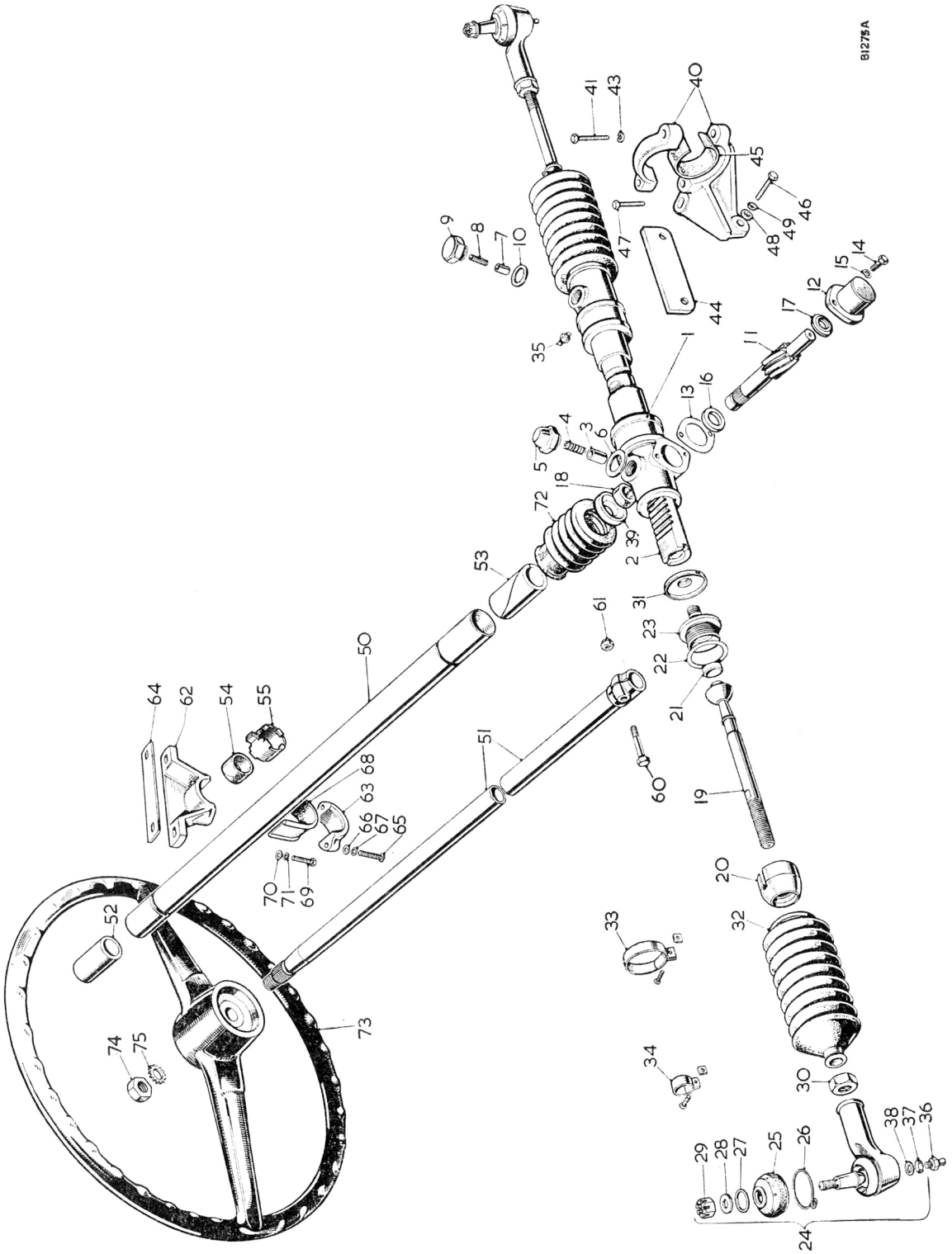
SECTION J

THE STEERING GEAR

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Front wheel alignment	J.2
Lubrication	J.1
Service tools	End of Section
Steering	
Column assembly	J.3
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THE STEERING GEAR COMPONENTS



KEY TO THE STEERING GEAR COMPONENTS

No.	*Description*
1.	Rack housing.
2.	Rack.
3.	Damper pad.
4.	Damper pad spring.
5.	Damper pad housing.
6.	Shim.
7.	Secondary damper pad.
8.	Secondary damper spring.
9.	Secondary damper housing.
10.	Housing washer.
11.	Pinion.
12.	Pinion tail bearing.
13.	Shim.
14.	Set screw.
15.	Spring washer.
16.	Pinion thrust washer (top).
17.	Pinion thrust washer (bottom).
18.	Pinion seal.
19.	Tie-rod.
20.	Bell housing (female).
21.	Ball seat.
22.	Shim.
23.	Ball housing (male).
24.	Ball socket assembly.
25.	Boot.
26.	Clip.
27.	Ring.
28.	Plain washer.
29.	Nut.
30.	Locknut.
31.	Lock washer.
32.	Seal.
33.	Clip (inner).
34.	Clip (outer).
35.	Lubricator.
36.	Lubricator.
37.	Dished washer.
38.	Fibre washer.
39.	Retainer.
40.	Bracket and cap assembly.
41.	Set screw.
43.	Spring washer.
44.	Seating.
45.	Packing.
46.	Set screw.
47.	Set screw.
48.	Plain washer.
49.	Spring washer.
50.	Outer column.
51.	Inner column tube.
52.	Felt bearing (top).
53.	Felt bearing (bottom).
54.	Felt bearing (bottom).
55.	Clip.
60.	Bolt.
61.	Nut.
62.	Bracket.
63.	Bracket cap.
64.	Shim.
65.	Set screw.
66.	Plain washer.
67.	Spring washer.
68.	Seating.
69.	Set screw.
70.	Plain washer.
71.	Spring washer.
72.	Draught excluder.
73.	Steering-wheel.
74.	Nut.
75.	Shakeproof washer.

GENERAL DESCRIPTION

The steering gear is of the rack and pinion type and is secured above the front frame cross-member immediately behind the radiator. Tie-rods, operating the swivel arms, are attached to each end of the steering-rack by ball joints enclosed in rubber gaiters.

The steering-column engages the splined end of a helical-toothed pinion to which it is secured by a clamp bolt.

End-play of the pinion is eliminated by adjustment of the shims fitted beneath the pinion tail end bearings. A damper pad inserted in the steering rack controls the backlash between the pinion and the rack.

Section J.1

LUBRICATION

The lubrication nipple provided at the left-hand side of the rack housing (right-hand side on left-hand-drive cars) is accessible when the bonnet is raised. Apply a gun filled with lubricant and give 10 strokes only at regular intervals.

Section J.2

FRONT WHEEL ALIGNMENT

When correctly adjusted the front wheels should toe in 0 to $\frac{1}{8}$ in. (0 to 3 mm.). To carry out the necessary adjustment first check that all tyres are inflated to the recommended pressures (see **'GENERAL DATA'**).

Turn the wheels to the straight-ahead position. With conventional base-bar-type alignment gauges measurements in front of and behind the wheel centres should be taken at the same points on the tyres or rim flanges. This is achieved by marking the tyres where the first reading is taken and moving the car forward approximately half a road wheel revolution before taking the second reading at the same points.

Wheels and tyres vary laterally within their manufacturing tolerances or as the result of service, and alignment figures obtained without moving the car are unreliable.

If the wheel alignment is incorrect adjust the track by slackening the locknut for each tie-rod ball joint and the clips securing the rubber gaiters to the tie-rods, then rotate each tie-rod equally in the necessary direction. Both tie-rods have right-hand threads.

NOTE.—To ensure that the steering-rack is in the central position and that the steering geometry is correct it is important to adjust the tie-rods to exactly equal lengths.

After adjustment tighten the ball joint locknuts.

Section J.3

STEERING-COLUMN ASSEMBLY

Removing

Remove the connector from the negative battery terminal. Release and remove the clamp bolt nut from the splined lower end of the steering-column. Disconnect the horn wire at its snap connection beneath the fascia. Remove the steering-column surround situated between the fascia panel and the steering-wheel, after removing its securing set screws located behind the fascia. Release the bolts securing the column bracket beneath the fascia panel. The steering-wheel may now be withdrawn. The inner and outer columns can be separated once the steering-wheel motif, steering-wheel securing nut, and steering-wheel have been removed. To avoid damage to the horn switch contact use Service tool 18G 562 to unscrew the nut.

Refitting

Refitting of the steering-column assembly is the reverse of the removal procedure. Use Service tool 18G 562 when tightening the steering-wheel nut.

Section J.4

STEERING-RACK AND PINION

Removing

Remove the clamp nut and bolt from the splined lower end of the steering-column and disengage the column from the splines.

Remove the split pins and slotted nuts from the ball pins and detach the tie-rod ball joint from the swivel arm, using Service tool 18G 313.

Remove the set screws securing the steering-rack clamp mounting brackets to the front cross-member. The rack assembly complete with tie-rods and brackets can now be removed.

Dismantling

Measure and record the distance from the spanner flats on the tie-rods to each of the ball joint locknuts; this will be of great assistance when reassembling.

Slacken the ball joint locknuts and unscrew the ball joint assemblies.

Position the rack housing over a receptacle to catch the oil, release the gaiter clips from the rack housing and tie-rods, and remove the rubber gaiters.

Remove the hexagonal cap adjacent to the oil nipple on the housing and withdraw it complete with sealing washer, pressure pad, and spring.

Remove the damper pad housing fitted at the pinion end of the rack housing and withdraw it complete with plunger, spring, and shims.

Extract the bolts securing the pinion shaft tail bearing and remove the bearing and shims. Withdraw the pinion complete with the bottom thrust washer. The top thrust washer (the thickest one) is trapped behind the rack teeth and may be removed after the rack is withdrawn.

Secure the rack housing between suitable clamps in a vice and tap back the washers locking the tie-rod ball housing. Remove the ball joint cap, using Service tool 18G 313.

NOTE.—In some cases the latter operation releases the ball seat housing from the ball joint cap; in this case difficulty will be experienced in removing the ball housing from the rack. It is therefore essential to release the ball

housing from the rack before the ball seat housing and joint cap are separated.

Remove the lock washer and withdraw the steering-rack from the housing.

Remove the ball seat housing from the ball joint caps, using Service tool 18G 313 together with 18G 312. The shims and ball seats are now free to be removed: ensure that the shims are kept to their respective sides.

Thoroughly clean and examine all parts of the dismantled assembly for wear, and renew if necessary.

Reassembly

Reassemble by reversing the dismantling procedure and pay special attention to the following points.

The ball joints linking the tie-rods to the rack must be a reasonably tight sliding fit without play. Any adjustment required is carried out by varying the thickness of shims fitted beneath the ball joint cap seating. The shims are available in thicknesses of ·002, ·003, ·005, and ·010 in. (·05, ·08, ·13, and ·25 mm.). When correctly adjusted, the ball housing must be locked in three places with the flange of the lock washers.

Place the thickest of the pinion thrust washers in position in the rack housing with its chamfered edge towards the rack. Replace the smaller thrust washer on the plain end of the pinion shaft with the chamfered edge towards the pinion teeth.

Ensure also that the centre tooth on the rack is in line with the mark on the splined end of the pinion shaft when replacing the pinion. Excessive end-float of the pinion is rectified by the fitting of shims. By means of a dial gauge placed at the end of the pinion shaft, check the end-float of the shaft, which should be between ·002 and ·005 in. (·05 and ·13 mm.). The shims are available in thicknesses of ·003, ·005, and ·010 in. (·08, ·13, and ·25 mm.). Replace the ball joint locknuts and joint assemblies in approximately their original positions, referring to the figures recorded when the rack was dismantled. To replace and adjust the rack damper, position the plunger in the cap and replace the cap. Screw down the cap until it is just possible to rotate the pinion shaft by drawing the rack through its housing. With a feeler gauge measure the clearance between the hexagon of the damper cap and its seating in the rack housing (Fig. J.2). After obtaining a figure, add ·002 to ·005 in (·05 to ·13 mm.) to arrive at the correct thickness of shims which must be placed beneath the damper cap. Shims are available in thicknesses of ·003 and ·010 in. (·08 and ·25 mm.). Remove the damper cap and plunger. Fit the spring beneath the plunger and assembly with the required number of shims to give the stated clearance. Fit a new pinion shaft oil seal and pump 10 fl. oz. (·28 litre) approximately of oil into the rack housing through the nipple provided.

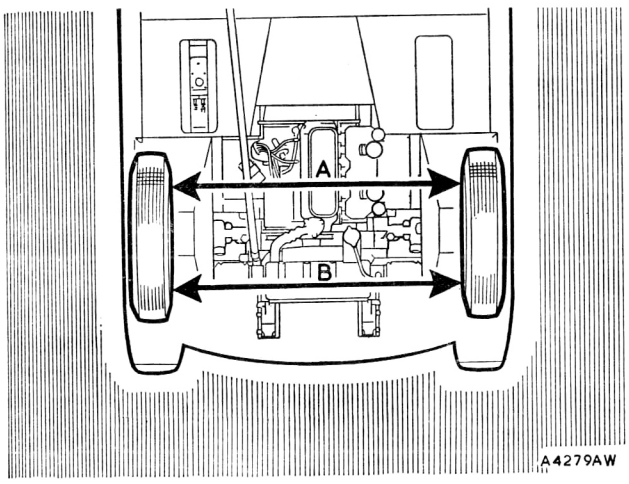


Fig. J.1

The toe-in must be adjusted so that (A) *is* 0 *to* $\frac{1}{8}$ *in.* (0 *to* 3 *mm.*) *greater than* (B)

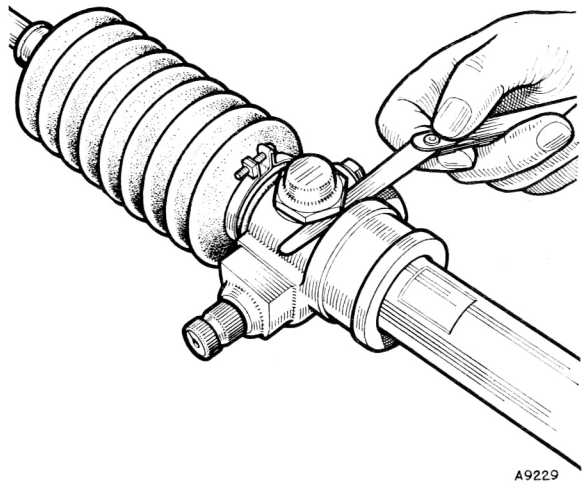


Fig. J.2

Checking the adjustment of the damper cap

Refitting

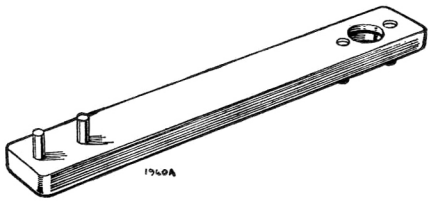
Refitting is the reverse of the removal procedure, except that the bolts securing the housing to its mounting brackets should not be fully tightened until the assembly has been replaced. This method of assembly will ensure that the steering-rack pinion is in correct alignment with the column. Finally, tighten the rack housing bolts.

(*For* **'SERVICE TOOLS'** *see page J.6*)

SERVICE TOOLS

18G 312. Steering Tie-rod Pin Spanner

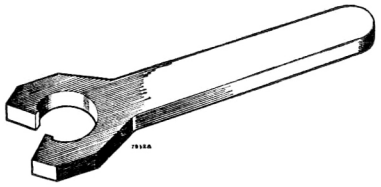
This tool is designed for use with the special 'C' spanner 18G 313 for dismantling the steering tie-rod ball housing. In use it is clamped in a vice and the pins of the spanner are engaged with the holes in the housing. Use the spanner 18G 313 to unscrew the housing cap.



18G 312

18G 313. Steering Tie-rod 'C' Spanner

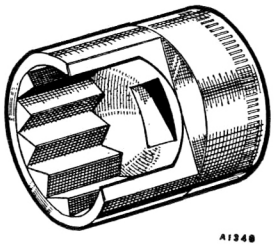
Designed to engage the shallow splines of the steering-rack ball housing cap and remove it without damage.



18G 313

18G 562. Steering-wheel Nut Spanner

Designed to enable the steering-wheel nut to be tightened without damage to the horn switch contact.



18G 562