



# SERVICE MANUAL

TRUCKS

**L 385**

*Export Service Department*

AKTIEBOLAGET

**VOLVO**

GÖTEBORG . SWEDEN

# PART 6

## FRONT AXLE AND STEERING GEAR

### FRONT AXLE

#### DESCRIPTION

L 385 trucks are fitted with a rigid beam-type front axle, that is to say the front axle consists of one single member.

The beam axle (31, Fig. 6-1) is made of drop-forged alloy steel.

It is attached to the front springs by means of four U-bolts.

The steering knuckles (1) are pivoted in the front axle by means of the two king pins (25). The steering knuckles are journalled in the king pins by means of bronze bushings (27) and tapered roller bearings (20, 21). The bronze bushing in each steering knuckle unit absorbs only the pressure in a radial direction while the roller bearing absorbs both radial and axial pressure. The roller bearing is held on the steering knuckle by means of a nut (18) and a washer (19). There are shims (22) to enable adjustment of the bearing to be carried out. The bearing is protected from dust and dirt by means of cover (17) and a felt ring (24). Each bronze bushing is protected by means of a washer (42) and a felt ring (26).

The front wheel hubs (7) are carried on the steering knuckles by means of two tapered roller bearings (5, 6 and 47, 48). The roller bearings are adjusted by means of nuts (2) which are locked with cotter pins. In order to prevent dust and dirt from coming into the bearing, there is a grease cap (4) and a felt ring (45). These also prevent grease from coming out of the hub. Should, however, any grease seep out of the hub, for example when the front wheel bearings are loose, it is prevented from coming onto the brake linings by means of an oil catcher (44). The steering knuckle arms (34) are attached to the steering knuckles by means of cones, keys, and nuts. On the left steering knuckle arm there is a ball stud for the Pitman-arm shaft to the steering mechanism.

The tie rod (32) is carried in ball studs (39) with loose sockets (37, 38). These are located by means of a plug (41) and a spring (40).

## REPAIR INSTRUCTIONS

### WORK THAT CAN BE CARRIED OUT WITHOUT REMOVING THE FRONT AXLE

#### Replacement of King Pins

1. Jack up the truck and put blocks under the front axle.
2. Disassemble the front axle according to instructions 1-5 under the heading "Disassembling the Front Axle".
3. Disconnect the brake hoses from the attachments in the frame (Fig. 6-2). Loosen the drag link from the ball stud (29).
4. Disassemble the front axle in accordance with instructions 6-11 under "Disassembling the Front Axle".
5. Remove any sharp edges there may be in the hole for the king pin bushing. Otherwise these edges can chafe the bushing externally so that it becomes loose after it is pressed into position. Press in the bushing (27) with tool SVO 2143. See Fig. 6-3. Turn the bushing so that the lubricating groove indexes with the lubricating hole in the steering knuckle.
6. Ream the bushing with tool SVO 2142. Lay the guide washer for the reamer in the place of the outer bearing race. This means that the reamer will be correctly aligned. While reaming is being carried out, the steering knuckle can be held in a vise while the reamer is rotated by means of a suitable tool. Another alternative is to fit the reamer in a vise as shown in Fig. 6-4. In this case the guide must be attached in the bearing recess. This can be done by using a bolt or with a ball and a rejected lubricator through the lubricating hole.  
  
When reaming is completed, the bushing should be blown clean and the fit on the new king pin should be checked. It should fit easily without looseness.
7. Assemble the front axle in accordance with instructions 1-6, 8-9 under the heading "Assembling the Front Axle".
8. Connect the brake hose to the attachment in the frame.
9. Assemble the axle in accordance with instructions 10 and 12 under the heading "Assembling the Front Axle".
10. Lubricate the king pins. Air-vent and adjust the brakes. Lower the truck from the blocks.

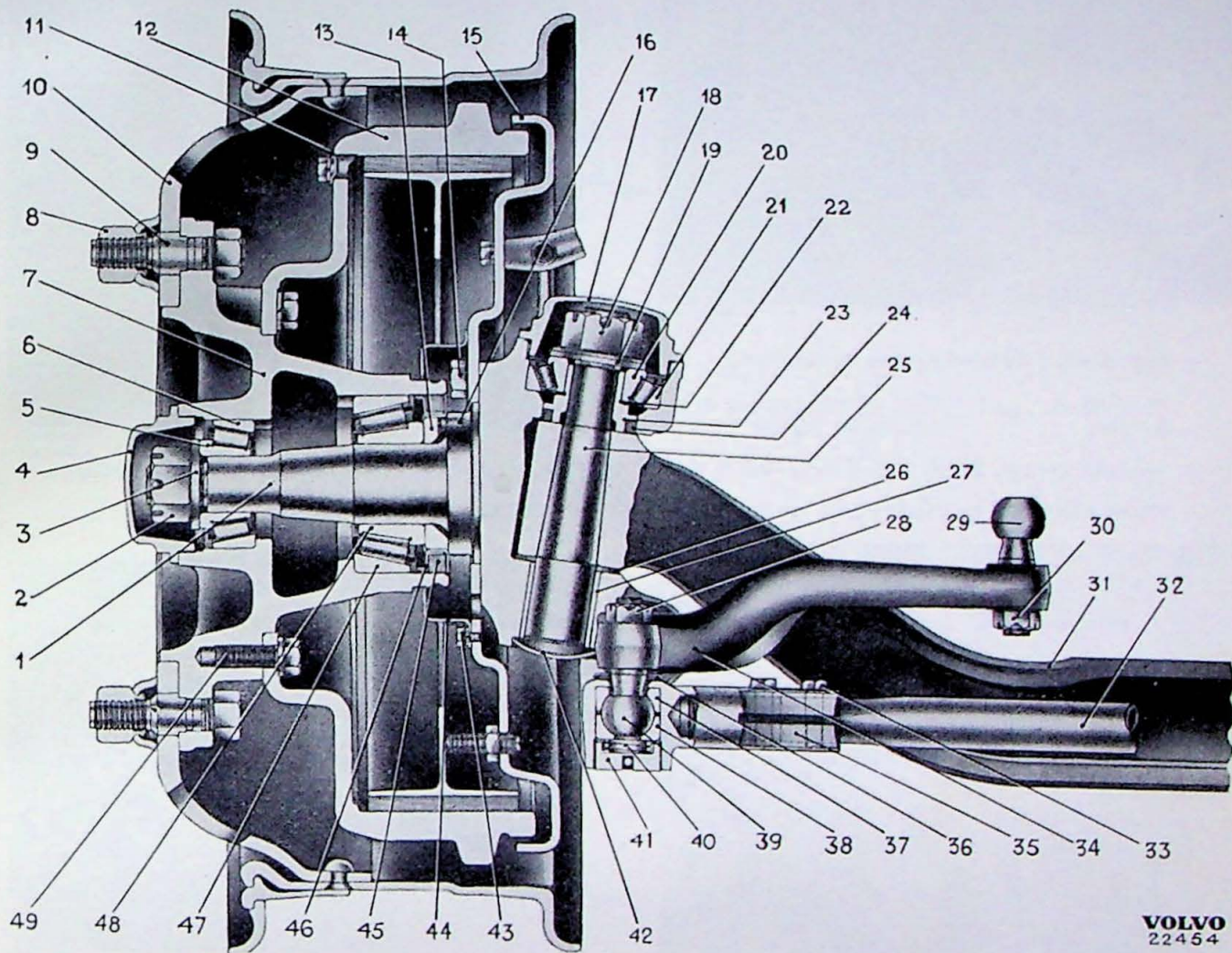
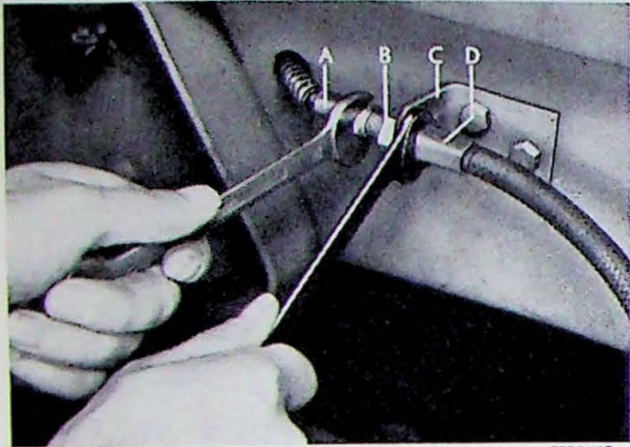


Fig. 6—1. Front axle.

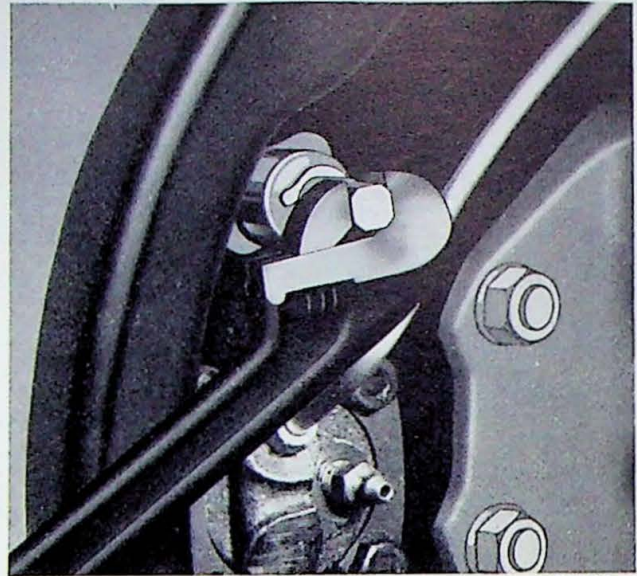
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|--|--|---|
| 1. Steering knuckle  | 17. Cover  | 34. Steering knuckle arm                                      |
| 2. Nut   | 18. Nut  | 35. Tie rod end   |
| 3. Thrust washer   | 19. Thrust washer                                    | 36. Dust cover  |
| 4. Grease cap  | 20. Inner race with set of rollers, king pin bearing | 37. Ball socket   |
| 5. Inner race with set of rollers, outer front wheel bearing | 21. Outer race, king pin bearing                     | 38. Ball socket   |
| 6. Outer race, outer front wheel bearing                     | 22. Shims  | 39. Ball stud   |
| 7. Front wheel hub   | 23. Spacer   | 40. Spring  |
| 8. Wheel nut   | 24. Felt ring  | 41. Plug  |
| 9. Wheel bolt  | 25. King pin   | 42. Dust cover washer   |
| 10. Wheel  | 26. Felt ring  | 43. Bolt  |
| 11. Inspection cover   | 27. King pin bushing                                 | 44. Oil catcher   |
| 12. Brake drum   | 28. Nut  | 45. Felt ring   |
| 13. Thrust washer  | 29. Ball stud  | 46. Retainer for felt ring                                    |
| 14. Bolt   | 30. Nut  | 47. Outer race, inner front wheel bearing                     |
| 15. Brake backing plate                                      | 31. Beam axle  | 48. Inner race with set of rollers, inner front wheel bearing |
| 16. Lock pin for thrust washer                               | 32. Tie rod  | 49. Bolt  |
|  | 33. Bolt   |   |



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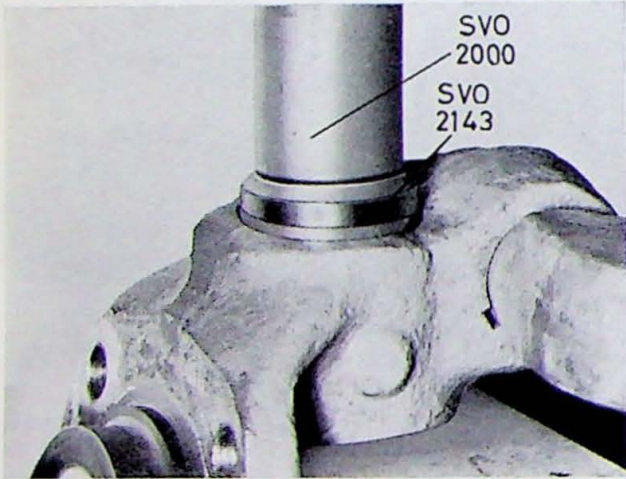
Fig. 6—2. Removing the brake hose.

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|--------|----------------|
| A. Cap | C. Attachment  |
| B. Nut | D. Hose nipple |



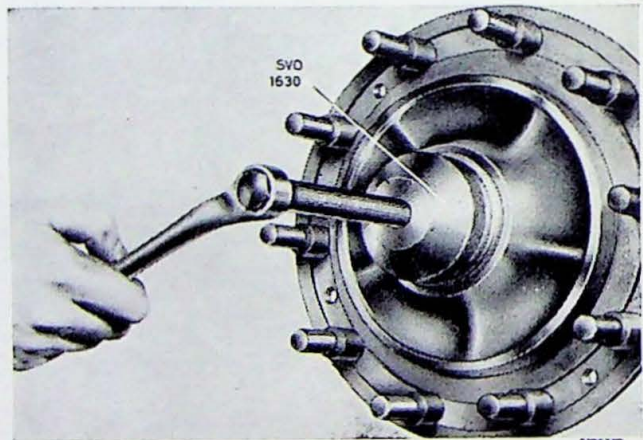
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Fig. 6—5. Backing off the brake shoes.



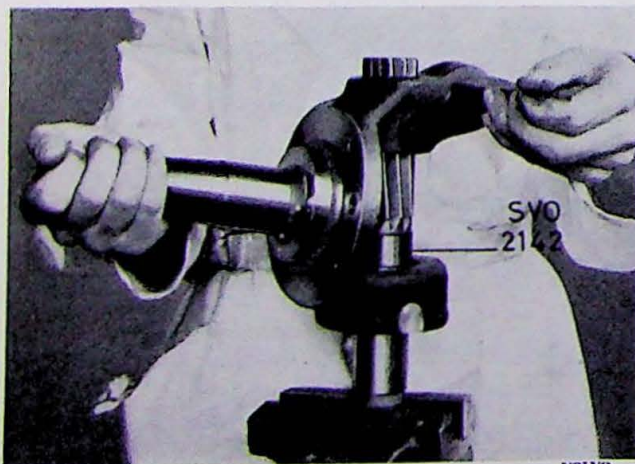
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Fig. 6—3. Fitting a king pin bushing.



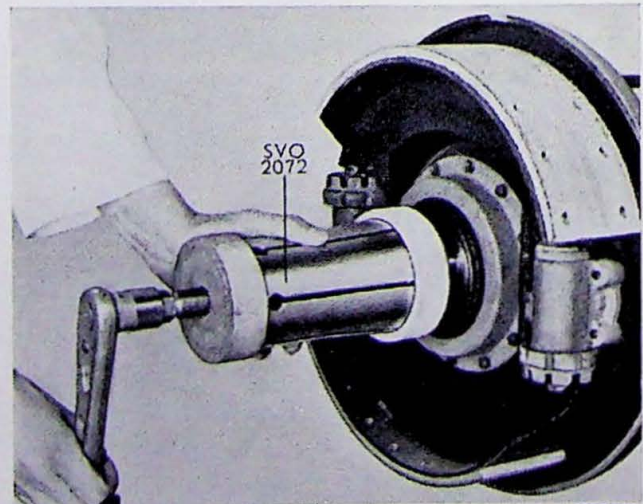
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Fig. 6—6. Removing the hub.



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Fig. 6—4. Reaming a bushing.



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Fig. 6—7. Removing the inner bearing race.

### Replacement of Front Wheel Bearings

1. Loosen the wheel nuts (8) about 1 turn.
2. Jack up the truck and put blocks under the front axle. Remove the wheel nuts and lift off the wheels.
3. Remove the grease cap (4), the cotter pin, the nut (2) and the washer (3).
4. Back off the brake shoes (Fig. 6-5). Then remove the wheel hub (7) with puller SVO 1630 A (Fig. 6-6).
5. Remove the outer bearing inner race (5). Press out the outer races (6-47) with a metal driver.
6. Remove the inner bearing inner race (48) with puller SVO 2072 (Fig. 6-7).
7. Press in the new outer races with driver SVO 2001 and SVO 2003 respectively (Fig. 6-15). Drive the inner bearing inner race onto the steering knuckle with tool SVO 2022 (Fig. 6-14).
8. Assembly is then carried out in the reverse order to that used when disassembling. Pack the bearing well with heat-resistant bearing grease. Pack grease as well between the inner bearing and the seal and fill the grease cap. The bearing is adjusted by tightening the nut and then loosening it about 1/6 of a turn.

### Replacement or Repair of Tie Rod Ends

In the instructions below, points 2 and 3 only concern repair and point 4 concerns replacement of tie rod ends.

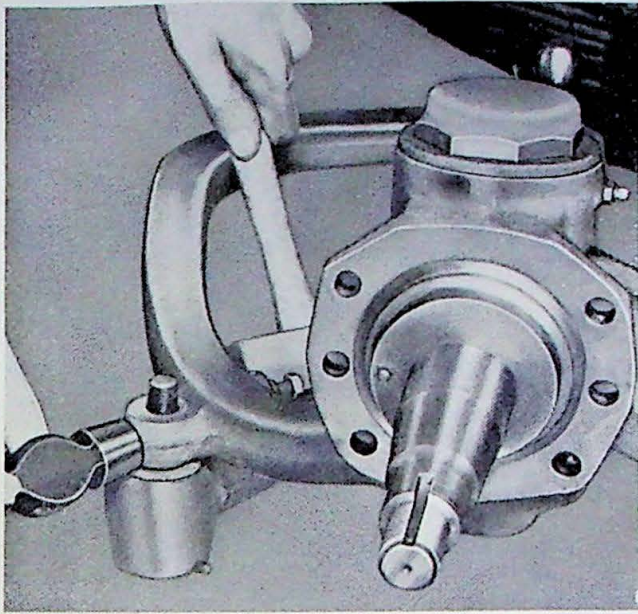
1. Remove the cotter pin and nut (28). Use a large hammer as backing and then strike with another hammer on the steering knuckle arm round the ball stud attachment. See Fig. 6-8. The ball stud will then loosen.
2. Remove the cotter pin and the plug (41). Remove the spring (40), the ball sockets (38, 37) and the ball stud.
3. Smear the new ball sockets with a little grease and assemble the tie rod end. The tie rod end can be adjusted by tightening the plug and then loosening it to the nearest cotter pin hole.
4. Loosen the bolts (33). Then unscrew the tie rod end (35) from the tie rod (32). Count how many turns it is screwed on and then screw on the new tie rod end an equal number of turns. Toe-in adjustment will thus be made easier.
5. Fit the tie rod. Do not forget the dust cover (36). Adjust toe-in in accordance with the instructions under the heading "Front Wheel Alignment". Lubricate the tie rod ends.

## REMOVING THE FRONT AXLE

1. Loosen the wheel nuts about 1 turn.
2. Jack up the truck and put blocks under the frame just behind the rear spring attachments. Let the jack remain under the front axle.
3. Remove the wheel nuts and lift off the wheels.
4. Remove the drag link from the ball stud (29).
5. Disconnect the brake lines from the attachment in the frame. (Put a wooden block under the brake pedal so that it cannot be depressed).
6. Loosen the spring U-bolts. Lower and pull out the front axle.

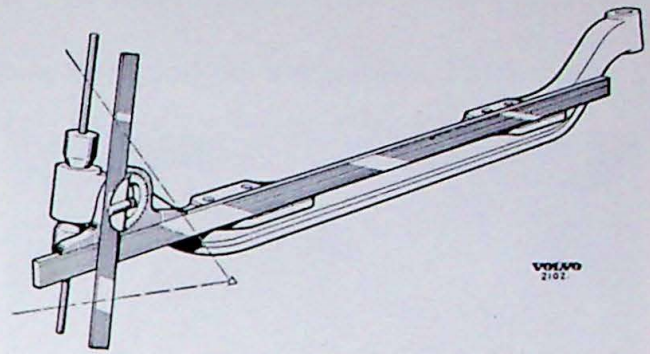
## DISASSEMBLING THE FRONT AXLE

1. Remove the grease cap (4).
2. Remove the cotter pin, the nut (2) and the washer (3).
3. Back off the brake shoes (Fig. 6-5). Pull off the hub (7) with puller SVO 1630 A (Fig. 6-6). Turn the hub now and then while removing it so that the brake shoes do not accompany it.
4. Remove the outer bearing inner race (5) from the hub. If required drive the outer races (6, 47) from the hub with a metal driver. If required, remove the bolts (49) and remove the brake drum (12).
5. Remove the inner bearing inner race (48) with puller SVO 2072 (Fig. 6-7). Remove the washer (13), the retainer (46) and the seal (45).
6. Remove the bolts (43) and take off the oil catcher (44). Remove the bolts (14) and remove the brake backing plate (15) complete with brake shoes.
7. Remove the cotter pin and the nut (28) for the ball stud (39). Use a large hammer as backing and strike with another hammer on the steering knuckle arm round the ball stud attachment (Fig. 6-8). The ball stud will then loosen.
8. Remove the cover (17) over the king pin bearing.
9. Remove the cotter pin, the nut (18) and the washer (19) for the king pin bearing.
10. Press out the king pin (25) downwards.
11. Remove the steering knuckle (1), the spacer (23) and the shims (22). If necessary press out the outer race (21) from the steering knuckle with a metal driver. The bushing (27) is pressed out if required with tool SVO 2143. See Fig. 6-3.
12. Remove the cotter pin and the plug (41) in the tie rod end. Separate the various parts.



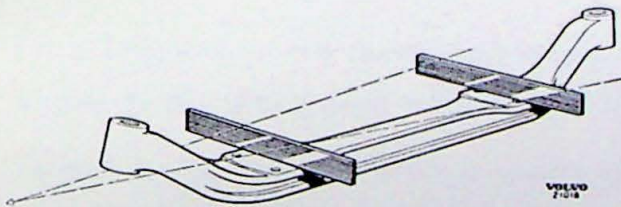
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Fig. 6—8. Removing the tie rod end.



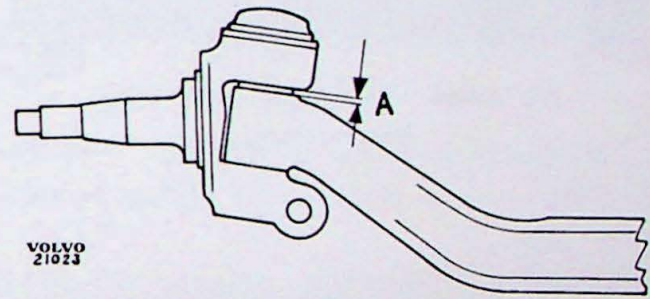
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Fig. 6—11. Checking the king pin inclination.



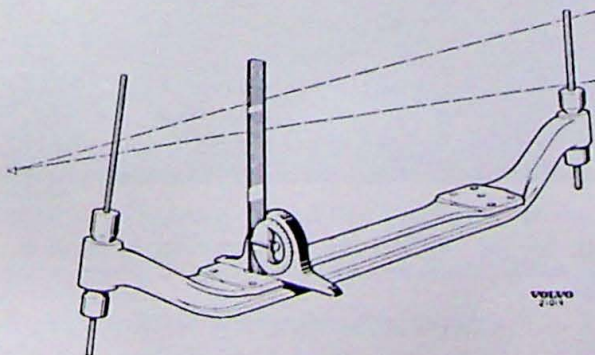
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Fig. 6—9. Checking whether the spring pads are parallel.



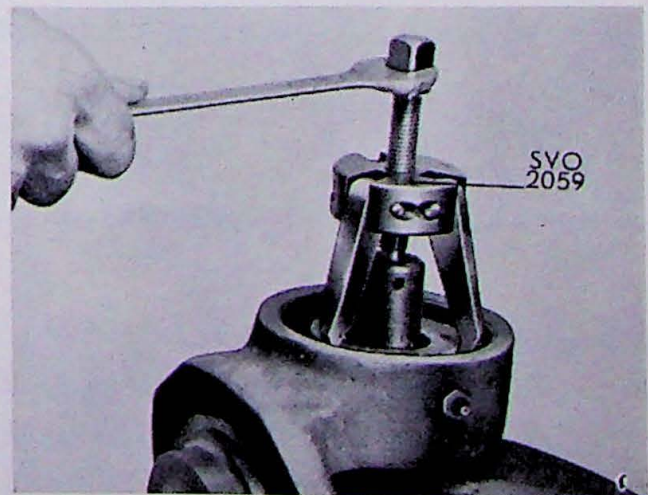
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Fig. 6—12. Checking the steering knuckle axial clearance.



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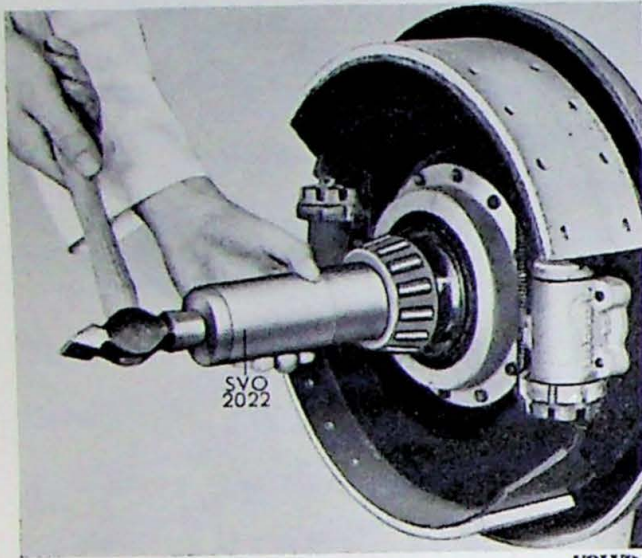
Fig. 6—10. Checking the center lines of the king pins.



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2059

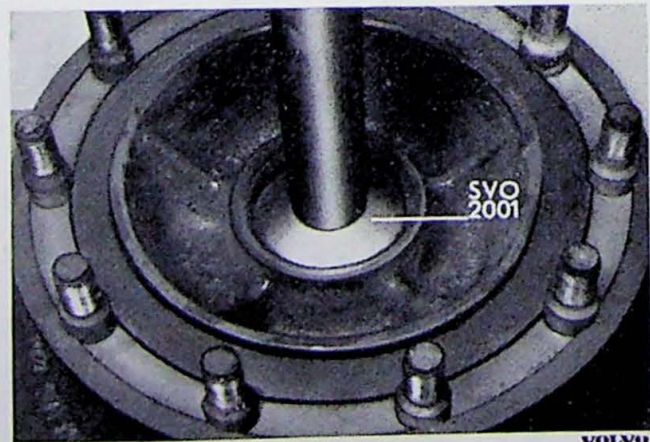
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Fig. 6—13. Removing the king pin roller bearings.



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Fig. 6—14. Fitting the inner wheel bearing race.



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Fig. 6—15. Fitting the bearing race in the hub.

## INSPECTING THE FRONT AXLE

Clean all parts thoroughly with kerosene or white spirit before inspection. Parts made of steel and cast-iron can be cleaned in an alkali bath after which they should be rinsed off with warm water and blown dry with compressed air.

Examine all parts for wear, deformation or other damage.

Examine the roller bearings carefully for scars or other damage on the bearing races, rollers or cages. Replace damaged bearings.

Check the ball studs. If they show any signs of ovality they must be replaced. Replace the ball sockets as well.

## MEASURING THE BEAM AXLE

The beam axle is fitted in a vise. Lay two straight-edge rulers on the spring pads as shown in Fig. 6-9. The spring pads should be parallel within 3 mm (0.120") measured over 300 mm (12").

Fit a pair of measuring spindles in the king pin holes. Sight from one end as shown in Fig. 6-10. The king pins should be parallel within 3 mm (0.120") measured over 300 mm (12").

Fit a T-square on the spring pad as shown in Fig. 6-10. The king pin should be at right angles to the spring pads within  $\pm 1.5$  mm (0.060") measured over 300 mm (12").

Stretch a wire between the measuring spindles and check with the T-square that the wire passes exactly over the holes for the center bolts. If this is not the case then the axle is deformed.

Lay a straight-edge ruler over the spring pads as shown in Fig. 6-11. Measure the king pin inclination. This should be  $7.5^\circ$ . A tolerance of  $\pm 1.5$  mm (0.060") measured over 300 mm (12") is permissible.

## STRAIGHTENING THE BEAM AXLE

Only slightly deformed beam axles may be straightened and this should be done when the axle is in a cold condition.

If the axle is curved it is straightened by using a hydraulic press. If the axle is twisted one end is clamped in a vise and it is then twisted back to its correct position by means of a long rod. Special tools are available so that a beam axle can be straightened without even removing it from the truck.

Before straightening is carried out, one must be certain as to exactly where the deformation is. First carry out a check with a straight-edge ruler on the spring pads to see if the axle

is twisted between these points. Then check king pin inclination by twisting the axle outside the spring pads.

The same applies to a twisted axle. First twist it back so that the spring pads are parallel. See Fig. 6-9. Then check that the king pins are parallel and at right angles to the spring pads as shown in Fig. 6-10.

#### ASSEMBLING THE FRONT AXLE

1. Press the outer race (21) on the steering knuckle with tool SVO 2001.
2. Fit the steering knuckle with the felt rings (24, 26) and the spacer (23) on the beam axle.
3. Smear a little grease on the king pin bushing (27) and then press in the king pin (25).
4. Fit the same number and the same thickness of shims (22) as were fitted earlier. Pack in the bearing (20) with grease and fit it on the steering knuckle. Fit the washer (19) and the nut (18) and tighten the bearing with the nut.
5. Measure the clearance (A Fig. 6-12) between the steering knuckle and the beam axle. The smallest permissible clearance is 0.05-0.15 mm (0.002"-0.006"). Shims should be removed or added until this clearance has been obtained. In order to add or remove shims, the king pin bearing is removed by using puller SVO 2059 (Fig. 6-13). After adjustment has been carried out the nut is tightened and secured.
6. Fit the cover (17). Fit a new, domed washer (42). Knock the washer flat so that it fits correctly in position.
7. Assemble the tie rod ends. The plug (41) should be tightened and then loosened to the nearest cotter pin hole.
8. Fit the tie rod on the steering knuckle arms. Do not forget the dust cover.
9. Fit the brake backing plate (15) with the brake shoes. Fit the oil catcher (44).
10. Fit the washer (13), retainer (46) and felt ring (45) on the steering knuckle. Drive on the inner bearing inner race with tool SVO 2022 (Fig. 6-14). Pack the bearing with heat-resistant bearing grease. Pack grease between the inner bearing and the seal as well as in the grease cap.
11. Press the outer races (6, 47) in the hub with tool SVO 2001 and tool SVO 2003 respectively (Fig. 6-15). Fit the hub on the steering knuckle.
12. Pack the outer bearing (5) with grease and fit it on the steering knuckle. Fit the washer (3) and the nut (2). Tighten the nut and then loosen it about 1/6 of a turn. The wheel hub should rotate easily without looseness. Secure the nut with the cotter pin. Fit the grease cap.

## FITTING THE FRONT AXLE

The front axle is fitted in the reverse way to that used when removing. Air-vent and adjust the brakes. Lubricate all lubricating points.