

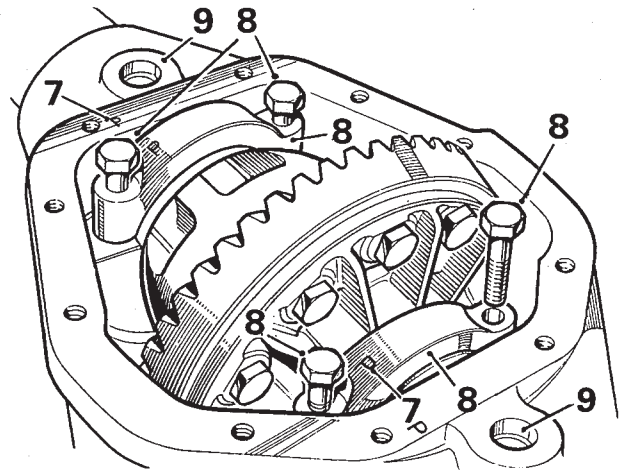


DIFFERENTIAL ASSEMBLY - 110/130

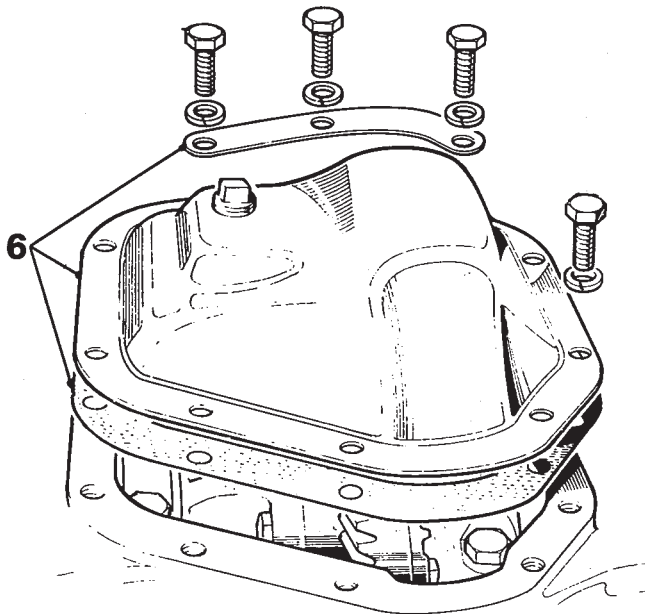
Service repair no - 51.15.07

Overhaul

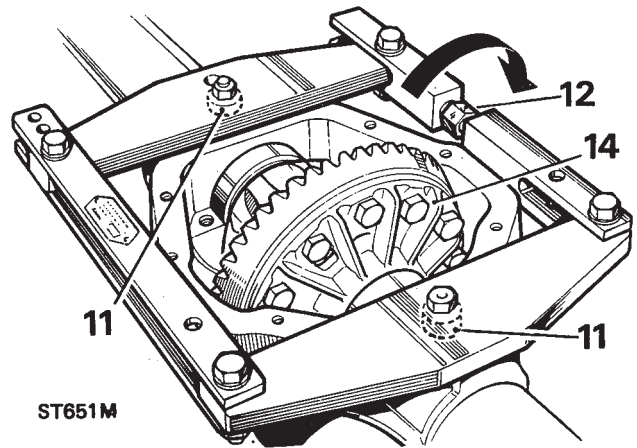
1. Drain off differential lubricating oil, and refit plug.
2. Remove rear axle assembly from vehicle **See Repair, Rear axle**
3. Remove hub driving member fixings.
4. Withdraw driving member and axle shaft sufficiently to disengage differential.
5. Repeat instruction 4 for other axle shaft.



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6. Remove fixings and support strip at differential cover and withdraw cover and joint washer.
7. Note relationship marking on bearing caps and axle casing to ensure correct refitting.
8. Remove fixings and withdraw differential bearing caps.
9. Clean out and examine spreader tool pegholes provided in gear casing face ensure that holes are free from dirt and burrs and damage.
10. Ensure that turnbuckle adjuster is free to turn.

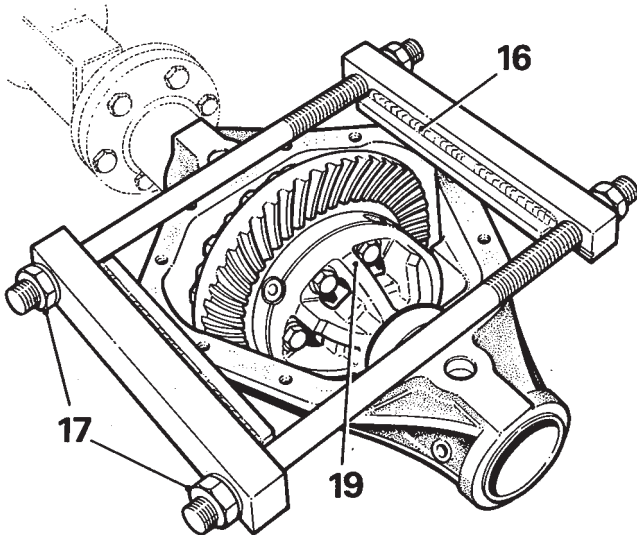
Using axle spreader 18G31C

11. Fit axle spreader to engage peg holes. (Spreader **18G131C**, Adaptor pegs **18G131F**)
12. Using a spanner, turn adjuster until all free play between spreader and casing is taken up, denoted by adjuster becoming stiff to turn.
13. Check that side members of spreader are clear of casing.
14. Stretch casing, rotating adjuster by one flat at a time, until differential assembly can be levered out. Do not lever against spreader use suitable packing under levers to avoid damage to casing.



CAUTION: To prevent permanent damage to the gear carrier case, it must not be over-stretched. Each flat on the turnbuckle is numbered to enable a check to be made on the amount turned. The maximum stretch permitted is 0,30 mm, equivalent to three flats.

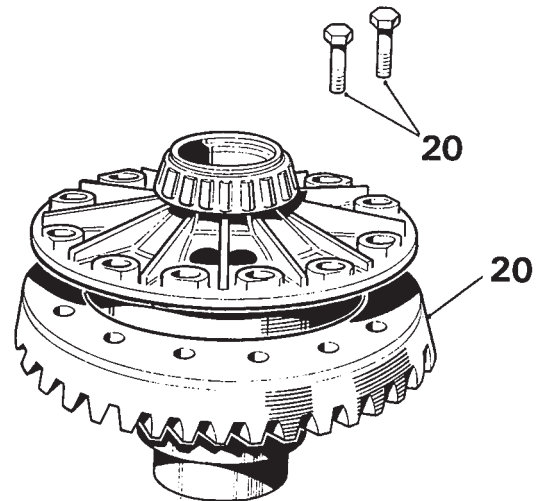
15. Ease off adjuster and remove spreader.



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Using axle compressor LRT-51-503 (GKN 131)

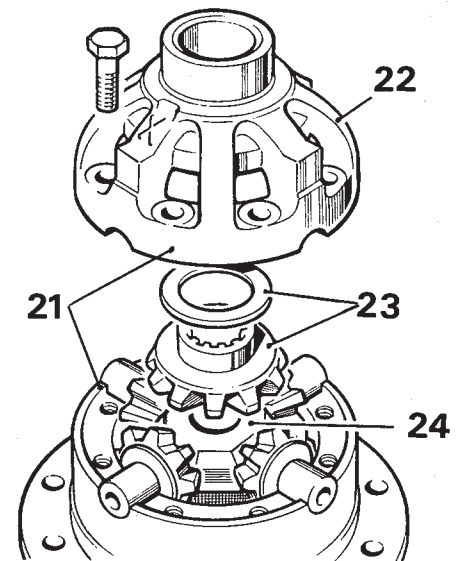
16. Place tool on to differential casing, as illustrated, with weld seam uppermost. Ensure that plates rest squarely on differential machined surface and end bars butt against edges of casing.
17. Tighten adjusting nuts by hand only, until all slack is taken up.
18. Continue to tighten both nuts alternately with a spanner, one flat at a time, to a maximum of three flats.
19. Carefully lever-out differential assembly.



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Dismantle differential

20. Add alignment marks between crown wheel and differential case for reassembly purposes, then remove fixings and withdraw crown wheel.



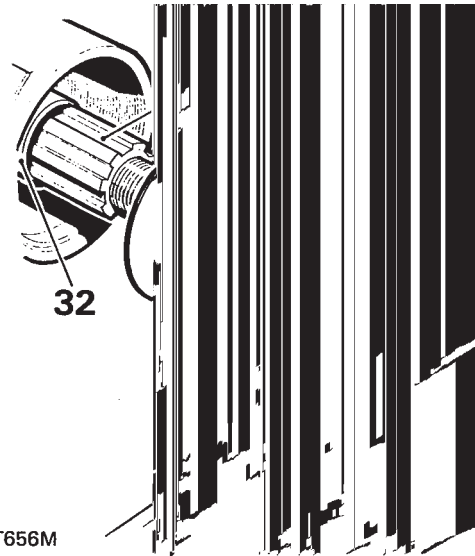
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21. Note alignment markings on two differential casings to ensure correct refitting, then remove fixings.
22. Lift off upper case.
23. Withdraw upper differential wheel and thrust washer.
24. Lift out cross-shaft and pinions.



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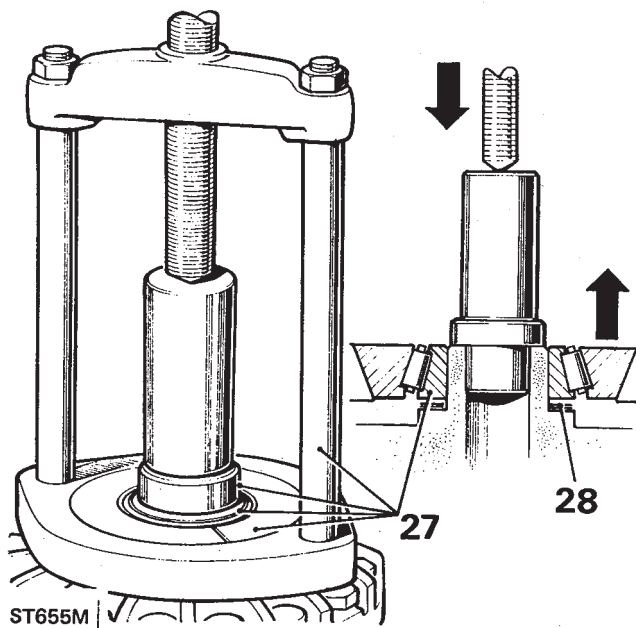
25. Withdraw four dished thrust washers.
26. Withdraw lower differential wheel and thrust washer.



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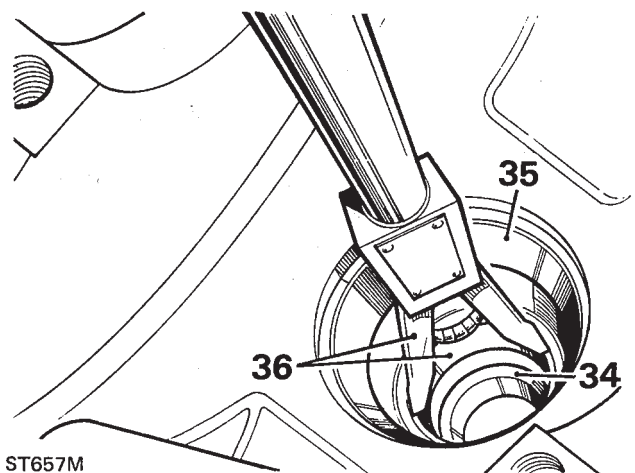
Remove final drive pinion

29. Using **LTR-51-003** to prevent coupling flange from rotating, remove flange locknut and plain washer.
30. Support drive pinion and remove coupling flange by tapping with a hide hammer.
31. Withdraw drive pinion together with inner bearing cone.
32. Withdraw and discard collapsible bearing spacer.
33. Withdraw oil seal, gasket and oil thrower.



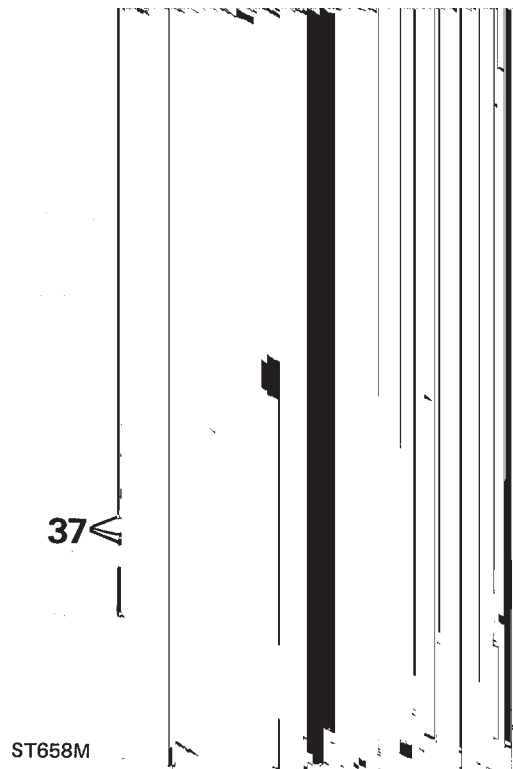
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27. Remove differential bearing cones using **LRT-51-500**, adaptors 1 and 2 and press **LRT-99-002**.
28. Withdraw shim washers fitted between bearing cones and differential casings.



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34. Withdraw outer bearing cone.
35. Using **LRT-51-502**, extract pinion inner bearing cup and shim washers from casing. Note shim washer thickness.
36. Extract pinion outer bearing cup from casing using **LRT-51-502**.



37. Using **LRT-51-500** and press **LRT-99-002**, remove inner bearing cone from pinion.

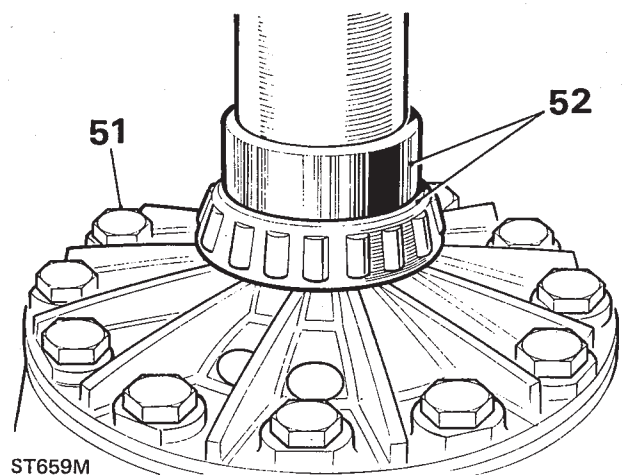
INSPECTION

38. Examine all components for obvious wear or damage.
39. Bearing cones must be a press fit on their locations, except drive pinion flange and bearing which is a slide fit.
40. The crown wheel and pinion are supplied as a matched pair and must not be interchanged separately. A new crown wheel and pinion matched pair may be fitted to an original gear carrier casing if sound. original crown wheel and pinion, if sound, may be fitted into a replacement casing.
41. The two parts of differential unit casing are matched and must not be replaced separately.
42. Discard and renew all thrust washers.
43. Differential housings with worn thrust washer seatings must be replaced as a pair.
44. Examine differential case to crown wheel joint face for burrs and damage which could lead to crown wheel run-out when fitted.

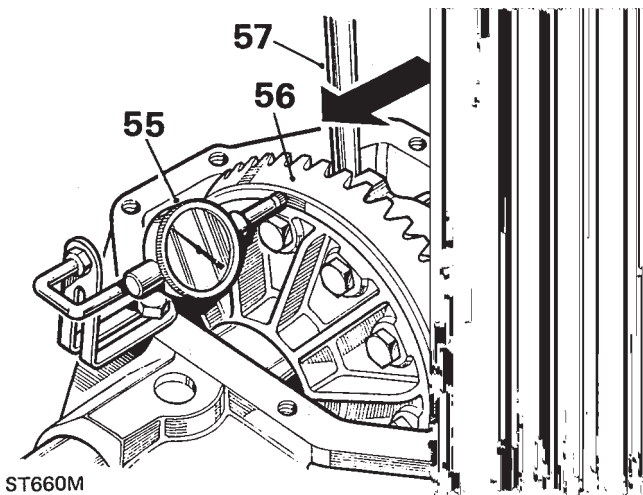
ASSEMBLE

Differential

45. Fit differential lower wheel and thrust washer to differential case. See illustration following instruction 23.
46. Fit dished thrust washers.
47. Fit cross-shaft and pinions.
48. Fit differential upper wheel and thrust washer.
49. Fit differential upper case lining-up marks.
50. Secure assembly with bolts using Loctite 'Studlock' grade CVX on threads and tighten evenly and diametrically to **95 Nm (70 lbf/ft)**.



51. Fit crown wheel to differential casing. Use Loctite 'Studlock' grade CVX on fixing bolt threads and tighten to correct torque.
52. Press on differential roller bearing cones less shim washers, using **LRT-51-504**, and leave to one side until required for instruction 6.
53. Fit bearing cups to differential.
54. Fit differential unit and bearings to gear carrier casing, and rotate unit to centralize bearings. Do not fit bearing caps.



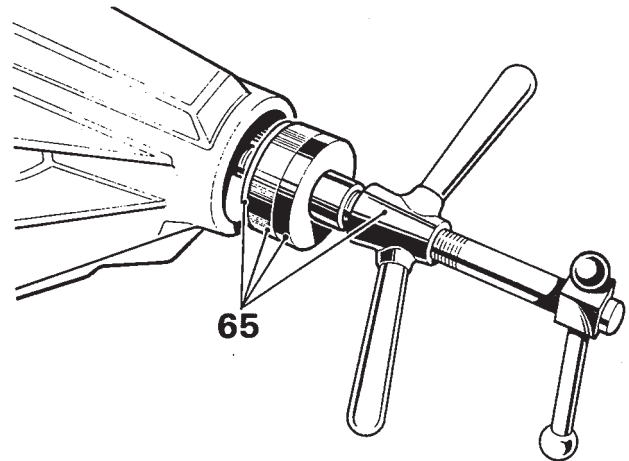
55. Position a suitable dial gauge indicator on casing with stylus registering on back face of crown wheel.
56. Rotate differential and check total indicated run-out on crown wheel back face. This must not exceed 0,05 mm. If run-out is excessive, check mating faces for dirt and damage if necessary, select a new radial position for crown wheel. When satisfactory, continue with following check.

Differential bearing adjustment

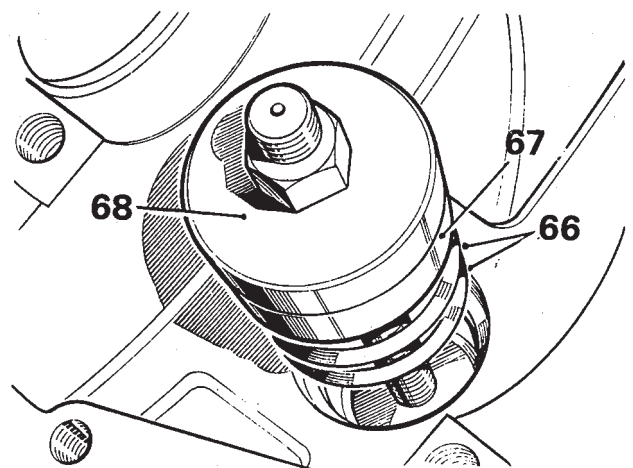
57. Insert two levers between casing and differential unit at one side.
58. Move differential unit fully to one side of casing do not tilt unit.
59. Rotate differential unit to settle bearings, continue to lever differential to side, then zero dial gauge indicator.
60. Lever assembly fully to other side of casing, rotate unit to settle bearings, then note total indicator reading.
61. Add 0,127 mm, for bearing pre-load, to total noted in preceding instruction. The sum is then equal to nominal value of shims required for differential bearings. Shims are available in range 0,07 mm, 0,12 mm, 0,25 mm and 0,76 mm. Select total value of shims required.
62. Remove differential unit and bearings and place aside. Do not fit shim washers until subsequent 'Differential backlash' checks have been made, instructions 6 to 102.

Fit drive pinion

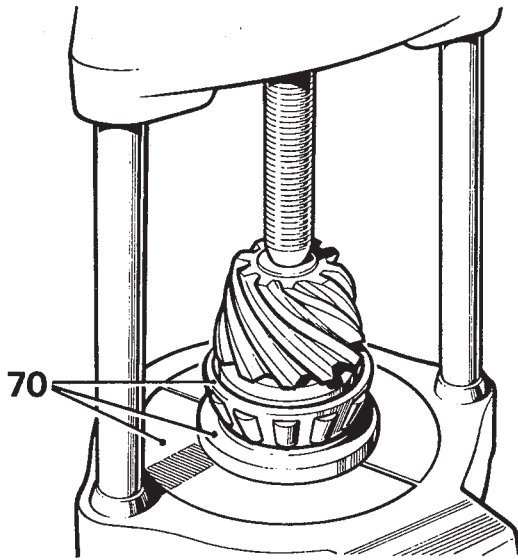
63. Select shim washers of same thickness value as those removed from under pinion inner cup, instruction 35, and place ready for fitting.



64. Position outer bearing replacer **LRT-51-505**, detail 2, and outer bearing cup on press **LRT-99-502**.
65. Locate assembly into pinion housing nose.
66. Place selected shim washers on to inner bearing cup seating.



67. Position inner bearing cup in casing.
68. Position inner bearing replacer **LRT-51-505**, detail 1, onto **LRT-99-502** and secure with fixing nut.
69. Hold still centre screw and turn butterfly lever to draw in bearing cups.

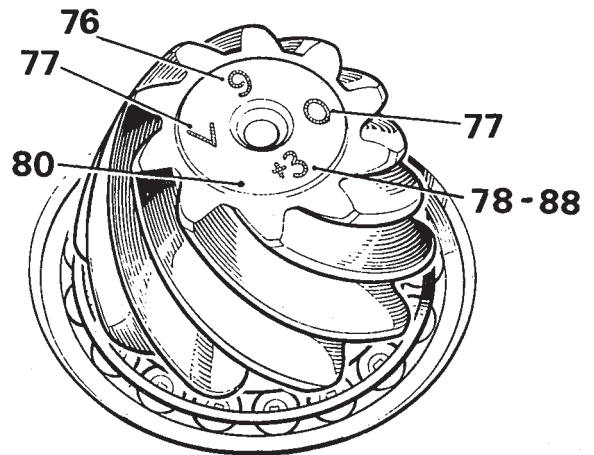


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70. Press inner bearing cone onto drive pinion using **LRT-51-502** details 1 and 2 and press **LRT-99-002**.
71. Position pinion and bearing in casing omit collapsible spacer at this stage.
72. Fit outer bearing cone onto pinion.
73. Fit coupling flange and plain washer and loosely fit flange nut.
74. Tighten coupling flange locknut to remove end-float from pinion.
75. Rotate pinion to settle bearings and slowly tighten flange locknut. Use a spring balance to obtain a torque resistance of 11 Kgf/cm (18 lbf/in) to rotate pinion.

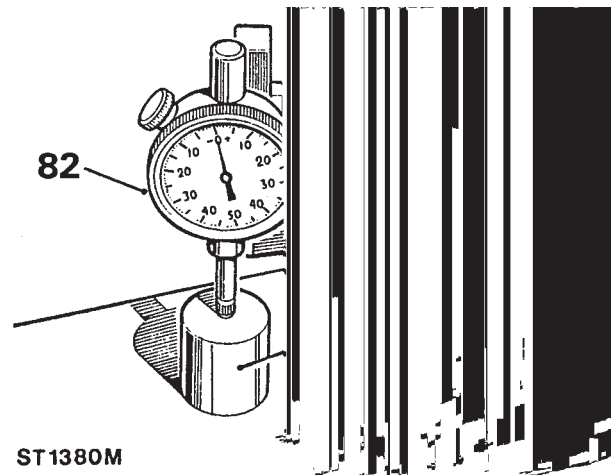
Drive pinion markings

76. Check that serial number marked on pinion end face matches that marked on crown wheel.
77. The markings on end face adjacent to serial number are of no significance during servicing.
78. The figure marked on end face opposite to serial number indicates, in thousandths of an inch, deviation from nominal required to correctly set pinion. A pinion marked plus (+) must be set below nominal, a minus (-) pinion must be set above nominal. An unmarked pinion must be set at nominal.



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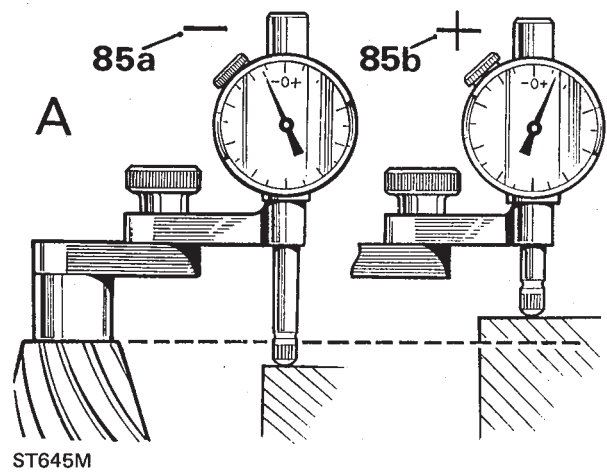
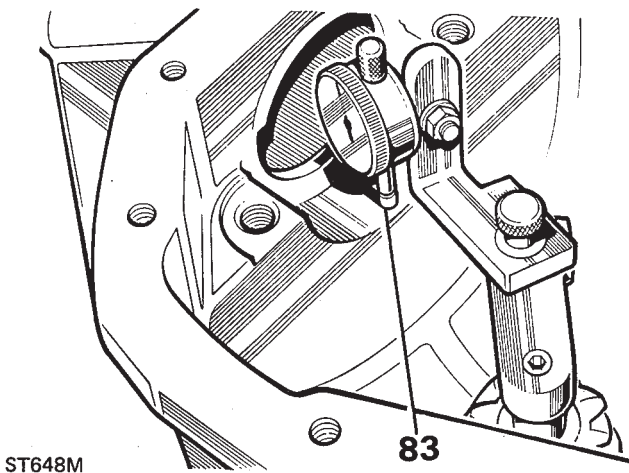
79. The nominal setting dimension is represented by setting gauge block **18G191P** or **LRT-54-503**, which is referenced from pinion end face to bottom radius of differential bearing bore. The latter gauge is illustrated following instruction 85.



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Drive pinion adjustment

80. Ensure that pinion end face is free of raised burrs around etched markings.
81. Remove keep disc from magnetized base of dial gauge tool **18G191**.
82. Place dial gauge and setting gauge **18G191P** or **LRT-54-503** on a flat surface and zero dial gauge stylus on to setting gauge.



- 83. Position dial gauge centrally on pinion end face with stylus registering on lowest point on one differential bearing bore. Note dial gauge deviation from zeroed setting.
- 84. Repeat on other bearing bore. Add together readings, then halve sum to obtain mean reading. Note whether stylus has moved up or down from zeroed setting.

Example 1

Reading obtained LH side..... + 0.1524mm
 Reading obtained RH side..... - 0.0762mm

Add + 0.1524mm - 0.0762mm = + 0.0762mm

Divide by 2 (0.0762 divided by 2)= 0.0381mm

Therefore subtract 0.0381mm from shim thickness behind pinion inner bearing track.

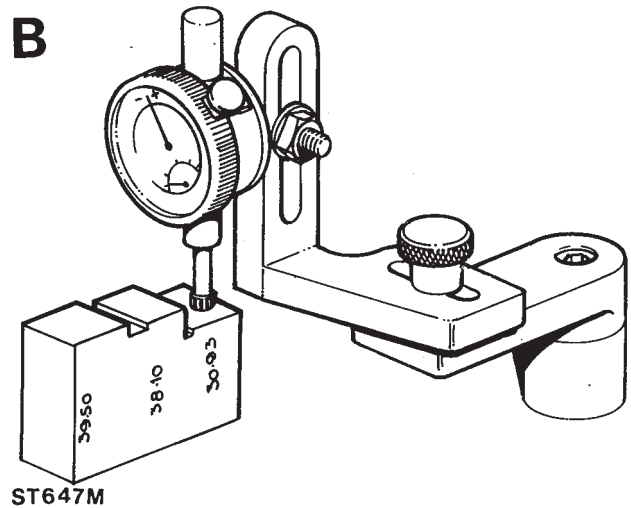
Example 2

Reading obtained LH side..... + 0.1524mm
 Reading obtained RH side..... - 0.2032mm

Add + 0.1524mm - 0.2032mm = + 0.0508mm

Divide by 2 (0.0508 divided by 2)= 0.0254mm

Therefore add 0.0254mm from shim thickness behind pinion inner bearing track.



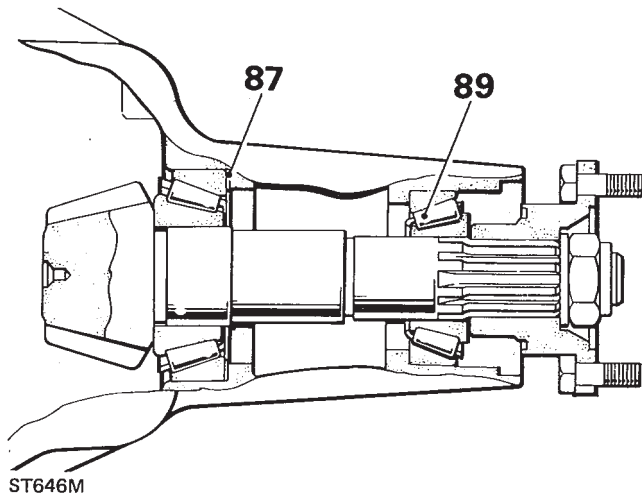
- 85. Where stylus has moved down (85a), amount is equivalent to thickness of shims that must be removed from under pinion inner cup to bring pinion down to nominal position. Where stylus has moved up (85b), amount is equivalent to additional thickness of shims required to bring pinion up to nominal position.

Illustration A. Using setting gauge **18G191P**.

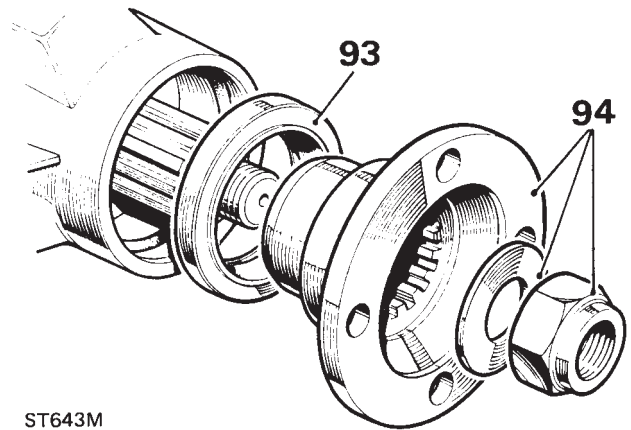
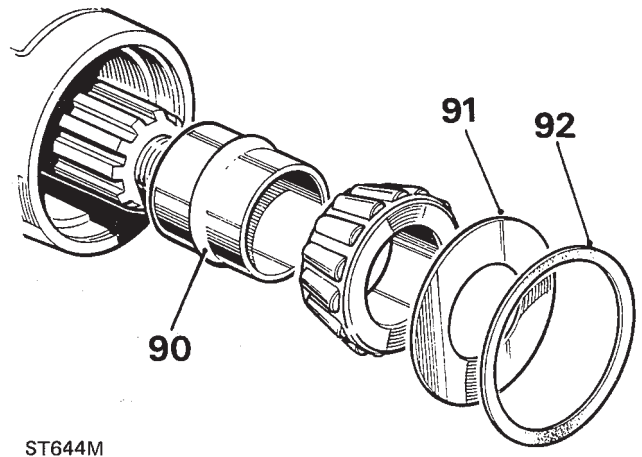
Illustration B. Using universal setting block **LRT-54-503**. This setting block has 3 setting heights.

Ensure that height marked 30. 3 mm is used for this differential.

86. Before adjusting shim thickness, check pinion face marking and if it has a plus (+) figure, subtract that from shim thickness figure obtained in previous instruction. Alternatively if pinion has a minus (-) figure, add amount to shim thickness figure.



87. Adjust shim thickness under pinion inner cup as necessary, by amount determined in instructions 85 and 86.
88. Recheck pinion height setting instructions 82 to 84. If setting is correct, mean reading on dial gauge will agree with figure marked on pinion end face. For example, with an end face marking of +3, dial gauge reading should indicate that pinion is 0.003 in (0.0762 mm) below nominal.
89. When pinion setting is satisfactory, temporarily remove pinion outer bearing.
90. Fit a new collapsible bearing spacer, flared end outward, to drive pinion and refit outer bearing.
91. Fit pinion oil slinger.
92. Fit oil seal gasket.
93. Fit pinion oil seal, lipped side first, using general purpose grease or, where available, a molybdenum disulphide based grease on seal lip, using **LRT-51-002** to drift in seal.
94. Fit coupling flange and plain washer and loosely fit a new flange nut. Secure **LRT-51-003** to coupling flange, using slave fixings.



95. Alternately tighten flange nut and check drive pinion resistance to rotation until following figures are achieved, as applicable
- A. Assemblies re-using original pinion bearings 17,3 to 34,5 kgf cm.
 - B. Assemblies with new pinion bearings 34,5 to 46,0 kgf cm.

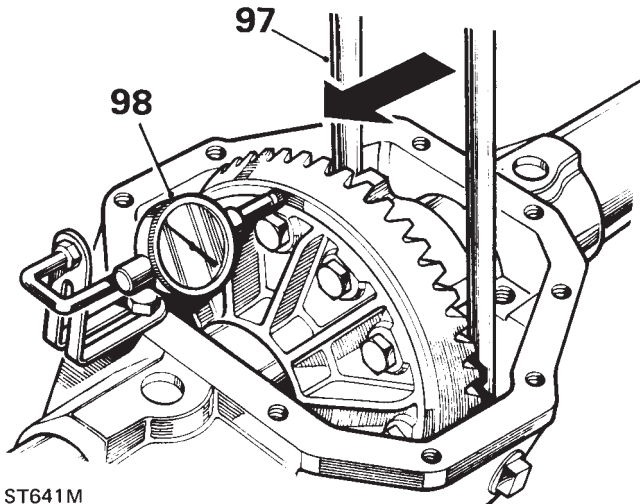


NOTE: Once the bearing spacer has started to collapse the torque resistance build-up is rapid, therefore check frequently, using a spring balance, to ensure the correct figures are not exceeded, otherwise a new collapsible bearing spacer will be required.



Differential backlash checks

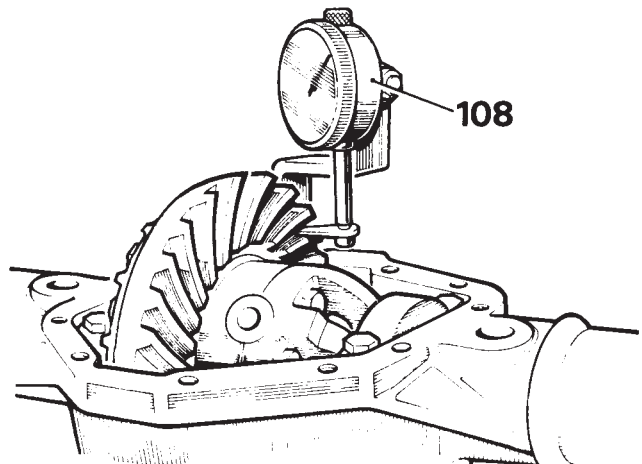
- 96. Pick up differential unit as left after instruction 52.



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- 97. Fit differential unit and lever unit away from drive pinion until opposite bearing cup is seated against housing. Do not tilt unit.
- 98. Install a dial gauge on casing with its stylus resting on back face of crown wheel. Zero the gauge.
- 99. Lever differential unit to engage crown wheel teeth in full mesh with drive pinion teeth. Do not tilt unit.
- 100. Note total reading obtained on dial gauge.
- 101. From this figure subtract 0,25 mm to obtain correct crown wheel backlash when fitted. The result indicates value of shimming to be fitted between differential case and bearing cone at crown wheel side of differential.
- 102. Fit shim value determined in instruction 101, taking shims from pack previously determined during 'Differential bearing adjustment' checks, instructions 57 to 62 LRT-51-500 details 1 and 2, press LRT-99-002, and LRT-51-504.
- 103. Fit remaining shims from instruction 101 to opposite side of differential. LRT-51-501 details 1 and 2, press LRT-99-002, and LRT-51-504.
- 104. Fit differential unit with shims and bearings to axle casing, using axle spreader LRT-51-503 with pegs 18G131F.
- 105. Remove axle spreader.

- 106. Fit bearing caps in their correct position, referring to relationship markings on caps and on axle casing.
- 107. Tighten bearing caps fixings to **135 Nm (100 lbf/ft)**.



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- 108. Mount a dial gauge on axle casing with stylus resting on a crown wheel tooth.
- 109. Prevent drive pinion from rotating and check crown wheel backlash which must be 0,15 to 0,27 mm. If backlash is not within specified limits, repeat differential backlash checks, instructions 6 to 102 looking for possible errors.
- 110. Fit differential cover and new gasket, coating both sides of gasket with Hylomar PL 32M or an equivalent non-setting sealant. Torque load for fixings is **30 Nm (22 lbf/ft)**.
- 111. Reverse instructions 3 to 5 and coat threads of hub driving member bolts with Loctite 'Studlock' grade CVX and fit and tighten bolts evenly to correct torque.
- 112. Fit rear axle assembly to vehicle **See Repair, Rear axle**.
- 113. Replenish differential with recommended lubricant **See LUBRICANTS, FLUIDS AND CAPACITIES, Information, Recommended lubricants and fluids**. After initial axle run, check oil level and replenish as necessary to filler/level plug hole.
- 114. Where major running parts have been replaced during servicing, it is a recommended practice to allow axle assembly to 'run in' by avoiding, where possible, heavy loads and high speeds during initial running.