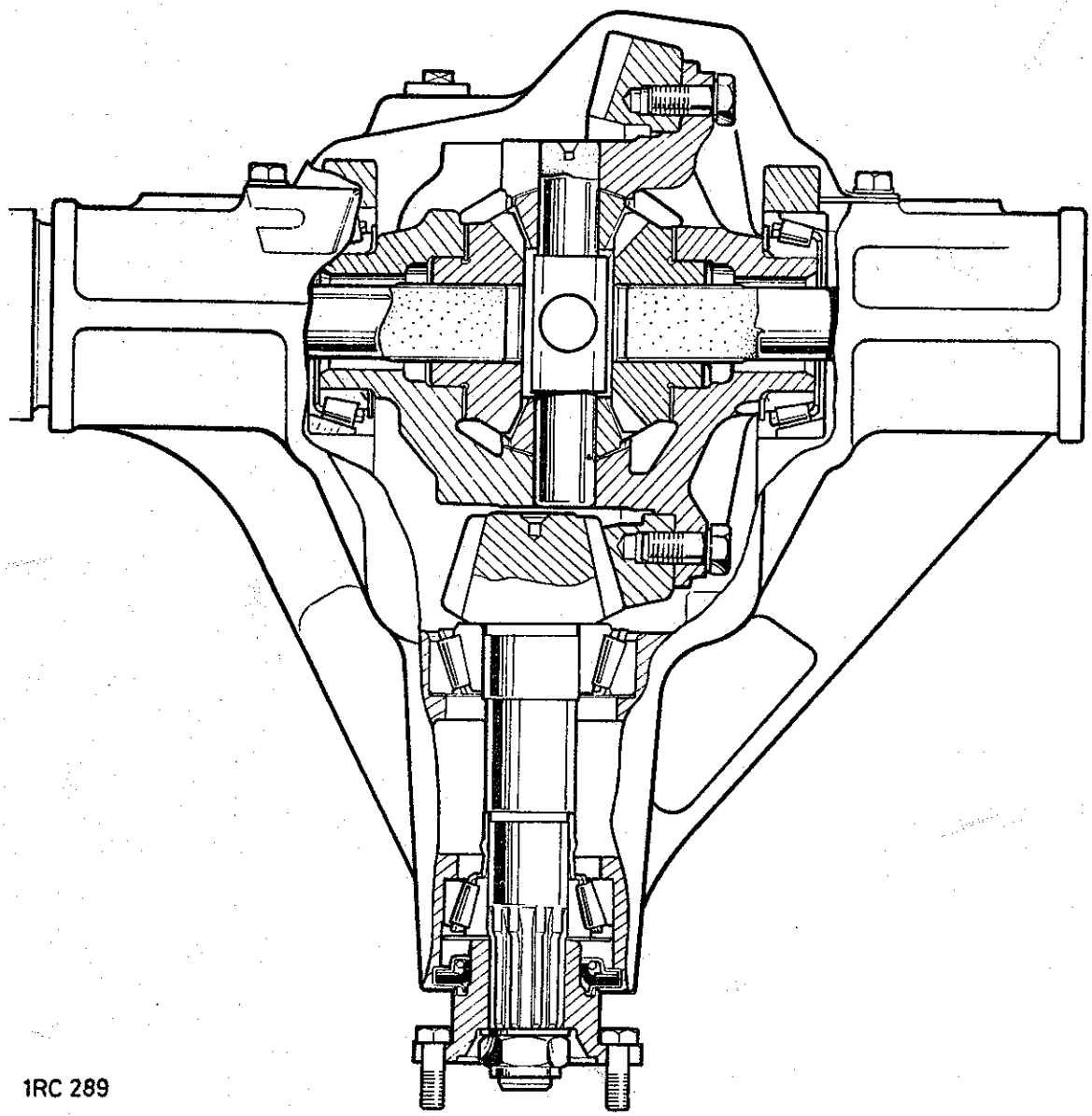
REAR AXLE AND FINAL DRIVE OPERATIONS

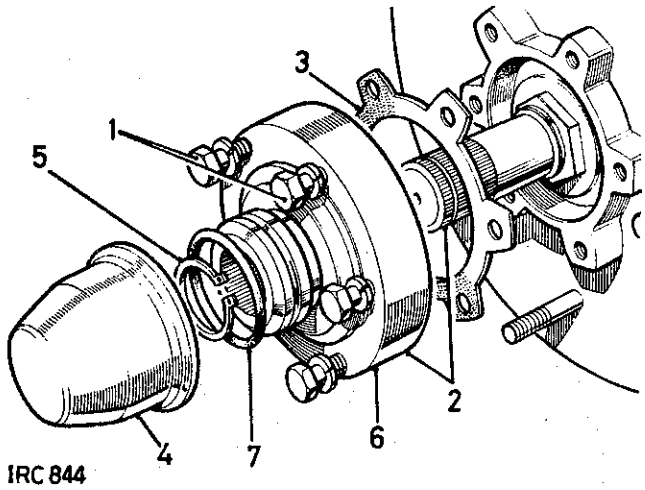


1RC 289

Sectioned view of final drive arrangement

AXLE SHAFT

—Remove and refit **51.10.01**



IRC 844

Removing

1. Remove the hub driving member fixings.
2. Withdraw the driving member and axle shaft complete.
3. Withdraw the joint washer.
4. Prise off the hub cap.
5. Remove the circlip.
6. Withdraw the driving member from the shaft.
7. Withdraw the 'O' ring seal.

Refitting

8. Reverse 1 to 7.

DIFFERENTIAL ASSEMBLY

–Remove and refit 51.15.01

–Overhaul 51.15.07

Service tools

18G47C	Screw press
18G131C	Axle spreader
18G191	Dial gauge, bracket and base
18G1122	Screw press
18G1205	Spanner for drive coupling
S123A	Pinion bearing cup remover
18G47BK	Pinion bearing cone remover/replacer
18G47BL	Differential bearing remover
18G1122G	Pinion bearing cup replacer
18G134DP	Differential bearing replacer
18G191P	Setting gauge for pinion height
18G131F	Pegs for axle spreader
RO1008	Oil Seal replacer

Removing the differential unit

NOTE: All fixing bolts used on the differential assembly and differential cover have metric threads.

1. Drain off the differential lubricating oil.
2. Remove the rear axle assembly. 51.25.01.
3. Remove the hub driving member fixings.
4. Withdraw the driving member and attached halfshaft sufficient to disengage the differential.
5. Repeat 4 for other halfshaft.
6. Remove the fixings at the differential cover and withdraw the cover and joint washer.
7. Note the relationship marking on the bearing caps and axle casing to ensure correct refitting.
8. Remove the fixings and withdraw the differential bearing caps.
9. Clean out and examine the spreader tool pegholes provided in the gear casing face; ensure that the holes are free from dirt and burrs and damage.

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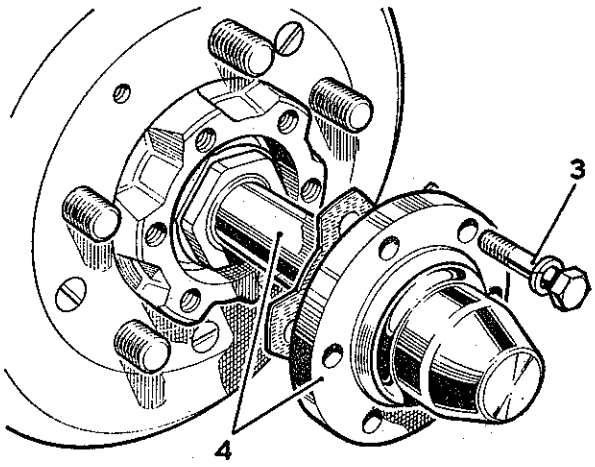

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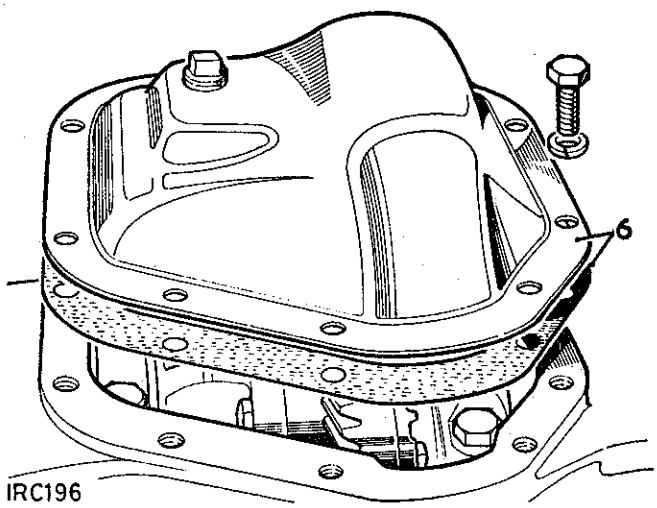

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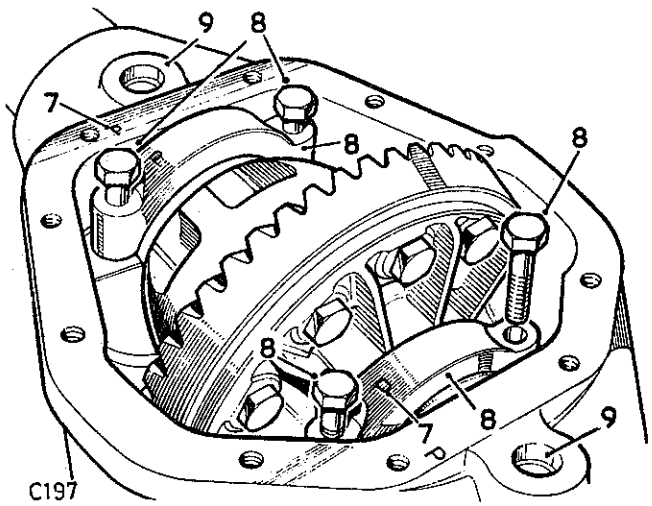

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10. Ensure that the turnbuckle adjuster is free to turn.
11. Fit the axle spreader to engage the peg holes. Spreader 18G131C, Adaptor pegs 18G131F.
12. Turn the adjuster until all free play between the spreader and casing is taken up, denoted by the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

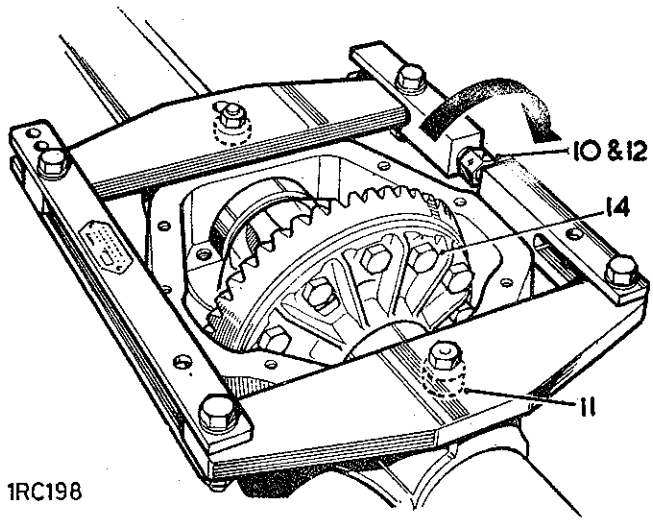
CAUTION: To prevent permanent damage to the gear carrier case it must not be over-stretched. Each flat on the turnbuckle is numbered to enable a check to be made on the amount turned. The maximum stretch permitted is 0,30 mm (0.012 in.), equivalent to three flats.

15. Ease off the adjuster and remove the spreader.

Dismantling the differential unit

16. Remove the fixings and withdraw the crownwheel.
17. Note the alignment markings on the two differential casings to ensure correct refitting, then remove the fixings.
18. Lift off the upper case.
19. Withdraw the upper differential wheel and thrust washer.

continued



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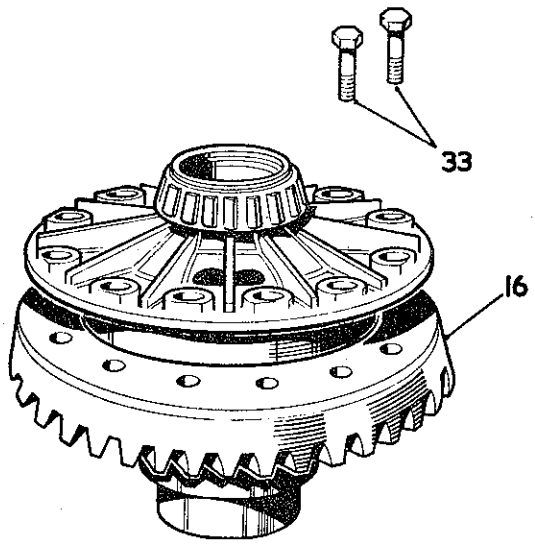

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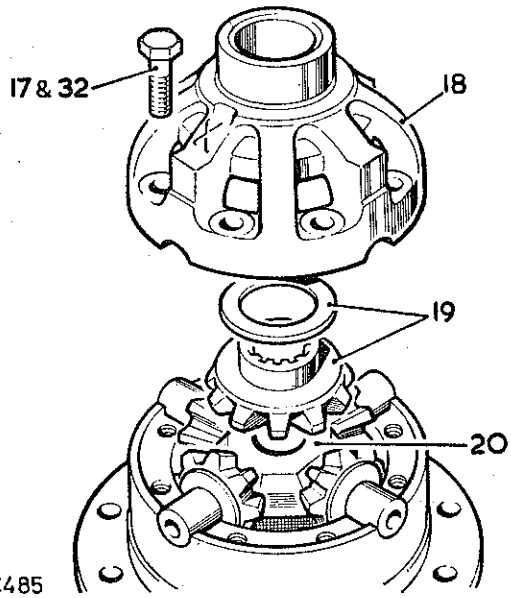

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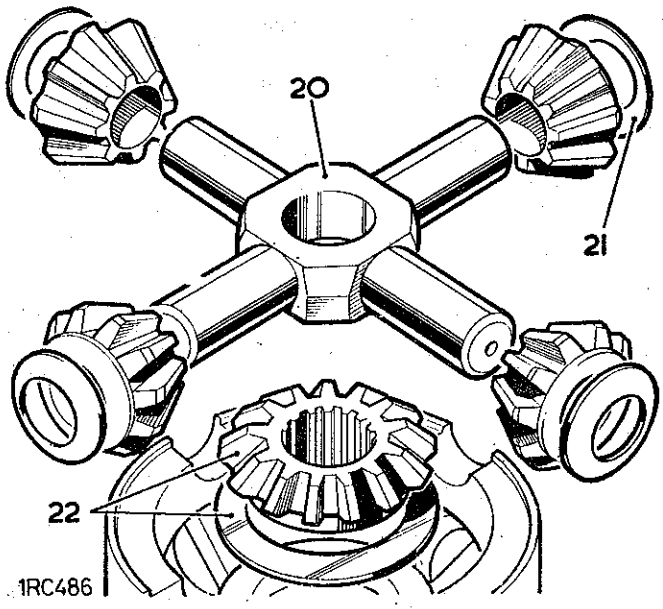
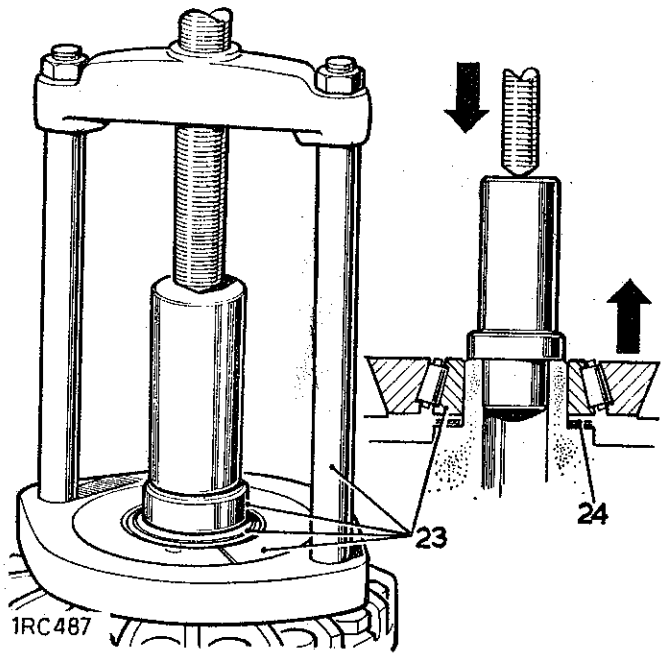
20. Lift out the cross shaft and pinions.
21. Withdraw the dished thrust washers.
22. Withdraw the lower differential wheel and thrust washer.
23. Remove the differential bearing cones. Remover 18G47BL details 1 and 2, Press 18G47C.
24. Withdraw the shim washers fitted between the bearing cones and the differential casings.



Inspecting

25. Examine all components for obvious wear and damage.
26. The bearing cones must be a press fit on their locations.
27. The crownwheel and pinion are supplied as a matched pair and must not be interchanged separately.
    A new crownwheel and pinion matched pair may be fitted to an original gear carrier casing if sound. The original crownwheel and pinion, if sound, may be fitted into a replacement casing.
28. The two parts of the differential unit casing are matched and must not be replaced separately.
29. Discard and replace all thrust washers.
30. Differential housings with worn thrust washer seatings must be replaced as a pair.
31. Examine the differential case to crownwheel joint face for burrs and damage which could lead to crownwheel run-out when fitted.



Assembling the differential unit

32. Reverse the items 17 to 22 aligning the marks on the differential casings. Casings fixings torque load is 9,1 to 10,4 kgf.m (66 to 75 lbf. ft.). The fixings tightening should be carried out at opposite sides of the casings and not by following the diameter. Use Loctite 'Studlock' grade on the fixing bolt threads.
33. **Fit the crownwheel to the differential casing. Fixings torque is 13 to 14,5 kgf.m (95 to 105 lbf.ft.). Use Loctite 'Studlock' grade on the fixing bolt threads.**
34. Check the total indicated run-out on the crownwheel back face. This must not exceed 0,05 mm (0.002 in.). If run-out is excessive, check the mating faces for dirt and damage; if necessary select a new radial position for the crownwheel.
35. Place the differential unit and the bearing cups and cones aside pending the subsequent 'Differential bearing adjustment' checks, items 45 to 54.

continued

Removing the final drive pinion

36. Prevent the coupling flange from rotating and remove the flange locknut and plain washer. Spanner 18G1205.
37. Support the drive pinion and remove the coupling flange by tapping with a hide hammer.
38. Withdraw the drive pinion together with the inner bearing cone.
39. Withdraw and discard the collapsible bearing spacer.
40. Withdraw the oil seal, gasket and oil thrower.
41. Withdraw the outer bearing cone.
42. Extract the pinion inner bearing cup and shim washers from the casing. Note the shim washer thickness. Remover S123A.
43. Extract the pinion outer bearing cup from the casing and, if fitted, the make-up washer (early models). Remover S123A.
44. Remove the inner bearing cone from the pinion. Remover 18G47BK and Press 18G47C.

Differential bearing adjustment

This procedure is to establish the correct value of shim washers to be fitted to pre-load the differential bearings. The fitted disposition of the shims, at each side of the differential, is decided during the subsequent 'Differential backlash' checks, items 88 to 94.

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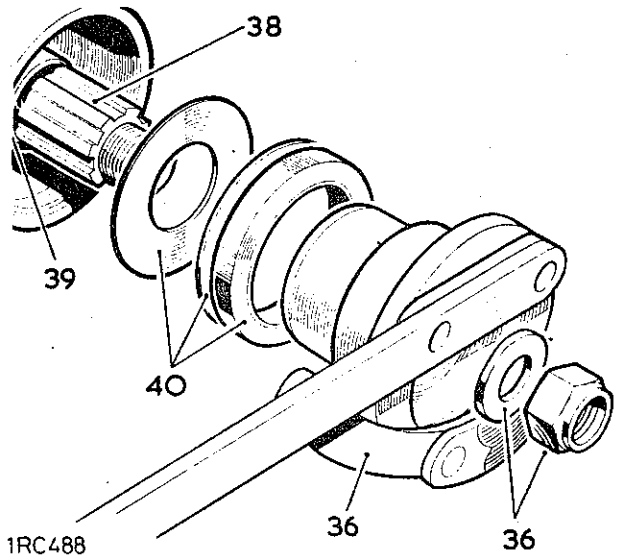

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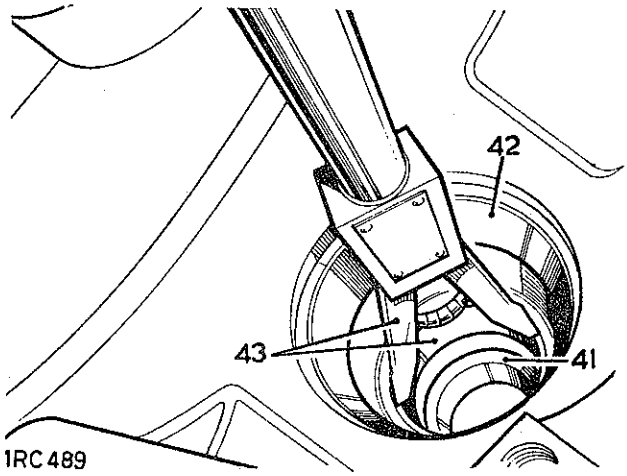

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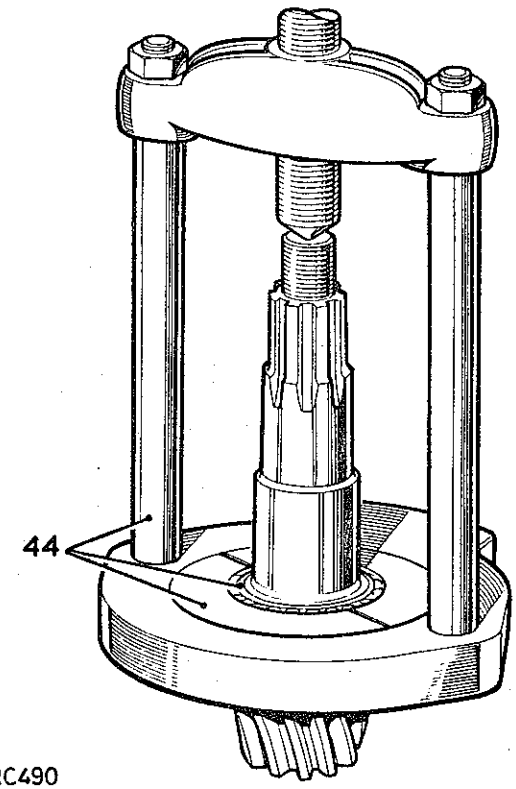

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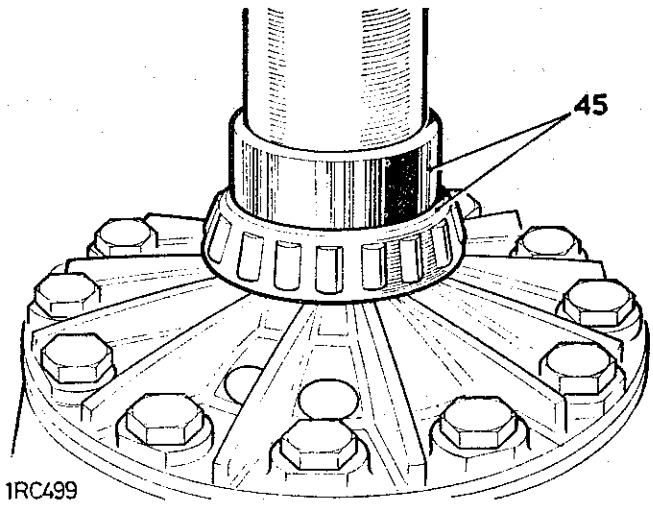
45. Press on the differential bearing cones less shim washers, using 18G134DP.
46. Fit the bearing cups to the differential.
47. Fit the differential unit and bearings to the gear carrier casing. Do not fit the bearing caps.
48. Position a suitable dial gauge indicator on the casing with the stylus registering on the back face of the crownwheel.
49. Insert two levers between the casing and the differential unit at one side.
50. Move the differential unit fully to one side of the casing; do not tilt the unit.
51. Rotate the differential unit to settle the bearings, continue to lever the differential to the side then zero the dial gauge indicator.
52. Lever the assembly fully to the other side of the casing, rotate the unit to settle the bearings, then note the total indicator reading.
53. Add 0.127 mm (0.005 in.), for bearing pre-load, to the total noted in 52. The sum is then equal to the nominal value of shims required for the differential bearings.
    Shims are available in the range 0,07 mm (0.003 in.), 0,12 mm (0.005 in.), 0,25 mm (0.010 in.) and 0,76 mm (0.030 in.). Select the total value of shims required.
54. Remove the differential unit and bearings and place aside. Do not fit the shim washers until the subsequent 'Differential backlash' checks have been made, items 88 to 94.



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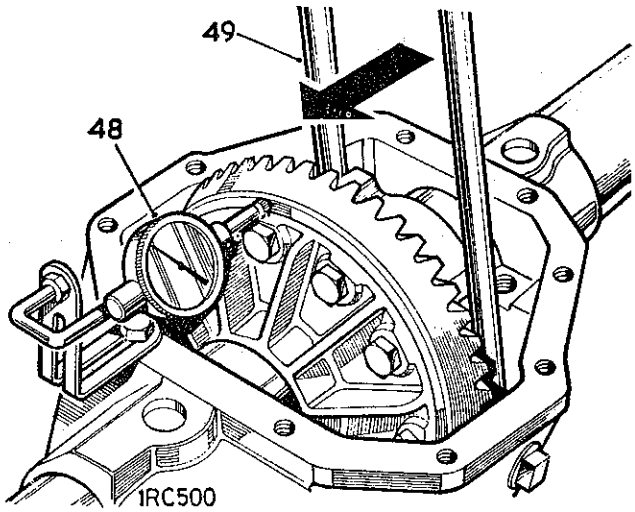

1RC500

Drive Pinion fitting

55. Select shim washers of the same thickness value as those removed from under the pinion inner cup, item 42, and place ready for fitting.
56. Position the outer bearing replacer 18G1122G detail 2, the outer bearing cup and, where fitted, the bearing make-up washer (early models) on the press tool 18G1122.
57. Locate the assembly into the pinion housing nose.

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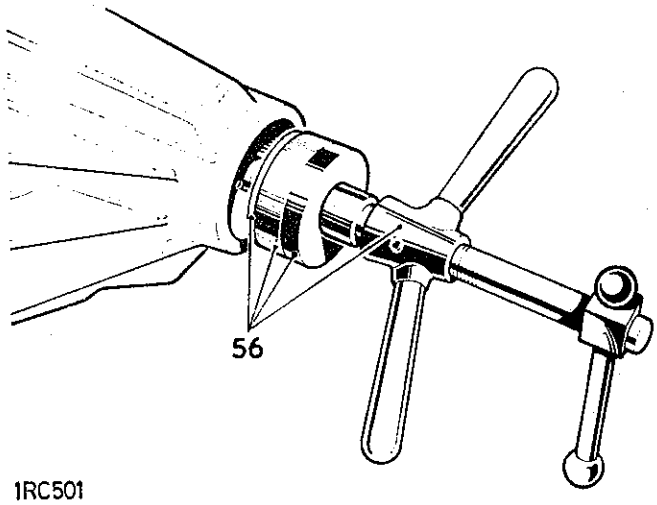
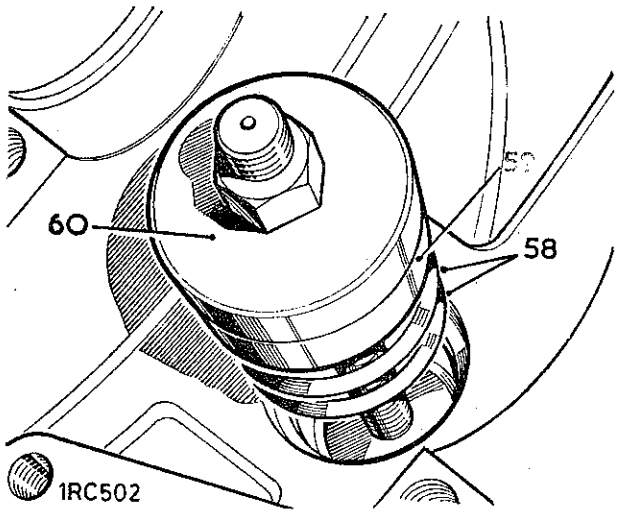


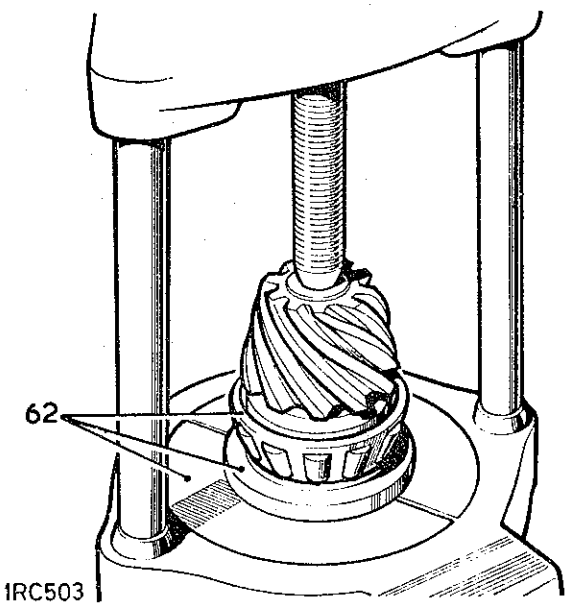
1RC501

58. Place the selected shim washers on to the inner bearing cup seating.
59. Position the inner bearing cup in the casing.
60. Position the inner bearing replacer 18G1122G detail 1 on to 18G1122 and secure with the fixing nut.
61. Hold still the centre screw and turn the butterfly lever to draw in the bearing cups.
62. Press the inner bearing cone on to the drive pinion. 18G47BK details 1 and 2 and 18G47C.
63. Position the pinion and bearing in the casing; omit the collapsible spacer at this stage.
64. Fit the outer bearing cone on to the pinion.
65. Fit the coupling flange and plain washer and loosely fit the flange nut.
66. Tighten the coupling flange locknut sufficient to remove end-float from the pinion.
67. Rotate the pinion to settle the bearings and slowly tighten the flange locknut until a torque resistance of 9,25 to 13,8 kgf.cm (8 to 12 lbf. in.) is required to rotate the pinion.



Drive pinion markings

68. Check that the serial number marked on the pinion end face matches that marked on the crownwheel.
69. The markings on the end face adjacent to the serial number are of no significance during servicing.
70. The figure marked on the end face opposite to the serial number indicates, in thousandths of an inch, the deviation from nominal required to correctly set the pinion. A pinion marked plus (+) must be deeper than nominal, a minus (–) pinion must be set shallower than nominal.
71. The nominal setting dimension is represented by the setting gauge block 18G191P, which is referenced from the pinion end face to the bottom radius of the differential bearing bore.



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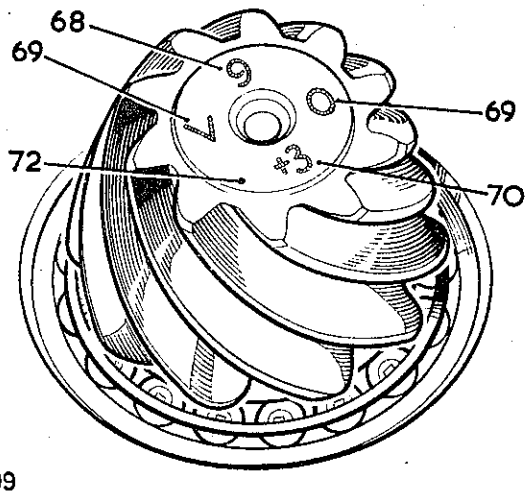

Drive pinion adjustment

72. Ensure that the pinion end face is free of raised burrs around the etched markings.
73. Remove the keep disc from the magnetised base of dial gauge tool 18G191.
74. Place the dial gauge and setting gauge 18G191P on a flat surface and zero the dial gauge stylus on to the setting gauge.
75. Position the dial gauge centrally on the pinion end face with the stylus registering on the lowest point on one differential bearing bore. Note the dial gauge deviation from the zeroed setting.
76. Repeat on the other bearing bore. Add together the readings then halve the sum to obtain the mean reading. Note whether the stylus has moved up or down from the zeroed setting.
77. a Where the stylus has moved *down* (indicating that the pinion is too high) record as a minus (–) figure.
    b Where the stylus has moved *up* (indicating pinion too low) record as a plus (+) figure.
78. For an ideal pinion height setting, the reading on the dial gauge should agree with the figure marked on the end face, item 70. For example, with an end face marking of +3, the dial gauge reading should indicate that the pinion is 0.003 in. lower than nominal (recorded as a plus (+) figure).
79. Where the figures do not agree, subtract the end face figure from the dial gauge reading; the result is the adjustment required to the thickness of shim washers fitted under the pinion inner bearing cup. For example: with an end face figure of –3 and a gauge reading of +0.010 in., the adjustment required is +0.010 in. minus –3 = +0.013 in., therefore add shims to this value to raise the pinion; and with an end face figure of +2 and a gauge reading of –0.005 in., the adjustment required is –0.005 in. minus +2 = –0.007 in., therefore subtract shims to this value to lower the pinion.
80. If necessary, adjust the shim thickness under the pinion inner cup as determined in item 79.

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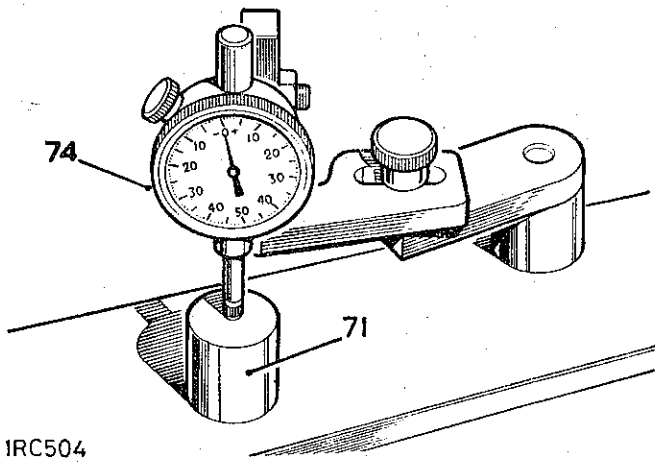

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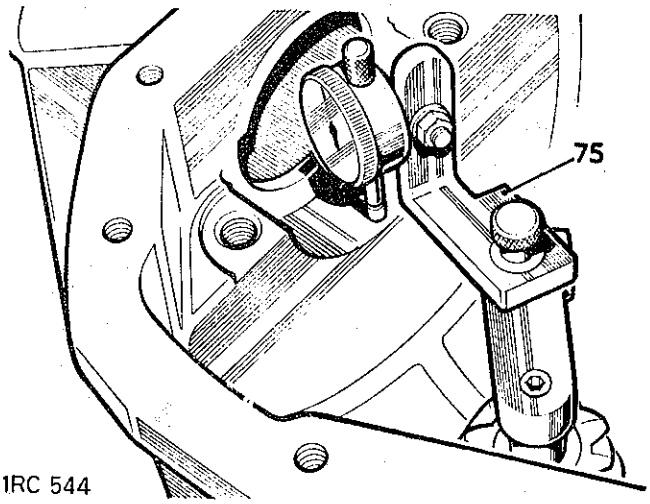

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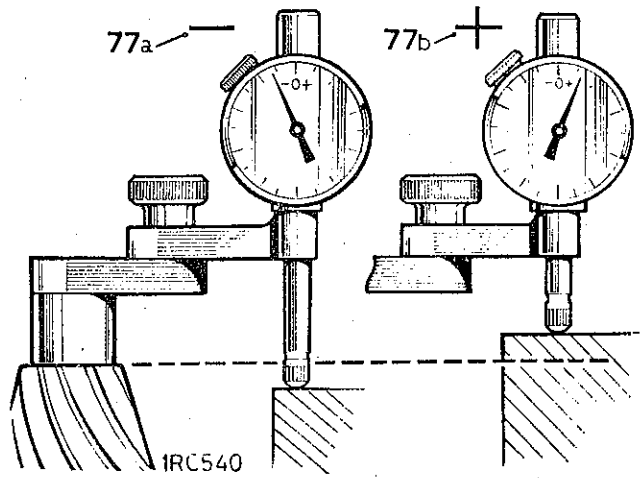
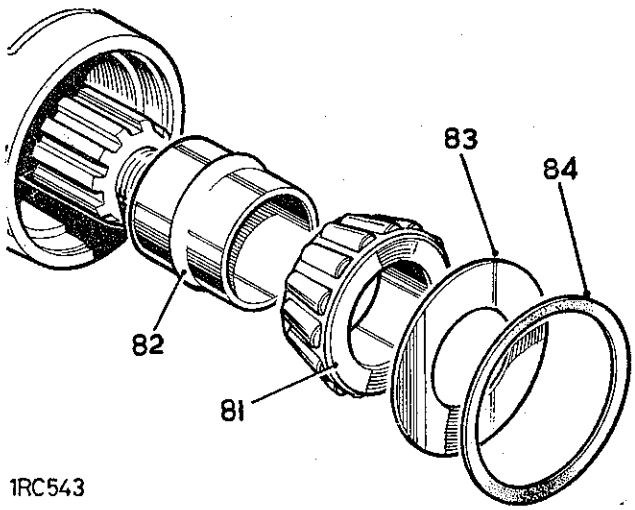


1RC540

81. When the pinion setting is satisfactory, temporarily remove the pinion outer bearing cone.
82. Fit a new collapsible bearing spacer, flared end outward, to the drive pinion and refit the outer bearing cone.
83. Fit the pinion oil slinger.
84. Fit the oil seal gasket.
85. Fit the pinion oil seal, lipped side first, using general purpose grease or, where available, a molybdenum disulphide based grease on the seal lip, using RO1008 to drift in the seal.
86. Fit the coupling flange and plain washer and loosely fit a new flange nut. Secure 18G1205 to the coupling flange, using slave fixings.
87. Alternately tighten the flange nut and check the drive pinion resistance to rotation until the following figures are achieved, as applicable:
    a. Assemblies re-using original pinion bearings: 17,2 to 34,5 kg cm (15 to 30 lb. in.); or
    b. Assemblies with replacement pinion bearings: 34,5 to 46,0 kg cm (30 to 40 lb. in.).

NOTE: A torque load of 34,5 kgf.m (250 lbf. ft.) approximately is required on the coupling flange nut to commence collapsing the bearing spacer. Thereafter, torque resistance build-up is rapid, therefore check frequently to ensure the correct figures are not exceeded, otherwise a new collapsible bearing spacer will be required.



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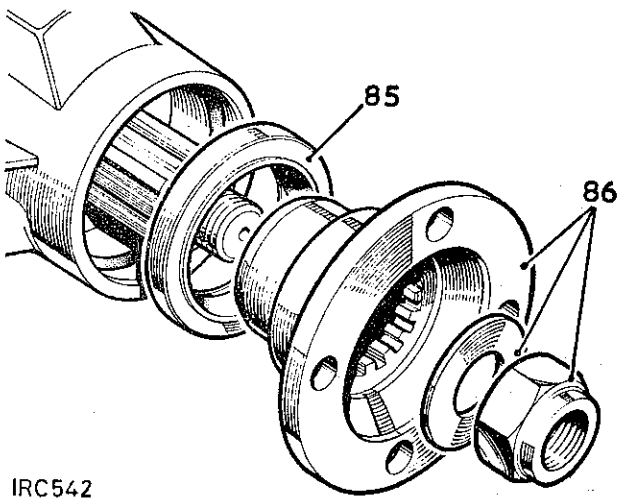

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Differential backlash checks

88. Fit the differential unit bearings but omit the shim washers. 18G134DP.
89. Fit the differential unit and lever the unit away from the drive pinion until the opposite bearing cup is seated against the housing. Do not tilt the unit.
90. Install a dial gauge on the casing with its stylus resting on the back face of the crownwheel. Zero the gauge.
91. Lever the differential unit to engage the crownwheel teeth in full mesh with the drive pinion teeth. Do not tilt the unit.
92. Note the total reading obtained on the dial gauge.

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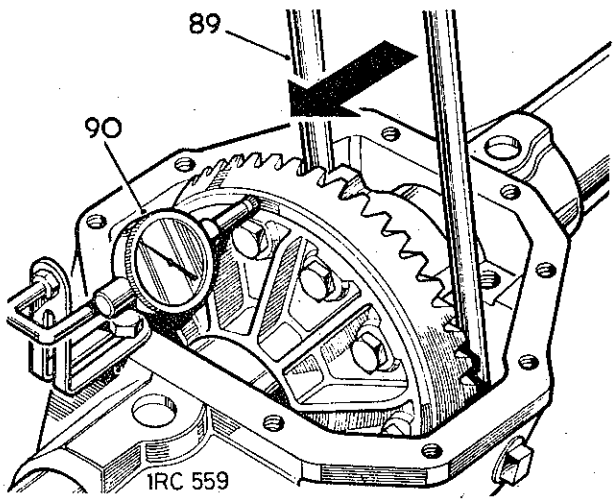

1RC 559

93. From this figure subtract 0,25 mm (0.010 in.) to obtain the correct crownwheel backlash when fitted.
    The result indicates the value of shimming to be fitted between the differential case and the bearing cone at the crownwheel side of the differential.
94. Fit the shim value determined in 93, taking the shims from the pack previously determined during 'Differential bearing adjustment' checks, items 45 to 54. 18G47BL details 1 and 2, press 18G47C. 18G134DP.
95. Fit the remaining shims from item 93 to the opposite side of the differential. 18G47BL details 1 and 2, press 18G47C. 18G134DP.
96. Fit the differential unit with shims and bearings to the axle casing, using the axle spreader 18G131C with pegs 18G131F.
97. Remove the axle spreader.
98. Fit the bearing caps in their correct position, referring to the relationship markings on the caps and on the axle casing.
99. Tighten the bearing caps fixings to 12,9 to 14,5 kgm (93 to 105 lb. ft.).
100. Mount a dial gauge on the axle casing with the stylus resting on a crownwheel tooth.
101. Prevent the drive pinion from rotating and check the crownwheel backlash which must be 0,15 to 0,27 mm (0.006 to 0.011 in.).
102. Fit the differential cover and new gasket.
    Torque load for fixings is 2,8 to 3,5 kgf.m (20 to 25 lbf. ft.).
103. Fit the rear axle assembly, 51.25.01.
104. Replenish the differential lubricating oil, capacity 2.6 litres 4.5 pints, (5.4 US pints), using oil to specification SAE 90 EP. After the initial axle run, check the oil level and replenish as necessary to the filler/level plug hole.
105. Where major running parts have been replaced during servicing, it is a recommended practice to allow the axle assembly to 'run in' by avoiding, where possible, heavy loads and high speeds during initial running;

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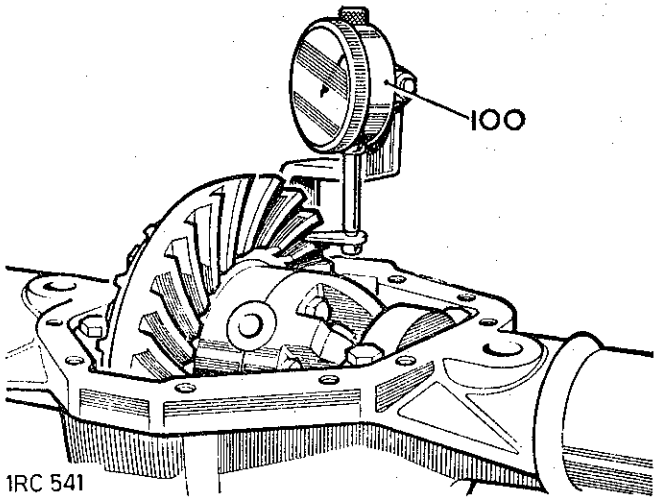
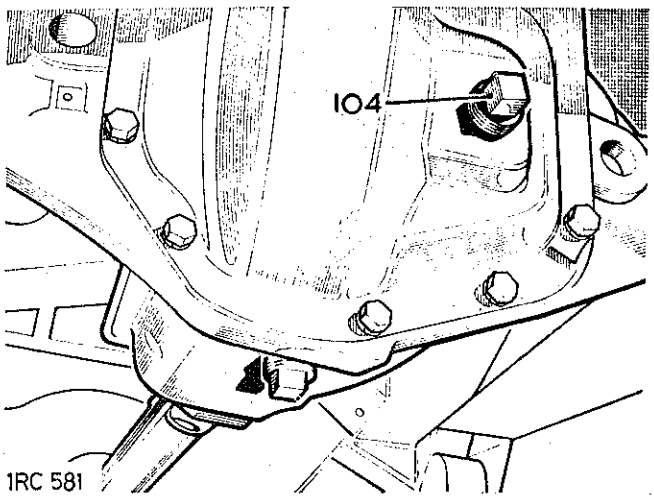




DATA

Crownwheel backlash	0,17 to 0,27 mm (0.006 to 0.011 in.).
Differential bearings pre-load	0,127 mm (0.005 in.).
Pinion height setting	Set using gauge 18G191P. Gauge length 30,912 mm (1.2177 in.).

Torque resistance initial setting figures

Torque to turn drive pinion and new pinion bearings	34,5 to 46 kg cm (30 to 40 lb. in.).
Torque to turn drive pinion re-using the original bearings	17,3 to 34,5 kg cm (15 to 30 lb. in.).
Lubricant capacity	2.6 litres (4.5 imp. pts.).

REAR AXLE AND FINAL DRIVE

PINION OIL SEAL

–Remove and reift **51.20.01**

Service tool: **18G1205, spanner for drive coupling**
RO1008, oil seal replacer

Removing

1. Drain the rear axle.
2. Raise and support the rear of the vehicle.
3. Remove the hub driving member fixings and disengage the axle shafts from the differential.
4. Disconnect the propellor shaft.
5. Measure and record the torque required to rotate the pinion.
6. Using 18G1205 to prevent the pinion from rotating, remove the flange retaining nut and washer, and withdraw the pinion flange.
7. Extract and discard the oil seal and gasket.

Inspection

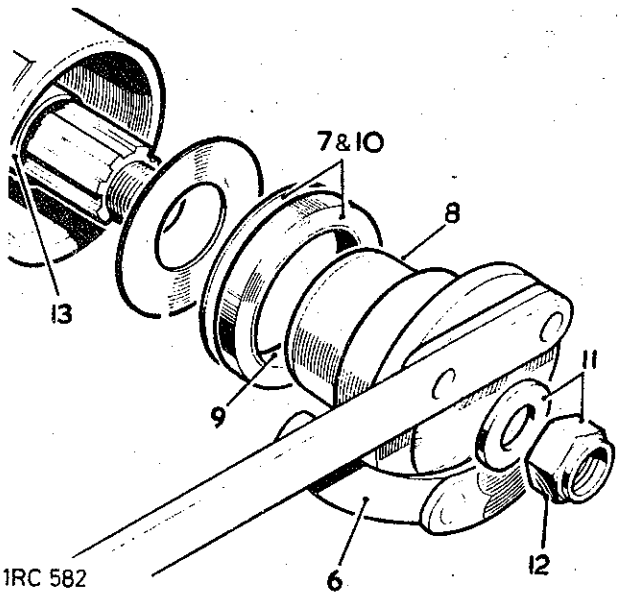
8. Examine the pinion flange for damage, paying particular attention to the oil seal track area.

Refitting

9. Grease the sealing lip of the new oil seal, using general purpose grease or, if available, grease with a molybdenum disulphide base.

NOTE: Where oil leakage past the seal outer diameter has occured, coat the metal circumference with Pettman's cement, avoiding contact with the seal rubber.

10. Fit the gasket and oil seal, lipped side first, using RO1008 to drift in the seal.
11. Refit the pinion flange and washer.
12. Screw on the retaining nut, tightening the nut gradually until resistance is felt.

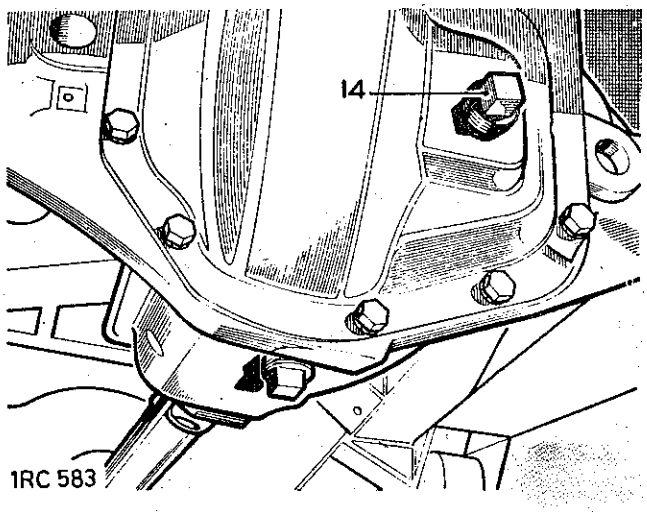


continued

13. Rotate the pinion to settle the bearings and measure the torque to rotate the pinion. If the reading obtained is less than that recorded in item 5, before the seal was removed, tighten the nut a very small amount, re-settle the bearings and recheck the torque reading. Repeat this procedure until a reading equal to that recorded in item 5, or between 17,2 to 23,0 kg cm (15 to 20 lb. in.), whichever is the greater, is obtained.

NOTE: Preload build up is rapid, tighten the nut with extreme care. If the required torque reading is exceeded, the axle must be dismantled and a new collapsible spacer fitted as described in 51.15.07.

14. Reverse 1 to 4.
Lubricant capacity 2,6 litres, 4.5 pints (5.4 US pints); oil to specification SAE 90EP.
Check and replenish as necessary to filler/level plug hole after initial axle run.



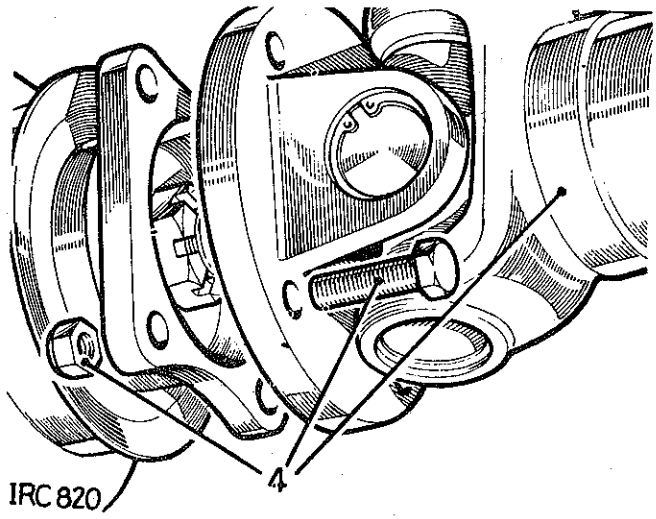
REAR AXLE ASSEMBLY

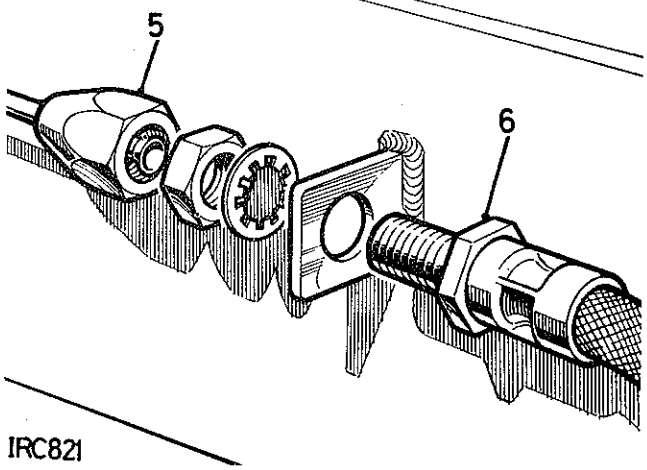
–Remove and refit **51.25.01**

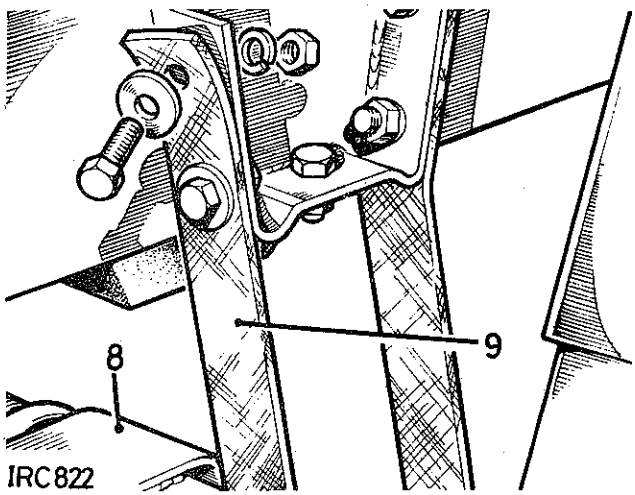
Removing

1. Slacken the fixings at both rear road wheels.
2. Jack up the rear of the vehicle and support on stands.
3. Remove both rear road wheels.
4. Disconnect the rear propeller shaft and move it clear of the final drive unit.
5. Disconnect the rear brake pipe at the connection with the flexible hose.
6. Withdraw the flexible hose from the chassis bracket.
7. Depress the brake pedal and wedge in that condition to minimise brake fluid loss.
8. Support the axle, using a jack.
9. Disconnect one end of each axle check strap.

continued



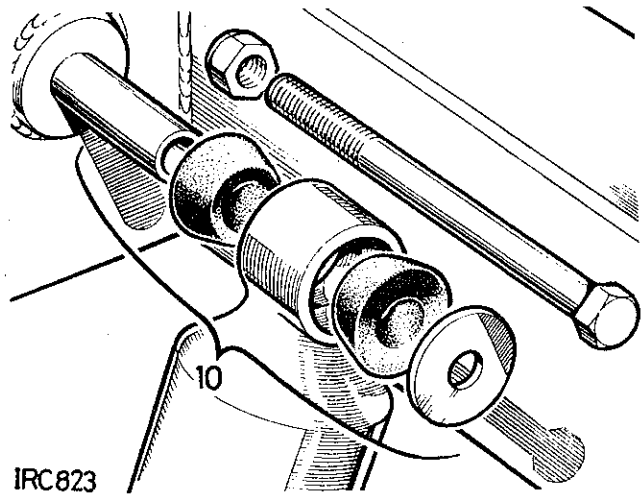




10. Disconnect the shock absorbers at the upper fixings.
11. Remove the four 'U' bolts from the axle.
12. Slacken the six shackle pins at the rear road springs, then remove the two rearmost shackle pins.
13. Lower and withdraw the rear axle.

Refitting

14. Reverse 12 and 13. Do not tighten the shackle pins at this stage.
15. Reverse 1 to 11.
16. Lower the vehicle to the ground and move vehicle bodily backward and forward to settle the springs. Tighten all six shackle pins and locknuts.



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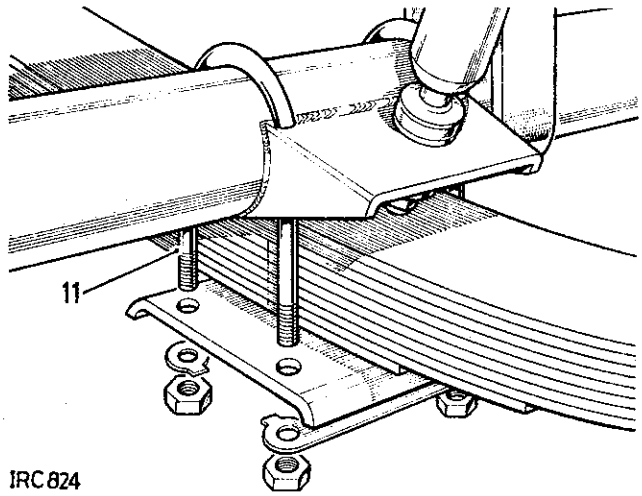

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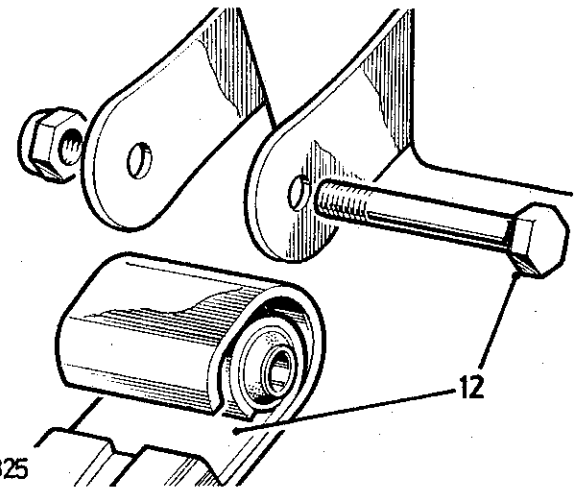

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