REAR AXLE

Remove and refit

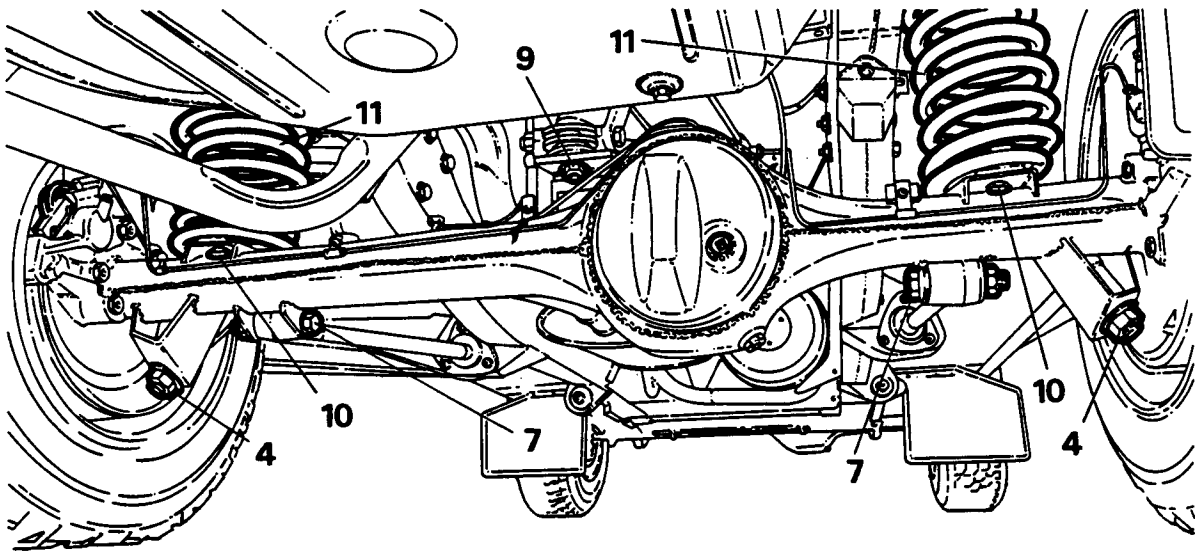
Removing

NOTE: The removal and refitting of the axle from the vehicle requires the assistance of two further personnel to steady the axle, when lowering or repositioning the axle.

1. Jack-up the rear of the vehicle and support the chassis.
2. Remove the road wheels.
3. Support the axle weight with a suitable hydraulic jack.
4. Disconnect the shock absorbers.
5. Disconnect the flexible brake hose at the connection under the floor.
6. Disconnect the pad wear multi-plug at the bracket mounted on the underside of the floor. Prise the rubber grommet out of the bracket and feed the plug through the hole.
7. Disconnect the lower links at the axle.
8. Mark the differential and propeller shaft drive flanges with identification marks to aid reassembly. Remove the four nuts and bolts, lower the propeller shaft and tie it to one side.
9. Disconnect the pivot bracket ball joint at the axle bracket.
10. Release the bolts and remove the coil spring retaining plates.
11. Lower the axle and remove the road springs.
12. Withdraw the axle assembly.

Refitting

13. Position the axle and fit the lower links, and tighten the bolts to the specified torque.
14. Reverse the removal instructions.
15. Tighten the pivot bracket ball joint to axle, to the specified torque.
16. Tighten the propeller shaft to differential drive flange, to the specified torque.
17. Bleed the braking system.



RR1514M

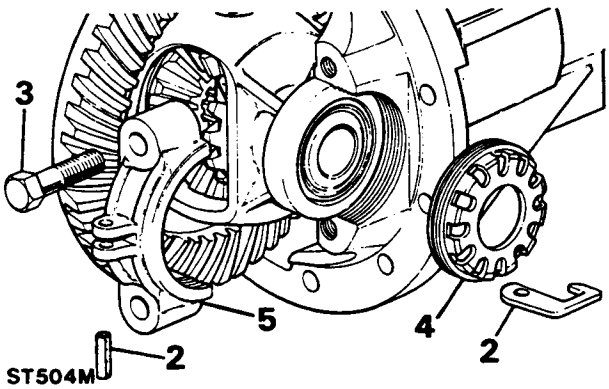
OVERHAUL AXLE DIFFERENTIAL ASSEMBLY

Service tools:
18G 1205 flange holder tool;
18G 191 pinion height setting gauge;
18G 191-4 universal setting block;
18G 47-6 pinion head bearing remover/replacer;
LST 106 oil seal replacer;
RO 262757A extractor for pinion bearing caps;
RO 262757-1 replacer—use with RO 262757A;
RO 262757-2 adaptor tail bearing cap replacer;
RO 530105 spanner—differential flange and carrier bearing nuts;
RO 530106 bracket for dial gauge and indicator;
MS 47 press

DISMANTLE

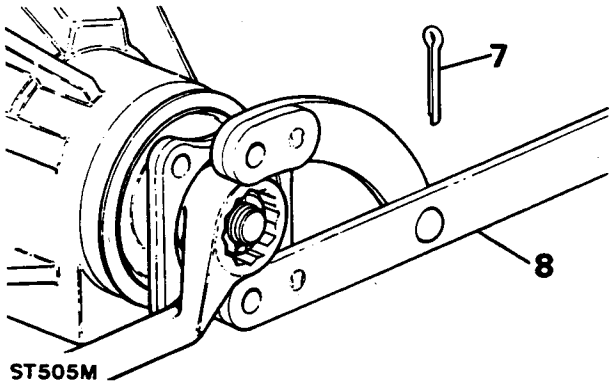
It is essential that differential components are marked in their original positions and relative to other components so that, if refitted, their initial setting is maintained. Note that the bearing caps must not be interchanged.

1. Remove the differential assembly from the axle.
2. Drift out the roll pin securing the bearing nut locking fingers to the bearing caps. Remove the locking fingers.
3. Slacken the bearing cap bolts and mark the caps for reassembly.
4. Using service tool RO 530105, remove the bearing adjusting nuts.
5. Remove the bearing cap bolts and bearing caps.
6. Lift out of the crown wheel, differential unit and bearings.



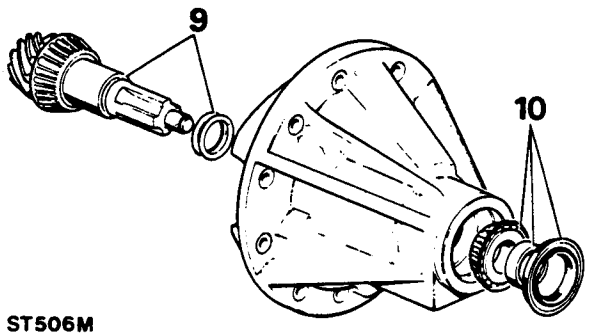
ST504M

7. Remove the split pin securing the pinion flange nut.
8. Remove the pinion flange nut using service tool 18G 1205 to restrain the flange.



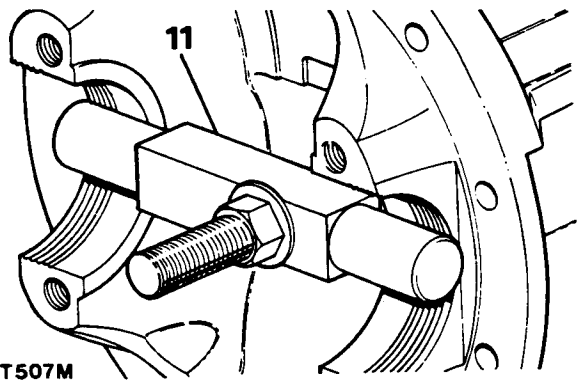
ST505M

9. Withdraw the pinion complete with pinion head bearing and outer bearing shims. Withdraw the shims.
10. Remove the pinion flange oil seal, spacer and bearing. Discard the oil seal.



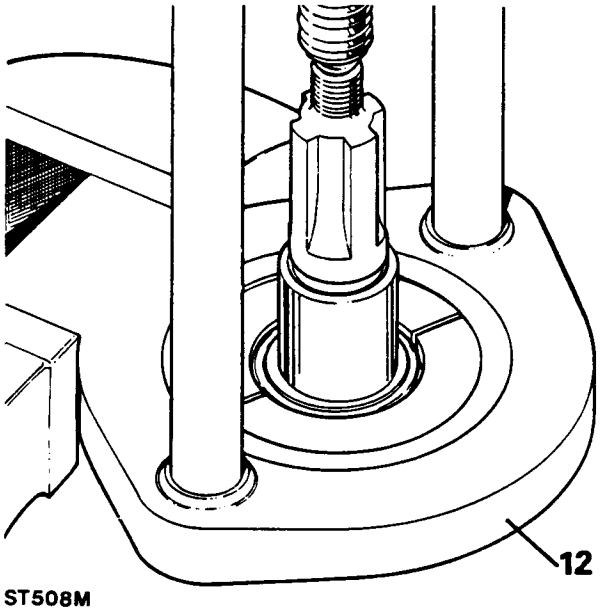
ST506M

11. Using service tool RO 262757A, remove the pinion head bearing track and shim and drift out the outer bearing track from the differential housing.



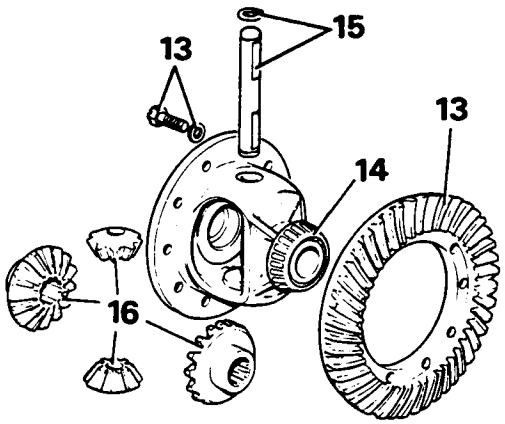
ST507M

12. Remove the pinion head bearing with service tool MS 47 and adaptor 18G 47-6.



ST508M

13. Remove the bolts and washers securing the crown wheel to the differential flange. Withdraw the crown wheel.
14. Remove the differential carrier bearings.
15. Remove the circlips securing the differential cross shaft. Extract the cross shaft.
16. Withdraw the differential gears and pinions.
17. Thoroughly clean all components.



ST509M

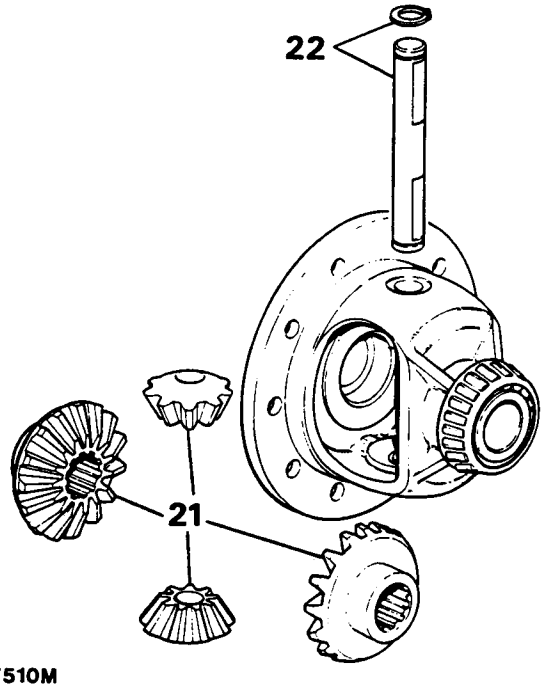
INSPECTION

18. Check all bearings for wear and/or pitting.
19. Check all gears for wear, scuffing, pitting and damaged teeth.
20. **NOTE. The crown wheel and pinion are supplied as a matched set, also the pinion housing and bearing caps.**

ASSEMBLE

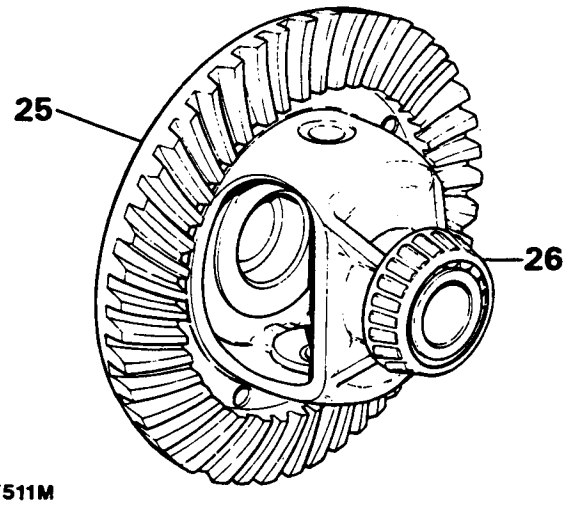
Differential gears

21. Fit the differential gears to the differential housing.
22. Fit the differential cross shaft and retaining circlips.



ST510M

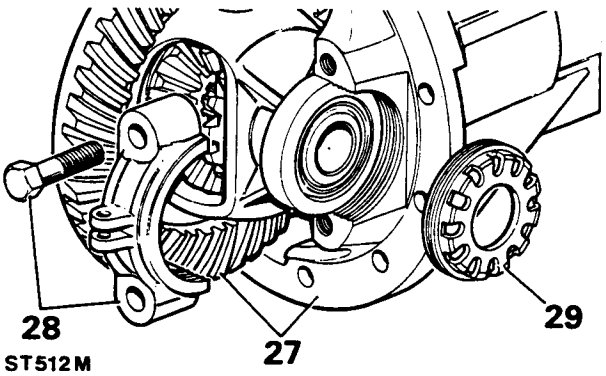
23. Check the gear for freedom of rotation and backlash. Nominal backlash should be present. Excessive backlash will necessitate renewal of the gears and/or the differential housing. No provision is made for backlash adjustment.
24. Check that the serial number marked on the pinion end face matches that marked on the crown wheel.
25. Ensuring that the differential housing flange and crown wheel are thoroughly clean fit the crown wheel. Fit the crown wheel bolts and washers and evenly tighten.
26. Fit the carrier bearings using a suitable press or drift and assemble the tracks to the bearings.



ST511M

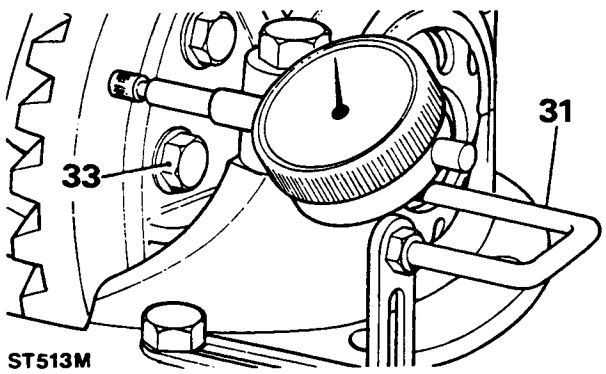
Continued

27. Place the differential housing complete with crown wheel and bearings in the pinion housing.
28. Fit the bearing caps and bolts. Do not fully tighten the bolts.
29. Fit the bearing adjusting nuts and adjust to obtain zero end-float.
30. Tighten the bearing cap bolts.



ST512M

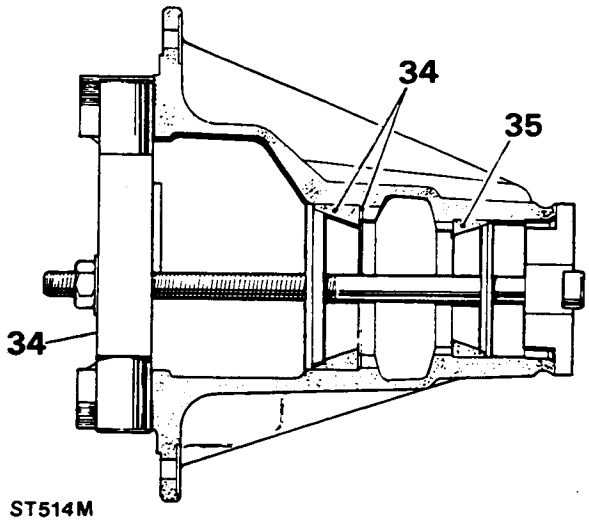
31. Using a dial gauge check the crown wheel for run-out. This should not exceed 0,10 mm (0.004 in). If excessive run-out is recorded remove the crown wheel and examine crown wheel and mounting flange for burrs, grit, etc. Refit the crown wheel and recheck. Run-out, attributable to a buckled or damaged differential housing flange can be corrected only by renewing the differential gear housing.
32. When satisifed that run-out is within the specified limits remove the differential housing from the pinion housing.
33. Remove the crown wheel bolts and refit them using Loctite 'Studlock'. Evenly tighten the bolts to the correct torque.



ST513M

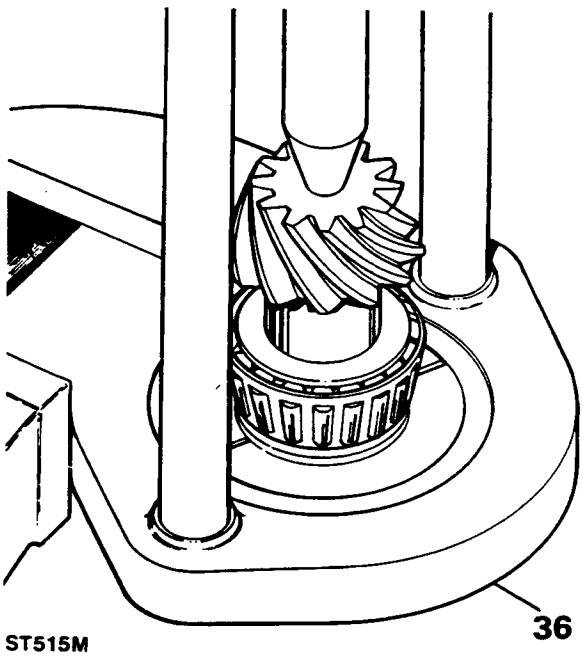
34. Fit the pinion head bearing track and the original shim to the pinion housing using service tools RO 262757A and RO 262757-1. If the original shim was damaged or mislaid use a new shim of at least 1,27 mm (0.050 in) thickness.
35. Fit the pinion outer bearing track to the pinion housing with service tool RO 262757A and RO 262757-2.

NOTE: Instructions 34 and 35 are carried out in one operation as illustrated.



ST514M

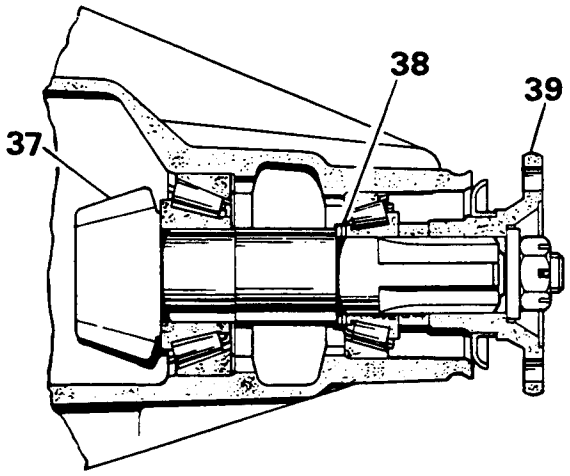
36. Fit the pinion head bearing to the pinion using service tool 18G 47-6.



ST515M

37. Enter the pinion into its location in the pinion housing. Do not fit the shims for bearing pre-load at this stage.
38. Fit the outer bearing and spacer.
39. Fit the driving flange, washer and nut.

Continued

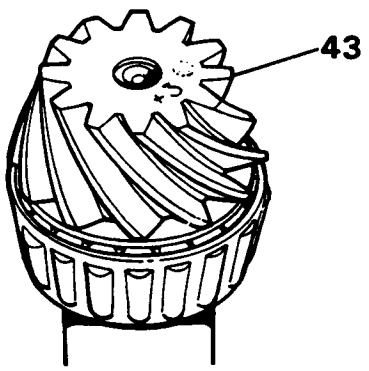


ST516M

40. Do not fit the oil seal at this stage.
41. Tighten the pinion flange nut slowly until the force required to rotate the pinion is 7,6 to 13 kgf cm (7 to 12 lbf in). This will pre-load the bearings in order to check the pinion height dimension.

Drive pinion markings

42. The markings on the end face adjacent to the serial number are of no significance during servicing.
43. 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 set below nominal, a minus (−) pinion must be set above nominal. An unmarked pinion must be set at nominal.
44. The nominal setting dimension is represented by the setting gauge block 18G 191-4 which is referenced from the pinion end face to the bottom radius of the differential bearing bore.



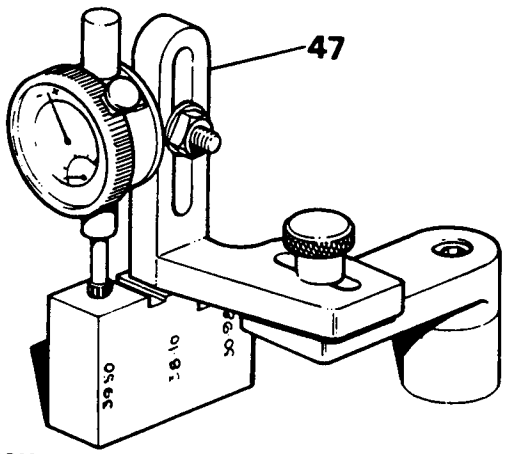
ST517

Drive pinion adjustment

45. Ensure that the pinion end face is free of raised burrs around the etched markings.
46. Remove the keep disc from the magnetised base of dial gauge tool 18G 191.
47. Place the dial gauge and setting block on a flat surface and zero the dial gauge stylus on the setting block.

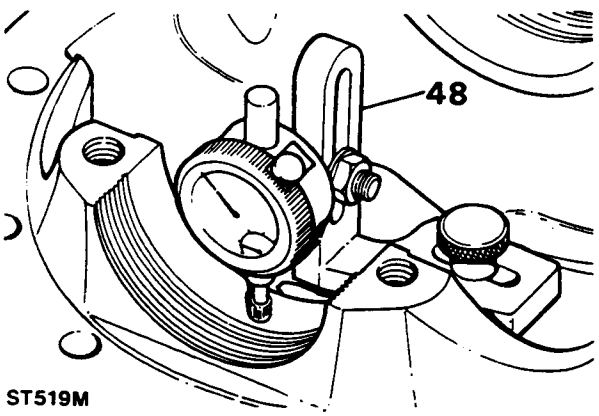
    NOTE: The setting block has three setting heights as follows:
    39,50 mm Rationalised axle
    38,10 mm Pre-Rationalised axle
    30,93 mm Salisbury axle

    Ensure that the height marked 39,50 mm is used for this differential.



ST518M

48. 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.



ST519M

Continued

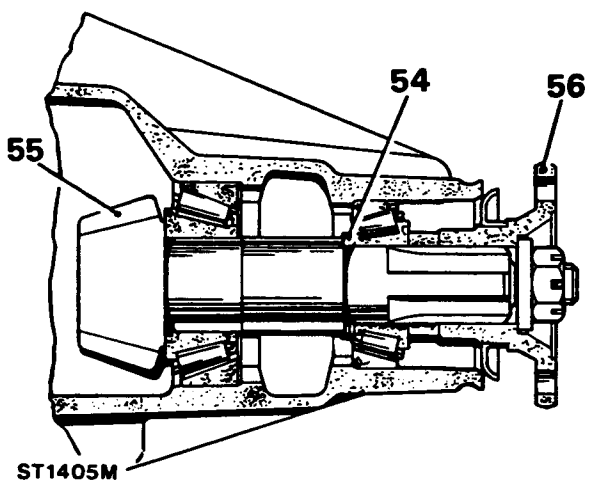
49. Repeat on the other bearing bore. Add together the readings than halve the sum to obtain the mean reading. Note whether the stylus has moved up or down from the zeroed setting.

    a. Where the stylus has moved down, the amount is equivalent to the thickness of shims that must be removed from under the pinion inner track to bring the pinion down to the nominal position.
    b. Where the stylus has moved up, the amount is equivalent to the addition thickness of shims required to bring the pinion up to the nominal position.

50. Before adjusting the shim thickness, check the pinion face marking and if it has a plus (+) figure, subtract that amount in thousandths of an inch from the shim thickness figure obtained in the previous item.
51. Alternatively, if the pinion has a minus (−) figure, add the amount to the shim thickness figure.
    Adjust the shim thickness under the pinion head bearing track as necessary.
52. Recheck the pinion height setting. If the setting is correct, the mean reading on the dial gauge will agree with the figure marked on the pinion end face. For example, with an end face marking of +3, the dial gauge reading should indicate that the pinion is +0.003 in.

Bearing pre-load adjustment

53. Remove the pinion flange, pinion, outer bearing and spacer.
54. Slide new shims, of the same thickness as the originals (bearing pre-load) into position on the pinion shaft. If the original shim was damaged or mislaid use a new shim of at least 4,06 mm (0.160 in) thickness.
55. Enter the pinion in its location in the pinion housing and fit the outer bearing and spacer.
56. Fit the driving flange, washer and nut.
57. Do not fit the oil seal at this stage.

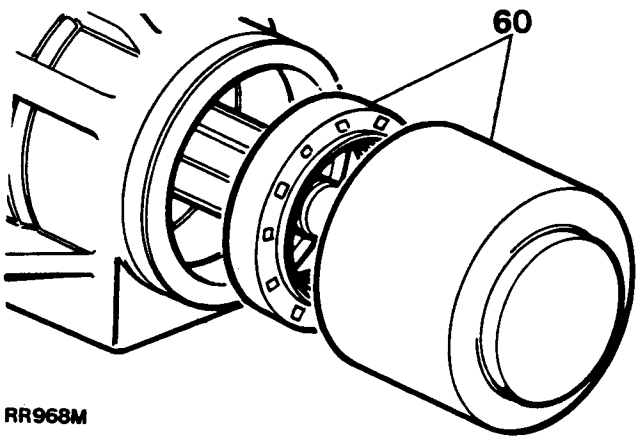


58. Tighten the pinion flange nut to the specified torque. The force required to rotate the pinion shaft should be within 7,6 to 13 kgf cm (7 to 12 lbf in) when initial inertia has been overcome. Change the bearing pre-load shim as necessary to obtain this requirement. A thicker shim will reduce pre-load; a thinner shim will increase pre-load.
59. Remove the pinion flange.

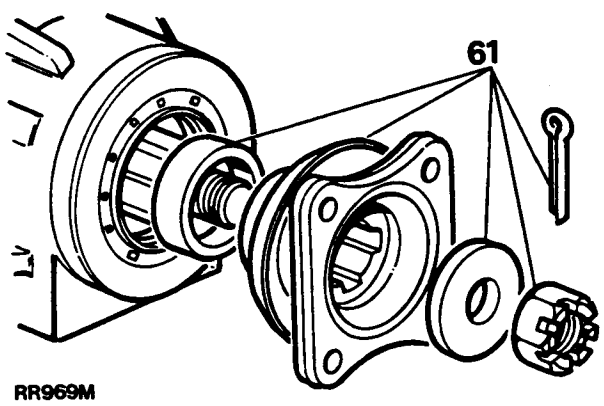
Fitting Pinion Oil Seal

CAUTION—Before fitting the new seal to the differential, examine the seal to ensure that it is clean, undamaged and that the garter spring is properly located. A small scratch on the seal lips could impair its efficiency.

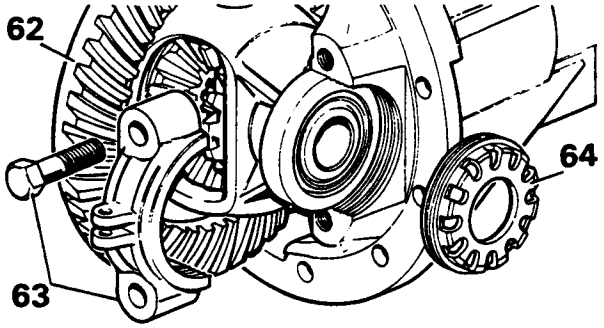
60. Coat the outer diameter of the new seal width an all-purpose grease and fit the seal, lip side leading squarely on the pinion nose housing and drive the seal into position flush with the end face of the housing using seal replacing tool LST106.



61. Lightly lubricate the seal lips with EP90 oil. Fit the distance piece and flange and secure with washer and nut. Tighten the nut to the specified torque and fit a new split pin.

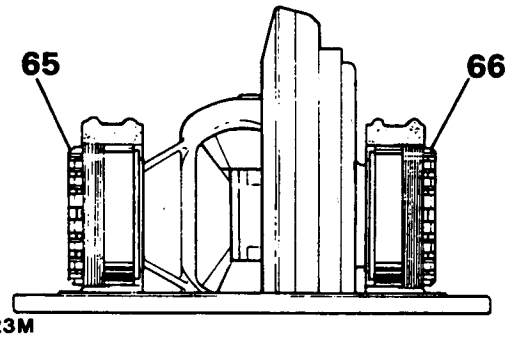


62. Place the differential housing in the pinion housing.
63. Fit the bearing caps and bolts. Do not fully tighten the bolts.
64. Fit the bearing adjusting nuts.



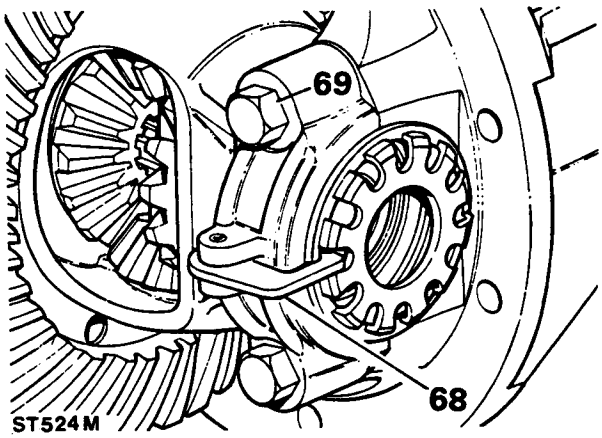
ST522M

65. Using service tool 530105, slacken the left hand bearing adjustment nut (as illustrated) to produce end float.
66. Tighten the right hand nut until crown wheel/pinion backlash is just removed.



ST523M

67. Tighten the left hand nut slowly until the crown wheel/pinion backlash is 0,10 to 0,17 mm (0.004 to 0.007 in).
68. Fit the locking fingers and roll pins. If necessary, tighten the adjustment nuts slightly to align the locking finger with a slot.



ST524M

69. Evenly tighten the bearing cap bolts to the specified torque.
70. Recheck crown wheel/pinion backlash.
71. Lubricate the bearings and gears.

DATA

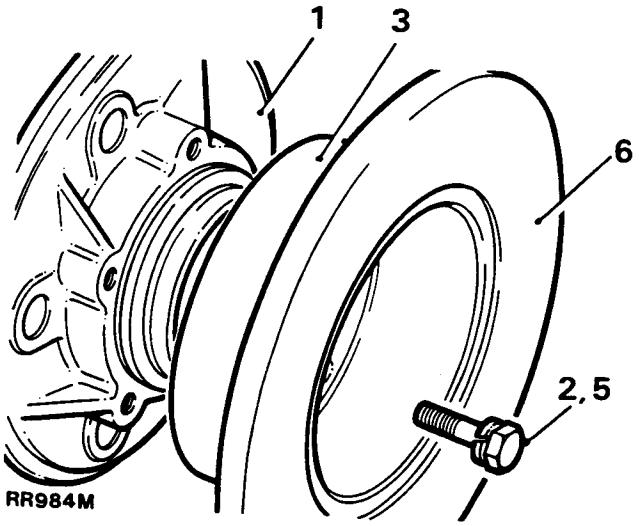
Pinion bearing pre-load	7,6 to 13 kgf cm (7 to 12 lbf in)
Crown wheel run-out	0,10 mm (0.004 in)
Crown wheel/pinion backlash	0,10 to 0,17 mm (0.004 to 0.007 in)

REAR DISCS

Remove and refit

Removing

1. Remove the rear hub assembly.
2. Remove the rear disc fixing bolts.
3. Tap off the disc from the rear hub.



Refitting

4. Locate the disc onto the rear hub.
5. Fit the disc fixing bolts. See 'Data Section' for tightening torques.
6. Using a dial test indicator, check the total disc run out, this must not exceed 0,15 mm (0.006 in). If necessary reposition the disc.
7. Fit the rear hub assembly.

Disc reclamation

Check the disc thickness marked on the disc boss—this dimension may be reduced to a minimum thickness of 13 mm (0.510 in) front and 12 mm (0.460 in) rear, by machining an equal amount off both sides.

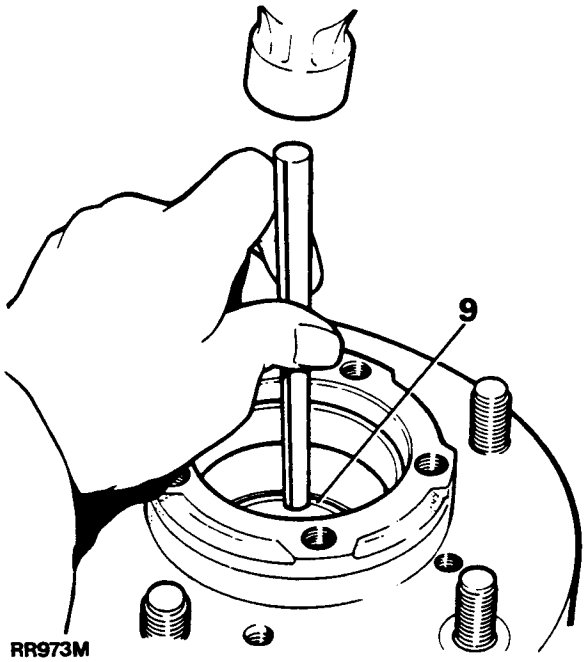
REMOVE AND OVERHAUL REAR HUBS

Special tools:

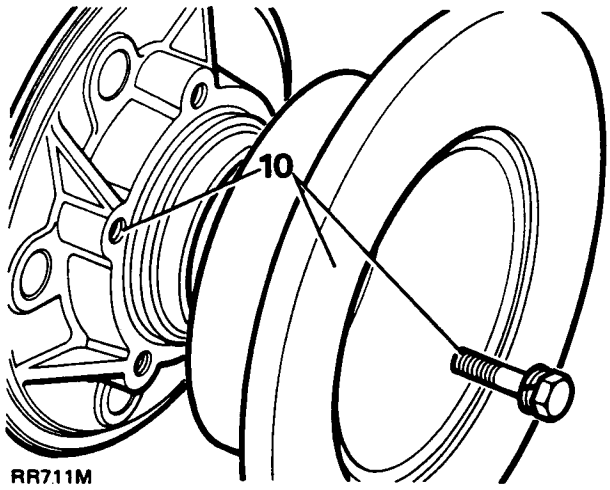
Oil Seal replacer	**LST550–5**
Drift for above tool	**MS550 or 18G134**
Hub nut spanner	**606435**

Remove

1. Jack-up the vehicle, lower on to axle stands and remove the road wheels.
2. Release the brake pipe from the axle, casing clips and remove the brake caliper retaining bolts and secure the assembly to one side. Take care not to kink the brake pipe.
3. Remove the five bolts securing the axle shaft to the hub and withdraw the shaft.
4. Bend back the lock tab and remove the outer nut using box spanner 606435 and remove the lock washer. Likewise remove the inner nut.
5. Remove the seal track spacer.
6. Withdraw the hub complete with bearing oil seals and brake disc.
7. Remove the inner and outer oil seals.
8. Remove the inner and outer bearing cones.
9. Drift-out the inner and outer bearing cups.



10. Degrease and examine the hub and brake disc and if necessary renew both or whichever part is unserviceable. The disc is attached to the hub with five bolts. Mark the relationship of the hub to the disc if the original parts are to be reassembled.

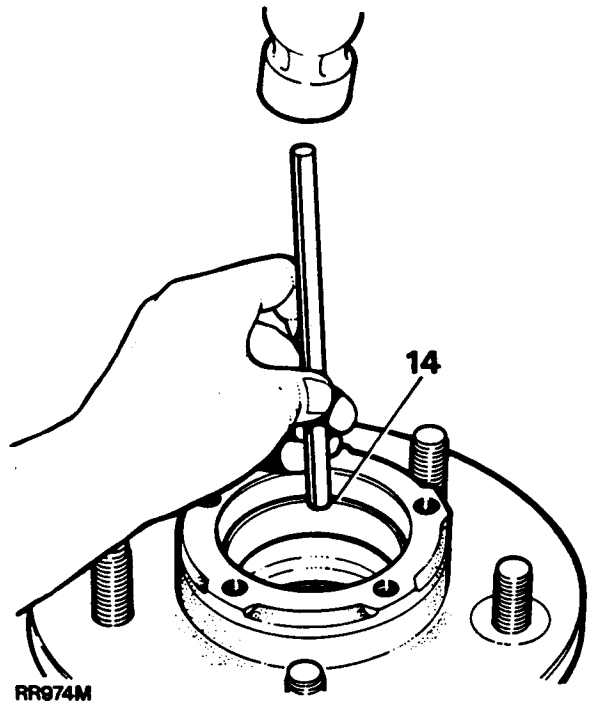


RR711M

11. Examine the stub axle and in particular check that the inner seal track is smooth and free from blemishes.
12. If necessary remove the six retaining bolts and remove the stub axle complete with the mudshield and joint washer.

Assemble

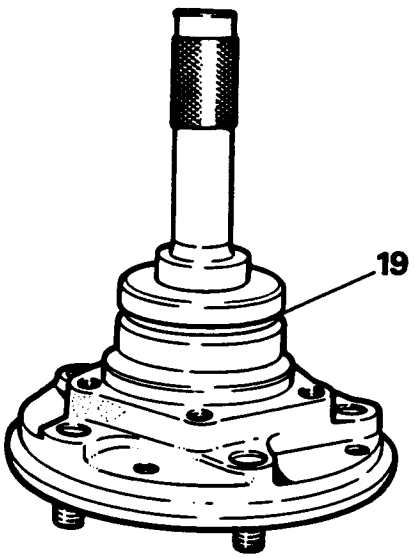
13. Using a new joint washer fit the stub axle and mud shield. Coat the threads of the retaining bolts with Loctite 270 and tighten evenly to the correct torque.
14. Fit the new inner and outer bearing cups to the hub.
15. Fit the new inner bearing cone and pack with one of the recommended hub greases.



RR974M

Fitting new oil seal—inner

16. Clean the hub oil seal housing and ensure that the seal locating surface is smooth and the chamfer on the leading edge is also smooth and free from burrs.
17. Examine the new seal and ensure that it is clean and undamaged and that the garter spring is properly located. Even a small scratch on the seal lip could impair its efficiency.
18. Although the new seal is already pre-greased by the manufacturer, apply one of the recommended hub bearing greases to the outside diameter of the seal before fitting, taking care not to damage the lip.
19. Place the seal, lip side leading, squarely on the hub and using the 76 mm end of seal replacer tool LST 550-5 and drift 550 or 18G 134, drive the seal into position, flush with the end face of the hub.



RR975M

Fitting outer oil seal

20. Fit the new outer bearing cone and pack with one of the recommended hub greases.

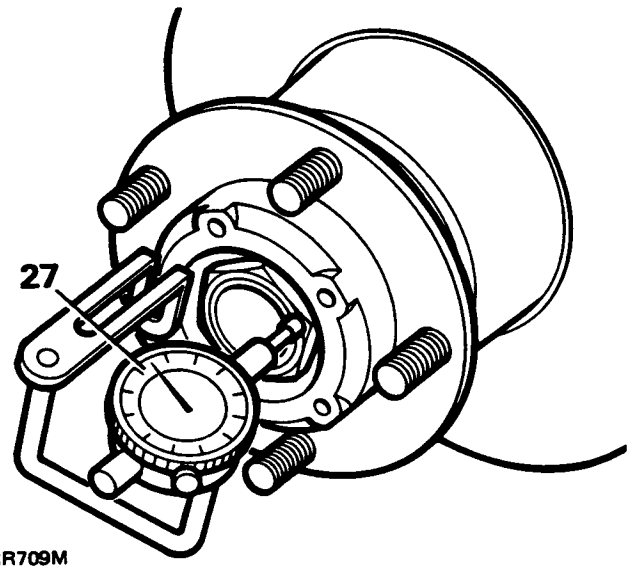
    Carry out instructions 16 to 18.

21. Place the seal, lip side leading, squarely on the hub and using the 72 mm end of seal replacer tool LST 550-5 and drift 550 or 18G 134, drive the seal into position to the depth determined by the tool.
22. Smear the lips of both seals with one of the recommended greases. This is important since a dry seal can be destroyed during the first few revolutions of the hub.

Continued

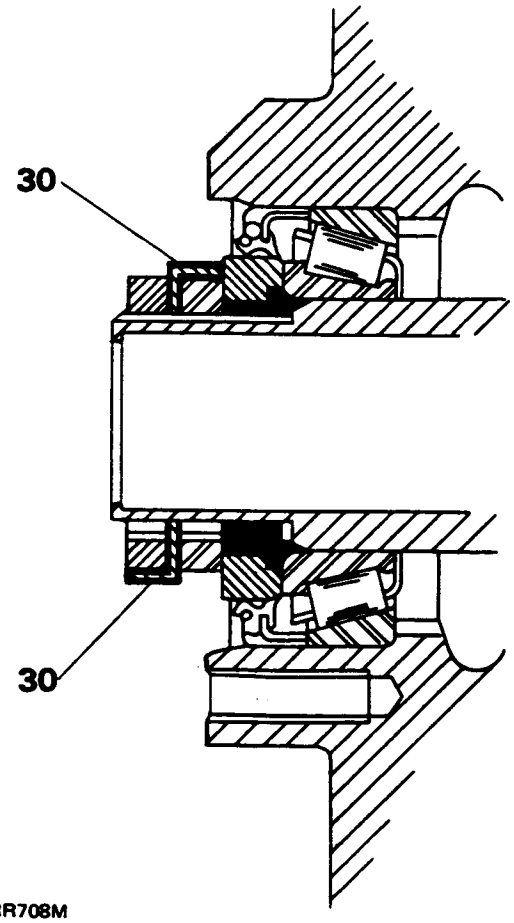
Fitting hub to stub axle

23. Select a new seal track spacer and check that the outer diameter is smooth and free from blemishes and that there are no burrs on the chamfered leading edge.
24. Taking care not to damage the seal lips fit the hub assembly to the stub axle. Do not allow the weight of the hub to rest even temporarily on the outer seal otherwise damage and distortion could occur. Therefore hold the hub clear of the stub axle until the seal track spacer is fitted.
25. Carefully fit the seal track spacer, seal lip leading.
26. Fit the hub inner nut and using spanner 606435 tighten the adjusting nut whilst slowly revolving the hub until all end-float is removed, then back-off the nut approximately half a turn.
27. Mount a dial test indicator and bracket on the hub so that the stylus rests in a loaded condition on the nut. Check the end-float which must be 0,013 to 010 mm (0.0005 to 0.004 in). Adjust the nut as necessary to achieve this.



RR709M

28. Fit the lock washer and locknut and tighten against the adjusting nut.
29. Rotate the hub several times to settle the bearings then re-check the end-float.
30. Bend one segment of the lock washer over the adjusting nut and another, diametrically opposite, over the locknut taking care not to damage the outer seal.

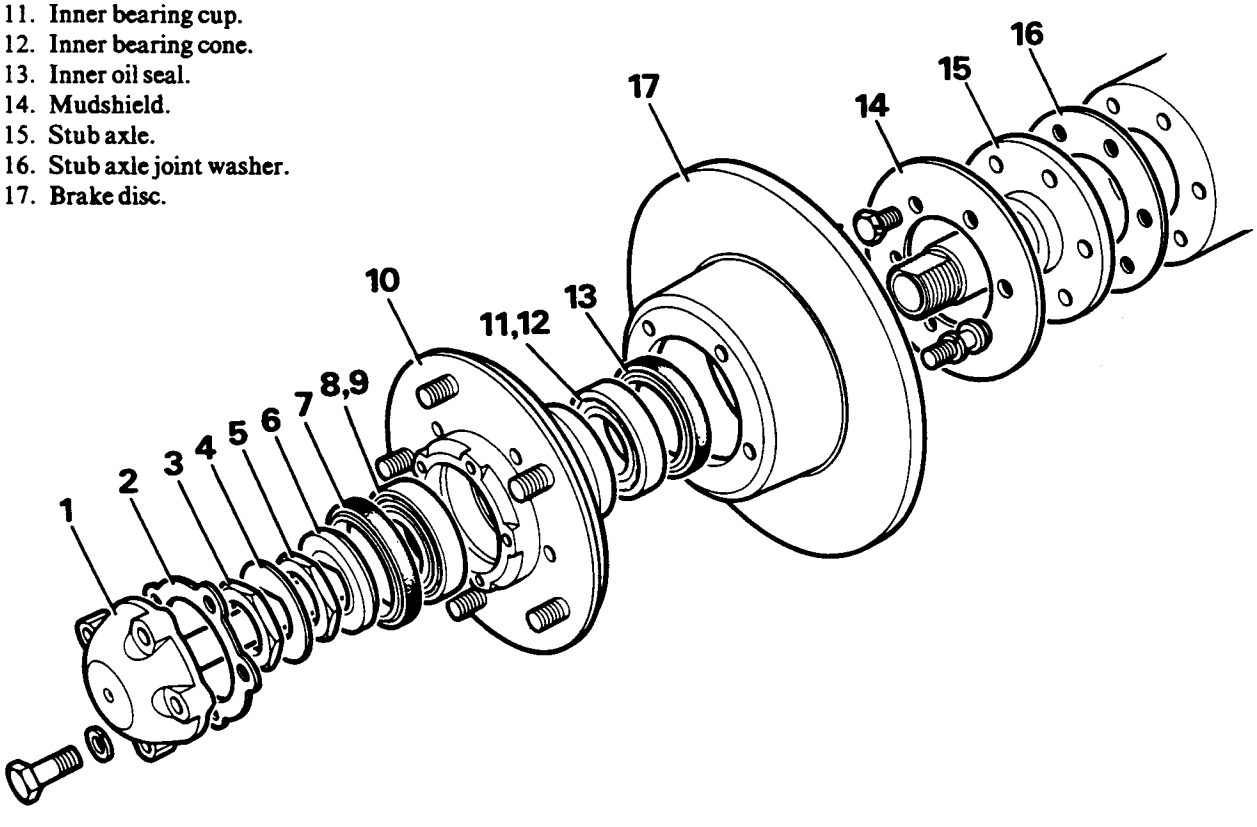


RR708M

31. Using a new joint washer, fit the hub driving shaft and evenly tighten the retaining bolts to the correct torque.
32. Fit the brake caliper and secure with the retaining bolts and tighten to the correct torque. Secure the brake pipes to the axle casing.
33. Fit the road wheels, jack-up the vehicle, remove the axle stands, lower the vehicle to the ground and tighten the road wheel nuts evenly to the correct torque.

KEY TO REAR HUB COMPONENTS

1. Rear axle shaft.
2. Joint washer.
3. Locknut.
4. Lock washer.
5. Adjusting nut.
6. Seal track spacer.
7. Outer oil seal.
8. Outer bearing cone.
9. Outer bearing cup.
10. Hub.
11. Inner bearing cup.
12. Inner bearing cone.
13. Inner oil seal.
14. Mudshield.
15. Stub axle.
16. Stub axle joint washer.
17. Brake disc.



RR706M

Notes