FRONT AXLE AND FINAL DRIVE OPERATIONS

DIFFERENTIAL ASSEMBLY

—Remove and refit 54.10.01

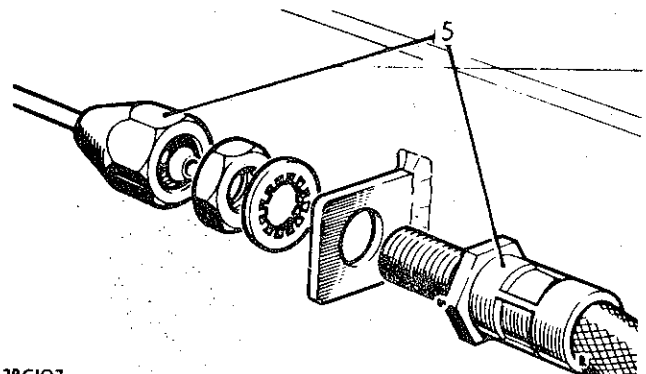
Service tool: 601763, Ball joint extractor

Removing

1. Drain the axle lubricating oil.
2. Slacken the front wheel nuts.
3. Jack up the front end and support on stands.
4. Remove the front road wheels.
5. Disconnect the front brake pipes at the connections with the flexible pipes, one each side of the vehicle, and withdraw the flexible pipes from the chassis brackets.
6. Depress and wedge the brake pedal to prevent further leakage of brake fluid.
7. Disconnect the steering track rod and drag link, using 601763 to extract the ball joints.
8. Remove the fixings between the swivel pin housings and the axle case, noting the steering lock stop plate, and on the right-hand side only, the jack location stop plate.
9. Withdraw the swivel pin housing, axle half shaft and front hub assembly complete.
10. Disconnect the prop shaft and move it clear of the differential.
11. Remove the differential assembly fixings and withdraw the assembly.

Refitting

12. Reverse 11.
13. Reverse 10.
14. Reverse 1 to 9. Torque load for ball joint fixings is 4,0 kgf.m (30 lbf.ft.).
15. Bleed the brakes.70.25.02.



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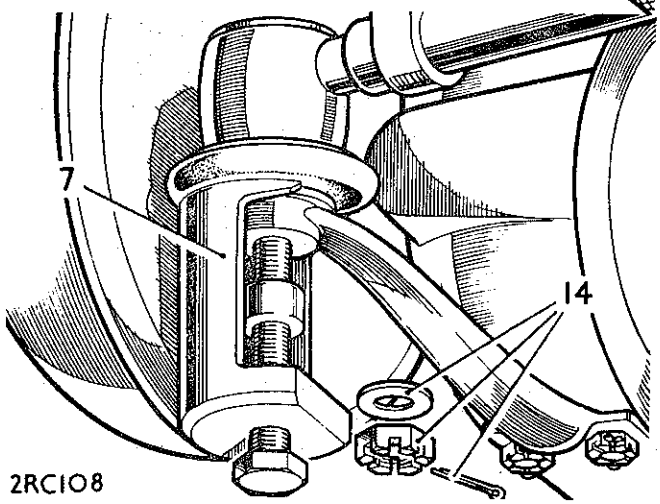

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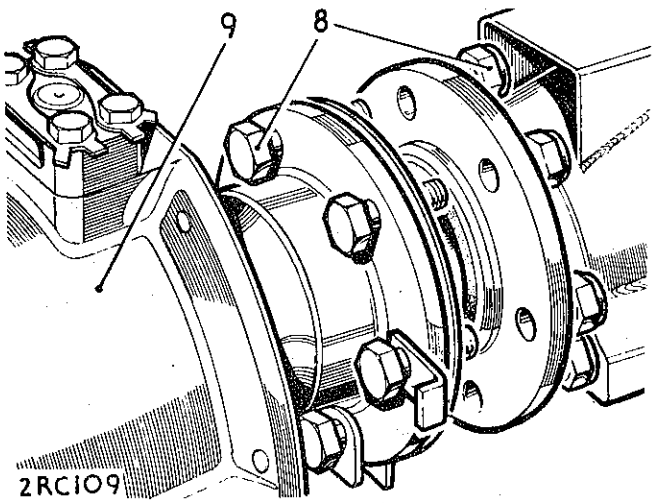

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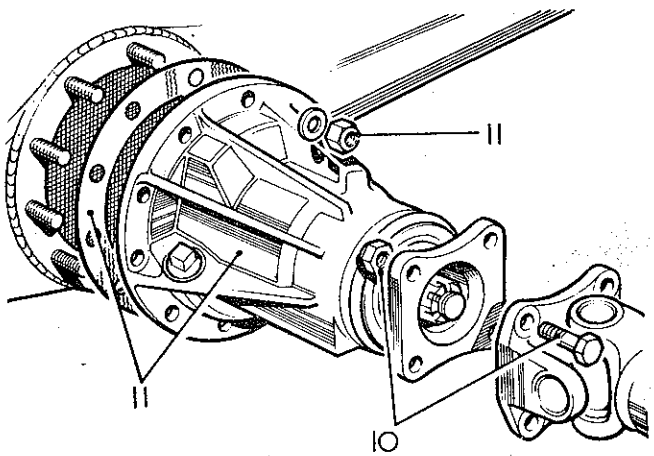

2RC269

DIFFERENTIAL ASSEMBLY

–Overhaul 54.10.07

Service tools:	262757	Bearing Extractor
	262758	Bearing press block
	530105	Differential spanner
	262761)	Height gauge for
	600299)	differential pinion.
	601998)	1 off, as required
	605004)	(see text)
	530106	Bracket for Dial Test Indicator

Dismantling

NOTE: During dismantling it is essential that all components are marked in their original position and relative to other components, so that if original components are refitted, their initial setting is maintained.

1. Remove the differential assembly 54.10.01.
2. Remove the bearing caps.
3. Remove the serrated nuts.
4. Withdraw the crownwheel and differential assembly.
5. Withdraw the differential bearings outer tracks.
6. Remove the driving flange.
7. Withdraw the pinion.
8. Withdraw the shim washers.
9. Prise out the oil seal.
10. Withdraw the spacer.
11. Withdraw the drive flange roller bearing.
12. Press off the pinion head bearing.
13. Locate the tool 262757 in the pinion housing. Ensure that the projections on the extractor bar fit the cast slots at the rear of the bearing outer race. If necessary, grind the projections until a sliding fit is obtained, otherwise the pinion housing may be damaged.
14. Extract pinion head bearing outer race together with its shim.
15. Press out flange end outer race.

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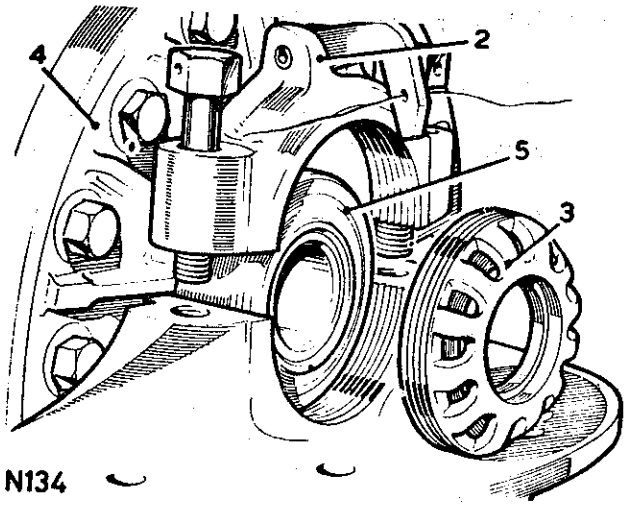

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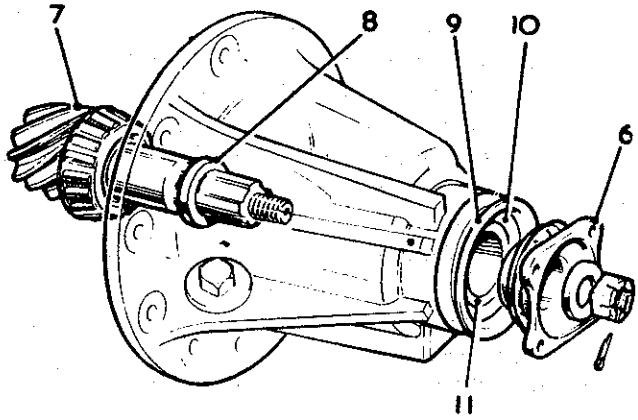

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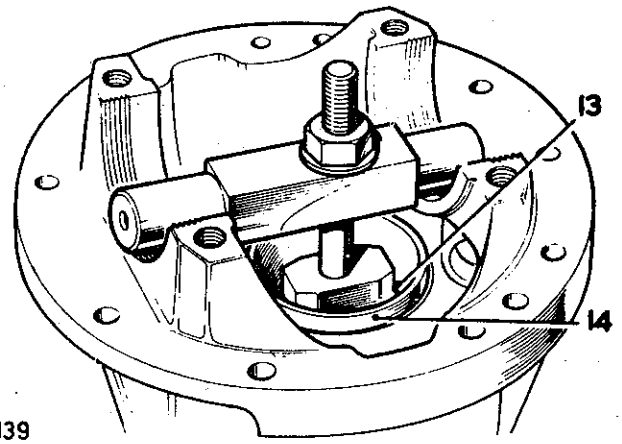

N139

16. Remove the crownwheel from the differential case.
17. Remove the split pin from the differential spindle.
18. Withdraw the spindle.
19. Withdraw the pinions by rotating the wheels.
20. Withdraw the wheels.
21. Withdraw thrust washers.
22. Extract the roller bearings.

Inspecting

23. Examine all components for obvious wear or damage.
24. All bearings must be a press fit, except the flange end pinion bearing, which must be a slide fit on the shaft.
25. Crownwheel and pinion is only supplied as a matched set and MUST NOT be interchanged separately.
26. Bevel pinion housing and bearing caps are matched sets, and MUST NOT be interchanged separately.

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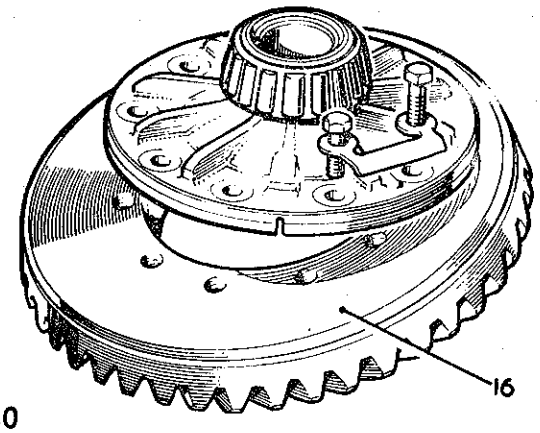

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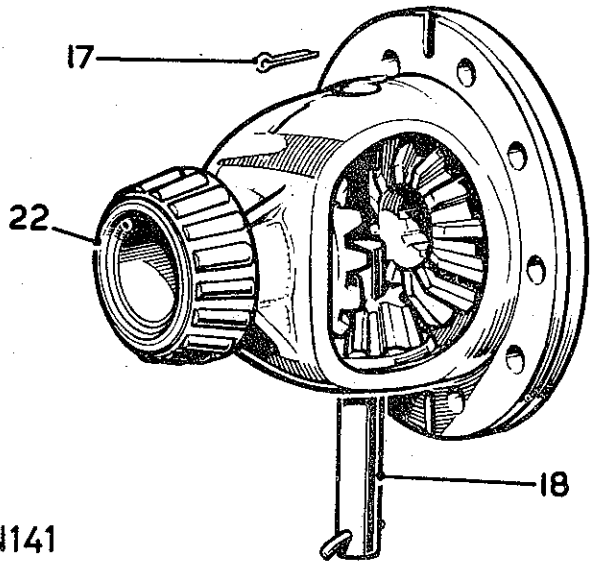

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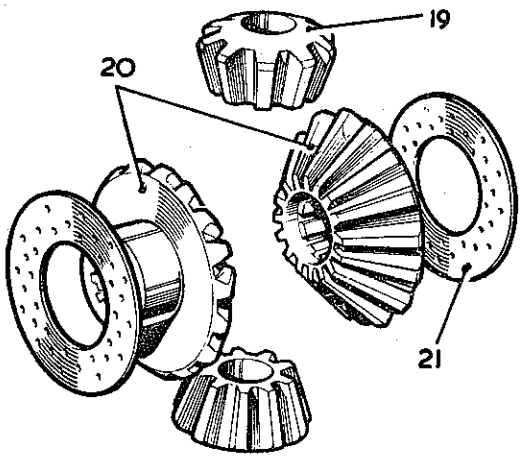
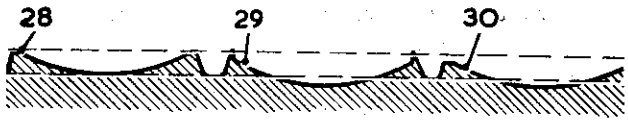
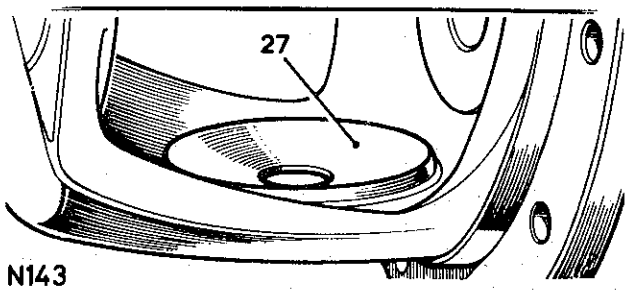


N142

27. Check the differential pinion seatings in the case, as follows–
28. The spherical seats must be finished flush.
29. The seat must not be stepped or recessed.
30. If a step is present, it must be ground away to prevent the pinion teeth rubbing the casing.





N143

Reassembling

31. Fit shim of same thickness removed during dismantling, in pinion head bearing seat.

NOTE: If original shim has been mislaid, use new shim of at least 1,27 mm (0.050 in) thickness.

32. Press in the pinion head bearing outer race, 262758 used with 262757.
33. Press in the flange end bearing outer race.
34. Press the pinion head roller bearing onto the pinion.
35. Locate the pinion shaft into the case together with the bearing pre-load adjustment shim removed during dismantling.

NOTE: If original shim has been mislaid, use new shim of at least 4,06 mm (0.160 in) thickness.

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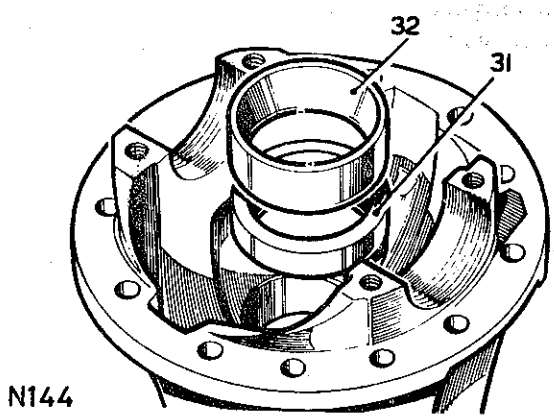

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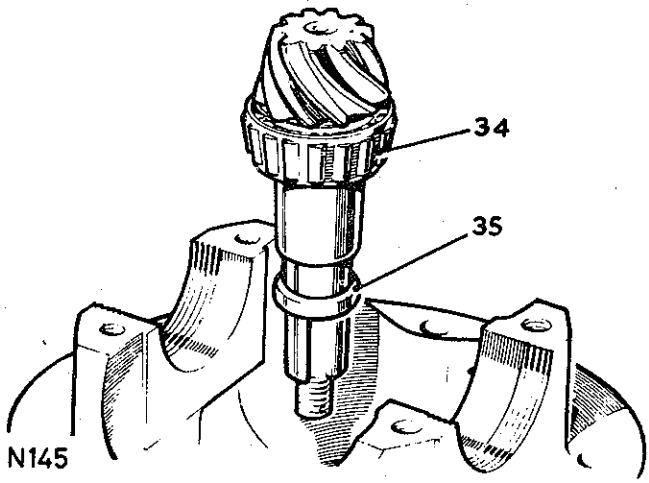
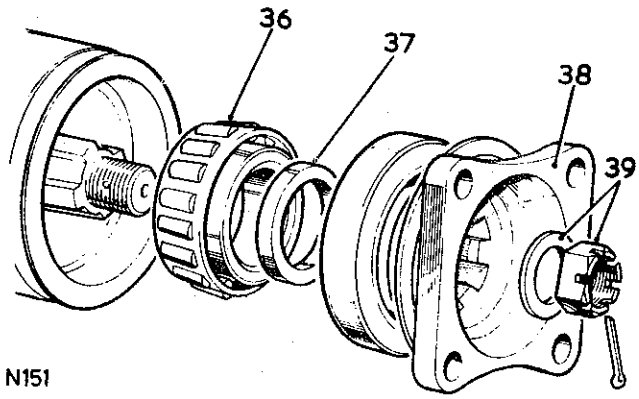


N145

36. Fit the flange end roller bearing.
37. Fit the distance washer.

NOTE: Do not fit the oil seal at this stage.

38. Fit the driving flange.
39. Fit the washer and nut. Torque 11,7 kgf.m (85 lbf.ft). While tightening the nut, check that the pinion can rotate. If the pinion becomes excessively stiff, use a thicker pre-load adjustment shim.



N151

Check and adjust pinion bearing pre-load

40. Tie a length of cord to the driving flange, then coil it around the flange hub.
41. Attach a spring balance to the loose end of the cord.
42. Apply a steady pull on the spring balance and note the force required to rotate the pinion shaft, after having overcome inertia.
    Bearing pre-load is correct when a figure of 3,2 to 4,5 kg (7 to 12 lb) is recorded on the spring balance.
43. Adjustment can be made by changing the shims located on the pinion shaft between the bearings, shims are available in a range of thicknesses. Thicker shimming will reduce bearing pre-load, thinner shimming will increase pre-load.

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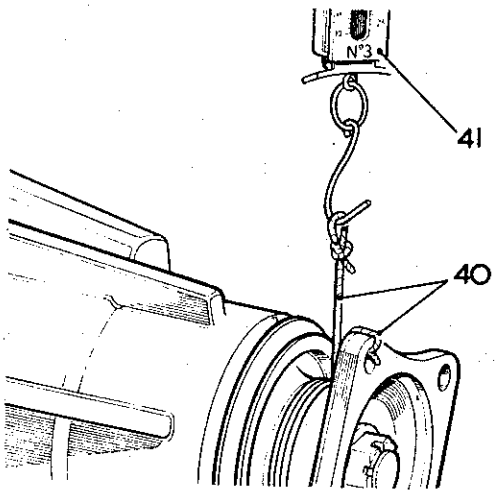

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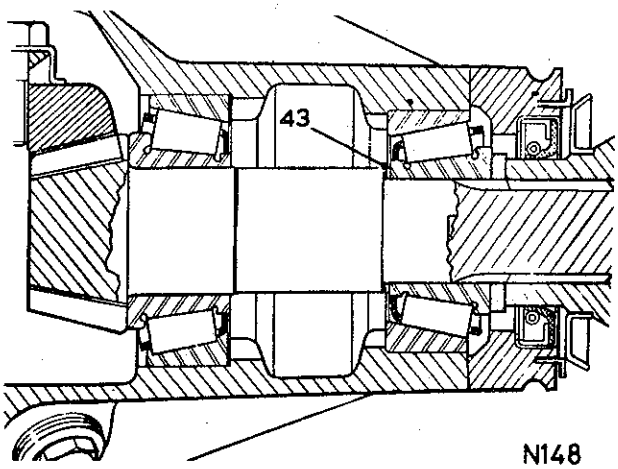

N148

Check and adjust pinion height setting

44. Locate the pinion height gauge into the pinion housing and secure with the bearing caps.

NOTE: There are four variations of height gauge in use, and any of these may be used.

45. Place the slip gauge onto the pinion face and hold firmly in place.
46. Using feeler gauges, measure the clearance between the height gauge and the slip gauge. Depending on the height gauge used, the following clearance must be obtained.
    0,07 mm to 0,10 mm (0.003 in to 0.004 in) with height gauges Part Nos. 601998, 262761 and 600299.
    0,28 mm to 0,30 mm (0.011 in to 0.012 in) with height gauge Part No. 605004.
47. If necessary, adjust the thickness of shims between the pinion head bearing outer race and the pinion case to obtain the correct clearance. Use tool 262757 to remove outer race.

NOTE: Any adjustment of the pinion height will affect the pinion bearing pre-load. When the pinion height is correct, repeat items 40 to 43.

48. When the pinion height and bearing pre-load is correct, remove the height gauge..
49. Remove the pinion driving flange.
50. Smear the outside diameter of the pinion oil seal with jointing compound.
51. Fit the seal, lipped side inward.
52. Fit the driving flange.
53. Fit the flange securing nut and washer. Torque 11,7 kgf.m (85 lbf.ft).
54. Secure nut with split pin.

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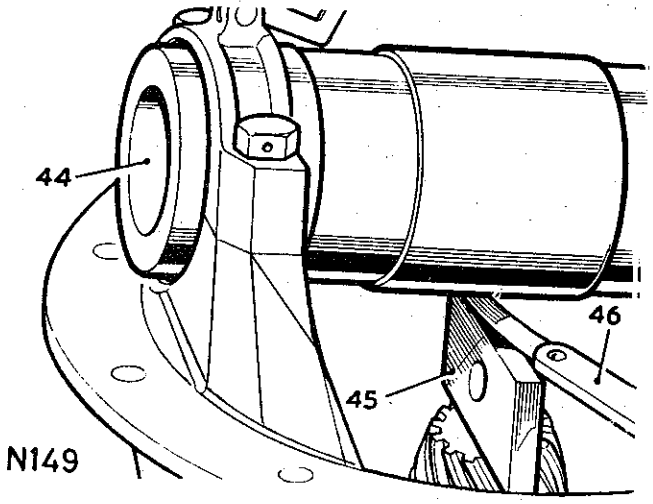
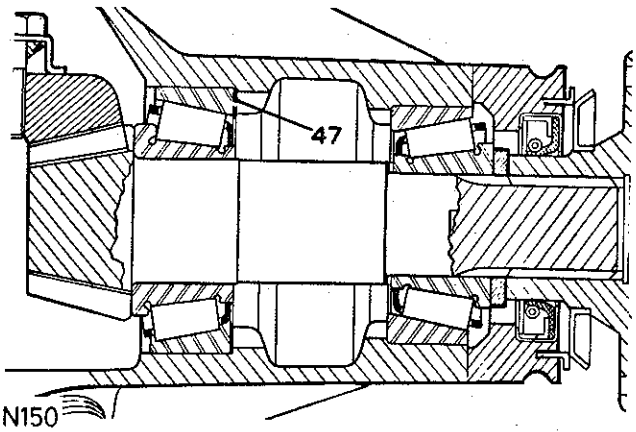
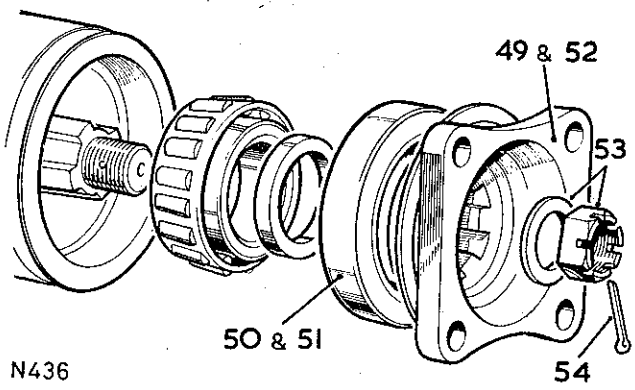


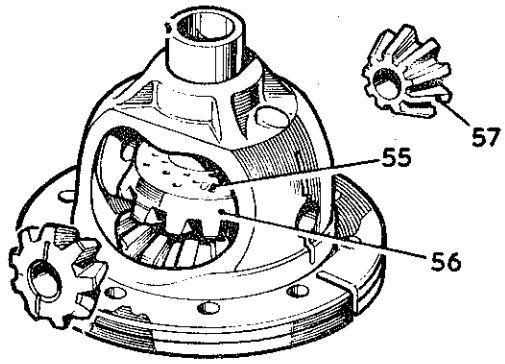




Differential wheel and pinion backlash

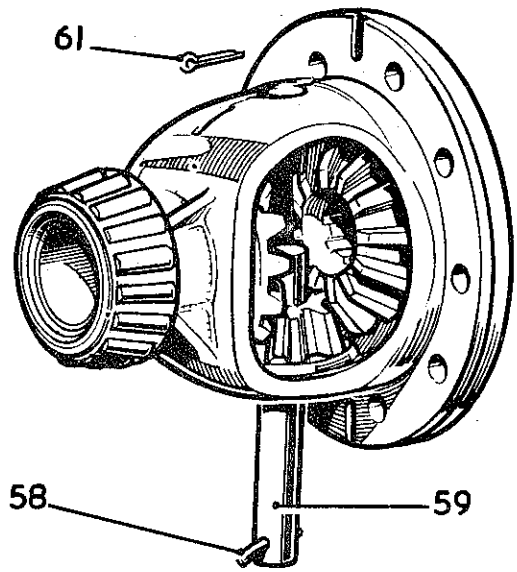
55. Place a thrust washer in position on the rear face of each differential wheel.
56. Locate the two differential wheels and thrust washers into the differential case.
57. Insert the differential pinions at exactly opposite points, then rotate the wheel and pinion assembly to align the holes in the pinions and case for the pinion spindle.

NOTE: If original components are being refitted, ensure that the wheel and pinion assembly is in its original position before fitting the spindle.



N152

58. Ensure that the plain pin is secure in the pinion spindle.
59. Fit the spindle.
60. Check for backlash between the differential wheels and pinions, a manual check is sufficient, no actual measuring is necessary. There must be a definite backlash, but this must be the minimum obtainable consistent with smooth running wheels and pinions. Adjustment can be made by changing the thrust washers for the differential wheels, which are available in a range of thicknesses.
61. Secure the spindle with a split pin.
62. Align the crownwheel with the differential case.
63. Locate lockplates in place.
64. Fit crownwheel securing bolts, noting that there are two fitted bolts 10 mm (0.390 in) diameter which must be fitted diametrically opposite. The remaining bolts are 9,5 mm (0.375 in) diameter. Tighten the bolts evenly to avoid distortion.
    Torque. 4,8 kgf.m (35 lbf.ft) for all the bolts.
65. Press on the differential roller bearings.
66. Fit the bearing outer races and locate the differential into the pinion housing.



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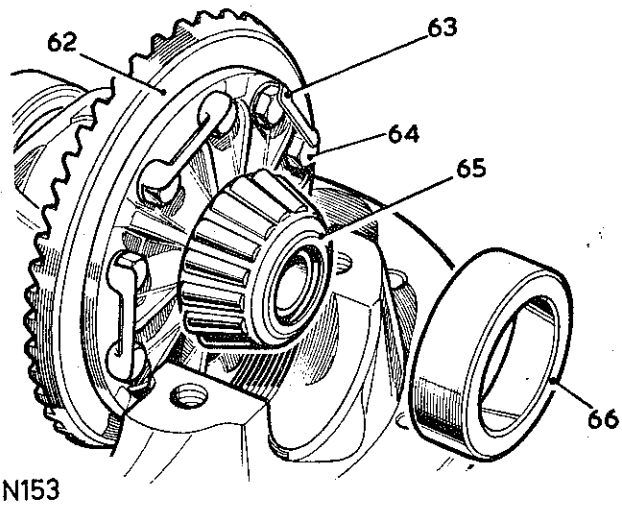

N153

67. Fit the serrated nuts.
68. Fit the bearing caps. Tighten the securing bolts firmly but not fully.
69. Using tool 530105, tighten both serrated nuts to remove all bearing end float without introducing pre-load.
70. Using a dial test indicator, measure the run-out on the rear face of the crownwheel, this must not exceed 0,10 mm (0.004 in). If excessive run-out is recorded, the crownwheel and differential must be removed from the bevel pinion housing and the crownwheel repositioned on the differential case. Re-assemble and recheck. If necessary, this procedure must be repeated until the run-out is correct.
71. When the crownwheel run-out is correct, ensure that the lockplates are fully engaged over the crownwheel securing bolts.
72. Using a dial test indicator, check the crownwheel to bevel pinion backlash. This must be 0,20 mm to 0,25 mm (0.008 in to 0.010 in). Where necessary, adjust the crownwheel backlash by alternately slackening and tightening the serrated nuts until the backlash is correct.
73. Move serrated nuts as indicated to reduce backlash.
74. Move serrated nuts as indicated to increase backlash.

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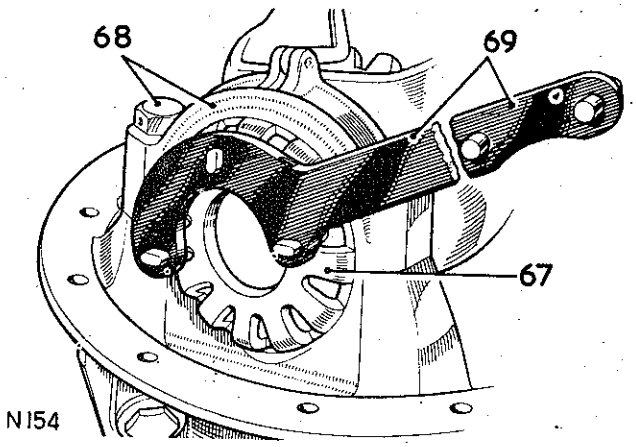

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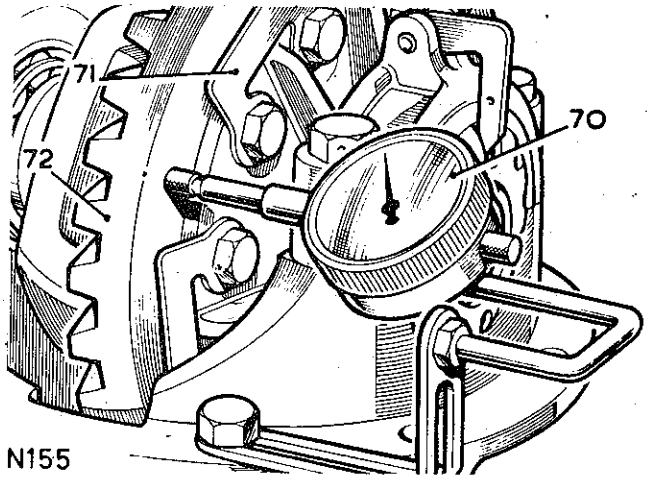

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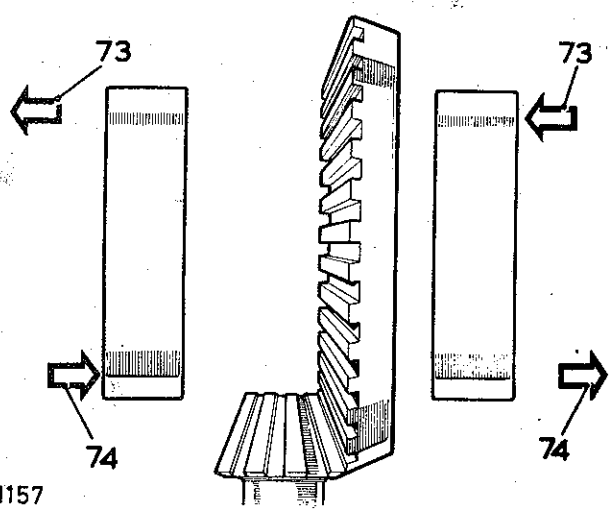
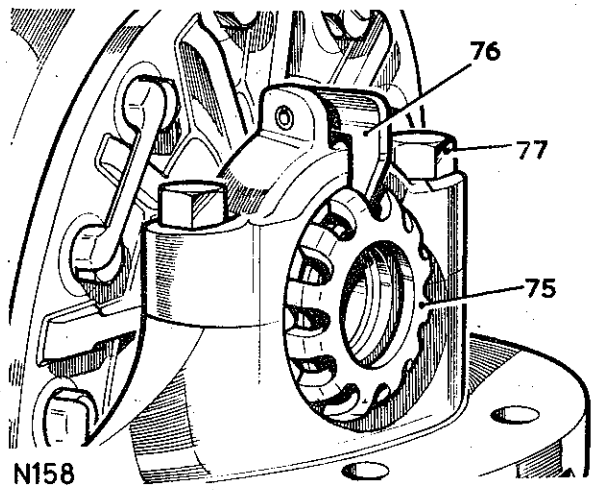


N157

75. With the backlash correct and no bearing end-float or pre-load, tighten both serrated nuts by half a serration only, to pre-load the taper roller bearings.
76. Engage the lockers into the serrated nuts. If either locker is not opposite a serration, bend it to fit.
77. Fit the spring pins to retain the lockers.
78. Tighten the bearing cap bolts. Torque 8,3 kgf.m (60 lbf.ft).
79. Refit the differential assembly. 54.10.01.

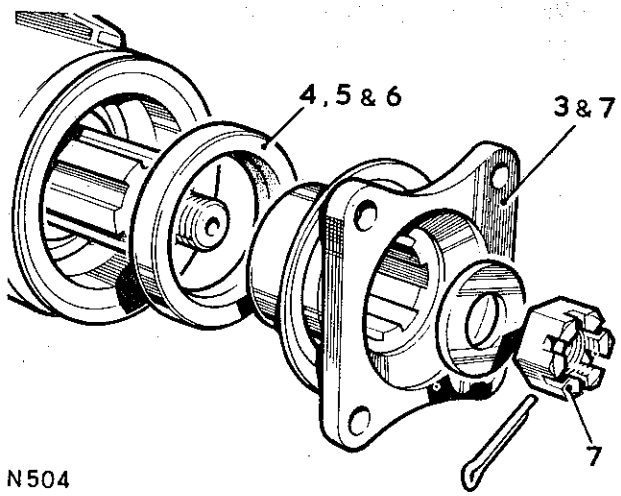


DATA

Pinion bearing pre-load	3,2 to 4,4 kg. (7 to 12 lb) torque resistance
Pinion height setting, clearance between height gauge and slip gauge	0,07 to 0,10 mm (0.003 to 0.004 in) using gauges 601998, 262761 or 600299. 0,28 to 0,30 mm (0.011 to 0.012 in) using gauge 605004.
Crownwheel run-out	0,10 mm (0.004 in)
Crownwheel to bevel pinion backlash	0,20 to 0,25 mm (0.008 to 0.010 in)
Bearing cap bolts, torque	8,3 kgf.m (60 lbf. ft)

PINION OIL SEAL

—Remove and refit 54.10.20



N504

Removing

1. Drain the lubricating oil from axle case.
2. Disconnect the propeller shaft at the differential.
3. Remove the pinion driving flange.
4. Prise out the oil seal.

Refitting

5. Smear the outside diameter of the oil seal with jointing compound.
6. Fit the seal, lipped side inward.

NOTE: Before fitting the driving flange, examine outside diameter for roughness or damage which may have caused failure of original seal, and rectify or replace as necessary.

7. Fit the pinion driving flange. Tighten the securing nut. Torque 11,7 kgf.m (85 lbf.ft).
8. Fit the propeller shaft.
9. Replenish the differential lubricating oil. See Division 09.
10. Ensure the axle case breather is clear. A blocked breather could cause failure of oil seals fitted in the axle assembly.

FRONT AXLE ASSEMBLY

—Remove and refit **54.15.01**

Service tool: 601763 Ball joint extractor

Removing

1. Slacken the fixings at both front road wheels.
2. Jack up the front of the vehicle and support on stands.
3. Remove both front road wheels.
4. Disconnect the front propeller shaft from the final drive unit.
5. Disconnect the front brake pipes at their connections with the flexible pipes each side of the vehicle, and withdraw the flexible pipes from the chassis brackets. Depress and wedge the brake pedal, to prevent further leakage of brake fluid.
6. Disconnect the steering drag link from the lower relay lever, using 601763 to extract the ball joints.
7. Disconnect the lower ends of the shock absorbers from the road spring bottom plates.

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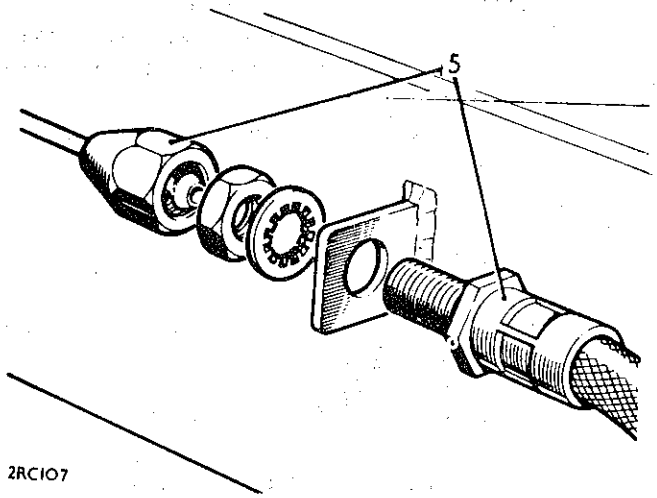

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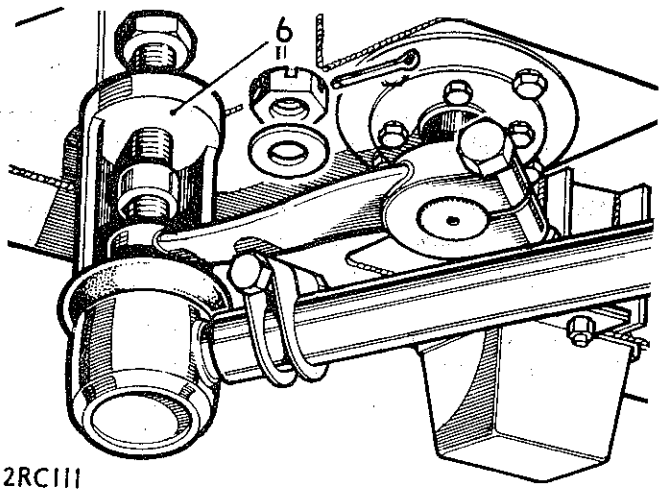

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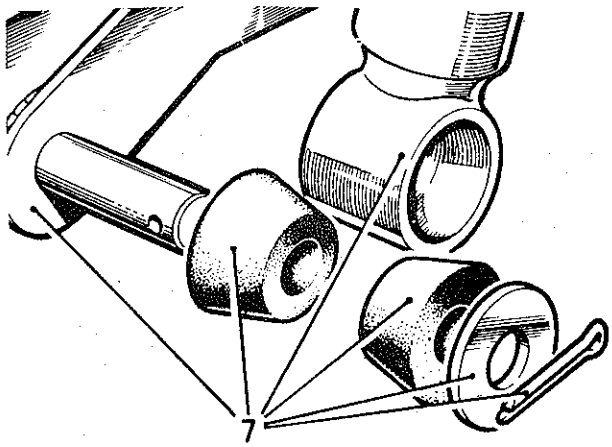


2RC112

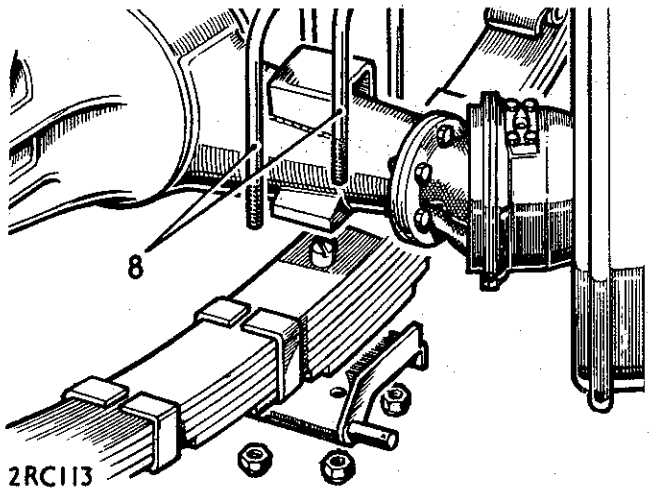
8. Remove the four 'U'-bolts from the axle.
9. Support the front axle with a jack, slacken all six shackle pins at the front road springs, then remove the two front pins.
10. Lower the jack and withdraw the axle.

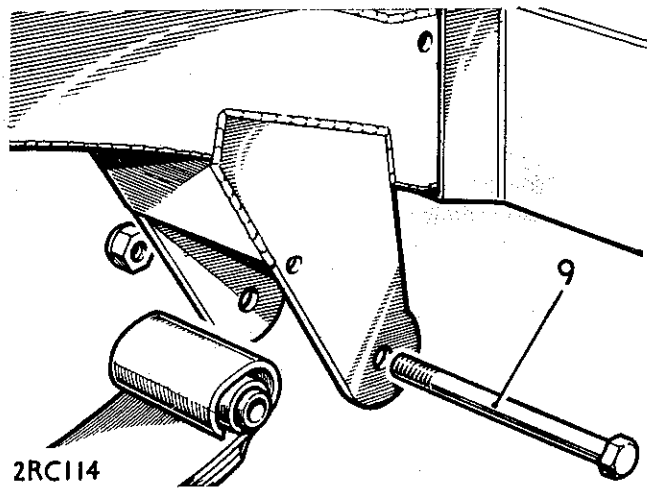
Refitting

11. Reverse 10.
12. Using a second jack, raise each road spring in turn and connect the front ends of the springs to the chassis, but DO NOT tighten the shackle pins and locknuts at this stage.
13. Fit the axle 'U'-bolts and engage the lock plates.
14. Reverse 7.
15. Reverse 6. Torque load 4,0 kgf.m (30 lbf.ft).
16. Reverse 5.
17. Reverse 4.
18. Reverse 3.
19. Lower the vehicle to the ground and move vehicle bodily backward and forward to settle the springs, then tighten all six shackle pins and locknuts.

NOTE: If the shackle pins and locknuts are tightened prior to lowering the vehicle to the ground, premature failure of the spring bushes may occur.

20. Bleed and adjust the brakes. 70.25.03, 70.25.02.
21. Replenish the front axle lubricating oil if required.
22. Check, and if necessary, adjust the steering stop. 57.65.03.





AXLE CASE OIL SEAL

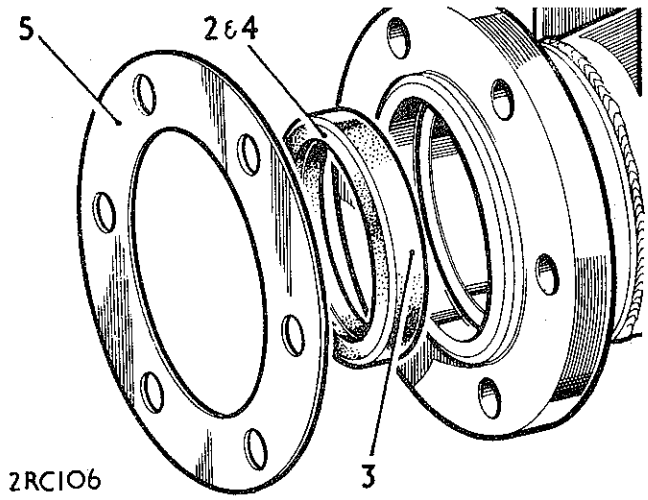
—Remove and refit 54.15.04

Removing

1. Carry out items 1 to 9 of operation 54.10.01.
2. Prise out the axle case oil seal.

Refitting

3. Where the oil seal outside diameter is metal and not rubber covered, smear the diameter with suitable jointing compound.
4. Fit the oil seal, lipped face inward, until flush with the axle recessed end.
5. Grease and fit the joint washer.
6. Reverse 1.



HALF SHAFT

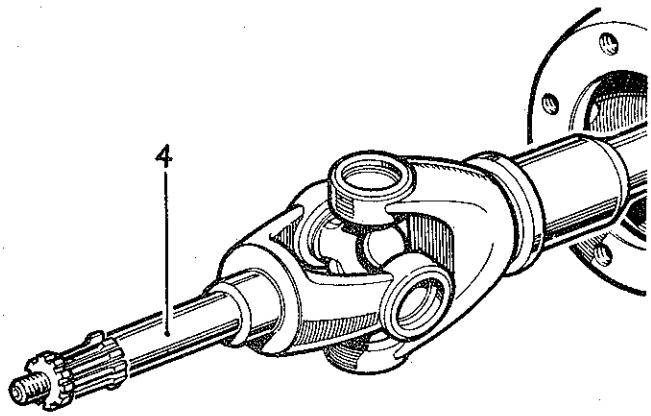
—Remove and refit 54.20.07

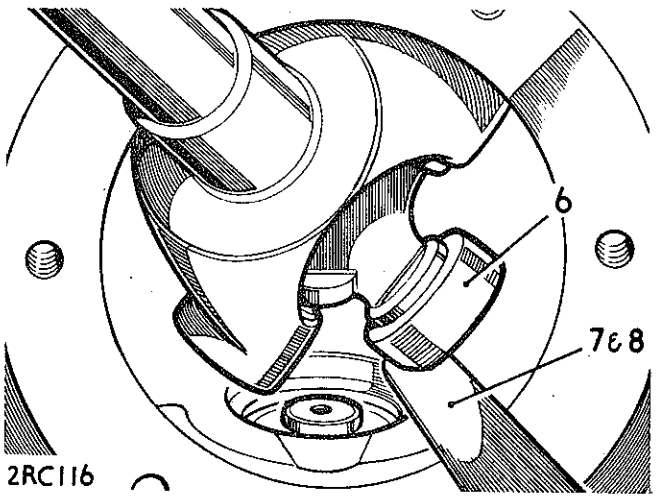
Removing

1. Drain the differential and swivel housing lubricating oils, Division 10 refers.
2. Remove the wheel hub. 60.25.01.
3. Remove the stub axle. 60.25.22.
4. Withdraw the axle half shaft complete.

Refitting

5. Fit the half shaft, long end first, taking care to avoid damaging the axle case oil seal.
6. Carry out the following check, item 7, at the top and bottom swivel pins with the yokes at the maximum angle with the chamfered radius closest to the swivel pin end face.
7. Rotate the half shaft and check that there is a minimum clearance of 1,2 mm (0.050 in) between the joint yoke ears and the swivel pin end faces.
8. If the clearance is insufficient, increase the chamfer on the yoke ears radius.
9. Reverse 1 to 3.





FRONT AXLE AND FINAL DRIVE

HALF SHAFT

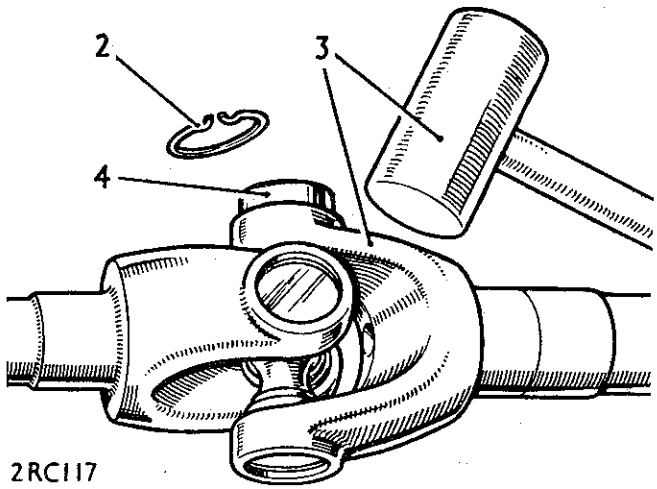
–Overhaul 54.20.09

Service tool: 275870 Axle shaft collar removal and replacer tools

Dismantling the universal joint

1. Remove the half shaft. 54.20.07.
2. Remove the circlip from the universal joint.
3. With one of the stub shaft yoke lugs uppermost tap the radius of the yoke lightly with a soft-nosed mallet.
4. The top bearing should then begin to emerge from the yoke.
5. Turn the joint over and withdraw the bearing downwards to retain the needle rollers.
6. Repeat items 2 to 5 to remove the opposite bearing.
7. Part the stub shaft from the spider journals.
8. Remove the half shaft bearings in the same manner as already described for the stub shaft.

Continued



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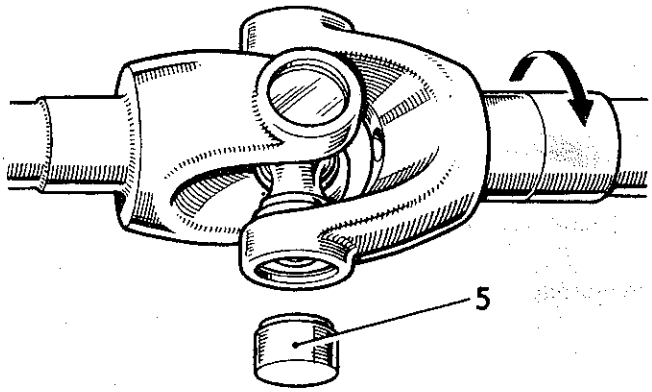

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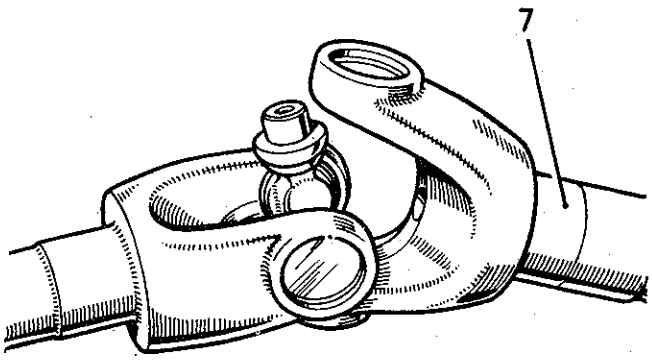

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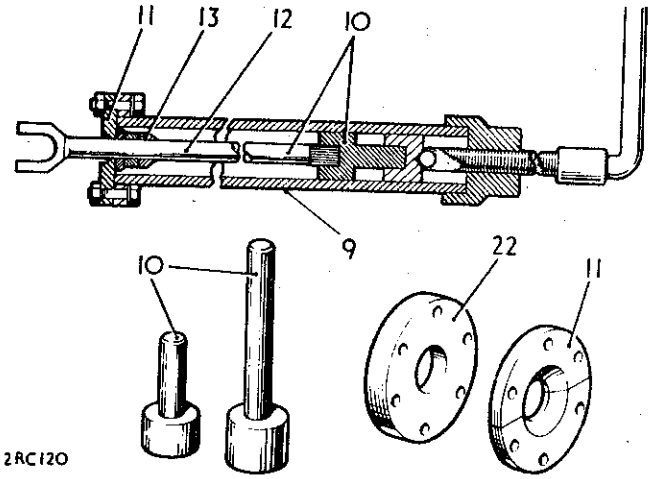
Dismantling the half shaft

9. Clamp the extractor tube in a vice.
10. Position adaptor No. 2 or No. 3, as applicable, onto the shaft and insert the assembly into the extractor tube.
11. Secure the shaft to the extractor, using adaptor No. 5.
12. Screw in the ram and press the shaft from the retainer collar, bearing and conical distance piece.
13. Remove the adaptors; discard the retaining collar.



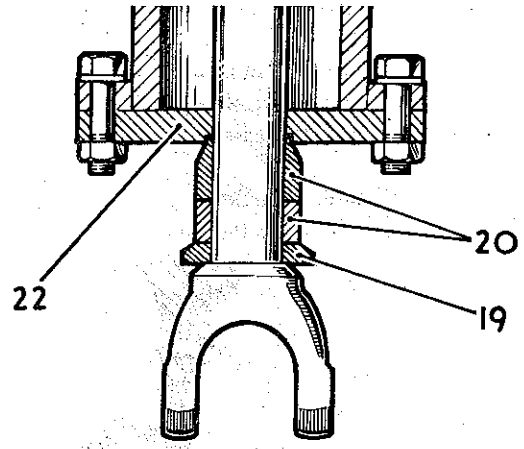
Inspecting

14. Examine all components for obvious wear or damage.
15. If the journal or bearings for the universal joint show any signs of wear, load markings or distortion, they must be renewed complete.
16. The bearing races should be a light drive fit in the yoke trunnions.
17. In the event of wear taking place in any of the four yoke holes, rendering them oval, a new stub shaft or half shaft must be fitted.
18. The bearing inner race must be a light press fit on the axle half shaft.

Continued

Reassembling the half shaft

19. Fit the conical distance piece over the half shaft with the internal chamfer to the radius on the shaft.
20. Place the roller race inner member and a new retaining collar over the half shaft with the chamfer towards the splined end.
21. Stand the shaft on end on a block of hard wood.
22. Bolt adaptor No. 4 to the tool with the recess towards the collar.
23. Drive the collar onto the shaft, using the extractor tube as a ram.



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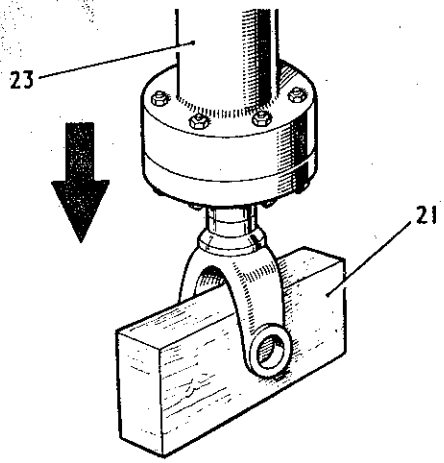
Reassembling the universal joint

24. Assemble the needle rollers in the bearing races, if necessary using a smear of vaseline to retain them in place.
25. Insert the journal in the stub shaft yoke holes, and using a brass drift slightly smaller in diameter than the hole in the yoke, lightly tap the first bearing into position, and retain with a circlip.
26. Repeat the foregoing operations for the other three bearings.
27. Ensure that all four circlips are firmly located in their grooves.
28. Check that the universal joint moves freely. If the joint appears to bind, hold one shaft so that the joint hangs free and tap the yoke ears lightly with a mallet.
29. Reverse 1.



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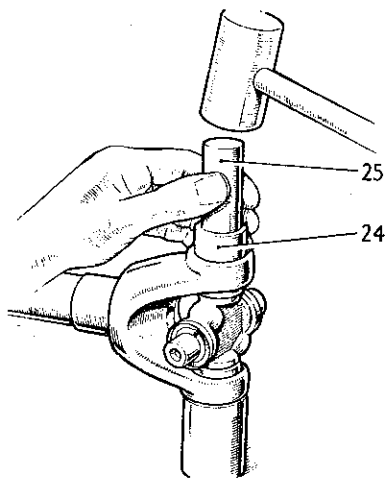

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