



**CARS**

Part 4 (46)

**REAR AXLE**  
(Spicer Mod. 27)

P 120, 2- and 4-door

P 1800, PV 544

# **SERVICE MANUAL**

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## DESCRIPTION

The rear axle on the P 120, P 1800 and PV 544 is carried in two support arms. The support arms are provided with two rubber bushes in which the rear axle housing is flexibly mounted. In order to take up the rear axle torque, there are two torque rods attached to the body and to levers on the housing. A track bar prevents the body and rear axle from moving sideways in relation to each other. The principle of the rear axle suspension is shown in Illustrations A and B. The design of the rear axle is shown in Illustration C.

The rear axle is of the hypoid type, that is to say, the drive pinion lies below the centre of the crown wheel. This means that the level of the propeller shaft can be lower and also permits greater stresses on the teeth of the pinion and crown wheel. Apart from the pressure exerted against each other by the teeth in the gear system, there is also a wiping motion between the teeth in a hypoid gear system. This is why extra demands are made on the adhesion of the oil used. For this reason, a special type of lubricating oil, called hypoid oil, which has outstandingly good adhesion, is used. The use of the wrong type of oil can cause extremely rapid wear of the gears.

The final drive assembly consists of the drive pinion, crown wheel and differential gears. The gear backlash and differential carrier bearing tension are

adjusted by means of shims inside the differential carrier bearings.

The differential carrier and the crown wheel are journalled in the final drive housing and the drive pin carrier respectively by means of two taper roller bearings. The crown wheel is attached to the differential carrier by means of bolts. The differential gears themselves in the differential carrier consist of two bevel pinions on trunnions and two side gears in which the drive shafts are carried by means of internal splines. The differential gears are journalled so that they can rotate and permit the drive shafts to rotate at different speeds when the car is being driven round bends. There is a washer under each of the differential gears and the drive pinion is carried in taper roller bearings. The axial location of the drive pinion relative to the crown wheel is adjusted by means of shims under the outer race of the rear pinion bearing. The pinion bearings are adjusted by means of shims under the inner race of the front pinion bearing.

The outer end of each drive shaft is journalled in a taper roller bearing. Bearing clearance is adjusted by means of shims under the brake backing plates. Inside each of the drive shaft bearings there is an oil seal which, together with a felt ring outside each bearing, prevents oil from seeping out from the final drive on to the brake linings.

## REPAIR INSTRUCTIONS

### WORK THAT CAN BE CARRIED OUT WITH THE REAR AXLE INSTALLED IN THE VEHICLE

#### Replacement of drive shaft oil seal

1. Remove the wheel and pull off the wheel hub, Fig. 1. Use puller SVO 1791. Remove the brake backing plate after having placed a wooden block under the brake pedal and loosened the brake line on the backing plate.
2. Pull out the drive shaft, Fig. 2. Use puller SVO 2204.
3. Pull out the oil seal by using tool SVO 4078, Fig. 3.
4. Drive in the new oil seal. Make sure it is correctly located. Use tools SVO 1801 and SVO 2456, Fig. 4.
5. Remove any oil and grease that there may be on the brake backing plate. Replace brake linings if they have any oil or grease on them.
6. Fit the drive shaft and brake backing plate with a new felt washer.
7. Check the drive shaft end play. See the instructions under the heading "Assembling".
8. Replace the draw key if it has been removed and then fit the hub and wheel.
9. Air-vent the brake lines and adjust the rear wheel brakes. Follow the instructions given in the part "Brakes".
10. Check the oil level in the rear axle.

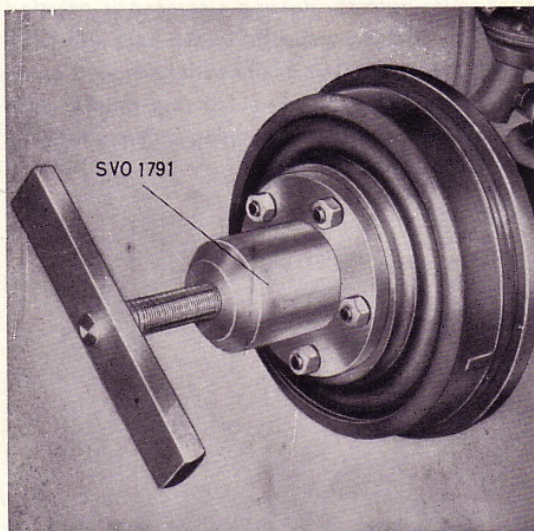


Fig. 1. Removing wheel hub.

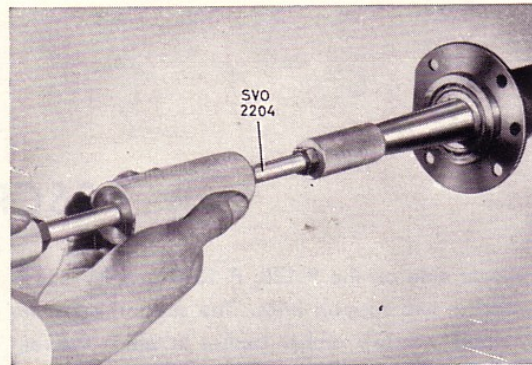


Fig. 2. Removing drive shaft.

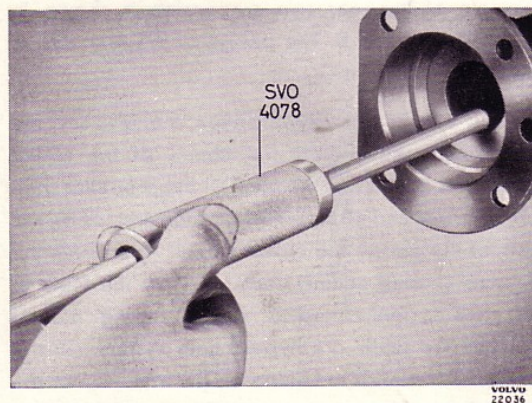


Fig. 3. Removing oil seal.

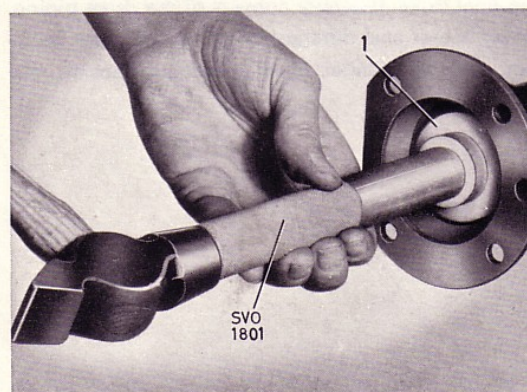


Fig. 4. Fitting oil seal.

1. Drift SVO 2456

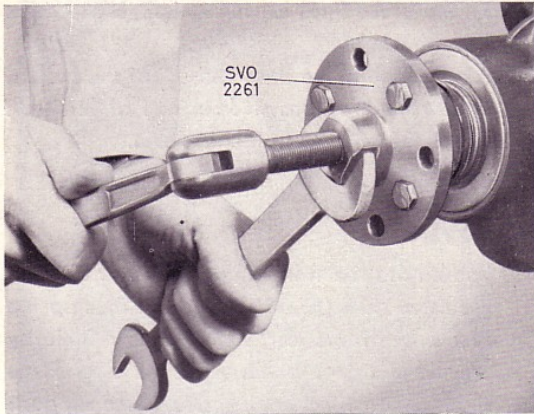


Fig. 5. Removing the flange, PV 544 and late production P 120, P 1800.

### Replacement of pinion oil seal

1. Disconnect the rear section of the propeller shaft from the flange (yoke) on the pinion. Check for looseness of the pinion in its bearing. If it is loose, this must be remedied before a new oil seal is fitted. See the instructions under the heading "Assembling".
2. Remove the flange nut by using lever SVO 2409 as counterhold. Pull off the flange for PV 544 and late production P 120 and P 1800 with tool SVO 2261, see Fig. 5. The yoke for early production P 120 and P 1800 is pulled off with tool SVO 2262, see Fig. 6. Remove the old oil seal by using tool SVO 4030, as shown in Fig. 7.
3. Insert a new paper gasket and fit the new oil seal with tool SVO 2403, as shown in Fig. 8.
4. Press on the flange (yoke) by using tool SVO 1845, see Fig. 9. Fit the washer and nut. Tighten the latter to a tightening torque of 28—30 kgm (200—220 lb. ft.).
5. Re-connect the propeller shaft.

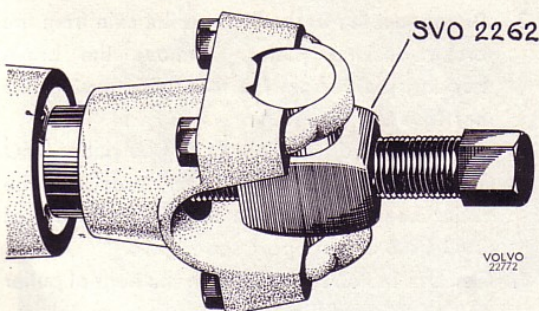


Fig. 6. Removing yoke, early production P 120, P 1800.

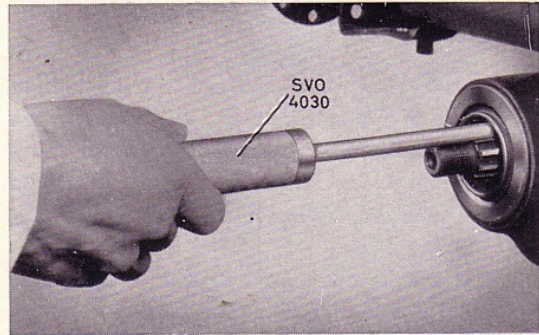


Fig. 7. Removing the oil seal.

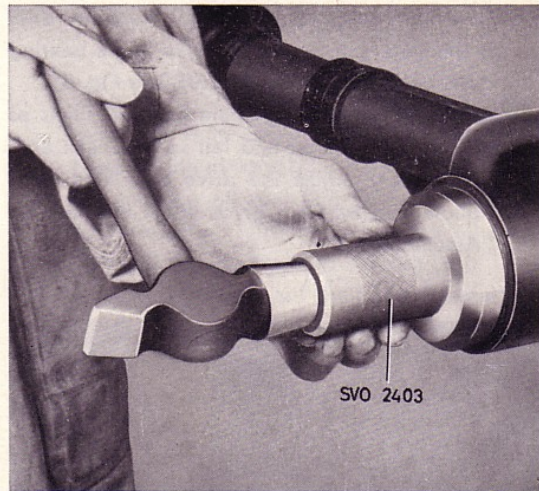


Fig. 8. Fitting the oil seal.

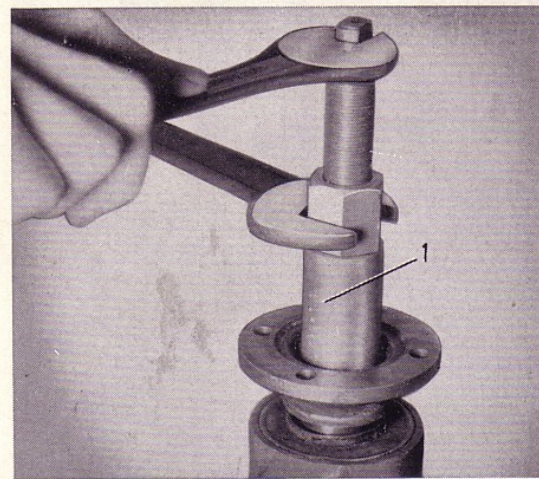


Fig. 9. Fitting the flange.

1. Press tool SVO 1845

## Replacement of drive shaft and/or bearing

1. Remove the wheel and pull off the hub as shown in Fig. 1. Use puller SVO 1791. Remove the brake backing plate after having placed a wooden block under the brake pedal and disconnected the brake line from the backing plate.
2. Pull out the drive shaft, Fig. 2. Use tool SVO 2204. Check or replace the oil seal.
3. Press off the bearing, see Fig. 10. Use tool SVO 1806 under the bearing. Fit the new bearing by using tool SVO 1805, see Fig. 30.
4. Pack the bearing with a high quality lithium base multi-purpose grease. Fit the drive shaft in the drive pinion carrier. Drive in the bearing outer race with tool SVO 2205, see Fig. 31.
5. Fit the brake backing plate and the shims as well as the retainer and felt seal. Check and, if necessary adjust the drive shaft end play. Follow the directions given under the heading "Assembling".

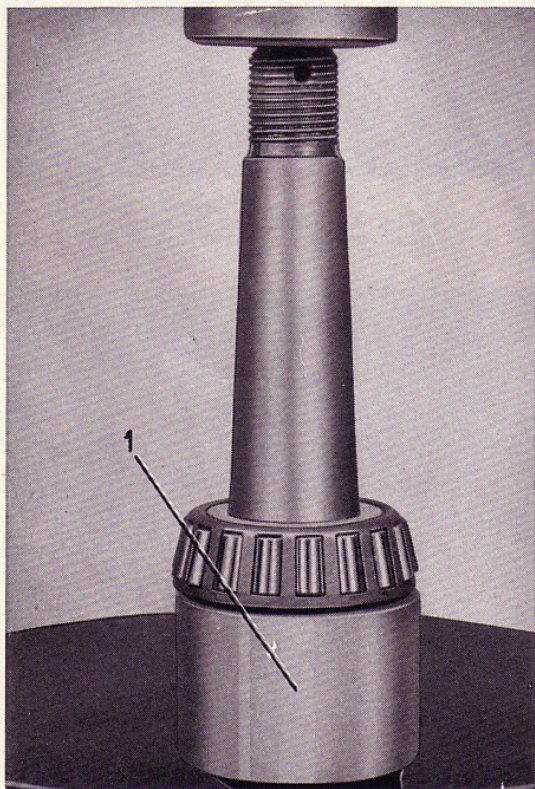


Fig. 10. Removal of drive shaft bearing.

1. Tool SVO 1806

6. Fit the brake lines as well as hub, brake drum and wheel.
7. Air-vent the brake lines and adjust the brakes. Follow the directions given in the Part "Brakes".
8. Check the oil level in the rear axle.

## REMOVING

1. Loosen the rear wheel nuts and the nuts from the drive shaft (13, Illustration C). Jack up the rear end of the car comparatively high by placing the jack under the rear axle. Place blocks against the front wheels. Place supports under the body in front of the rear wheels. Take off the rear wheels.
2. Disconnect the rear propeller shaft section from the flange (22) on the pinion (28) and disconnect the brake line from the master cylinder to the rear axle level with the rear universal joint (place a wooden block under the brake pedal).
3. Loosen the track bar, shock absorbers and shock absorber straps from the rear axle. Disconnect the handbrake cables and the adjuster.
4. Loosen fine nuts for the support arms. Lower the rear axle and remove the springs. Loosen the bolts for the torque rods and remove the rear axle.
5. Clean the rear axle externally and drain off the oil.

## DISMANTLING

Before dismantling the rear axle, measure up the drive shaft end play and the crown wheel backlash since this enables any fault to be located and remedied.

1. Place the rear axle in a stand or on a couple of supports of a suitable height. Remove the rear wheel hubs with puller SVO 1791, see Fig. 1.
2. Disconnect the brake lines on the axle from the brake backing plates. Remove the brake backing plates from the rear axle housing. Do not lose the shims.
3. Remove the drive shafts (13). Use puller SVO 2204, see Fig. 2. If necessary, press out the roller bearing (15) from the shafts. Use tool SVO 1806 as a support, see Fig. 10.
4. Remove the oil seals (14) with the help of puller SVO 4078, see Fig. 3.
5. Remove the inspection cover from the rear axle casing.

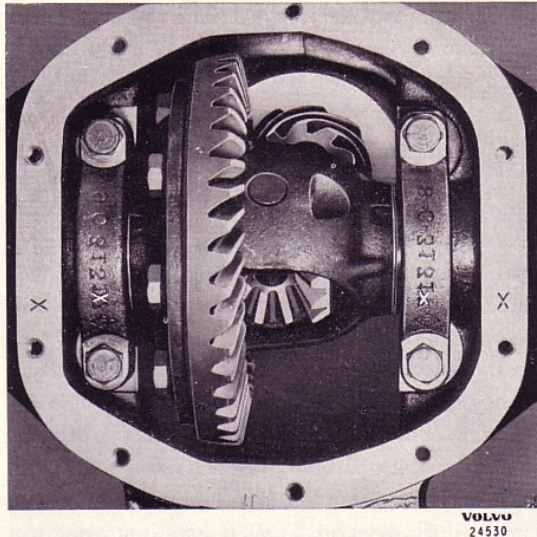


Fig. 11. Alignment markings on cap and carrier.

6. Check the aligning marks on the cap (2) and the carrier (21), see Fig. 11. If there are no markings, or if they are difficult to see, mark one side with a punch. Remove the cap.
7. Fit tool SVO 2394 in the holes in the drive pinion carrier as shown in Fig. 12. Fit an indicator so that the expansion of the drive pinion carrier can be read off. Tighten the tensioning screw so that the carrier is expanded not more than 0.3 mm (0.012"). Remove the indicator. Lift out the differential carrier with crown wheel.
8. Remove the nut for the flange (yoke) (22). Use lever SVO 2409 as counterhold. Pull off the flange for PV 544 and late production P 120 and P 1800 with puller SVO 2261, see Fig. 5. The

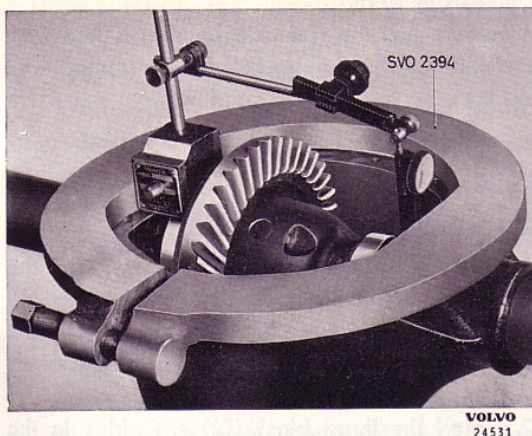


Fig. 12. Expanding the drive pinion carrier.

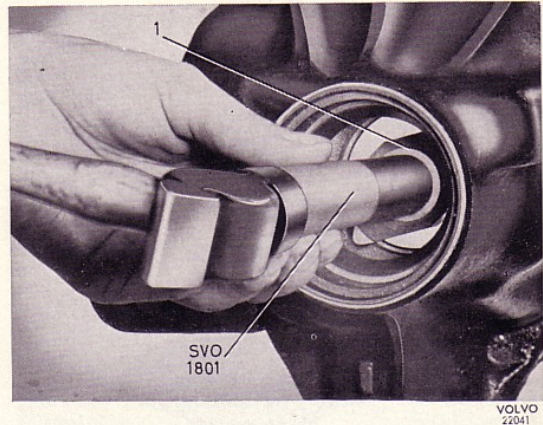


Fig. 13. Removing the bearing race.

1. Drift, see text

yoke for early production P 120 and P 1800 is pulled off with puller SVO 2262, see Fig. 6. Press off the pinion (28).

9. Remove the oil seal (25) by using tool SVO 4030, see Fig. 7. Then remove the oil slinger (24) and the front pinion bearing (27).
10. If necessary, drive out the bearing outer race, see Fig. 13. Use the standard handle SVO 1801 and tool SVO 4063 for the front and SVO 4064 for the rear race. Do not lose the shims (30) under the rear ring.
11. If necessary, pull off the rear bearing (29) from the pinion (28) by using puller SVO 2392, see Fig. 14.

The puller is fitted in the following way: Slide the puller down over the rollers and press down the circlip. Then tighten the puller with the screw until the rollers are against both the edge of the inner race and the edge of the puller. Strike the circlip with a hammer.

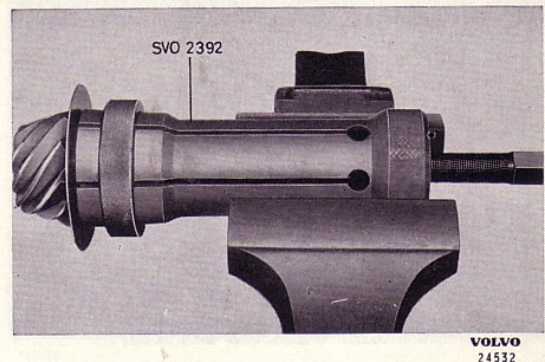


Fig. 14. Removing the rear pinion bearing.

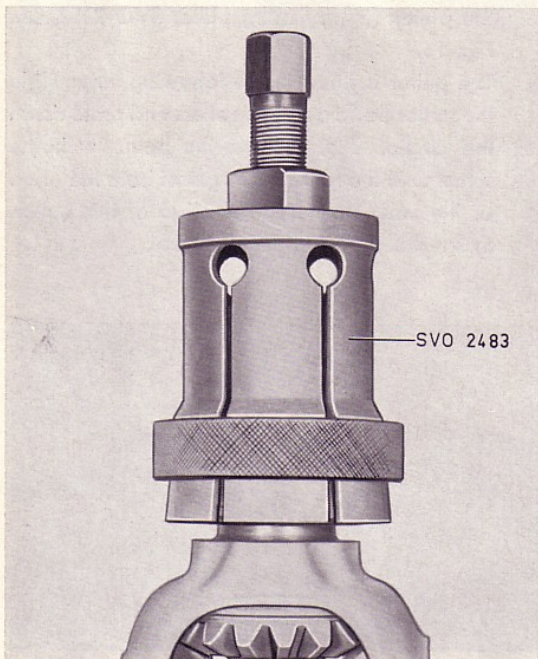


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Fig. 15. Removing the locking pin.

### Dismantling the differential

1. Loosen the ring gear bolts and remove the crown wheel (9).
2. Drive out the locking pin (7), see Fig. 15, and then the shaft (10) for the differential gears. Take out the block (12), the differential gears (6, 8) and the thrust washers (5, 11).



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Fig. 16. Removing the differential carrier bearings.

3. Pull off the differential carrier bearings (1) with puller SVO 2483, see Fig. 16. Do not lose the shims (3).

### INSPECTING

The various components must be thoroughly cleaned before inspection can be carried out. All bearing races and bearings must be thoroughly examined. All bearing races, rollers and retainers must be free from damage. Replace any damaged bearings and races. The drive pinion and crown wheel must be thoroughly examined for damage on their teeth. Cracks in the teeth can result in pieces loosening while the vehicle is being driven. These pieces can come between the gears and can cause extensive damage in the final drive unit. If there is any damage or cracks on the pinion or crown wheel, they must be replaced. These (the crown wheel and drive pinion) are sold in complete sets since they are matched in a special machine to ensure the correct backlash and silent operation. The differential gears should also be examined for cracks and damage on the teeth. The differential gears should be fitted in a clean and dry condition in the differential carrier together with the shaft and thrust washers so that looseness and wear can easily be determined. If there is looseness, the parts concerned should be replaced. The thrust washers should be free from any unevenness.

Check to ensure that the cylindrical part of the flange in contact with the oil seal is not worn or scratched. If this is the case, replace the flange and the oil seal. Inspect the drive shafts. Shafts that are distorted or damaged in any way should be replaced.

Examine the oil seals and replace them if they are damaged or worn.

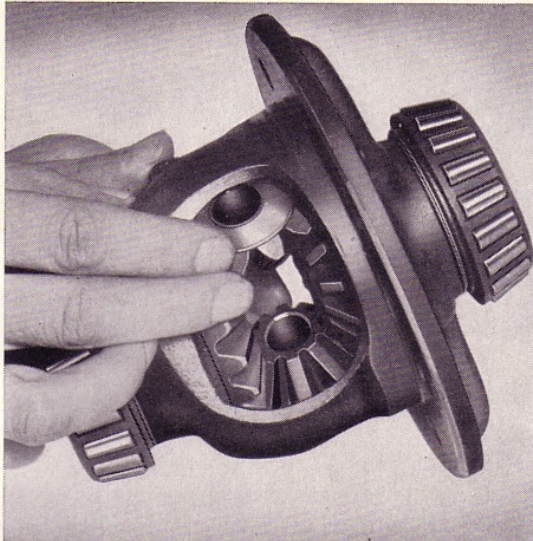
Make sure that the rear axle housing is free from cracks. Check that the brackets for the support arms and track bar are in good condition.

### ASSEMBLING

#### Assembling the differential

1. Place the differential side gears (6) and the thrust washers (5) in the differential carrier (4). Then "roll" in the differential pinions (8), both simultaneously with the dished thrust washers (11), see Fig. 17.
2. Insert the thrust block (12) and drive in the shaft (10).





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Fig. 17. Fitting the differential gears.

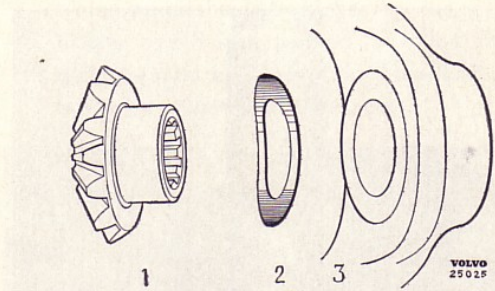
3. Check the differential unit. If there is any looseness, fit new thrust washers. The flat thrust washers (5) can be replaced with either oversized thrust washers or spring thrust washers. Fit the spring thrust washers the right way round. The "back" should face the differential carrier, see Fig. 18.

After checking and, if necessary, replacing the washers, fit the locking pin (7).

4. Fit the crown wheel (9). Make sure that the contact surfaces are clean and free from burr. Tighten the bolts to a torque of 5.5—7 kgm (40—50 lb. ft.).

### Assembling the final drive

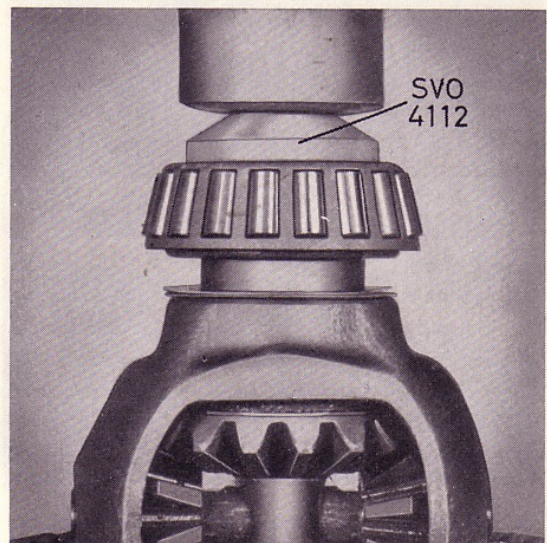
1. Press on the differential carrier bearings (1) without shims. Use tool SVO 4112, see Fig. 19. Place the differential carrier with the crown wheel and roller bearings in the housing. Measure the end play. The end play can be measured in two ways, either with a dial indicator or a feeler gauge. Whichever method is used, measurement must be carried out with great accuracy if a good result is to be obtained. If a dial indicator is used, place it against the reverse side of the crown wheel, see Fig. 20. The differential, (remember this also includes the bearing outer races) is slid first one way and then the dial indicator is set to zero. Then the differential is slid the other way and the end play read off. If the feeler gauge



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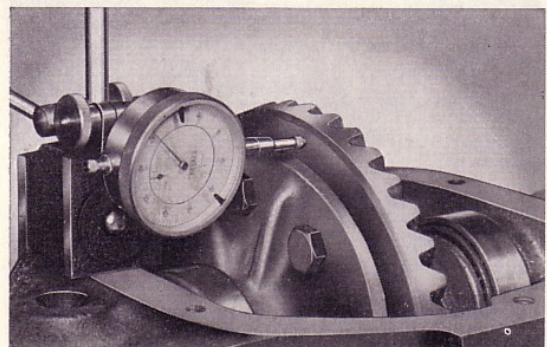
Fig. 18. Fitting spring thrust washers.

1. Differential gear
2. Thrust washer
3. Differential carrier



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Fig. 19. Fitting the differential carrier bearings.



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Fig. 20. Measuring the differential end play.

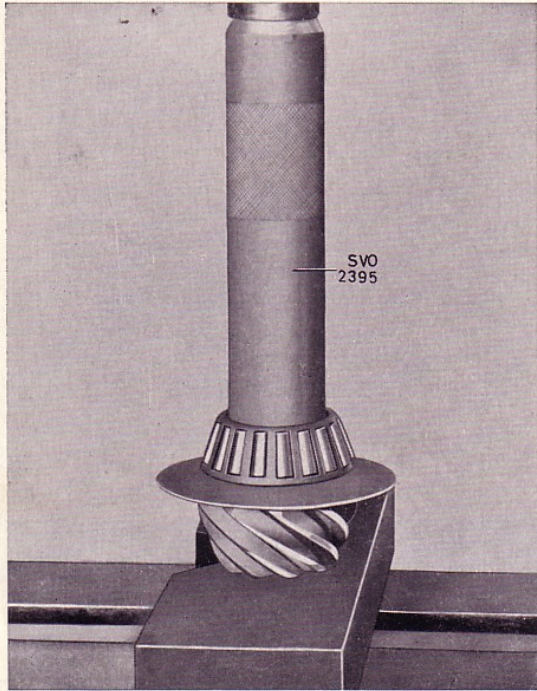


Fig. 21. Fitting the rear pinion bearing.

system is to be used, use two gauges which are pushed down between one of the outer races and the bearing recess in the differential carrier. Add 0.2 mm (0.008") to the measurement obtained, this showing the total thickness of the shims to be used when assembly is carried out.

2. Fit the oil slinger washer, if any, on the pinion (28). A later type of pinion does not have this oil slinger washer. With an earlier type, the oil

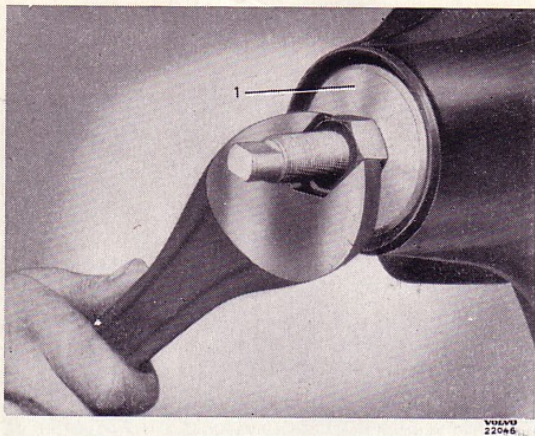


Fig. 22. Fitting the bearing races.

1. Press tool SVO 4047

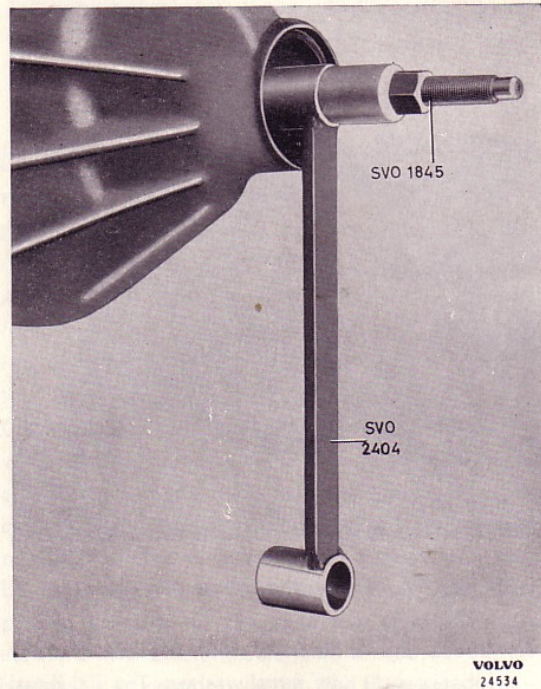


Fig. 23. Fitting the pinion.

slinger washer can be removed if at the same time an extra shim with thickness 0.030" is fitted on the rear bearing. Press on the rear bearing (29) with tool SVO 2395, see Fig. 21.

3. Replace the number of shims (30) for the rear pinion bearing outer race which were there before dismantling, in the casing and then press in the outer races with the help of tool SVO 4047, see Fig. 22.
4. Place the pinion in the casing and fit the same number of shims (26) which were there when

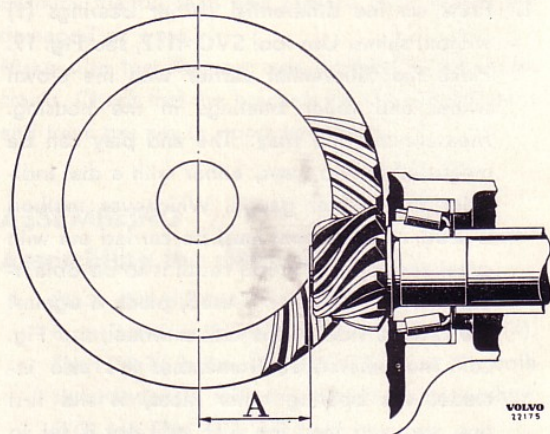


Fig. 24. Pinion location.

- A. Nominal measurement = 2.094"

dismantling and then fit the front pinion bearing (27). Fit the wrench SVO 2404 and the press tool SVO 1845 on the front end of the pinion and pull in the pinion, see Fig. 23.

5. Replace the press tool SVO 1845 with a washer and nut. Tighten the nut to a torque of 28—30 kgm. (200—220 lb. ft.). Then check the pinion bearing tension. It should be relatively easy to rotate the pinion (11.5—23 kgcm = 10—20 lb. in.). There should be no looseness. Bearing tension is adjusted by means of shims (26) on the front pinion bearing.
6. There should be a certain nominal measurement (A, Fig. 24) to the centre line of the crown wheel. Due to tolerances in manufacture, however, there are deviations from this nominal measurement. The deviation is shown on the ground surface of the pinion by means of a figure with a plus or minus sign. If there is a plus sign in front of the figure, the nominal measurement is to be increased and, in the case of a minus sign, the nominal measurement is to be decreased. The deviation figure shown on the drive pinion is in thousandths of an inch. To check the location of the pinion, use a dial indicator, indicator retainer SVO 2284 and a measuring tool SVO 2393 which consists of two parts: a pinion gauge and an adjuster fixture. Checking is carried out in the following way: Place the pinion gauge on the ground end surface of the pinion and place the adjuster fixture in the differential bearing recesses as shown in Fig. 25. Place the indicator retainer on the drive pinion carrier and zero the indicator against the adjuster fixture, Fig. 26. Then move over the indicator retainer so that the indicator is against the pinion gauge, see Fig. 27. If the pinion is marked "O", the adjuster fixture and the pinion gauge should be at the same height. If it is marked "+" then the

pinion gauge should be higher than the adjuster fixture, and if it is marked "-" the pinion gauge should be lower than the adjuster fixture when adjustment is correct.

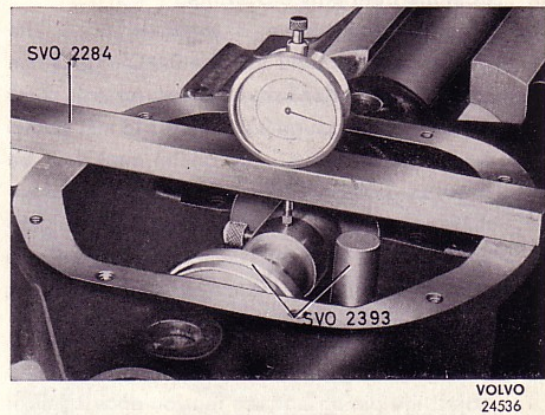


Fig. 26. Setting the indicator to zero.

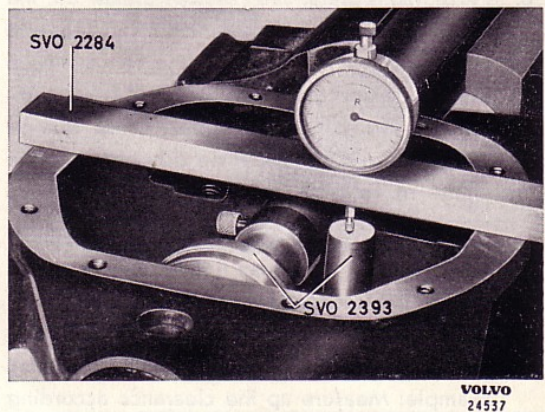


Fig. 27. Measuring the pinion location.

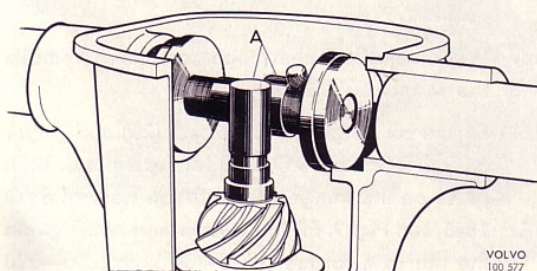


Fig. 25. Location of measuring tool.

A. Measuring tool SVO 2393

Conversion table, inches to millimetres	
inches	millimetres
0.001	0.025
0.002	0.051
0.003	0.076
0.004	0.102
0.005	0.127
0.006	0.152
0.007	0.178
0.008	0.203
0.009	0.229

Correction is carried out by adding or removing shims under the rear pinion bearing outer race. If the pinion bearing had the correct tension, just as many shims must be added or removed from the front pinion bearing.

Example. The pinion is marked "+2". The pinion gauge should then be  $0.002'' = 0.05 \text{ mm}$  under the adjuster fixture. Measurements show that the pinion gauge is  $0.006'' = 0.15 \text{ mm}$  above the adjuster fixture. The pinion must then be lowered  $0.006'' + 0.002'' = 0.008''$  ( $0.15 + 0.05 = 0.20 \text{ mm}$ ), so shims corresponding to this thickness (measured with a micrometer) are to be removed from under the rear pinion bearing outer race.

7. After adjusting the pinion location, check and adjust the pinion bearing tension once again if necessary.
8. Place the differential (without shims on the bearings) in the drive pinion carrier. Measure up the differential end play (the play between the pinion and the outer position of the differential). This can be measured either with an indicator against the reverse side of the crown wheel or with two feeler gauges. Note the clearance obtained.
9. The clearance measured under point 8 above should be decreased by the backlash. Use here the average value ( $0.005'' = 0.12 \text{ mm}$ ) of the backlash ( $0.003 - 0.006'' = 0.08 - 0.15 \text{ mm}$ ). Example: Measure up the clearance according to point 1 =  $0.056''$  ( $1.4 \text{ mm}$ ) + tension  $0.008''$  ( $0.2 \text{ mm}$ ) =  $0.064''$  ( $1.6 \text{ mm}$ ). Measure up the clearance according to point 8 above =  $0.038''$  ( $0.92 \text{ mm}$ ). Thickness of shims on the crown wheel side =  $0.038 - 0.005 = 0.033''$  ( $0.92 - 0.12 = 0.8 \text{ mm}$ ). Thickness of shims on opposite side =  $0.064 - 0.032 = 0.032''$  ( $1.6 - 0.8 = 0.8 \text{ mm}$ ).
10. Pull off the differential carrier bearings with puller SVO 2483. Fit shims according to the calculated values under the bearings and press these on again.
11. Fit tool SVO 2394, see Fig. 12, and an indicator on the drive pinion carrier. Tighten the tensioning screw so that the drive pinion carrier is expanded by not more than  $0.012''$  ( $0.3 \text{ mm}$ ). Remove the indicator. Fit in the differential with bearings. Then remove the tool SVO 2394.

4—10

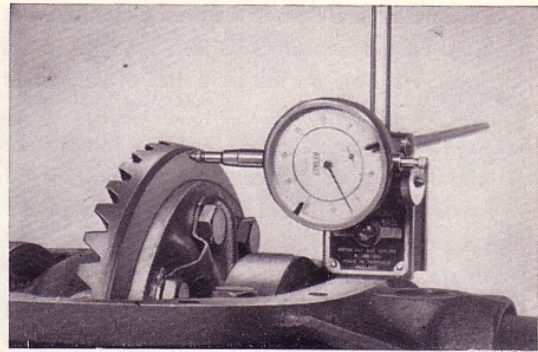


Fig. 28. Measuring the crown wheel run-out.

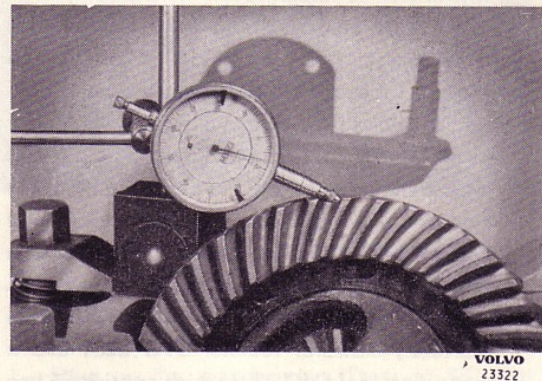


Fig. 29. Measuring the backlash.

12. Fit the cap (2) with bolts and tighten the bolts to a torque of 5.5—7 kgm (40—50 lb. ft.). Fit an indicator against the reverse side of the crown wheel, see Fig. 28. Rotate the crown wheel and measure its run-out. This should not exceed  $0.003''$  ( $0.08 \text{ mm}$ ).
13. Measure the backlash as shown in Fig. 29. This should be  $0.08 - 0.15 \text{ mm}$  ( $0.004 - 0.008''$ ).
14. Check the setting by marking the tooth contact as described under "Adjusting the tooth contact".
15. When adjustment has been completed, remove the wrench SVO 2404.
16. Fit the oil slinger (24), oil seal (25) and paper gasket. Use tool SVO 2403 for the oil seal. Then press on the flange (22) with the help of SVO 1845, see Fig. 9. Fit the washer and nut. Tighten the nut to a torque of 28—30 kgm (200—220 lb. ft.).
17. Fit the inspection cover and gasket.

### Assembling the rear axle

1. Drive in the oil seals (14) for the drive shafts (13) with drift SVO 2456 as shown in Fig. 4.
2. Drive the bearings (15) on to the drive shafts if they have been removed. Use tool SVO 1805 as shown in Fig. 30.
3. Pack the bearings with high-quality heat-resistant grease. Insert the drive shafts into the rear axle housing. Drive in the bearing outer races with sleeve SVO 2205, see Fig. 31.
4. Fit the brake backing plate and retainer with felt seal on the left-hand side of the rear axle housing. Insert the shims on the right-hand side

of the housing and then fit the brake backing plate and retainer with felt seal as shown in Fig. 32. Check the drive shaft end play, see Fig. 33. The end play should be 0.007—0.20 mm (0.003—0.008") and any adjustment should only be carried out on the right-hand side of the housing.

5. Fit the brake line as well as hub and brake drum.

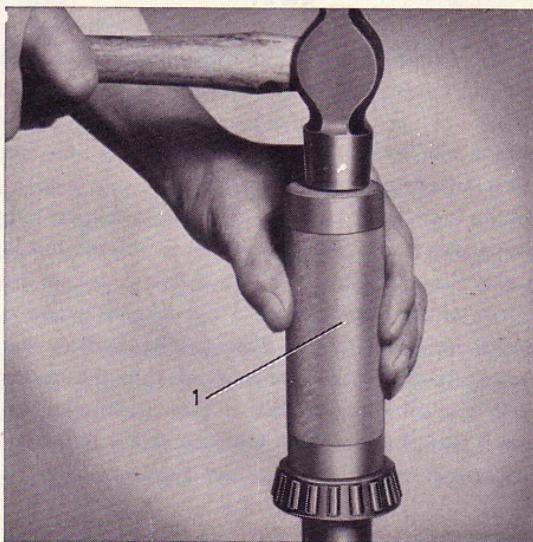


Fig. 30. Fitting the drive shaft bearings.

1. Sleeve SVO 1805

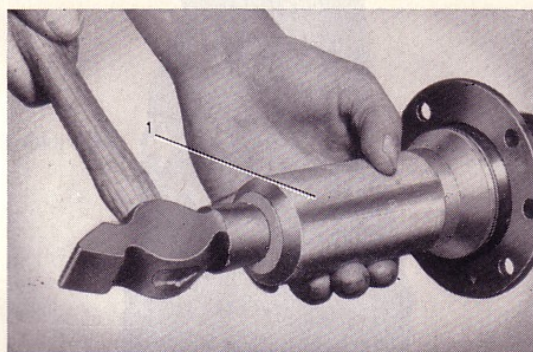


Fig. 31. Fitting the bearing race.

1. Sleeve SVO 2205

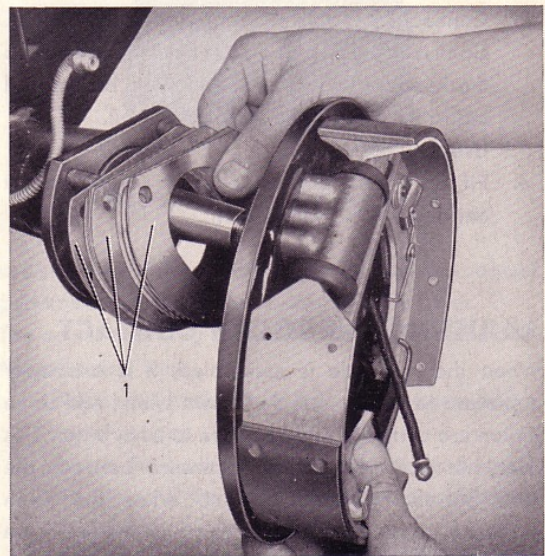


Fig. 32. Fitting the brake backing plate.

1. Shims

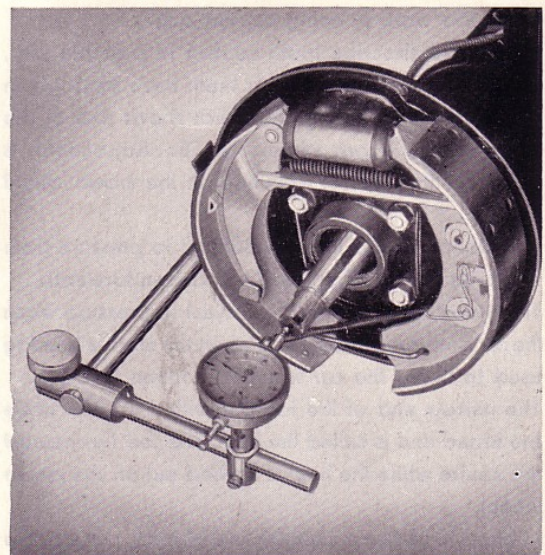


Fig. 33. Measuring the drive shaft end play.

## INSTALLING

1. Lift up the rear axle and fit the torque rod. Slide the support arms into the retainers on the body and fit the rubber blocks, washers and nuts. Tighten the nuts only a couple of turns to begin with.
2. Fit the springs, retainers and rubber blocks in position. Lift up the rear axle with a jack. Tighten the support arm nuts. Fit the shock absorbers, shock absorber straps and track rod.
3. Connect up the universal joint at the flange. Connect up the brake fluid hoses. Connect up the handbrake cables. Air-vent the brakes and adjust the handbrake. Fill up with oil. Use only hypoid oil.
4. Fit the wheels and wheel nuts. Lower the car and tighten the wheel nuts.

## ADJUSTING THE TOOTH CONTACT

When the rear axle is assembled, it is extremely important to ensure that the crown wheel and drive pinion are correctly fitted relative to each other. This does not only concern the clearance between the teeth but also the tooth contact. When the tooth contact is correct, the stresses to which the teeth are subjected when the car is driven are distributed over the greater part of the tooth surfaces. In this way tooth breakage is avoided, as well as abnormally rapid wear of the gears, and quiet running is ensured. The instructions given below can be used as a guide when this work is being carried out.

In order to describe tooth contact in a simple way, the various parts of the gear teeth have been given special names. See Fig. 34, which shows one of the teeth on the crown wheel. NOTE: Adjustment is based on the contact obtained on the crown wheel teeth.

The driving side is the side subject to pressure from the drive pinion when the car is driven forwards.

The reverse side is the side subject to pressure when the car is reversed, as well as when the engine is being used to brake the car when it is driven forwards.

The narrow end of the tooth is called the toe while the broad end is called the heel. The toe lies nearest the centre while the heel is furthest out on the crown wheel.

In order to obtain a clear picture of tooth contact, the crown wheel teeth are smeared on both sides with marking paint consisting of red lead mixed with

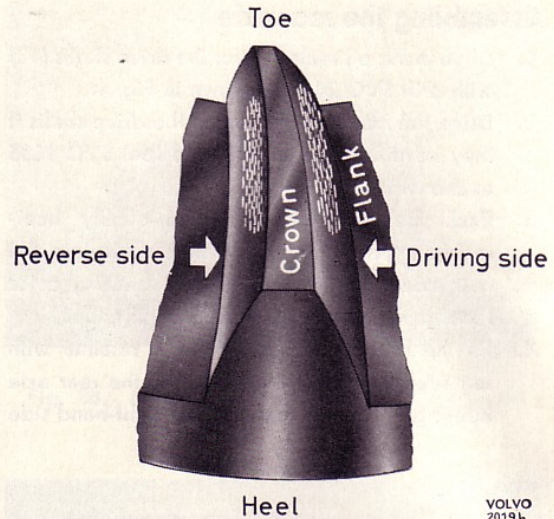


Fig. 34. Correct tooth contact.

engine oil. The marking paint must not be too thin since this can give a faulty result.

All the teeth should be smeared with a thin coating of marking paint. The pinion is then rotated ten to twelve times in both directions; at the same time the crown wheel is braked hard by using a wooden wedge or similar device. The marking paint on the crown wheel teeth is thus removed while the pinion teeth contact them, so that a clear picture of the extent and position of the tooth contact is obtained. The correct tooth contact pattern is shown in Fig. 34.

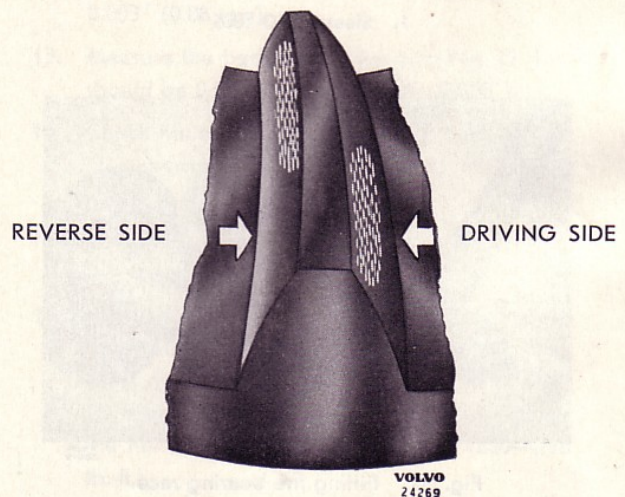


Fig. 35. Faulty tooth contact.

**NOTE: The tooth contact pattern is almost rectangular in shape and is half way up the tooth on the driving side but rather nearer the toe than the heel. On the reverse side the contact pattern is rather higher than on the driving side but otherwise similar.**

Tooth contact adjustment is carried out by altering the position of the pinion relative to the crown wheel by adding or removing shims at the rear pinion bearing outer race. At the same time, however, an equal number of shims of the same thickness must be added or removed at the forward bearing so that the pinion bearing tension is not altered.

Each time the position of the pinion is altered, the backlash must be adjusted and checked, see Fig. 29. On a hypoid gear, the tooth contact pattern moves diagonally over the teeth and in a different direction on the driving and reverse sides.

If the pinion is moved inwards, the contact pattern of the driving side moves from a high position at the heel, Fig. 35, to a low position at the toe, Fig. 36. On the reverse side, the tooth contact pattern moves at the same time from a high position at the toe, Fig. 35, to a low position at the heel, Fig. 36. This means that the tooth contact pattern on the driving side moves in the same direction as the pinion. If the contact pattern is too far out towards the heel, the pinion is moved inwards, and if the contact pattern is too far out towards the toe, the pinion is moved outwards.

When you consider that the contact pattern is correct on the driving side, look at the contact pattern on the

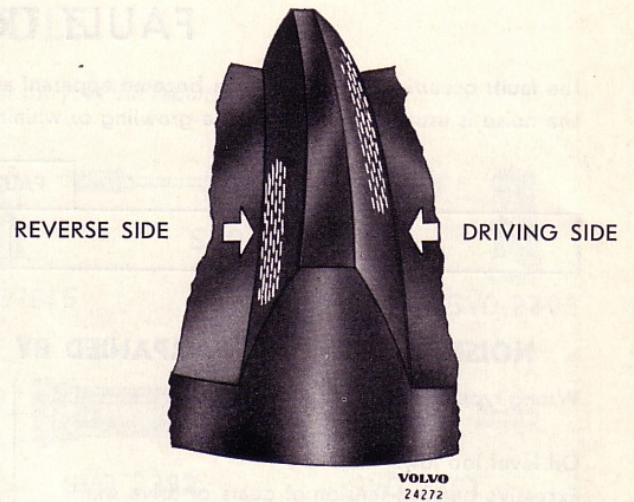


Fig. 36. Faulty tooth contact.

reverse side. If the adjustment is correct, the contact patterns should be almost opposite each other.

The actual adjusting procedure is best carried out in the following way:

1. Adjust the backlash to the values shown in the specifications.
2. Smear the teeth with marking paint and rotate the pinion at the same time as the crown wheel is braked.
3. Notice the position of the contact pattern and adjust as stated above. Each time the position of the drive pinion is changed, check and adjust the backlash.

## FAULT TRACING

The faults occurring in the rear axle become apparant as noise, overheating, leakage or drive shaft breakage. The noise is usually in the form of a growling or whining sound.

REASON	FAULT	REMEDY
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### NOISE POSSIBLY ACCOMPANIED BY ABNORMALLY HIGH TEMPERATURE

<p>Wrong type of oil used in rear axle.</p> <p>Oil level too low.</p> <p>Excessive bearing tension of gears or drive shaft.</p> <p>Faulty backlash.</p> <p>Worn bearings.</p> <p>Distorted rear axle housing.</p> <p>Distorted rear axle.</p>		<p>Drain off all the oil. Inspect the rear axle.</p> <p>Flush out the rear axle housing. Fill with hypoid oil.</p> <p>Top-up with oil.</p> <p>Remove the gears (drive shaft) and adjust the bearings.</p> <p>Remove the gears, adjust the backlash and tooth contact in accordance with instructions.</p> <p>Remove the rear axle gears and replace worn bearings.</p> <p>Replace.</p> <p>Replace.</p>
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### THUMPING SOUND IN REAR AXLE WHEN ACCELERATING OR DECELERATING

First ensure that the sound does not depend on worn universal joints.

<p>Worn washers on differential gears.</p> <p>Differential gears or differential shaft worn.</p> <p>One of the drive gears is loose on its hub.</p> <p>Worn splines on shafts or in gears.</p>		<p>Fit new washers.</p> <p>Replace worn parts.</p> <p>Tighten loose nuts.</p> <p>Replace worn parts.</p>
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### LEAKAGE

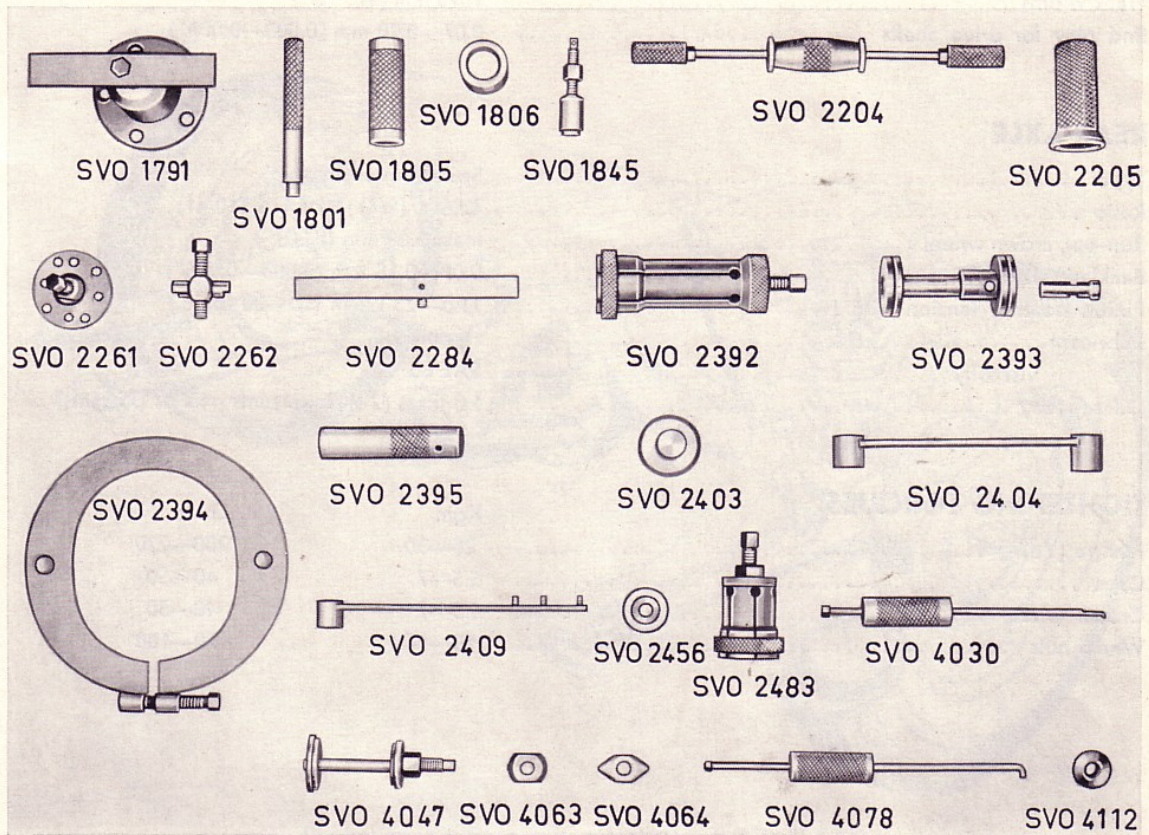
In case of leakage, first check that the ventilation hole in the rear axle housing is not blocked.

<p>Leakage at drive shaft (oil on brake linings).</p> <p>Leakage at the pinion.</p> <p>Leakage between rear axle housing and inspection cover.</p>		<p>Replace the oil seal inside the bearing and the felt washer.</p> <p>Replace oil seal and paper gasket.</p> <p>If necessary, adjust or replace the pinion bearing.</p> <p>Check that the sealing surfaces are clean and smooth, replace the gasket.</p>
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# TOOLS

The following tools are required for carrying out repairs on the rear axle.



VOLVO  
100 653

- |          |  |          |   |
|----------|--|----------|---|
| SVO 1791 | Puller for wheel hub.  | SVO 2394 | Expander tool for dismantling differential.         |
| SVO 1801 | Standard handle 18×200 mm.                                     | SVO 2395 | Sleeve for assembly of rear pinion bearing.         |
| SVO 1805 | Sleeve for fitting drive shaft bearing.                        | SVO 2403 | Tool for fitting oil seal at flange (yoke).         |
| SVO 1806 | Cushioning ring for removing and fitting drive shaft bearings. | SVO 2404 | Tool for fitting front pinion bearing.              |
| SVO 1845 | Press tool for fitting flange (yoke).                          | SVO 2409 | Counterhold lever for flange (yoke).                |
| SVO 2204 | Puller for drive shaft.  | SVO 2456 | Drift for oil seal, drive shaft.                    |
| SVO 2205 | Sleeve for fitting drive shaft bearing outer race.             | SVO 2483 | Puller for differential carrier bearings.           |
| SVO 2261 | Puller for flange, PV 544, and late prod. P 120, P 1800.       | SVO 4030 | Puller for oil seal at flange (yoke).               |
| SVO 2262 | Puller for yoke, early prod. P 120, P 1800.                    | SVO 4047 | Fitting tool for pinion bearing outer races.        |
| SVO 2284 | Retainer for dial indicator.                                   | SVO 4063 | Drift for removing front pinion bearing outer race. |
| SVO 2392 | Puller for rear pinion bearing.                                | SVO 4064 | Drift for removing rear pinion bearing outer race.  |
| SVO 2393 | Measuring tool for adjustment of pinion.                       | SVO 4078 | Puller for drive shaft oil seal.                    |
|          |  | SVO 4112 | Drift for fitting differential carrier bearings.    |

## SPECIFICATIONS

Rear axle, type .....	Semi-floating
Track widths .....	1315 mm (51 <sup>49</sup> / <sub>64</sub> " )
End play for drive shafts .....	0.07—0.20 mm (0.003—0.008")

### REAR AXLE

Type .....	Spiral bevel (hypoid)
Ratio .....	4.56: 1 (9/41) or 4.1: 1 (10/41)
Run-out, crown wheel .....	max. 0.08 mm (0.003")
Backlash .....	0.08—0.15 mm (0.003—0.006")
Pinion bearing tension .....	11.5—23 kgcm (10—20 lb. in.)
Lubricant .....	Hypoid oil
viscosity .....	SAE 80
Oil capacity .....	1.3 litres (2 <sup>1</sup> / <sub>4</sub> Imp. pints = 2 <sup>3</sup> / <sub>4</sub> US pints)

### TIGHTENING TORQUES

	Kgm	Lb. ft.
Flange (Yoke) .....	28—30	200—220
Caps .....	5.5—7	40—50
Crown wheel .....	5.5—7	40—50
Wheel nuts .....	10—14	70—100

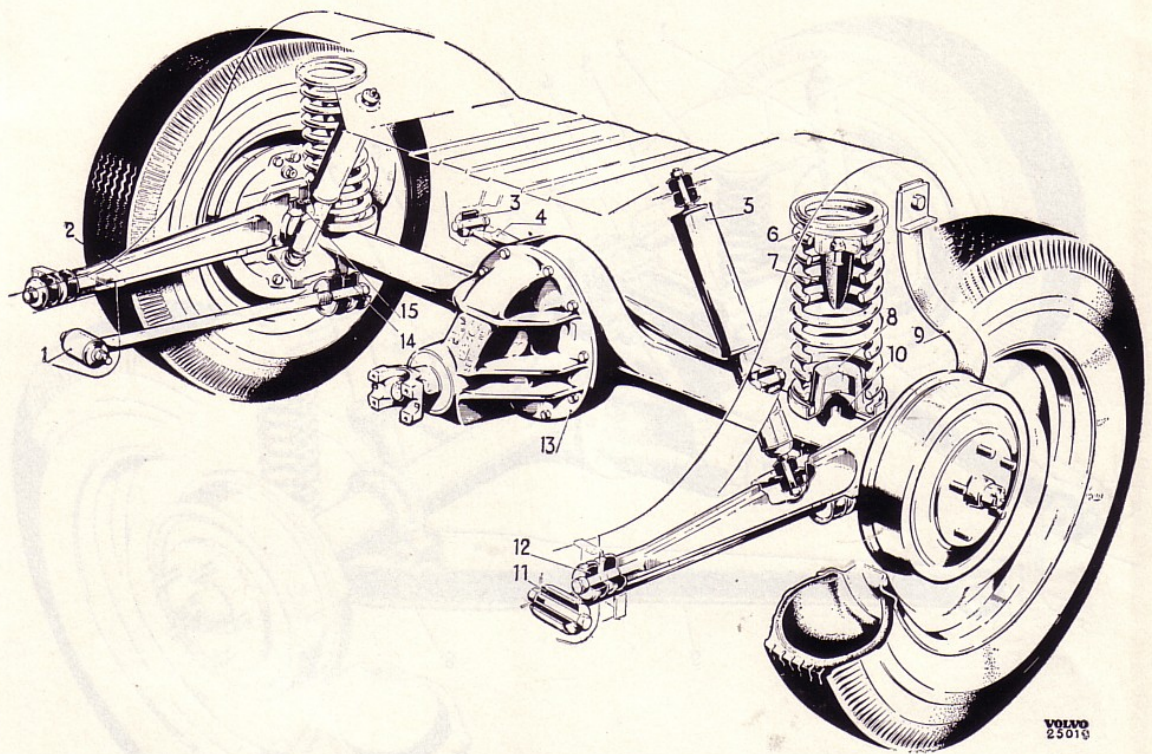


Illustration A. Rear axle suspension, P 120, P 1800.

1. Torque rod
2. Support arm
3. Rubber bush for track rod
4. Track rod
5. Shock absorber
6. Spring
7. Rubber block
8. Spring retainer
9. Shock absorber strap
10. Rubber block
11. Rubber bush for torque rod
12. Rubber bush for support arm
13. Rear axle
14. Rubber bush for torque rod
15. Rubber bush for support arm

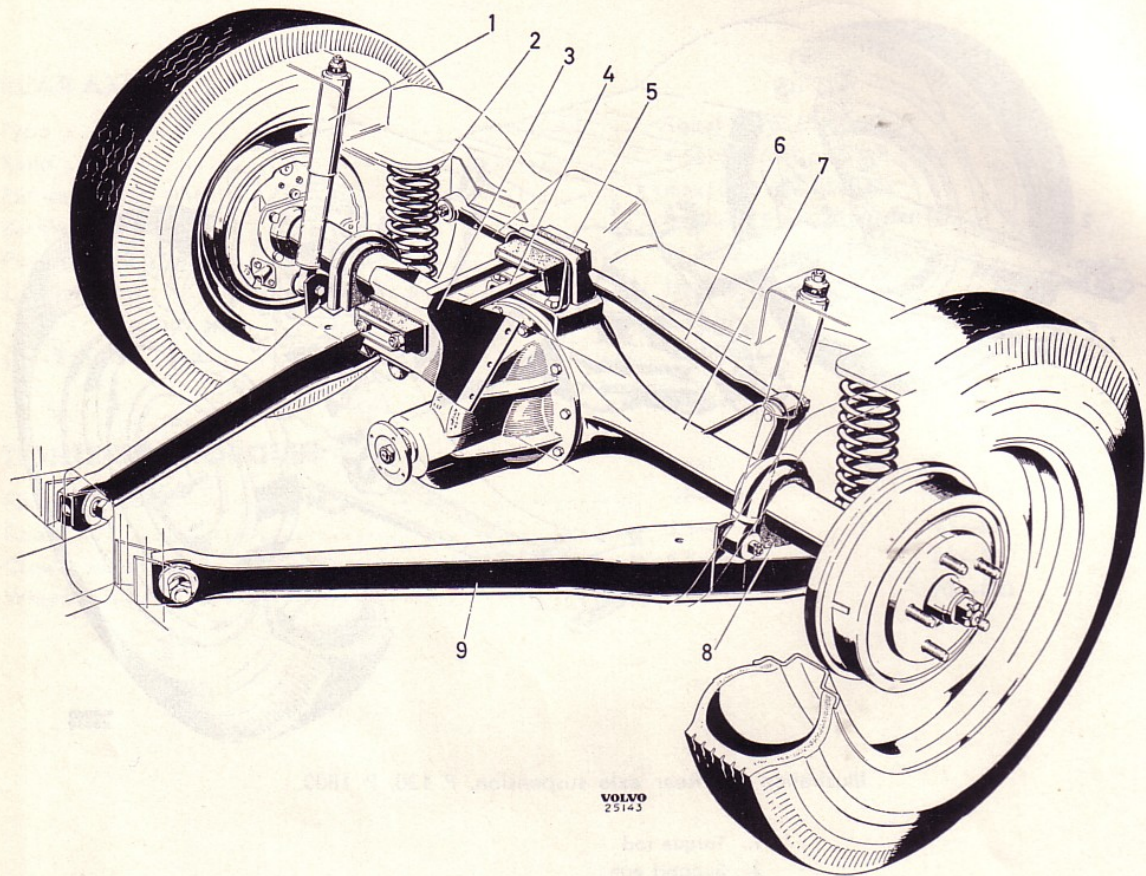
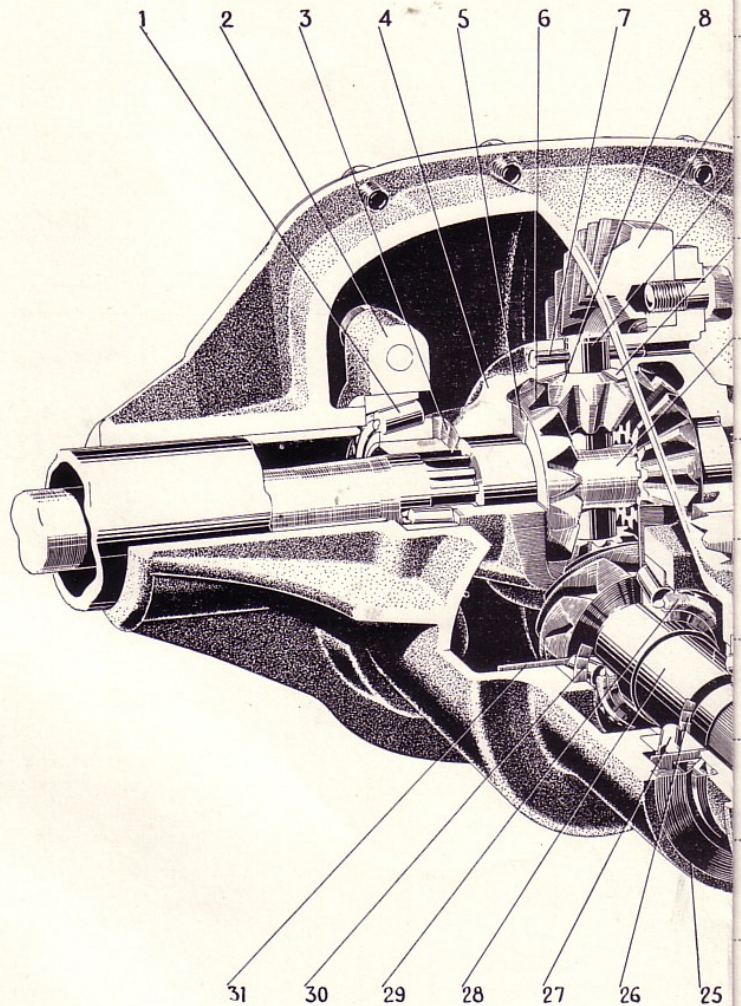


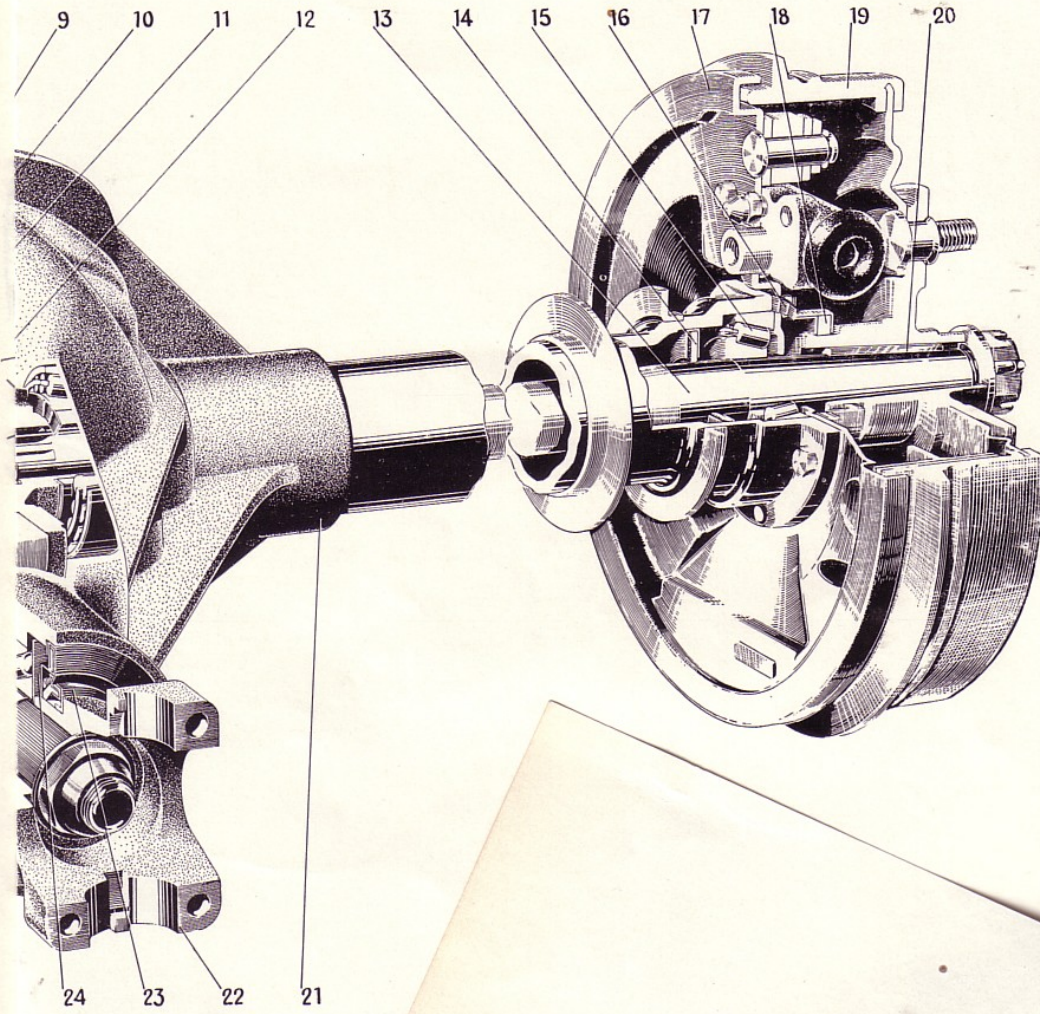
Illustration B. Rear axle suspension, PV 544.

1. Shock absorber
2. Spring
3. Attachment in body
4. Torque rod
5. Rubber block
6. Track rod
7. Rear axle
8. Rubber bush
9. Support arm

1. Differential carrier bearing
2. Bearing cap
3. Shims
4. Differential carrier
5. Thrust washer
6. Differential side gear
7. Locking pin
8. Differential pinion
9. Crown wheel
10. Shaft
11. Thrust washer, dished
12. Thrust block
13. Drive shaft
14. Oil seal
15. Roller bearing
16. Shims, only on right-hand side
17. Brake backing plate
18. Retainer with felt seal
19. Brake drum
20. Draw key
21. Drive pinion carrier
22. Flange
23. Dust cover plate
24. Oil slinger
25. Oil seal
26. Shims
27. Front pinion bearing
28. Pinion
29. Rear pinion bearing
30. Shims
31. Oil slinger, early prod.  
Shims in late prod.



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tion C. Rear axle, Spicer Mod. 27

## REFERENCES TO WORKSHOP BULLETINS

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Handelstryckeriet, Göteborg 1964

