



Land Rover
Range Rover

Workshop Bulletin

ATTENTION SERVICE MANAGER

JUNE 1987
BULLETIN NUMBER SLR 621 EN WB1

LAND ROVER

SU CARBURETTORS

GEMMER POWER ASSISTED STEERING

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Land Rover Merchandising Service
P.O. Box 534, Erdington, Birmingham B24 0QS

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Section
Number

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01 INTRODUCTION

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INTRODUCTION

This Bulletin covers the Introduction of the twin SU H.I.F. 44 Carburetters on the Land Rover 90 and 110 V8 Engine, and the Gemmer Power assisted steering box prior to it being included in the updated 90-110 Workshop Manual, which will be numbered as follows

- SLR 621 EN WM — English
- SLR 622 DU WM — Dutch
- SLR 623 FR WM — French
- SLR 624 GR WM — German
- SLR 625 IT WM — Italian

CARBURETTER OVERHAUL — S.U. HIF 44 — Right hand

DISMANTLE

1. Remove the carburetters from the engine and clean the exteriors with a suitable solvent.
2. Remove the two nuts and spring washers and withdraw the air intake adaptor and joint washer.
3. Unscrew and remove the piston damper assembly and drain the oil.
4. Remove the three screws and lift-off the suction chamber complete with piston and spring.
5. Remove the spring clip from the top of the piston rod and withdraw the piston and spring.
6. Unscrew the fuel metering needle guide locking screw. If the needle cannot be removed from the piston with the fingers, hold the needle as close to the piston as possible, in a soft jawed vice and with a sharp pull withdraw the needle, guide and spring assembly.
7. Remove the four screws and withdraw the float chamber cover plate and sealing ring.
8. Remove the jet adjusting lever retaining screw and spring.
9. Withdraw the jet complete with the bi-metal lever and separate the lever from the jet.
10. Unscrew and remove the float pivot spindle and plain washer, and remove the float.
11. Lift-out the needle valve.
12. Unscrew and remove the needle valve and filter.
13. Unscrew and remove the jet bearing nut.
14. Invert the carburetter body to allow the jet bearing to fall out. If the bearing sticks, carefully tap it out from the bridge side.
15. Remove the piston guide peg.
16. Remove the suction chamber-to-body sealing ring.
17. Unscrew and remove the mixture adjusting screw and seal. Use thin nosed pliers to finally withdraw the screw.
18. Bend-back the cam lever nut lock tabs and remove the nut and lock washer.
19. Remove the cam lever and spring.
20. Remove the end seal cover and seal.
21. Remove the two screws and withdraw the cold start valve body and seal together with the valve spindle. **Also** collect the paper joint washer.
22. Note the position of the throttle levers and return spring.
23. Bend-back the lock washer tabs and remove the throttle lever nut.
24. Remove the lock washer, bush washer and throttle actuating lever.
25. Release the throttle return spring and remove the throttle adjusting lever from the throttle butterfly spindle and remove the return spring.
26. Hold the butterfly closed and mark the relationship of the butterfly to the carburetter flange.
27. Remove the butterfly two retaining screws and withdraw the butterfly from the spindle.

28. Withdraw the throttle butterfly spindle from the carburetter body together with the two seals.
29. Clean all components with petrol or de-natured alcohol ready for inspection. Do not use abrasives for the removal of stains or deposits.

INSPECTION

30. Examine the throttle spindle and bearings for excessive axial clearance.
31. Check the float needle and seating for wear and the float for punctures and renew if necessary.
32. Check the condition of all rubber seals, 'O' rings and joint washers and renew if necessary. The float cover plate seal must be renewed.
33. Examine the carburetter body for cracks and damage.
34. Ensure that the inside of the suction chamber is clean and fit the piston into the chamber without the spring. Hold the assembly horizontally and spin the piston. The piston should spin freely in the suction chamber without any tendency to stick.
35. Inspect the metering needle for wear, scores and distortion. Check also that it has the correct designation number — see Engine Tuning Data, Section 05.
36. Examine the bi-metal jet lever for cracks.
37. Check all springs for cracks and distortion.

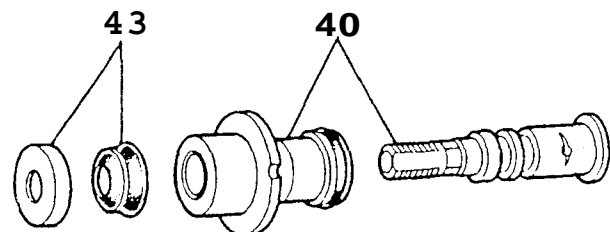
ASSEMBLE

Fit throttle butterfly

38. Fit the throttle spindle to the carburetter body and insert the throttle disc into the spindle in its original position. Secure the disc with new screws and ensure that before tightening the throttle disc is correctly positioned and closes properly. Splay the split ends of the screws to prevent turning.
39. Fit new seals to both ends of the throttle spindle ensuring that they are fitted the correct way round.

Fit cold start assembly

40. Fit a new 'O' ring to the valve body and assemble the valve spindle to the valve body.

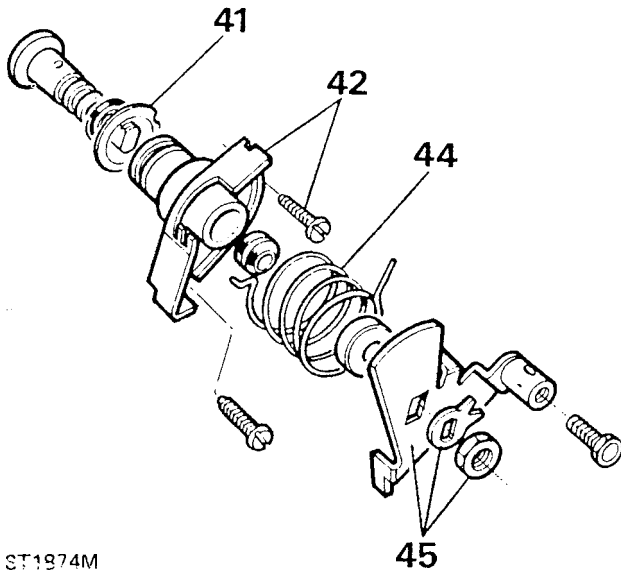


ST1873M

41. Fit a new paper joint washer to the valve noting that the half-moon cut-out in the washer is clearance for the top retaining screw.

continued

42. Fit the starter assembly to the carburettor body and secure with the two screws.
43. Fit the end seal and cover.
44. Fit the return spring.
45. Fit the cam lever and tension the spring. Fit a new lock washer and secure with the nut and bend the tabs over a convenient flat.
46. Adjust the coils of the spring, if necessary, to prevent coil binding.

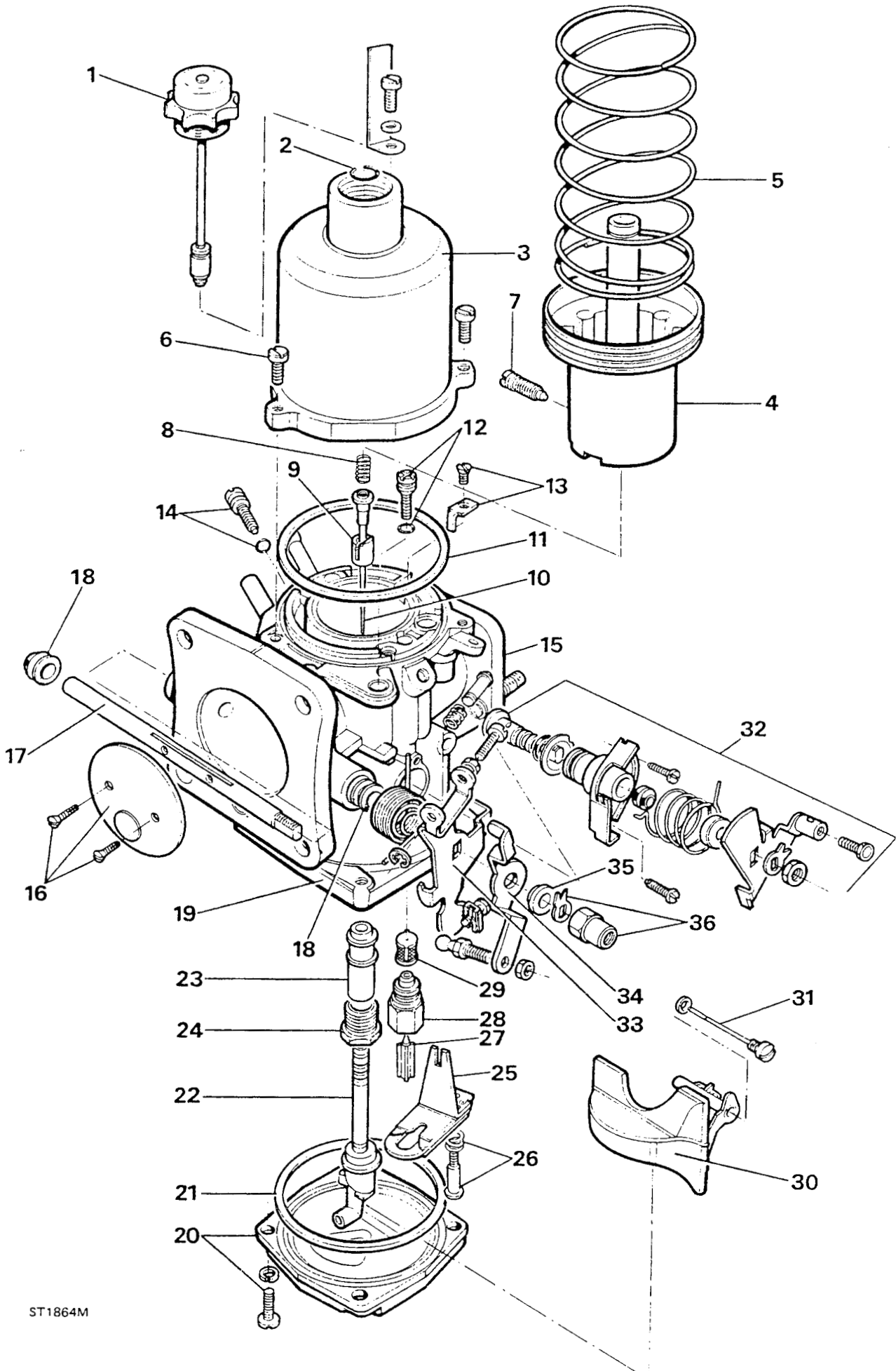


ST1974M

KEY TO S.U. CARBURETTER COMPONENTS

- | | |
|--|--|
| 1. Piston damper. | 20. Float chamber cover and retaining screws. |
| 2. Spring clip. | 21. Float chamber cover seal. |
| 3. Suction chamber. | 22. Jet assembly. |
| 4. Piston. | 23. Jet bearing. |
| 5. Piston spring. | 24. Jet bearing nut. |
| 6. Suction chamber retaining screws — 3 off. | 25. Bi-metal jet lever. |
| 7. Needle retaining screw. | 26. Jet retaining and adjusting screw and spring. |
| 8. Needle bias spring. | 27. Float needle. |
| 9. Needle guide. | 28. Float needle seat. |
| 10. Needle. | 29. Float needle seat filter. |
| 11. Suction chamber sealing ring. | 30. Float |
| 12. Throttle adjusting screw and seal. | 31. Float pivot spindle. |
| 13. Piston key and retaining screw. | 32. Cold start and cam lever assembly. |
| 14. Mixture adjusting screw and seal. | 33. Throttle adjusting lever and lost motion assembly. |
| 15. Carburetter body. | 34. Throttle actuating lever. |
| 16. Throttle butterfly and retaining screws. | 35. Bush washer. |
| 17. Throttle spindle. | 36. Throttle lever assembly retaining nut and lock washer. |
| 18. Throttle spindle seals — 2 off. | |
| 19. Float chamber. | |

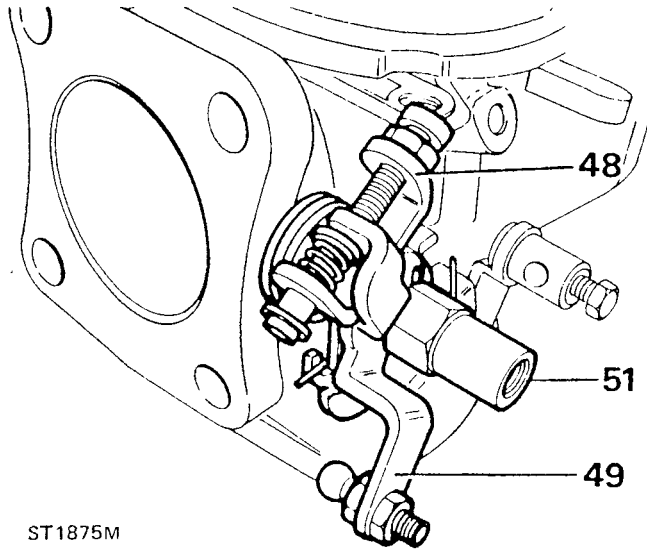
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ST1864M

Fit throttle lever assembly

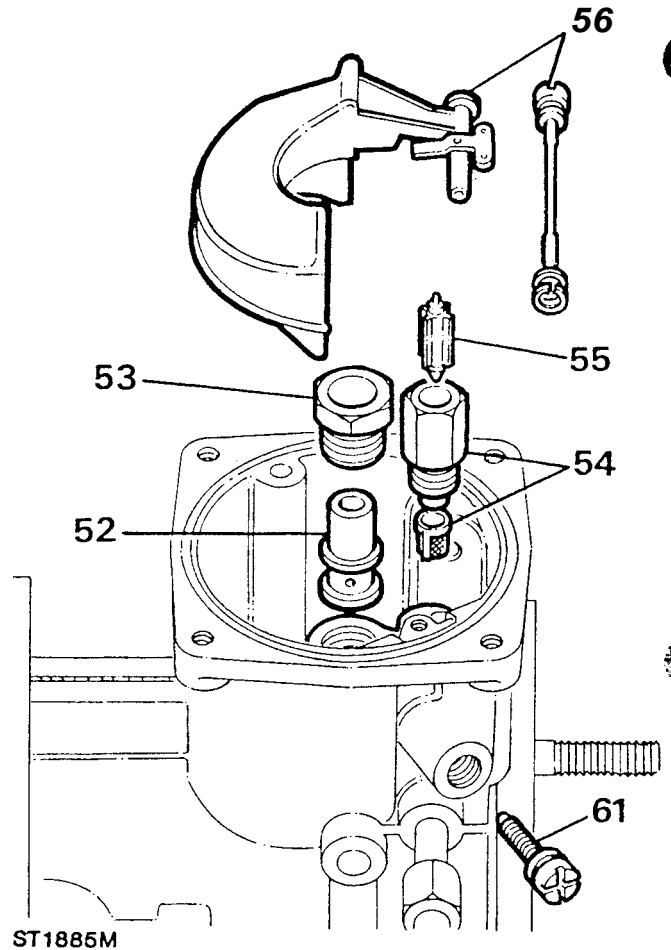
47. Fit the return spring so that the longest leg rests against the throttle adjusting screw housing.
48. Fit the throttle adjusting lever and lost motion assembly and tension the return spring.
49. Fit the throttle actuating lever.
50. Fit the bush washer and lock washer.
51. Fit and tighten the special nut and bend the lock tabs over a convenient flat.



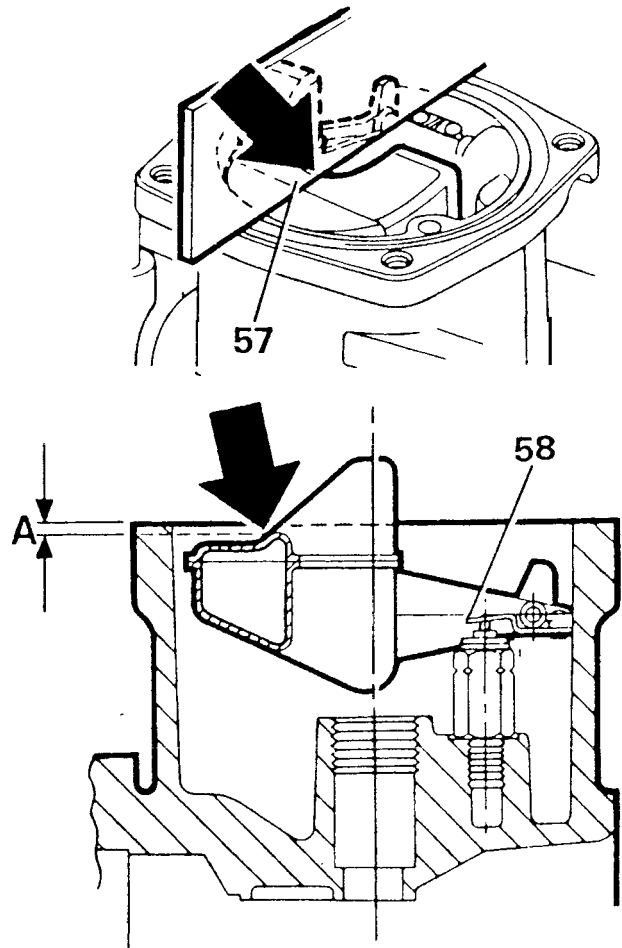
ST1875M

Fit jet and float assembly

52. Fit the jet bearing, long end towards the float.
53. Fit the jet bearing nut.
54. Clean or renew the filter and fit the float needle seat.
55. Fit the needle valve, spring loaded pin uppermost.
56. Fit the float and secure with the pivot pin.
57. Hold the carburettor in the inverted position so that the needle valve is closed by the weight of the float only. Check using a straight edge that the point on the float, arrowed on the illustration, is 1.0 to 1.5 mm (0.04 to 0.062 in) below the level of the float chamber face, dimension 'A'.
58. Adjust the float position by carefully bending the brass pad until the correct dimension is achieved. After adjustment, check that the float pivots freely about the spindle.



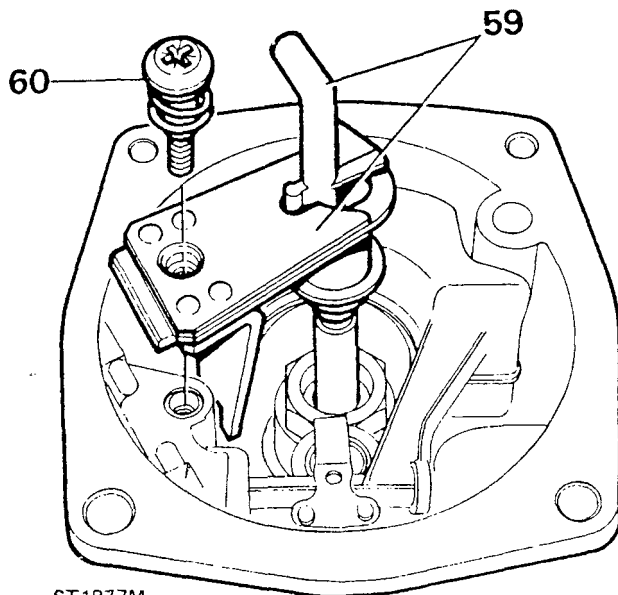
ST1885M



ST1876M

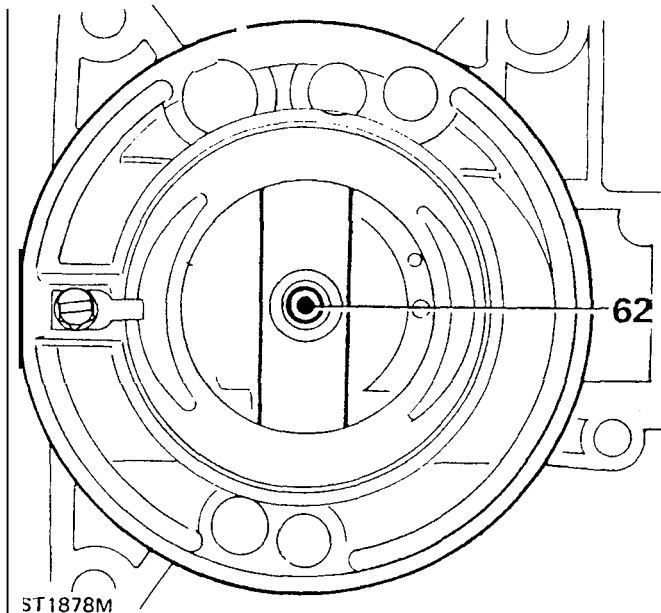
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59. Assemble the jet to the bi-metal jet lever and ensure that the jet head moves freely in the cut-out.
60. Fit the jet and bi-metal jet lever to the carburettor and secure with the spring loaded jet retaining screw.
61. Fit the mixture adjusting screw.



ST1877M

62. Adjust the mixture screw until the jet is flush with the carburettor bridge, then turn the screw a further three and one half turns clockwise.

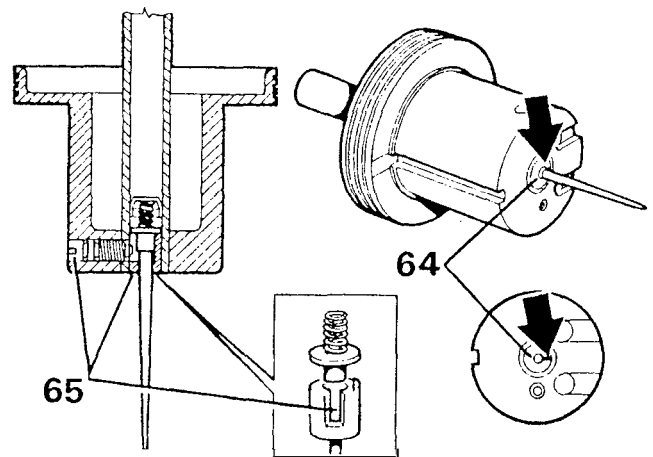


ST1878M

63. Using a new sealing ring, fit the float chamber cover, noting that it can only be fitted one way. Secure with the four screws and spring washers and evenly tighten.

Fit piston and suction chamber

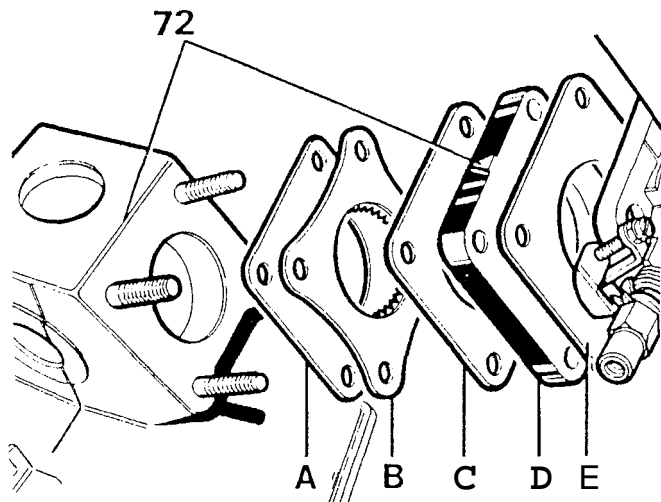
64. Fit the needle, spring and guide assembly to the piston ensuring that the etched arrow head on the needle locating guide is aligned between the piston transfer holes, as illustrated.
65. Secure and ensure that when the screw is tightened the guide is flush with the piston and that the screw locates in the guide slot.



ST1879M

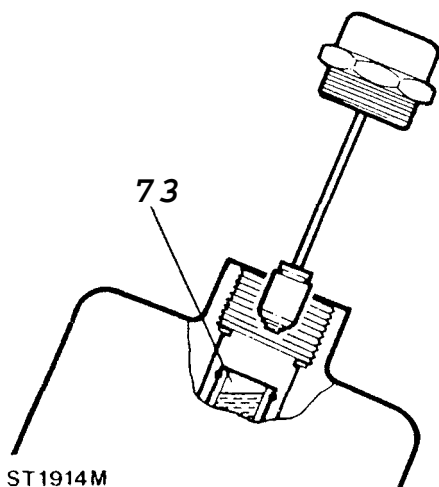
66. Fit the piston key to the carburettor body using a new screw. Tighten the screw and splay the end.
67. Fit a new suction chamber sealing ring to the groove in the carburettor body.
68. To prevent the piston spring being 'wound-up' during assembly, temporarily fit the piston and suction chamber less the spring to the body. Kcmove the suction chamber and fit the spring to the piston. Hold the suction chamber above the spring and piston, align the pencil marks and lower the chamber over the spring and piston, taking care not to rotate the suction chamber. Secure the chamber to the body with the three screws, tightening evenly and check that the piston moves freely.
69. Hold the piston at the top of its stroke and fit the spring clip.
70. Fit the piston damper.
71. Using a new joint washer, fit the air intake adaptor and secure with the two nuts and spring washers.
72. Fit the carburettors to the inlet manifold ensuring that the joint washers, deflector and insulator are fitted in the sequence illustrated. The insulator must be fitted with the arrow head uppermost and pointing inwards towards the manifold. Secure with the four nuts and spring washers and tighten evenly to the correct torque.
 - A. Joint washer.
 - B. Deflector-teeth pointing inwards.
 - C. Joint washer.
 - D. Insulator.
 - E. Joint washer.

continued



ST1880M

- 73. Connect the linkages and top-up the carburettor dampers with a recommended oil to the top of the hollow piston rod.
- 74. Tune and adjust the carburetters.



ST1914M

TUNE AND ADJUST — SU HIF 44 CARBURETTERS

Special tools:

- Carburettor balancer 605330 or B89
- Non-dispersive infra-red exhaust gas analyser.

General Requirements Prior to Tuning Carburetters.

Accurate engine speed is essential during carburettor tuning, therefore the distributor pick up air gap and ignition timing must be checked together with the vacuum advance system.

Whenever possible the ambient air temperature of the tuning environment should be between 15° to 26°C (60° to 80°F). When checking engine speed, use an independent and accurate tachometer.

Idling adjustments should be carried out on a fully warmed up engine, that is, at least 5 minutes after the thermostat has opened. This should be followed by a run of one minute duration at an engine speed of approximately 2,500 rev/min before further adjustments or checks are carried out. This cycle may be repeated as often as required. It is important that the above cycle is adhered to, otherwise overheating may result and settings may be incorrect. The piston dampers must always be kept topped-up with the correct grade of oil.

Before any attempt is made to check settings a thorough check should be carried out to ensure that the throttle linkage between the pedal and carburetters is free and has no tendency to stick. Ensure that the choke control lever is pushed fully down.

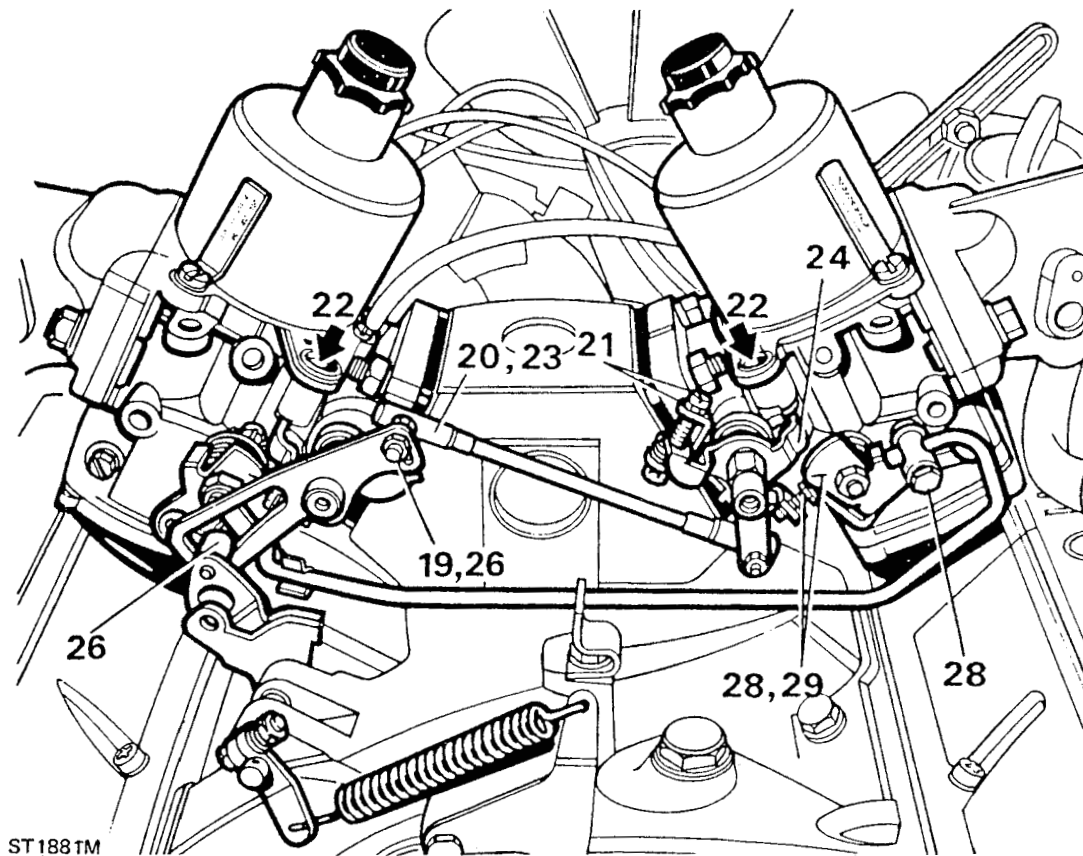
NOTE: References to left and right hand are as from the drivers seat.

TAMPER — PROOFING

To comply with E.C.E. regulations the idle speed and mixture adjusting screws must be tamper — proofed following any adjustments. **A** red blanking plug; **Part number — JZX 1258** must be fitted into the mixture screw resess and a red cap; **Part number JZX 1197** fitted over the idle adjustment screw (throttle adjustment screw).

continued

MODEL	CARBURETTER PART No.	S.U. SPEC No.	EXHAUST CO (NEW ENGINE)	EXHAUST (After 3000 km)	IDLE SPEED R.P.M.	FAST IDLE SPEED R.P.M.
ALL HICOMP V8 ENGINES	ETC7122 ETC7123	FZX2006			600 - 700 NEW ENGINE	1100 ± 50
ALL UCOMP V8 ENGINES	ETC7124 ETC7125	FZX2005			700 - 800 RUN-IN ENGINE	



ST188TM

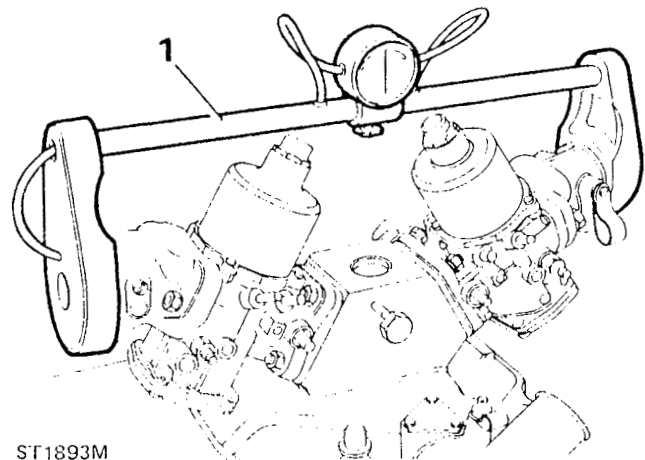
The following instructions apply to both carburetters unless otherwise stated.

Before commencing the following instructions, remove the air cleaner, air intake elbows, mixture adjustment screw plug and mixture screw cap.

CARBURETTER BALANCE

Using balancer 605330

1. Disconnect the interconnecting link between the two carburetters. Fit the balancer to the carburetter intakes and ensure that there are no air leaks, if necessary, zero the gauge with the adjustment screw.
2. Start the engine, and if necessary allow it to reach normal operating temperature. If the needle moves to the right, decrease the air flow through the left hand carburetter by unscrewing the idle screw. Alternatively, increase the air flow through the right hand carburetter by screwing down the idle screw. Reverse the procedure if the pointer moves to the left. Reconnect the carburetter interconnecting link.



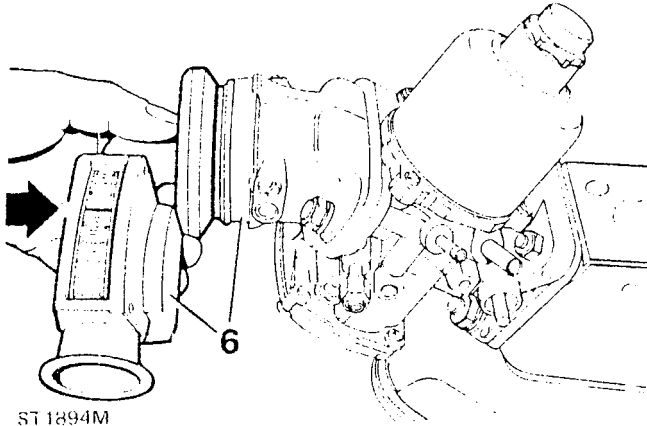
ST1893M

Using balancer I389

3. Disconnect the inter-connecting throttle link between the two carburetters.
4. Back-off the idle adjusting screw on each carburetter, clear of the throttle lever.
5. Turn each throttle adjusting screw so that it touches the throttle lever, then turn the screws by equal amounts to achieve an approximate idle speed of 700 to 800 rev/min.
6. Press the balancer firmly over the carburetter intake. Press or withdraw the control on the side of the balancer to adjust the meter needle reading to approximately half scale, and note the reading.

continued

7. Without altering the position of the balancer control, place the balancer on the second carburettor intake and adjust the idle screw as necessary to achieve the same reading.

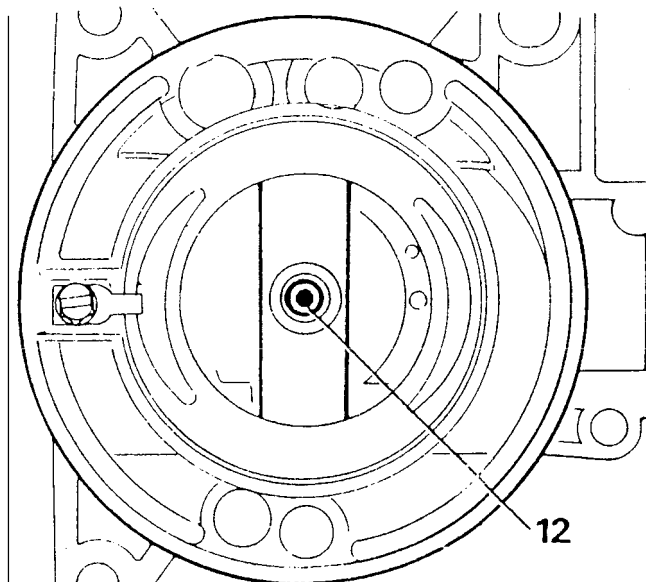


ST1894M

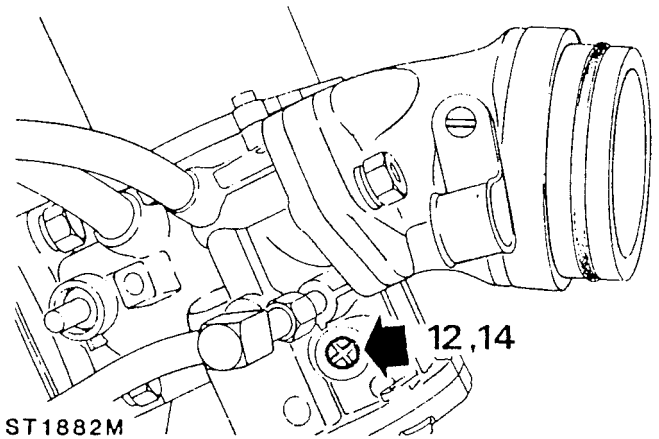
8. Alternatively, adjust and check the balance of both carburetters until an idle speed of 700 to 800 rev/min is obtained.
9. Reconnect the throttle inter-connecting link, and again check the idle speed and balance.

Mixture setting

10. Ensure that the engine is still at normal operating temperature.
11. Mark the relationship of the suction chamber to the carburettor body, remove the retaining screws and lift off the suction chamber complete with pistons.
12. To achieve a datum setting for the mixture screw, turn it anti-clockwise until the jet is level with the carburettor bridge. Check by placing a straight edge across the bridge and adjust as necessary so that the jet just touches the straight edge.
13. Refit the suction chamber and piston, evenly tighten the retaining screws. Check that the piston moves freely without sticking. Top-up the piston damper.

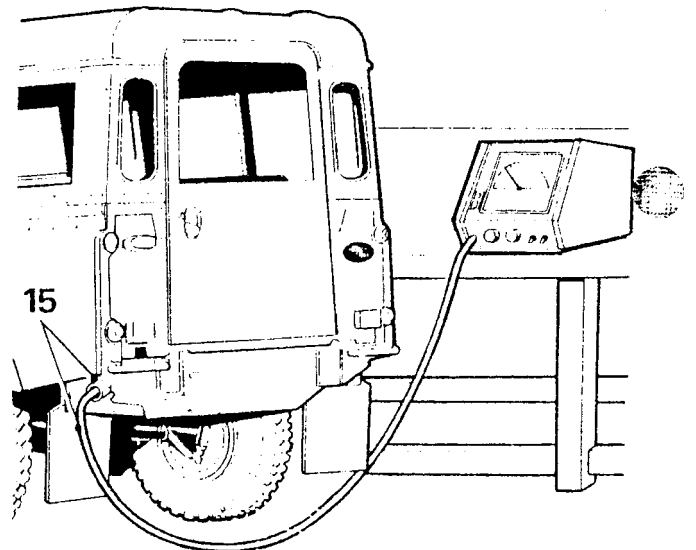


ST1883M



ST1882M

14. Turn the mixture adjustment screw three and one half turns clockwise.
15. Insert the probe of an infra-red exhaust gas analyser as far as possible up the exhaust pipe, start the engine and allow a one and one half minute stabilisation period.
16. Adjust the mixture screw on both carburetters by equal amounts, rich or weak to achieve a CO reading of 0.5 to 2.5%.
17. If after approximately two minutes the CO level is not satisfactory run the engine at 2000 rev/min for one minute to stabilise the equipment, continue the setting procedure until a stable CO reading of 0.5 to 2.5% at an idle speed of 700-800 rev/min is obtained.



ST1915M

Idle speed and linkage adjustment

18. Check that the engine is at normal operating temperature.
19. Slacken the nut, at the left hand carburettor securing the inter-connecting link ball to the throttle cam lever.

20. Disconnect the inter-connecting link between the carburetters at the left hand carburetter.
21. At the right hand carburetter, release the lock nut and slacken off the lost motion adjustment screw, until it is well clear of the spring loaded pad.
22. If necessary adjust the idle screw to maintain the correct idle speed. Check the CO level and carburetter balance, adjust if required.
23. Re-connect the inter-connecting link to the left hand carburetter.
24. Hold the right hand throttle lever against the idle screw stop and adjust the lost motion screw until contact is made with the spring loaded pad, tighten the lock nut.
25. Check the idle speed and balance. Adjust the lost motion screw to restore balance if necessary.
26. Ensuring that the roller is firmly seated in the lower corner of the cam lever, tighten the nut which secures the inter-connecting link ball to the cam lever.

Fast idle adjustment

27. Pull out the cold start control (choke) until the scribed line on the left hand fast idle cam is in-line with the centre of the fast idle screw head.
 28. Check that the scribed line on the right hand fast idle cam is similarly in-line with the fast idle screw head. If there is mis-alignment, slacken the fast idle cam link rod screw at the right hand carburetter and move the cam until the scribed line coincides with the centre of the screw head. Tighten the cam rod screw.
 29. Turn the fast idle screw clockwise, on each carburetter, until just clear of the cam.
 30. Turn the fast idle screw of the leading (left-hand) carburetter down (clockwise) until a slight change in engine speed is noted.
 31. Similarly turn the fast idle screw of the second carburetter (right-hand) down until a further slight change of engine speed is noted.
 32. Adjust the fast idle screws of both carburetters by equal amounts to achieve a fast idle speed of 1100 to 1150 rev/min.
 33. Tighten the fast idle screw lock-nut on both carburetters. Push the cold start (choke) fully home then pull it out again to its full extent and re-check the fast idle speed.
 34. Fit the appropriate blanking plug and cap to the mixture screw recess and idle adjusting screw.
 35. Fit the Carburetter air intake elbows and air cleaner.
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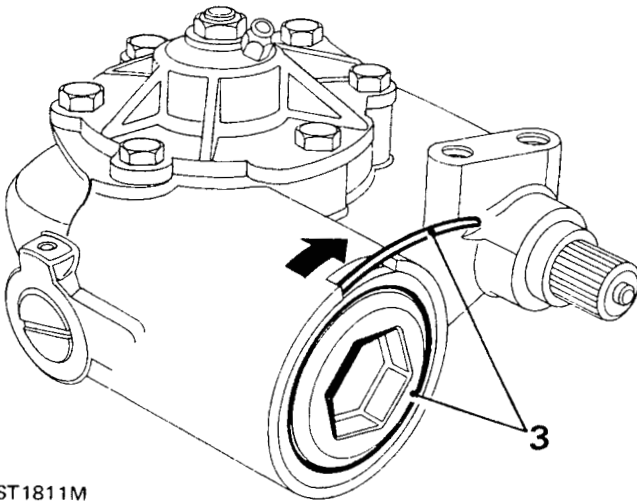


Special tools:

Drop arm puller	MS 252A
End cover wrench adaptor	LST123
Input shaft oil seal installer	LST124
Sector shaft oil seal installer	LST125
Valve seal installer and valve ring compressor	LST126
Preload setting tool	RO1016

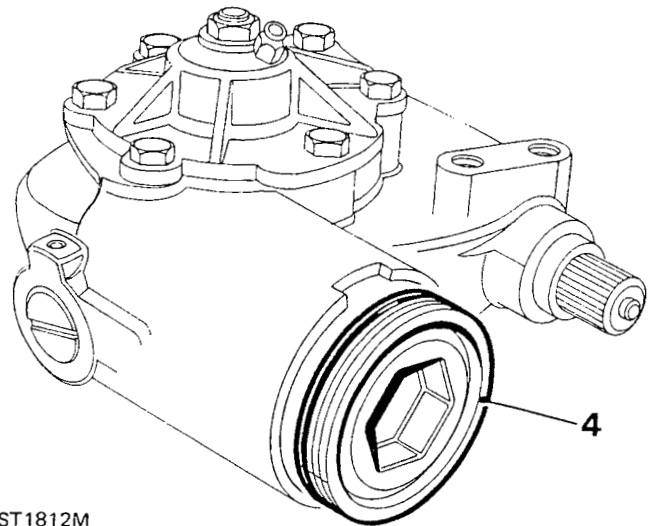
Dismantle

1. Remove the steering box from the vehicle.
2. Bend back the locking tab and remove the drop arm nut. Using special tool MS 252 A or a suitable alternative, withdraw the drop arm from the sector shaft.
3. Using special adaptor tool LST123 turn the cylinder cover anti-clockwise to expose end of the locking ring. Now turn the cover clockwise to extract the ring.



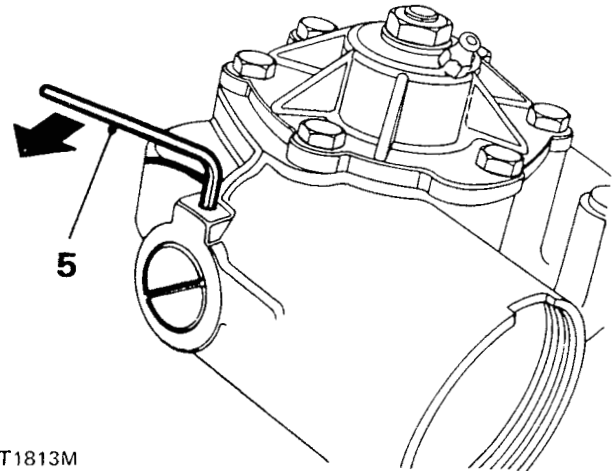
ST1811M

4. To remove the cover, turn the input shaft to the left lock for a LHD drive steering box or to the right for a RHD drive steering box until the rack piston pushes the cover out to enable it to be withdrawn by hand.



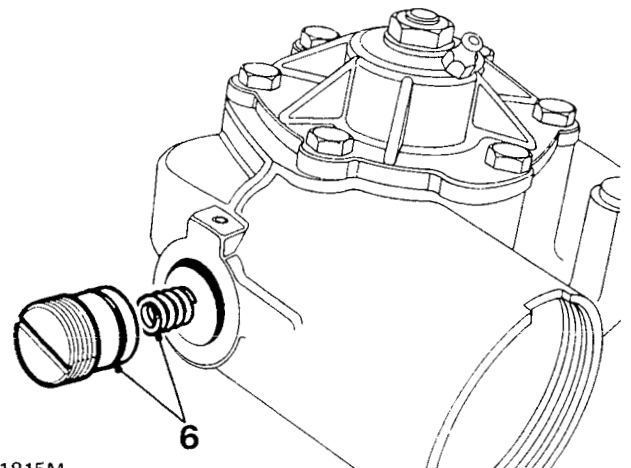
ST1812M

5. Slacken the grub screw securing the rack pad adjuster.



ST1813M

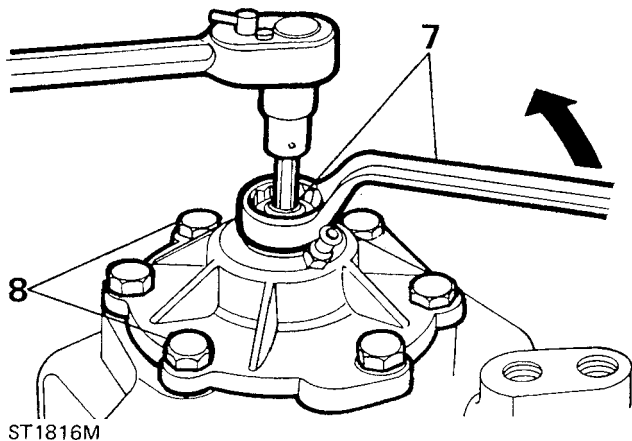
6. With a screwdriver remove the rack pad adjuster, 'O' ring and spring.



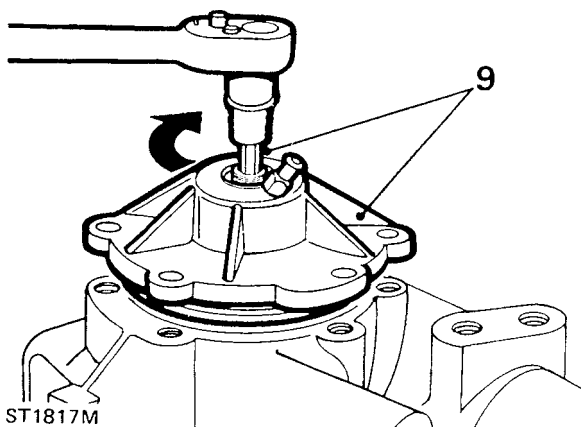
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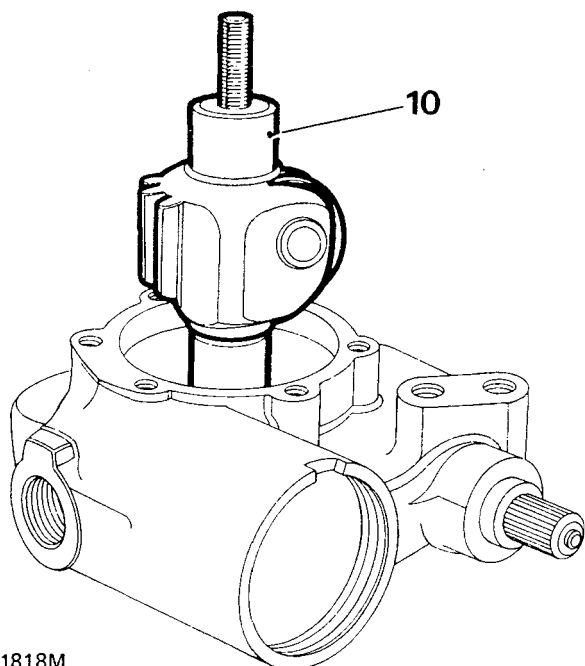
7. Restrain the sector shaft adjuster with a 6 mm hexagonal key and remove the locknut.
8. Remove the six bolts securing the sector shaft cover.



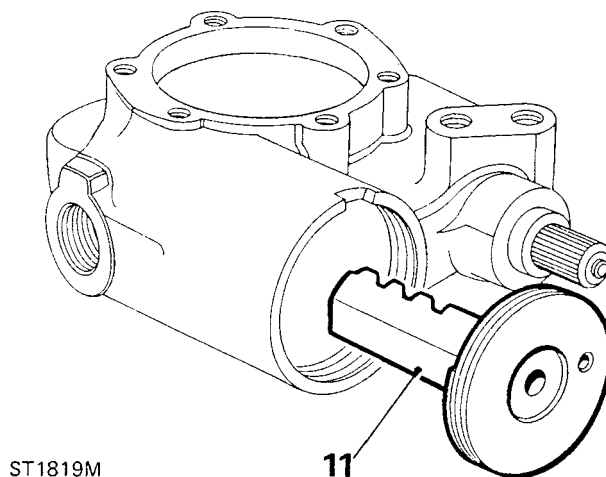
9. Hold the sector shaft cover and turn the adjuster and screw clockwise until the cover can be removed.



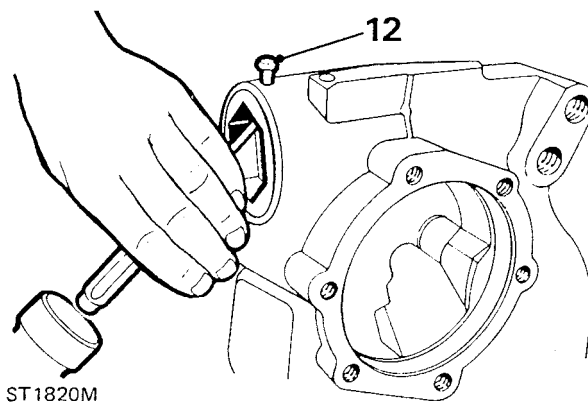
10. Lift-out the sector shaft.



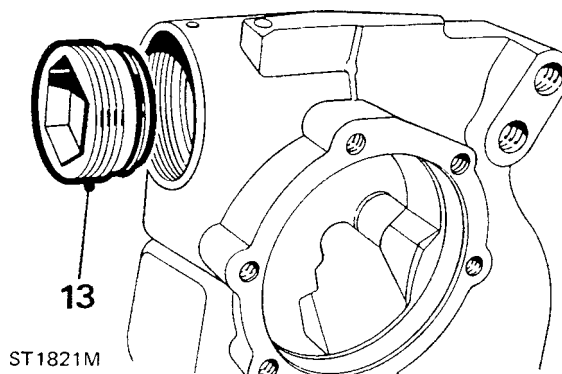
11. Remove the rack and piston assembly and collect the rack adjuster thrust pad.



12. Drive-out the worm adjusting screw locking pin.

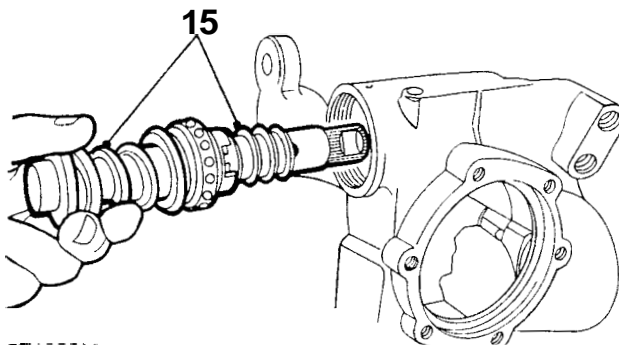


13. Using special tool LST123, remove the input shaft worm adjusting screw anti-clockwise.



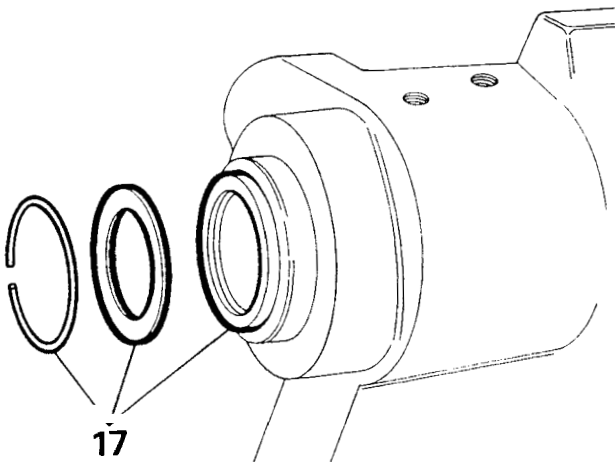
14. Tap the splined end of the input shaft to free the outer bearing. Remove the bearing track and ball cage assembly.

15. Withdraw the input shaft, worm and valve assembly.

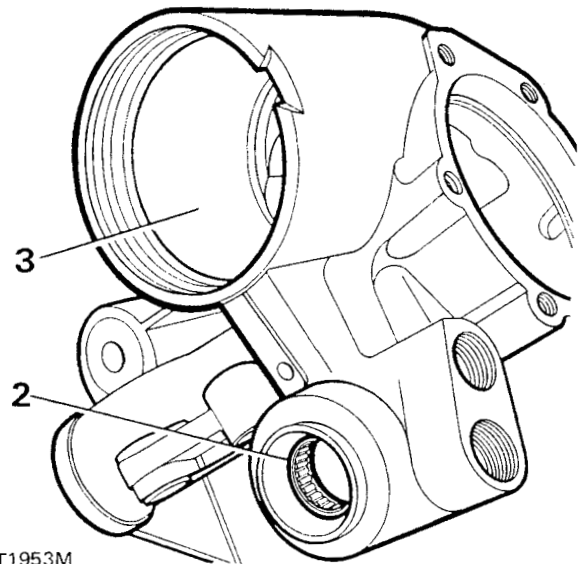


ST1822M

16. Release the circlip and remove the steel washer and oil seal from the sector shaft housing.
17. Remove the wire circlip, anti-extrusion washer and oil seal from the input shaft housing.



ST1949M



ST1953M

Sector shaft assembly

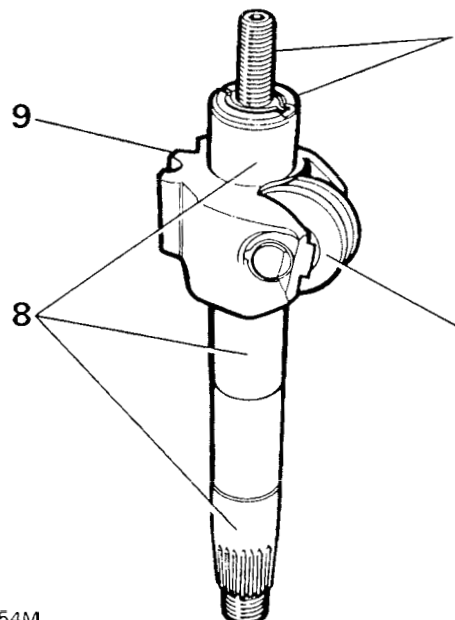
5. Check that no side play or wear exists in the roller.
6. Check the condition of the adjuster and its retainer and that the crimping is sound.
7. The axial clearance of the adjuster should not exceed 0,20 mm (0.008 in).
8. Examine the bearing journals on the shaft for wear and damage.
9. Check the gear teeth for excessive and uneven wear, scores and pitting.

continued

INSPECTION AND OVERHAUL OF COMPONENTS

Steering box housing

1. Examine the sector shaft upper and lower needle roller bearings and if necessary drive them from the housing with a suitable drift.
2. Inspect the input shaft needle bearing and if worn drive it from the housing and press-in a replacement.
3. Examine the piston bore for wear and scores.
4. Check the input shaft bores for wear and scores.



ST1954M

Valve and worm assembly

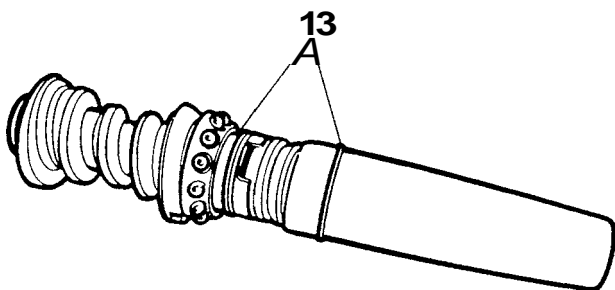
NOTE: If the inner ball race is faulty and unfit for further service it cannot be renewed and a new valve and worm assembly must be obtained and fitted. Should this be the case, the following checks of the valve and worm can be ignored.

10. Examine the valve rings which must be free from cuts, scratches and scores. Also, the rings should be a loose fit in the grooves.
11. If any ring is unsatisfactory, all the rings must be renewed. When removing the rings take care not to damage the valve grooves.
12. To fit new rings use special tool LST126, which consists of the following three parts:-

- a) Ring expander.
- b) Split coller.
- c) Ring compressor

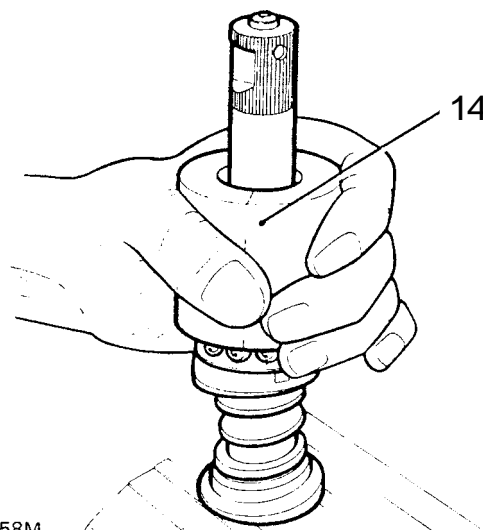
Before using the tool lubricate each part with the recommended power steering fluid.

13. Warm the five rings in hot water leaving them in the water until ready for fitting. When pliable, feed the ring for the lower groove (nearest the roller bearing) over the expander and position the expander over the input shaft, slide the ring into the groove and mould it into position with the fingers.



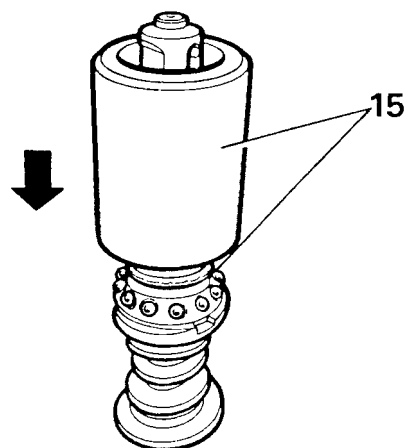
ST1941M

14. Encircle the ring with the split coller and squeeze the coller together, by hand, and hold for approximately thirty seconds.



ST1958M

15. Remove the split coller and with care, case the compressor tool over the ring and leave for a few minutes to cool before carefully removing the tool.

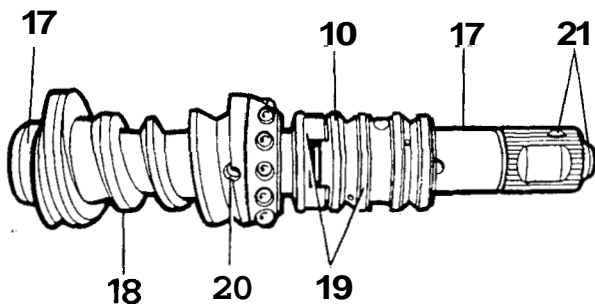


ST1942M

16. Using the expander tool, as before, fit the remaining four rings, one at a time, into the grooves and mould with the fingers. It is important that only one ring at a time is placed on the expander since in the meantime the remaining rings could cool in an expanded condition making it difficult to locate and contract the rings in the valve grooves. Encircle the four rings with the split coller and squeeze together for approximately thirty seconds. Then, with care, ease the compression tool over the four rings and allow to cool for about five minutes before carefully withdrawing the compressor.

continued

worm.



ST1955M

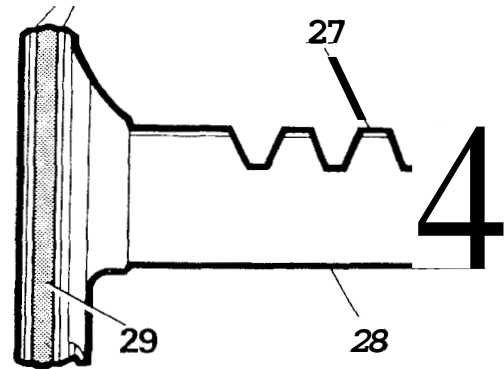
22. The valve and worm assembly should be renewed if there is wear at the following points:
- Inner and outer bearing tracks.
 - Worm.
 - Valve locator.
 - Input shaft needle bearing journal.
23. Examine the outer ball race and track for wear and general condition. The race should be renewed if there is wear and pitting or if a new valve and worm assembly is being fitted.

Thrust pad and adjuster

- Examine the thrust pad for scores.
- Check that the thrust pad seat in the adjuster is not worn or scored.
- Check that the thrust pad spring is not broken.

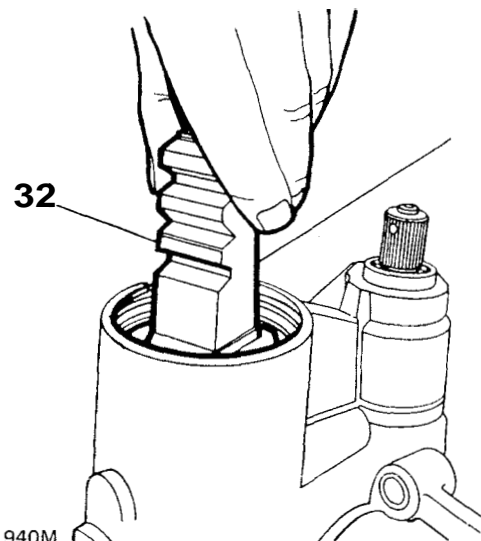
Rack and piston

- Examine the rack teeth for wear and pitting.
- Check that the surface on which the thrust pad bears is not worn and scored.



ST1957M

32. To fit a new plastic seal to the piston, warm the seal in hot water and fit to the piston groove. Insert the piston in the inverted position i.e. piston first into the cylinder and leave to cool.



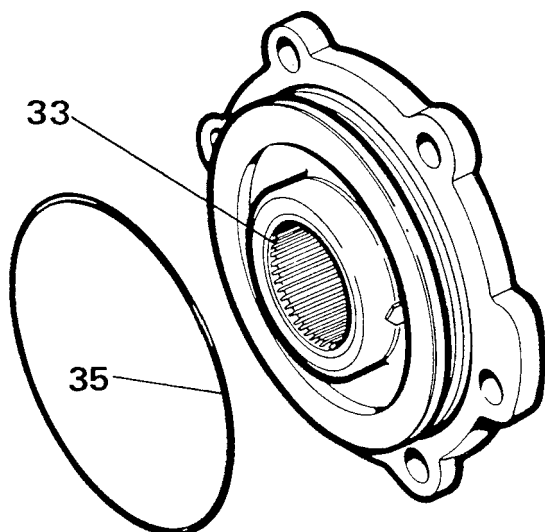
ST1940M

Sector shaft cover

33. Examine the sector shaft cover needle bearing and if necessary extract the bearing taking care not to damage the housing.

continued

34. Drive-in a new bearing, up to the shoulder, with the bearing number and chamfered ends of the rollers trailing.
35. Fit a new 'O' ring seal to the cover.
36. Check that the cover bearing lubrication passage and bleed nipple hole is clear.

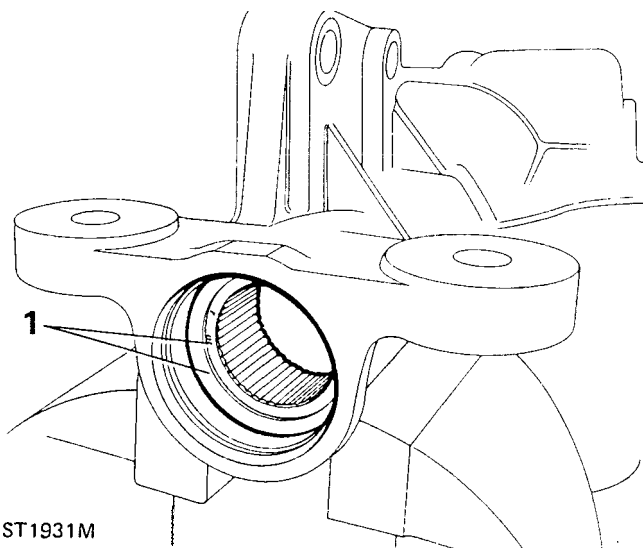


ST 1946M

Assemble

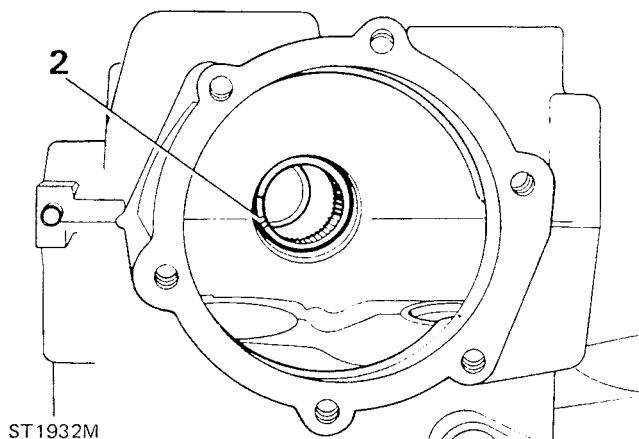
During the following assembly instructions absolute cleanliness must be observed. Also when fitting components and oil seals they must only be lubricated with the recommended fluid, or petroleum jelly.

1. If removed, fit the sector shaft lower needle bearings, numbers outwards, to the steering box to just below the chamfer.



ST1931M

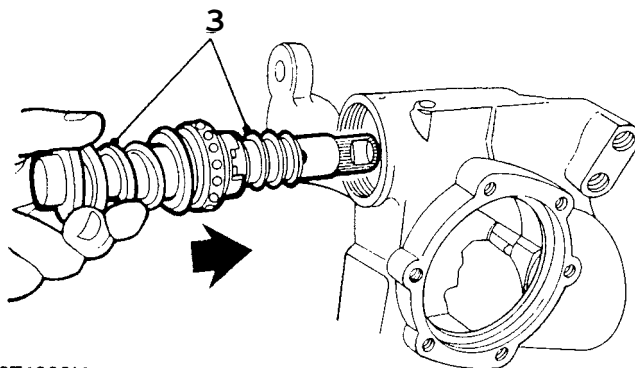
2. Fit the sector shaft upper needle bearings, numbers outwards, up to the shoulder



ST1932M

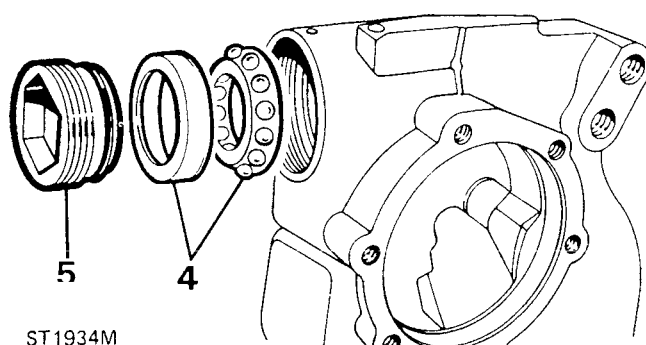
Fitting the valve and worm assembly (input shaft)

3. Fit the input shaft to the steering box housing and lubricate with the recommended fluid. Turn the shaft to the straight ahead position.

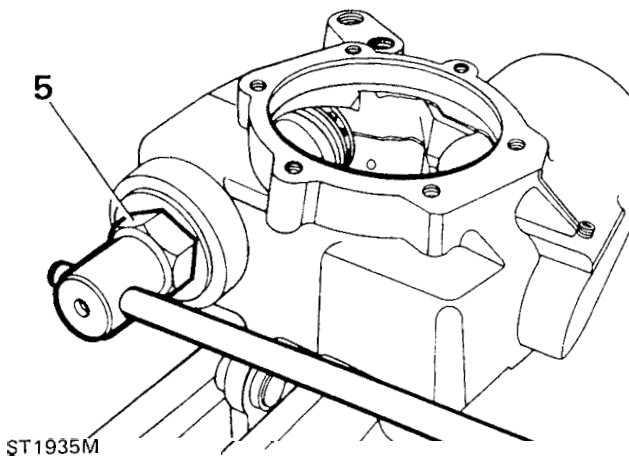


ST1933M

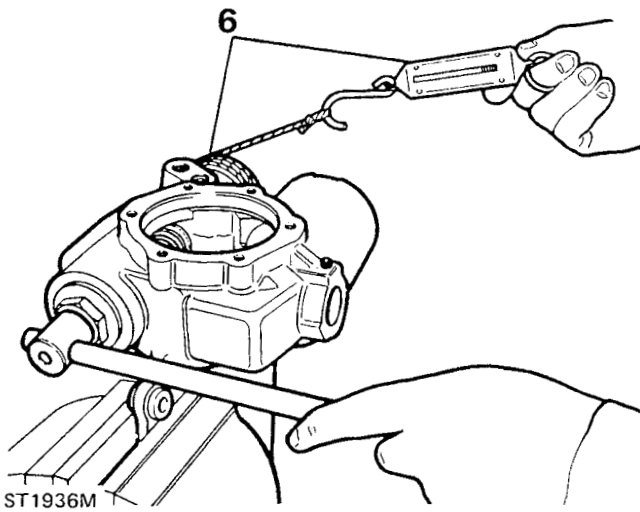
4. Fit the input shaft outer bearing and track.
5. Lubricate and fit the input shaft cover and 'O' ring seal using special tool LST123.



ST1934M

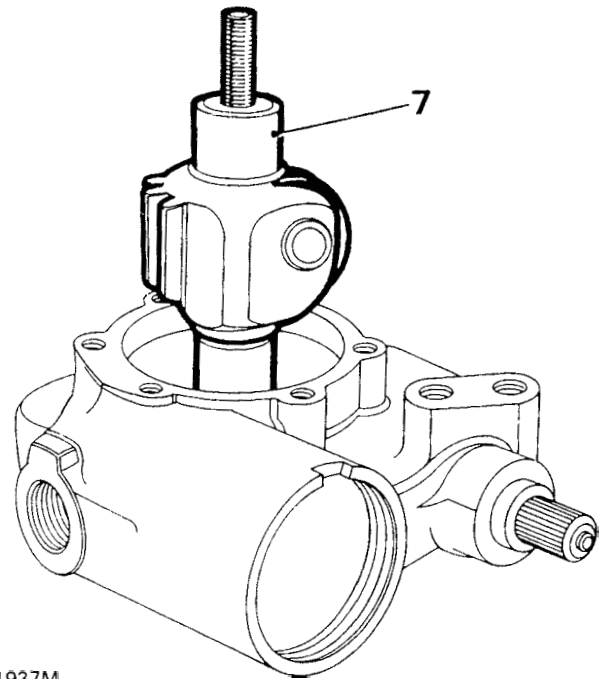


6. Secure preload setting tool R01016 to the input shaft with the grub screw. Wind string round the tool and tie a spring balance to the free end of the string. Whilst turning the input shaft cover clockwise, pull the spring balance until a constant preload reading of 0,69 Nm is achieved.

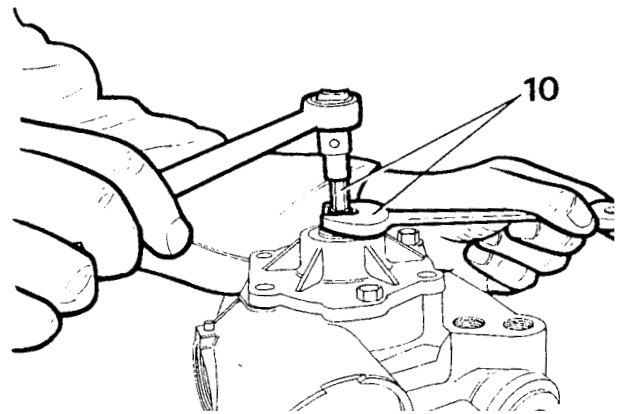


Fitting sector shaft and piston-rack assembly

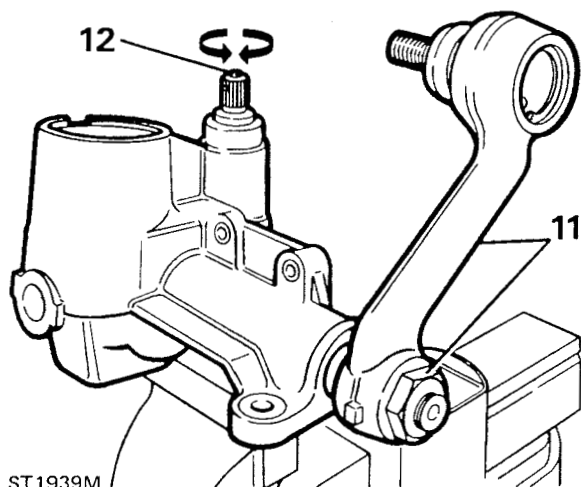
7. Fit the sector shaft to the housing and engage it with the input shaft worm in the straight ahead position.
8. Screw-on, to the sector shaft adjuster, the sector shaft cover and secure with two or three of the six retaining screws.
9. Turn the adjuster screw clockwise, with a 6 mm hexagonal key, until the sector shaft just makes contact with the input shaft worm.



10. Without moving the adjuster, fit the locknut whilst restraining the adjuster screw with the 6 mm key and just nip the locknut with an open-ended spanner.



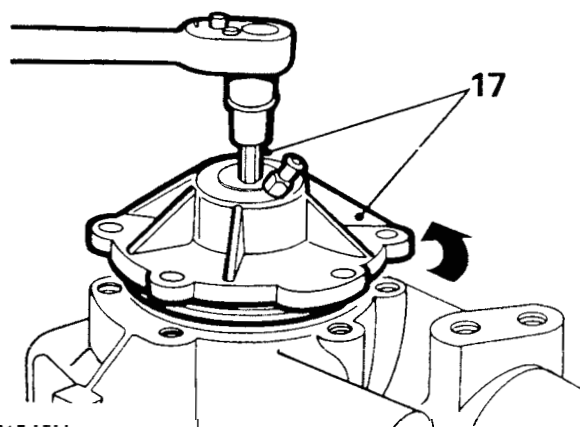
11. Temporarily fit the drop arm and tighten the locknut until no clearance is felt between the sector shaft and drop arm.
12. Rotate the input shaft one turn clockwise, then turn the shaft back to the straight ahead position whilst noting the point at which the backlash to the drop arm disappears or is 'taken-up'.
13. Repeat instruction 12 and rotate the input shaft anti-clockwise on to the opposite lock.



14. If the difference between the two points at which the backlash is 'taken-up' or disappears is greater than 90° (¼ of a turn) it will be necessary to change the shimming behind the input shaft inner bearing cup.
15. If the shimming requires adjustment, add a shim on right-hand drive steering boxes if backlash starts too quickly on clockwise rotation. Should backlash start too quickly for anti-clockwise rotation, remove a shim. For a left-hand drive steering box, reverse the foregoing procedure.

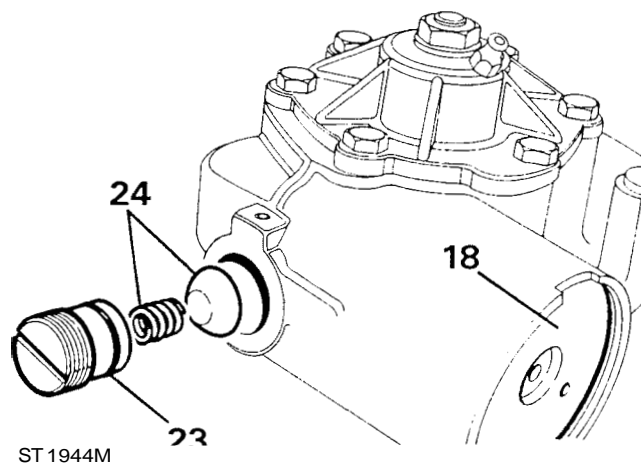
NOTE: If it is necessary to perform instruction 15, instructions 3 to 13 must be repeated afterwards.

16. Remove the drop arm and whilst restraining the sector shaft adjuster, so that it does not turn, remove the locknut.
17. Remove the sector shaft cover screws and while still restraining the adjuster, unscrew clockwise, the cover from the sector shaft and withdraw the sector shaft.



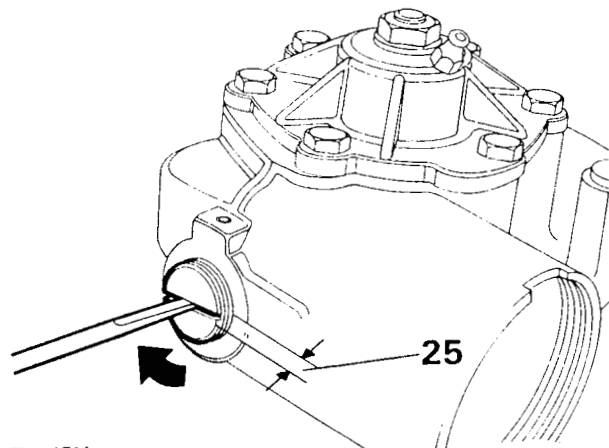
ST1943M

18. Lubricate the rack piston plastic seal and insert the piston into the piston bore, rack end first, as in instruction 11 of the dismantling procedure, to a depth of 37 mm below the lip of the bore.
19. Lubricate and fit the sector shaft in the straight ahead position.
20. Lubricate and fit 'O' ring seal to the sector shaft cover.
21. Restrain the sector shaft adjuster and screw-on the cover, reversing instruction 17. Secure with the six bolts, tightening evenly to 25 to 30 Nm (18 to 22 lbs ft).
22. Restrain the sector shaft adjuster and fit and tighten the locknut, as instruction 10.
23. Fit and lubricate an 'O' ring seal to the rack adjuster screw.
24. Fit the rack pad and spring noting that the larger flat side of the pad is towards the rack.



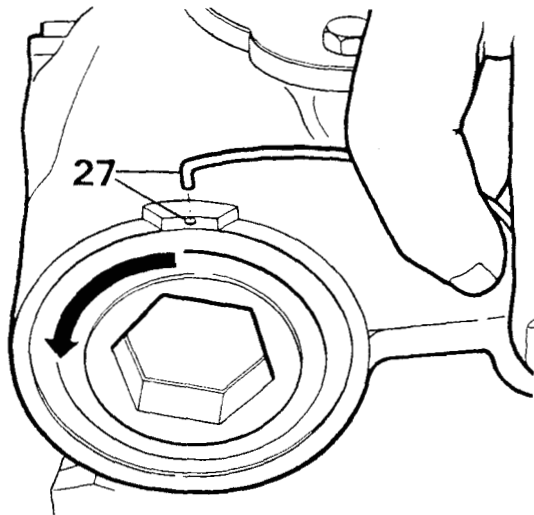
ST1944M

25. Screw-in the rack pad adjuster until the head is 4 mm from the steering box face.



ST1945M

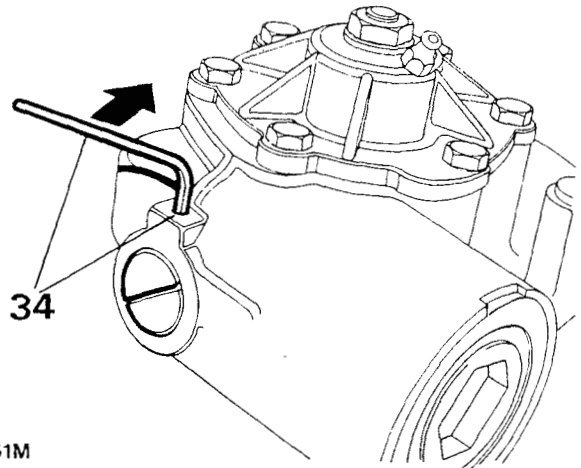
26. Lubricate and fit an 'O' ring seal to the piston-rack cover.
27. Fit the piston cover to steering box. Align the retaining ring hole in the cover with the cut-out in steering box housing and insert hooked end of the retaining ring in the hole. Using special tool LST123, rotate the cover anti-clockwise to feed the ring into the groove until the ring is fully seated. This is a reversal of instruction 3 of the dismantling procedure.



ST1956M

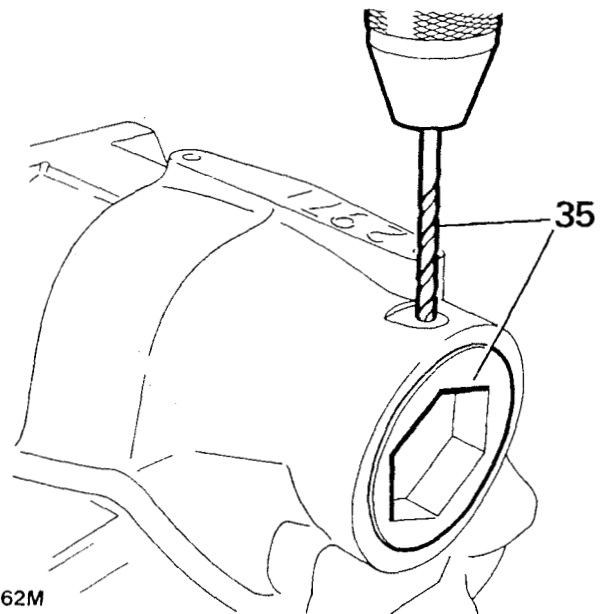
28. Temporarily fit the drop arm and secure with the nut so that no backlash is present between the arm and sector shaft. Set the steering in the straight ahead position.
29. Fit the preload setting tool R01016 to the input shaft and secure with the grub screw. Rotate the input shaft in both directions clockwise and anti-clockwise $\frac{1}{2}$ to $\frac{3}{4}$ of a turn to check the backlash distribution.
30. To check the drop arm angular travel for a LHD drive steering box use the preload setting tool to turn the input shaft two turns clockwise and one and three-quarter turns anti-clockwise. For RHD drive boxes, the opposite applies.
31. Remove the drop arm.
32. Return to the straight ahead position and screw the rack adjuster clockwise until the adjuster pad just contacts the pad.

33. Restrain the sector shaft adjuster, as in instruction 10, and tighten the locknut to 70 to 90 Nm (52 to 66 lbs/ft).
34. Secure the rack adjuster with the grub screw, reversing the dismantling procedure instruction 5.



ST1961M

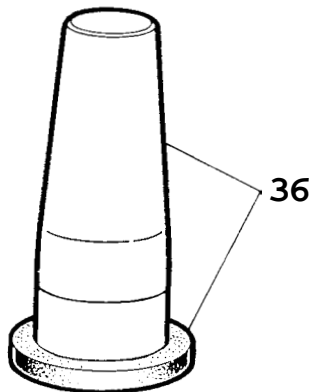
35. Secure the worm adjuster with a new pin. If necessary, drill a new 4 mm hole in the adjuster through the hole in the steering box housing to locate the pin. Check, before drilling that the new hole will not break into the side of the existing hole.



ST1962M

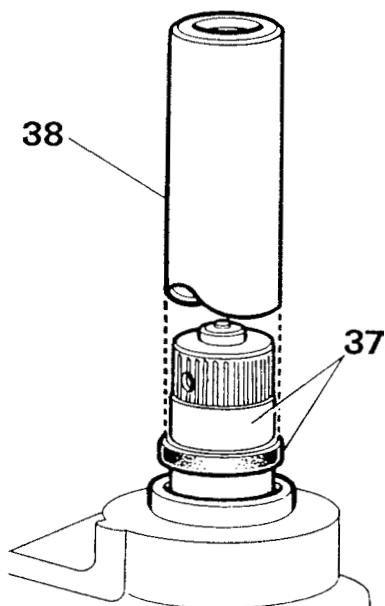
Fitting input shaft oil seal

36. Using the three part tool LST124, lubricate a new seal and slide it, lip side leading, over the conical seal-saver to the detachable lower part of the tool.



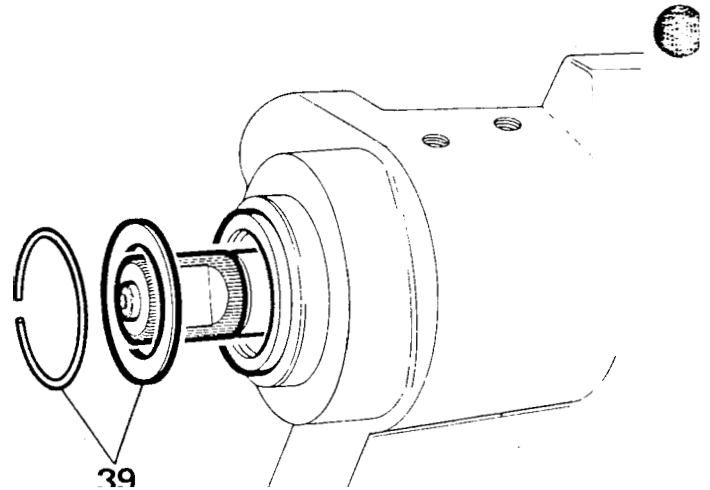
ST1947M

37. Withdraw the conical seal-saver and place the lower part of the tool with the seal, lip side downwards, over the input shaft.
 38. Place the seal-driver part of the tool on top of the seal and drive it fully home.



ST1948M

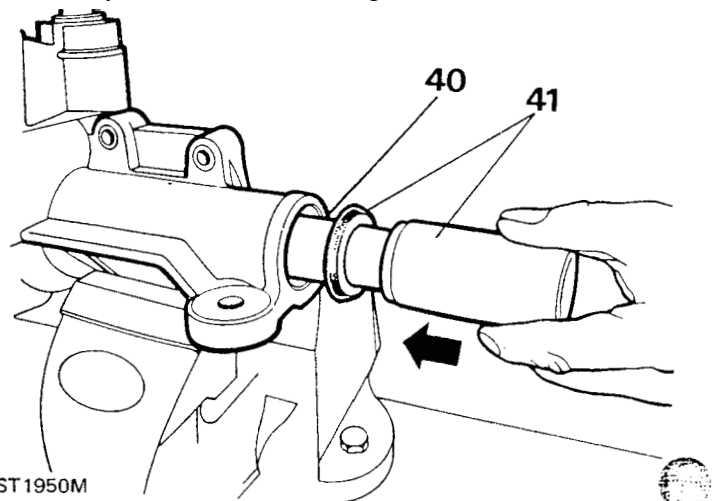
39. Fit the anti-extrusion washer and secure the assembly with the wire circlip.



ST1952M

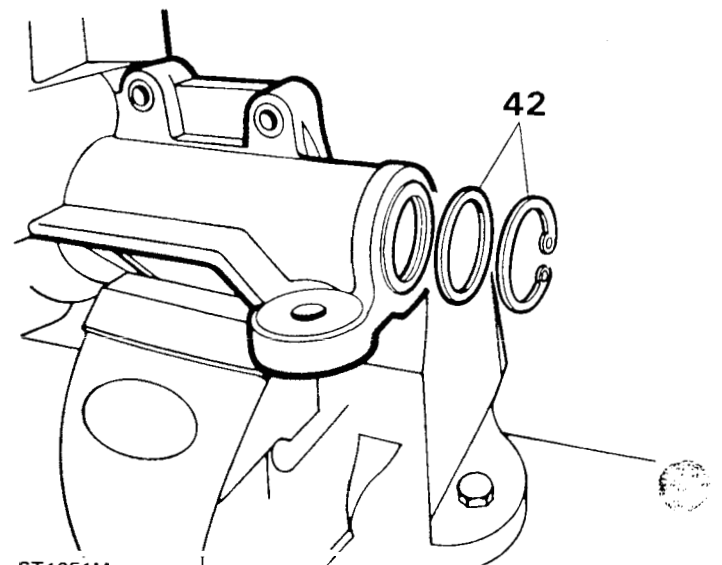
Fitting sector shaft oil seal

40. Lubricate the oil seal and seal-saver LST125, and slide the seal over the tool, lip side leading.
 41. Using the seal-driver part of the tool, push the seal fully home into the housing.



ST1950M

42. Fit the steel washer and secure the assembly with the circlip.



ST1951M

43. Fit the drop arm, tab washer and nut. Tighten the nut to 170 to 180 Nm (125 to 132 lbs/ft). Fold one side of the tab washer over the **drop** arm and the other over a flat against the nut.
44. Refit the steering box to the vehicle and bleed the hydraulic system.

NOTE: Bleeding and test of the power steering box is the same as that for the Adwest Lightweight box.

