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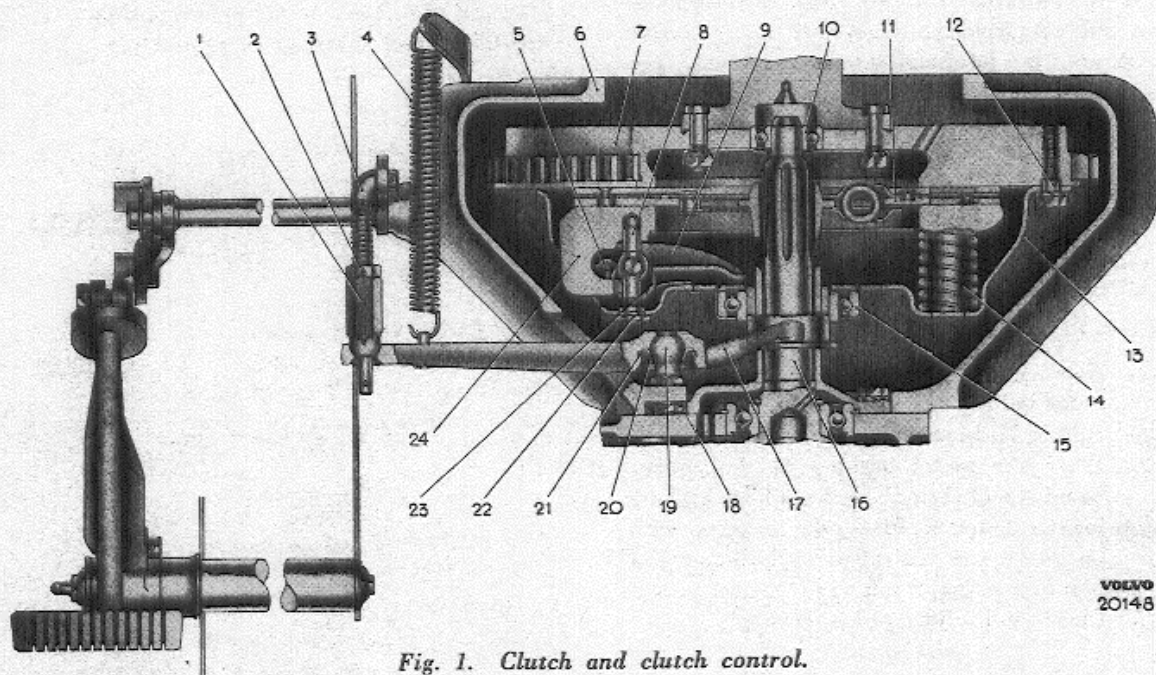
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## DESCRIPTION

The clutch on PV 544-444-445 is a Borg and Beck single plate, dry disc type. The pressure plate is operated by three release levers which are actuated from the clutch pedal by links, clutch fork and release bearing. The thrust required on the pressure plate is obtained from six strong pressure springs. The release bearing is guided by a tubular extension on the main drive pinion bearing cover.

From engine No. 49746 the clutch is balanced together with the crankshaft and flywheel and is marked with a special colour. Re-fitting after repair should be carried out in accordance with this marking.

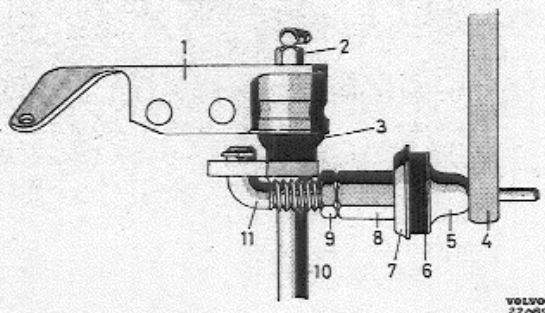
On PV 544 and PV 444 from chassis No. 131918 the clutch control is slightly different. Thus the inner end of the intermediate shaft is journalled in a rubber bushing and the pressure link is made in two parts and provided with a spring loaded adjusting device. This is shown in figs. 2-4.



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*Fig. 1. Clutch and clutch control.*

- |   |                                    |                                 |
|---|------------------------------------|---------------------------------|
| 1. Adjusting nut                                  | 9. Release lever                   | 17. Clutch release fork         |
| 2. Lock nut                                       | 10. Flywheel pilot bearing         | 18. Locking bolt for ball joint |
| 3. Pressure link                                  | 11. Driven plate                   | 19. Ball joint                  |
| 4. Return spring                                  | 12. Clutch cover bolt              | 20. Ball seat                   |
| 5. Strut between release lever and pressure plate | 13. Clutch cover                   | 21. Locking ring for ball seat  |
| 6. Flywheel housing                               | 14. Pressure spring                | 22. Adjusting nut               |
| 7. Flywheel                                       | 15. Release bearing                | 23. Release lever spring        |
| 8. Eyebolt for lever                              | 16. Main drive pinion (disc shaft) | 24. Pressure plate              |



*Fig. 2. Clutch control.*

- |                   |                         |
|-------------------|-------------------------|
| 1. Bracket        | 7. Washer               |
| 2. Grease nipple  | 8. Adjusting nut        |
| 3. Rubber bushing | 9. Lock nut             |
| 4. Release fork   | 10. Intermediate shaft. |
| 5. Cup            | 11. Pressure link       |
| 6. Rubber cushion |                         |

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# REPAIR INSTRUCTIONS

## Work which can be carried out with the clutch in position

### Adjusting clutch pedal free-play

The clutch pedal should be adjusted so that the free-play is 20—25 mm (.79—.98") on early production PV 444 and PV 445 and 10—15 mm (.39—.59") on PV 444 from chassis No. 131918 onwards and PV 544. Adjusting is carried out from underneath if the protective plate on the left-hand side is not fitted. The adjusting nut (1, fig. 1) is also accessible from the top on the left-hand side. Adjusting is carried out by using a short set spanner. The adjusting nut is locked with the lock nut after adjustment.

### Replacing rubber bushing for intermediate shaft

1. Remove the return spring. Slacken the bolts and remove the bracket. Remove the rubber bushing.
2. Place the metal bushing in the rubber bushing and then place the rubber bushing in the bracket. Place the bracket with bushing on the intermediate shaft and then bolt in position. Hook on the return spring.
3. Check and adjust pedal free-play.

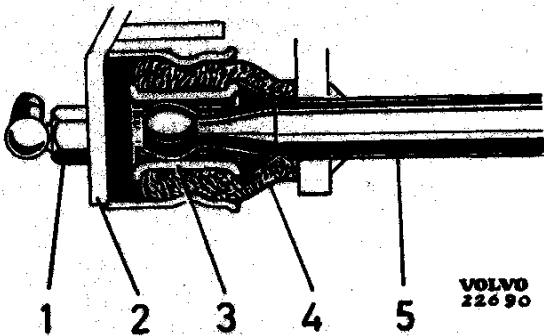


Fig. 3. Journalling of intermediate arm.

1. Grease nipple
2. Bracket
3. Bushing
4. Rubber bushing
5. Intermediate arm

### Replacing rubber cushion in pressure link

1. Remove the return spring. Remove the split pin and take off the pressure link.
2. Pull the pressure link apart and remove the rubber cushion. Fit on the new cushion and assemble the pressure link.
3. Fit the pressure link and lock it with the split pin. Hook on the return spring.
4. Check and adjust pedal free-play.

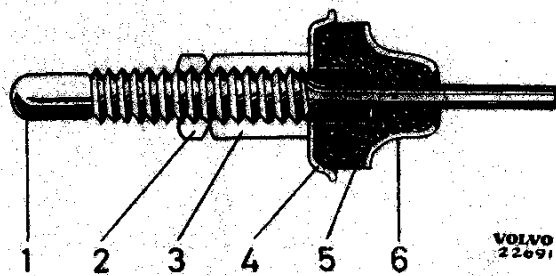


Fig. 4. Pressure link.

1. Pressure link
2. Lock nut
3. Adjusting nut
4. Washer
5. Rubber bushing
6. Cup

### Removing

1. Remove the gearbox, following the instructions given in Part 3.
2. Lift off the return spring (4, fig. 1) and disconnect the pressure link (3) at the release fork.
3. Remove the release bearing (15).
4. Remove the plate cover under the fly-wheel.
5. Remove the release fork (17) by first slackening the ball joint (19) a few turns with a 17 mm set spanner and hold this still whilst unscrewing the bolt (18) on which the ball joint is fitted. Then turn the release fork half a turn and remove it from the rear, fig. 5.

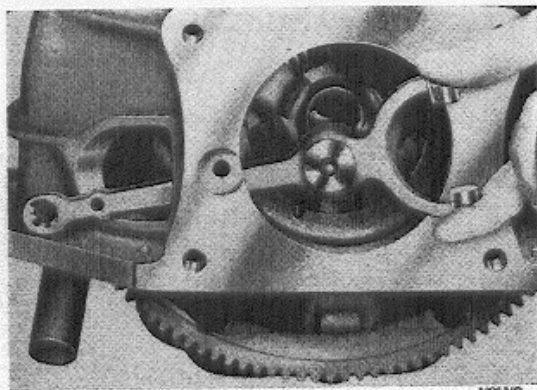


Fig. 5. Removing the clutch release fork.

6. Check that the clutch and flywheel are marked with paint as shown in fig. 6. If this is not the case, mark the clutch and flywheel together with the pressure plate with a centre punch. This must be done so that when refitting the clutch after repair it will resume the position in which it was previously fitted so that the original balance is maintained. Turn the flywheel round to make sure that no earlier marking exists.
7. Slacken the six clutch casing bolts transversely a little at a time in order to avoid breakage and remove them. Hold up the clutch so that it does not fall to the floor. The clutch and driven plate can now be removed downwards. See fig. 7.

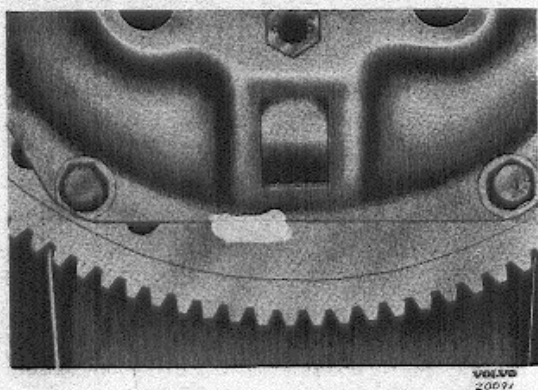


Fig. 6. Marking of clutch and flywheel.

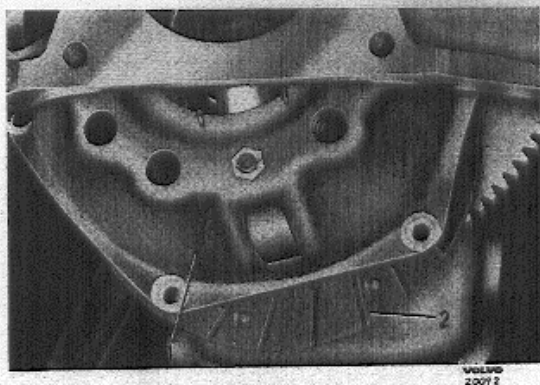


Fig. 7. Removing clutch.

1. Clutch
2. Driven plate

## Replacing driven plate linings

1. Drill out the old rivets with a drill of the same diameter as the rivets, 3.5 mm (.014") preferably by drilling through the rivet heads and remove the old linings. Do not drive out the rivets in a press or with a drift as this may deform the plate.
2. Examine the plate. The indentations on the tongues should be even. The plate must not be warped. The plate springs and the rivets in the hub must sit firmly and must not be loose. The driven plate should slide easily on the main drive pinion without any looseness. Ensure that there are no cracks. Replace the driven plate if any of the above defects are found. If the plate shows any sign of blueing indicating slipping, it must be replaced by a new one.
3. Rivet on the new linings, preferably in a rivet press. Use a riveting punch designed for tubular rivets.

*Note.* The rivets should be inserted from the lining side and riveted up from the opposite side using every other hole in the lining. After riveting the linings should be spaced from each other as determined by the indentations in the driven plate. See fig. 8. This is very important to ensure smooth engagement.

Keep the clutch linings absolutely free from oil since oil on the linings will cause the clutch to slip.

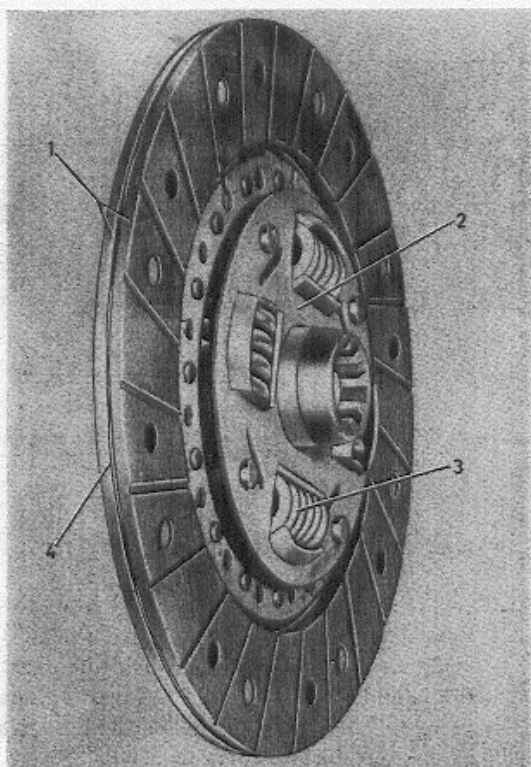


Fig. 8. Clutch plate.

1. Linings
2. Hub
3. Spring
4. Clutch disc

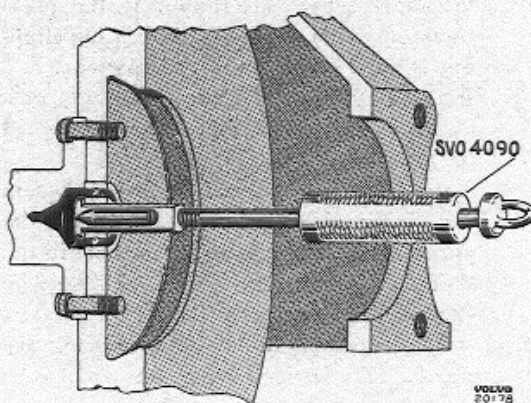


Fig. 9. Removing pilot bearing.

## Main drive pinion pilot bearing in flywheel

Remove the pilot bearing with puller SVO 4090. See fig. 9.

If the flywheel is removed the bearing can be driven out with drift SVO 1426.

Clean the pilot bearing with petrol. If the bearing runs smoothly without excessive play, pack it with ball bearing grease and refit it.

*Note.* Heat-resistant grease must be used.

The bearing is pressed in with drift SVO 1426.

## Dismantling

1. Mark the clutch as shown in fig. 10 if marking as per point 6 was not required.

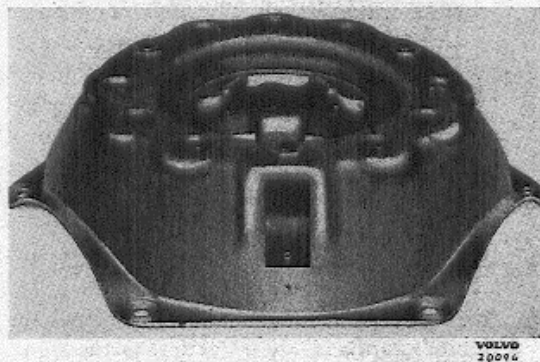


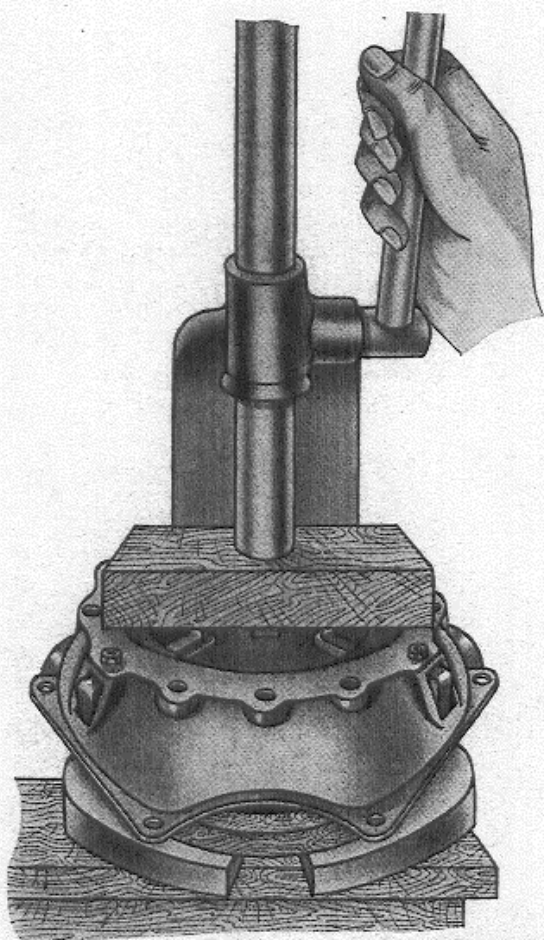
Fig. 10. Marking of clutch casing and pressure plate.

2. Place the clutch in a press with a wood block under the pressure plate (the wooden block should preferably be round of about 200 mm (7.9") diameter and 40 mm (1.6") thick. Place a wooden block or something similar on top of the clutch. Press the clutch casing down about 3 mm (.12") and lock the press in this position, see fig. 11.
3. Unscrew the three clutch lever adjusting nuts (22).
4. Release the press tool slowly so that the springs do not jump out of place and lift off the clutch casing.
5. Remove the levers as shown in fig. 12.

## Inspecting

Inspect the pressure plate for warping. The pressure plate should be laid on a surface table or against a new pressure plate. Check with a 0.15 mm (.006") feeler gauge. If the gauge can be inserted at any point, warping is excessive. The pressure plate must not be cracked or have a damaged surface neither must there be any scratches or damage caused by rivets. The same applies to the flywheel surface.

If the surfaces are blued or only lightly scratched they can be reconditioned by grinding in a lathe with a slide-mounted grinding machine, see fig. 13. Not more than 0.75 mm (.030") of material should be ground away. If the damage goes deeper the parts should be replaced.

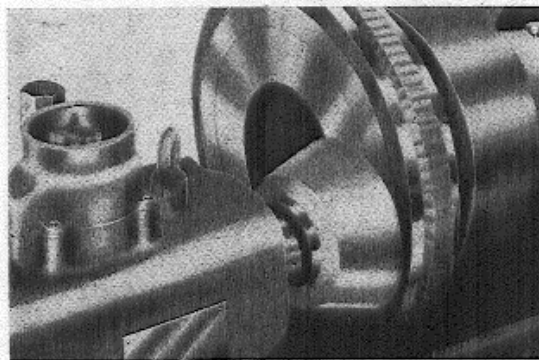


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Fig. 11. Dismantling the clutch.



Fig. 12. Dismantling levers.



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Fig. 13. Grinding the flywheel.

Check the release levers for wear at the contact surfaces.

The pressure springs should be of the prescribed length both loaded and unloaded as stated in the specifications.

The release bearing should be checked by slowly turning it round a few times with light pressure so that the balls rotate on the races. The bearing should run smoothly without sticking anywhere. The release bearing should also slide easily on the clutch release sleeve from the gearbox.

*Note.* The release bearing is filled with lubricant during manufacture which is intended to last for the whole life-time of the bearing. The bearing must not, therefore, be washed in petrol or any other solvent, neither must it be warmed up so that the lubricant can melt and run out.

A damaged or worn bearing must be replaced by a new one. If the bearing has become blued as a result of having slipped round during driving, it must be replaced since the lubricant will have melted and run out.

Check the clutch fork pivot pin. The ball must not be worn or dry. The ball cup must be intact and the locking ring in position so that the fork cannot jump off the ball. Replace any parts which are worn or damaged. Lubricate the ball joint with grease when assembling.

Examine the disc as per point 2 under "Replacing driven plate linings".

## Assembling

1. Place the pressure plate in a press on the same wooden block which was used for dismantling, see fig. 11.
2. Lubricate the contact surfaces of the release levers with oil. Lubricate sparingly so that no oil can run down on to the clutch plate after fitting.
3. Fit the release levers as shown in fig. 12.
4. Place the six pressure springs in position.
5. Ensure that the three springs (1, fig. 14) for the release levers are in position and place the clutch casing over the six pressure springs in the position previously marked. See fig. 10.
6. Place a wooden block on the clutch casing and press this down far enough so that the adjusting nuts can be screwed on to the threaded eyebolts. Screw down the nuts to full nut width. The clutch is now ready for adjusting.

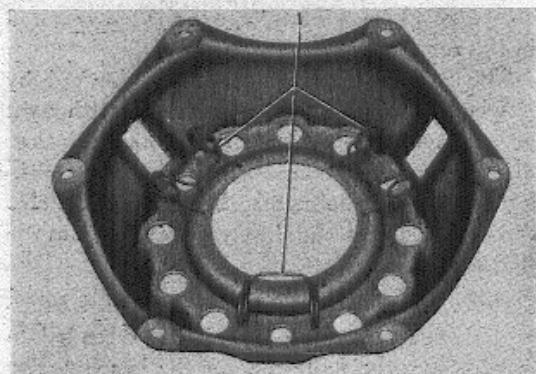


Fig. 14. Fitting the springs.

1. Springs for clutch release levers

## Adjusting clutch release levers

This adjustment, which is very important for the proper functioning of the clutch, is carried out with the help of a special jig, SVO 2065.

The jig is used together with a special universal jig SVO 1077 provided for the purpose.

Jig SVO 2065 is placed beneath the pressure plate in place of the clutch plate so that three heels come centrally beneath the release levers. Then bolt the clutch to the universal jig. Press down the levers a few times with a hammer handle or something similar so that they are located in their operating position. Then adjust the levers so that they lie 7.5 mm (.295") under the upper surface of the jig hub. Tool SVO 1443 A is placed in the jig hub and is used as a check gauge, see fig. 15.

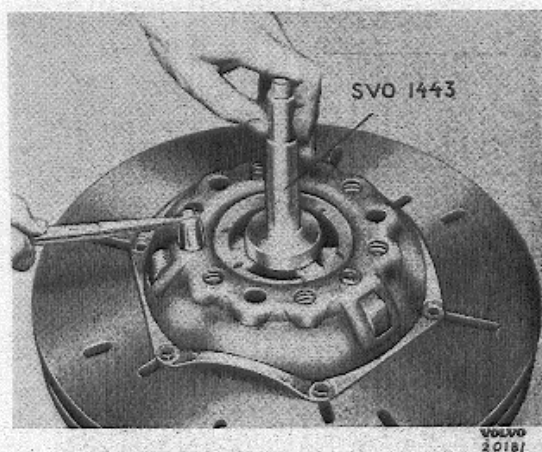
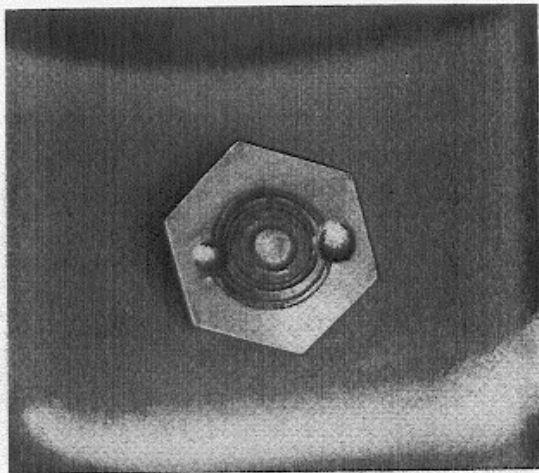


Fig. 15. Adjusting the clutch release levers.

When all three levers have been adjusted, carry out a check on all of them. Then lock the adjusting nuts with a centre punch, see fig. 16.

## Checking flywheel housing with dial indicator

Before the clutch is fitted the position of the flywheel housing in relation to the crankshaft must be checked. The hole in the housing must be concentric with the flywheel pilot bearing within a maximum permitted tolerance of 0.15 mm (.006"). The surface of the casing facing the gearbox should be at right-angles to the centre line of the crankshaft within a maximum permitted tolerance of 0.08 mm (.0032").

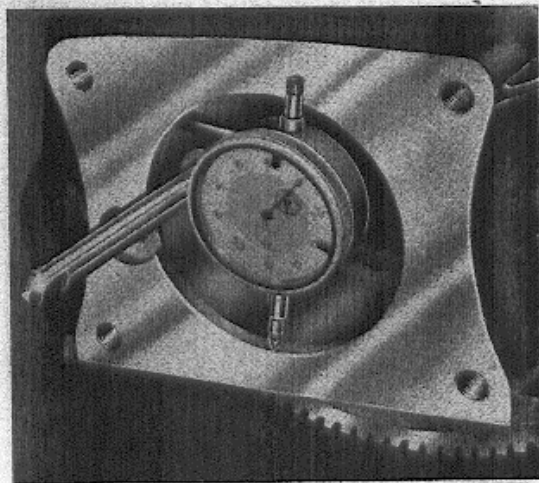


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Fig. 16. Locking of adjusting nuts.

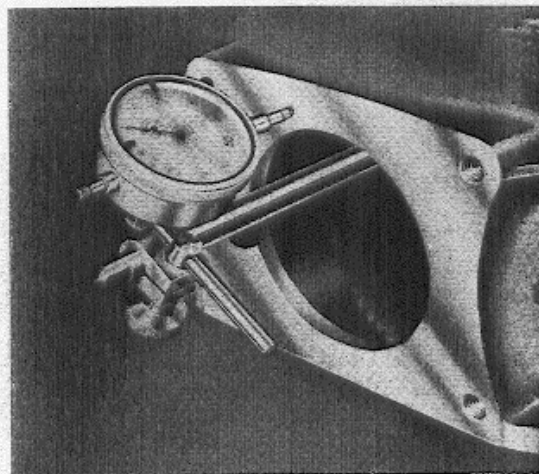
Measuring is done by means of a dial indicator which is secured to the flywheel with holder SVO 4149. Fig. 17 shows the position of the indicator when check measuring the hole. If deviation should exceed that permitted, adjustment can be done by slackening the securing bolts slightly and driving the casing over to the correct position.

Fig. 18 shows how the indicator is fitted when checking the surface. If the surface is not at right-angles to the crankshaft within 0.08 mm (.0032") inclusive indicator reading, check to see whether the cause is due to dirt between the casing and the block.



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Fig. 17. Checking position of flywheel housing with dial indicator.

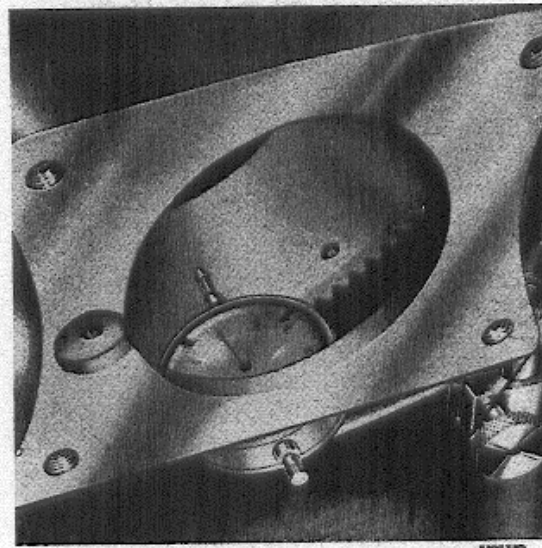


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Fig. 18. Checking position of flywheel housing with dial indicator.

## Checking flywheel with dial indicator

In order to check whether the flywheel is warped, the short dial indicator attachment SVO 4149 is placed in one of the securing bolt holes in the housing, see fig. 19. The indicator is fitted with its point on the outer edge of the surface and set to zero. The crankshaft is turned and the dial readings noted. Maximum permitted deviation is 0.20 mm (.008").



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Fig. 19. Checking the flywheel with dial indicator.

If the indicator shows too great a deviation, check to see whether there is dirt or unevenness on the crankshaft flange or the flywheel.

## Fitting

Lubricate the flywheel pilot bearing with ball bearing grease if this has not been done previously. Check before fitting that the clutch linings, flywheel and pressure plate are absolutely free from oil. Wash with clean petrol and dry off well with a clean piece of rag.

1. Turn the flywheel so that the paint marking or the marking made when removing, is visible. See fig. 6.
2. Set up the clutch plate (with highest side of hub facing backwards) and clutch in centring mandrel SVO 1443 A so that the guide pin on the latter enters the flywheel pilot bearing.
3. Turn the clutch so that the marking on same coincides with the marking on the flywheel.
4. Screw in the six clutch retaining bolts and tighten them transversely a few turns at a time. Remove the centring mandrel.
5. Fit the release fork by inserting it in the flywheel housing back to front and then turning it half a turn (fig. 5). Secure the pivot ball (19) with the bolt (18) fig. 1.
6. Fit the release bearing.
7. Fit the pressure link between the pedal and release fork and fit on the return spring.
8. Fit the gearbox in accordance with the instructions in Part 3.
9. Bolt on the casing under the flywheel.

## Overhauling pedal shaft

### Removing

Remove from both pedals the part which goes up through the toe plate. Disconnect the return springs and pressure links for the brake and clutch.

Remove the locking ring (12, fig. 21) from the inner end of the pedal shaft. Drive out the pedal shaft outwards and remove the pedals.

3. Fit new bushings in the pedals. Use drift SVO 4088 with backing ring SVO 4089 for this. If necessary ream the bushings.

If the shaft is worn at the pedal positions it should be replaced.

## Fitting

1. First fit washer (3) on the grooved end of the shaft, see fig. 21. Place the ring (2) in position outside the washer.
2. Lubricate the bushing in the clutch pedal, fit the narrow rubber ring (4) on the side which faces outwards and the rubber sleeve (6) on the side of the pedal facing the frame.
3. Fit the clutch pedal on the shaft (7) and move shaft into position in the frame.
4. Fit rubber sleeve (9) on the side of the brake pedal facing the frame. Lubricate the bushing and fit the pedal on the shaft.
5. Then fit on the brace bar (11). Press together the whole with cramp SVO 4084, fig. 20 and fit on lock ring (12).
6. Screw in the grease nipple (1) at the clutch pedal end and the plug (13) at the opposite end. Lubricate with chassis grease.
7. Connect up the pressure links and return springs for brake and clutch. Bolt on the upper part of the pedals and adjust clutch pedal free-play. See page 2 concerning this.

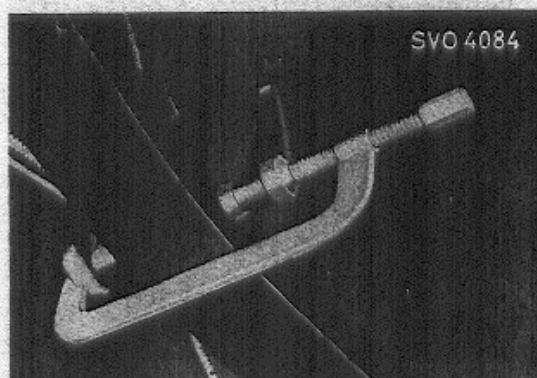
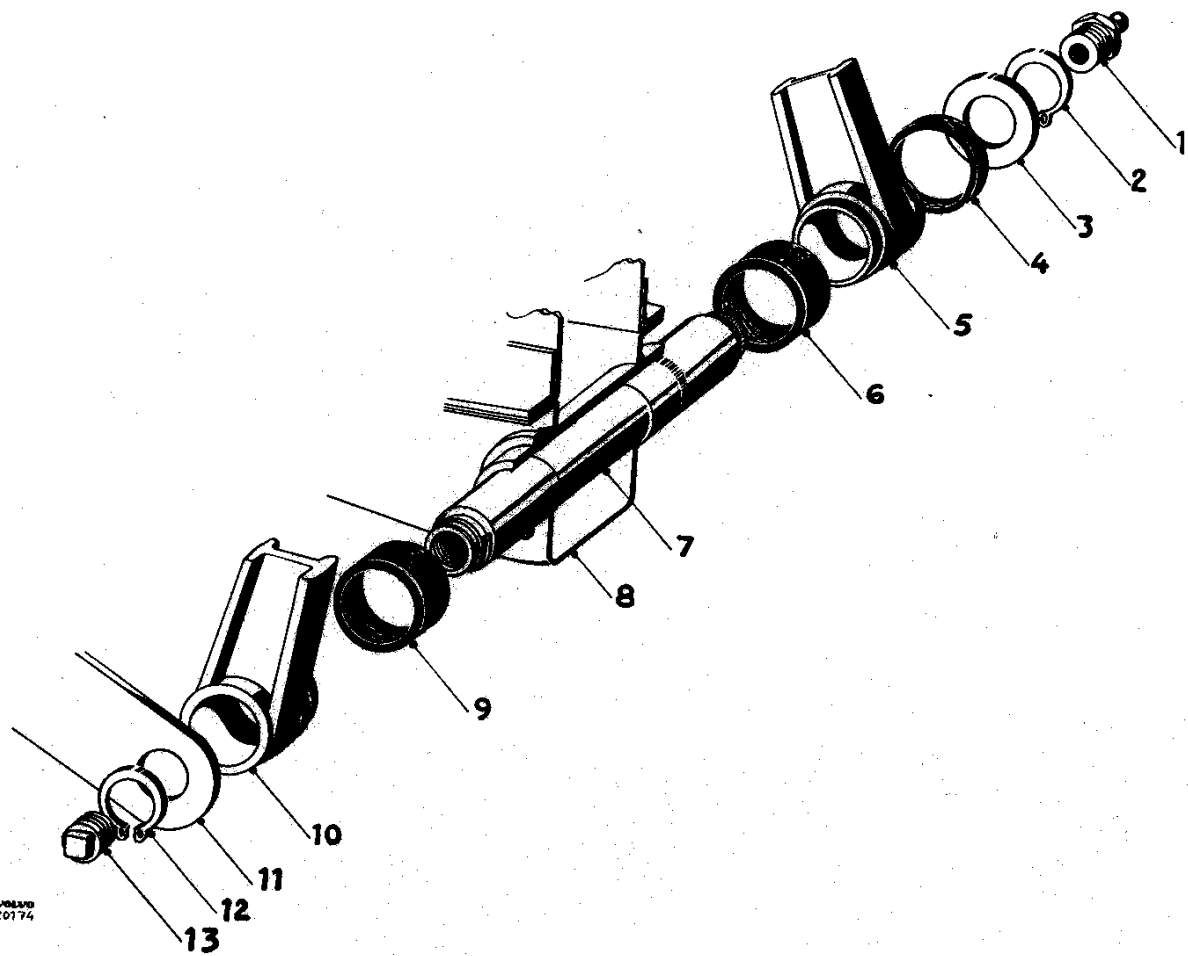


Fig. 20. Fitting the pedals.



*Fig. 21. Pedal arrangement.*

- |                  |                      |
|------------------|----------------------|
| 1. Grease nipple | 8. Body frame member |
| 2. Locking ring  | 9. Rubber sleeve     |
| 3. Washer        | 10. Brake pedal      |
| 4. Rubber ring   | 11. Brace bar        |
| 5. Clutch pedal  | 12. Locking ring     |
| 6. Rubber sleeve | 13. Plug             |
| 7. Pedal shaft   |                      |

# TRACING FAULTS

## FAULT

REASON	REMEDY
--------	--------

### Clutch sticks

Clutch wrongly adjusted.	Follow instructions under heading "Adjusting clutch release levers" and "Adjusting clutch pedal freeplay".
Driven plate warped.	Fit new driven plate.
Oil on linings, flywheel or pressure plate.	Fit new linings. Wash flywheel and pressure plate with clean petrol.
Clutch linings have glassy surface.	Fit new linings.
Driven plate sticks on drive shaft.	Clean and lubricate hub and shaft sparingly. File off burr if any. (Replace drive shaft if necessary).
Surface on pressure plate or flywheel scratched, cracked or damaged.	Replace pressure plate or flywheel. (Surfaces which are blued or only slightly scratched can be ground).
Engine loose in bearers.	Tighten engine in bearers. Replace any damaged bearers.
Driven plate loose on hub.	Fit new driven plate.
Clutch pedal sticks.	Lubricate pedal bushing and clutch joints.
Excessive play in universal joints or rear axle gear.	Adjust or replace worn parts.

### Clutch slips

Clutch wrongly adjusted.	Follow instructions under heading. "Adjusting clutch pedal free-play".
Clutch linings worn.	Fit new linings.
Pressure springs too weak or broken.	Replace faulty springs by new ones.
Clutch pedal sticks.	Lubricate and replace any worn parts.

### Clutch does not disengage

Clutch wrongly adjusted.	Follow instructions under heading. "Adjusting clutch pedal free-play".
Faulty release bearing.	Fit new bearing.
Linings too thick.	Fit new linings.
Worn linkage or ball joint.	Replace faulty parts.
Pressure plate cracked or warped.	Replace pressure plate.
Driven plate warped.	Fit new driven plate.
Rubber bushing for intermediate shaft or rubber cushion in pressure rod too soft.	Replace rubber bushing and/or cushion.

### Noise in clutch

Springs in hub broken or loose.	Replace driven plate and linings.
Release bearing dry or worn.	Replace bearing.
Flywheel pilot bearing worn or not lubricated.	Replace or lubricate bearing.
Driven plate loose on hub.	Fit new driven plate.
Broken pressure springs.	Replace springs.

## TOOLS

The following special tools are required for carrying out repairs to the clutch and pedal shaft.

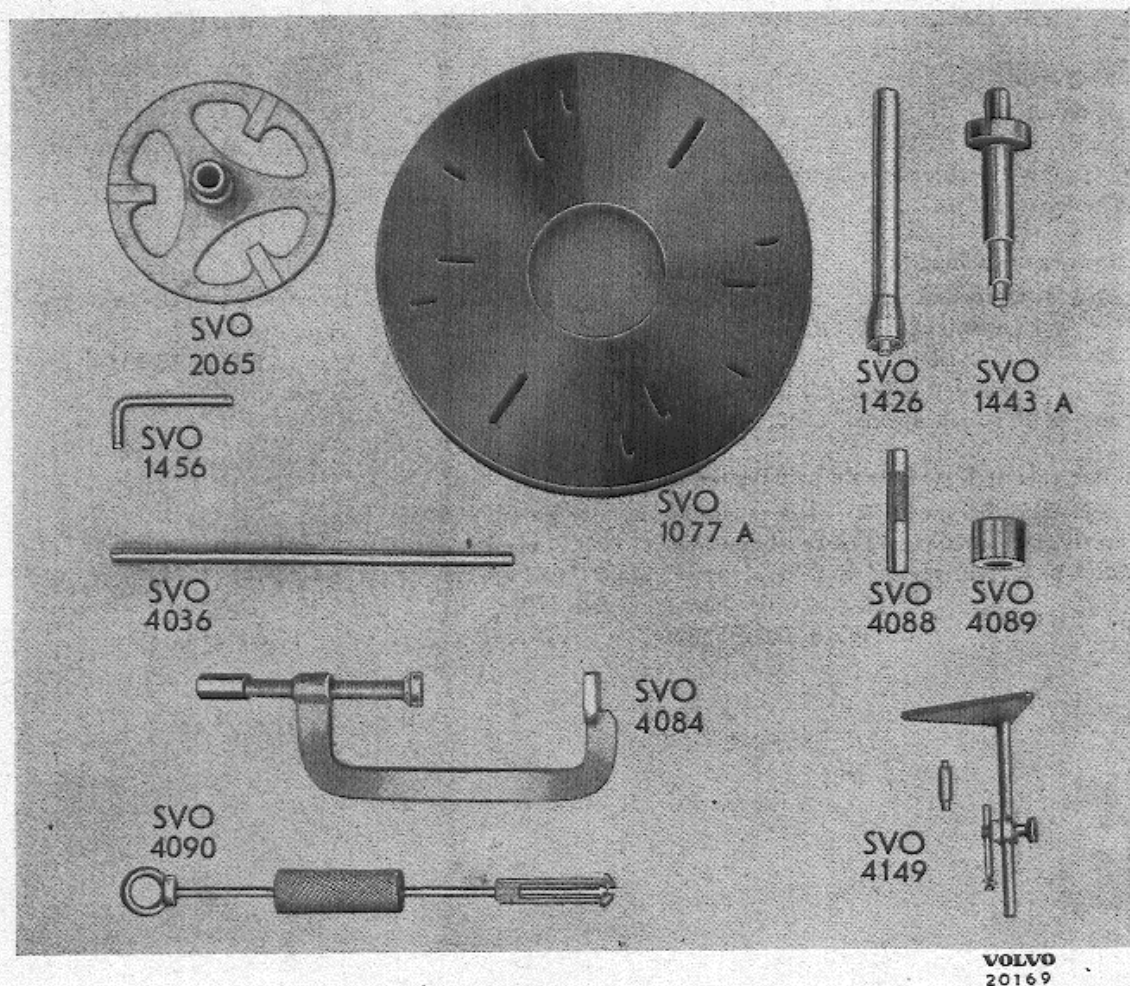


Fig. 22.

### Clutch

- SVO 1077A Universal jig.
- SVO 1426 Drift for flywheel pilot bearing.
- SVO 1433A Mandrel for centring driven plate and adjusting levers.
- SVO 1456 Wrench for lower gearbox bolts.
- SVO 2065 Adjusting jig for release levers.
- SVO 4036 Wrench for upper gearbox bolts.
- SVO 4090 Puller for ball bearing in flywheel.
- SVO 4149 Dial indicator attachment.

### Pedal shaft

- SVO 4084 Cramp for assembling pedal shaft.
- SVO 4088 Drift for pedal bushing.
- SVO 4089 Backing washer for pressing in and out pedal bushing.

# SPECIFICATIONS

Type .....	Single dry disc
Size .....	8"
Friction area, total .....	340 cm <sup>2</sup> (52.7 sq.in.)
Driven plate thickness when fitted .....	7.0—7.5 mm ( <sup>9</sup> / <sub>32</sub> — <sup>19</sup> / <sub>64</sub> ")
<b>Lining rivets:</b>	
Number .....	16
Size .....	<sup>9</sup> / <sub>64</sub> × <sup>1</sup> / <sub>4</sub> " (3.5 × 6.5 mm)
Distance between release lever contact surface for release bearing and flywheel .....	46 mm (1 <sup>13</sup> / <sub>16</sub> ")
<b>Clutch springs, length:</b>	
B 4 B: Unloaded .....	approx. 58 mm (2 <sup>9</sup> / <sub>32</sub> ")
Loaded with 77 ± 2.5 kg (170 ± 5 <sup>1</sup> / <sub>2</sub> lb) .....	38 mm (1 <sup>1</sup> / <sub>2</sub> ")
B 16: Unloaded .....	approx. 55 mm (2 <sup>5</sup> / <sub>32</sub> ")
Loaded with 88 ± 2.5 kg (194 ± 5 <sup>1</sup> / <sub>2</sub> lb) .....	38 mm (1 <sup>1</sup> / <sub>2</sub> ")
Number of clutch springs .....	6
<b>Clutch release levers should be adjusted to:</b>	
a position 7.5 mm ( <sup>19</sup> / <sub>64</sub> ") below hub of adjuster jig (SVO 2065) within ± 1.5 mm ( <sup>1</sup> / <sub>16</sub> ") and within 0.25 mm (.0010") of each other.	
Clutch pedal free-play: PV 444 (early prod.) and PV 445 .....	20—25 mm ( <sup>3</sup> / <sub>4</sub> —1")
PV 444 with effect from chassis No. 121010 — J DV 544	10—15 mm ( <sup>3</sup> / <sub>8</sub> — <sup>19</sup> / <sub>32</sub> ")