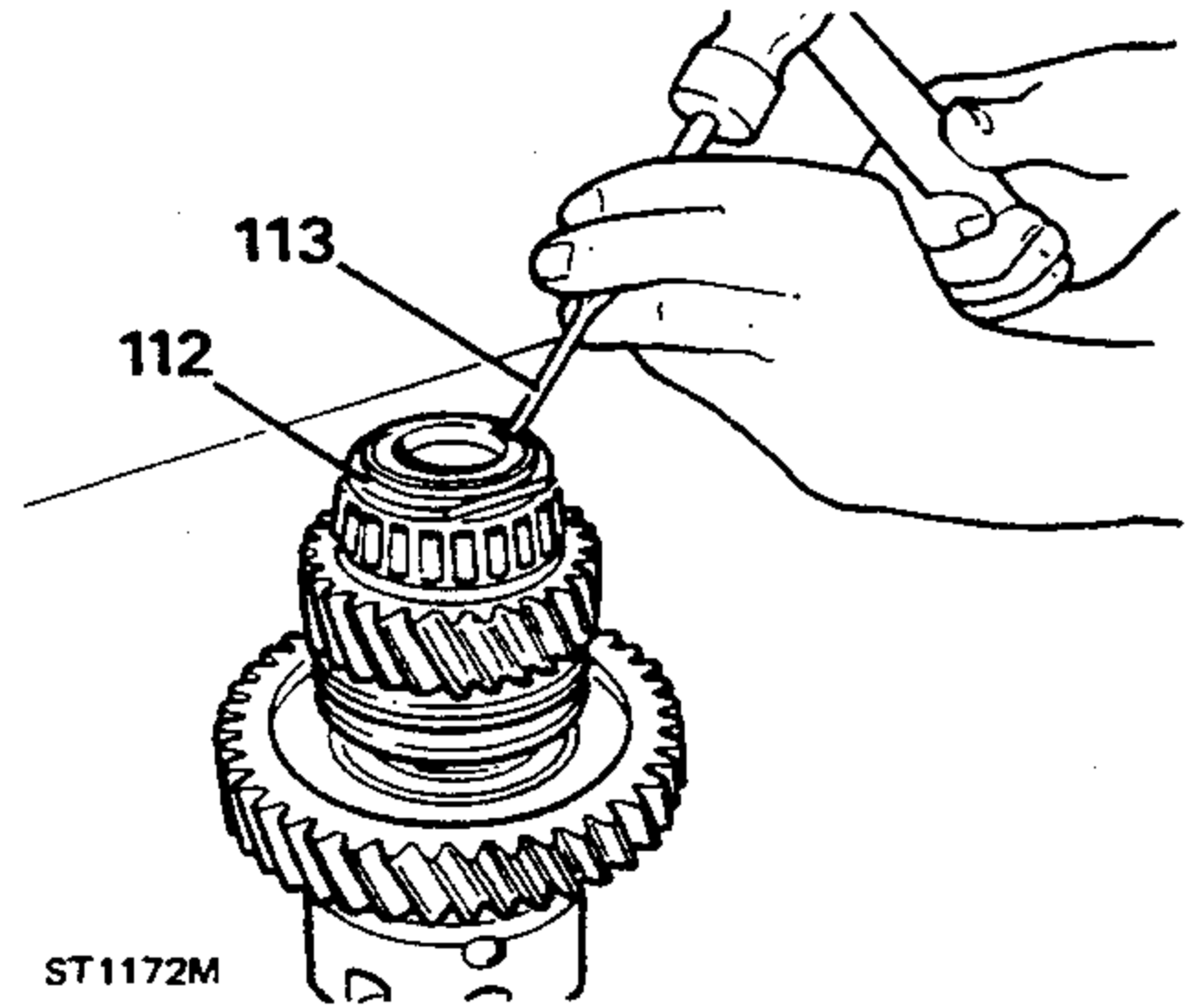
Reassembling

99. Fit the selected thrust washer and bevel gear to the rear (lower) differential case.
100. Assemble the side gears and dished washers on their respective shafts and fit to the rear case.
101. Fit the other selected thrust washer and bevel gear to the rear case.
102. Lubricate all parts with oil.
103. Fit and align the front differential case, locate the eight securing bolts and tighten to the specified torque.
104. Finally check that the differential gears revolve freely.
105. Place the front (outer) differential bearing on the front differential case and press into position using larger end of tool 18G1424.
106. Invert the differential unit in the vice.
107. Fit the low range gear (largest) to the rear differential case (with its 'dog' teeth uppermost).
108. Press the high/low hub onto the splined area of the case. Check end-float of low range gear. See Data at end of section.
109. Slide the high/low selector sleeve onto the hub outer splines, observing the alignment marks.
110. Fit the bush into the high range (smallest) gear and slide the bushed gear onto the rear differential case. Check end-float of high range gear and running clearance of gear on bush. See data at end of section.

NOTE: If the clearances vary considerably from those specified in the data the assembly must be rebuilt.

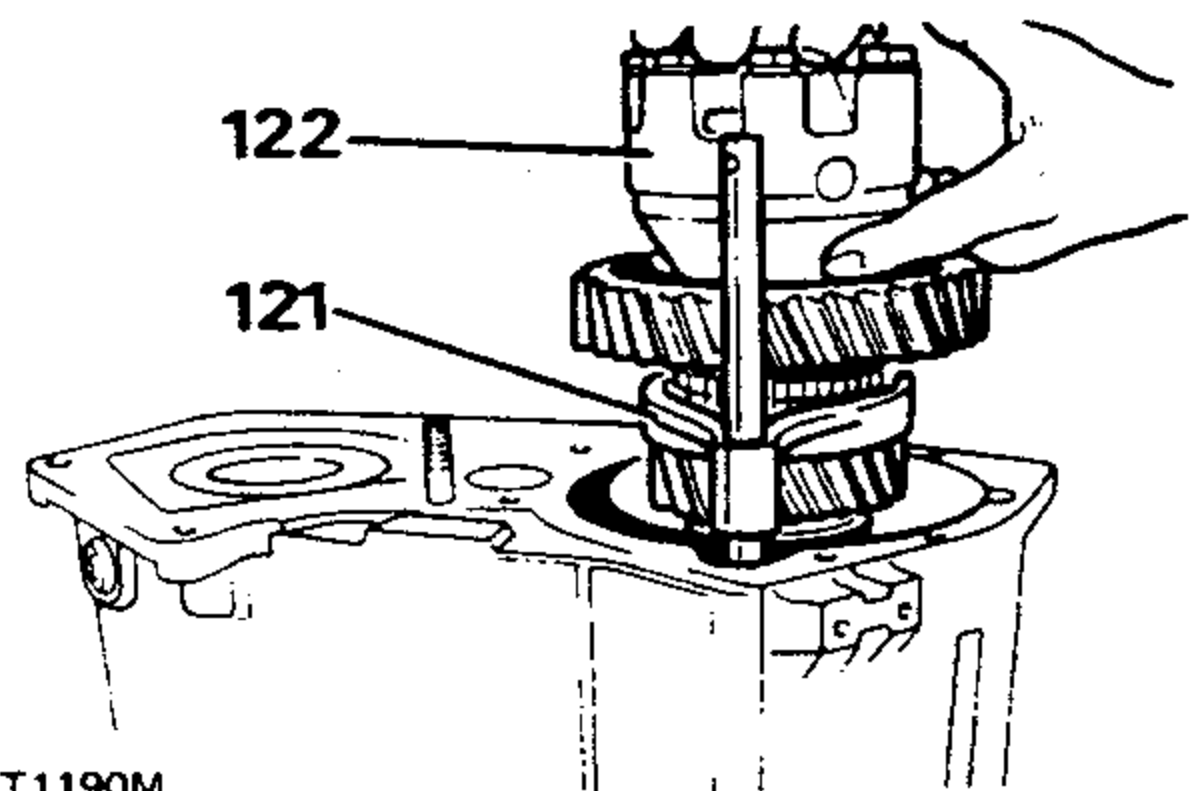
111. Place the rear differential bearing on the rear differential case and press into position using the smaller end of tool 18G1424.

112. Fit the 'stake' nut using tool 18G1423 and tighten to the specified torque.
113. Peen the nut flange into the slot provided.



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114. Remove the differential unit from the vice.
115. Lubricate gears, bearings, sleeve and bush with oil.
116. Clean and check the high/low selector fork assembly for wear and renew if necessary.
117. To renew the selector fork remove the square set screw retaining it to the selector shaft and ensure any traces of Loctite are removed from the threads.
118. Refit the selector fork with the fork boss towards the three detent grooves. Align the hole in the fork boss with the indent in the shaft nearest to the detent grooves.
119. Apply Loctite 290 to the set screw threads and fit the set screw to the correct torque.
120. Prop up the transfer box so that its front side is uppermost.
121. Fit the selector fork to the high/low selector sleeve in the differential assembly.
122. Locate the differential assembly and high/low selector fork assembly into the transfer case. It may be necessary to rotate the output shaft to ease fitment.



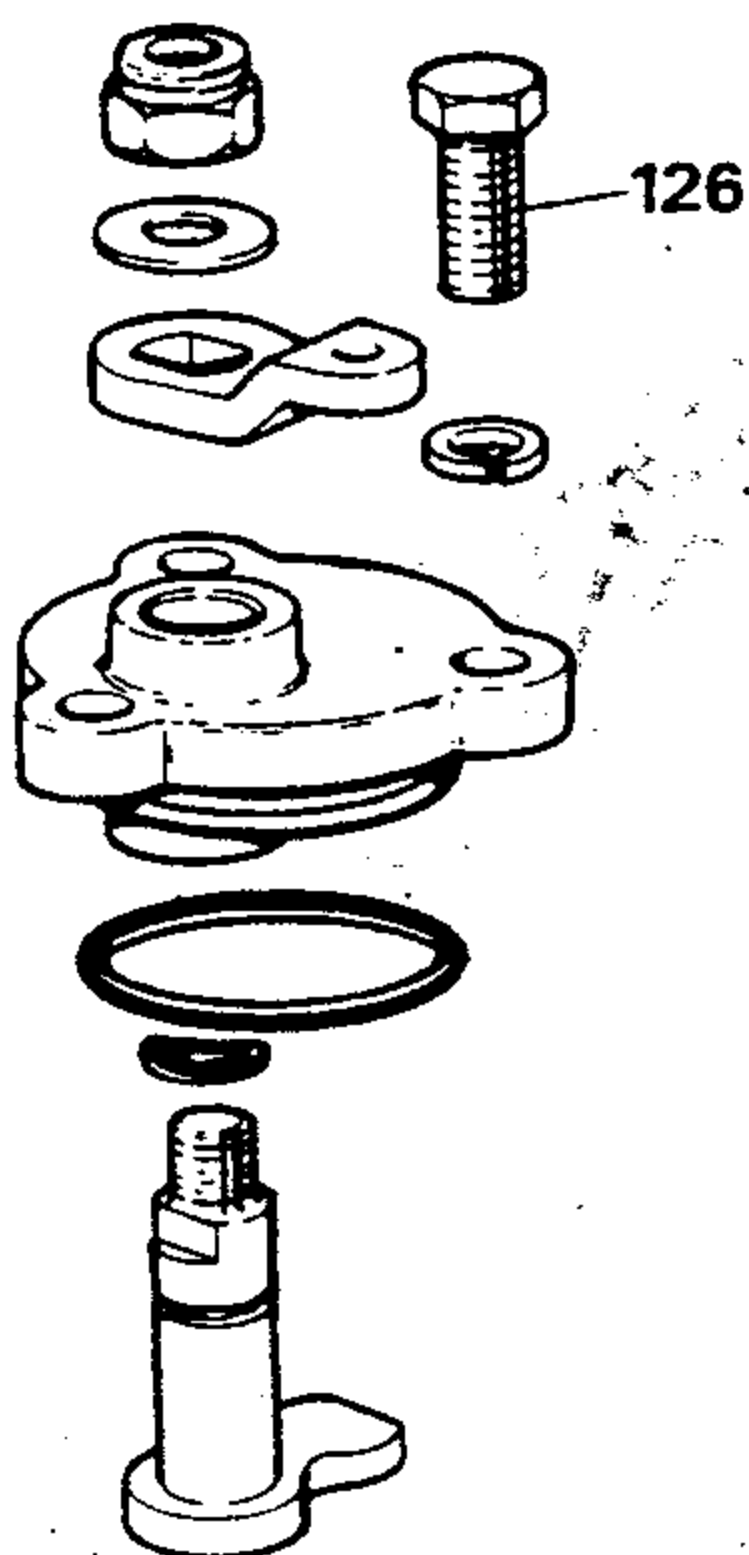
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123. Fit the selector shaft detent ball and spring, apply Loctite 290 to the detent plug threads, screw in the detent plug until the spring is just coil bound, then back off two complete turns.

Front output shaft housing

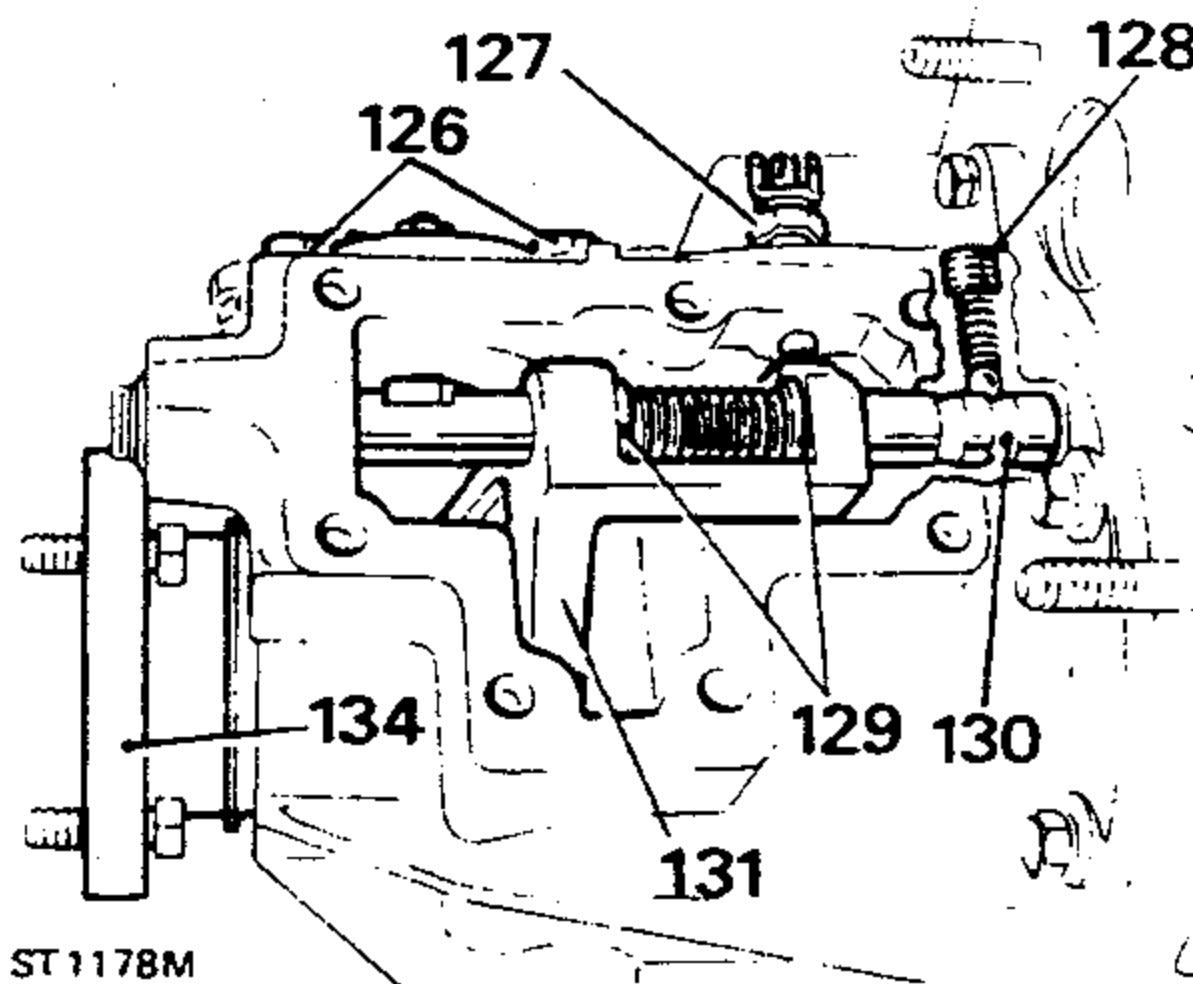
Dismantling

124. Secure the housing in the vice, using soft jaws.
 125. Remove the seven screws securing the differential lock selector side cover and release the side cover and gasket.
 126. Remove the three screws securing the differential lock finger housing and lift out the complete assembly.



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127. Slacken the lock nut retaining the differential lock switch and unscrew the switch.
 128. Remove the detent plug from the top of the housing and lift out the spring and ball using a magnet.
 129. Compress the selector fork spring inside the housing and slide out the spring locating 'C' caps.
 130. Slide the selector shaft out of the rear of the housing.
 131. Remove the selector fork and spring through the side cover aperture.
 132. Lift out dog sleeve from the back of the output shaft housing.
 133. Using the flange wrench 18G1205 remove the flange nut, steel and felt washers. A two-legged puller may be necessary.

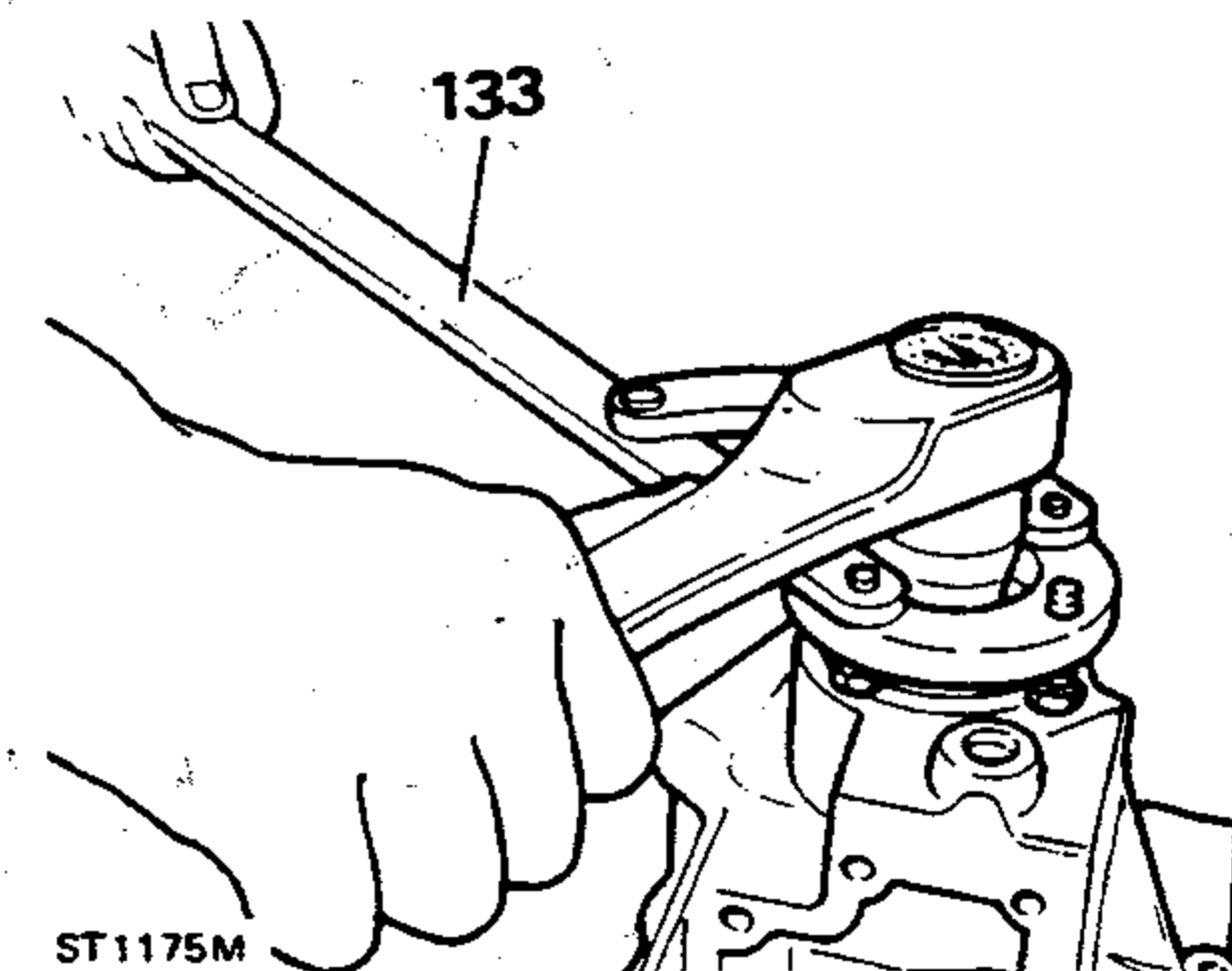


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NOTE: Ensure that flange bolts are fully engaged in the wrench.

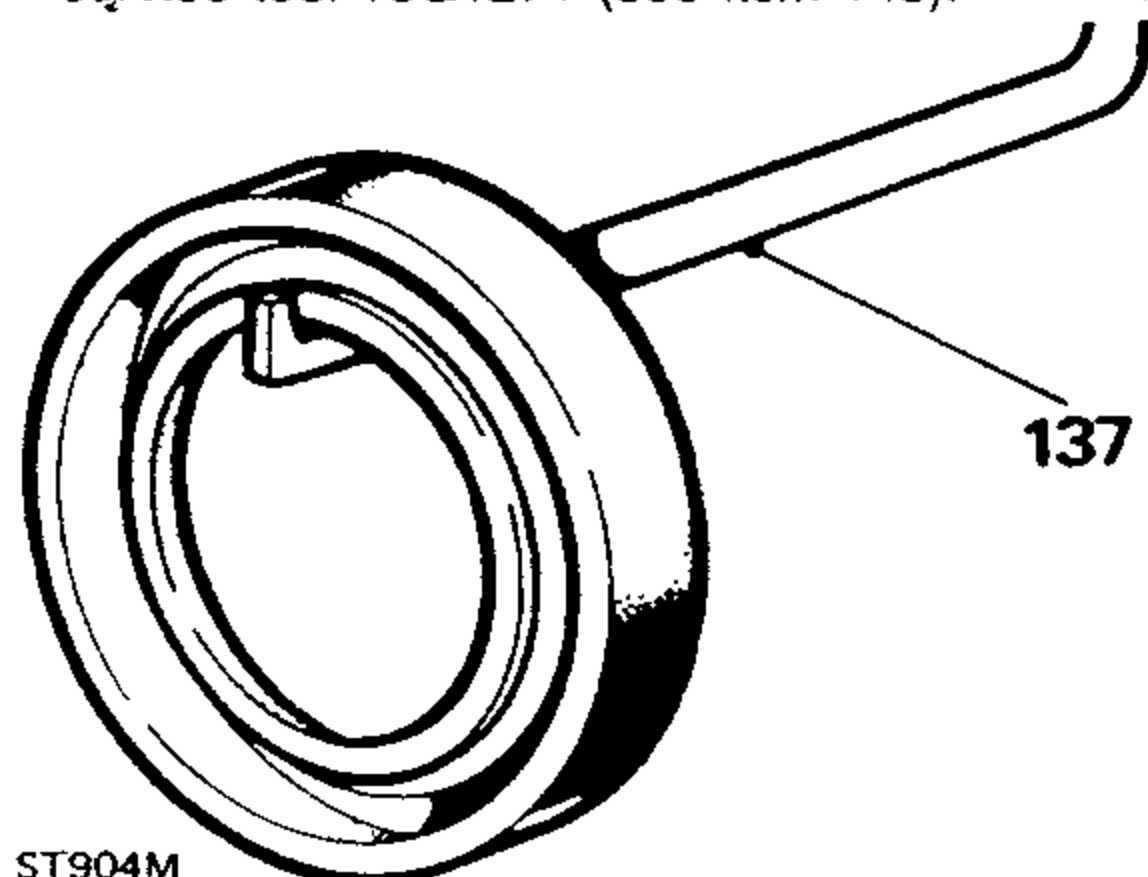
134. Remove the output shaft flange with oil seal shield.

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



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135. Drift the front output shaft rearwards out of the housing.
 136. Slide off the collar from the output shaft.
 137. Prise out and discard the oil seal(s), using service tool 18G1271 (see item 145).



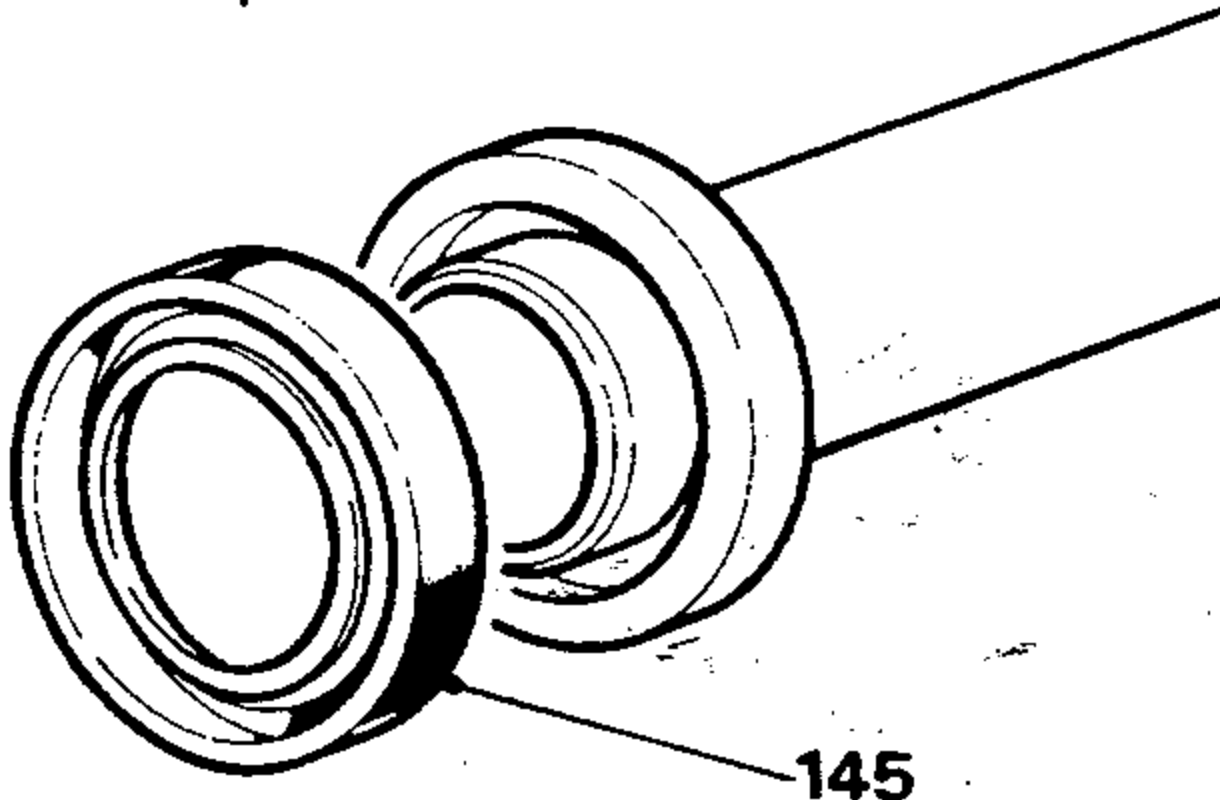
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138. Using circlip pliers 18G257 remove the circlip.
139. Remove the housing from the vice and drift out the bearing from inside.
140. Press out the differential front bearing cup and remove the shim behind it.
141. Clean all parts ensuring that any traces of Loctite are removed from faces and threads.
142. Renew oil seals and examine all parts for wear or damage, renew as necessary.

Reassembling

143. Press the front bearing into the housing. Do not use excessive force, if necessary, warm the housing assembly and case.
144. Fit the bearing retaining circlip, using circlip pliers 18G257.
145. Fit a new dual lip oil seal (open side inward) until the seal is in contact with the bearing circlip. It is essential to use replacer tool 18G1422.

NOTE: On early production two separate seals were used, these should be replaced with the new dual lip seal.



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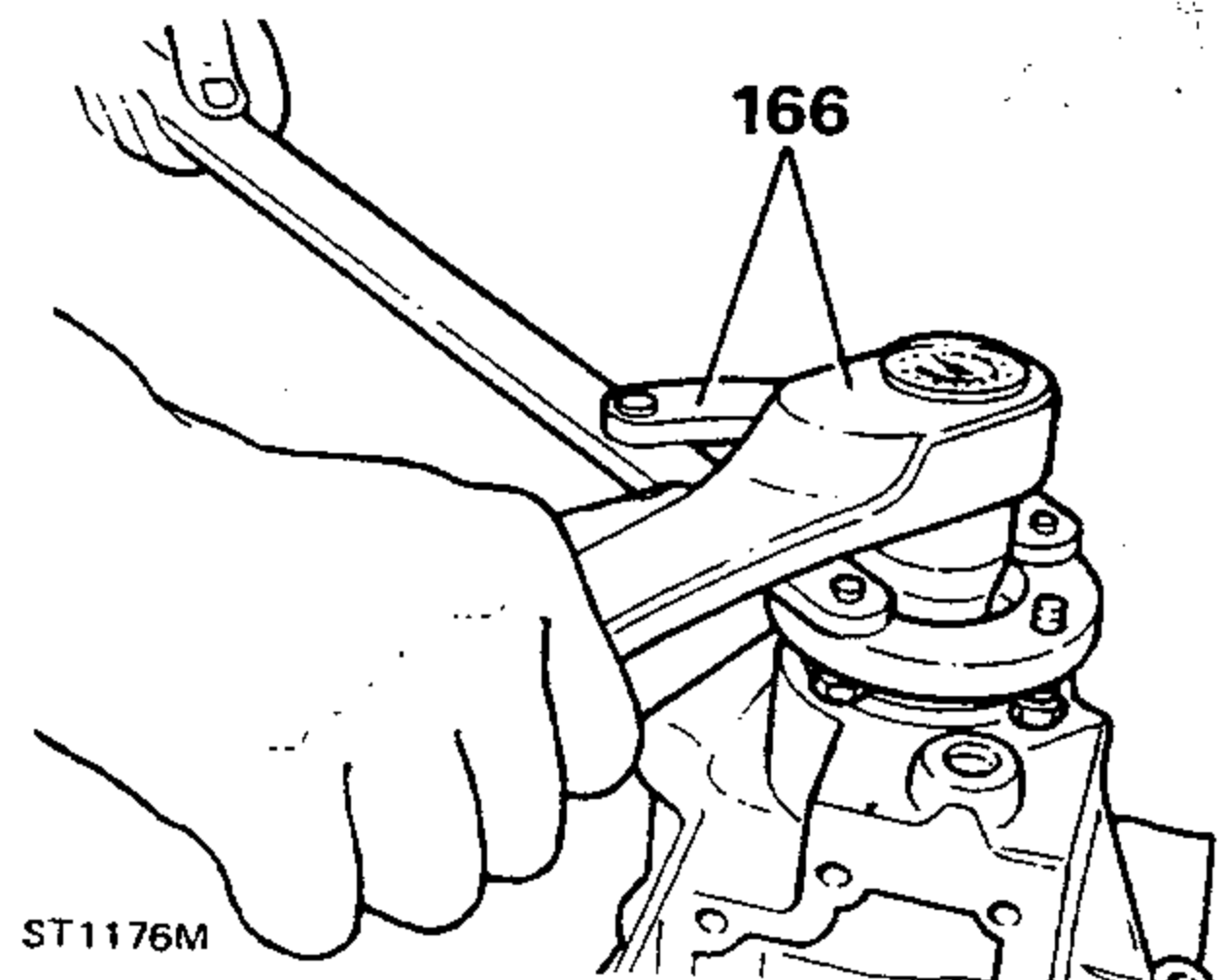
146. Carefully charge the lips of the seal with grease.
147. Slide the collar onto the front of the output shaft with its chamfered edge to the front.
148. Fit the output shaft through the back of the housing.
149. Examine the flange seal track to check for any damage that may harm the seal.

Obtaining bearing pre-load

150. Measure the original differential front bearing track shim, noting its thickness.
151. Refit the original shim.
152. Drift the differential front bearing track into the housing.
153. Grease and fit a new gasket and locate the front output shaft housing on the transfer box.
154. Loosely retain the housing with the eight securing bolts (with spring washers), the upper middle bolt is longer. Do not fully tighten the bolts at this stage.

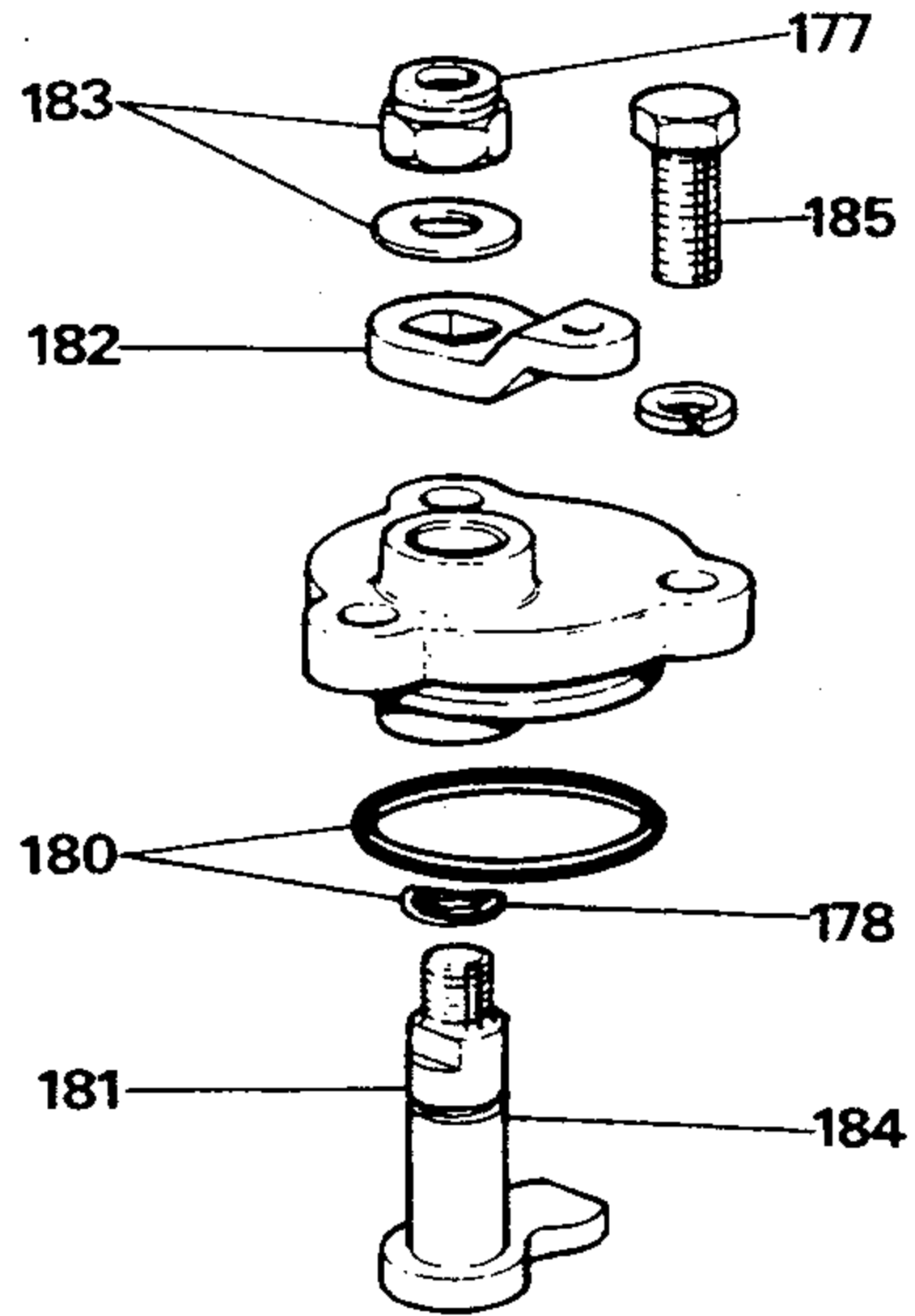
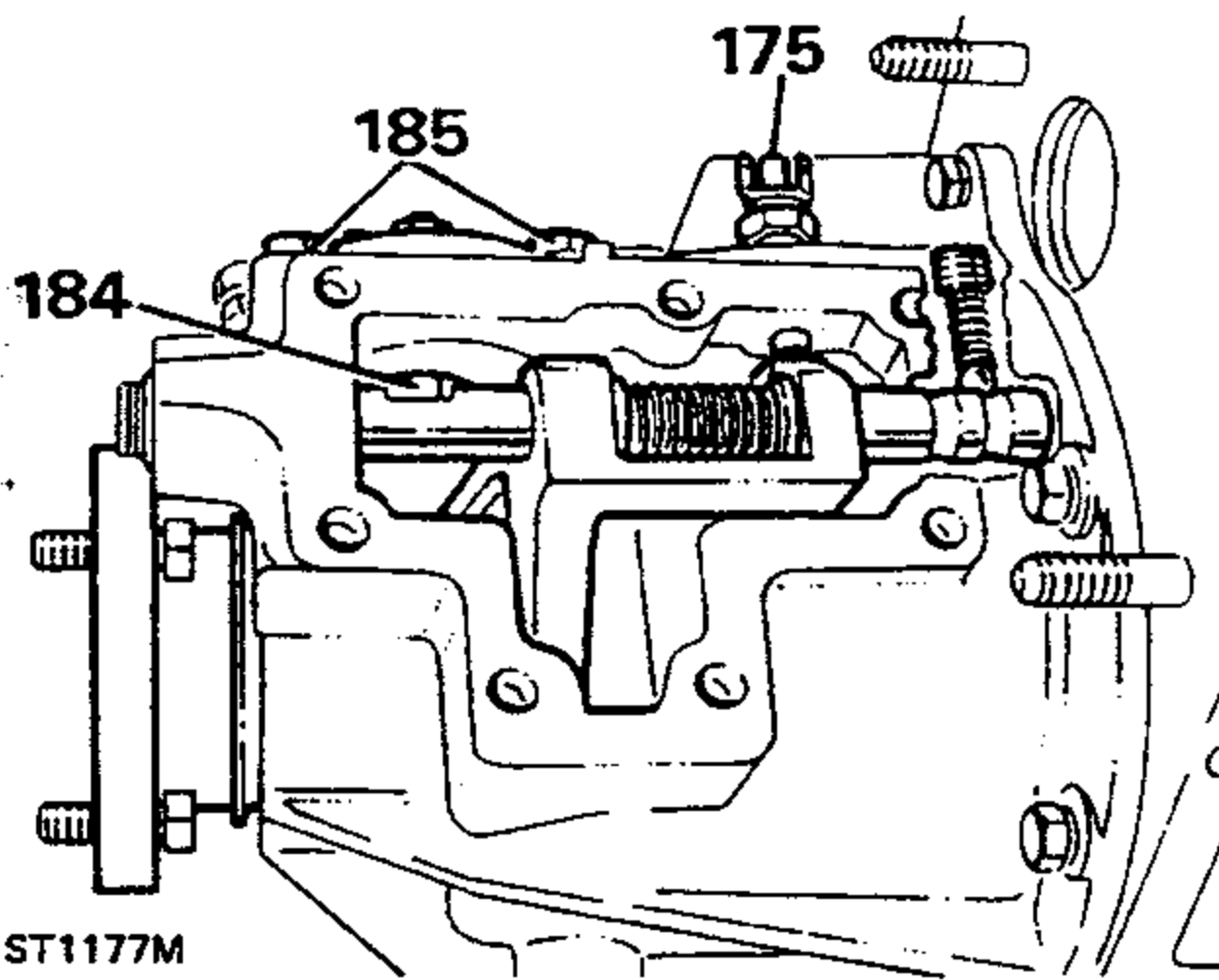
155. Engage high or low gear.
156. Check the rolling resistance of the differential, using a spring balance and a piece of string wound around the exposed splines on the high/low hub. Little or no resistance will register.
157. Tighten the bolts a little at a time, occasionally checking the rolling resistance. With the correct shim selected and the bolts tightened to the specified torque a pull of 1,8 to 4,5 Kg is required on the spring balance. This applies to new or used bearings.
158. If the reading is outside the above limits remove the front output shaft housing assembly from the transfer case.
159. Using a suitable extractor, withdraw the front differential bearing cup from the housing and exchange the shim for one of suitable thickness.
160. Refit the bearing cup.
161. Having obtained the correct rolling resistance prop-up the transfer box on the bench with the front side uppermost.
162. Grease and fit the front output shaft housing gasket and locate the housing on the transfer box.
163. Apply Loctite 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.
164. Turn the transfer box into its normal operating position.
165. Fit both input and output flanges as follows.
166. 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.



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167. Slide the dog sleeve onto the rear of the output shaft ensuring that the selector groove in the dog sleeve is to the front.
168. Compress the differential lock selector shaft spring, and fit it between the selector fork lugs.
169. Locate the selector fork inside the side cover aperture in the housing engaging the groove in the dog sleeve on the output shaft.
170. 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.
171. Rotate the selector shaft until the two flats are uppermost.
172. Compress the spring slightly between the fork lugs and fit the two locating 'C' caps.



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Reassembly

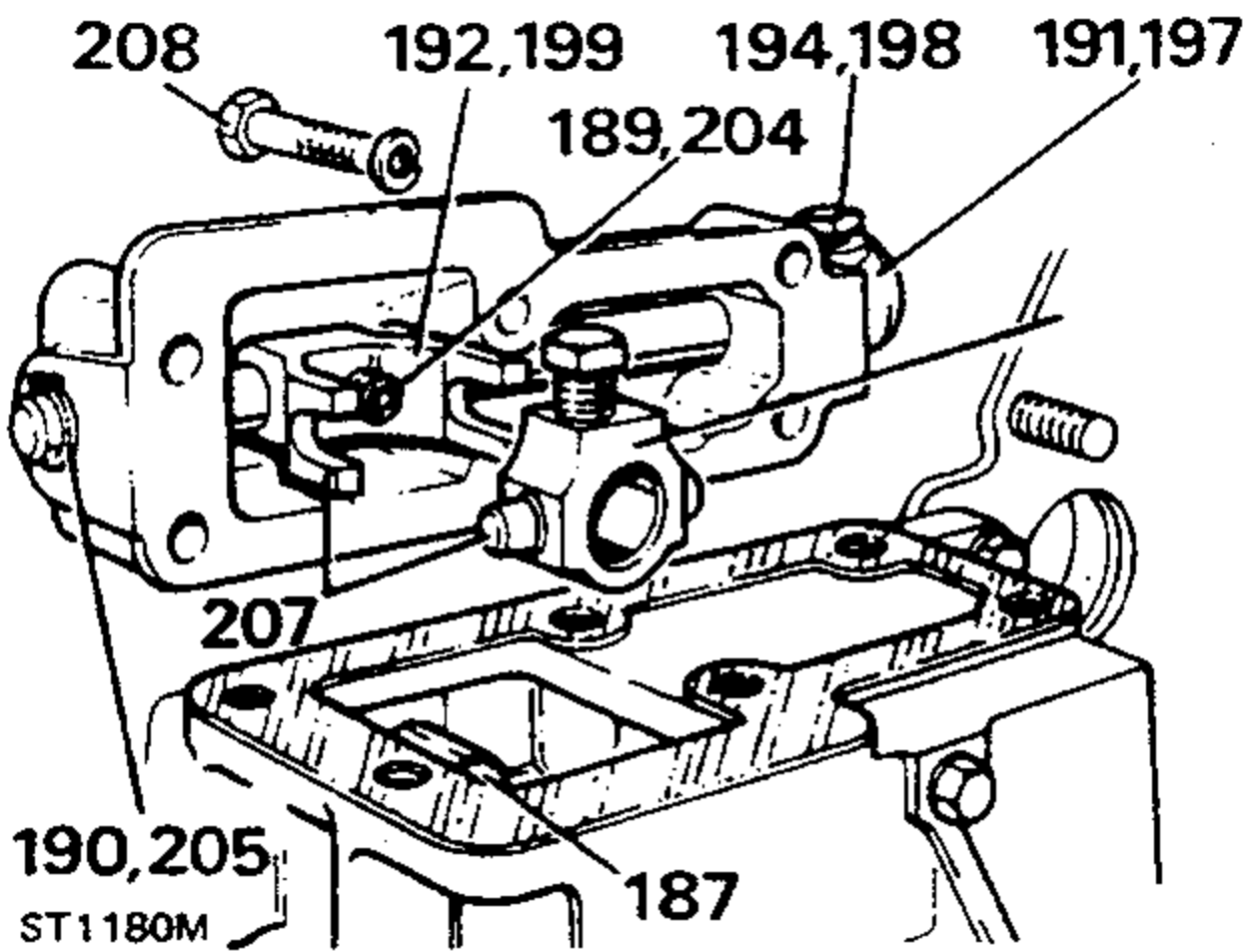
173. Fit the selector shaft detent ball and spring via the tapped hole in the top of the housing.
174. Apply Loctite 290 to the detent plug threads, screw in the detent plug until the spring is just coil bound, then back off two complete turns.
175. Loosely fit the differential lock switch in the tapped hole on top of the housing, leaving the locknut loose for adjustment.
176. Grease and fit the differential lock selector side cover gasket and fit the side cover, securing it with the seven bolts (with spring washers).

Differential lock finger housing

Dismantling

177. Remove and discard the Nyloc nut and release the lock lever and selector 'finger' from the 'finger' housing.
178. Remove and discard the 'O' rings from the selector finger and the selector finger housing.
179. Clean remaining parts, examine for wear or damage, renew as necessary.

180. Fit new 'O' rings to the finger housing and selector finger and lubricate with oil.
181. Locate the selector finger in the finger housing.
182. Fit the differential lock lever over the flats on the selector finger so that it will face forward in the operating position.
183. Fit the plain washer and a new Nyloc nut.
184. 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.
185. Apply Loctite 290 to the 'finger' housing screw threads and fit the three securing screws (with spring washers) to the correct torque.
186. Grease and fit the differential lock selector side cover gasket and fit the side cover, securing it with the seven bolts (with spring washers).
187. 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.
188. Locate the yoke on the selector shaft, apply Loctite 290 to the yoke set screw and fit the screw to the specified torque.



High/low selector housing

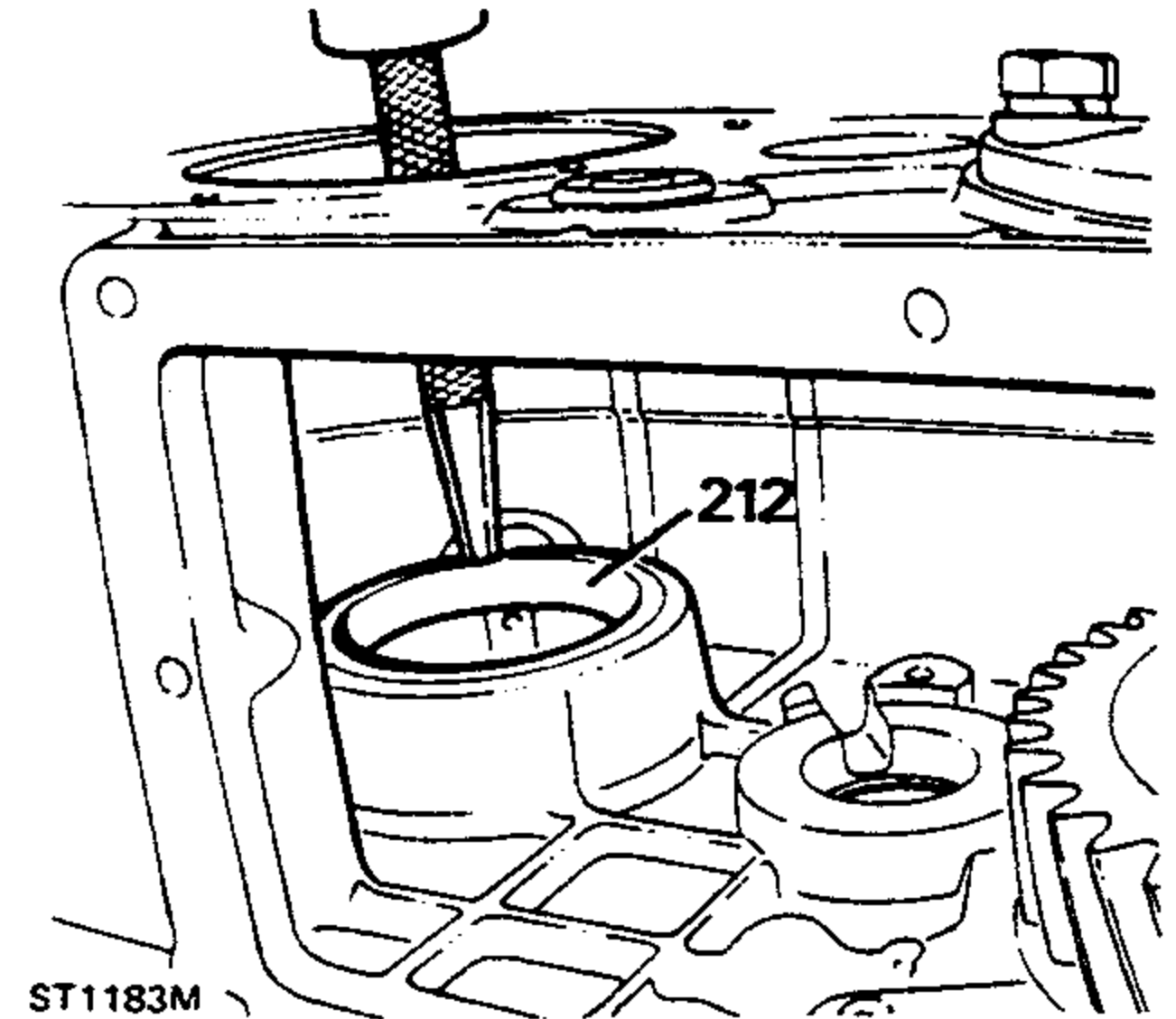
Dismantling

189. Remove the selector fork grub screw completely.
190. Remove the cross shaft retaining circlip.
191. Withdraw the cross shaft from the selector housing with the operating arm attached.
192. Lift out the selector fork from the housing.
193. Remove the two 'O' rings from the cross shaft.
194. Remove the operating arm from the cross shaft by removing the retaining set screw.
195. Clean parts ensuring that all traces of Loctite are removed, examine for wear or damage, renew as necessary.

Reassembling

196. Fit the 'O' ring to the operating arm end of the cross shaft.
197. Locate operating arm on the shaft blind hole.
198. Apply Loctite 290 to the operating arm set screw threads and fit the set screw.
199. Locate the selector fork inside the housing.
200. Slide the cross shaft into the housing passing it through the selector fork.
201. Fit the 'O' ring to the fork end of the cross shaft (inside the housing) and lubricate both 'O' rings.
202. Position the cross shaft fully home.
203. Locate the selector fork on the shaft blind hole.
204. Apply Loctite 290 to the fork grub screw threads and fit the grub screw.
205. Fit the circlip on the end of the cross shaft.
206. Grease and fit the gasket to the high/low selector housing aperture on the front output shaft housing.
207. Position the high/low selector housing so that the projecting selector fork engages the yoke side pins inside the housing.
208. Fit the six selector housing retaining bolts (with spring washers).
209. Prop up the transfer box on the bench with front side uppermost.

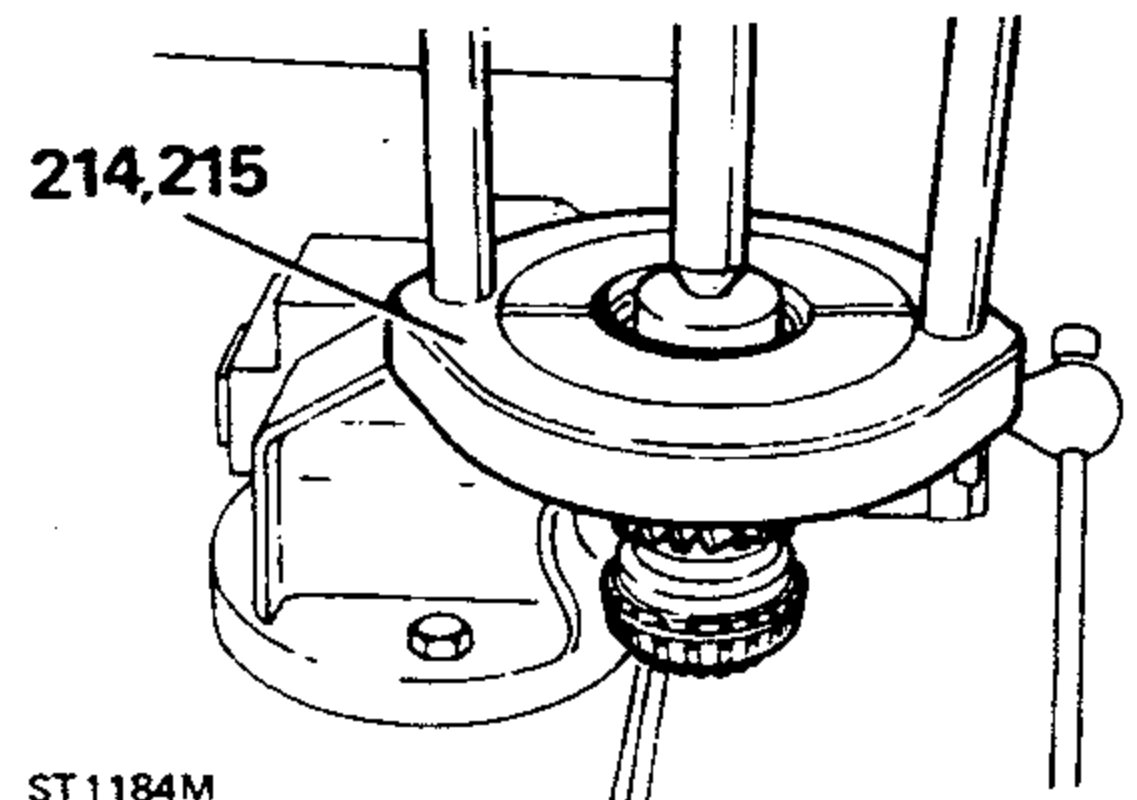
210. Fit the oil seal into the front of the transfer box (seal lip to rear of case) using replacer tool 18G1422.
211. Prop up the transfer box on the bench with rear side uppermost.
212. Drift in the input gear front bearing track from inside the back of the transfer box, using a suitable punch.



Input gear

Dismantling

213. Clean all parts, examine for wear and damage, renew as necessary. Remove the bearings only if they are to be renewed.
214. Secure hand press MS47 in vice and using collars and buttons 18G47-7 remove the front taper roller bearing from the input gear assembly.
215. Reverse input gear assembly in hand press and remove the rear taper roller bearing.
216. Remove the hand press from the vice.



Reassembly

217. Locate the front taper roller bearing on the input gear assembly and press the bearing fully home.

218. Repeat above procedure and fit the rear taper roller bearing.
219. Lubricate both bearings with oil.
220. Fit input gear assembly into the transfer box from the rear (gear end first).

Obtaining bearing pre-load - with intermediate gear cluster removed

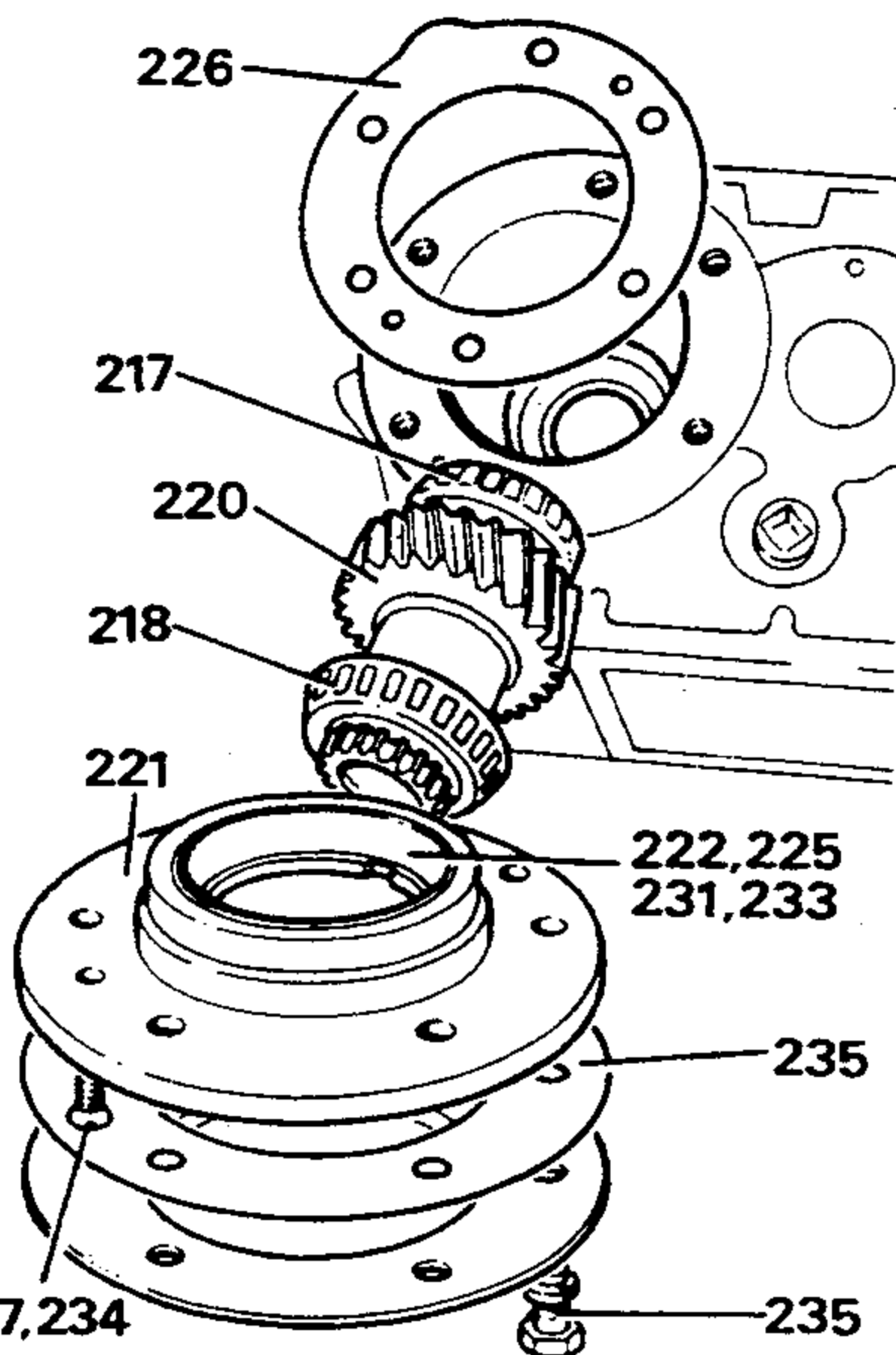
221. Secure the mainshaft bearing housing in the vice.
222. Press out the rear input gear bearing cup and remove the shim behind it.
223. Clean the main bearing housing and measure original shim, noting its thickness.
224. Fit the original shim to the main bearing housing.
225. Locate the rear bearing cup on the main bearing housing and press it fully home.
226. Apply grease to the gasket and fit onto the transfer box casing.
227. Fit the main bearing housing and tighten the two securing screws to the specified torque.

NOTE: The pre-load can only be measured while the Transfer gearbox is separated from the main gearbox.

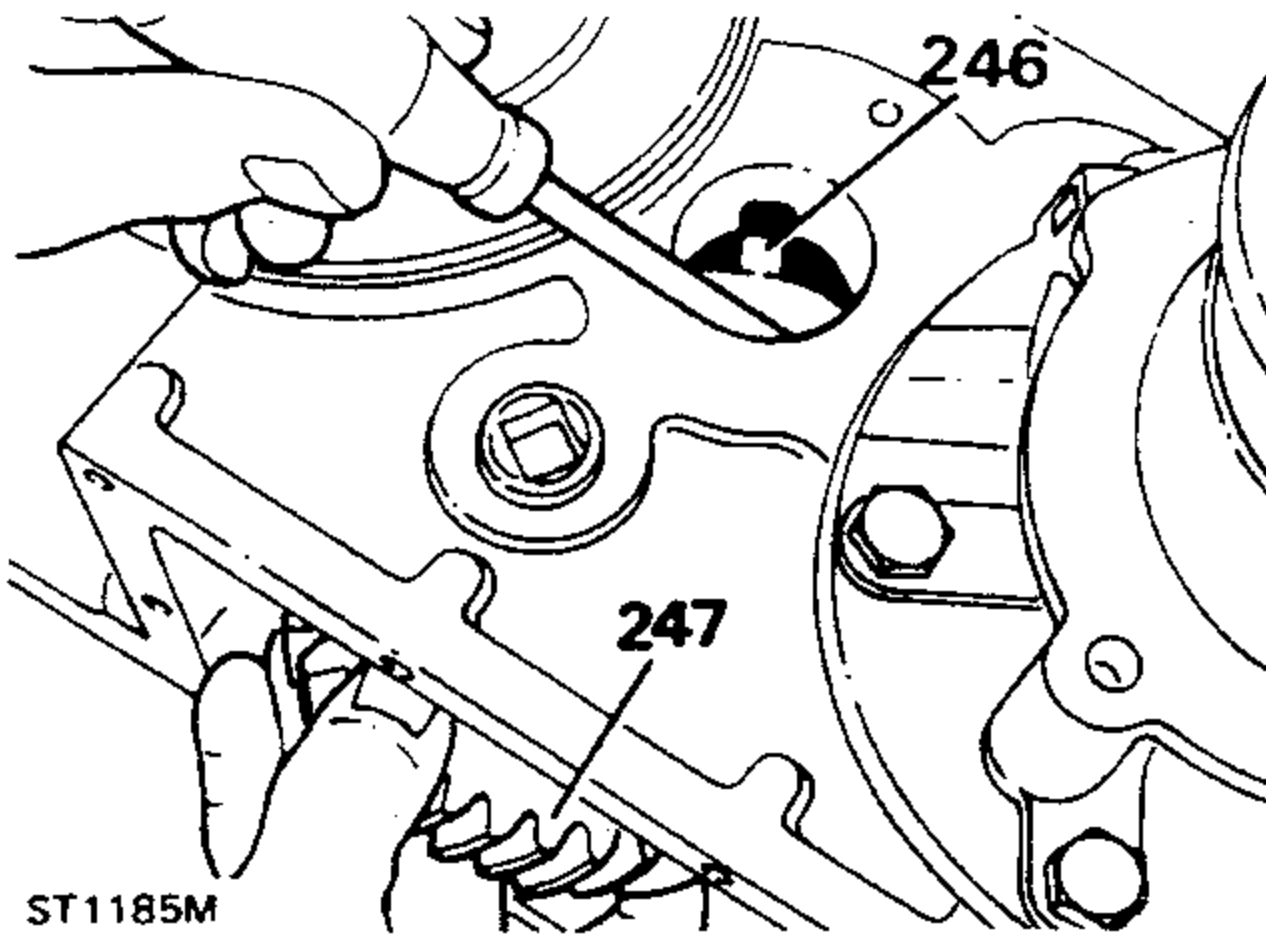
229. If the reading obtained is outside the above limits the original shim must be changed accordingly.
230. Remove the two screws retaining the mainshaft bearing housing.
231. Press out the rear bearing cup from the bearing housing and remove and discard the original shim.
232. Select a shim to the required thickness to obtain the correct pre-load of 0,02 to 0,07 mm on reassembly.
233. Fit the shim to the main bearing housing and then press the rear bearing cup into position.
234. Fit the main bearing housing and tighten the two securing screws to the specified torque.
235. Grease and fit P T O cover gasket and finally fit the P T O cover securing it with six bolts (with plain washers) to the specified torque.

Intermediate gear assembly - Reassembly

236. First remove the needle roller bearings and spacer from the gear assembly.
237. Clean the parts, including the thrust washers and lock plate and examine for wear or damage, renew as necessary. Refer to DATA at end of section for thrust washer thickness.
238. Fit the 'O' ring to the intermediate shaft.
239. Fit the 'O' ring into the front of the transfer case.
240. Lubricate thrust washers, bearings, shaft and spacer.
241. Fit needle bearings with spacer interposed. If the bearings have plastic cages, the flanged end of each cage must face the thrust washers, when fitted.
242. Fit front thrust washer to slot in transfer (plain side to case).
243. Locate gear assembly partially into the transfer case so that it rests on the front thrust washer.
244. Locate rear thrust washer (plain side uppermost) into slot in transfer case.
245. Gently push gear assembly into mesh.
246. 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.

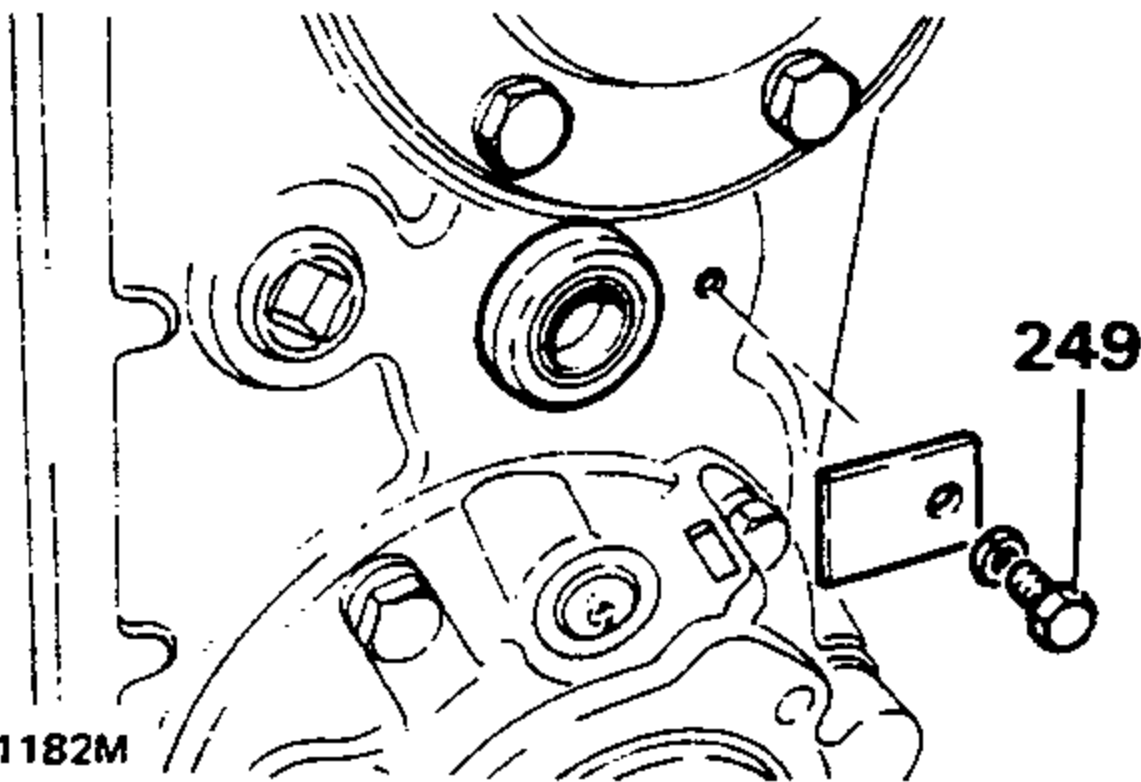


228. Wind sufficient string around the gear teeth to rotate the input gear. A pull of 1,4 to 3,6 Kg is required on the spring balance. This applies to new or used bearings.



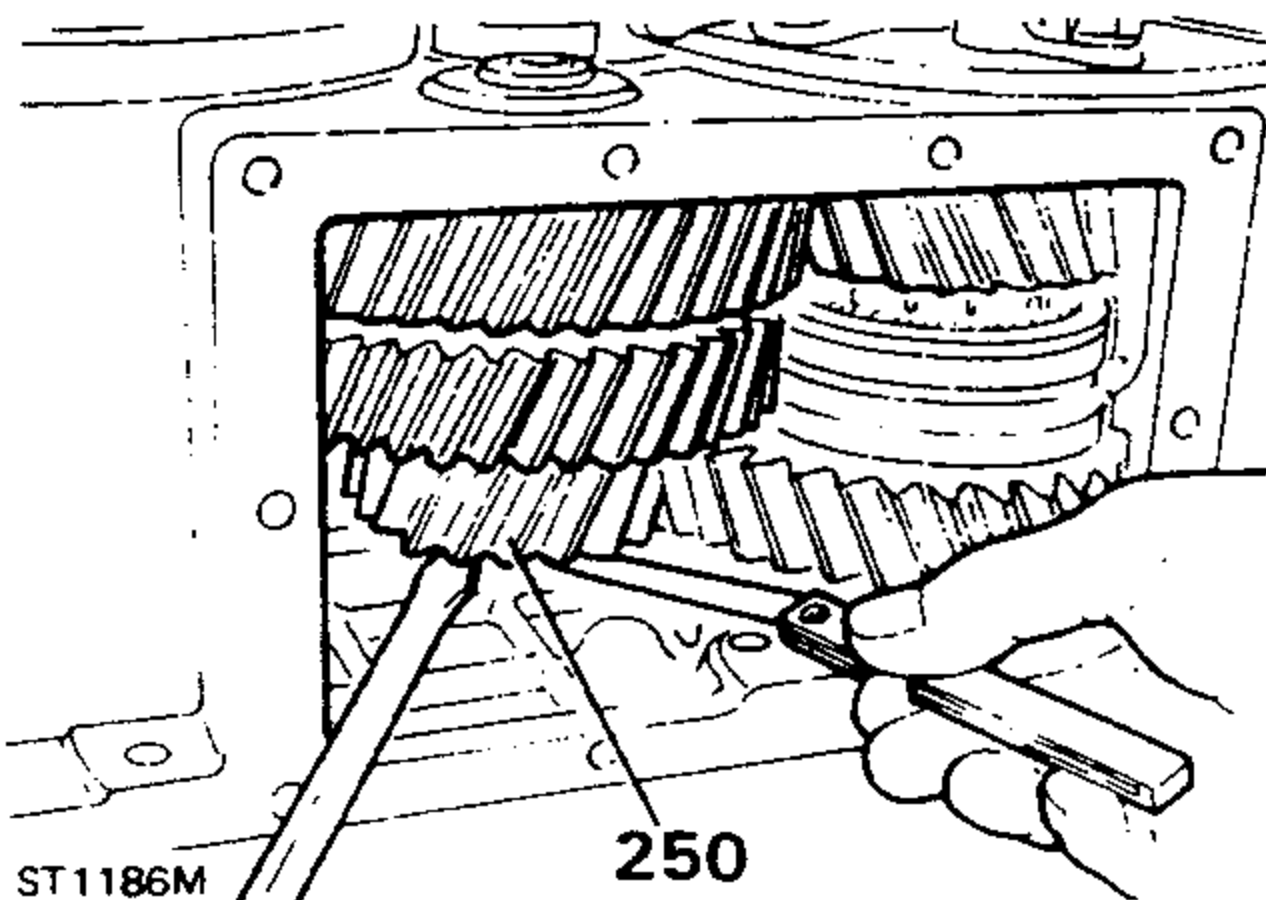
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247. Align gear and thrust assembly and slide the intermediate shaft into the transfer box from the rear.
248. Align the shaft so that the lock plate slot in the end is on top.
249. Apply Loctite 290 to the lock plate bolt threads. Locate lock plate into position and fit securing bolt (with spring washer).



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250. 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 and 0,35 mm.



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251. Grease and fit the bottom cover gasket.

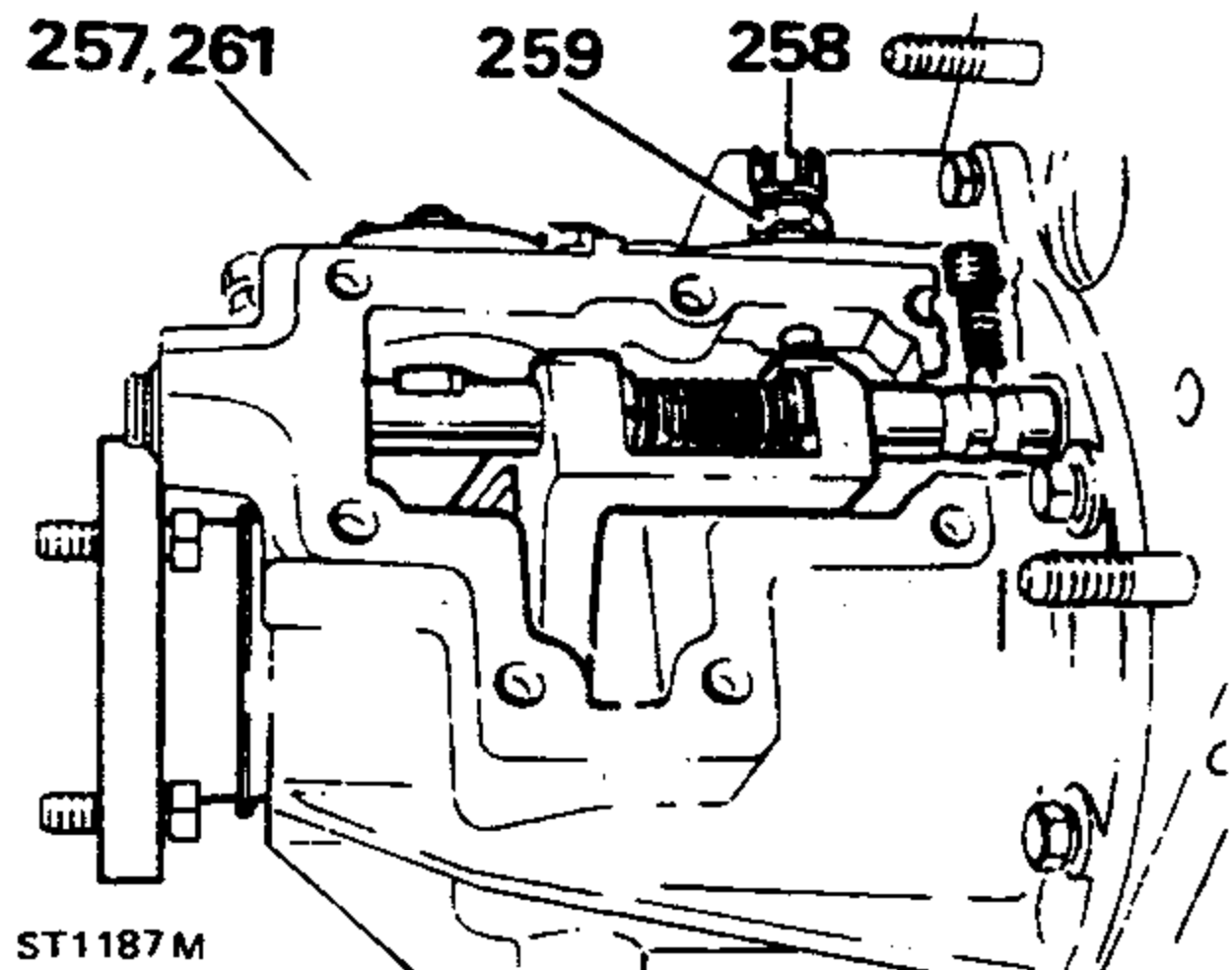
252. Apply Loctite 290 to the ten bottom cover fixing bolts only.
253. Clean and fit the bottom cover, using the ten bolts (with spring washers).

Transmission brake assembly

254. Clean brake backplate and oil drip plate and apply silicone rubber sealant. Locate the backplate on the rear output shaft/speedometer housing so that the brake operating lever is on the right-side rear.
255. Fit the four Brako Durlok bolts, the lower two with plain washers, also retain the oil drip plate. Tighten to specified torque.
256. Clean and fit brake drum and fit the two countersunk retaining screws.

Differential lock switch adjustment

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



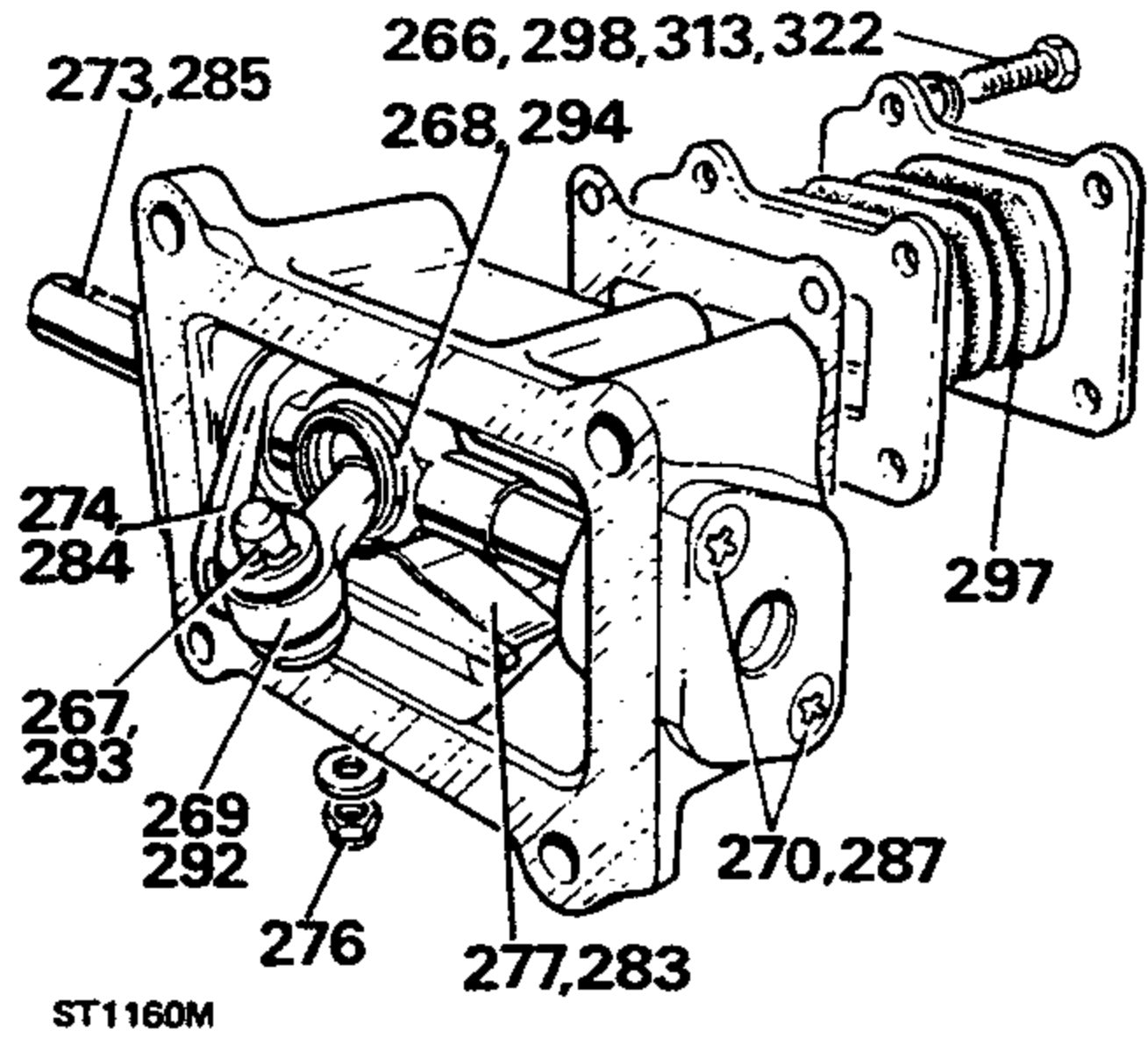
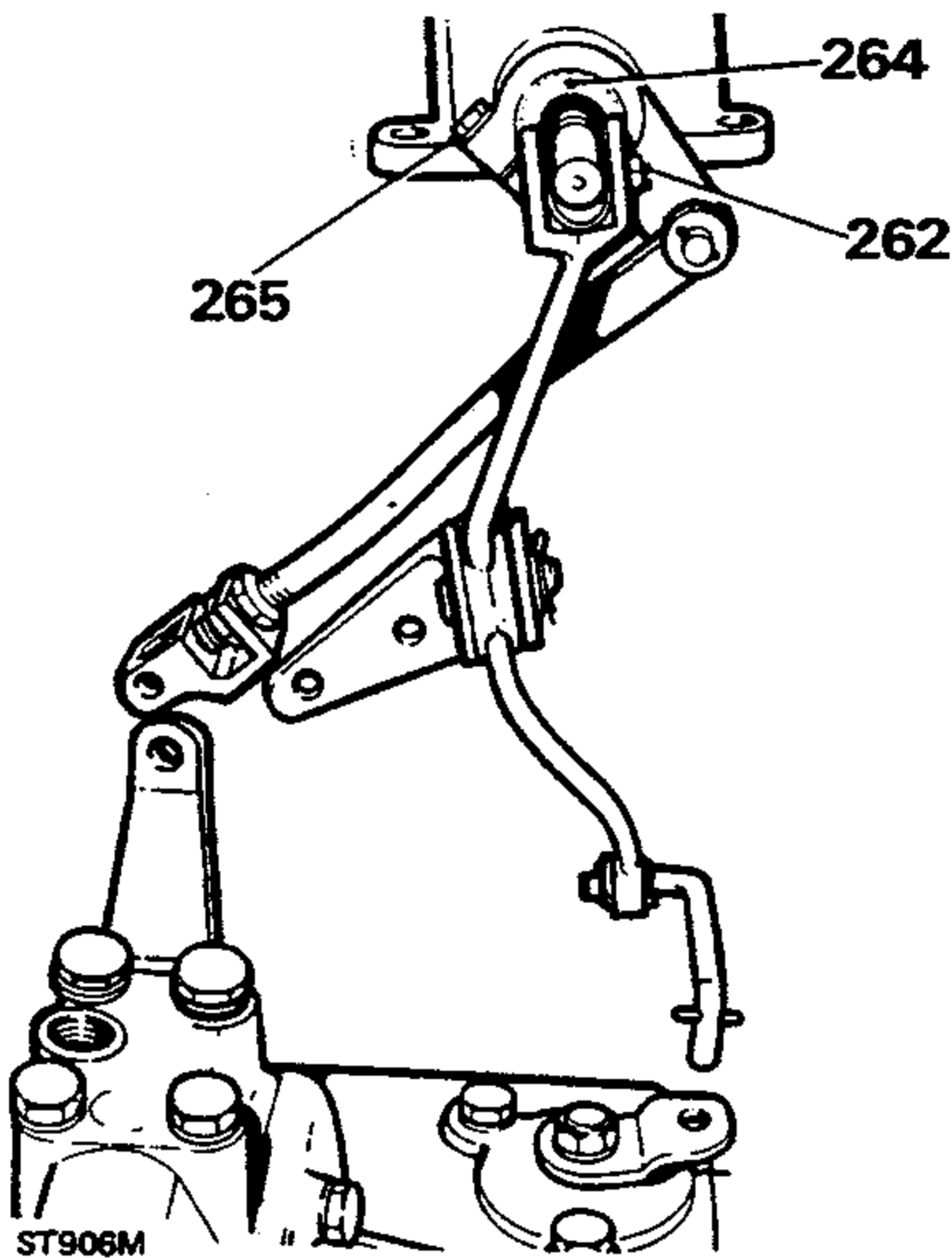
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High/low selector housing

Dismantling

262. 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.

- 263. Remove the washer and clevis pin and the anti-rattle nylon strip.
- 264. Mark the position of the high/low gear change operating arm on the splined shaft of the gear change crank arm.
- 265. Slacken the clamp bolt and remove the operating arm.
- 266. Remove the four bolts from the top of the gear change housing and lift off the grommet plate grommet, gate plate and gasket.
- 267. Remove the split pin from the gear change crank arm clevis pin and remove the clevis pin.
- 268. Remove the circlip from the high/low gear change lever bush.
- 269. Withdraw the gear change lever from the housing, with ball and socket bush.



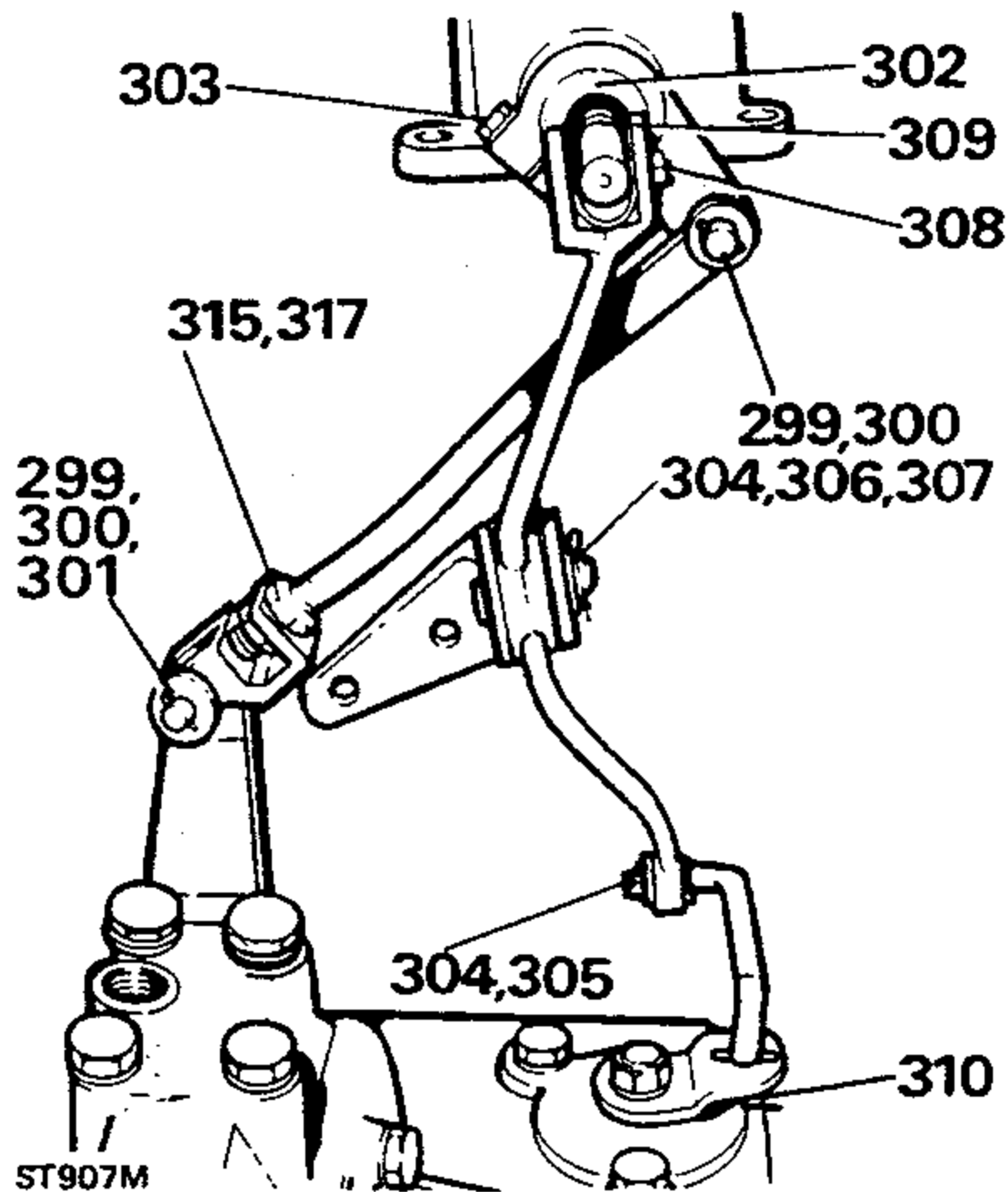
ST1160M

Reassembly

- 270. Remove the two countersunk screws from the housing end cover.
- 271. Remove the housing end cover.
- 272. Remove the two 'O' rings from the end cover.
- 273. Remove the cross shaft from the housing.
- 274. Compress the detent spring and remove the gear change arm from inside the housing.
- 275. Remove the two 'O' rings from the crank arm.
- 276. Remove and discard the two Nyloc nuts retaining the detent plate.
- 277. Remove the detent plate and spring from the housing.
- 278. Clean all parts, examine for wear or damage, renew as necessary.

- 279. Fit the two 'O' rings to the housing end cover.
- 280. Fit the two 'O' rings to the gear change crank arm.
- 281. Lubricate 'O' rings with oil.
- 282. Clip the detent spring onto the detent plate.
- 283. Fit detent plate assembly into housing and retain from outside with two Nyloc nuts (with plain washers).
- 284. Compress the detent spring and fit the gear change crank arm in the housing.
- 285. Fit cross shaft into position locating end in the crank arm.
- 286. Fit the housing end cover to support the other end of the cross shaft.
- 287. Finally secure the housing end cover with the two countersunk screws.
- 288. Before refitting the gear change lever remove the clevis pin bushes and the Nylon socket bush and ball.
- 289. Clean all parts, examine for wear or damage, renew as necessary.
- 290. Fit and grease gear lever ball and Nylon socket bush to gear lever.
- 291. Fit and grease clevis pin bushes.
- 292. Locate gear change lever assembly in cross shaft (do not fit socket bush retaining circlip at this stage).
- 293. Align gear change lever end with crank arm fork ensuring that the gear lever is cranked rearwards and fit clevis and split pin.
- 294. Finally secure Nylon socket bush with circlip.
- 295. Grease and fit gasket to gear change housing face.
- 296. Fit the gate plate.
- 297. Fit the grommet.

298. Fit the grommet plate and retain with the four securing bolts (with spring washers).



299. Before refitting the high/low connecting rod and gear change operating arms remove the respective clevis pins and Nylon bushes. Clean and examine for wear or damage, renew as necessary.
300. Grease and fit the Nylon bushes to the high/low selector and gear change operating arms.
301. Assemble both operating arms to the connecting rod with clevis pin, plain washer and split pin.
302. Slacken the gear change 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.
303. Tighten the clamp bolt to the specified torque.
304. Before refitting the differential lock cross shaft lever and pivot bracket remove the respective clevis pins and Nylon bushes. Also remove the split pin retaining the cranked lever and disconnect it. Clean and examine for wear or damage, renew as necessary.
305. Fit the cranked lever to the bottom of the cross shaft lever and secure with a new split pin (with plain washer).

NOTE: Early gearboxes were fitted with a short connecting link secured by a 'Nyloc' nut.

306. Grease and fit the Nylon bushes to the middle pivot of the cross shaft lever.

307. Fit the cross shaft lever to the (loose) pivot bracket with the clevis pin, washer and split pin.
308. Fit the cross shaft lever fork (top) to the gear change cross shaft.
309. Locate the anti-rattle Nylon strip and fit the clevis pin, plain washer and split pin.
310. Fit the cranked lever, at the bottom of the differential lock cross shaft lever, to the lock lever and retain the clevis pin and plain washer with a new split pin.
311. Grease and fit the Nylon bushes to the operating arm on the selector housing cross shaft.

Adjustment of high/low connecting rod

312. This operation is carried out in situ or on the bench, after assembly to the main gearbox.
313. 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.
314. 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.
315. Slacken off the connecting rod locknuts.
316. Move gear change lever into high range (rearwards) and move the operating arm on the selector housing cross shaft into high range (forwards).
317. Tighten locknut(s).
318. Check that the gear change lever does not foul the gate plate in this position.
319. Engage and check low range in the same way.
320. After adjustment return the gear change lever to the high range position.
321. Remove the four bolts retaining the gate plate and refit the grommet and grommet plate.
322. Refit the four bolts (with spring washers).

* On early versions of the transfer gearbox a different connecting rod fork end was used with a single locknut. In this case the following method of adjustment is recommended.

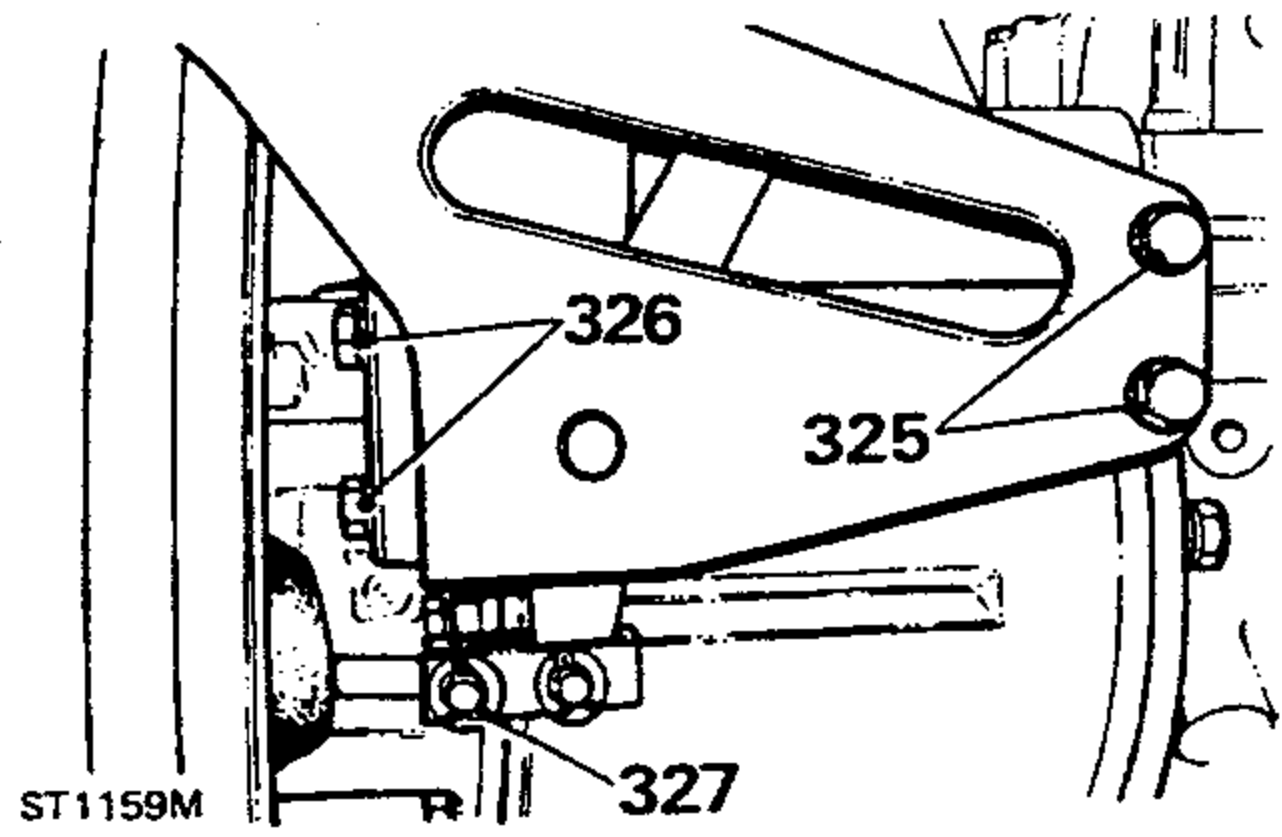
- Disconnect the top of the differential lock cross shaft lever from the gear change cross shaft.
- Remove the four bolts retaining the gear change housing to the remote gear change housing on the main gearbox.
- Lift up the housing assembly (with the connecting rod attached) and rotate it as required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

Transfer box mounting - Refitting

323. Fit the rubber mounting plate to the right side of the front output housing by fitting the four securing bolts (with new lock tabs).

Handbrake linkage - Refitting

324. Locate the handbrake linkage bracket in position on the right hand side of the transfer box casing and secure as follows.
325. Fit the two bolts (with spring washers) and distance pieces to retain the front side of the linkage bracket.
326. Fit the two bolts (with spring washers) to secure the rear end of the linkage bracket. The lower bolt is shorter.



327. Insert the clevis pin through the brake operating lever, fit the handbrake link, plain washer and split pin.

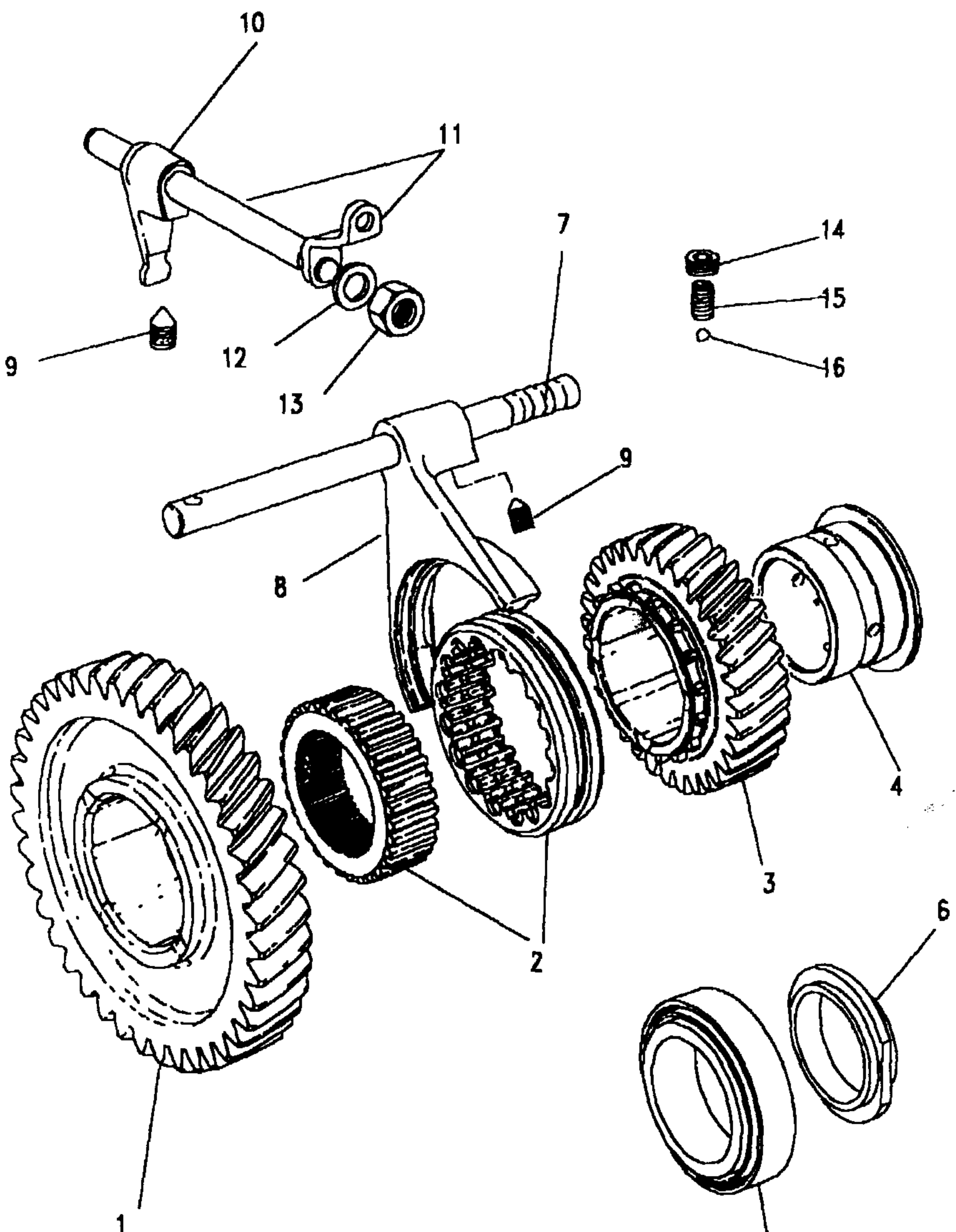
DATA

Input shaft bearing pre-load	0,02 to 0,07 mm
Intermediate gear end-float	0,08 to 0,35 mm
Intermediate gear thrust washer thickness	2,70 to 2,75 mm
Centre differential rolling resistance - minus intermediate gear cluster and output shaft flange	1,8 to 4,5 Kg
Input gear rolling resistance - minus intermediate gear cluster	1,4 to 3,6 Kg
Differential pinions backlash.....	0,02 to 0,07 mm
Output shaft bearing pre-load	0,02 to 0,07 mm
Low range gear end-float	0,05 to 0,15 mm
High range gear/bush running clearance diameter	0,03 to 0,09 mm

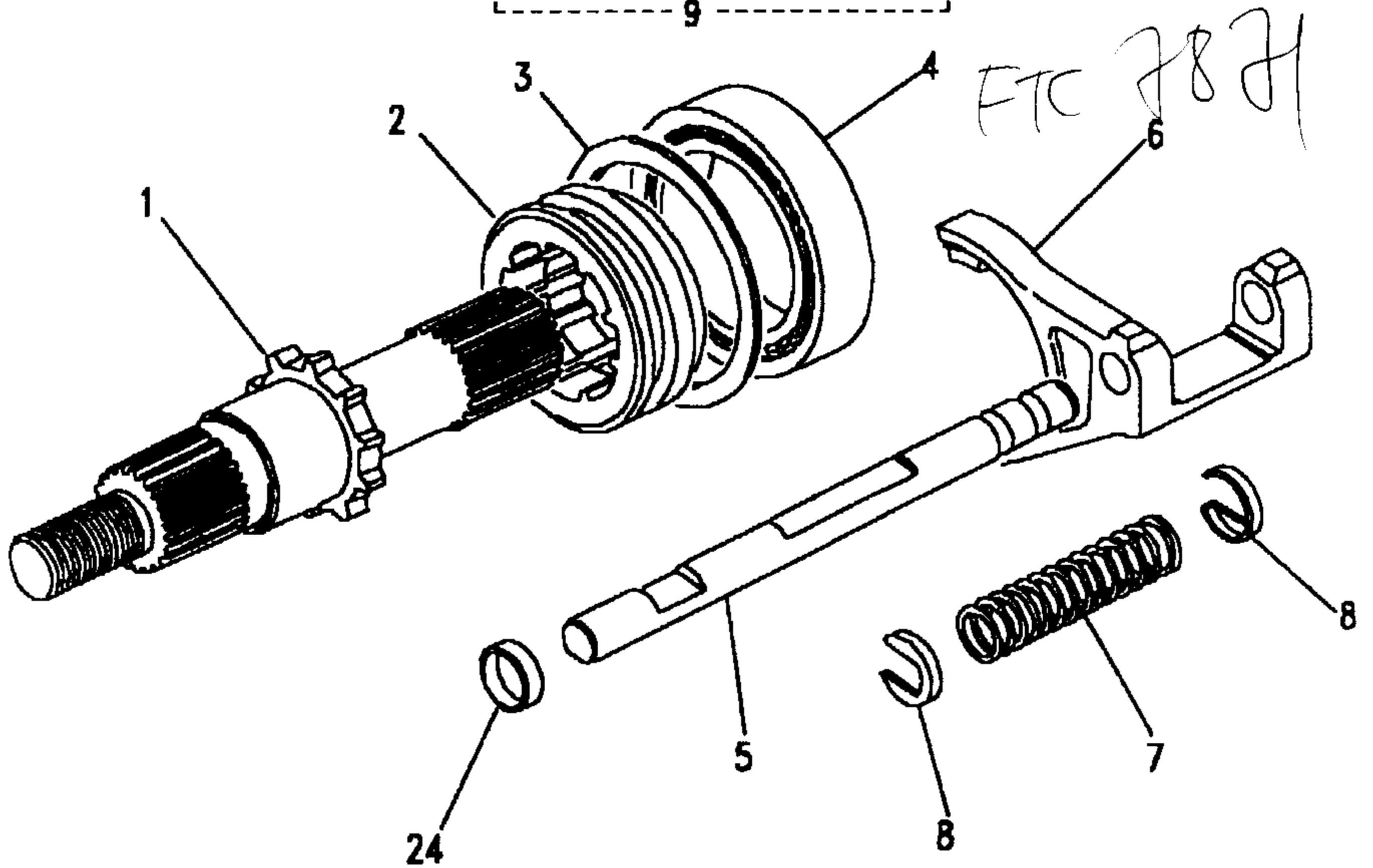
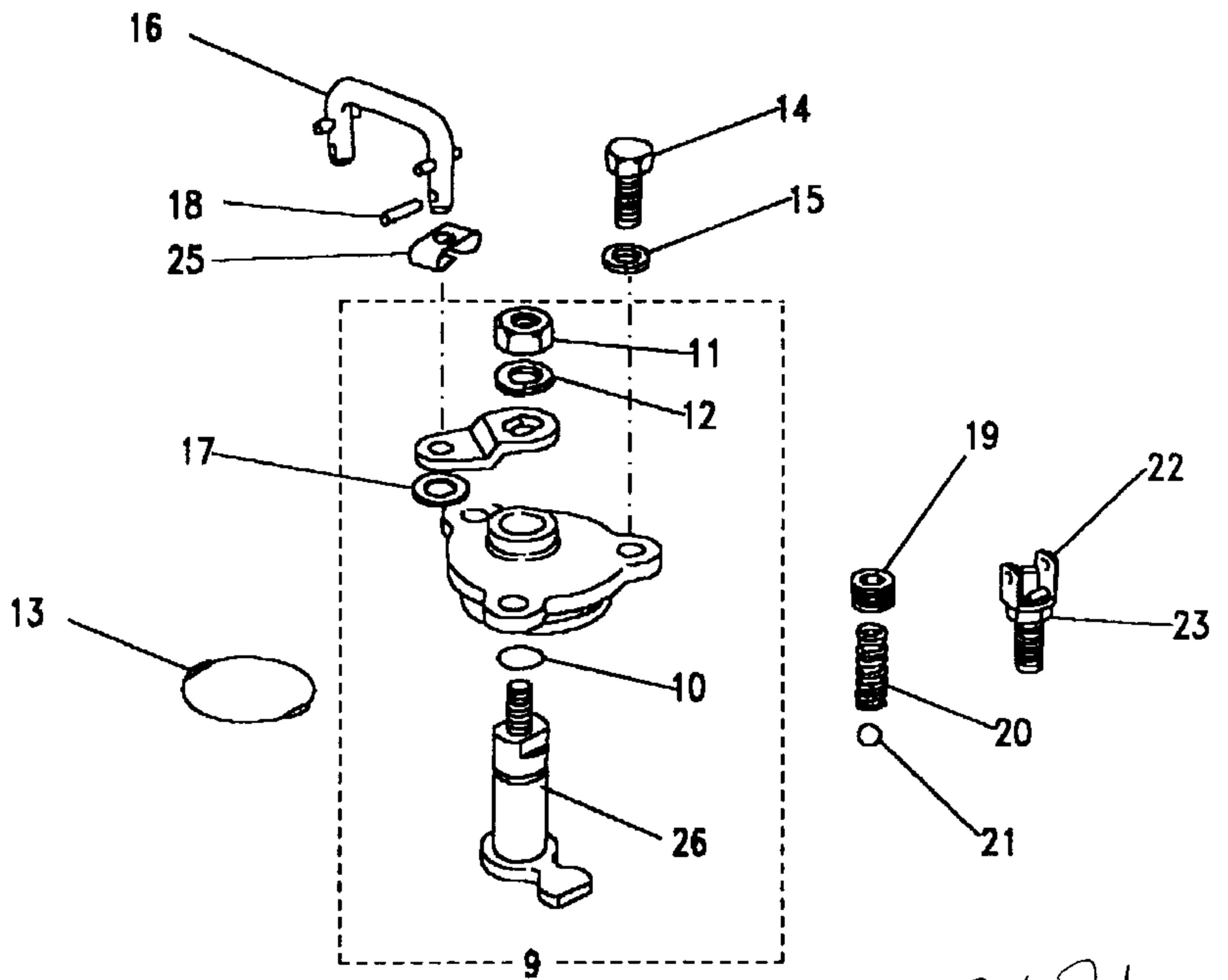
TORQUE VALUES Nm

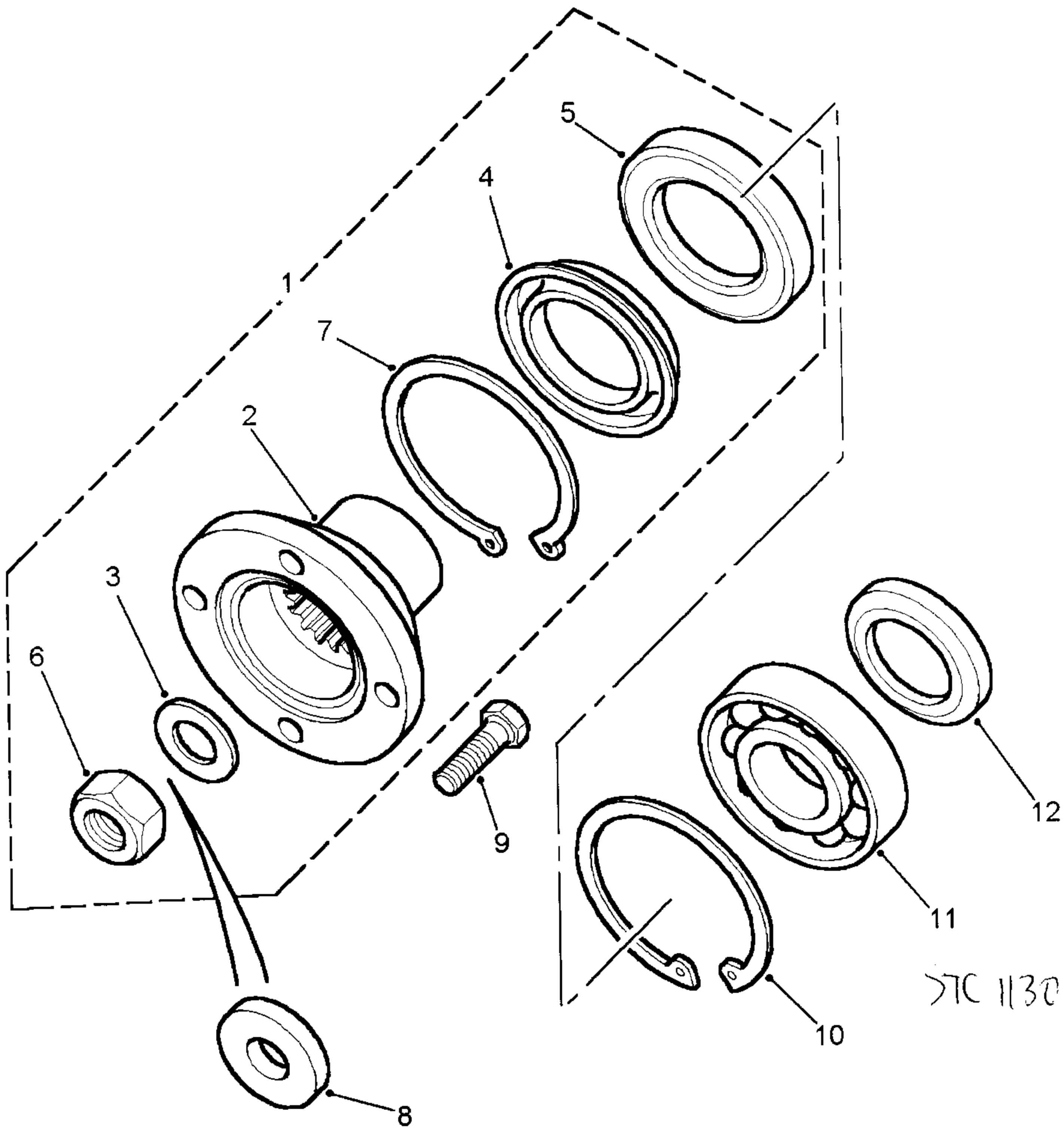
Pinch bolt operating arm	9
Gate plate to grommet plate	9
End cover	45
Speedometer cable retainer	9
Speedometer housing/rear output	See note
Locating plate to gear change housing	6
Bottom cover to transfer case	25
Front output housing to transfer case	25
Cross shaft housing to front output housing	25
Gear change housing	25
Pivot shaft	25
Connecting rod	25
Retaining plate intermediate shaft	25
Front output housing cover	25
Gear change housing	25
Bracket to extension housing	25
Finger housing to front output housing	25
Mainshaft bearing housing	25
Brake drum	25
Gearbox to transfer box	45
Bearing housing to transfer gearbox	9
Speedometer housing to transfer gearbox	45
Selector fork to cross shaft	25
Yoke to selector shaft high/low	25
Selector fork high/low to shaft	25
Operating arm high/low	25
Transmission brake	72
Gearbox to transfer case	45
Gearbox to transfer case	See note
Oil drain plug	30
Differential case	60
Output flange	162
Differential case rear and shaft main drive 2/4-wheel drive	72
Link arm and cross shaft lever to ball joint	10
Oil filler/level plug	30
Transfer breather	9

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.

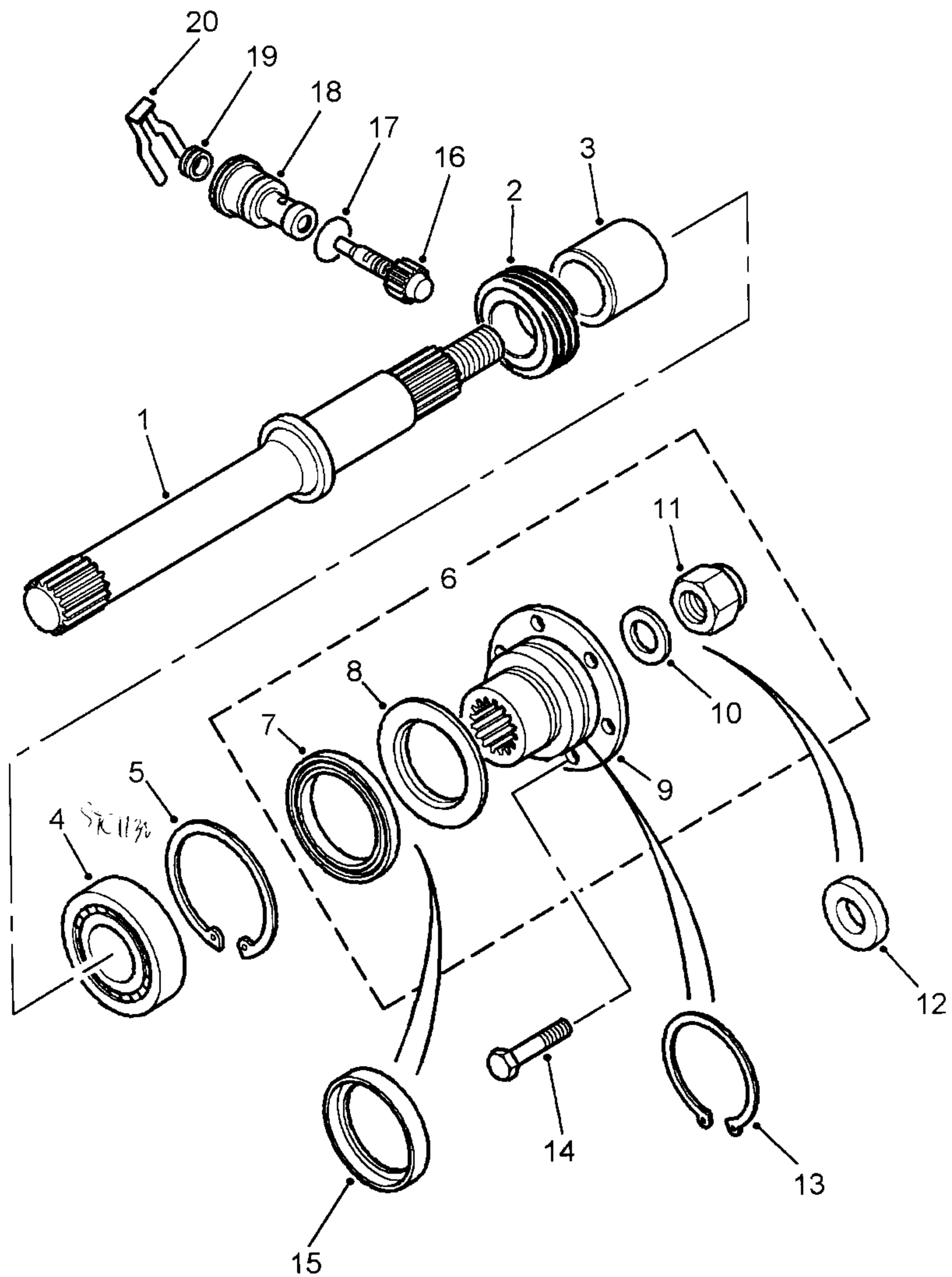


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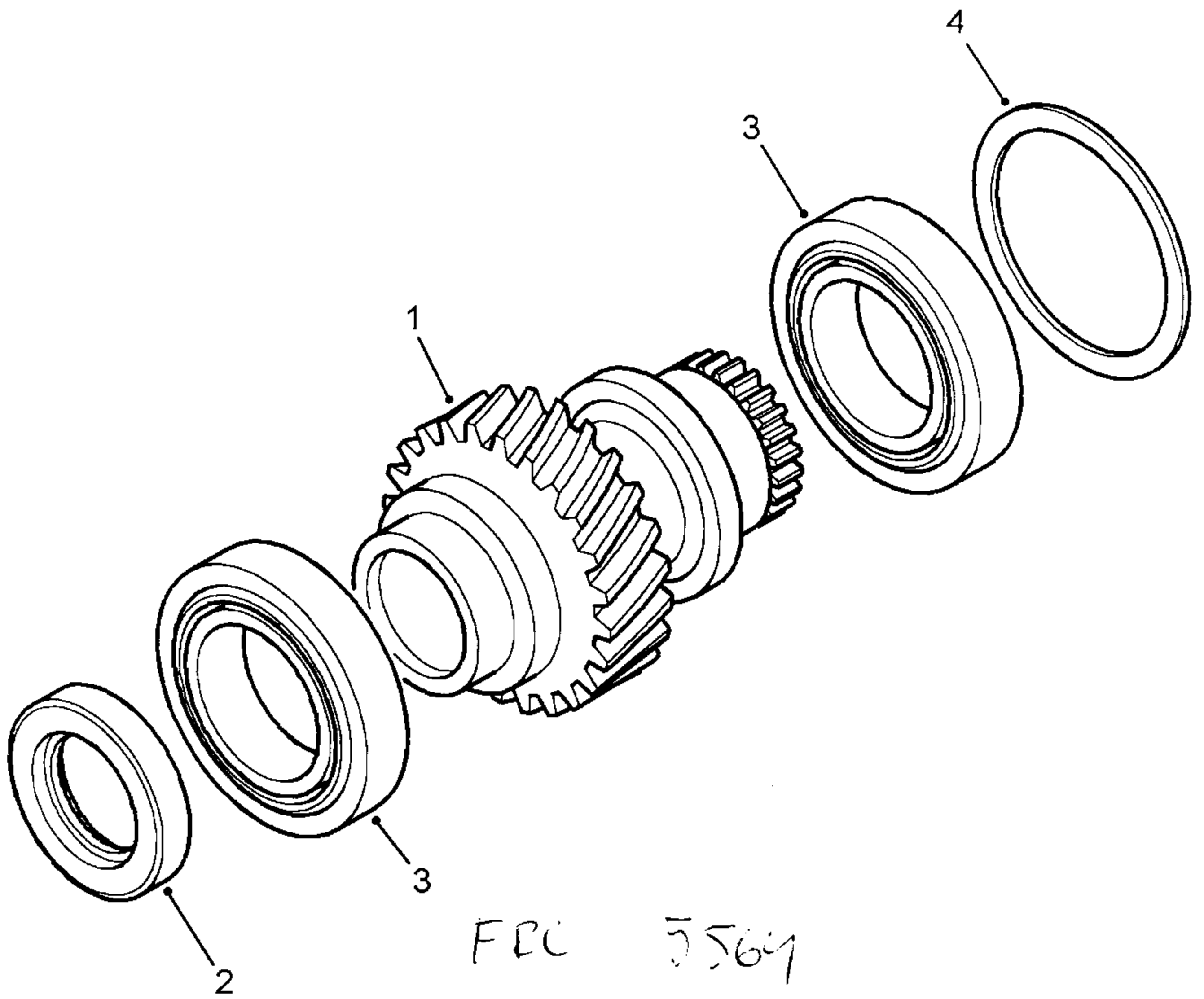


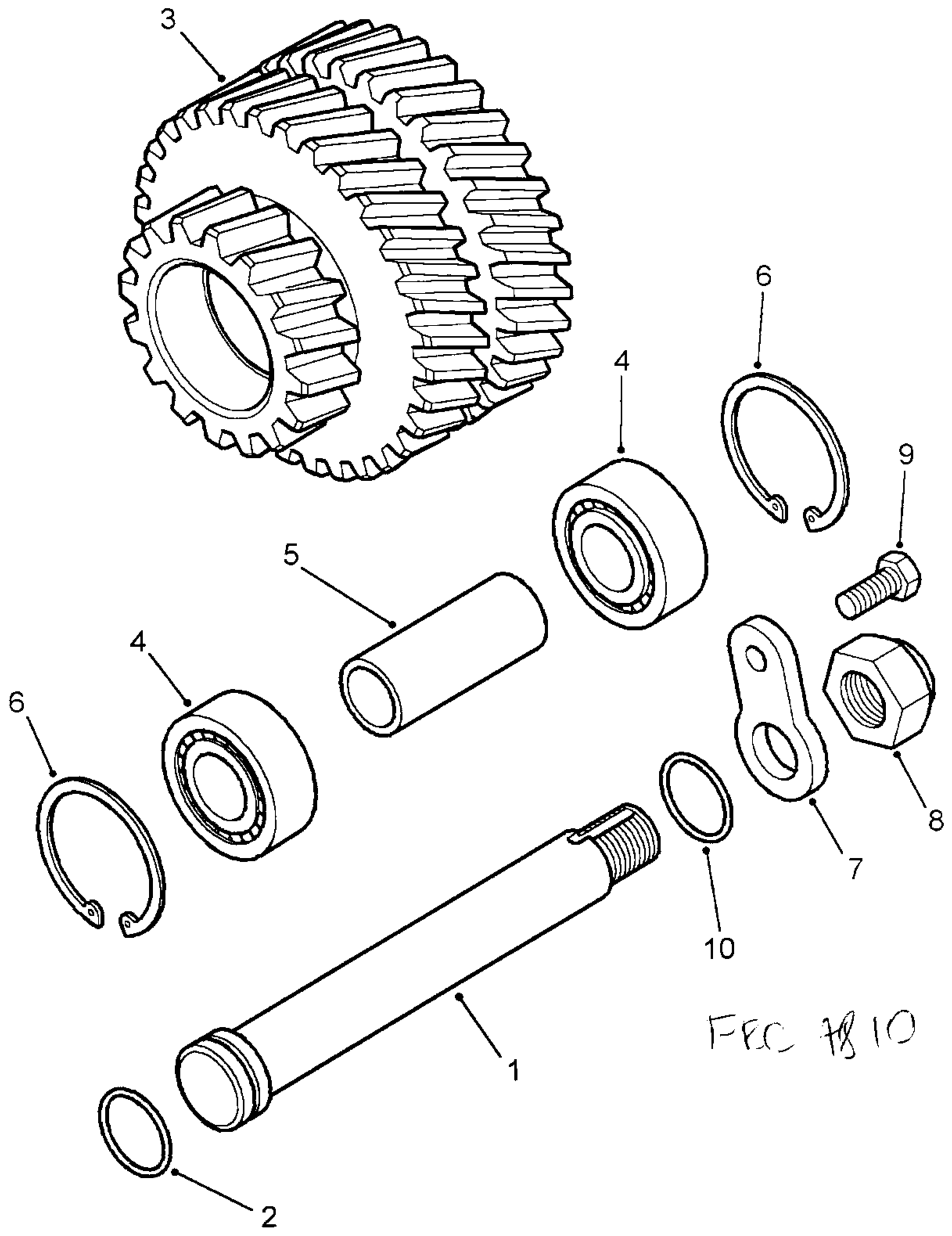


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