

PART 6

FRONT END AND
STEERING SYSTEM

C3-series

SERVICE MANUAL

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GROUP 60 GENERAL

Data

WHEEL ANGLES

Caster	3.0°
Camber	1.0°
King-pin inclination	8.0°
Toe-in	0–3 mm (0–0.12")
Wheel inclination angle	31–32°

FRONT AXLE

Type	Rigid
Track	1540 mm (60.6")

STEERING KNUCKLE

Pre-load, lower steering pin	0.3 mm (0.012")
With play in steering pin adjust pin by removing shims until bushings are worn.	
Shims, steering knuckle support – lower ball shell, thicknesses in mm (in.)	0.35, 0.45, 0.60, 0.80 (0.014, 0.018, 0.024, 0.032)

STEERING GEAR

Make and type	ZF, worm and roller
Reduction ratio	22:1
Number of steering wheel turns from lock to lock	5.1
Pre-load, worm bearing	25–55 N (2.5–5.5 kp = 5.5–12 lbf)
Pre-load over centre position, complete steering gear	15–25 N (1.5–2.5 kp = 3.3–5.5 lbf)
Shims for worm bearing, thicknesses in mm (in.)	0.10, 0.12, 0.15, 0.30 (0.004, 0.005, 0.006, 0.012")
Adjuster washer between adjuster screw and sector shaft, thickness in mm (in.) in steps of 0.05 mm = 0.002"	2.1–2.5 mm (0.08–0.10")
Lubricant	Hypoid oil
Viscosity	MP 80 or MIL-L-2105 B, SAE 80
Capacity	0.5 litre (1 pint)

AUXILIARY STEERING ARM

Axial clearance	0 mm
Shims, relay arm, thicknesses in mm (in.)	0.1 and 0.35 (0.004 and 0.014)

TIGHTENING TORQUES

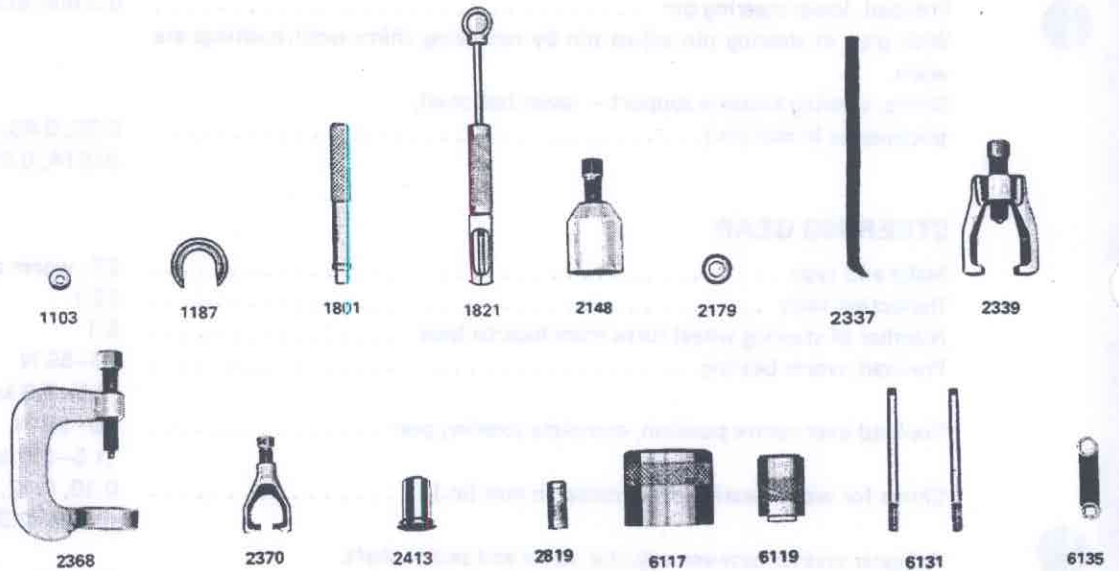
Steering wheel nut	35–35 Nm (3.5–4.5 kpm = 25–33 lbftf)
Nut, Pitman arm	250 Nm (25 kpm = 180 lbftf) and to next hex for locking
Crown nut, aux. steering arm journalling	80–100 Nm (8–10 kpm = 57–72 lbftf)
Nut, king pins	150–200 Nm (15–20 kpm = 108–145 lbftf)

Bolt, steering knuckle support — wheel carrier	100–120 Nm (10–12 kpm = 72–87 lbftf)
Nut, tie rod ¹⁾	140–180 Nm (14–18 kpm = 101–130 lbftf)
Nut, lower steering rod ¹⁾	100–120 Nm (10–12 kpm = 72–87 lbftf)
Nut, upper steering rod ¹⁾	140–180 Nm (14–18 kpm = 101–130 lbftf)

¹⁾ See Fig. 64–2.

Tools

The following special tools are required for service work on the front end and steering system.



- | | |
|--|--|
| 1103 Intermediate section for 2368 puller | 2413 Drift for installing auxiliary steering arm bushings |
| 1187 Clamp for 2368 puller | 2819 Drift for installing bushing on lower steering pin |
| 1801 Standard handle | 6117 Sleeve for installing rubber dust cover |
| 1821 Puller for removing auxiliary steering arm bushings | 6119 Sleeve for installing sector shaft sealing ring |
| 2148 Puller for steering joint at sector arm | 6131 Guide pins for removing and installing wheel carriers |
| 2179 Drift for fitting sector shaft bushings | 6135 Spanner for torque tightening |
| 2337 Drift | |
| 2339 Puller for removing pitman arm | |
| 2368 Puller for removing steering wheel | |
| 2370 Puller for removing steering pins | |

GROUP 63 FRONT END

Description

The ends of the front axle are provided with spherical steering knuckle supports (9, Fig. 63-1) on which the wheel carriers (1) are suspended in steering pins (6 and 14). The steering pins have ball shells (6 and 14) which are journaled in bushings (4 and 13) of synthetic material. The steering pins should be lubricated with grease of a quality specified according to the lubricating instructions. When being installed, the lower steering pin should be fitted with shims (12) so that there is pre-loading on the steering pins.

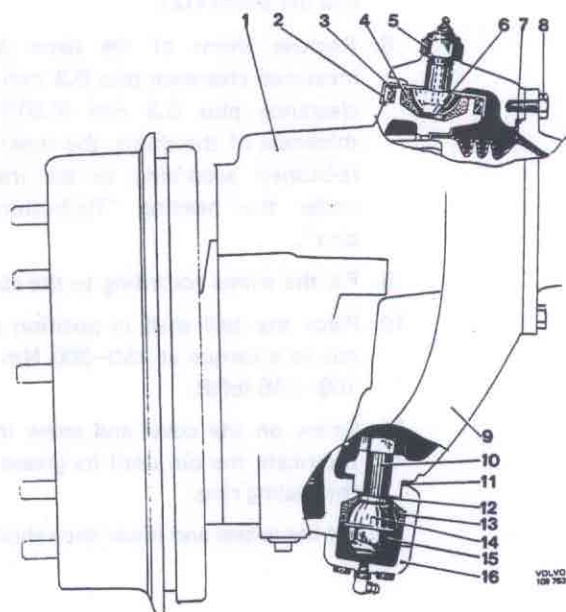


Fig. 63-1. Steering pins

- | | |
|---------------------|-----------------------------|
| 1. Wheel carrier | 9. Steering knuckle support |
| 2. Sealing washer | 10. Bolt |
| 3. Sealing ring | 11. Sealing ring |
| 4. Upper bushing | 12. Shims |
| 5. Nut | 13. Lower bushing |
| 6. Upper ball shell | 14. Lower ball shell |
| 7. Rubber bellows | 15. Nut |
| 8. Attaching bolt | 16. Cover |

SERVICE PROCEDURES

STEERING KNUCKLES

Adjusting the steering pins

The steering pins must be adjusted when loose. This is done as follows:

1. Jack up the vehicle.
2. Remove the wheel.
3. Remove the lubricator on the cover (16, Fig. 63-1).
4. Place a dial indicator as shown in Fig. 63-2.

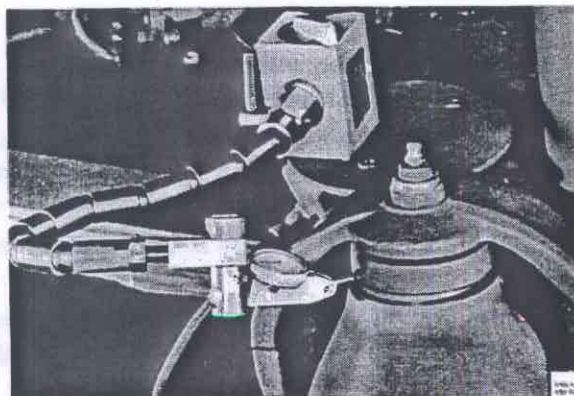


Fig. 63-2. Placing the dial indicator

5. Place a jack under the cover, Fig. 63-3. Push up the pin and release it entirely a couple of times. Read off the clearance measured.
6. Unscrew the cover (16).
7. Remove the nut (15), the lower ball shell (14) and the shims (12).
8. Remove shims of the same thickness as the measured clearance plus 0.3 mm (0.012"). If the clearance plus 0.3 mm (0.012") exceeds the thickness of the shims, the steering pins must be re-bushed according to the instructions given under the heading "Re-bushing the steering pins".
9. Fit the shims according to the above calculation.
10. Place the ball shell in position and tighten the nut to a torque at 150-200 Nm (15-20 kpm = 108-145 lbftf).
11. Screw on the cover and screw in the lubricator. Lubricate the pin until its grease squeezes out at the sealing ring.
12. Fit the wheel and lower the vehicle.

Re-bushing the steering pins

Special tools:

- 2370 Puller
- 2819 Drift
- 6131 Guide pins
- 6117 Sleeve
- 6135 Spanner

Removing the wheel carriers

1. Remove the wheel nuts on the wheel. Jack up the vehicle.
2. Remove the wheel.
3. Remove the steering joint from the steering arm with puller 2370, see Fig. 63-4.
4. Disconnect the brake lines from the brake hoses. Plug the hoses with sealing nipples. Remove the bracket with the hoses from the wheel carrier.
5. Remove the bracket plate for the hollow rubber spring.
6. Remove the upper bolts securing the wheel carrier to the front axle casing. Fit guide pins 6131 in the upper holes.
7. Remove the lower lubricator and place a jack under the wheel carrier.

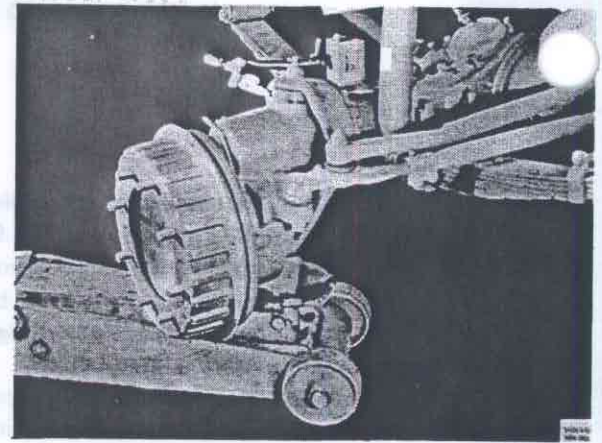


Fig. 63-3. Measuring the clearance

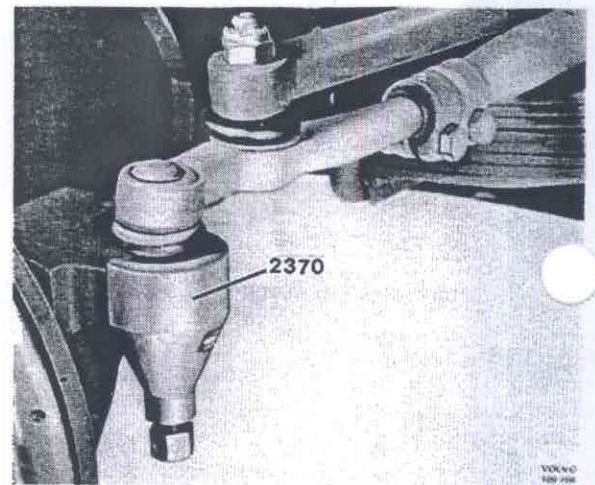


Fig. 63-4. Removing a steering joint

8. Remove the upper bolts and pull out the wheel carrier and drive shaft, see Fig. 63-5. NOTE! Observe care so that the rubber bellows do not get clamped between the drive shaft and steering knuckle support.

Disassembling the steering pins

1. Clean well the removed unit.
2. Knock out the rubber bellows with a suitable tool.
3. Remove the cover (16, Fig. 63-1) under lower steering pin and unscrew the nut (15) holding the pin together. Pull out the bolt (10) and then the ball shell (14), also the shims (12). Take care of the shims.

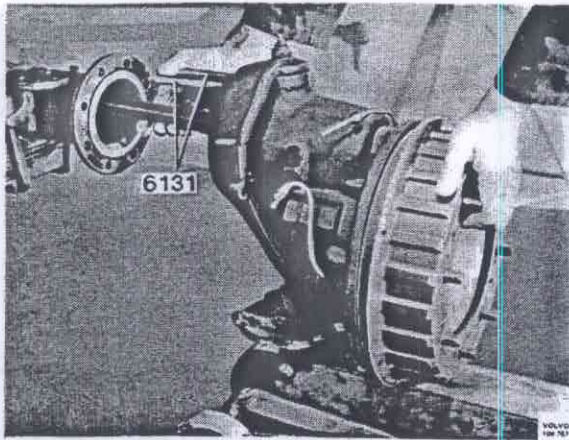


Fig. 63-5. Removing the wheel carrier

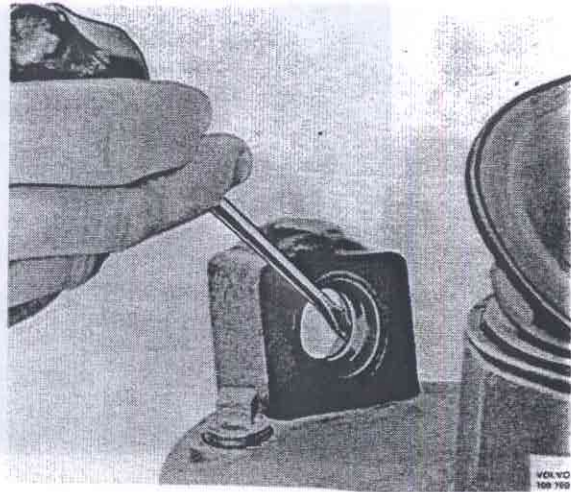


Fig. 63-7. Removing the lower bushing

4. Lift off the steering knuckle support (9) and remove the old sealing rings (3 and 11).
5. Knock out the old bushings (4 and 13) with a suitable tool, see Figs. 63-6 and 63-7.

Checking, replacing parts

1. Clean all parts thoroughly. Clean thoroughly the surfaces between the cover (16) and wheel carrier, and between the steering knuckle support and front axle.

2. Check the ball shells (6 and 14, Fig. 63-1) and the surface on the sealing washer (2) for the sealing ring. Replace worn parts.
3. Replace the upper ball shell and sealing washer by removing the nut (5). If necessary hold against the ball shell with an Allen spanner, see Fig. 63-8.
4. When assembling, tighten the nut to a torque of 150–200 Nm (15–20 kpm = 108–145 lbft).

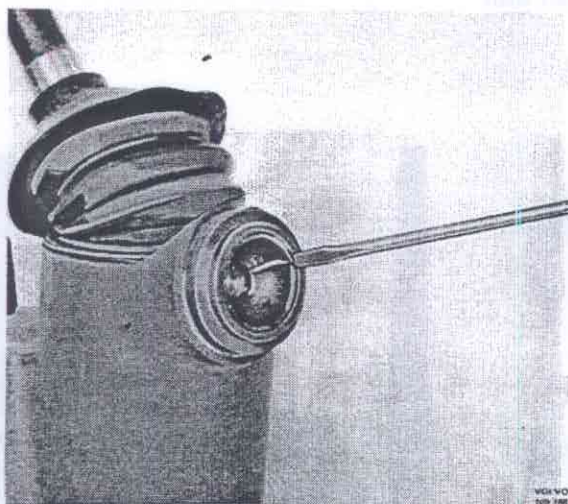


Fig. 63-6. Removing the upper bushing

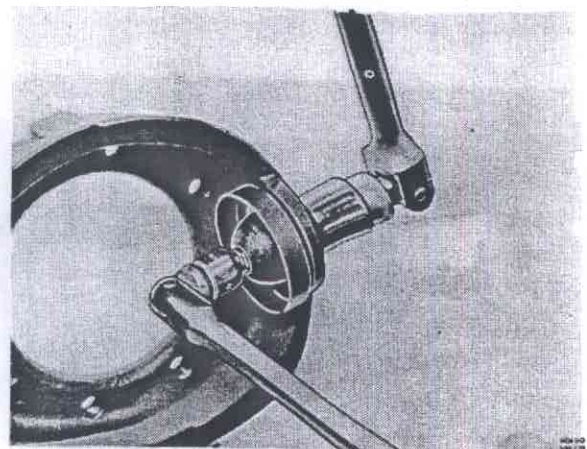


Fig. 63-8. Removing the upper ball shell