SERVICE MANUAL

P 210, PV 544

Part 2 b

CLUTCH

Den 8½"

Service Department

AKTIEBOLAGET

VOLVO

GÖTEBORG SWEDEN

CONTENTS

DESCRIPTION

The clutch is a single plate dry disc type of Borg and Beck manufacture. The pressure plate (4, Illustration 1) is operated by means of three levers (13) which are actuated from the clutch pedal (14) by links, clutch fork and release bearing. The thrust required on the pressure plate is obtained fro strong pressure springs (5). The release be (6) is guided by a tubular extension on the ing cover of the main drive pinion.

REPAIR INSTRUCTIONS

Work which can be carried out with the clutch fitted

Adjusting clutch pedal free play

The clutch pedal should be adjusted so that the free play is 10—15 mm (0.39—0.59"). Adjusting is carried out from underneath if the protective plate on the lefthand side is not fitted. The adjusting nut 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.

Raplacing rubber bushing for intermediate shaft

Early prod.

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.

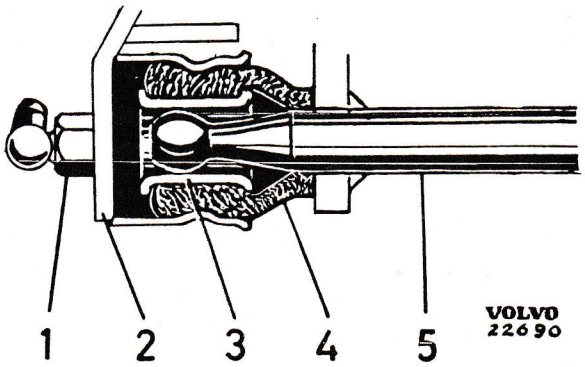

Fig. 1. Journalling of intermediate arm.

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

Late prod.

Remove the snap ring from the intermediate Disconnect the pressure links. Remove the shaf replace the bushings. Fit the shaft and the parts. Check and adjust pedal free play.

Replacing rubber cushion in pressure link

1. Remove the return spring. Remove the spl and take off the pressure link.
2. Pull the pressure link apart and remov rubber block. Fit on the new block and ass the pressure link.
3. Fit the pressure link and lock it with the pin. Hook on the return spring.
4. Check and adjust pedal free play.

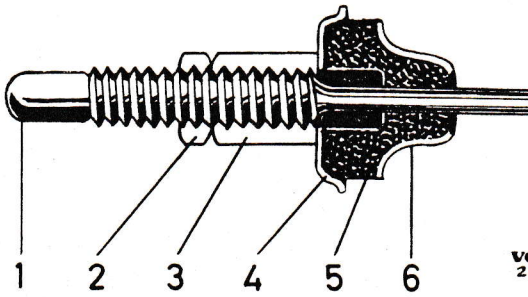

Fig. 2. Pressure link.

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

Clutch

Removing, early prod.

1. Remove the gearbox. Follow the instruc given in Part 3.
2. Lift off the return spring and disconnec pressure link at the release fork.
3. Remove the release bearing.

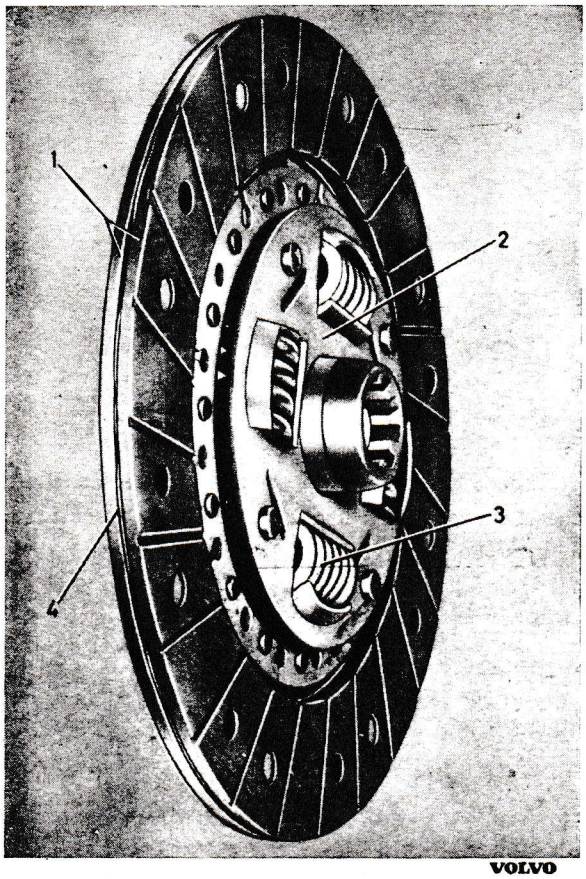

Fig. 3. Clutch plate

1. Facing 2. Hub 3. Spring 4. Disc

4. Remove the cover under the flywheel.
5. Remove the release fork by first slackening the ball joint a few turns with a 17 mm spanner and then holding it still while unscrewing the bolt on which the ball joint fits. Then turn the release fork half a turn and remove it backwards.

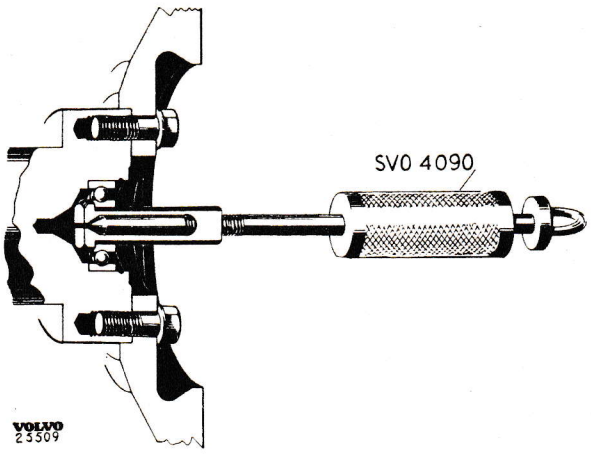

Fig. 4. Removing guide bearing

6. Check that the clutch and the flywheel are marked with paint. Otherwise, mark the clutch and flywheel with pressure plate with a centre punch. This must be done in order to ensure that the clutch is refitted in the same position as before.
7. The six bolts which hold the clutch to the flywheel should be slackened crosswise a couple of turns at a time to prevent breakage and then removed. Hold up the clutch so that it does not fall to the floor. The clutch and the plate can then be removed downwards.

Removing, late prod.

1. Remove the gearbox. Follow the instructions given in Part 3.
2. Lift off the return spring and disconnect the pressure link at the release fork. Remove the plate from the lower front part of the flywheel housing (46). Remove the bolts and take off the flywheel housing.
3. Remove the release bearing (25). Unscrew the bolt which holds the ball joint for the release fork. Remove the ball and fork.
4. The six bolts which hold the clutch to the flywheel should be slackened crosswise a couple of turns at a time to prevent breakage and should then be removed. Hold up the clutch so that it does not fall to the floor. Lift off the clutch and clutch plate (23).

Replacing clutch facings

1. Drill out the old rivets with a drill having the same diameter as the rivets, 9/64″ (3.5 mm) and remove the old facings.
2. Check the clutch plate. The indentations should be even. The clutch plate must not be warped. The springs and rivets in the hub should fit securely and not show any signs of looseness. The plate should slide easily on the main drive pinion without any play. Check to see that there are no cracks. If any of these defects are found the clutch plate should be replaced with a new one.
3. Rivet on the new facings (preferably in a rivet press). Note. The rivets should be inserted from the side on which the facing lies and riveted from the opposite direction against the disc. Use every other hole in the facing. After riveting, the facings should be spaced from each other as

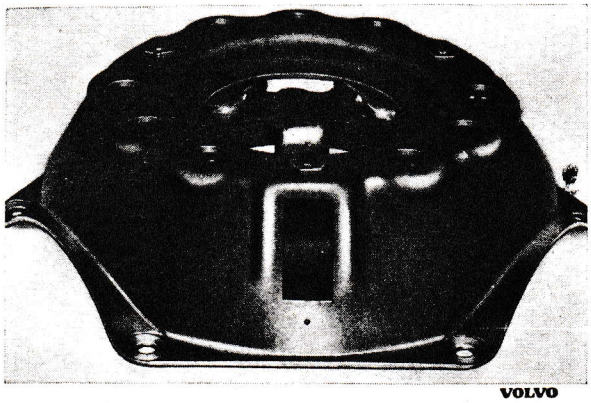

Fig. 5. Marking of clutch cover and pressure plate.

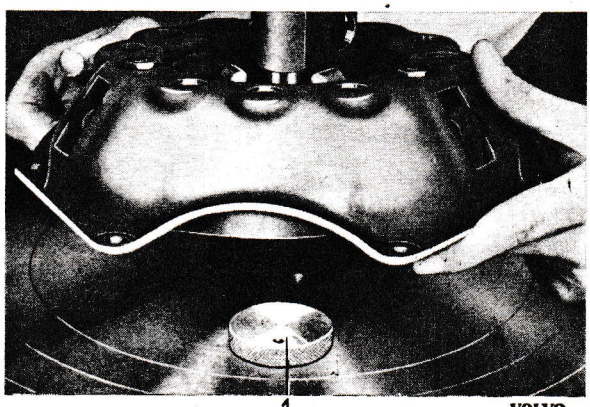

Fig. 6. Placing clutch in fixture, 1.

1. Packing block No. 0

determined by the indentations in the disc. See Fig. 3. This is most important in order to achieve a smooth engagement when starting and driving. The clutch facings must be absolutely free from oil. Oil on the facings can cause the clutch to chatter or grab.

Main drive pinion guide bearing in the flywheel

The bearing is pulled out with puller SVO 4090 after the locking ring has been removed. See Fig. 4.

The bearing should be cleaned in gasoline. If the bearing, upon inspection, runs smoothly and evenly and has no significant play, it should be packed with ball bearing grease and refitted. Note. Heat-resistant grease should be used. The bearing is pressed in with drift SVO 1426.

Disassembling

1. Mark the clutch as shown in Fig. 5.

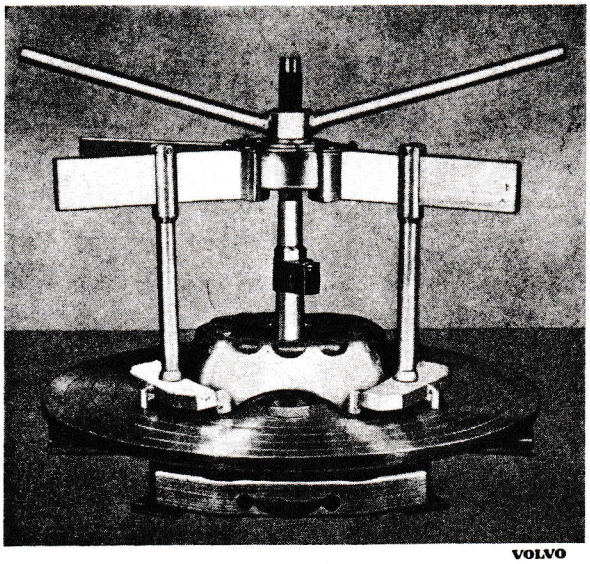

Fig. 7. Placing the clutch in the fixture, II.

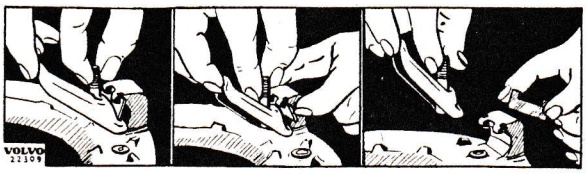

Fig. 8. Removing the levers.

2. Place the packing blocks No. 0 on fixture SVO 2322, see Fig. 6. Place on the clutch, the 3-point supports, the arms and the three thrust rods, see Fig. 7. Place on the wrench and press down the clutch until the housing contacts the bottom plate.
3. Screw off the three adjusting nuts for the clutch release levers (31).
4. Screw up the wrench and remove the arms and thrust rods. Remove the clutch cover casing (21).
5. Remove the levers as shown in Fig. 8.

Inspecting

Examine the pressure plate for warping. The pressure plate should be laid on a surface table and then tested with a feeler gauge 0.006″ (0.15 mm) thick. If this can be inserted at any point, warping is too great. The pressure plate must not be cracked or have a scored surface. There must be no scratches or other damage caused by the rivets. The same applies to the surface on the flywheel.

If the surfaces are blued or only lightly scored they can be reconditioned by grinding in a lathe

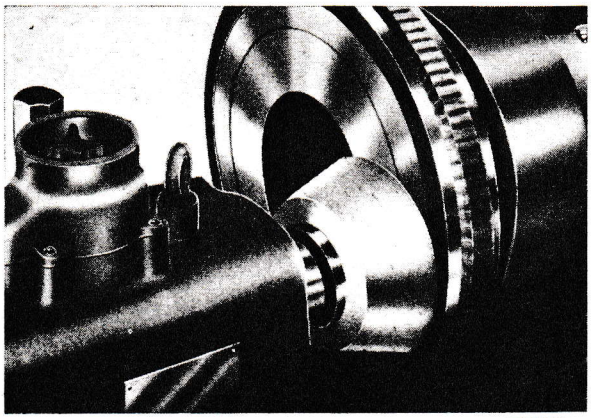

Fig. 9. Grinding the flywheel.

with a saddle-mounted grinding machine, see Fig. 9. When carrying out this operation, not more than 0.03″ (0.75 mm) of material may be ground away. If the damage is deeper, the parts should be replaced.

The pressure springs should have the prescribed length, see the specifications.

The release bearing is checked by turning it round a few times under light pressure so that the balls rotate against the races. The bearing should turn easily without binding at any point. The release bearing should also slide easily on the guide extension from the transmission.

Note. During manufacture the release bearing is packed with lubricant which is intended to last the whole lifetime of the bearing. The bearing must therefore not be washed in gasoline or any other solvent, neither must it be warmed up to such an extent that the lubricant can run out. If the bearing is damaged or worn, it must be replaced by a new one. If it has become blued through having run round during driving, it should be replaced since the lubricant will have melted and run out.

The release fork joint should be examined. The ball must not be worn or dry. The ball cup should be intact and the locking ring securely in position so that the fork cannot jump off the ball. Replace all parts which are worn or damaged. Lubricate the ball joint with grease when assembling.

Examine the clutch plate in accordance with point 2 under "Replacing the clutch facings".

Assembling

1. Place the pressure plate (22) on packing blocks no. 0 in fixture SVO 2322.

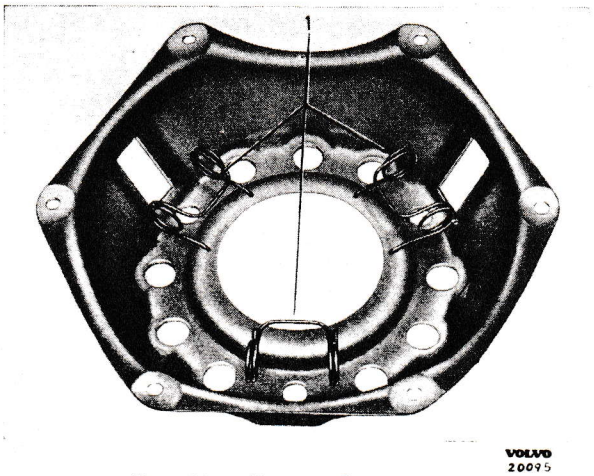

Fig. 10. Fitting the springs.

1. Springs for clutch levers

2. Lubricate the contact surfaces of the clutch levers (31) with oil. Lubricate sparingly so that no oil can run down into the clutch plate after fitting.
3. Fit the clutch levers as shown in Fig. 8.
4. Place the six pressure springs (24) in position. (The springs should be arranged so that black ones and unpainted ones come alternately.)
5. Ensure that the three springs (1, Fig. 10) for the clutch levers are in position and place the clutch cover casing (21) over the six pressure springs in the position previously marked, Fig. 5.
6. Place on the 3-point support, arms, thrust rods and wrench. Press down the clutch cover casing until it contacts the bottom plate all round. Place the adjusting nuts on the eyebolts (32) and screw them on to full nut width. The clutch is now ready for adjusting.

Adjusting the clutch levers

This adjustment is carried out in fixture SVO 2322 with the help of the measuring gauge kept in the compartment. Fit the gauge and arm in the attachment on the spindle and set the gauge to measurement 40.5 for 8″ clutch and 41.5 for 8 1/2″ clutch (adjusting surface at upper edge of arm). The foot of the measuring gauge is ground with tolerance positions corresponding to the mutual tolerance between the levers, see Fig. 11, and a side surface which is set parallel with the lever. Set the clutch lever to a height level with the maximum tolerance surface, see Fig. 12. The minimum tolerance surface must not then pass the edge of the clutch lever. Swing the arm when moving the measuring gauge over the clutch levers, see Fig. 13.

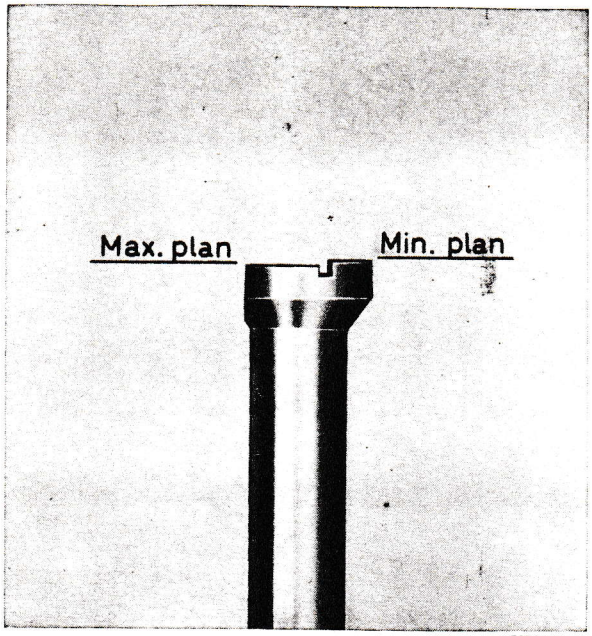

Fig. 11. Measuring gauge with tolerance positions.

Max. plan = Max. level
Min. plan = Min. level

After adjusting, carry out a further check on all the levers. Then secure the adjusting nuts by means of a center punch, see Fig. 14. Remove the measuring gauge and arm before releasing the clutch.

Dial indicating the flywheel

When checking to see that the flywheel is not warped, a dial indicator gauge is applied with the help of a magnetic attachment on the cylinder block. The measuring point of the indicator is directed onto the face of the flywheel near the outer diameter. The crankshaft is rotated and the variations read off. Maximum permissible warp is 0.008″ (0.20 mm).

Dial indicating the flywheel housing

The flywheel housing is measured with a dial indicator gauge applied to the flywheel by means of a magnetic attachment.

Measurement is carried out partly to check that the face of the housing attached to the transmission is at right-angles to the crankshaft with a permissible deviation of max. 0.002″ (0.05 mm) per 4″ (100 mm) diameter and partly that the hole is

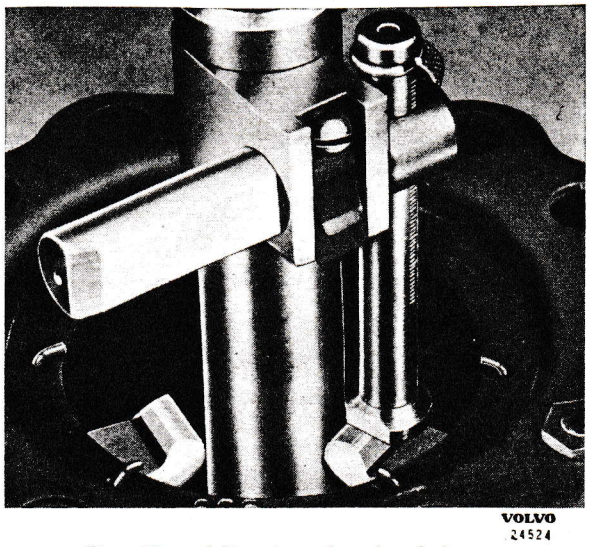

Fig. 12. Adjusting the clutch levers.

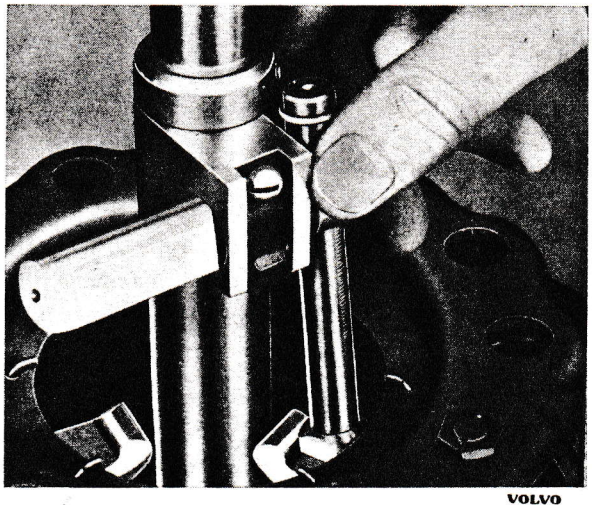

Fig. 13. Moving the measuring gauge.

concentric with the axis of rotation of the crankshaft with a max. permissible deviation of 0.006″ (0.15 mm).

Fitting

Check before fitting that the clutch facings, flywheel and pressure plate are completely free from oil. Wash them with clean gasoline and dry off well with a clean piece of material.

Early production

1. Turn the flywheel so that the paint marking or the mark made when removing, becomes visible.
2. Set up the clutch plate (the highest side of the hub facing backwards) together with the clutch

and insert the centring mandrel SVO 1443 so that the guide journal on this penetrates into the guide bearing in the flywheel.

3. Turn the clutch so that the mark on this coincides with the mark on the flywheel.
4. Place in the six bolts which retain the clutch and tighten them crosswise a couple of turns at a time. Remove the centering mandrel.
5. Fit the release fork by inserting it into the flywheel housing back to front and then turn it half a turn and secure the ball joint with the bolt.
6. Fit the release bearing.
7. Fit the linkage between the pedal and the release fork and fit on the return spring.
8. Fit the gearbox in accordance with the instructions in Part 3.
9. Bolt on the cover under the flywheel.

Late production

1. Set up the clutch plate (23) (the highest side of the hub facing backwards) together with the clutch and insert the centering mandrel SVO 1443 so that the guide projection on this enters the guide bearing in the flywheel.
2. Place in the six bolts which retain the clutch and tighten them crosswise a couple of turns at a time. Remove the centering mandrel.
3. Fit the release fork (33) in the flywheel housing (46) and secure the joint ball with the bolt.
4. Fit the flywheel housing and release bearing (25).
5. Fit the linkage between the pedal and the release fork and fit on the return spring.
6. Fit the gearbox in accordance with the instructions given in Part 3.
7. Bolt the plate onto the lower front part of the flywheel housing.

Overhauling pedal shaft

Removing

1. 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.
2. Remove the locking ring (12, fig. 16) 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. se 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.

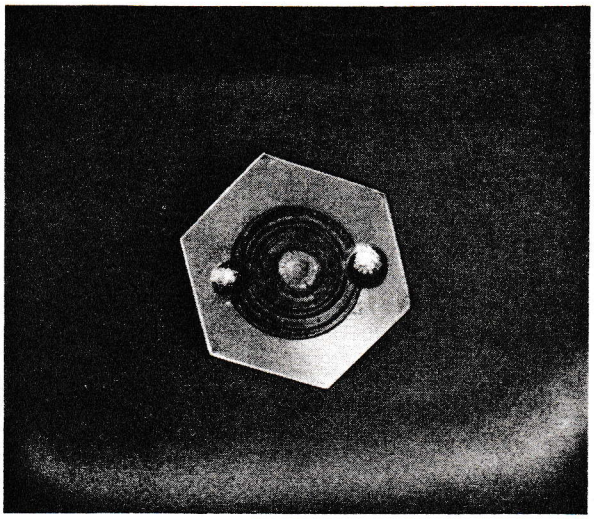

Fig. 14. Locking the adjusting nuts.

Fitting

1. First fit washer (3) on the grooved end of the shaft, see fig. 16. 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. 15 and fit on lock ring (12).

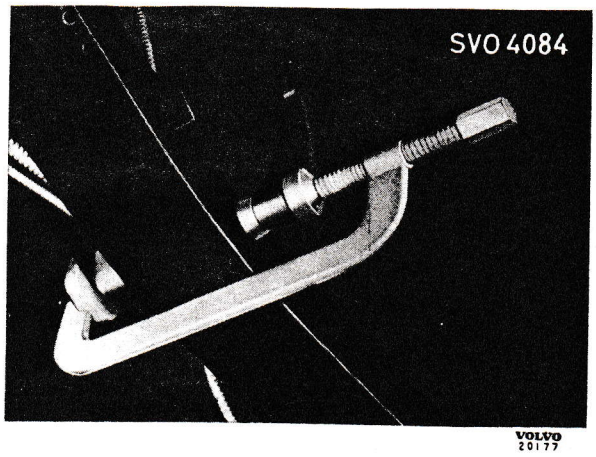

Fig. 15. Fitting the pedals.

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.

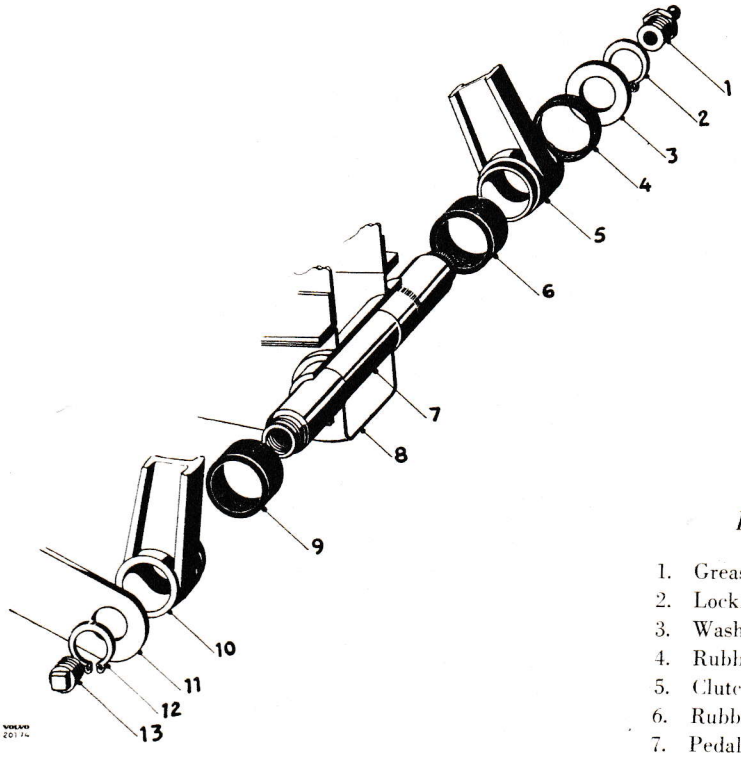

Fig. 16. Pedal arrangement.

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

FAULT TRACING

Fault	Reason	Remedy
The clutch grabs		
	Clutch wrongly adjusted.	Follow the instructions under "Adjusting the clutch levers" and "Adjusting the clutch release fork travel and clutch pedal play".
	Clutch plate warped.	Fit new clutch plate.
	Oil on the clutch facings, flywheel or pressure plate.	Replace the facing. Clean the flywheel and pressure plate with clean gasoline.
	Clutch facings glazed on the surface.	Fit new clutch facings.
	Clutch plate binds on the shaft.	Clean and lubricate the hub and shaft sparingly. File off any burr. (Replace the main drive pinion if necessary.)
	Surface of the pressure plate of flywheel is scratched, cracked or burnt.	Replace the pressure plate or flywheel (surfaces which are blued or only slightly scratched can be ground).
	Engine loose in mountings.	Tighten the engine. Replace damaged engine mountings.
	Clutch disc loose on the hub.	Fit new disc.
	Clutch pedal binds.	Lubricate the pedal bushing.
	Excessive play in the universal joint or rear axle gear.	Adjust or replace worn parts.
The clutch slips		
	Clutch wrongly adjusted.	Follow the instructions under "Adjusting the clutch release fork travel and clutch pedal play".
	The clutch facings worn.	Fit new facings.
	Clutch springs too weak or broken.	Check all the springs. Replace faulty springs with new ones.
The clutch does not disengage		
	Clutch wrongly adjusted.	Follow the instructions under "Adjusting the clutch release fork travel and clutch pedal play".
	Faulty release bearing.	Fit new bearing.
	Pressure plate cracked or warped.	Replace the pressure plate.
	Clutch plate warped.	Fit new clutch plate.
Noisy clutch		
	Springs in the clutch plate hub broken or loose.	Replace clutch plate and facings.
	Release bearing worn or dry.	Replace the bearing.
	Bearing in the flywheel worn or not lubricated.	Replace or lubricate the bearing.
	Clutch plate is loose at the hub.	Fit new clutch plate.
	Broken clutch springs.	Replace the springs with new ones.

TOOLS

For carrying out repairs on the clutch the tools shown below (Fig. 18) are required together with clutch fixture SVO 2322. (Fig. 17).

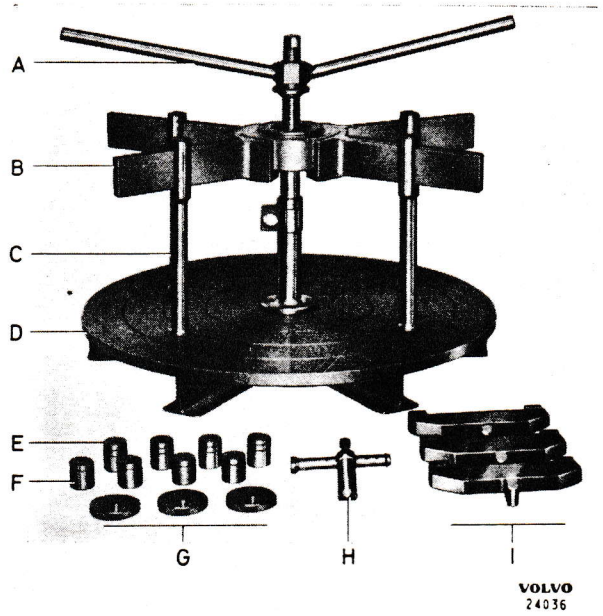

Fig. 17. Clutch fixture SVO 2322 with accessories.

A. Wrench
B. Arm
C. Thrust rod
D. Bottom plate
E. Spacing block No. 2
F. Spacing block No. 1
G. Spacing block No. 0
H. Measuring gauge with holder
I. 3-point support

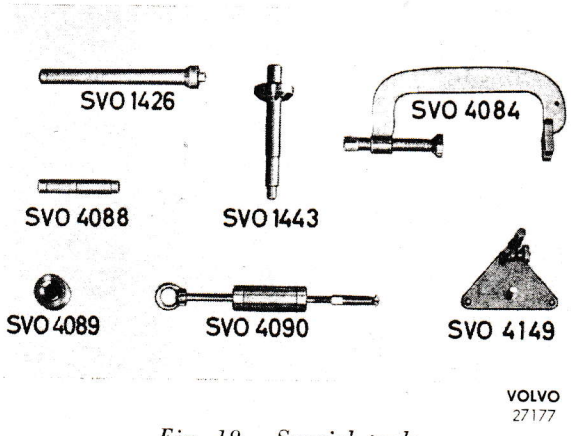

Fig. 18. Special tools.

Clutch

SVO 1426 Drift for support bearing in flywheel
SVO 1443 Mandrel for centering the clutch plate
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

For B 16

Type	Single dry disc
Size	8″
Friction area, total	340 cm² (52.7 sq. in.)
Thickness of clutch plate when fitted	7.0—7.5 mm (0.276—0.295″)
Rivets for clutch facings:	
Number	16
Size	9/64″×1/4″ (3.5×6.5 mm)
Distance between the flywheel and clutch release lever contact surface with the relief bearing	46 mm (1.81″)
Clutch springs:	
B 16 A, early production and B 16 B:	
Colour: Neutral	
Length, loaded with 85.5—90.5 kg (188—199 lb.)	38 mm (1.496″)
B 16 A, late production:	
Colour: Light yellow and light green	
Length, loaded with 82—86 kg (180—189 lb.)	40 mm (1.575″)
Number	6
Adjusting the clutch release levers:	
Alternative I 7.5 mm (0.295″) lower than the hub in adjusting jig SVO 2065 within a limit of ± 1.5 mm (0.06″) and within 0.25 mm (0.010″) of each other.	
Alternative II, adjustment 40.5 in clutch fixture SVO 2322, packing blocks number 0.	
Clutch pedal free play	10—15 mm (3/8″—19/32″)
Tightening torque for bolt for joint ball	1.7—1.9 kgm (12—14 lb. ft.)

For B 18

Type	Single dry disc
Size	8 1/2″
Friction area, total	440 cm² (68.2 sq. in.)
Clutch plate thickness when fitted	7.0—7.5 mm (0.276—0.295″)
Rivets for clutch facings, number	16
Distance between the clutch release lever contact surface for the release bearing and flywheel	46 mm (1.81″)
Clutch springs:	
Number	6
Marking	Neutral
Length, loaded with 85.5—90.5 kg (188—199 lb.)	38 mm (1.496″)
Adjustment of clutch release levers:	
Adjustment 41.5 in clutch fixture SVO 2322, packing blocks number 0.	
Clutch pedal free play	10—15 mm (3/8″—19/32″)
Tightening torque for bolt for joint ball	1.7—1.9 kgm (12—14 lb. ft.)

ıstration I. Clutch and clutch controls.

1. Flywheel
2. Clutch cover casing
3. Clutch plate
4. Pressure plate
5. Clutch spring
6. Clutch release bearing
7. Clutch disc shaft (main drive pinion, gearbox)
8. Spring
9. Shaft pin
10. Eyebolt
11. Lip
12. Cover for clutch disc shaft
13. Clutch release lever
14. Pedal
15. Clutch release fork
16. Return spring
17. Shaft
18. Pressure link
19. Rubber bushing
20. Adjusting nut
21. Lock nut
22. Pressure link
23. Grease nipple
24. Intermediate shaft
25. Bracket
26. Flywheel housing
27. Locking ring
28. Support bearing in crankshaft
29. Crankshaft