

Section N4

Steering column

Upper steering column - To remove with steering wheel and lower link dismantled

The upper steering column is an energy absorbing unit. It comprises a lower extension and is fitted with a three point fixing bracket, spot welded on to the outer casing. Anti-vibration rubber mountings secure the column to under-facia steel-work whilst the lower end of the unit is fitted through a large rubber grommet and fastened to the toeboard by a circlip.

1. With the facia components dismantled, remove either the 4 in 1 instrument or the speedometer, to gain access to the steering column fixing behind the instrument panel. Carefully allow the instrument to hang from its connecting wires.
2. Slacken the two 3/8 in. U.N.F. socket head cap screws from the steering column upper mounting. Hold the tapping block and heavy washers through the instruments aperture.
3. Release the cap screws and extract the block and washers from behind the panel. Place components safely aside.
4. Replace the panel instrument.
5. Remove the large circlip and washer from the engine compartment side of the toeboard (see Fig. N33)
6. Unscrew and remove the knurled connector (purple/black wire) and unclip the Lucar connector (black wire) attached to the steering column.
7. From inside the car, support the column and release the single 3/8 in. U.N.F. socket head cap screw from the lower mounting. Retain the screw and washers but discard the nut.
8. From the driving position withdraw the steering column through the toeboard rubber grommet.
9. Inspect for worn and damaged components.

Note

Care should be taken when manoeuvring the column inside the saloon to avoid damage to the woodwork and trim.

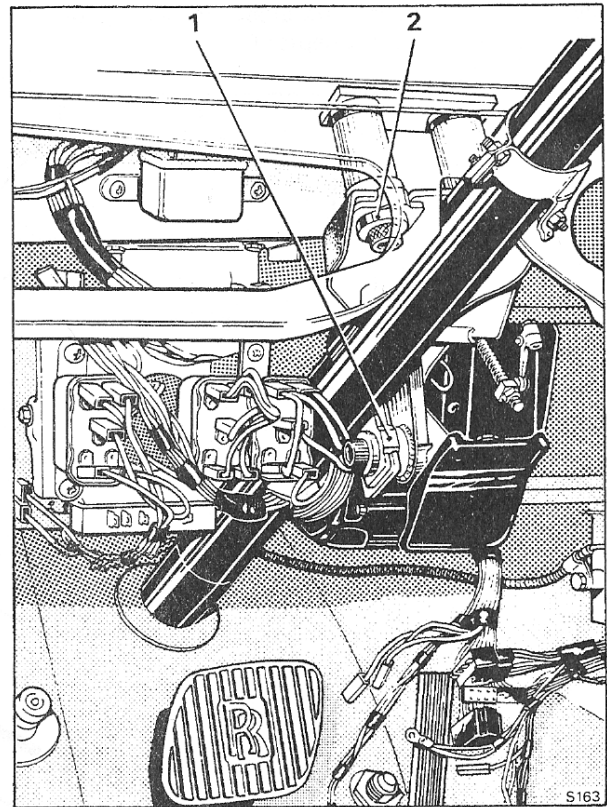
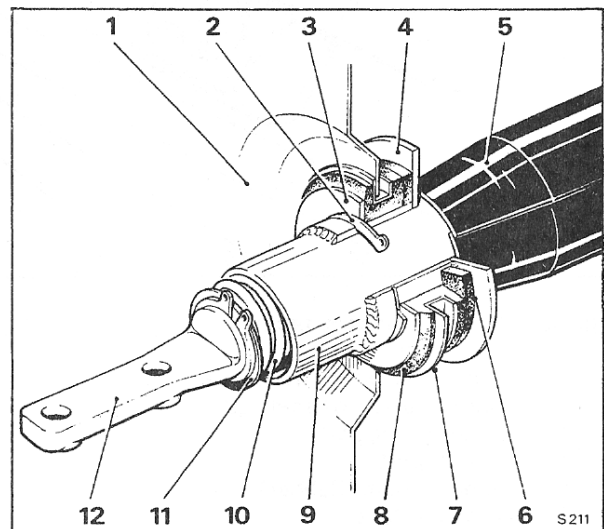


Fig. N32 Steering column in position

- 1 Lower mounting point
- 2 Upper mounting point

Fig. N33 Toe-board fixing

- 1 Toeboard bulkhead
- 2 Circlip
- 3 Washer
- 4 Flange
- 5 Plastic cover
- 6 Soft rubber washer
- 7 Bulkhead reinforcement
- 8 Bulkhead grommet
- 9 Main tube
- 10 Spring
- 11 Washer and circlip
- 12 Linkage arm



Upper steering column - To fit

Reverse the procedure for removal giving consideration to the following points.

1. Before replacing the column into the toeboard a new rubber grommet and foam washer should be fitted.
2. Ensure that when replacing the two upper socket head cap screws the spigot rubbers and inner metal tube are not disturbed. Torque tighten to the figures given in Chapter P.

3. Locate a new nut to the column lower mounting, then finger tighten the cap screw until the washer just binds against the column locating capsule.

4. At this point check if the original slotted washer will make up the gap between the capsule and support bracket.

5. If a larger gap is apparent, measure this with feeler gauges and substitute the number of washers as necessary, using the following example.

With a measured gap of between zero and 0,35 mm. (0.014 in.), only one adjusting washer

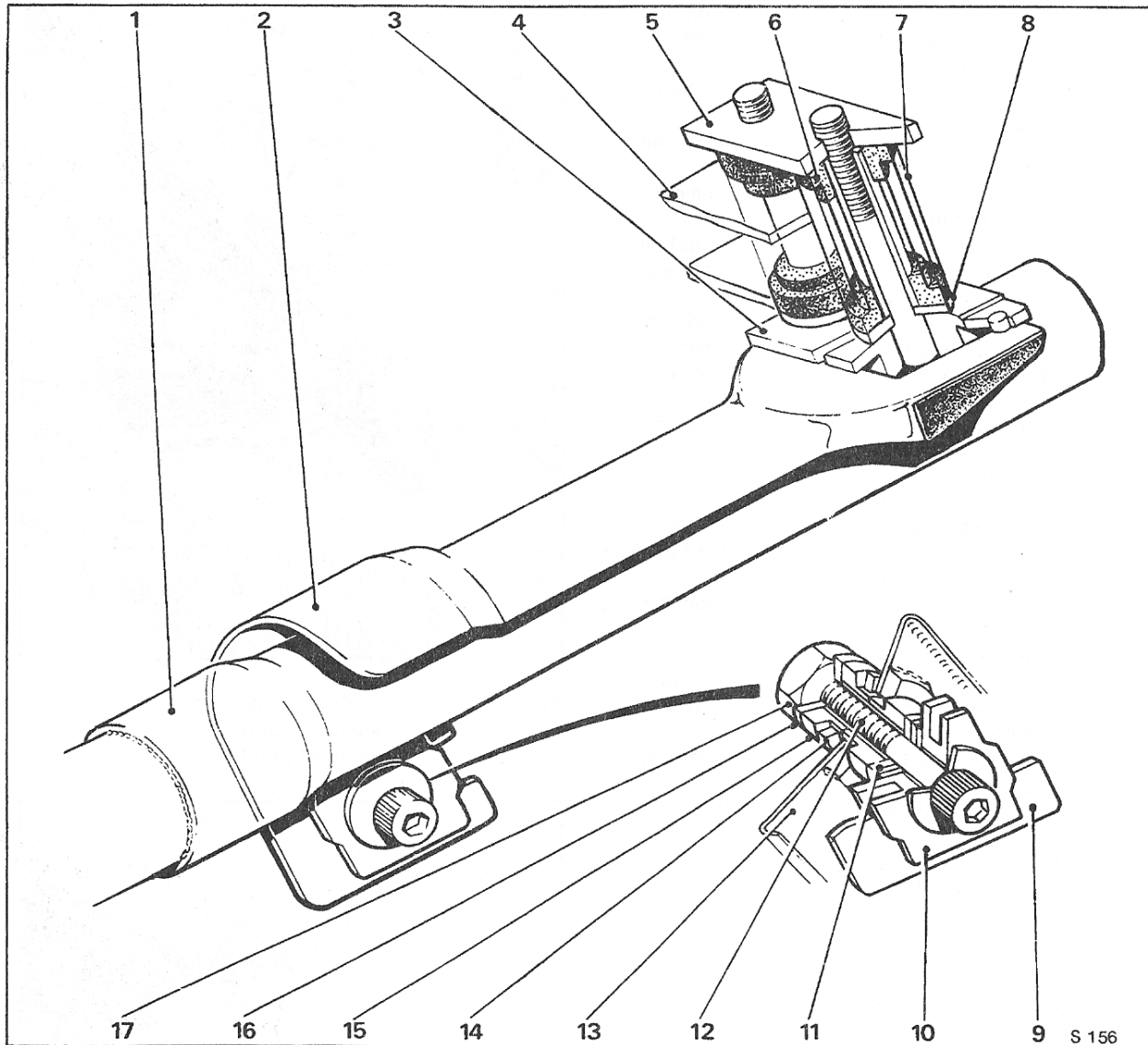


Fig. N34 Column mounting points

- | | |
|------------------------------|-------------------------------------|
| 1 Outer tube | 9 Lower flange |
| 2 Column mounting attachment | 10 Captive alloy washer |
| 3 Captive alloy washers (2) | 11 Shim washers (as required) |
| 4 Bulkhead support | 12 Distance tube |
| 5 Tapped plate | 13 Bulkhead support and welded bush |
| 6 Flanged bush (Rubber) | 14 Plain washer |
| 7 Distance tube | 15 Flanged bush (Rubber) |
| 8 Plain washer | 16 Plain washer |
| | 17 Nut |

S 156

will be necessary. With a large gap necessitating more than one washer, the following calculation can be applied.

$$\begin{array}{l} \text{Measured gap divided by} \\ 0,35 \text{ mm. (0.014 in.)} \end{array} = \begin{array}{l} \text{Number of washers} \\ \text{required to complete the assembly.} \end{array}$$

Slotted adjusting washers are manufactured from 22 S.W.G. 0,70 mm. (0.028 in.) material, the size designed to compensate for the 0,70 mm. (0.028 in.) compression of the spigot rubbers.

Steering link - To remove and fit (Fig. N35)

The lower link unit comprises an upper safety stalk and bonded coupling attached to a universal joint and shaft splined at the lower end. The shaft connects with a lower universal joint which in turn is secured to the pinion box.

Warning

Do not use impact force to remove any joint on or near to the steering unit. Irreparable damage to the unit, could result.

1. With the rack and pinion unit removed from the suspension, release the two bolts securing the upper link to the steering column extension unit and carefully lower from under the car.
2. Remove the heat shields and inspect universal joints and bonded coupling.
3. Detach the bonded coupling from the flanged yoke to inspect the safety stalk.
4. Release the pinch bolt holding the lower universal joint to the intermediate shaft. Dismantle.

At this stage, inspect the splines, screw threads, bonded coupling and universal joints for wear, to ensure new parts are fitted where necessary.

5. When fitting the upper link to the bonded coupling, torque tighten the two bolts to the figures quoted in Chapter P.
6. Fit heatshield onto protruding bolt threads fitted in operation 5 and secure with washers and half nuts torque tightened to the figures quoted in Chapter P.
7. Fit the intermediate link flange to the bonded coupling with safety stalk positioned and special button headed bolts torque tightened to the figures quoted in Chapter P. Ensure washers are fitted between the bonded coupling and the safety stalk base plate.
8. Replace the intermediate shaft to lower link, ensuring the cut-away in the spline is in horizontal relation to the pinch bolt which should be finger tightened. Place the heat shield in position.

The upper and lower link assembly, can now be installed.

Note

To set the steering wheel in a straight ahead position, it may be necessary to offset the linkage in the adjustment, by one spline at the steering wheel (36 splines) and the pinion box (48 splines).

9. With the road wheels in the straight ahead position use the centring plug (RH 9119) to ensure the setting mark drilled into the steering rack is centrally disposed in the blanking plug aperture.

10. Replace the blanking plug.
11. Check that the steering column lower extension machined face is lying horizontal and facing upwards.
12. Fit the steering wheel on the nearest spline to the straight ahead position then adjust by turning the wheel slightly to give an exact setting.
13. Align the upper link to the lower extension face, then feed the lower splined clip over the pinion box spline and nip together with the pinch bolt and castellated nut.
14. Check at this stage if the upper link and lower extension faces are parallel. Any further adjustment must be made using the procedure shown in operations 12 and 13.

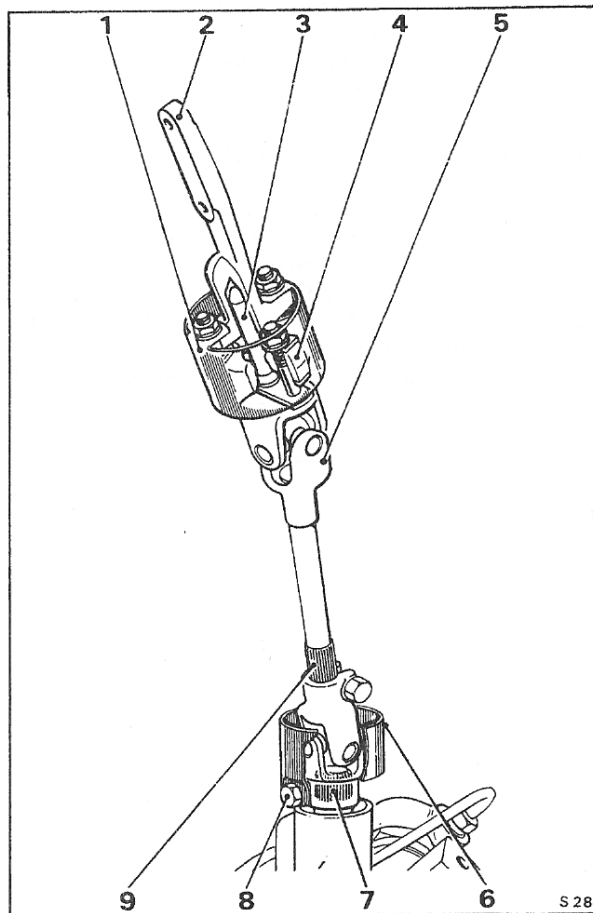


Fig. N35 Column to steering unit linkage

- 1 Heatshield
- 2 Link to column connector
- 3 Safety stalk
- 4 Bonded coupling
- 5 Universal joint
- 6 Heatshield
- 7 Spline
- 8 Pinch bolt
- 9 Adjustable spline

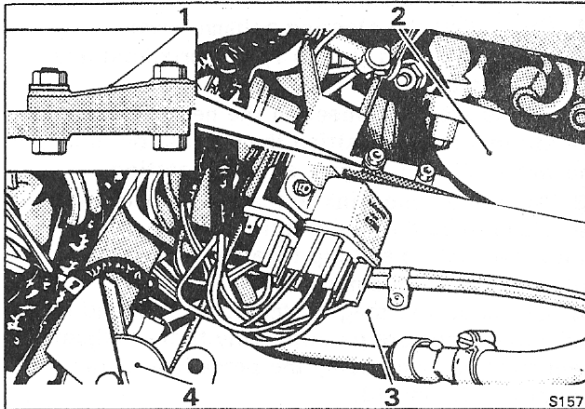


Fig. N36 Steering column extension to lower link

- 1 Column to link attachment (and inset)
- 2 Exhaust manifold
- 3 Right-hand valve panel
- 4 Pulley to speed control unit

15. Torque tighten the lower pinch bolt and castellated nut. Use the torque tolerance to allow the fitting and securing of a new split pin.

16. Fit the two bolts into the underside of the steering column lower extension.

Fit a **nut** to the bolt adjacent to the bonded coupling and a **nut and washer** to the bolt adjacent to the toe-board (see Fig. N36 - Inset).

Torque tighten to the figures quoted in Chapter P.

17. Fit and torque tighten the steering wheel column nut.

Refer to Chapter P for the above torque tightness figures.

Section N5

Steering linkage

Introduction

Steering linkage to the road wheels is by track rods attached with ball pin joints to the rack and pinion inner bracket at the centre and the side steering levers at the hubs.

Toe-in is readily adjusted by screwed connectors situated between the inner and outer track rod components. This function does not require the withdrawal of the hub ball joint. Grease nipples are fitted to all four ball pin locations.

Adjustable track rod units - To remove

1. Turn the steering unit onto full lock in any one direction.
2. Remove the split pin, castellated nut and washer from the ball pin assembly.
3. Using special tool (RH 8100) release the ball joint taper and withdraw this from the inner ball joint bracket.
4. Turn the steering unit onto full lock in the opposite direction and using the same procedure, withdraw the opposite ball joint.
5. Remove the split pins, castellated nuts and washers from the outer track rod ball joints.

6. Support the track rod, then using special tool (RH 8080) withdraw the outer ball joints from the side steering levers and remove the track rods from beneath the car.

7. Inspect the ball joint units and replace if necessary

Ball pin unit - To remove

1. Unscrew and remove the hexagon headed plug from the track rod end socket.
2. Using circlip pliers remove the clip and sealing boot then the ball pin.
3. Discard the unit.
4. Clean out the track rod socket using 'Genklene' or an equivalent solution.
5. Inspect internal surfaces for damage.

Track rod socket - To renew

If at this stage of dismantling the socket was found to be damaged, check the number of turns required to remove the damaged socket and to set the new socket into the approximate position. The final toe-in setting can be made only when the track rod assembly has been fitted into the car.

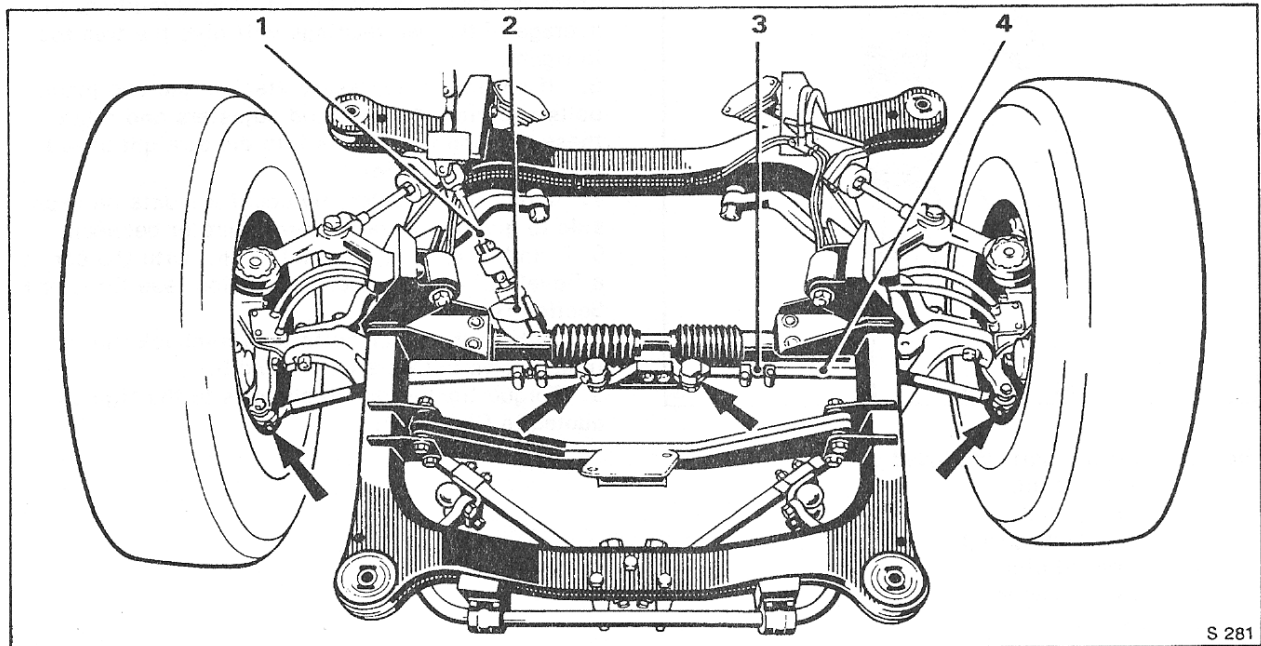


Fig. N37 Steering linkage

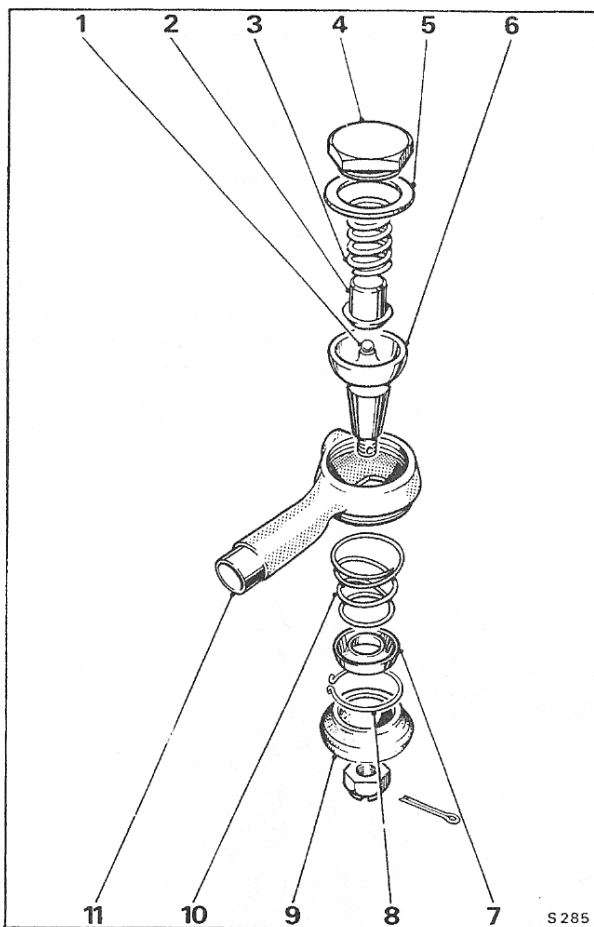
- 1 Lower link unit
- 2 Spool valve and pinion box

- 3 Track rod adjuster
 - 4 Outer track rod
- ➔ Grease points

N5 - 2

Ball pin unit - To fit

1. Place the ball pin components into the track rod socket in the following sequence, lightly lubricating each component with an approved grease.
2. Fit the taper pin through the rectangular hole with the shoulder bearing on the inner seat.
3. Smear the ball seat with approved grease and fit the ball bearing, spring seat, spring, alloy joint washer and finally the retaining plug.
4. Apply Rocol T 265 grease to the seal faces of the ball joint then fit the rubber seal with its assembled lower retaining clip, coil spring and upper seating.

**Fig. N38 Ball pin unit. Exploded view**

- | | |
|----|------------------------------|
| 1 | Ball bearing |
| 2 | Spring seat |
| 3 | Ball joint spring |
| 4 | Screwed plug |
| 5 | Alloy washer |
| 6 | Ball pin |
| 7 | Spring seat |
| 8 | Retaining spring |
| 9 | Dust cover |
| 10 | Dust cover expander |
| 11 | Track rod ball joint housing |

5. Locate the clip and lower edge of the rubber seal under the lip of the track rod socket.
6. Fit the grease nipple into position then lubricate the assembly with approved grease, until it exudes from the seals.
7. Each joint will require approximately 9,5 gms. (0.66 oz.) of grease for an initial filling operation.

Adjustable track rod units - To fit

Clean the taper connections in the side steering levers, the centre ball joint bracket and the ball joint units assembled in the track rods.

1. Lightly smear the bearing surfaces before offering the assembly up to the steering unit.
2. Fit the inner ball joint down into the centre bracket and the outer ball joint up into the side steering lever socket.
3. Secure the ball joints with new castle nuts and split pins. Tighten the $\frac{3}{4}$ in. U.N.F. ($1\frac{1}{8}$ in. A/F) nuts to a torque tightness figure quoted in Chapter P using the tolerance to align the split pin holes.

Front wheel toe-in - To adjust

1. Place the car on a level surface and set the steering wheel in the straight ahead position.
2. Remove the gear selector thermal cut-out, as described in Chapter M - Electrical System.
3. Move the car forward a full half revolution of the road wheels. Moving the car backwards instead of forward will give an incorrect reading.
4. Take a reading using optical alignment equipment.
5. Move the car forward a further half revolution of the road wheels and take a second reading. An average of the two readings will give the true toe-in figure.
6. If setting is necessary slacken the two pinch bolts securing the track rod adjusters and rotate these to bring the wheels into the straight ahead position (zero toe-in).
7. Rotate the adjusters by equal amounts on each side to give an overall toe-in figure of between 0' 7" and 0' 17" ($\frac{1}{32}$ in. and $\frac{3}{32}$ in.) with the car in a 'levelled' or 'showroom' condition (see Chapter H Section H5).
8. Tighten the pinch bolts then re-check the toe-in as shown in Operations 4 and 5.
9. Torque tighten the pinch bolts to the figures quoted in Chapter P.

Section N6

Fault diagnosis

Malfunction	Possible cause	Action
Steering pump and reservoir		
Hydraulic fluid leaks	Reservoir cover seal or filler cap seal leaking due to fluid level being too high or air in fluid	Check oil level and top-up if required. Bleed system to remove air by operating steering. Examine cap and cover for damage or distortion.
	Reservoir to pump 'O' rings leaking	Renew 'O' rings
	Flow control valve plug 'O' rings leaking	Renew 'O' rings
	Steering pump bearing seal leaking	Renew seal. Examine shaft for wear or damage
	Reservoir or filler cap seals damaged	Renew seals
Momentary increase in effort when turning wheel quickly to right or left	Low fluid level in reservoir	Check fluid level. Top-up if required. Examine system for leaks
	Pump drive belt(s) slipping	Correctly adjust pump drive belt(s)
	Heavy internal fluid leak	Check pump outlet pressure. If pressure is low renew combined flow control and relief valve. If pressure remains low, check system for internal leaks by dismantling steering unit
	Aerated fluid	Renew fluid or allow system to stand for at least one hour
Noisy system		
	Low fluid level	Fill reservoir to correct level with an approved fluid and bleed system by operating steering
	Loose drive belt(s)	Correctly adjust drive belt(s)
	Pressure hose not correctly fitted	Ensure correct run of hose
	Excessive back pressure due to partially blocked pipes or resistance to steering gear movement	Locate restriction and correct if necessary

N6 - 2

Malfunction	Possible cause	Action
Noisy system (continued)		
	Scored rotor or rollers	Renew rotor and rollers or fit new pump if required
	Excessive wear on cam ring	Fit new steering pump
	Defective flow control valve	Renew valve
	Scored pressure plate	Lap to remove light scoring. Renew heavily scored components
	Vanes incorrectly fitted	Fit vanes correctly
	Vanes sticking in rotor slots	Free by removing burrs or dirt
	Extreme wear on pump ring	Renew pump ring, rotor and vanes
	Face of thrust plate scored	Lap to remove light scoring. Renew rotor, vanes and pump ring if rotor is heavily scored
	Scored rotor	Lap to remove light scoring. Renew heavily scored components
	Aerated fluid	Change fluid or allow system to stand for at least one hour
Steering		
Car pulls to one side or the other	Front end geometry misaligned	Check steering geometry
	Pump drive belt(s) slipping	Correctly adjust steering pump belt(s)
	Flow control valve sticking	Examine flow control valve. Renew valve if necessary
Heavy steering	Incorrect tyre pressures	Check and correct tyre pressures
	Loose pump drive belt(s)	Correctly adjust drive belt(s)
	Low fluid level in reservoir	Check level of fluid in reservoir. Top-up if required. Examine system for leaks
	Lack of lubricant in steering joints	Examine all steering joints. Grease with approved lubricant if required
	Insufficient fluid pressure	If the preceding checks do not reveal the cause of heavy steering, check pump pressure
	Faulty or obstructed flow control valve	Renew or replace if necessary

Malfunction	Possible cause	Action	
Heavy steering (continued)	Incorrect front wheel alignment	Check and adjust if required	
	Excessive castor or toe-in	Adjust castor or toe-in to within specified limits	
	Incorrect camber angle	Correct camber angle to within specified limits	
	Distorted flexible coupling or defective universal joint	Examine flexible coupling. Renew if necessary. Examine universal joint in lower steering column. Renew if necessary	
	Triangle levers misaligned	Check wheel castor and camber	
	Front sub-frame distorted	Check sub-frame for correct alignment. Correct or renew if required	
	Kinks in hoses	Ensure correct run of hoses	
	Obstruction in hose. Inner bore of hose swollen, caused by overheated or incorrect fluid	Renew hose	
	Pressure loss in rack and pinion unit caused by worn P.T.F.E. seals, scored bore	Overhaul unit	
Steering wheel	Leakage at pinion valve	Overhaul unit	
	Excessive play at steering wheel	Excessive play in steering linkage	Adjust steering linkage or renew parts if required.
		Insufficient pre-load	Strip and rebuild steering unit
		Defective bonded coupling	Replace
		Worn universal joints in lower linkage	Replace
		Front wheel bearings incorrectly adjusted or worn	Correctly adjust bearings or renew if required
		Worn check valve in pressure connection	Renew check valve

N6 - 4

Malfunction	Possible cause	Action
Steering linkage		
	Steering linkage loose	Examine linkage pivot points for wear. Renew worn parts if required
Rack and pinion unit		
Oil leak from centre linkage	Loose convoluted seal clips	Tighten
	Defective centre seal	Fit new seal and bond
Hydraulic fluid leaks from hose connections and pipe unions	Loose hose connections or damaged 'O' rings	Tighten hose connections. If tightening fails to cure leak, examine ends of hoses for cracks or damage. Renew 'O' rings if necessary
	Damaged hose	Examine hose for fretting, fraying or deterioration. Renew hose if required. Ensure that correct hose run is obtained and that hose clips are correctly fitted.

Section N7

Workshop tools

Tool Number	Description
Steering wheel	
RH 7870	Extractor – Corniche and Camargue
Spool valve and pinion	
RH 9120	Spline cover – Input shaft. Upper oil seal
RH 9121	Applicator – Input shaft. Upper and lower oil seal
RH 9117	Applicator – P.T.F.E. rings. Spool valve
RH 9118	Sizing tool – P.T.F.E. rings. Spool valve
RH 9123	Torque arm – Spool valve ball race pre-load (use with spring balance)
Steering pump	
RH 7674	Pliers (two-way) – Circlip and snap ring
RH 9106	Fitting and extracting tool – Pulley
Rack unit	
RH 9112	Sizing tool (small) – P.T.F.E. scarf jointed bearing
RH 9113	Sizing tool (medium) – P.T.F.E. scarf jointed bearing
RH 9114	Sizing tool (large) – P.T.F.E. scarf jointed bearing
RH 9119	Screwed location plug – Rack centring
RH 9125	Spanner (open ended) – To fit torque wrench
RH 9122	Torque wrench extension – Steering rack anchorage