

OVERHAUL AXLE DIFFERENTIAL ASSEMBLY

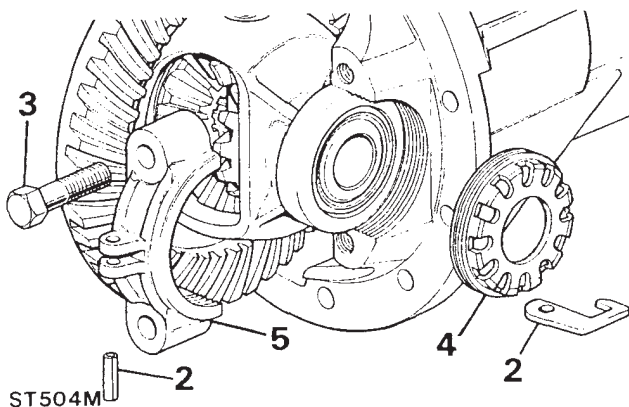
Service tools:

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; or
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

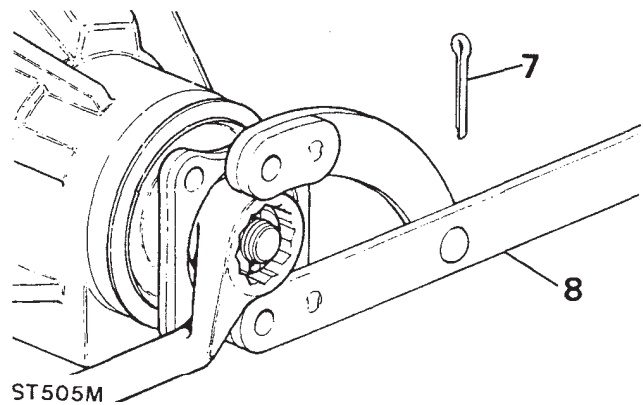
DISMANTLE

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.

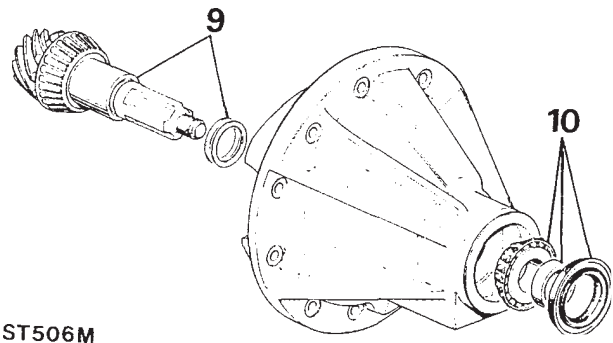
1. Remove the differential assembly from the axle.
2. Drift out the roll pin securing the bearing nut locking fingers to the bearing caps. Remove the locking fingers.
3. Slacken the bearing cap bolts and mark the caps for reassembly.
4. Using service tool RO 530105, remove the bearing adjusting nuts.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



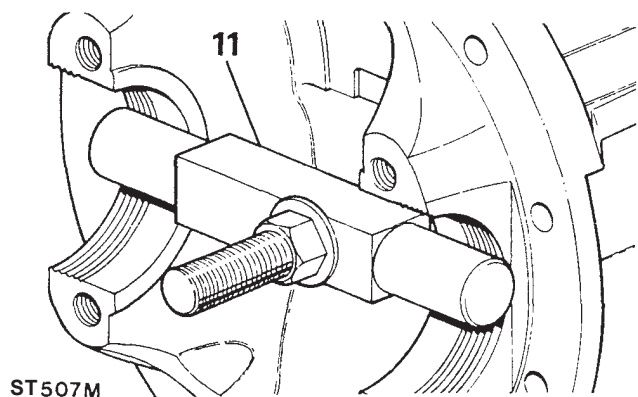
7. Remove the split pin securing the pinion flange nut.
8. Remove the pinion flange nut using service tool 18G 1205 to restrain the flange.



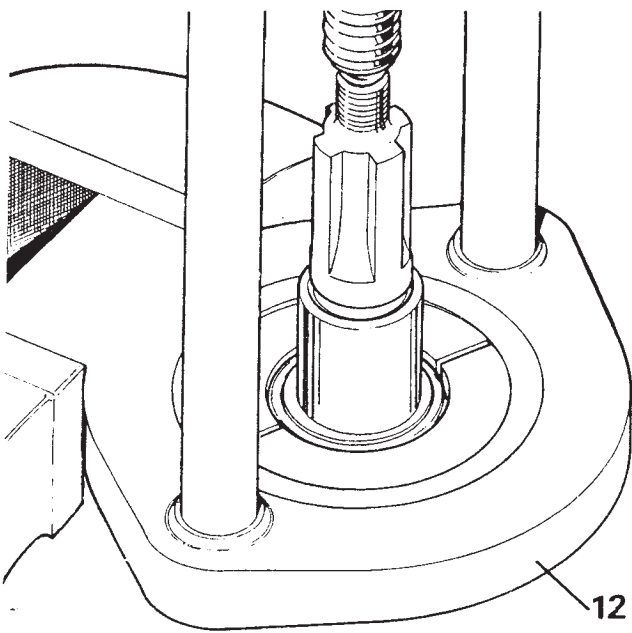
9. Withdraw the pinion complete with pinion head bearing and outer bearing shims. Withdraw the shims.
10. Remove the pinion flange oil seal, spacer and bearing. Discard the oil seal.



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.

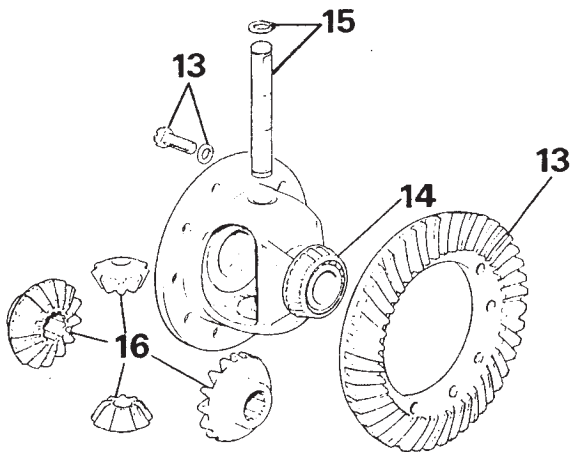


12. Remove the pinion head bearing with service tool MS 47 and adaptor 18G 47-6.



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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.



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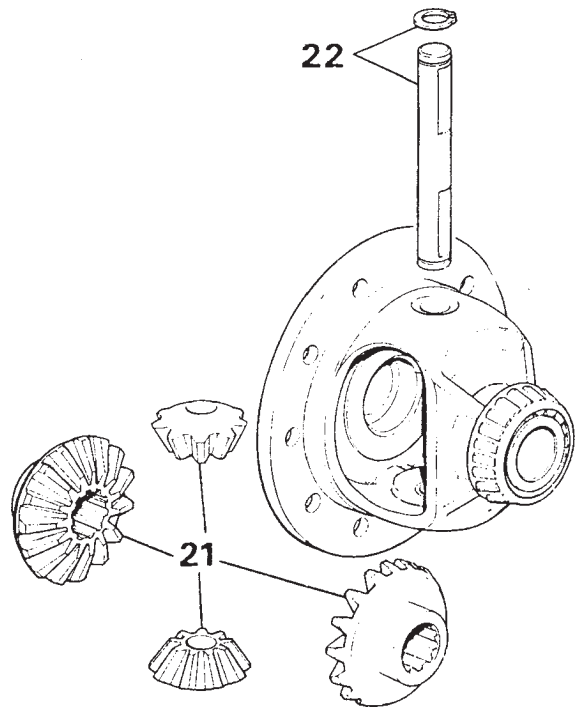
INSPECTION

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

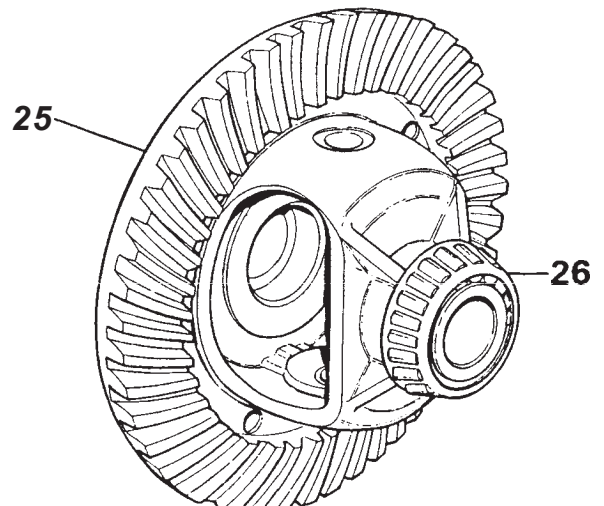
Differential gears

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



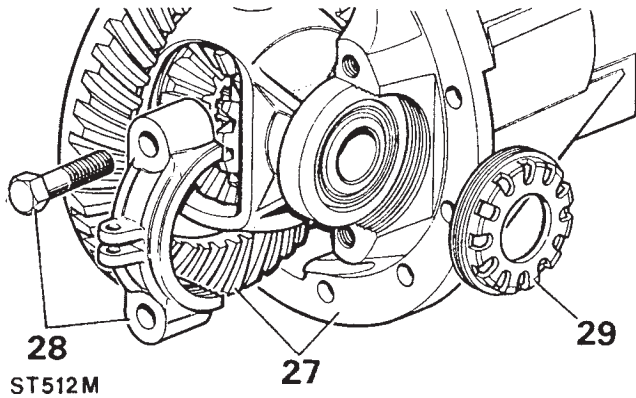
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23. Check the gear for freedom of rotation and backlash. Nominal backlash should be present. Excessive backlash will necessitate renewal of the gears and/or the differential housing. No provision is made for backlash adjustment.
24. Check that the 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.

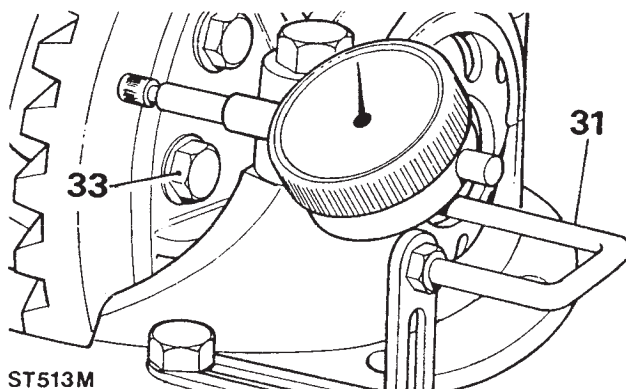


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27. Place the differential housing complete with crown wheel and bearings in the pinion housing.
28. Fit the bearing caps and bolts. Do not fully tighten the bolts.
29. Fit the bearing adjusting nuts and adjust to obtain zero end-float.
30. Tighten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

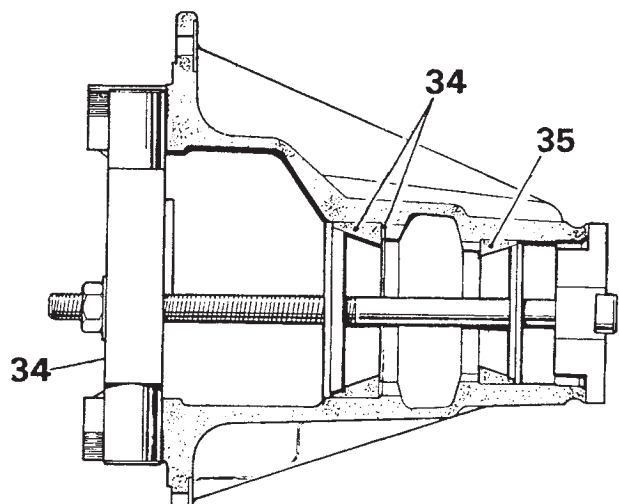


31. Using a dial gauge check the crown wheel for run-out. This should not exceed 0,10 mm (0.004 in). If excessive run-out is recorded remove the crown wheel and examine crown wheel and mounting flange for burrs, grit, etc. Refit the crown wheel and recheck. Run-out, attributable to a buckled or damaged differential housing flange can be corrected only by renewing the differential gear housing.
32. When satisfied 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.

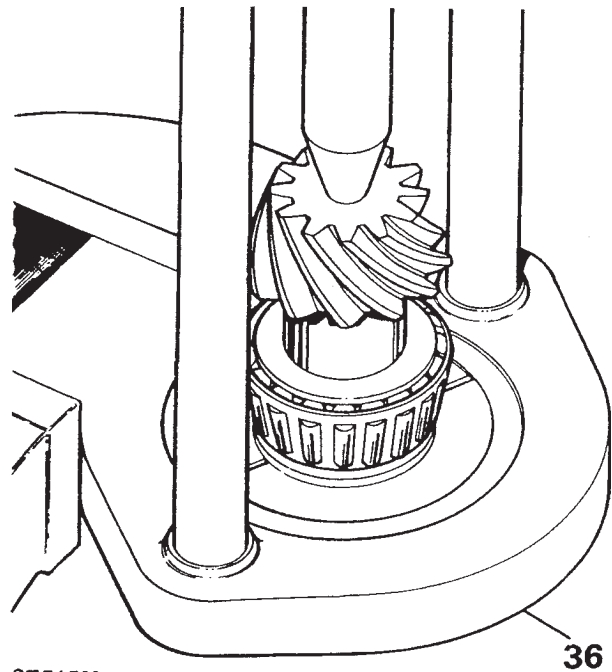


34. Fit the pinion head bearing track and the original shim to the pinion housing using service tools RO 262757A and RO 262757-1. If the original shim was damaged or mislaid use a new shim of at least 1,27 mm (0.050 in) thickness.
35. Fit the pinion outer bearing track to the pinion housing with service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

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

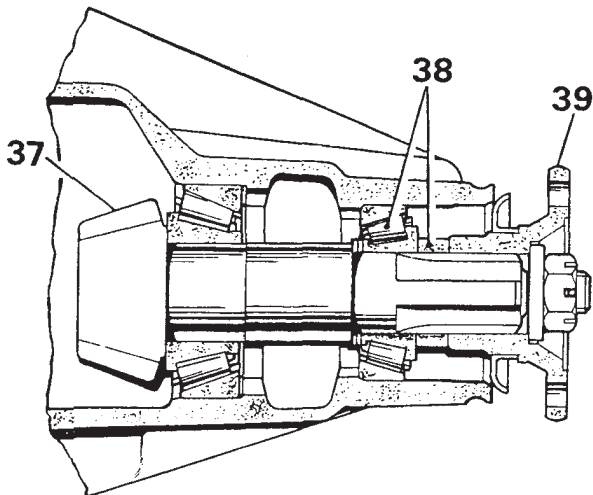


36. Fit the pinion head bearing to the pinion using service tool 18G 47-6.



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.

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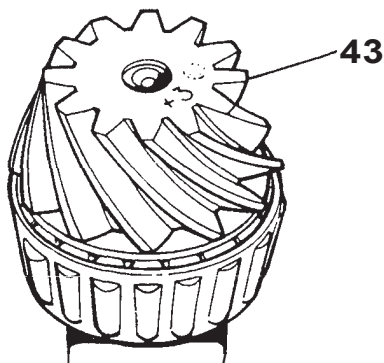


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- 40. Do not fit the oil seal at this stage.
- 41. Tighten the pinion flange nut slowly until the force required to rotate the pinion is 23 to 40,25 kgf cm (20 to 35 lbf in). This will pre-load the bearings in order to check the pinion height dimension.
NOTE: If using original bearings, which are bedded in, the pre-load figure is 11,5 to 17,25 kgf cm (10 to 15 in lb).

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

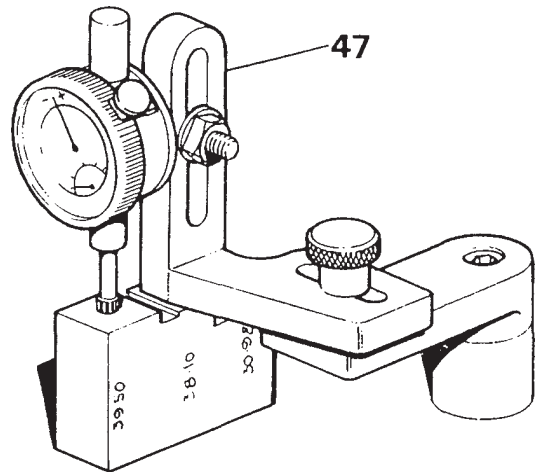
Drive pinion adjustment

- 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:

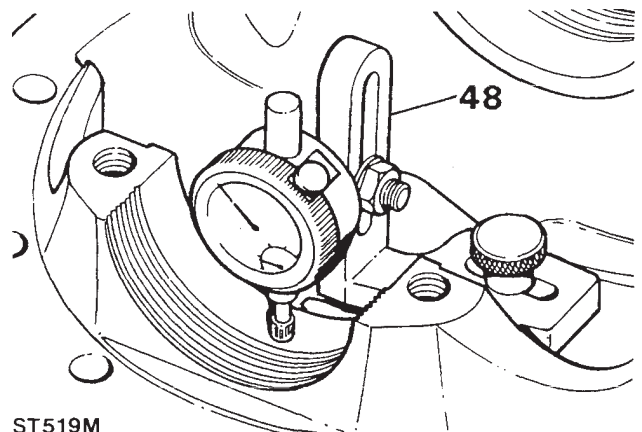
- 39,50 mm Rationalised axle
- 38,10 mm Pre-Rationalised axle
- 30,93 mm Salisbury axle

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



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- 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.



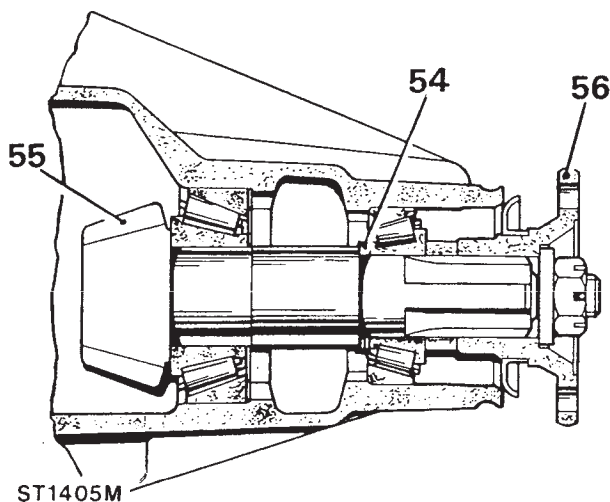
ST519M

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49. 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.
 - 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 23 to 40,25 kgf cm (20 to 35 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.

NOTE: If using original bearings, which are bedded in, the pre-load figure is 11,5 to 17,25 kgf cm (10 to 15 in lb).

59. Remove the pinion flange.

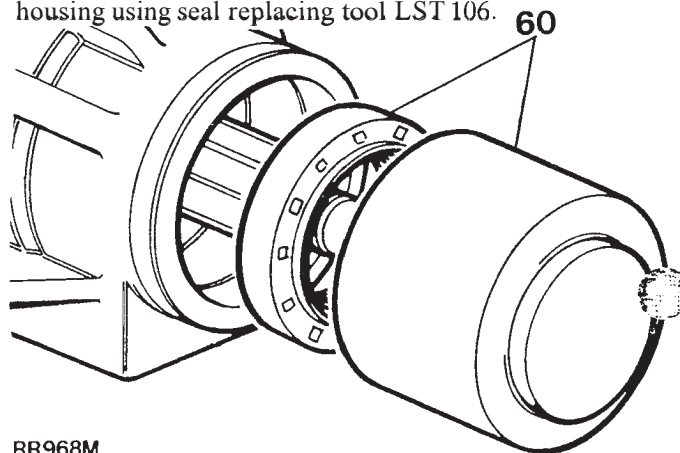
Fitting Pinion Oil Seal — latest type FRC 8220

CAUTION A — When fitting the latest type oil seal FRC 8220 in place of the early type FRC 4586 the latest mudshield FRC 8154 must be fitted in place of the early type 236072.

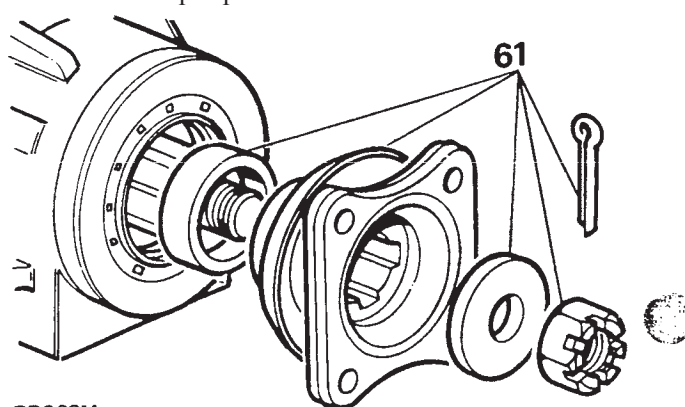
Also seal replacer 18G 1382 must be used to fit the early type oil seal FRC 4586. This tool must not be used to fit latest seal FRC 8220.

CAUTION B — 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.

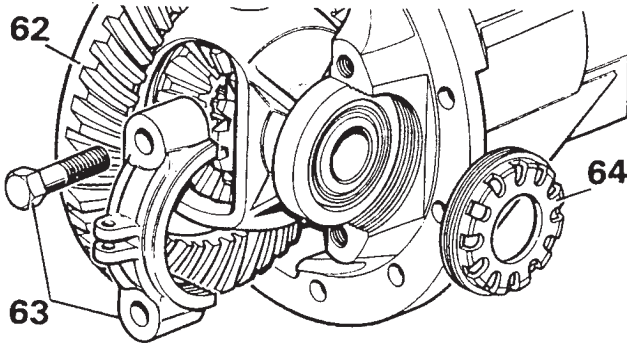
60. Coat the outer diameter of the new seal with an all-purpose grease and fit the seal, lip side leading squarely on the pinion nose housing and drive the seal into position flush with the end face of the housing using seal replacing tool LST 106.



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.

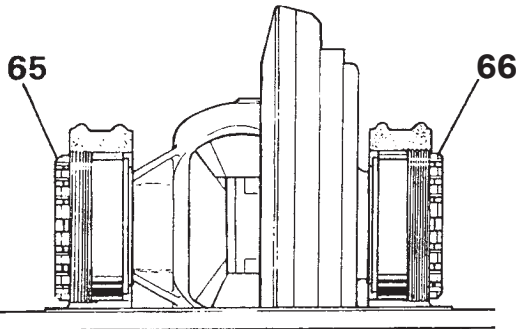


- 62. Place the differential housing in the pinion housing.
- 63. Fit the bearing caps and bolts. Do not fully tighten the bolts.
- 64. Fit the bearing adjusting nuts.



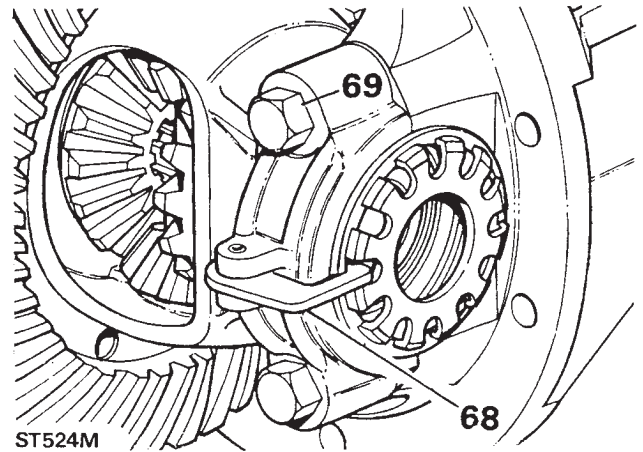
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- 65. Using service tool 530105, slacken the left hand bearing adjustment nut (as illustrated) to produce end float.
- 66. Tighten the right hand nut until crown wheel/pinion backlash is just removed.



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- 67. Tighten the left hand nut slowly until it contacts the bearing. Continue turning the left-hand nut until a backlash of 0,10 to 0,17 mm (0.004 to 0.007 ins) is achieved. Do not slacken the right-hand nut at any time, otherwise the bearing preload will be affected.
- 68. Fit the locking fingers and roll pins. If necessary, tighten the adjustment nuts slightly to align the locking finger with a slot.



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- 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	23 to 40,25 kgf cm (20 to 35 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)