

POWER STEERING BOX

Remove and refit

Service tools:

Ball joint extractor—18G1063

Drop arm extractor—MS252A

NOTE: It is important that whenever any part of the system, including the flexible piping, is removed or disconnected, that the utmost cleanliness is observed.

All ports and hose connections should be suitably sealed off to prevent ingress of dirt, etc. If metallic sediment is found in any part of the system, the complete system should be checked, the cause rectified and the system thoroughly cleaned.

Under no circumstances must the engine be started until the reservoir has been filled. Failure to observe this rule will result in damage to the pump.

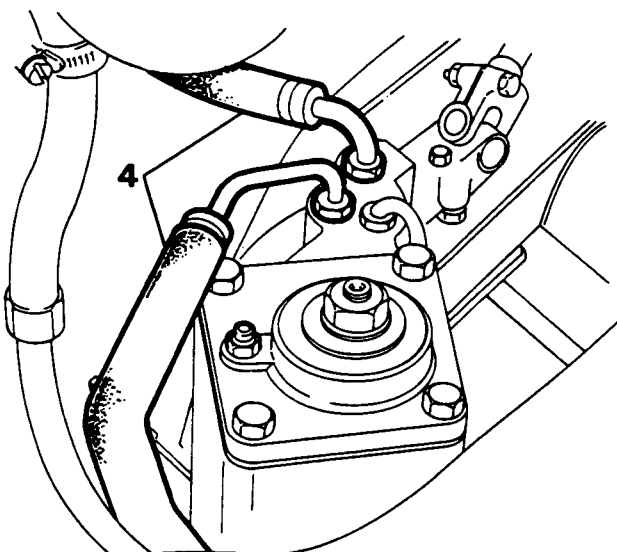
Metric pipe fittings are now used with 'O' ring pipe ends on the fittings to the steering box.

Follow normal 'O' ring replacement procedure whenever pipes are disconnected.

Ensure that compatible metric components are used when fitting replacement pipes.

Removing

1. Park the vehicle on level ground.
2. Prop open the bonnet.
3. Remove the filler cap from the power steering fluid reservoir. Disconnect the pipes from the pump. Drain and discard the fluid. Replace the filler cap.
4. Disconnect the flexible hoses from the steering box.

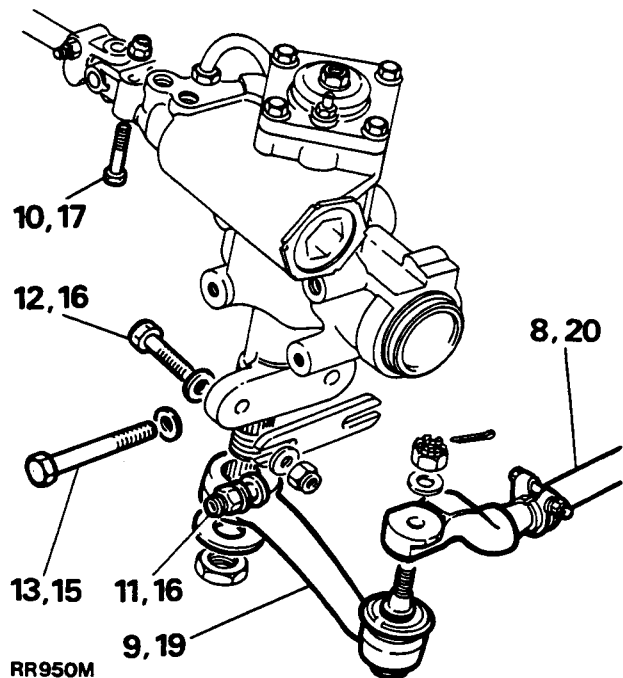


RR949M

5. Blank off all disconnected hose connections to prevent ingress of foreign matter.
6. Jack up and support the chassis front end. Alternatively, raise the vehicle on a ramp.

WARNING: Whichever method is adopted, it is essential that the wheels are chocked and the handbrake applied.

7. Right-hand drive vehicles only—disconnect the lead from the oil pressure switch.
8. Uncouple the drag link and remove, using ball joint extractor 18G1063.
9. Remove the drop arm, using drop arm extractor MS252A.



10. Remove the pinch bolt attaching the universal joint to the power steering box.
11. Slacken the nut securing the tie bar to the chassis.
12. Remove the bolts securing the tie bar to the steering box and move the tie bar aside.
13. Remove the fixings attaching the power steering box to the chassis side member.
14. Withdraw the power steering box.

continued

Refitting

15. Refit the steering box to the chassis side member and tighten the four Nyloc nuts to the correct torque.
16. Refit the tie bar to the steering box, and tighten the tie bar securing nut to the correct torque.
17. Reconnect the pinch bolt, attaching the universal joint to the power steering box, and tighten to the correct torque.
18. Reconnect the lead to the oil pressure switch.
19. Refit the drop arm.
20. Refit the drag link and secure.
21. Lower the vehicle to ground level.
22. Remove the blanking plugs and reconnect the flexible hoses to the steering box.
23. Remove the blanking plug and refit the flexible hose to the power steering pump.
24. Ensure that the steering wheel is correctly aligned when the wheels are in the straight-ahead position.

NOTE: It may be necessary to remove the steering wheel and reposition on the splines to obtain this condition. See steering wheel—remove and refit.

25. Remove the filler cap from the power steering fluid reservoir. Fill the reservoir to the oil level mark with the recommended fluid (see Section 09) and bleed the power steering system. See power steering system—bleed.
26. Check the fluid level and replace the filler cap.
27. Check, and if necessary, adjust the steering box.
28. Test the steering system for leaks, with the engine running, by holding the steering hard on full lock in both directions.

CAUTION: Do not maintain this pressure for more than 30 seconds in any one minute, to avoid causing the oil to overheat and possible damage to the seals.

29. Close the bonnet.
30. Road test the vehicle.

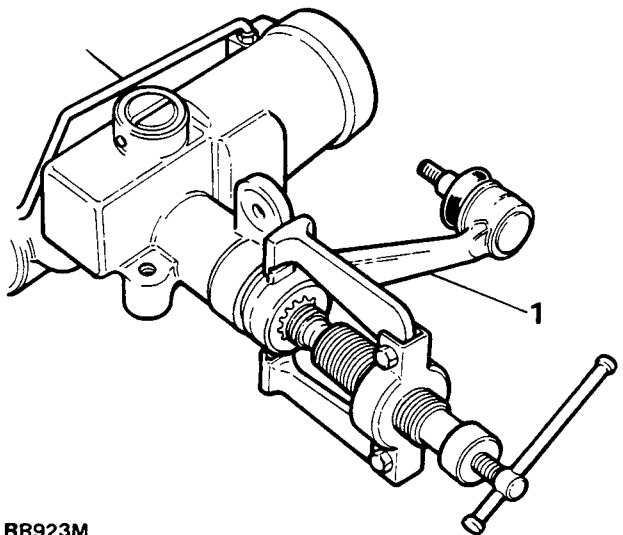
POWER STEERING BOX OVERHAUL

Service tools:

- 'C' Spanner—LST120
- Worm adjusting socket—LST119
- Drop arm extractor—MS252A
- Ring expander—606602
- Ring compressor—606603
- Seal saver, sector shaft—606604
- Seal saver, valve and worm—R01015
- Torque setting tool—R01016

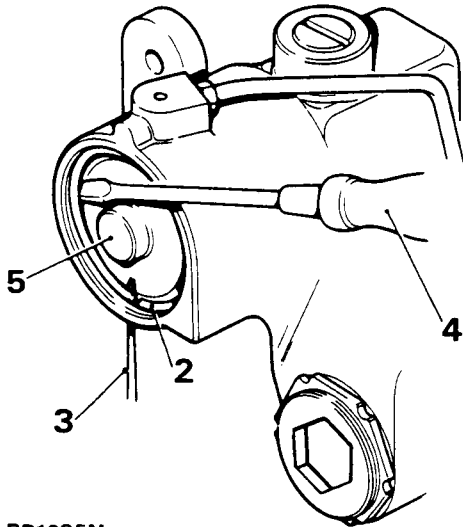
Dismantle

1. Remove the steering box from the vehicle, and withdraw the drop arm.



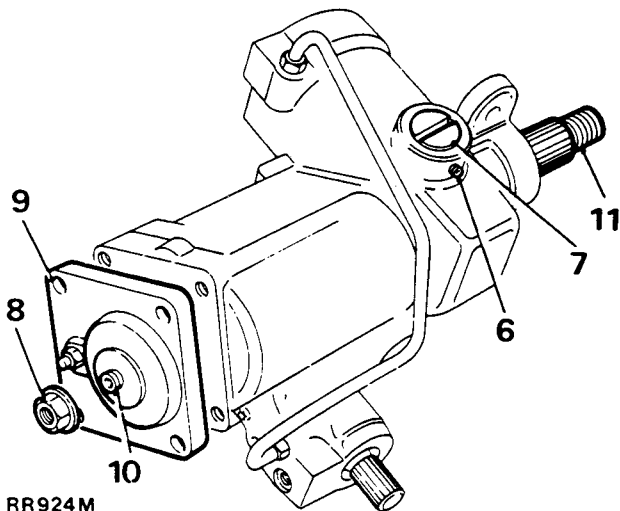
RR923M

2. Rotate the retainer ring, as necessary, until one end is approximately 12 mm (0.500 in) from the extractor hole.
3. Lift the cover retaining ring from the groove in the cylinder bore, using a suitable pointed drift applied through the hole provided in the cylinder wall.
4. Complete the removal of the retainer ring, using a screwdriver.
5. Turn on left lock (LH steering) until the piston pushes out the end cover (for RH steering models, turn on right lock).



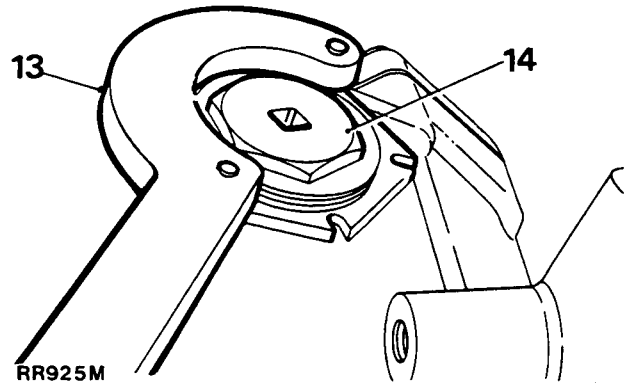
RR1695M

6. Slacken the grub screw retaining the rack pad adjuster.
7. Remove the rack pad adjuster.
8. Remove the sector shaft adjuster locknut.
9. Remove the sector shaft cover fixings.
10. Screw in the sector shaft adjuster until the cover is removed.
11. Slide out the sector shaft.



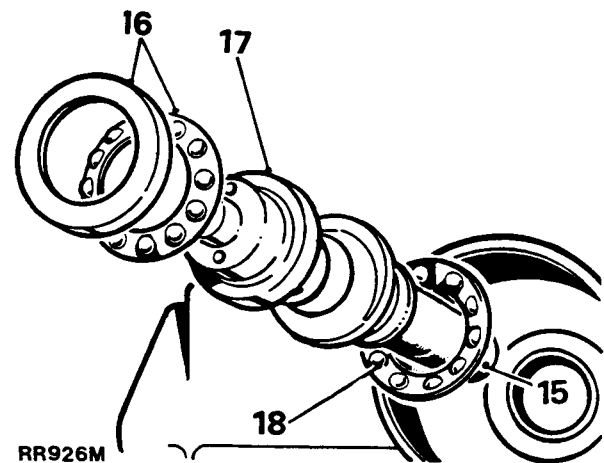
RR924M

12. Withdraw the piston, using a suitable bolt screwed into the tapped hole in the piston.
13. Remove the worm adjuster locknut using 'C' spanner, LST120.
14. Remove the worm adjuster using socket LST119.



RR925M

15. Tap the splined end of the spindle shaft to free the bearing.
16. Withdraw the bearing cup and caged ball bearing assembly.



RR926M

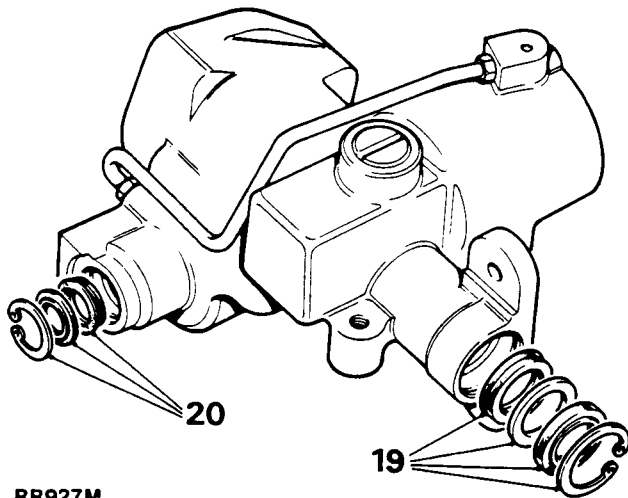
17. Withdraw the valve and worm assembly.
18. Withdraw the inner bearing ball race and shims. Retain the shims.

Continued

Steering box seals

19. Remove the circlip and seals from the sector shaft housing bore.

NOTE: Do not remove the sector bush unless replacement is required. Refer to instruction 22.



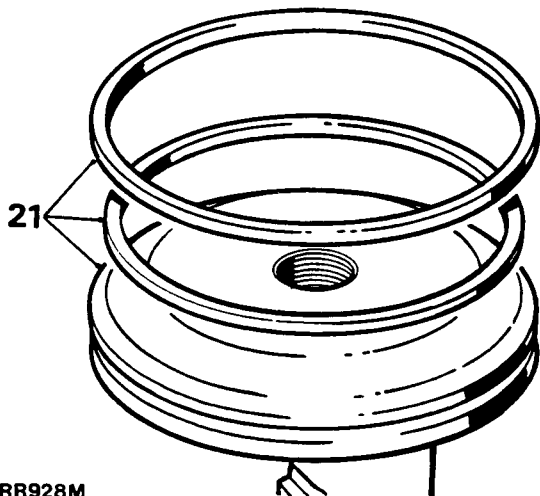
20. Remove the circlip and seals from the input shaft housing bore.

NOTE: Do not remove the input shaft needle bearing unless replacement is required.

Inspecting

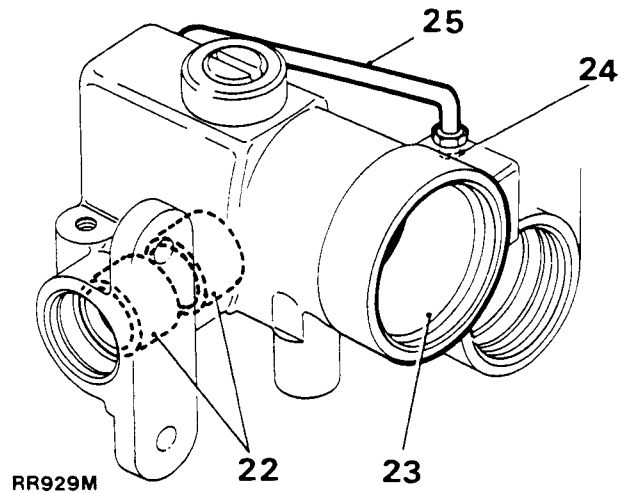
21. Discard all rubber seals and provide replacements.

NOTE: A rubber seal is fitted behind the plastic ring on the rack piston. Discard the seal also the plastic ring and provide replacements.



Steering box casing

22. If necessary, replace the sector shaft bush, using suitable tubing as a drift.
23. Examine the piston bore for traces of scoring and wear.

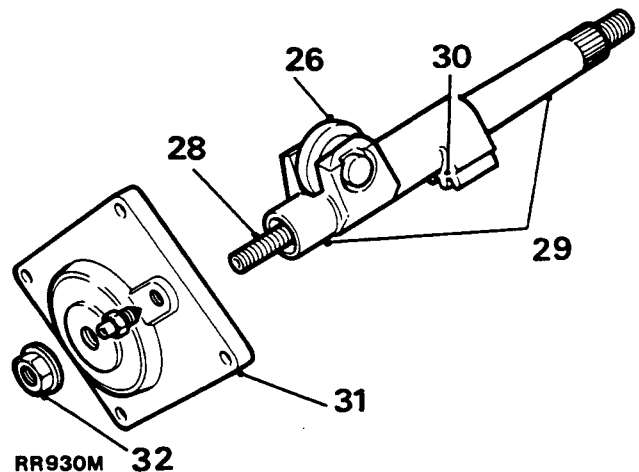


24. Examine the inlet tube seat for damage. If replacement is necessary this can be undertaken by using a suitable tap.

25. Examine the feed tube for signs of cracking.

Sector shaft assembly

26. Check that there is no side play on the rollers.
27. If excessive side play on the roller does exist renew the sector shaft.
28. Check the condition of the adjuster screw threads.
29. Examine the bearing areas on the shaft for excessive wear.
30. Examine the gear teeth for uneven or excessive wear.



RR928M

Sector shaft cover assembly

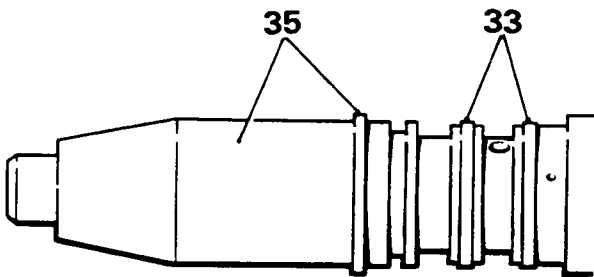
- 31. The cover, bush and seat are supplied as a complete assembly for replacement purposes.

Sector shaft adjuster locknut

- 32. The locknut functions also as a fluid seal and must be replaced at overhaul.

Valve and worm assembly

- 33. Examine the valve rings which must be free from cuts, scratches and grooves. The valve rings should be a loose fit in the valve grooves.

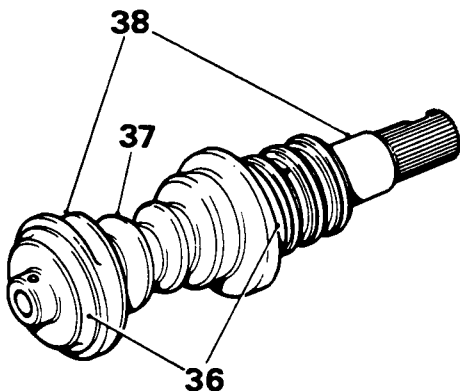


RR931M

- 34. Remove the damaged rings ensuring that no damage is done to the seal grooves.
- 35. If required, fit replacement rings, using the ring expander 606602. Both rings and tool may be warmed if found necessary. Use hot water for this purpose. Then insert into the ring compressor 606603 to cool.

NOTE: The expander will not pass over rings already fitted. These rings must be discarded to allow access then renewed.

- 36. Examine the bearing areas for wear. The areas must be smooth and not indented.



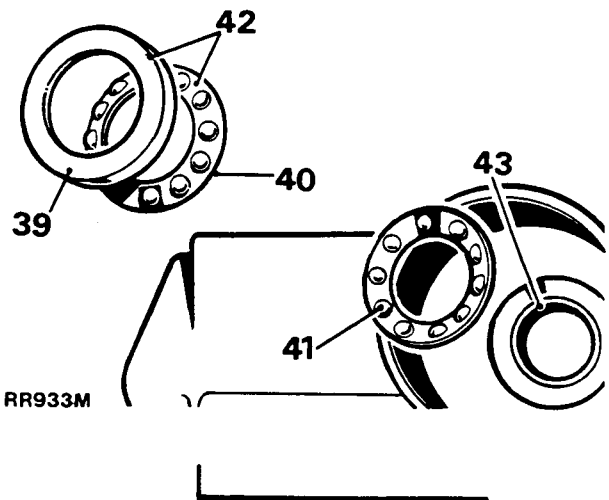
RR932M

- 37. Examine the worm track which must be smooth and not indented.
- 38. Check for wear on the torsion bar assembly pins; no free movement should exist between the input shaft and the worm.

NOTE: Any sign of wear makes it essential that the complete valve and worm assembly is renewed.

Ball bearing and cage assemblies

- 39. Examine the ball races and cups for wear and general condition.
- 40. If the ball cage has worn against the bearing cup, fit replacements.



RR933M

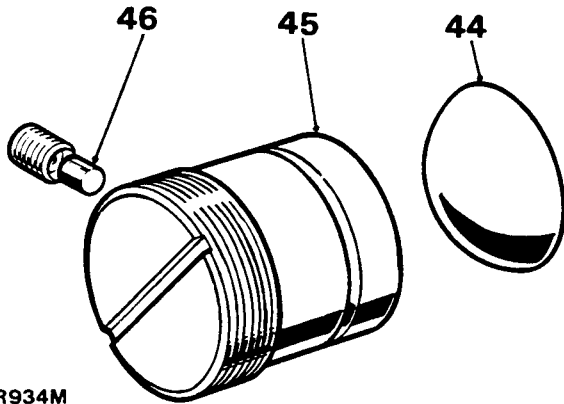
- 41. Bearing balls must be retained by the cage.
- 42. Bearings and cage repair are carried out by the complete replacement of the bearings and cage assembly.
- 43. To remove the inner bearing cup and shim washers, jar the steering box on the work bench, or use a suitable extractor.

NOTE: Should difficulty be experienced at this stage, warm the casing and the bearing assembly. Cool the bearing cup using a suitable mandrel and jar the steering box on the bench.

Continued

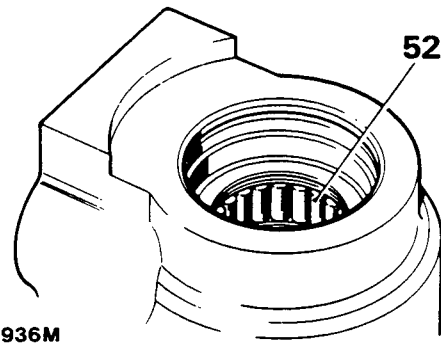
Rack thrust pad and adjuster

- 44. Examine the thrust pad for scores.
- 45. Examine the adjuster for wear in the pad seat.
- 46. Examine the nylon pad for distortion and adjuster grub screw assembly for wear.



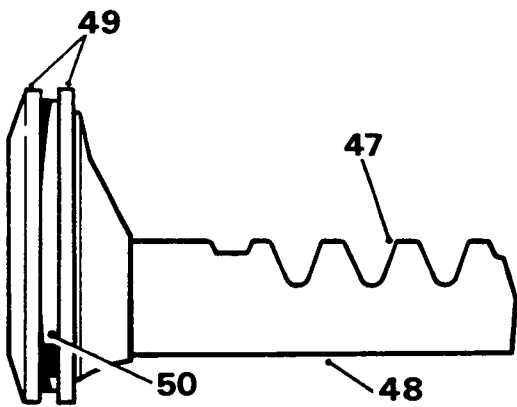
Input shaft needle bearing

- 52. If necessary, replace the bearing. The replacement must be fitted squarely in the bore (numbered face of the bearing uppermost). Then, carefully push the bearing in until it is flush with the top of the housing bore. Ideally, the bearing will be just clear of the bottom of the housing bore.



Rack and piston

- 47. Examine for excessive wear on the rack teeth.
- 48. Ensure the thrust pad bearing surface is free of scores and wear.



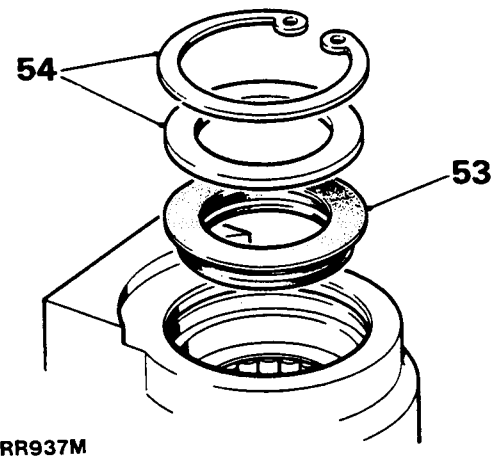
- 49. Ensure that the piston outer diameters are free from burrs and damage.
- 50. Examine the seal and ring groove for scores and damage.
- 51. Fit a new rubber ring to the piston. Warm the white nylon seal and fit this to the piston. Slide the piston assembly into the cylinder with the rack tube outwards. Allow to cool.

Reassemble

NOTE: When fitting replacement oil seals, these must be lubricated with recommended fluid. Also ensure that absolute cleanliness is observed during assembly.

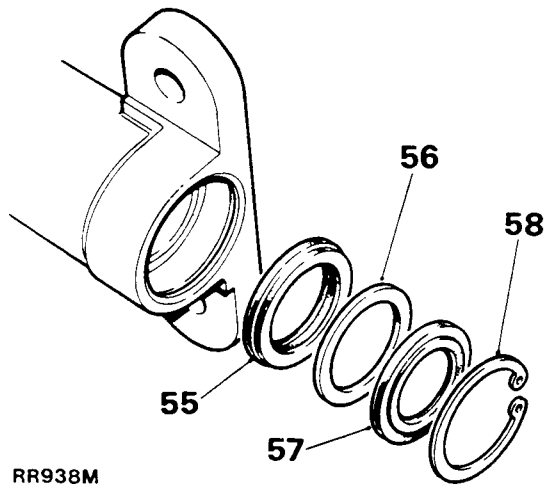
Input shaft oil seal

- 53. Fit the seal, lipped side first, into the housing. When correctly seated, the seal backing will lie flat on the bore shoulder.
- 54. Fit the extrusion washer and secure with the circlip.



Sector shaft seal

- 55. Fit the oil seal, lipped side first.
- 56. Fit the extrusion washer.
- 57. Fit the dirt seal, lipped side last.
- 58. Fit the circlip.



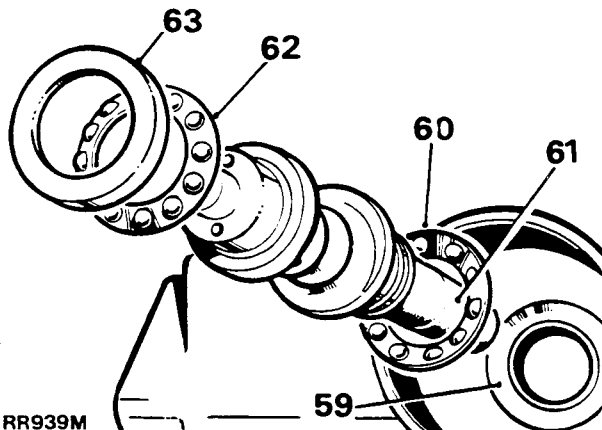
RR938M

Fitting the valve and worm assembly

- 59. If removed, refit the original shim washer(s) and the inner bearing cap. Only vaseline must be used as an aid to assembling the bearings.

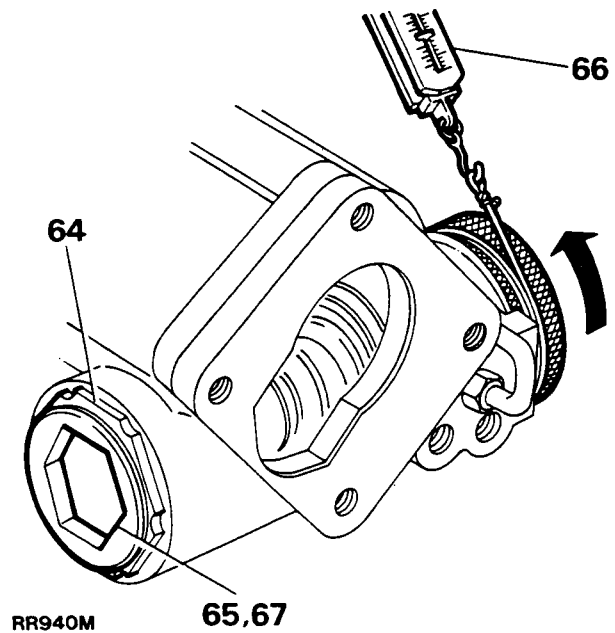
NOTE: If the original shims are not available, fit shim(s) of 0.76 mm (0.030 in) nominal thickness.

- 60. Fit the inner cage and bearings assembly.
- 61. Fit the valve and worm assembly, using seal saver R01015 to protect the input shaft seal.
- 62. Fit the outer cage and bearings assembly.
- 63. Fit the outer bearing cup.



RR939M

- 64. Renew the worm adjuster sealing ring and loosely screw the adjuster into the casing. Fit the locknut, but do not tighten.
- 65. Turn in the worm adjuster until the end-float at the input is almost eliminated.
- 66. Measure and record the maximum rolling distance of the valve and worm assembly, using a spring balance and cord coiled around the torque setting tool RO1016.
- 67. Turn in the worm adjuster to increase the figure recorded in instruction 66 by 1.8 to 2.2 kg (4 to 5 lb) at 1.250 in (31.7 mm) radius to settle the bearings, then back off the worm adjuster until the figure recorded in instruction 66 is increased by 0.9 to 1.3 kg (2 to 3 lb) only, with locknut tight. Use worm adjusting socket LST119 and 'C' spanner LST120.

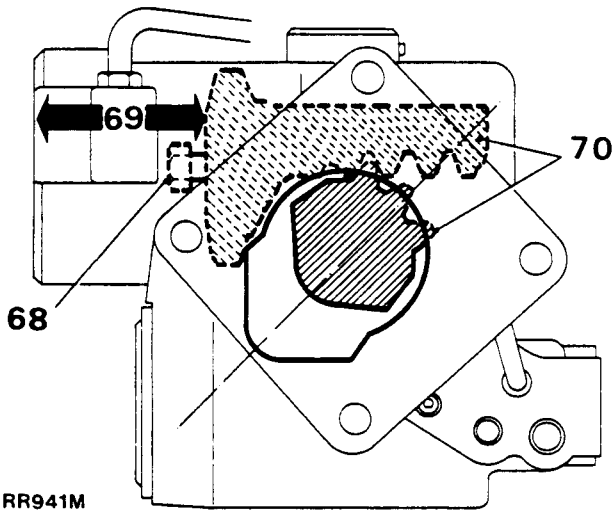


RR940M

Continued

Fitting the rack and piston

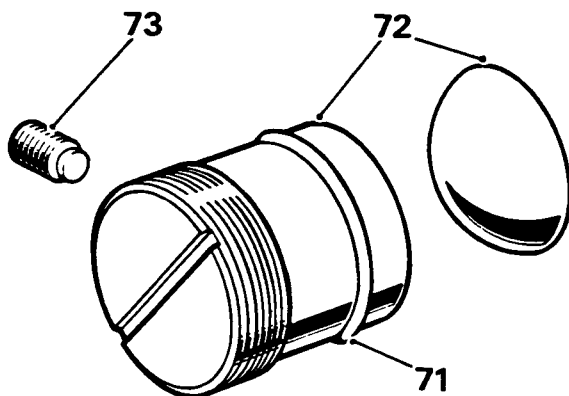
68. Screw a suitable bolt into the piston head for use as an assembly tool.



69. Fit the piston and rack assembly so that the piston is 63.5 mm (2.5 in) approximately from the outer end of the bore.
70. Feed in the sector shaft using seal saver 606604 aligning the centre gear pitch on the rack with the centre gear tooth on the sector shaft. Push in the sector shaft, and, at the same time rotate the input shaft about a small arc to allow the sector roller to engage the worm.

Fitting the rack adjuster

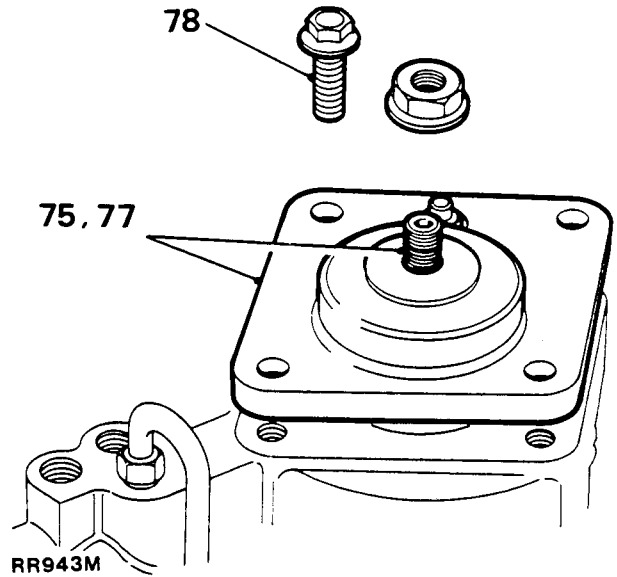
71. Fit the sealing ring to the rack adjuster.
72. Fit the rack adjuster and thrust pad to engage the rack. Back off a half turn on the adjuster.
73. Loosely fit the nylon pad and adjuster grub screw assembly to engage the rack adjuster.
73. Loosely fit the nylon pad and adjuster grub screw assembly to engage the rack adjuster.



RR942M

Fitting the sector shaft cover

74. Fit the sealing ring to the cover.
75. Screw the cover assembly fully on to the sector shaft adjuster screw.



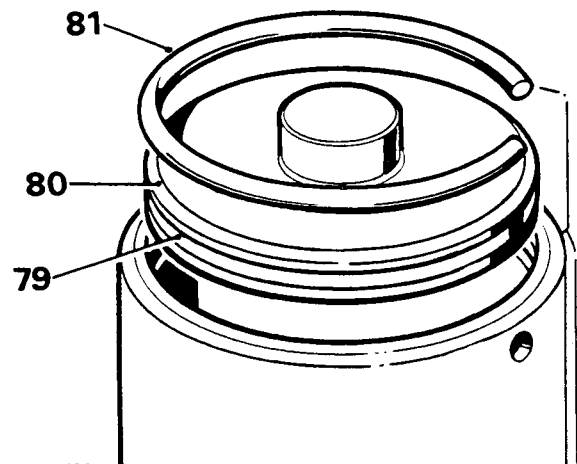
76. Position the cover on to the casing.
77. Tap home the cover. If necessary back off on the sector shaft adjuster screw to allow the cover to joint fully with the casing.

NOTE: Before tightening the fixings, rotate the input shaft about a small arc to ensure that the sector roller is free to move in the valve worm.

78. Fit the cover fixings and tighten to the correct torque.

Fitting the cylinder cover

79. Fit the square section seal to the cover.
80. Remove the slave bolt and press the cover into the cylinder just sufficient to clear the retainer ring groove.

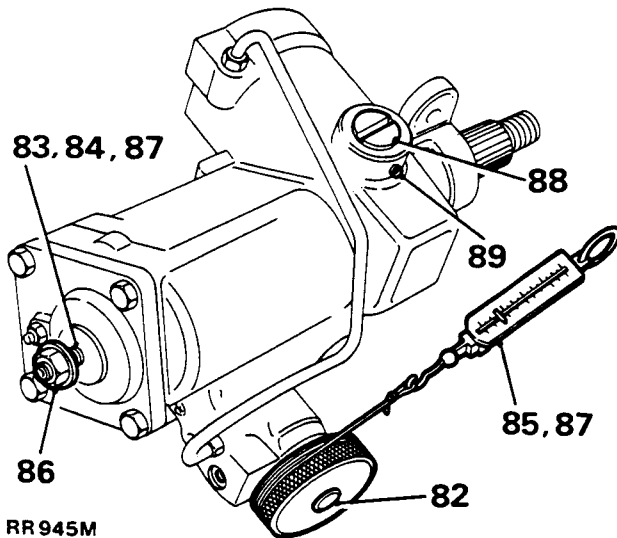


RR944M

81. Fit the retainer ring to the groove with one end of the ring positioned 12 mm (0.5 in) approximately from the extractor hole.

Adjusting the sector shaft

82. Set the worm on centre by rotating the input shaft half the total number of turns from either lock.



RR945M

83. Rotate the sector shaft adjusting screw anti-clockwise to obtain backlash between the input shaft and the sector shaft.
84. Rotate the sector shaft adjusting screw clockwise until the backlash is just eliminated.
85. Measure and record the maximum rolling resistance at the input shaft, using a spring balance, cord and torque tool R01016.
86. Hold still the sector shaft adjuster screw and loosely fit a new locknut.
87. Turn in the sector shaft adjuster screw until the figure recorded in instruction 88 is increased by 0.9 to 1.3 kg (2 to 3 lb) with the locknut tightened.

Adjusting the rack adjuster

88. Turn in the rack adjuster to increase the figure recorded in 90 by 0.9 to 1.3 kg (2 to 3 lb). **The final figure may be less than but must not exceed 7.25 kg (16 lb).**
89. Lock the rack adjuster in position with the grub screw.

Torque peak check

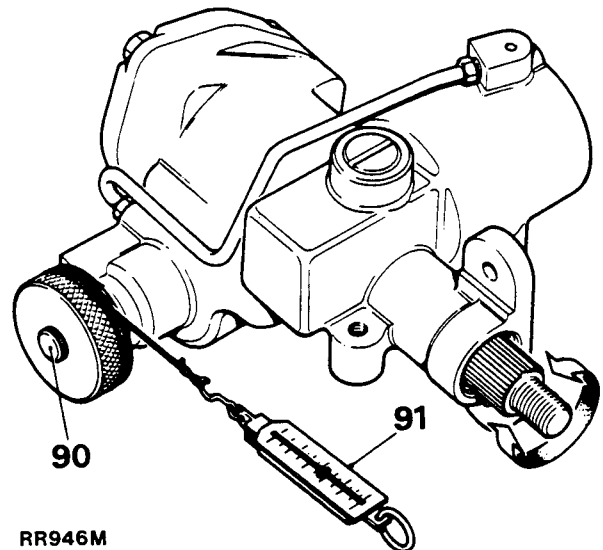
With the input shaft rotated from lock-to-lock, the rolling resistance torque figures should be greatest across the centre position (1½ turns approximately from full lock) and equally disposed about the centre position.

The condition depends on the value of shimming fitted between the valve and worm assembly inner bearing cup and the casing. The original shim washer value will give the correct torque peak position unless major components have been replaced.

NOTE: During the following 'Procedure', the stated positioning and direction of the input shaft applies for both LH and RH boxes. However, the procedure for shim adjustment where necessary, differs between LH and RH steering boxes and is described under the applicable LH stg. and RH stg. headings.

Procedure

90. With the input coupling shaft toward the operator, turn the shaft fully anti-clockwise.
91. Check the torque figures obtained from lock-to-lock using a spring balance cord and torque tool R01016.



RR946M

Adjustments

92. Note where the greatest figures are recorded relative to the steering position. If the greatest figures are not recorded across the centre of travel (i.e. steering straight-ahead position), adjust as follows:

LH steering models. If the torque peak occurs **before** the centre position, add to the shim washer value; if the torque peak occurs **after** the centre position, **subtract** from the shim washer value.

RH steering models. If the torque peak occurs **before** the centre position, subtract from the shim washer value; if the torque occurs **after** the centre position, **add** to the shim washer value.

Shim washers are available as follows:

0.03 mm, 0.07 mm, 0.12 mm and 0.24 mm (0.0015 in, 0.003 in, 0.005 in and 0.010 in).

NOTE: Adjustment of 0.07 mm (0.003 in) to the shim value will move the torque peak area by ¼ turn approximately on the shaft.

93. Fit the drop arm to the steering box using a new tab washer. Tighten the nut to the correct torque and bend over tab.
94. Refit the steering box to the vehicle.
95. Replenish the system with the correct grade of fluid. Refer to Recommended Lubricants and Power Steering System—bleed.
96. Test the system for leaks, with the engine running, by holding the steering hard on full lock in both directions.

NOTE: Do not maintain this pressure for more than 30 seconds in any one minute to avoid overheating the fluid and possibly damaging the seals.

97. Road test the vehicle.

5. Ensure that the fluid level is in alignment with the mark on the reservoir.
6. Wipe off all fluid released during bleeding.
7. Check all hose joints, pump and steering box for fluid leaks under pressure by holding the steering hard on full lock in both directions.

CAUTION: Do not maintain this pressure for more than 30 seconds in any one minute, to avoid causing the oil to overheat and possible damage to the seals. The steering should be smooth lock-to-lock in both directions, that is, no heavy or light spots when changing direction when the vehicle is stationary.

8. Carry out a short road test. If necessary, repeat the complete foregoing procedure.

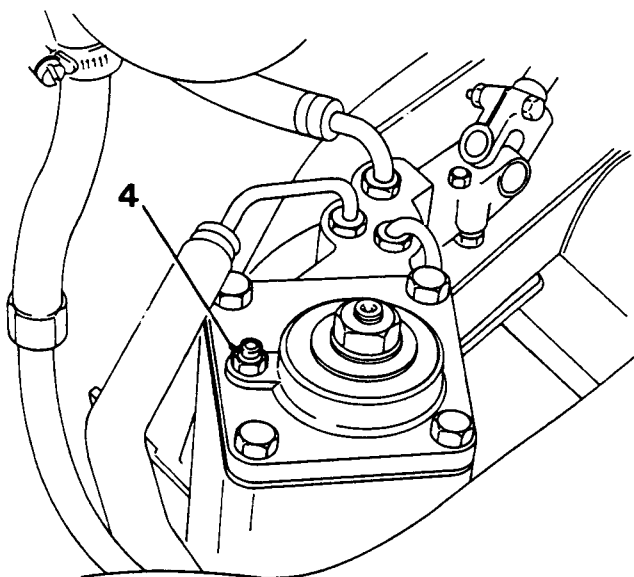
POWER STEERING SYSTEM

Bleed

1. Fill the steering fluid reservoir to the mark on the side of the reservoir with one of the recommended fluids.
2. Start and run the engine until it attains normal operating temperature.
3. Check and correct the reservoir fluid level.

NOTE: During the carrying out of items 4, 5 and 6, ensure that the steering reservoir is kept full. Do not increase the engine speed or move the steering wheel.

4. Run the engine at idle speed, slacken the bleed screw. When fluid seepage past the bleed screw is observed, retighten the screw.



RR947M

POWER STEERING SYSTEM

Test

If there is a lack of power assistance for the steering the pressure of the hydraulic pump should be checked first before renewing any components of the system. The fault diagnosis chart should also be used to assist in tracing faults in the power steering system.

Procedure

1. The hydraulic pressure test gauge is used for testing the power steering system. This gauge is calibrated to read up to 140 kgf/cm² (2000 lbf/in²) and the normal pressure which may be expected in the power steering system is 77 kgf/cm² (1100 lbf/in²).
2. Under certain fault conditions of the hydraulic pump it is possible to obtain pressures up to 105 kgf/cm² (1500 lbf/in²). Therefore, it is important to realise that the pressure upon the gauge is in direct proportion to the pressure being exerted upon the steering wheel. When testing, apply pressure to the steering wheel very gradually while carefully observing the pressure gauge.
3. Check, and if necessary replenish, the fluid reservoir.
4. Examine the power steering units and connections for leaks. All leaks must be rectified before attempting to test the system.
5. Check the steering pump drive belt for condition and tension, rectify as necessary.
6. Assemble the test equipment and fit to the vehicle.
7. Open the tap in the adaptor.
8. Bleed the system but exercise extreme care when carrying out this operation so as not to overload the pressure gauge.

9. With the system in good condition, the pressures should be as follows:
- Steering wheel held hard on full lock and engine running at 1,000 rev/min, the pressure should be 70 to 77 kgf/cm² (1000 to 1100 lbf/in²).
 - With the engine idling and the steering wheel held hard on full lock, the pressure should be 28 kgf/cm² (400 lbf/in²) minimum.

These checks should be carried out first on one lock, then on the other.

CAUTION: Under no circumstances must the steering wheel be held on full lock for more than 30 seconds in any one minute, otherwise there will be a tendency for the oil to overheat and possible damage to the seals may result.

- Release the steering wheel and allow the engine to idle. The pressure should be 7 kgf/cm² (100 lbf/in²).
- If the pressures recorded during the foregoing test are outside the specified range, or pressure imbalance is recorded, a fault exists in the system. To determine if the fault is in the steering box or the pump, close the adaptor tap for a period not exceeding five seconds.
- If the gauge fails to register the specified pressure, the pump is inefficient and the pump relief valve should be examined and renewed as necessary.
- Repeat the foregoing test after renewing the relief valve and bleeding the system. If the pump still fails to achieve the specified pressures, the pump should be overhauled or a new unit fitted.
- If pump delivery is satisfactory and low pressure or marked imbalance exists, the fault must be in the steering box valve and worm assembly.

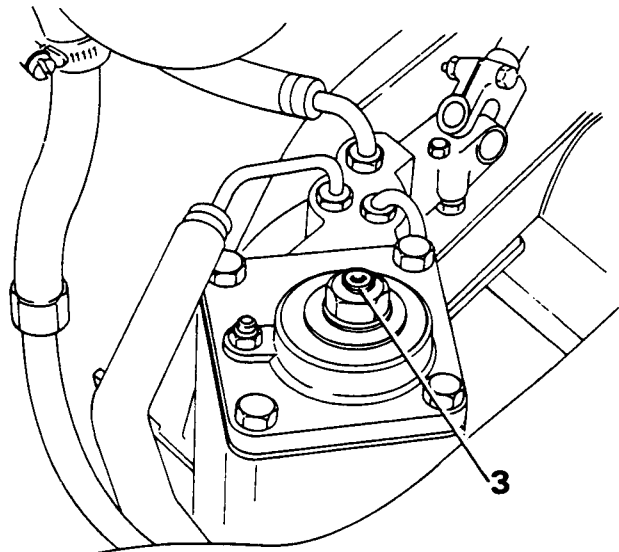
ADJUST POWER STEERING BOX

NOTE: The condition of adjustment which must be checked is one of minimum backlash without overtightness when the wheels are in the straight-ahead position.

- Jack up the front of the vehicle until the wheels are clear of the ground.

WARNING: Wheels must be chocked in all circumstances.

- Gently rock the steering wheel about the straight-ahead position to obtain the 'feel' of the backlash present. This backlash must not be more than 9.5 mm (0.375 in).
- Continue the rocking action whilst an assistant slowly tightens the steering box adjuster screw after slackening the locknut until the rim movement is reduced to 9.5 mm (0.375 in) maximum.



RR1563M

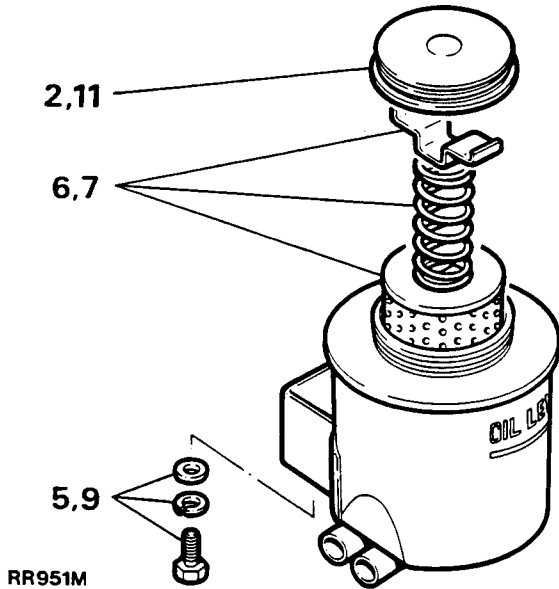
- Tighten the locknut, then turn the steering wheel from lock to lock and check that no excessive tightness exists at any point.
- Lower the vehicle to ground level and remove the wheel chocks.
- Road test the vehicle.

POWER STEERING FLUID RESERVOIR

Remove and refit

Removing

1. Prop open the bonnet.
2. Remove the reservoir filler cap.



3. Disconnect the return hose from the steering box. Drain the fluid completely from the reservoir.

CAUTION: It is most important that this fluid is not re-used.

4. Refit the return hose to the steering box.
5. Remove the fixings attaching the reservoir to the wing valance. Disconnect the flexible hoses and withdraw the reservoir.

NOTE: If the reservoir is not to be refitted immediately, the hoses must be sealed to prevent the ingress of foreign matter.

6. Depress the spring retainer and withdraw the filter element.

Refitting

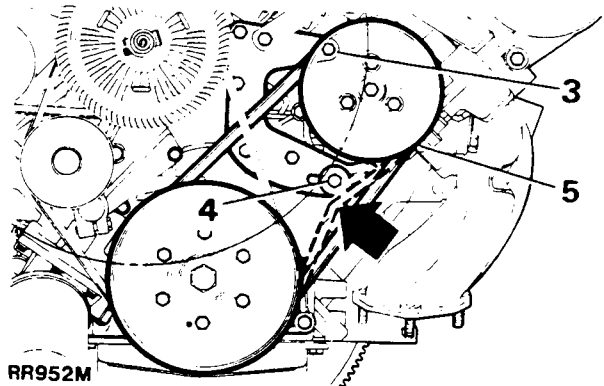
7. Fit a new filter element.
8. Refit and tighten the fixings attaching the reservoir to the wing valance.
9. Reconnect the flexible hoses to the reservoir. Tighten the clips.
10. Fill the reservoir to the prescribed level with one of the recommended fluids (Section 09) and bleed the power steering system. See power steering system—bleed.
11. Fit the reservoir filler cap.
12. Close the bonnet.

POWER STEERING PUMP DRIVE BELT

Adjust

Procedure

1. Prop open the bonnet.
2. Check, by thumb pressure, the belt tension between the crankshaft and the pump pulley. There should be a free movement of between 11 to 14 mm (0.437 to 0.562 in). If adjustment is necessary, proceed as follows:
 3. Slacken the nut securing the pump mounting bracket to the cylinder head.



4. Slacken the bolt securing the pump lower bracket to the slotted adjustment link.
5. Pivot the pump as necessary and adjust until the correct belt tension is obtained.
6. Maintaining the tension, tighten the pump adjusting bolt and the top pivot nut.

NOTE: Check the alternator drive belt tension after adjusting the power steering pump belt.

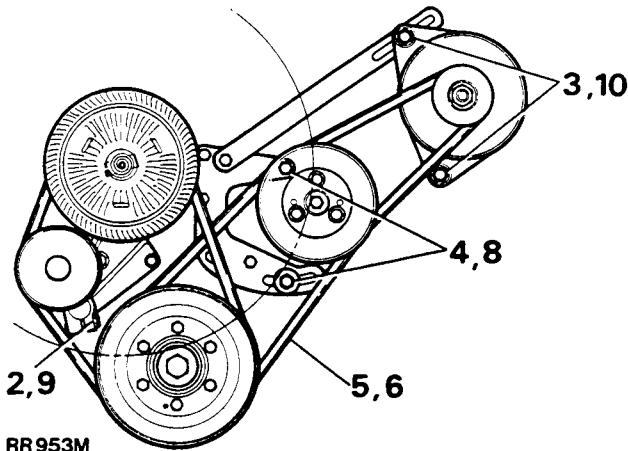
7. Close the bonnet.

POWER STEERING PUMP DRIVE BELT

Remove and refit

Removing or preparing for the fitting of a new belt

1. Prop open the bonnet.
2. Slacken the jockey pulley bolt and remove the fan belt.
3. Slacken the alternator mountings and remove the drive belt.
4. Slacken the power steering pump mountings.
5. Pivot the pump and remove the drive belt.



RR953M

Refitting

6. Locate the driving belt over the crankshaft and pump pulleys.
7. Adjust the position of the pump to give a driving belt tension of 11 to 14 mm (0.437 to 0.562 in) movement when checked by thumb pressure midway between the crankshaft and pump pulleys.
8. Maintaining the tension, tighten the pump adjusting bolt and the top pivot nut.
9. Refit the fan belt and adjust the tension to give 11 to 14 mm (0.437 to 0.562 in) movement when checked by thumb pressure midway between the crankshaft and water pump pulleys.
10. Refit the alternator drive belt and adjust to give 11 to 14 mm (0.437 to 0.562 in) movement when checked midway between the power steering pump and alternator pulleys.

NOTE: Whenever a new belt is fitted, it is most important that its adjustment is rechecked after approximately 1.500 km (1,000 miles) running.

11. Close the bonnet.

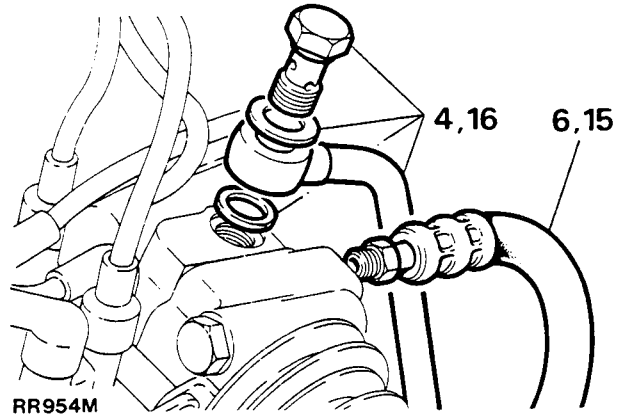
POWER STEERING PUMP

Remove and refit

Removing

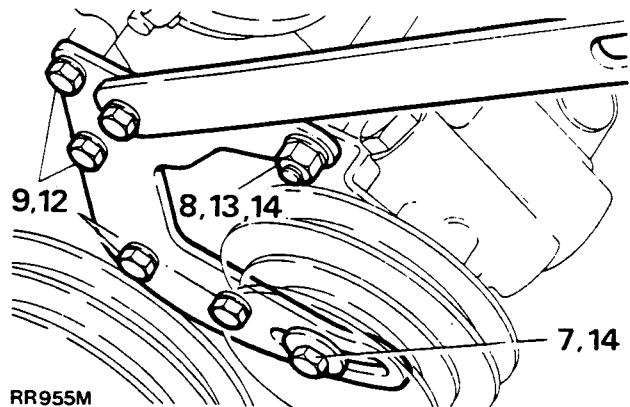
1. Prop open the bonnet.
2. Remove the alternator.
3. Remove the filler cap from the power steering fluid reservoir.
4. Disconnect the inlet hose from the pump, retaining the copper crimp washer and rubber gasket. Drain the fluid into a suitable container and blank off the orifices against the ingress of dirt.

CAUTION: Under no circumstances must the fluid be re-used.



RR954M

5. Replace the reservoir filler cap.
6. Disconnect the outlet hose from the pump. Blank off the orifices to prevent ingress of foreign matter.
7. Slacken and remove the adjuster bolt below the pulley.
8. Slacken and remove the nut on the front mounting bracket.
9. Remove four bolts and withdraw the front mounting bracket complete with the alternator adjusting link.
10. Slide off the power steering pump.



RR955M

Refitting

11. Offer up the power steering pump, locating the driving belt over the pulley.
12. Refit the pump mounting bracket and tighten the four bolts.
13. Refit the nut to the front mounting bracket.
14. Adjust the position of the pump to give a driving belt tension of 11 to 14 mm (0.437 to 0.562 in) movement when checked by thumb pressure midway between the crankshaft and pump pulleys. Fit and tighten the pump adjuster bolt below the pulley, also tighten the nut at the front mounting bracket.
15. Remove the blank and reconnect the outlet hose to the pump.

Continued

16. Replace the square sectioned rubber gasket to the groove around the inlet port and replace the inlet hose to the pump. Tighten the union bolt to the correct torque.
17. Fit the alternator, fit and adjust the drive belt to the correct tension.
18. Remove the filler cap from the steering fluid reservoir.
19. Fill the steering fluid reservoir to the level mark with one of the recommended fluids (Section 09).
20. Replace the filler cap.
21. Bleed the power steering system.
22. Test the steering system for leaks with the engine running, by holding the steering hard on full lock in both directions.

CAUTION: Do not maintain this pressure for more than 30 seconds in any one minute, to avoid causing the oil to overheat and possible damage to the seals.

23. Close the bonnet.
24. Road test the vehicle.

POWER STEERING PUMP OVERHAUL—Series 30

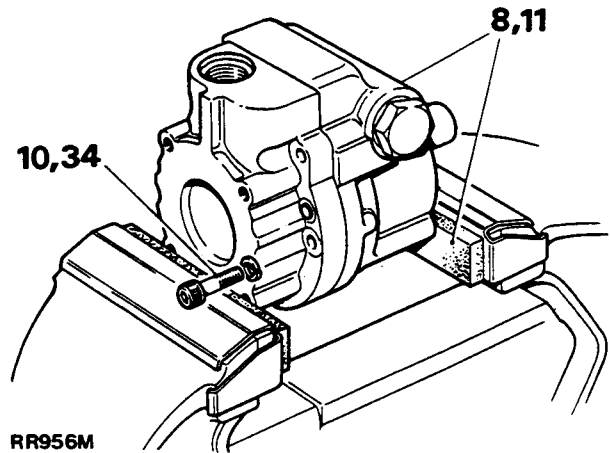
Dismantle

1. Remove the steering pump from the vehicle.
2. Clean the exterior of the pump and drain off any oil.
3. Remove the bolt, spring washer and large plain washer securing the pulley to the pump shaft.
4. Using a suitable puller, withdraw the pulley. Do not attempt to hammer the shaft from the pulley, or lever the pulley from the shaft, as this may cause internal damage.
5. Withdraw the square key from the shaft.
6. Remove the four bolts and spring washers securing the bearing retainer plate and front mounting plate to the pump body. Remove the plates.
7. Remove the three bolts and spring washers securing the rear mounting plate to the pump body and remove the plate.
8. Clamp the pump body in a vice, ensuring that the jaws are protected.
9. Remove the blank from the inlet port.

NOTE: The tubular steel venturi flow director under the inlet adaptor is pressed into the cover and should not be removed.

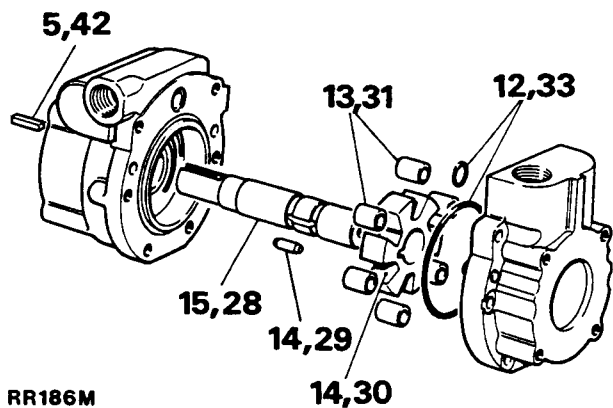
10. Remove the six Allen screws securing the cover to the pump body. Separate the cover from the body vertically to prevent the parts falling out.
11. Remove the pump from the vice.
12. Remove the 'O' ring seals from the grooves in the pump body.
13. Carefully tilt the pump body, and remove the six rollers.

14



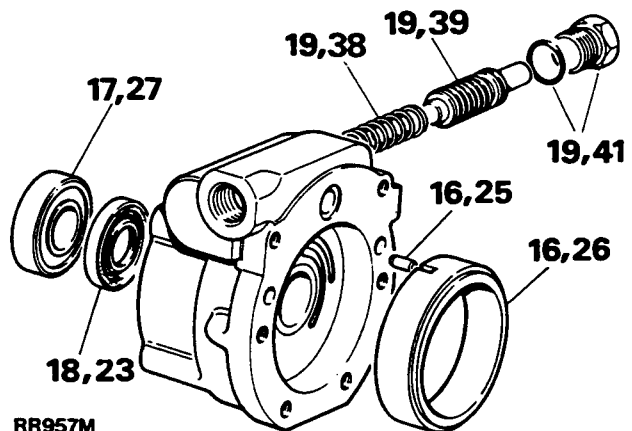
RR956M

14. Draw the carrier off the shaft, and remove the drive pin.
15. Remove the shaft from the body.
16. Remove the cam and the cam lock peg from the pump body.



RR186M

17. If necessary withdraw the sealed bearing from the shaft.
18. Remove the shaft seal from the body, ensuring that no damage is caused to the shaft bushing.
19. Remove the valve cap, 'O' ring, valve and valve spring from the body. Place all parts where they will not be damaged, or subject to contamination.



RR957M

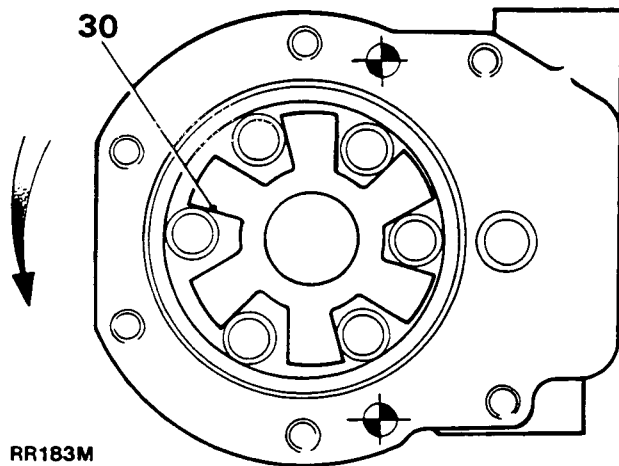
Inspection

20. Wash all parts in a suitable solvent, air dry, or wipe clean with a lint-free cloth if air is not available.
21. Check the pump body and cover for wear. Renew either part, if faces or bushes are worn.
22. Check the pump shaft around the drive pin slot. Remove any burrs.

NOTE: Ensure that the aluminium restrictor in the output port is thoroughly cleaned but not dislodged.

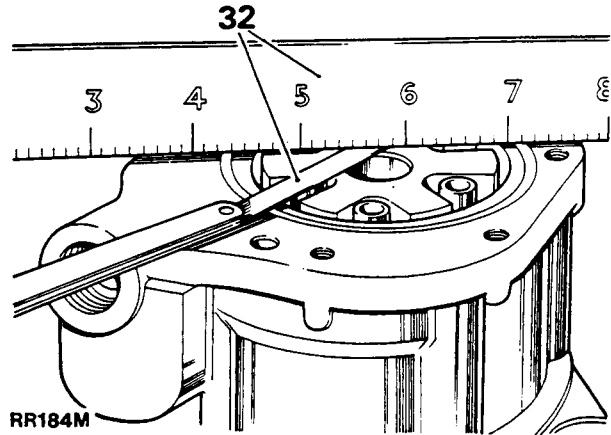
Reassemble

23. Carefully examine a new shaft seal to ensure that it is clean and undamaged. Smear the sealing lips with grease and apply a fine smear of 'Wellseal' to the pump body where the outside diameter of the oil seal locates (applies to metal cased seals). Place the seal square to the housing recess with the lip towards the inside of the housing.
24. Press the seal into position approximately 0.80 mm ($\frac{1}{32}$ in) below the seal housing face, ensuring that it does not tilt.
25. Replace the cam lock peg into the location in the body.
26. Renew the cam if worn or damaged. Refit the cam, ensuring that it seats correctly in the body and that the slot locates over the locking peg.
27. Fit a new sealed bearing onto the pump shaft.
28. Insert the shaft and bearing assembly into the seal side of the body.
29. Refit the carrier drive pin in the shaft.
30. Inspect the carrier and replace in position, ensuring that the greater angle on the carrier teeth is in the leading position as illustrated.



31. Inspect the rollers, paying particular attention to the finish on the end. Renew the rollers if scored, damaged or oval. Refit the rollers to the carrier.

32. Using a straight edge across the cam surface, and a feeler gauge, check the end clearance of the carrier and rollers in the pump body. If the end clearance is more than 0.05 mm (0.002 in) renew the carrier and rollers.



33. Smear a fine trace of Loctite 275 to the pump body in a 'figure of 8' outside the 'O' rings and inside the bolt holes. Install new 'O' rings to the body of the pump.
34. Refit the cover on the pump body and secure with six Allen screws and spring washers.
35. Tighten the Allen screws, in diagonal sequence, checking that the shaft rotates freely and does not bind. Finally, tighten to the correct torque.
36. Refit the rear mounting plate to the pump body and secure with three bolts and spring washers.
37. Refit the front mounting plate and the bearing retainer plate to the pump body and secure with four bolts and spring washers.
38. Refit the flow control valve spring in the bore. The spring tension should be 8 to 9 lbf (11 to 12 Nm) at 21 mm (0.820 in). If not, renew the spring.
39. Replace the valve in the bore, inserting the valve so that the exposed ball end enters last. Ensure that the valve is not sticking.
40. Renew the 'O' ring on the valve cap and assemble in the pump. Tighten the cap to the correct torque.
41. Refit the pulley key.
42. Refit the pulley to the shaft and secure with the special washer, spring and washer and bolt. Tighten the bolt to the correct torque.
43. Refit the steering pump to the vehicle.

POWER STEERING

FAULT DIAGNOSIS

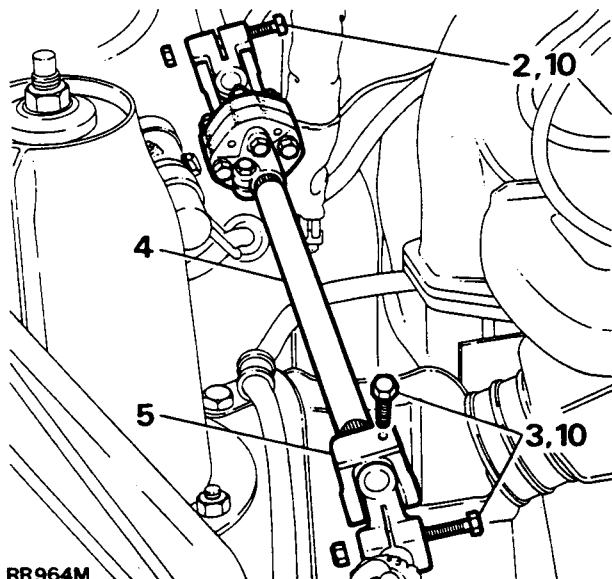
| SYMPTOM | CAUSE | TEST ACTION | CURE | | | | | | | | | | | | | |
|--|--|--|---|---------------------------------|---|-------------------|---------------------------------------|--|--|--|--|--|---|--|---|--|
| INSUFFICIENT POWER ASSISTANCE WHEN PARKING | (1) Lack of fluid (2) Engine idling speed too low (3) Driving belt slipping (4) Defective hydraulic pump and/or pressure relief valve | Check hydraulic fluid tank level Try assistance at fast idle Check belt tension (a) Fit pressure gauge between high pressure hose and steering pump, with steering held hard on full lock, see Note 1 below, and 'Power steering system test' (b) Release steering wheel and allow engine to idle. See 'Power steering system test' | If low, fill and bleed the system If necessary, reset idle speed Adjust the driving belt If pressure is outside limits (high or low) after checking items 1 and 3, see Note 2 below If pressure is greater, check steering box for freedom and self-centring action | | | | | | | | | | | | | |
| POOR HANDLING WHEN VEHICLE IS IN MOTION | Lack of castor action Steering too light and/or over-sensitive | This is caused by over-tightening the rocker shaft backlash adjusting screw on top of steering box Check for loose torsion bar fixings on steering box valve and worm assembly | It is most important that this screw is correctly adjusted. See instructions governing adjustment Fit new valve and worm assembly | | | | | | | | | | | | | |
| HYDRAULIC FLUID LEAKS | Damaged pipework, loose connecting unions, etc. | Check by visual inspection; leaks from the high pressure pipe lines are best found while holding the steering on full lock with engine running at fast idle speed (see Note 1 below) Check 'O' rings on pipework (Leaks from the steering box tend to show up under low pressure conditions, that is, engine idling and no pressure on steering wheel) | Tighten or renew as necessary Renew as necessary | | | | | | | | | | | | | |
| EXCESSIVE NOISE | (1) If the high pressure hose is allowed to come into contact with the body shell, or any component not insulated by the body mounting, noise will be transmitted to the car interior (2) Noise from hydraulic pump | Check the loose runs of the hoses Check oil level and bleed system | Alter hose route or insulate as necessary If no cure, change hydraulic pump | | | | | | | | | | | | | |
| <p>Note 1. Never hold the steering wheel on full lock for more than 30 seconds in any one minute, to avoid causing the oil to overheat and possible damage to the seals.</p> <p>Note 2. High pressure — In general it may be assumed that excessive pressure is due to a faulty relief valve in the hydraulic pump. Low pressure — Insufficient pressure may be caused by one of the following:</p> <table style="margin-left: 40px;"> <tr> <td>1. Low fluid level in reservoir</td> <td rowspan="2">} Most usual cause of insufficient pressure</td> </tr> <tr> <td>2. Pump belt slip</td> </tr> <tr> <td>3. Leaks in the power steering system</td> <td></td> </tr> <tr> <td>4. Faulty relief valve in the hydraulic pump</td> <td></td> </tr> <tr> <td>5. Fault in steering box valve and worm assembly</td> <td></td> </tr> <tr> <td>6. Leak at piston sealing in steering box</td> <td></td> </tr> <tr> <td>7. Worn components in either steering box or hydraulic pump</td> <td></td> </tr> </table> | | | | 1. Low fluid level in reservoir | } Most usual cause of insufficient pressure | 2. Pump belt slip | 3. Leaks in the power steering system | | 4. Faulty relief valve in the hydraulic pump | | 5. Fault in steering box valve and worm assembly | | 6. Leak at piston sealing in steering box | | 7. Worn components in either steering box or hydraulic pump | |
| 1. Low fluid level in reservoir | } Most usual cause of insufficient pressure | | | | | | | | | | | | | | | |
| 2. Pump belt slip | | | | | | | | | | | | | | | | |
| 3. Leaks in the power steering system | | | | | | | | | | | | | | | | |
| 4. Faulty relief valve in the hydraulic pump | | | | | | | | | | | | | | | | |
| 5. Fault in steering box valve and worm assembly | | | | | | | | | | | | | | | | |
| 6. Leak at piston sealing in steering box | | | | | | | | | | | | | | | | |
| 7. Worn components in either steering box or hydraulic pump | | | | | | | | | | | | | | | | |

COUPLING SHAFT AND UNIVERSAL JOINTS

Remove and refit

Removing

1. Note the position of the steering wheel spokes.
2. Remove one pinch bolt from the top universal joint to the steering column.



RR964M

3. Remove two pinch bolts from the lower universal joint.
4. Withdraw the shaft and universal joints.
5. Withdraw the lower universal joint from the shaft.

NOTE: Do not dismantle the upper coupling joint. The steering shaft, rubber coupling and top universal joint is only available as an assembly.

Refitting

6. Position the lower universal joint on the shaft.
7. Offer the shaft assembly to the steering column, aligning the pinch bolt hole with the flat on the column.
8. Position the steering wheel as noted in 1.
9. Fit the lower universal joint to the steering box shaft.
10. Fit the pinch bolts, and tighten to the correct torque.

STEERING COLUMN

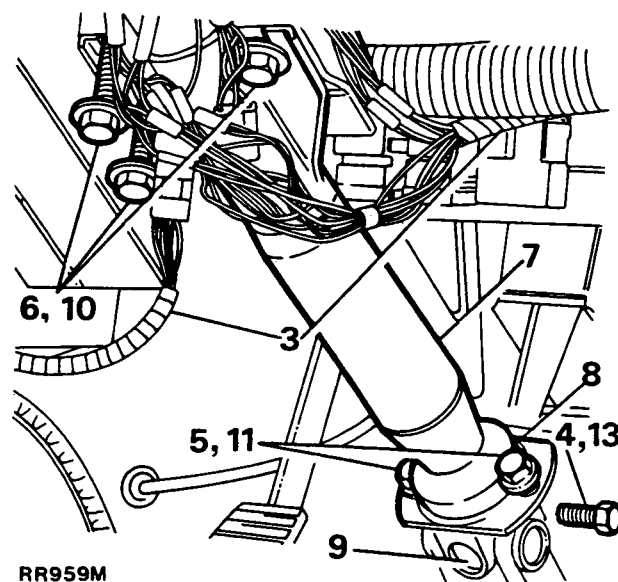
Remove and refit

Service tool: 18G1014 Extractor for steering wheel

IMPORTANT: The steering column is of a 'safety' type and incorporates shear pins. Therefore do not impart shock loads to the steering column at any time.

Removing

1. Remove the steering wheel using extractor 18G1014.
2. Remove the lower fascia panel, driver's side.
3. Disconnect the electrical leads from the steering column switches.



RR959M

4. Remove the top pinch bolt, universal joint to steering column.
5. Remove the fixings, steering column to toe board.
6. Remove the fixings, steering column to dash bracket.
7. Withdraw the steering column assembly.

Refitting

8. Position the sealing gasket on the end of the column assembly.
9. Feed the steering shaft through the tow board and engage the drive splines at the coupling shaft.
10. Loosely fit the column upper fixings.
11. Loosely fit the column lower fixings.
12. Tighten upper and lower fixings.
13. Fit universal joint pinch bolt, and tighten to the correct torque.
14. Reverse 1 to 3.

STEERING COLUMN ASSEMBLY

Overhaul

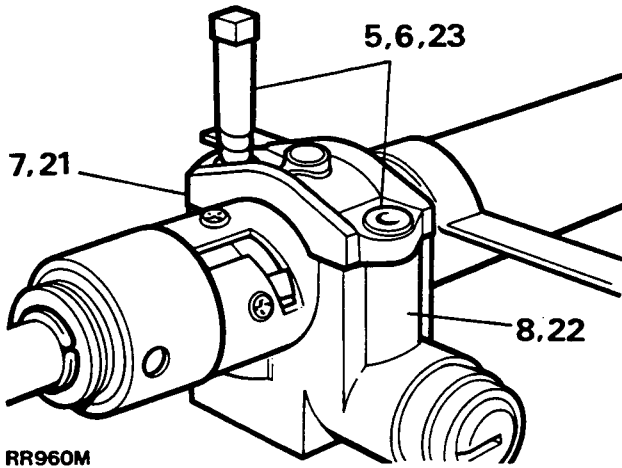
1. Remove the steering column assembly.

Dismantling

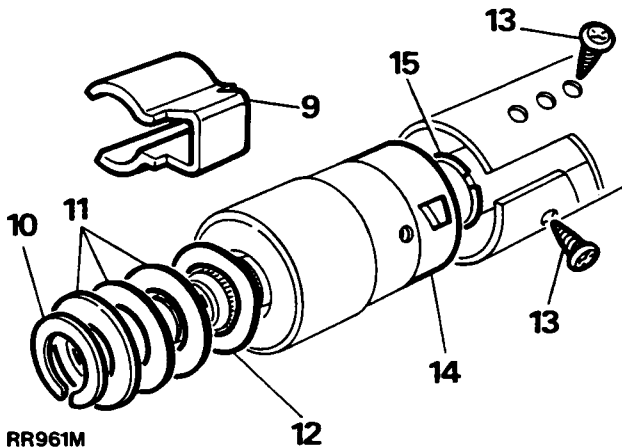
2. Remove the lighting switch from the lower shroud.
3. Remove the direction indicator switch from the column assembly.
4. Remove the wiper/washer switch from the column assembly.

Removing the steering column lock assembly, 5 to 8

5. Drill a hole in each sheared bolt to accept an 'easy-out' extractor.



6. Remove the sheared bolts.
7. Detach the end cap.
8. Withdraw the column lock assembly.
9. Lift off the cam for the self-cancelling switch from the column.



Removing the top bearing assembly, 10 to 15

10. Remove the circlip.
11. Withdraw the thrust washer and shim washer(s).
12. Withdraw the wave washer.
13. Remove the fixings, top bearing assembly to steering column.
14. Withdraw the top bearing assembly.
15. Remove the retaining ring from groove in the steering column.
16. If required, renew the mesh cover, using heat fusing to join together the replacement cover edges.

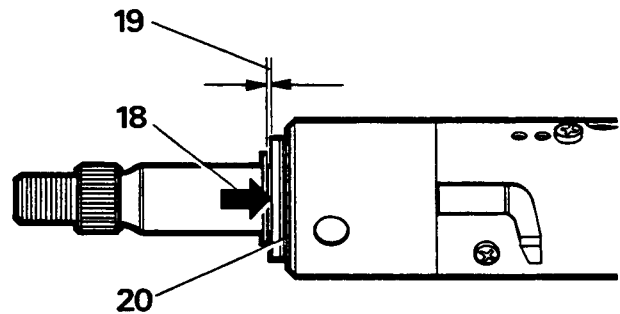
IMPORTANT: The steering column is now dismantled as far as is permitted. A replacement steering column comprises outer column, inner column and lower bearing assembly.

Assembling

17. Reverse 10 to 15.

Checking the top bearing end load, items 18 to 20

18. Hold down the thrust washer and shims fully against the wave washer spring load.



19. Measure the clearance between the thrust washer and the circlip. The clearance must be 0.12 mm (.005 in).
20. Adjust the clearance as necessary by fitting replacement shim washer(s) which are available in the range 0.127 to 0.762 mm (.005 to .030 in) in 0.127 (.005) stages.

Fitting the steering column lock

21. Position the steering lock cap on the outer column, locating the spigot in the hole provided.
22. Offer the lock assembly to the column.
23. Fit the shear bolts to retain the cap and lock assembly.
24. Tighten the bolts sufficient to shear the heads.
25. Reverse 1 to 4.

STEERING COLUMN LOCK AND IGNITION/STARTER SWITCH

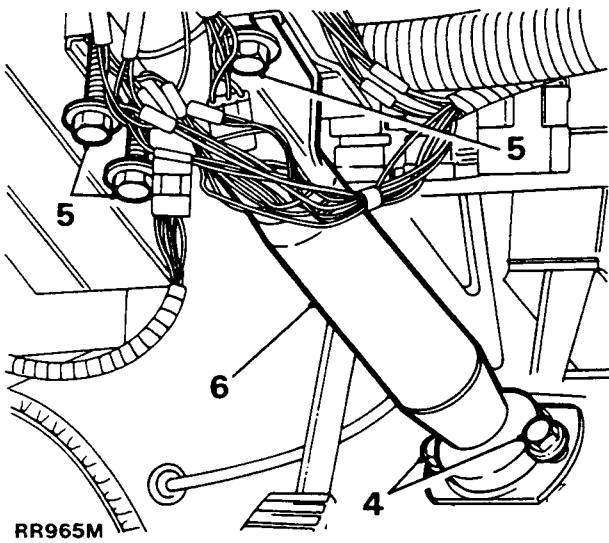
Remove and refit

IMPORTANT: The steering column is of a 'safety' type and incorporates shear pins. Therefore do not impart shock loads to the steering column at any time.

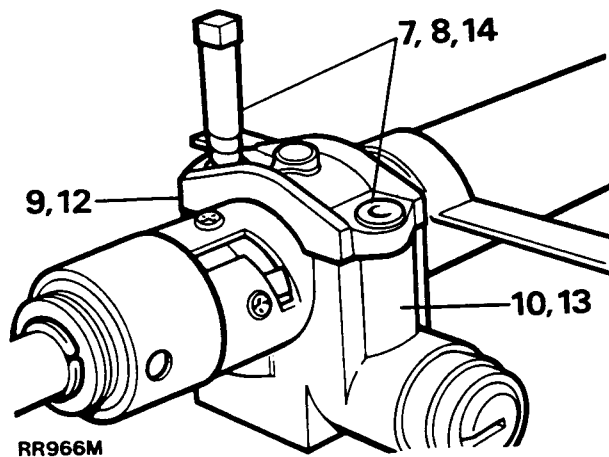
Ignition/starter switch only remove and refit is described in Electrical Section 86.

Removing

1. Remove the lower fascia panel, driver's side.
2. Remove the top shroud.
3. Remove the lighting switch from the lower shroud.
4. Remove the steering column fixings at the toe board.



5. Remove the fixings, steering column to dash bracket.
6. Lower the steering column to gain access to the column lock fixings and remove the insulating cover.
7. Drill a hole in each sheared bolt to accept an 'Easiout' extractor.



8. Remove the sheared bolts.
9. Detach the end cap.
10. Withdraw the column lock assembly.
11. Remove the ignition/starter switch.

Refitting

12. Position the steering lock cap on the outer column, locating the spigot in the hole provided.
13. Offer the lock to the column.
14. Fit the shear bolts to retain the cap and lock.
15. Tighten the bolts sufficient to shear off the heads.
16. Fit the ignition/starter switch.
17. Reverse 1 to 6.

STEERING WHEEL

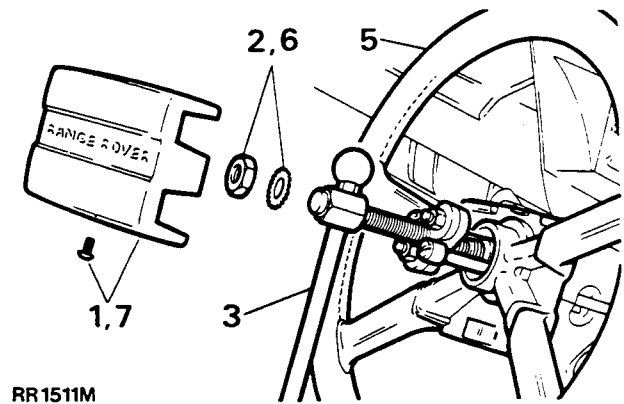
Remove and refit

Service tools: 18G 1014—Steering wheel remover
18G 1014-2—Adaptor pins

IMPORTANT: The steering column is of a 'safety' type and incorporates shear pins. Therefore do not impart shock loads to the steering column during removing and refitting the steering wheel or at any time.

Removing

1. Remove the securing screw and withdraw the trim pad.
2. Remove the steering wheel nut and washer.



3. Extract the steering wheel using service tool 18G 1014. Ensure the adaptor pins are inserted to their full length and tighten the cap screws.

Refitting

4. Position the road wheels 'straight ahead'.
5. Position the steering wheel on the column splines, in the straight ahead position.
6. Fit the nut and washer, tighten to the correct torque.
7. Fit the trim pad and tighten the securing screw.

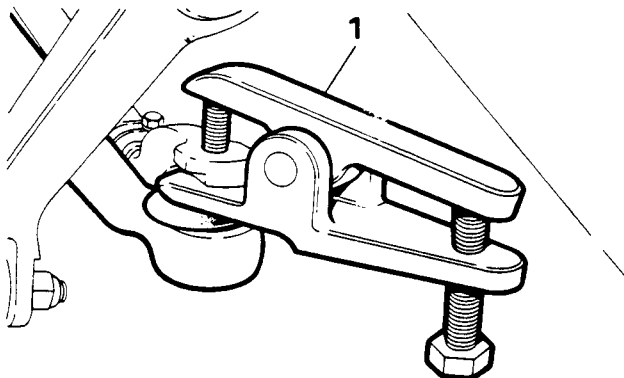
DROP ARM

Remove and refit

Service tools: 18G1063 Ball joint extractor
MS252A Drop arm extractor

Removing

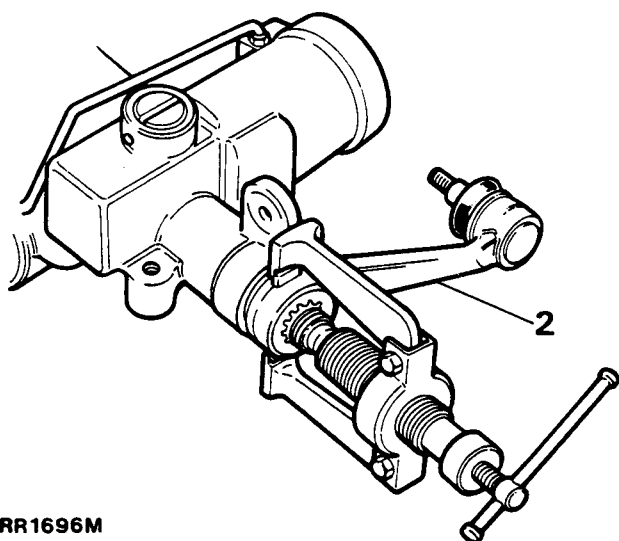
1. Disconnect the drag link from the drop arm ball joint, using extractor 18G1063.



RR1505M

2. Remove the drop arm from the steering box rocker shaft, using extractor MS252A.

NOTE: The drop arm ball joint is integral with the drop arm.



RR1696M

Refitting

3. Set the steering box in the midway lock-to-lock position.
4. Fit the drop arm in position, aligning the dead splines.
5. Fit the drop arm fixings and tighten to the correct torque.
6. Fit the drag link and tighten to the correct torque.

DROP ARM BALL JOINT

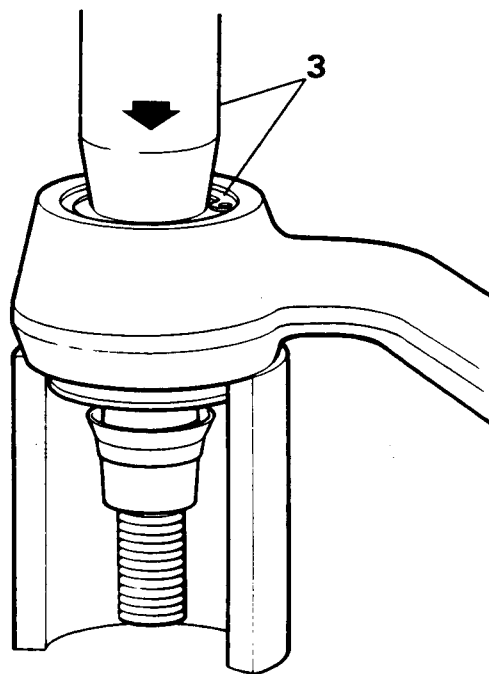
Overhaul

The drop arm ball joint can be overhauled and there is a repair kit available which consists of the following items.

- | | |
|------------------------|--------------------------|
| Ball pin | Ball lower socket |
| Retainer | Spring |
| Spring rings | 'O' ring |
| Dust cover | Cover-plate |
| Ball top socket | Circlip |

Dismantle

1. Remove the drop arm from the vehicle and clean the exterior.
2. Remove the spring rings and prise off the dust cover.
3. In the interests of safety, position the ball joint under a press to relieve the spring tension and support the housing both sides of the ball pin, as illustrated. Apply pressure to the cover plate and remove the circlip and slowly release the pressure.

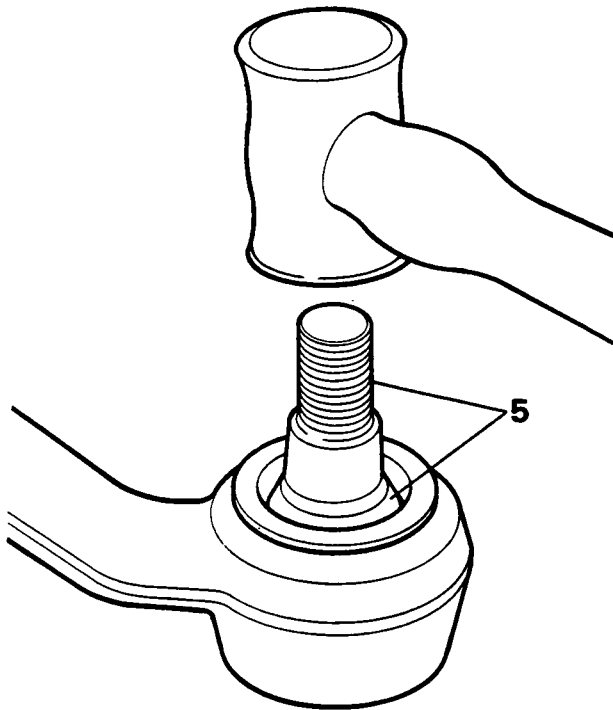


ST1382M

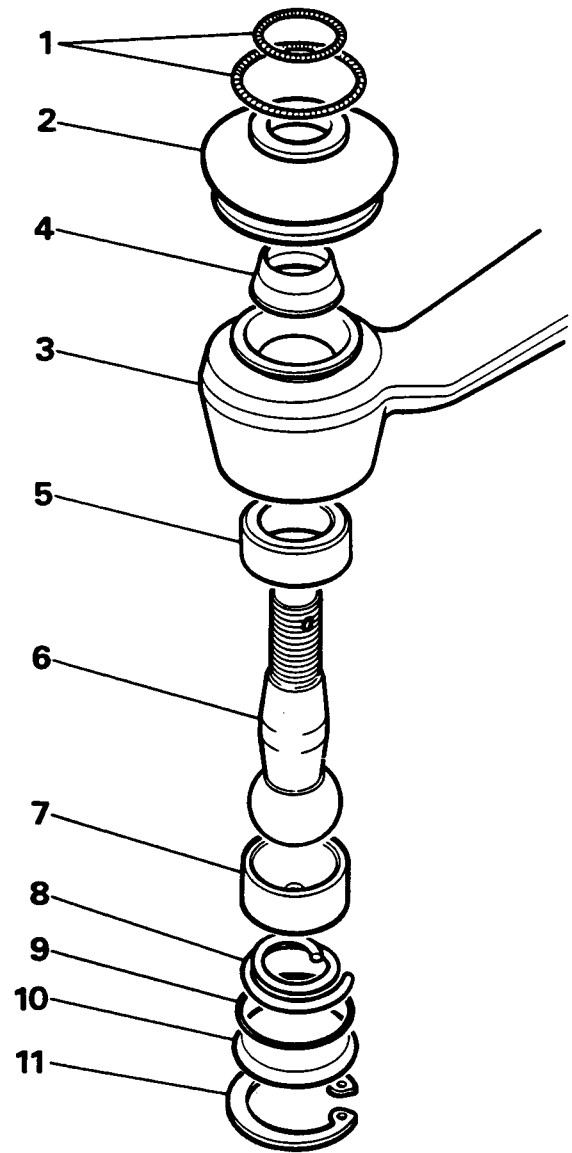
WARNING: Personal injury could result if the circlip is removed without pressure being applied and maintained to the cover plate.

4. Remove the spring, top socket and 'O' ring.

5. Since the ball pin cannot be removed with the retainer in position, tap the threaded end of the ball pin to release the retainer and to remove the pin from the housing.



ST1383M



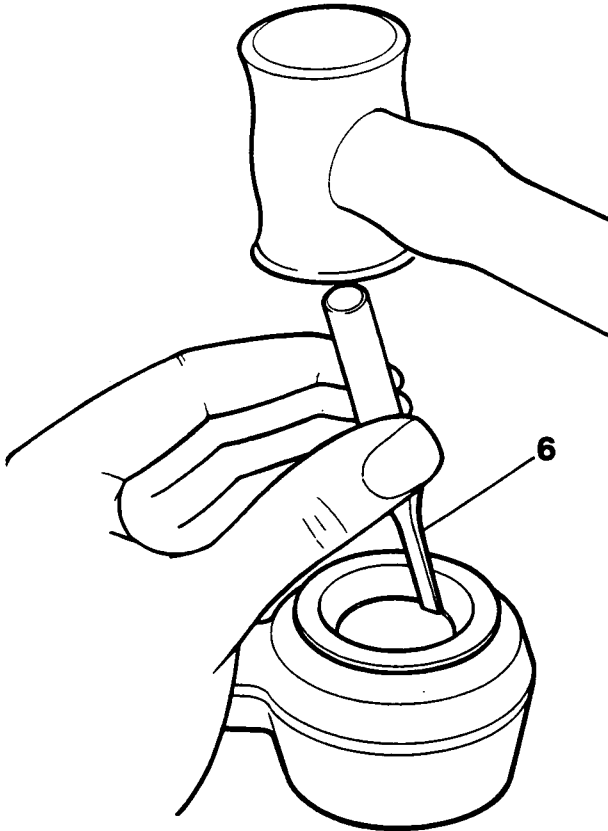
ST1381M

KEY TO BALL JOINT

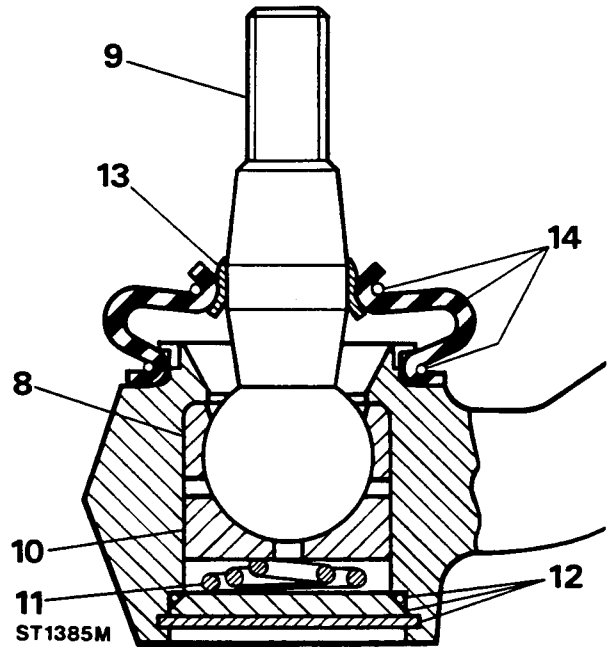
- | | |
|------------------|-----------------|
| 1. Spring rings | 7. Top socket |
| 2. Dust cover | 8. Spring |
| 3. Ball housing | 9. 'O' ring |
| 4. Retainer | 10. Cover-plate |
| 5. Bottom socket | 11. Circlip |
| 6. Ball pin | |

Continued

6. Using a sharp-edged punch or chisel, drive the ball lower socket from the housing. Should difficulty be experienced, apply gentle heat to the housing and then continue to drive the socket from the housing.



ST1384M



14. Fit the dust cover and retain with the two spring rings.
 15. Fit the drop arm to the steering box using a new lock washer. Tighten the retaining nut to the correct torque and bend over the lock washer.
 16. Assemble the ball pin to the drag link, see instructions for fitting drag link and track rod, and tighten the castle nut to the correct torque and secure with a new split pin.

7. Clean the housing and remove any burrs.

Assemble

8. Press in the lower socket squarely up to the shoulder.
 9. Dip the ball in Duckhams LB10 grease, or equivalent and fit to the housing and pack with grease.
 10. Fit the top socket.
 11. Fit the spring, small diameter towards the ball.
 12. Fit the 'O' ring and using the same method as for removing the circlip, compress the cover plate and secure with the circlip. Ensure that the circlip is fully seated in the machined groove.
 13. Press the retainer onto the ball pin so that the top edge is level with the edge of the taper.

TRACK ROD AND LINKAGE

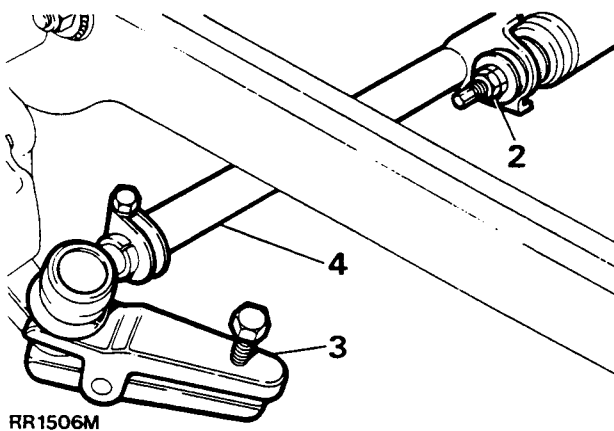
Remove and refit

Service tool: 18G 1063—Ball joint extractor

TRACK ROD

Removing

1. Jack-up and support chassis.
2. Disconnect the steering damper at the track rod.
3. Disconnect the track rod at the ball joints, using extractor 18G 1063.
4. Withdraw the track rod complete.

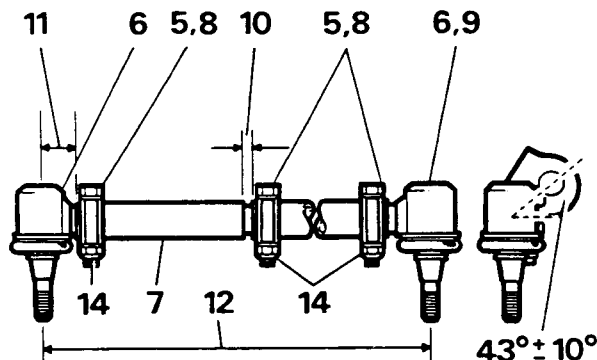


RR1506M

LINKAGE

Removing

5. Slacken the clamp bolts.
6. Unscrew the ball joints.
7. Unscrew the track rod adjuster, left-hand thread.



RR1507M

Refitting

8. Fit the replacement parts. Do not tighten the clamp pinch bolts at this stage.
9. Screw in a ball joint to the full extent of the threads.
10. Set the adjuster dimensionally to the track rod as illustrated, to 8.9 mm (.350 in).
11. Set the adjuster end ball joint dimensionally, as illustrated to 28.57 mm (1.125 in).
12. The track rod effective length of 1230.0 mm (48.4 in) is subject to adjustment during the subsequent wheel alignment check.

TRACK ROD

Refitting

13. Fit the track rod and tighten the ball joint nuts to the correct torque.
14. Check the front wheel alignment.
15. Reverse 1 and 2.

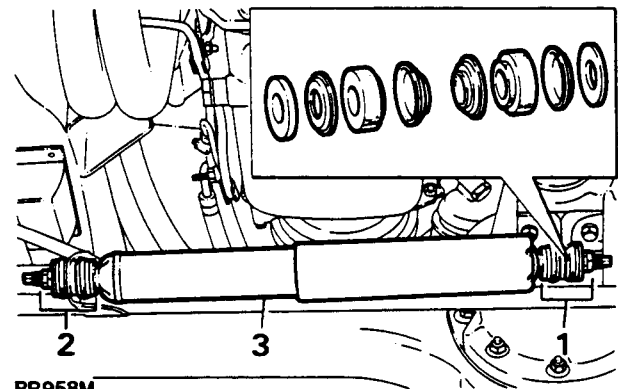
CAUTION: A track rod that is damaged or bent must be renewed. No attempt should be made to repair or straighten it.

STEERING DAMPER

Remove and refit

Removing

1. Remove the fixings at the differential case bracket.



RR958M

2. Remove the fixings at the track rod bracket.
3. Withdraw the steering damper.

Refitting

4. Reverse 1 to 3.

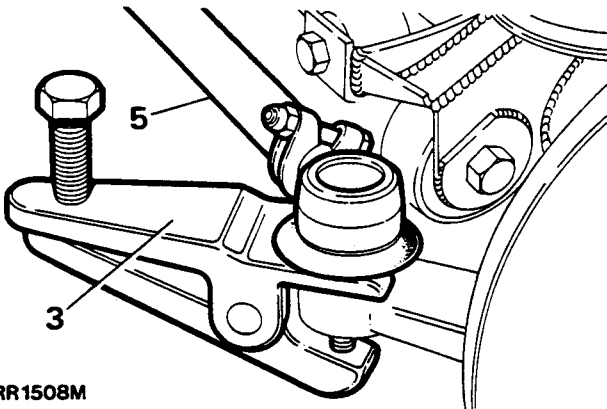
DRAG LINK AND DRAG LINK ENDS

Remove and refit

Service tool 18G 1063—Extractor for ball joint

Removing

1. Jack-up and support chassis.
2. Remove the passenger's side road wheel.
3. Disconnect the drag link ball joint at the swivel housing arm, using extractor 18G 1063.



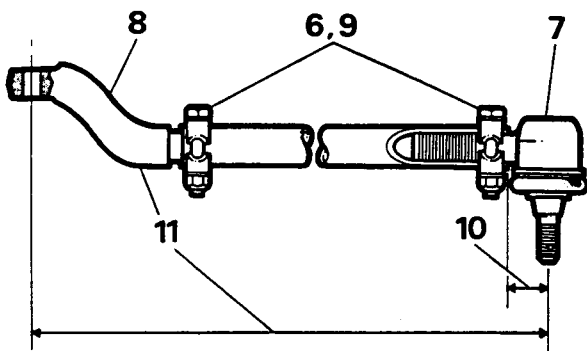
RR1508M

4. Disconnect the drag link end at the drop arm ball joint, using extractor 18G 1063.
5. Withdraw the drag link.

DRAG LINK ENDS

Removing

6. Slacken the clamp bolts.
7. Unscrew the ball joint.
8. Unscrew the cranked end.



RR1509M

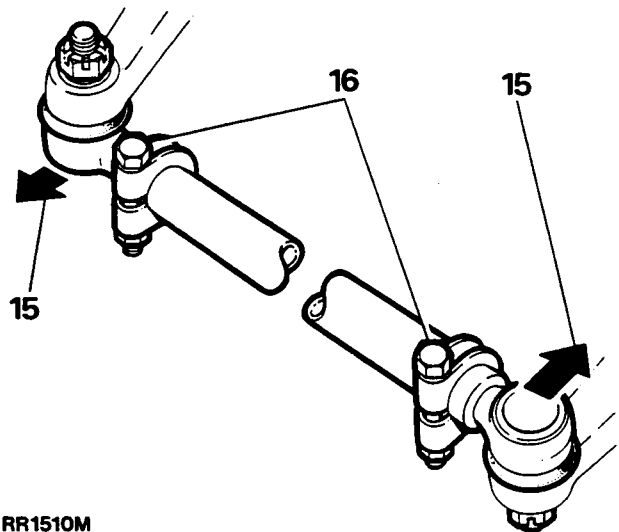
Refitting

9. Fit the replacement ends. Do not tighten the clamp bolts at this stage.
10. Set the ball joint dimensionally to the drag link, as illustrated, to 28.57 mm (1.125 in).
11. Adjust the cranked end to obtain the nominal overall length of 919.0 mm (36.2 in). The length is finally adjusted during refitting.

DRAG LINK

Refitting

12. Fit the drag link. Tighten the ball-joint nuts to the correct torque.
13. Check, and if necessary, set the steering lock stops.
14. Turn the steering and ensure that full travel is obtained between the lock stops. Adjust the drag link length to suit.
15. Using a mallet, tap the ball joints in the direction indicated so that both ball pins are in the same angular plane.



RR1510M

16. Tighten the clamp bolts to the correct torque.
17. Reverse 1 and 2.

CAUTION: A drag link that is damaged or bent must be renewed. No attempt should be made to repair or straighten it.

FRONT WHEEL ALIGNMENT

Check and adjust

Checking

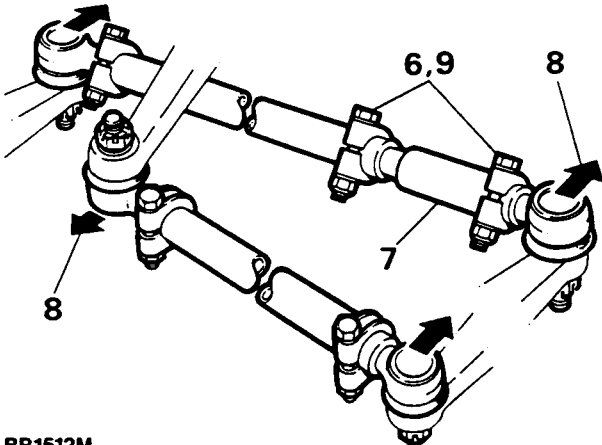
Toe-out dimensions

NOTE: No adjustment is provided for castor, camber or swivel pin inclination.

1. Set the vehicle on level ground with the road wheels in the straight-ahead position.
2. Push the vehicle back then forwards for a short distance to settle the linkage.
3. Measure the toe-out at the horizontal centre-line of the wheels.
4. Toe-out must be 1.2 to 2.4 mm (.04 to .09 in).
5. Check-tighten the clamp bolts fixings to the correct torque.

Adjusting

6. Slacken the adjuster sleeve clamp bolts.
7. Rotate the adjuster to lengthen or shorten the track rod.



RR1512M

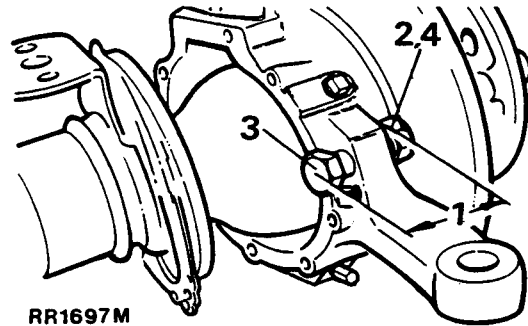
8. Check the toe-out setting as in instructions 1 to 4. When the toe-out is correct, lightly tap the steering linkage ball joints, in the directions illustrated, to the maximum of their travel to ensure full unrestricted working travel.
9. Finally, tighten the clamp bolts to the correct torque.

STEERING LOCK STOPS

Check and adjust

Checking

1. Measure the stop bolt protrusion as illustrated. This must be 40.5 mm (1.59 in).



RR1697M

Adjusting

2. Slacken the stop bolt locknut.
3. Turn the stop bolt in or out as required.
4. Tighten the locknuts.
5. Check the wheels position at full lock.

