

# Flying Spares

Dear Sir/ Madam,  
Thank you for ordering one of our loan tools.

Many of these tools are limited in their availability and difficult to replace or repair.

In order to keep their condition to the highest quality we inspect all our tools when they are returned to us.

Upon receipt please check that the tool is suitable for the task required, there may be a slight variance from the picture on our website. Should you have any concerns about the condition of the tool please contact me on 01455 299 781 or email me at [martin@flyingspares.co.uk](mailto:martin@flyingspares.co.uk).

Once you have used the tool please be mindful that there may be another request for it, and there is a possibility that I call or email you as a reminder to return the tool.

Thereafter, upon return it is very important that the tool is returned in the original packaging to ensure safe transit.

If you send the tool back with your own courier please ensure you take out suitable insurance cover, particularly where electrical tools are concerned as additional packing may also be required.

Finally, should the tool be returned in a substandard condition we reserve the right to withhold some or all of the surcharge.

To arrange collection please contact us on 01455 292969 and the cost of this will be deducted from your surcharge credit.

Thank you again for your business and helping us to keep these tools in the best condition, your cooperation is very much appreciated.

Yours Faithfully,

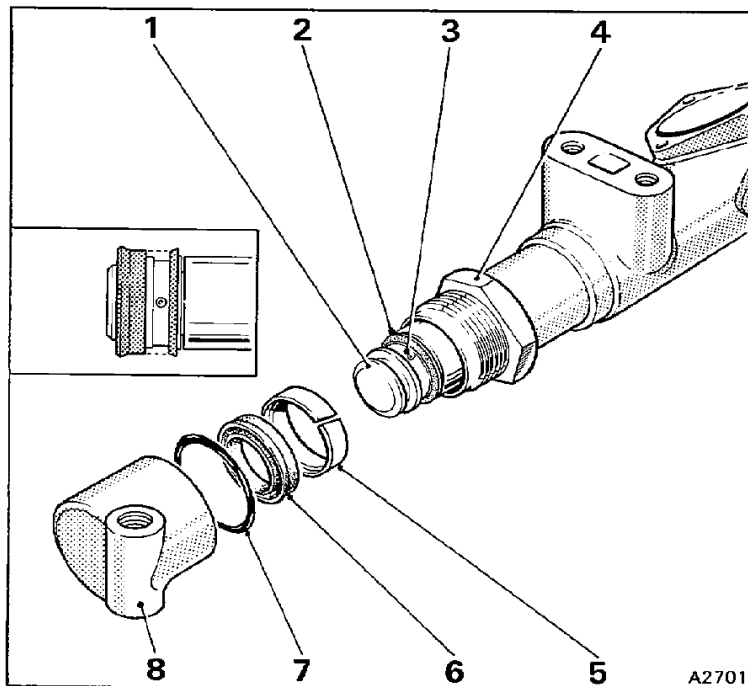
Martin Scott  
(Reconditioning)

# Flying Spares

## INFORMATION SHEET STEERING CENTRALISING TOOL (RH12123LOAN)

*This information can be found on IETIS (TSD6000)*

### Rack and pinion unit - To replace oil seals and bearing rings



#### **N2-8 Assembly of pinion box end components**

It is important that the pinion and valve housing assembly has been overhauled and the associated thrust ball race has been correctly shimmed before fitting the rack to the tube assembly.

Remove the pinion and valve housing assembly as described in, Rack and pinion unit - To dismantle. Ensure that this assembly stays together. Remove the assembly by pulling on the splined input shaft. If the valve housing is allowed to slide up over the splined shaft, the upper and lower oil seals may be damaged.

There are three seals on each end of the rack bar.

- (a) Wiper seal - Narrow black ring seal with a sharp outer diameter. If it is necessary to remove this seal, note which way it is fitted before removal.
- (b) Bearing ring - Broad white PTFE ring with a scarf joint.
- (c) Piston seal - Black lip seal without an energising spring.

The wiper seals and bearing rings are fitted to the rack bar before it is fitted to the pinion box and tube assembly.

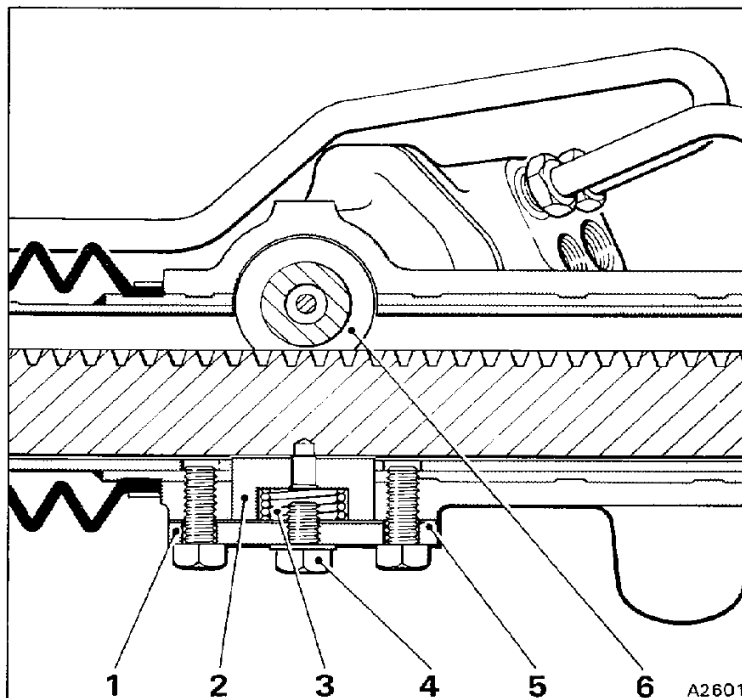
The piston seals are fitted to the rack bar after it has been assembled into the pinion box and tube assembly.

- 1.) Grip the rack bar firmly in a padded vice. Remove the bearing rings and piston seals from both ends.
- 2.) Examine the wiper seals for damage. If damage is apparent, using a suitable punch and hammer, remove the retaining pin from the floating piston assembly. Discard the pin and piston assembly.
- 3.) To remove the fixed bearing ring carrier from the opposite end of the rack bar, secure removal tool RH 12213 in a vice and position the bearing ring carrier into the tool. Using a soft headed mallet, drive the rack bar out of the bearing ring carrier. Discard the carrier and seal.
- 4.) Fit a new floating piston assembly, complete with wiper seal, to the rack bar. Secure in position with a new retaining pin. Take care to drive the pin in squarely, so that it passes cleanly through the hole in the opposite side.
- 5.) Fit a new wiper seal to the fixed bearing ring carrier end of the rack bar, ensuring that the sharp edge of the seal faces in towards the centre of the rack bar.
- 6.) Fit a new bearing carrier, taking care to ensure that it fits squarely and abuts the shoulder on the rack bar.
- 7.) Fit new scarf jointed PTFE rack bearings into their respective grooves at each end of the rack.
- 8.) Gently press each scarf joint together. Ensure that each gap has an initial (nominal) measurement of 2,03 mm (0.080 in).  
If a smaller gap is observed, cut one end of the scarf joint until the gap is correct.
- 9.) Using sizing tools (in the following order) RH 9114, RH 9113, and RH 9112, progressively reduce the diameter of the PTFE bearings, until they are a sliding fit in the rack tube.

Ensure that the gap at the scarf joint has not gone below a minimum of 0,25 mm (0.010 in). Also, ensure that it is positioned so as not to come into contact with the edges of the centre slot, etc., when the rack is assembled.

Remove any burrs from the slot. Wipe the area clean before assembly.

### **Rack and pinion unit - To assemble (unit not incorporating an external adjuster) (see fig. N2-10)**



**N2-10 Pinion mesh adjustment (rack and pinion unit not incorporating an external adjuster)**

- 1.) Remove the rack bar from the vice and replace it with the pinion box and tube assembly. Clamp the tube horizontally in the vice with the valve housing mounting face uppermost and the rack slipper hole facing towards the operator.
- 2.) From the pinion box end (smooth bore end) of the tube, push the rack bar into its central position. Ensure that the centralizing hole is in the middle of the rack slipper hole.
- 3.) Assemble the valve and pinion assembly (complete with shim pack, etc.) into the steering box. Ensure that with the rack in the central position, the flat on the pinion spline is on the same side and at right-angles to the short tube for right-hand drive cars, and the long tube for left-hand drive cars.
- 4.) Fit the three setscrews and screw down. Do not torque tighten at this stage.

The torque required to rotate the valve should not exceed 0,9 Nm (0,09 kgf m; 8 lbf in). If it does exceed this figure, the rack PTFE bearing rings could be incorrectly sized. Withdraw the rack bar and using sizing tools (in the following order) RH 9114, RH 9113, and RH 9112, progressively reduce the diameter of the PTFE bearings.

- 5.) Torque tighten the three retaining setscrews to between 20 Nm and 25 Nm (2,0 kgf m and 2,5 kgf m; 15 lbf ft and 18 lbf ft) whilst rotating the pinion, to ensure that the pinion pre-load is still correct.
- 6.) Fit the rack bar piston seals to each end of the rack using fitting tool RH 12214.

When fitting the seal to the long end tube, ensure that the seal is not damaged by the threaded bore. Ensure each seal seats correctly in its location groove.

- 7.) Fit the rack slipper (without the spring) and then fit the centre block to the rack.
- 8.) Fit the slipper coverplate with a shim pack, including a paper gasket at either end. Ensure that the thickness of the shim pack is sufficient to produce between 1 mm and 2 mm (0.040 in and 0.080 in) radial free play of the centre block in the rack tube.
- 9.) With the rack in the central position and the pinion housing retaining setscrews torque tightened, progressively reduce the thickness of the shim pack until zero free play is achieved.

Add one extra 0,05 mm (0.002 in) shim to the shim pack and insert the spring into the rack slipper. Torque tighten the slipper coverplate retaining setscrews to between 20 Nm and 25 Nm (2,0 kgf m and 2,5 kgf m; 15 lbf ft and 18 lbf ft).

The torque required to rotate the valve should now be between 1,13 Nm and 1,69 Nm (0,12 kgf m and 0,17 kgf m; 10 lbf in and 15 lbf in), with the rack in the central position. Readjust if necessary.

- 10. Fit the centring plug RH 12123.
- 11. Fit new convoluted seals as described in, Replacement of convoluted seals, Operations 8 to 16 inclusive. Prior to Operation 13, fit the long oil pipe to the valve housing and torque tighten the retaining nut to between 23 Nm and 27 Nm (2,4 kgf m and 2,7 kgf m; 17 lbf ft and 20 lbf ft).
- 12. Screw the lock-nut onto the threaded end of the rack tube. Then, clean and prime the threads with Loctite primer.
- 13. Fit a new 'O' ring into the groove in the end cap.
- 14. Commence to screw the end cap onto the tube. After 2 or 3 complete turns, apply a ring of Loctite 542 to the next three threads. Then, continue to screw on the end cap until it abuts the end of the tube.

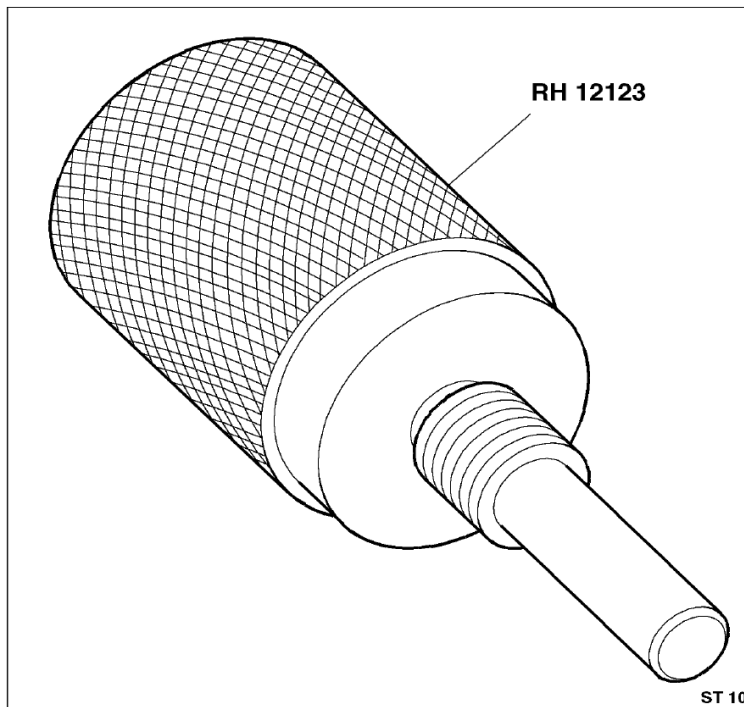
**Note: Ensure when carrying out this operation that the 'O' ring is not displaced.**

- 15. Fit the short oil pipe to the valve housing. Unscrew the end cap up to one complete turn, until it lines up with the banjo fitting on the oil pipe.
- 16. Tighten the lock-nut to between 47 Nm and 54 Nm (4,8 kgf m and 5,5 kgf m; 35 lbf ft and 40 lbf ft), using spanner RH 9125.
- 17. Torque tighten the short oil pipe into the valve housing to between 23 Nm and 27 Nm (2,4 kgf m and 2,7 kgf m; 17 lbf ft and 20 lbf ft).

Fit the banjo bolt hydraulic fitting, ensuring new sealing washers are fitted.

Torque tighten the banjo bolts to between 35 Nm and 41 Nm (3,6 kgf m and 4,1 kgf m; 25 lbf ft and 30 lbf ft).

- 18. The unit is now ready for fitting to the car, but do not remove the centring plug at this stage.



**RH12123TOOL**