

Section 7

**SPRINGS, SHOCK ABSORBERS,  
WHEELS**

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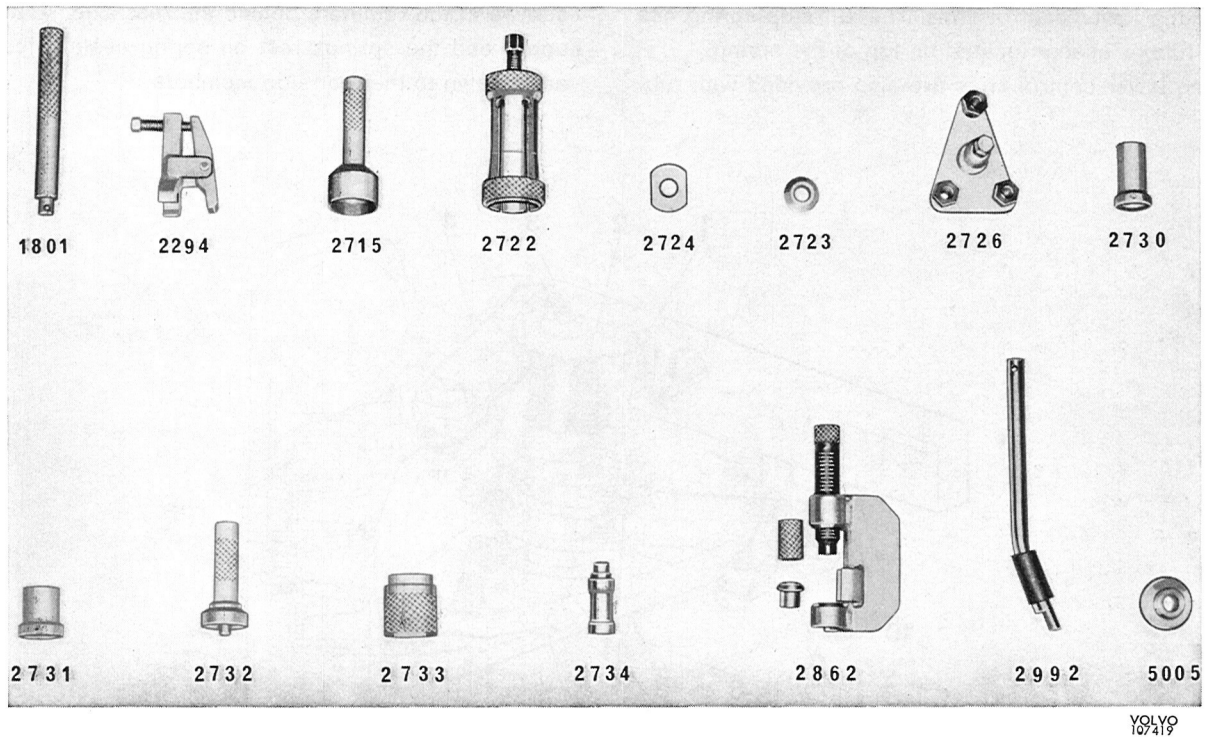
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# GROUP 70

## GENERAL TOOLS

The tools' spare parts numbers start with 999 (previously SVO) in front of the tool number.



VOLVO  
107419

Fig. 7-1. Tools used for work on suspension and hubs

999  
(SVO)

- 1801 Standard handle 18×200 mm.
- 2294 Puller for ball joint, steering rod.
- 2175 Drift for removing and fitting grease cap.
- 2722 Puller for inner ring, inner wheel bearing.
- 2724 Drift for fitting outer ring, outer front wheel bearing and removing outer ring, inner wheel bearing.
- 2725 Drift for removing outer ring, outer front wheel bearing.
- 2726 Puller for front wheel hub.
- 2730 Drift for removing and fitting rear bushing in trailing arm (+2733)

999  
(SVO)

- 2731 Drift for removing and fitting Panhard Rod bushings (+2733).
- 2732 Drift for removing and fitting front bushing, trailing arm.
- 2733 Counterhold for removing and fitting bushing, trailing arm, support rod and Panhard Rod.
- 2734 Drift for removing bushing in support rod.
- 2862 Press tool for replacing wheel bolt.
- 5005 Drift for fitting outer ring, inner front wheel bearing and washer.

## GROUP 73

# SPRINGS

## GENERAL INFORMATION

The Volvo 140 is provided with coil springs both front and rear. The front wheel suspension is independent. The upper ends of the front spring (1, Fig. 7-2) are seated in housings formed in the front axle member, and are located in the bottom of the lower control arms. The left side spring has a rubber spacer located on top of the spring.

The lower control arms are also provided with rub-

ber buffers (5), which absorb any impacts arising from loading on the spring. The front axle member is fitted with rubber buffers (4) which limit the downward movements of the control arms.

The rear springs are at the lower end retained by screws at the retainers behind the rear axle. At the upper end the springs rest on spring seals, which are screw to the rear side members.

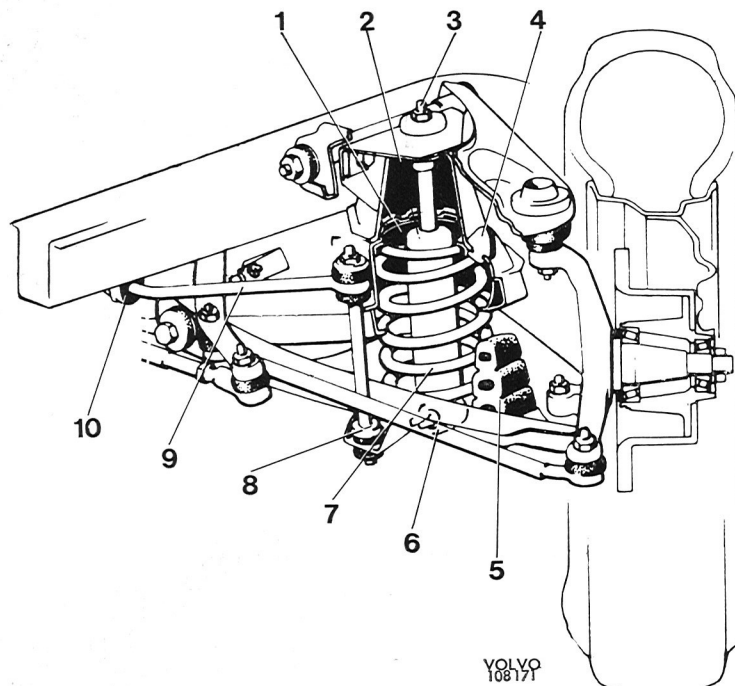


Fig. 7-2. Front spring and shock absorber

1. Spring
2. Shock absorber
3. Shock absorber upper attachment
4. Rubber buffer
5. Rubber buffer
6. Shock absorber lower attachment
7. Attachment for stabilizer
8. Stabilizer
9. Attachment (in frame) for stabilizer



# SERVICE PROCEDURES

## FRONT SPRINGS

Volvo Standard Times Op. No. 73104 comprises removal and installation of front spring.

### REMOVAL

1. Remove the hub cap and loosen the wheel nuts a couple of turns.
2. Jack up the front end at the front jack attachments. Remove the wheel.
3. Remove the shock absorber according to Group 76.
4. Disconnect the steering rod from the steering arm. Loosen the brake hose clamps. Remove the stabilizer attachments (7, Fig. 7-2).
5. Place a jack under the lower control arm. Loosen the nuts for the ball joints, knock with a hammer until the ball joints loosen from the spindle. Remove the nuts and lower the jack slightly. Remove the hub carrier with the front wheel brake unit and place it on a suitable stand.
6. Lower the jack fully and remove the spring. Do not forget the left side rubber spacer.

### INSTALLATION

1. Position the rubber spacer and the spring. Lift the lower control arm with a jack placed immediately under the spring and install the hub carrier.
2. Tighten the ball joints at the hub carrier. Firmly screw the stabilizer to the lower control arm.
3. Check the upper attachment for the shock absorber lower washer and rubber bushing (7 and 1, Fig. 7-8). Position the shock absorber and tighten its attachments.
4. Point the wheels straight forwards (with the lower control arm unloaded) and clamp firmly the brake hoses to the stabilizer screw.
5. Restore (install the wheel and wheel nuts, lower vehicle, tighten nuts, etc.).

## REAR SPRINGS

Volvo Standard Times Op. No. 73202 comprises removal and installation of rear spring, one side.

### REMOVAL

1. Remove the hub cap and loosen the wheel nuts a couple of turns. Jack up the vehicle. Place stands in front of the rear jack attachments according to Fig. 7-3. Remove the wheel.

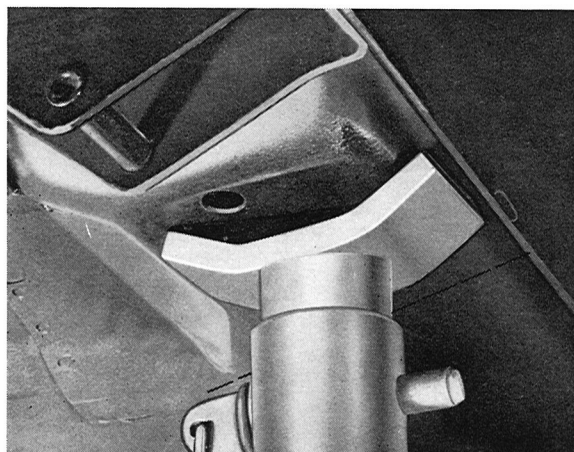


Fig. 7-3. Rear stand location

2. Jack up the rear axle with the jack so that the spring compresses. Loosen the lower spring attachments.
3. Remove the upper attachment (9, Fig. 7-6) for the shock absorber. Lower the jack carefully and remove the spring.

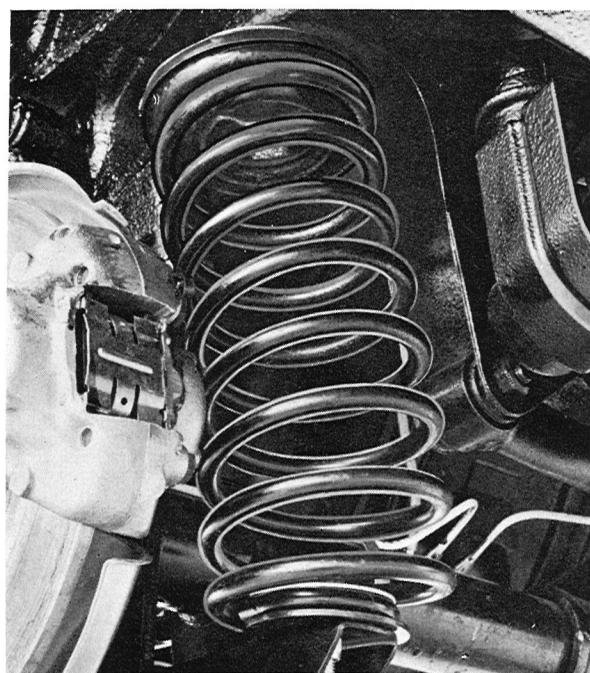
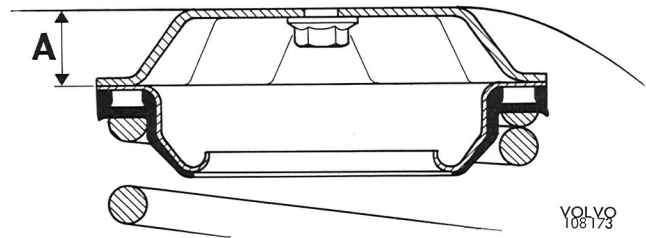


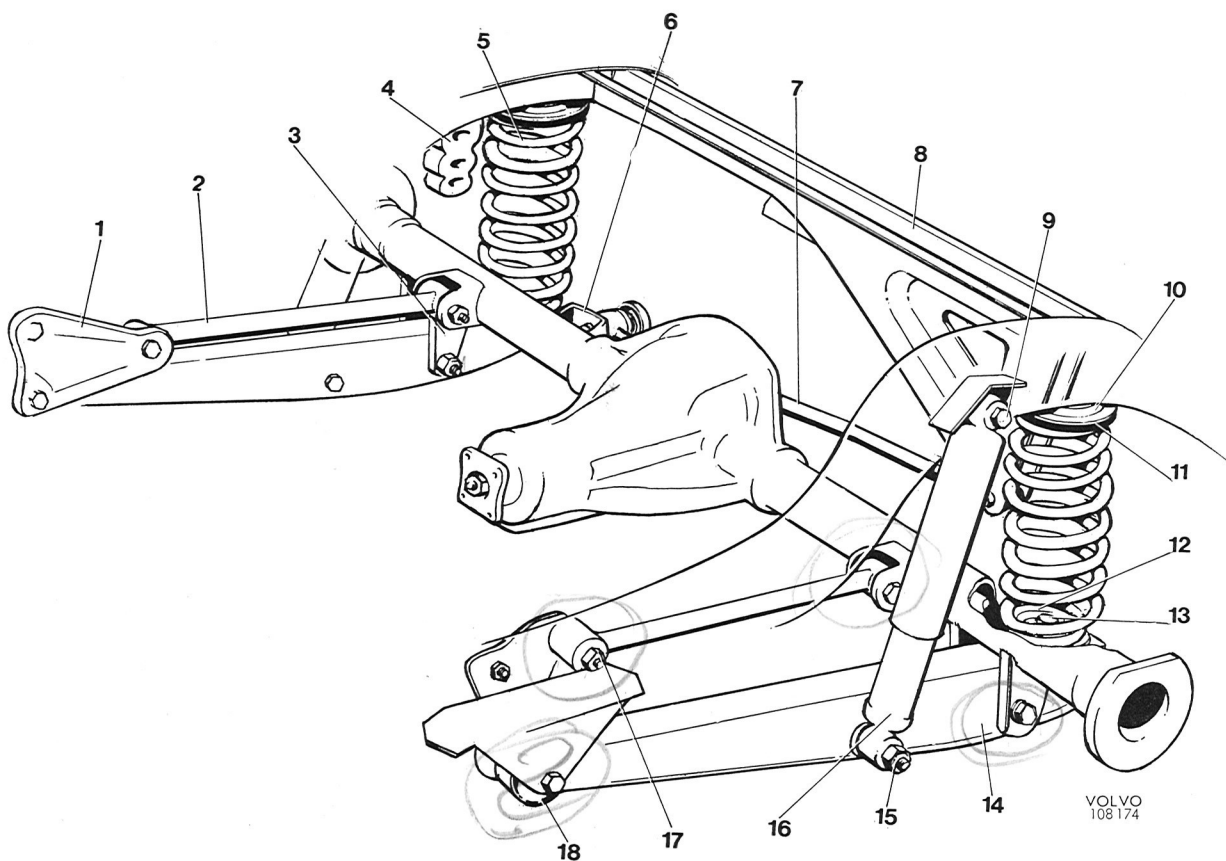
Fig. 7-4. Rear spring

## INSTALLATION

1. If the spring seats have been removed, install seat with  $A=21$  mm ( $=.8268''$ ) on left side and  $A=11$  mm ( $=.4331''$ ) on right side, see Fig. 7-5.
2. Install the rubber spacer in the spring seat and align the spring against the rubber spacer.
3. Raise the jack and securely fix the spring to the lower attachment with the washer (14) and the screw (13).
4. Install the upper shock absorber screw, the wheel and the wheel nuts.
5. Restore (lower vehicle and tighten wheel nuts, install hub cap, etc.).



**Fig. 7-5. Rear spring seat**  
Left side,  $A=21$  mm ( $=.8268''$ )  
Right side,  $A=11$  mm ( $=.4331''$ )



**Fig. 7-6. Rear axle suspension**

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1. Bracket                         | 11. Rubber spacer                   |
| 2. Support rod                     | 12. Bracket                         |
| 3. Bracket                         | 13. Screw, lower spring attachment  |
| 4. Rubber buffer                   | 14. Washer                          |
| 5. Rear spring                     | 15. Trailing arm                    |
| 6. Bracket                         | 16. Shock absorber                  |
| 7. Panhard rod (track rod)         | 17. Shock absorber lower attachment |
| 8. Rear side-member                | 18. Front support rod attachment    |
| 9. Shock absorber upper attachment | 19. Front bushing, trailing arm     |
| 10. Washer                         |                                     |

# SHOCK ABSORBERS AND STABILIZING DEVICES

## GENERAL INFORMATION

### GENERAL

The 140 is equipped with hydraulic double-acting, telescopic type shock absorbers. They require no maintenance and cannot be disassembled.

The front shock absorber upper attachment (Fig. 7-8) consists of a spindle (5), which is fixed into a housing in the front axle member with upper bushings (1 and 6), washers (3 and 7) and a spacer sleeve.

The front shock absorber lower attachment (Fig. 7-9) cannot be disassembled. It consists of an eyelet provided with a rubber bushing and a piece of tubular pipe with flattened ends which are screwed to the bottom side of the lower control arm.

The stabilizer (8, Fig. 7-2), which is attached to both the lower control arms (7) and to the frame (9), increases the stability of the vehicle.

The rear shock absorber attachment (Fig. 7-10) consists of eyelets provided with rubber bushings (1 and 3) which cannot be disassembled. These absorbers are at the top bolted to the rear side-members and at the bottom to the support arms.

The rear axle is attached to the body through two flexibly mounted trailing arms (15, Fig. 7-6). Longitudinal forces are taken up by two support rods (2) and the lateral forces are absorbed by a Panhard Rod (7). The support rods and the Panhard Rod are attached to the rear axle frame through the rubber bushings.

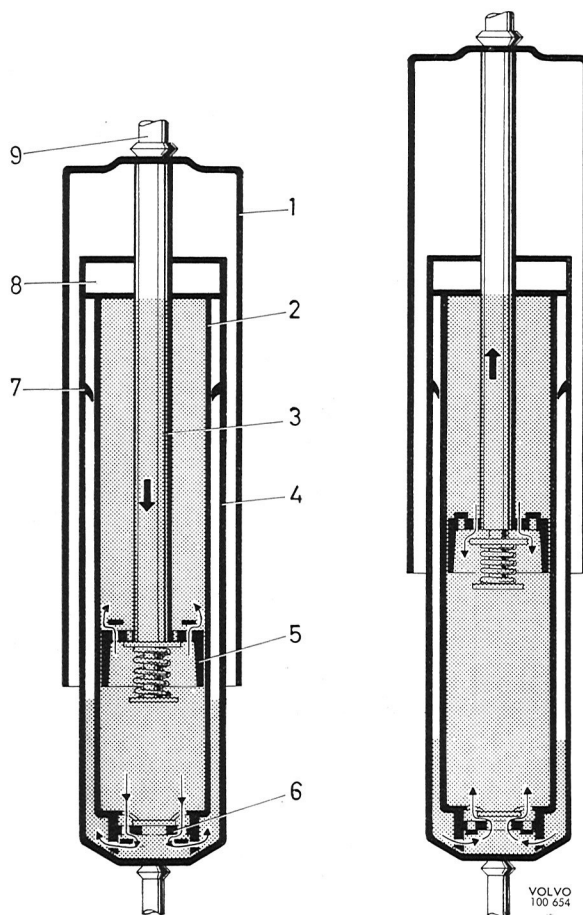


Fig. 7-7. Shock absorber, function

- |                       |                     |
|-----------------------|---------------------|
| 1. Dust cover         | 6. Valve            |
| 2. Working cylinder   | 7. Baffle ring      |
| 3. Piston rod         | 8. Cover            |
| 4. Reservoir cylinder | 9. Upper attachment |
| 5. Piston             |                     |

### SHOCK ABSORBERS

#### DESIGN

The design of the shock absorbers is shown in Fig. 7-7. The outer cylinder (1) serves only as protection against dust and dirt. The other two cylinders (2 and 4) are concentrically arranged, one inside the other. The inner cylinder (2) is the actual working cylinder and the lower end is provided with a valve (6). Inside the inner cylinder there is a piston (5) in which holes are drilled, the passage of oil through these holes being checked by valves. The piston is attached to a piston rod (3), whose upper end forms an attachment to the body. At the opposite end of the shock absorber is attached a similar screw attachment. The space between the cylinders (2 and 4) serves as a reservoir and is only partially filled with fluid. The inner cylinder (2) is completely filled with fluid on both sides of the piston (5). The cover (8) serves as a seal and guide for the piston rod (3). The baffle ring (7) acts as a baffle for the fluid.

## FUNCTION

When the shock absorber is compressed or extended according to the vehicle movements, the piston (5) moves in the inner cylinder (2). Fluid then flows through the valve-controlled holes in the piston. The speed with which the piston moves is determined by the rate at which the fluid passes through the holes from one side of the piston to the other. Since the drilled holes are very narrow, the fluid can only pass through slowly, thus braking the movement of the piston. When the shock absorber is suddenly compressed or extended, a

further braking effect is caused by turbulence in the fluid passing through the holes in the piston. This dampens any rolling tendency of the vehicle and ensures smoother riding.

When the shock absorber is compressed or extended, the volume on each side of the piston is not altered by the same amount since the piston rod occupies a certain space. When the shock absorber is compressed, some of the fluid passes out through the valve (6) into the reservoir, and when the shock absorber is extended, fluid is again sucked into the cylinder (2) on the underside of the piston.

## SERVICE PROCEDURES

### SHOCK ABSORBER CHECK

An accurate shock absorber check can only be made with special devices. A rough check can be made in order to see that the shock absorbers are functioning by noting the damping effect when rocking the car up and down and then releasing it. A test can also be made by driving the vehicle over a bumpy surface.

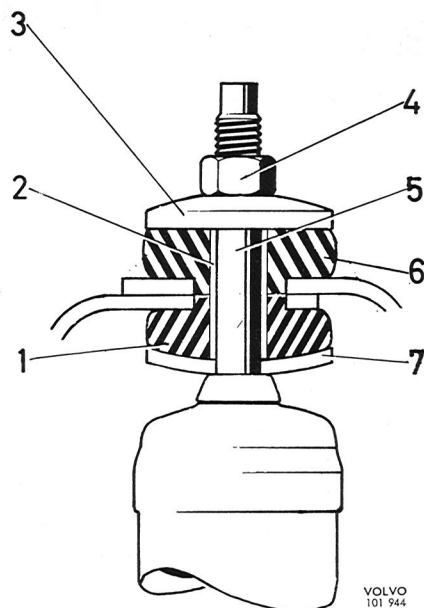


Fig. 7-8. Upper attachment, front shock absorber

- |                   |                   |
|-------------------|-------------------|
| 1. Rubber bushing | 5. Spindle        |
| 2. Spacer sleeve  | 6. Rubber bushing |
| 3. Washer         | 7. Washer         |
| 4. Nut            |                   |

### FRONT SHOCK ABSORBER REPLACEMENT

Volvo Standard Times Op. No. 76102.

1. Remove the upper nut (4, Fig. 7-8), the washer (3) and the rubber bushing (6).
2. Remove the two lower attaching bolts (Fig. 7-9) on the underside of the lower control arm, and remove the shock absorber.

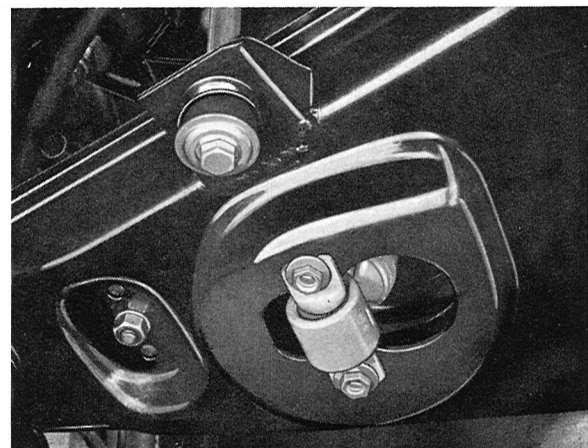


Fig. 7-9. Lower attachment, front shock absorber

3. Install the washer (7), the spacer sleeve (2) and the rubber bushing (1).
4. Extend the shock absorber and install it. Position and tighten the lower bolts.
5. Install the upper rubber bushing (6), the washer (3) and the nut. Tighten the nut until it makes firm contact with the spacer sleeve.

## REAR SHOCK ABSORBER REPLACEMENT

Volvo Standard Times Op. No. 76104

1. Remove the hub cap. Slacken the wheel nuts a couple of turns. Jack up the rear end of the vehicle at the jack attachments. Place stands in front of the jack attachments according to Fig. 7-3. Remove the wheel. Remove the shock absorber.
2. Install and tighten the shock absorber, see Fig. 7-10. Install the wheel and wheel nuts. Lower the vehicle. Attach the hub cap.

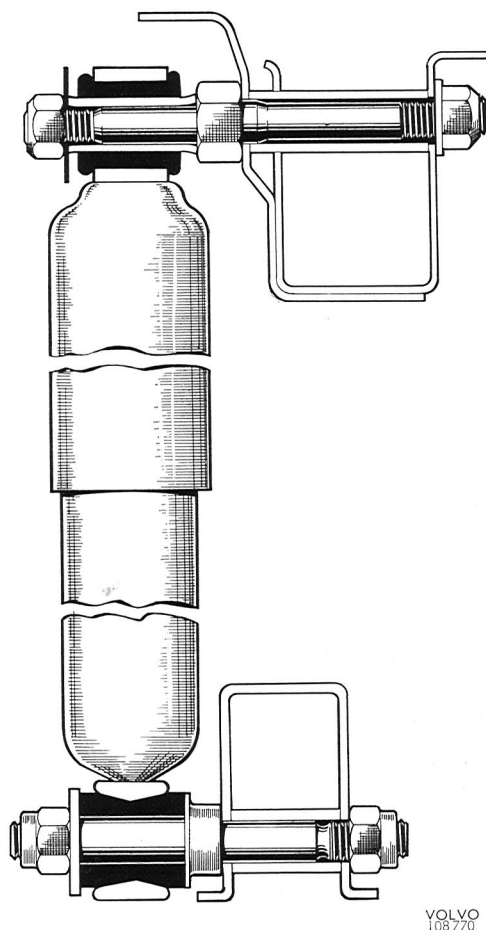


Fig. 7-10. Attachment, rear shock absorber

- |                  |            |
|------------------|------------|
| 1. Bushing       | 3. Bushing |
| 2. Spacer sleeve | 4. Washer  |

## TRAILING ARM BUSHING REPLACEMENT

Volvo Standard Times Op. No. 76328

1. Jack up the car and put stands according to Fig. 7-3. Do not remove the jack.
2. Disconnect the shock absorber at the lower attachment. Remove the lower screw of the

spring and then lower the jack until the spring releases from the trailing arm. Move the spring backwards so that it runs free from the trailing arm. Raise the jack until the rear axle is in a level position.

3. Remove the screw on the trailing arm at the rear axle bracket (3, Fig. 7-6). Remove the front screw and remove the trailing arm.
4. Press out the front bushing with tool 2732. Coat the new bushing with oil and press it in with the same tool according to Fig. 7-11. Make sure that the plane sides of the bushing are at right angles to the trailing arm shaft (Fig. 7-11).



Fig. 7-11. Removal (installation I), front bushing, trailing arm

5. Press out the rear bushing with tool 2730 and tool 2733.  
Press in the new bushing with the same tools, using tool 2730 in the reverse direction.
6. Place the trailing arm in position and install the front and rear screws.
7. Lower the jack under the rear axle, move the spring in position on the trailing arm, again raise the rear axle to the horizontal position and install the lower screw for the spring.
8. Install and tighten the nuts for the trailing arm screws. Install and tighten the nut for the lower shock absorber attachment, see Fig. 7-10.
9. Restore.



## BUSHING REPLACEMENT, ANTI-ROLL BAR (PANHARD ROD)

Volvo Standard Times Op. No. 76322

1. Jack up the rear end of the vehicle and place stands in front of the rear shock absorber attachments according to Fig. 7-3.
2. Remove the nuts at both brackets (6 and 12, Fig. 7-6). Remove the Panhard Rod from the bracket mounted on the rear axle. Remove the screw at the bracket (12) attached to the frame and remove the Panhard Rod.
3. Check the bushings. If necessary, press out the bushings with 2731, using 2733 as a counterhold (Fig. 7-12).

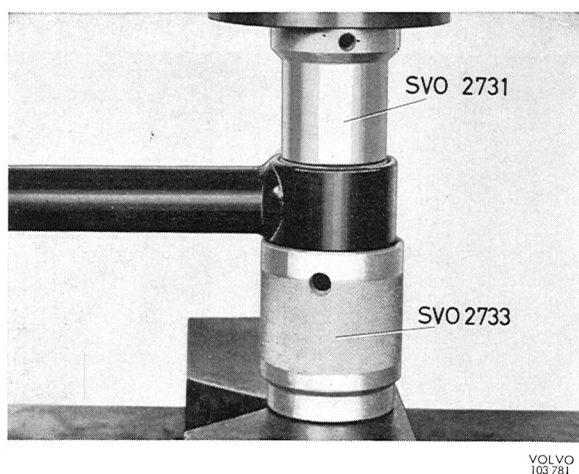


Fig. 7-12. Removal, Panhard Rod bushing

Pressing in the bushings can be done with the same tools, only in this case 2731 is reversed (Fig. 7-13).

4. Install the bar with the screw to the frame bracket (12).

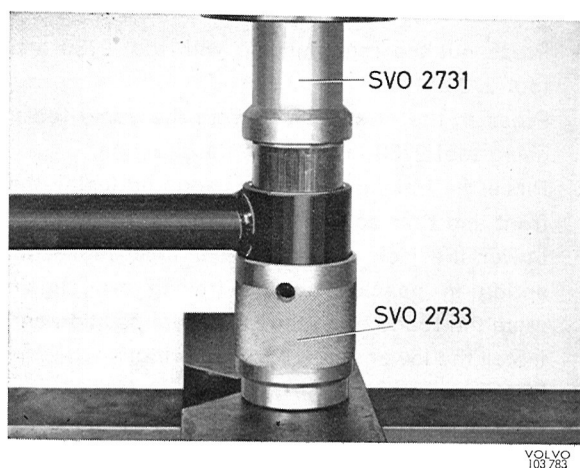


Fig. 7-13. Installing Panhard Rod bushing

5. Place the other end of the rear axle bracket (6) and install nut cap and nut. Screw on the frame bracket nut.
6. Remove the stands and lower the vehicle.

## SUPPORT ROD BUSHING REPLACEMENT

Volvo Standard Times Op. No. 76328

The support rod bushings are pressed out with tool 2734 and counterhold 2733. They are suitably pressed in a drift press directly on the bushing and with tool 2733 as a counterhold (see Fig. 7-14). Before pressing in the rubber bushing, coat it with oil so that it slides easily in position and is not damaged.

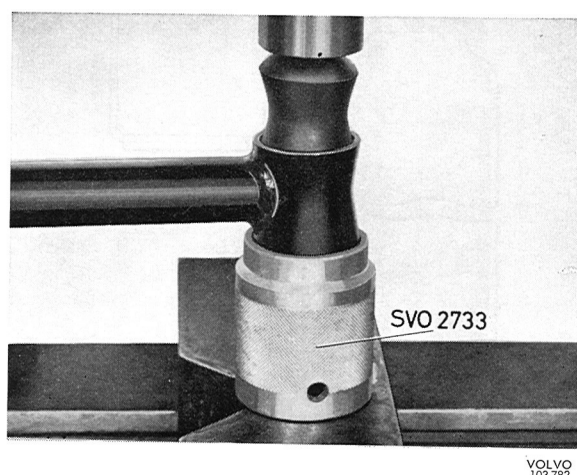


Fig. 7-14. Support rod bushing installation

When installing the bushings, they should be turned so that the markings come at right angles to the length of the rod as shown by the arrows in Fig. 7-15.

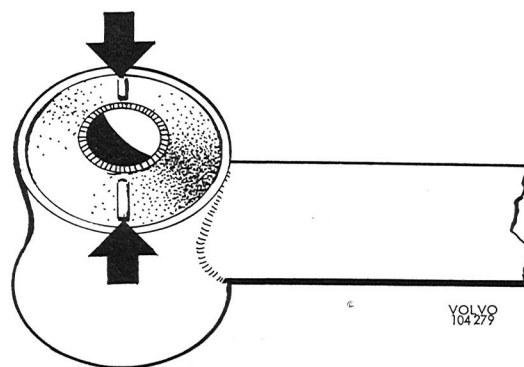


Fig. 7-15. Support rod bushing marking

## GROUP 77

# WHEELS

## SERVICE PROCEDURES

### WHEEL CHANGE

It is important that all grit and dirt and any surplus paint is cleaned off from the contact surfaces between wheel and hub.

### WHEEL STUD REPLACEMENT

Volvo Standard Times Op. No. 77473

The wheel studs can be replaced without removing the front wheel hubs or drive shafts.

1. Remove the brake caliper and brake disc according to the instructions in Section 5.
2. Set up tool 2862, without the accessory components, as shown in Fig. 7-16. Run the impact wrench until the stud is fully removed. If the old stud is loose in the hub, the hole must be checked. If the hole diameter exceeds 16.27 mm (.64"), the hub must be replaced.

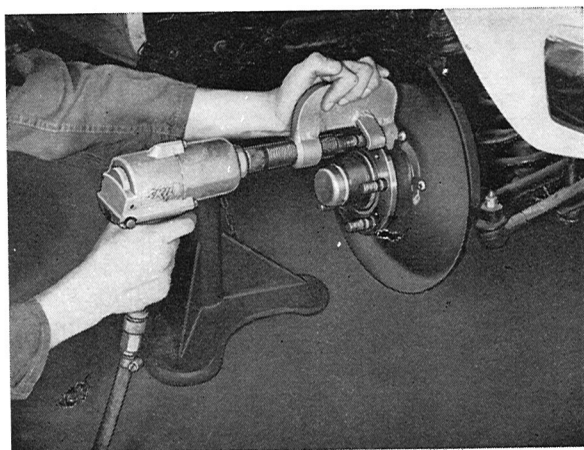


Fig. 7-16. Wheel stud removal

3. Insert a new oversize wheel stud and press it in by hand as far as possible.
4. Place the accessory part, the pin, in the press tool.
5. Place the sleeve on the outer end of the wheel stud.

6. Place the tool in position (see Fig. 7-17) and use an impact wrench to screw in the stud completely.

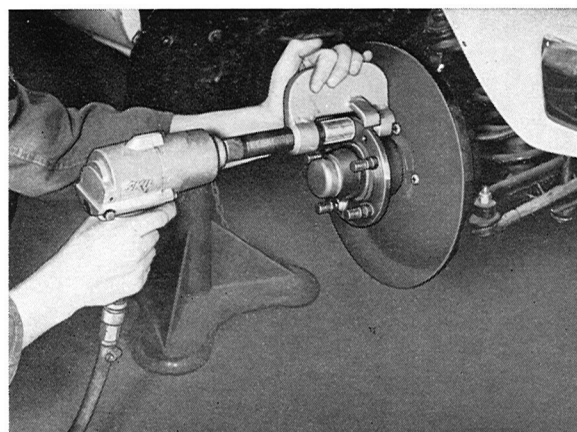


Fig. 7-17. Wheel stud installation

NOTE. When replacing a wheel stud, always use a new, oversize stud. The oversize stud can be installed without previously machining the hole.

### REPLACEMENT AND ADJUSTMENT OF FRONT WHEEL BEARING

Volvo Standard Times:

Replace Front Wheel Inner and/or Outer Bearings and Races, incl. Seals One side — Op. No. 77404  
Both sides — Op. No. 77408

1. Remove the hub cap and slacken the wheel nuts slightly.
2. Jack up the front end and put stands under the lower control arms. Remove the wheel nuts and the wheel.
3. Remove the front wheel brake according to the instructions in Section 5 under "Front wheel brake unit removal".

4. Remove the grease cap with tool 2715 (Fig. 7-18). Remove cotter pin and castle nut.

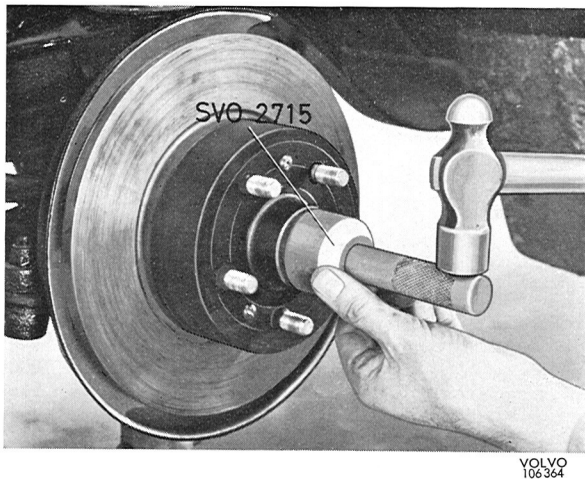


Fig. 7-18. Grease cap removal

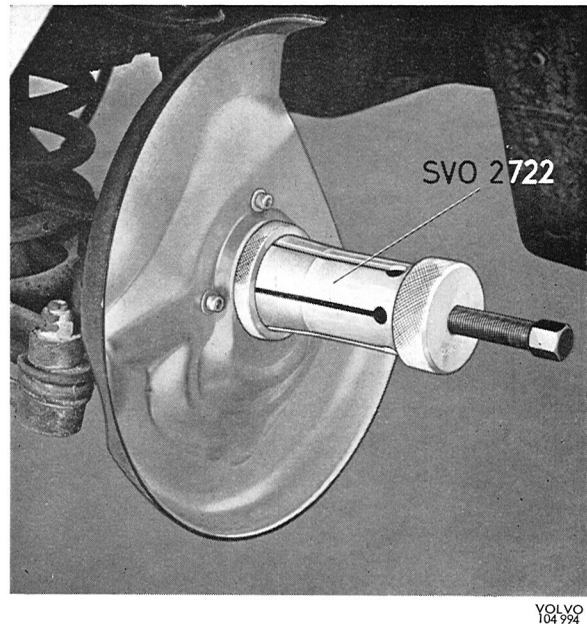


Fig. 7-20. Inner bearing removal

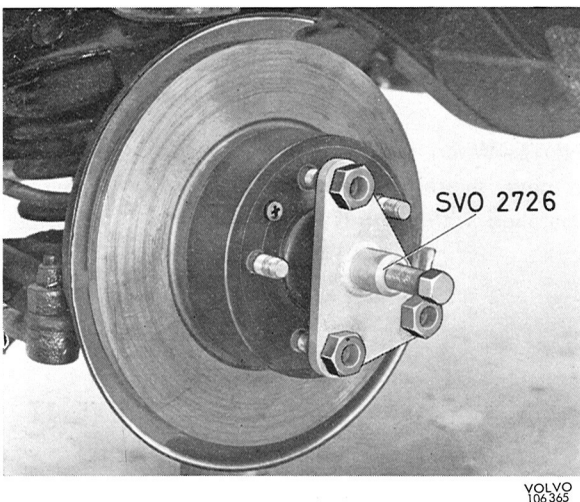


Fig. 7-19. Hub removal

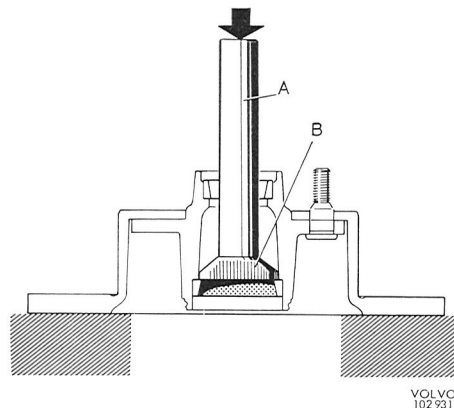


Fig. 7-21. Inner bearing race removal

A=Tool 1801 B=Tool 2724

5. Remove the bearing races. Use drift 2724 (Fig. 7-21) for the inner bearing ring together with standard handle 1801. Use drift 2725 for the outer bearing race together with standard handle 1801 (Fig. 7-22).

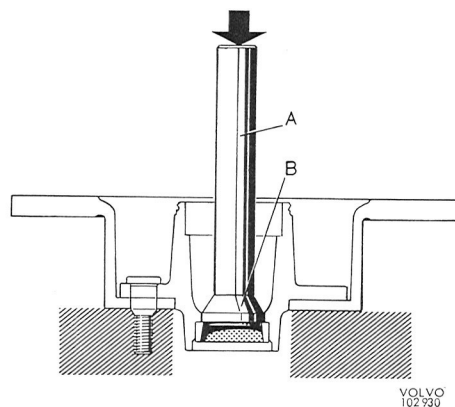


Fig. 7-22. Outer bearing race removal

A=Tool 1801 B=Tool 2725

Pull off the hub with puller 2726 (see Fig. 7-19). Pull off the inner bearing from the stub axle with puller 2722 (see Fig. 7-20) if the bearing remains in place.



6. Clean the hub, brake disc and grease cap.
7. Press in the new bearing races. Use drift 5005 in addition to standard handle 1801 for the inner ring (Fig. 7-23).

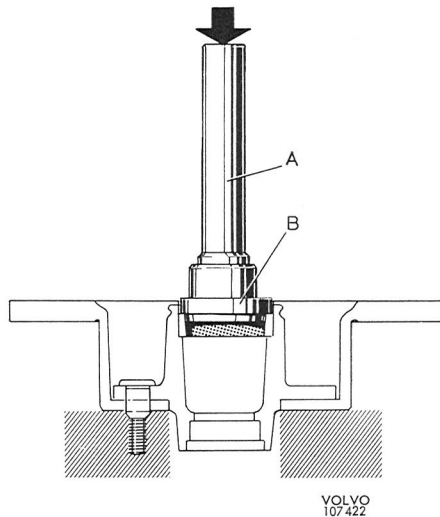


Fig. 7-23. Inner bearing race installation  
A=Tool 1801 B=Tool 5005

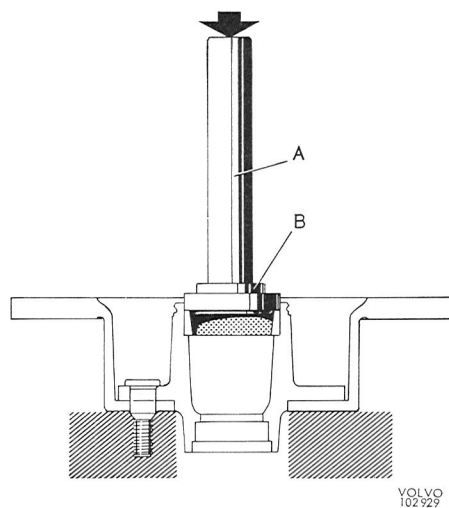


Fig. 7-24. Outer bearing race installation  
A=Tool 1801 B=Tool 2724

Use drift 2724 in addition to handle 1801 for the outer bearing race (Fig. 7-24).

8. Grease the bearing with a grease press. If a grease press is not available, pack the bearings by hand with as much thick grease as there is room for between the roller retainer and the bearing inner race. Also apply grease to the outer sides of the bearings and on the outer races pressed into the hub. The recess in the hub is filled with grease all round up to the smallest diameter of the outer race of the outer bearings, see Fig. 7-25.

Use a high-class bearing grease for the bearing. Place the inner bearing in position in the hub. Press in the washer until it lies

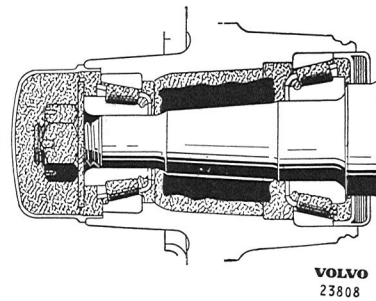


Fig. 7-25. Front wheel bearing lubrication

against the bearing outer ring. Use tools 1809 and 5505, see Fig. 7-26.

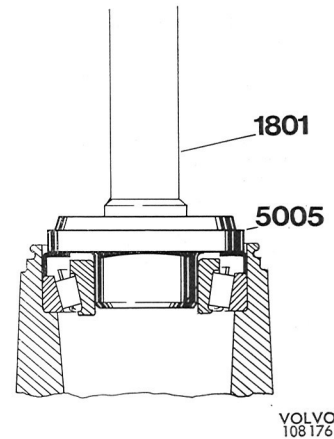


Fig. 7-26. Installation of washer

Without the tools, however, press the rubber ring onto the hub carrier until it bottoms.

NOTE: It is important that the ring is fitted flat and not at an angle.

9. Install the hub on the stub axle. Install the outer bearing, washer and castle nut.
10. Adjust the front wheel bearings by first tightening the nut with a torque wrench to  $70 \text{ Nm} = 7 \text{ kpm} = 50 \text{ lb.ft.}$  Then slacken the nut  $1/3$  of a turn. If the slot in the nut does not coincide with the cotter pin hole in the stub axle, slacken it further to enable the cotter pin to be installed. Check that the wheel rotates easily without any play.
11. Fill the grease cap half full of grease and install it with tool 2715.
12. Install the front wheel brake unit according to Section 5.
13. Clean the wheel from any grit and dirt from the contact surfaces between the wheel and hub. Install the wheel and tighten the nuts sufficiently so that the wheel cannot be displaced on the hub. Lower the vehicle and tighten the wheel nuts. Tighten every other nut a little at a time until all of them are finally tightened to a torque of  $100\text{--}400 \text{ Nm} = 9.5\text{--}14 \text{ kpm} = 70\text{--}100 \text{ lb.ft.}$  Install the hub cap. restore.

