



PART 4
POWER
TRANSMISSION
C3-series

SERVICE MANUAL

CONTENTS

GROUP 40 GENERAL

Data	1
Special tools	5
Description	6

GROUP 41 CLUTCH

Description	1
Service Procedures	1
Clutch work in vehicle	1
Clutch pedal	1
Clutch wire	1
Reconditioning	2
Illustration A	5

GROUP 42 MANUAL GEARBOX

Description	1
Service Procedures	5
Work on transmission in vehicle	5
Auxiliary gearbox	5
Gearbox	10
Removing	10
Disassembling	12
Checking and replacing parts	19
Assembling	19
Installing	30
Auxiliary gearbox	32
Removing	32
Disassembling	34
Checking and replacing parts	39
Assembling	39
Installing	49
Illustration A Gearbox	53
B Gearbox	55
C Gearbox	57
D Auxiliary gearbox	59
E Auxiliary gearbox	61

GROUP 45 PROPELLER SHAFTS

Description	1
Service Procedures	1

GROUP 46 REAR AXLE AND FRONT AXLE

Description	1
Service Procedures	4
Differential carriers	4
Work on diff. carriers in vehicle	4
Diff. carriers, diff. locks	4
Replacing diff. carriers	7
Removing front diff. carrier	7
Installing front diff. carrier	8
Removing rear diff. carrier	9
Installing rear diff. carrier	10
Replacing diff. sleeve	11
Disassembling diff. carriers	11
Checking and replacing parts	14
Assembling	14
Wheel Carriers	21
Front wheel carriers	21
Removing wheel carrier	21
Replacing rubber bellows, wheel carrier	22
Replacing drive shaft joint	22
Reconditioning drive shaft joint	23
Reconditioning wheel carrier	25
Installing wheel carrier	28
Rear wheel carrier	30
Removing wheel carrier	30
Reconditioning wheel carrier	31
Installing wheel carrier	34
Power take-off	35
Removing	35
Disassembling	35
Assembling	37
Installing	40
Illustration A Differential carriers	41
B Differential carriers	43
C Wheel carriers, front	45
D Wheel carriers, front	47
E Wheel carriers, rear	49
F Wheel carriers, rear	51
G Power take-off	53
H Power take-off	55

GROUP 48 POWER TAKE-OFF

Description	1
Service Procedures	2
Removing	2
Disassembling	3
Checking and replacing parts	6
Assembling	6
Installing	8
Illustration A	9
B	11

GROUP 40 GENERAL

Data

CLUTCH

Clutch type	Single disc, dry plate
Size	9 1/2"
Friction surface	456 cm ²
Spring type	Disc spring
Rivets for clutch lining, number	36
size	3.6 x 5.2 mm (0.142–0.205")
Withdrawal lever free play	5 mm (0.20")
Maximum permissible taper, thrust plate	0.025 mm (0.0010")

GEARBOX

Type designation	S 4 18/3 ZF
Reduction ratios:	
1st gear	3.87:1
2nd gear	2.08:1
3rd gear	1.39:1
4th gear	1:1
reverse	4.16:1
Shims, bearing — input shaft, alt.	0.5–1.5 (in stages 0.1 mm = 0.020–0.060") 0.0039"
cover — input shaft, alt.	0.4–1.0 (in stages 1 mm = 0.016–0.039") 0.0039"
cover — bearing, countershaft, alt.	0.5–1.5 (in stages 0.1 mm = 0.020–0.060") 0.0039"
cover — bearing, output shaft	0.4–1.0 (in stages 0.1 mm = 0.016–0.039") 0.0039"
Circlip, output shaft	1.8, 1.9 and 2.0 mm (0.071, 0.075 and 0.080")
Axial clearances, cover — bearing, input shaft	± 0.05 mm (0.0020")
bearing — input shaft	0.0 ± 0.1 mm (0.0039")
cover — bearing, countershaft	+ 0.1 mm (0.0039")
cover — bearing, output shaft	± 0.05 mm (0.0020")
Oil change quantity	1.2 litres (2 pints)
Oil type	Gear oil API-GL-1 SAE 80 or SAE 80/90
Tightening torques	
Nut, output shaft	140–160 Nm (14–16 kpm = 101–115 lbftf)
Nuts, housing pistons	20– 25 Nm (2.0–2.5 kpm = 14–18 lbftf)
Allen bolts, housing pistons	8– 12 Nm (0.8–1.2 kpm = 5.8–8.7 lbftf)
Bolts, front cover	22– 25 Nm (2.2–2.5 kpm = 15–18 lbftf)
Nuts, clutch casing	41– 51 Nm (4.1–5.1 kpm = 30–37 lbftf)
Nuts, auxiliary gearbox — gearbox	23– 28 Nm (2.3–2.8 kpm = 17–20 lbftf)

AUXILIARY GEARBOX

Type designation	FD 51
Reduction ratio:	
Low gear	2.39:1
High gear	1:1
Shims, bearing – rear cover, alt.	0.10, 0.15, 0.35 and 0.50 mm (0.0039, 0.0060, 0.0140 and 0.020’')
Circlip, alt.	1.9 and 2.0 mm (0.075 and 0.080’')
End play, intermediate gear	0.01–0.05 mm (0.0004–0.0020’')
output shaft	0.03–0.08 mm (0.0012–0.0031’')
control mechanism flange	0.1 mm (0.0039’')
pull rod – cover bolt	approx. 8 mm (0.31’’) or 5.3 turns
Oil change quantity	1,3 litre (2,3 pints.)
Oil type	Gear oil API-GL-16 SAE 80 or SAE 80/90
Tightening torques:	
nut, output shaft	100–120 Nm (10–12 kpm = 72–87 lbftf)
nut, countershaft	100–120 Nm (10–12 kpm = 72–87 lbftf)

PROPELLER SHAFTS

Type designation	1300
Lubricant	Grease MP
Tightening torque:	
flange bolts	55–65 Nm (5.5–6.5 kpm = 40–48 lbftf)

DIFFERENTIAL CARRIER

Type designation	EV II
Reduction ratio	2.91:1
Shims, spacer sleeve-bearing pinion	0.08 mm (0.003’')
	0.13 mm (0.005’')
	0.25 mm (0.010’')
	0.75 mm (0.030’')
Shims, bearing-pinion	0.08 mm (0.003’')
	0.13 mm (0.005’')
	0.25 mm (0.010’')
Thrust washers, diff. side gears	0.74–0.98 (in stages 0.04 mm (0.029–0.039’’) = 0.0016’')
Oil change quantity	1.5 litres (2,6 pints.)
Oil type	Rear axle oil API-GL-5 or MIL-L-2105B, SAE 80

Tightening torques:

pinion nuts:	280–300 Nm	(28–30 kpm = 202–217 lbftf)
bolts, crown wheel	80–100 Nm	(8–10 kpm = 58–72 lbftf)
caps	55– 67 Nm	(5.5–6.7 kpm = 40–48 lbftf)

WHEEL CARRIERS

Reduction ratio	2.06:1	
Oil change quantity, wheel carrier, front	0.3 litre	(0,5 pints)
rear	0.4 litre	(0,7 pints)
Oil type:	Gear oil API-GL-1 SAE or SAE 80/90	

Tightening torques:

bolts, rear axle casing-wheel carrier housing	100–120 Nm	(10–12 kpm = 72–87 lbftf)
front axle casing	100–120 Nm	(10–12 kpm = 72–87 lbftf)

POWER TAKE-OFF, rear axle

Reduction ratio	1:1	
Shims, drivegear	1.25, 1.30, 1.35, 1.40, 1.60, 1.65, 1.85, 1.90, 1.95, 2.00 mm.	
Axial clearances, drivegear bearing	0.03–0.08 mm	
Tightening torques:		
not, out put shaft	100–120 Nm	(10–12 kpm = 72–87 lbftf)
not, drive gear	25–41 Nm	(2.5–4.1 kpm = 15–30 lbftf)

POWER-TAKE-OFF

Reduction ratio	1:1	
Oil change quantity	0,2 litre	(0,4 pints)
Tightening torques:		
bolts, output shaft	41–51 Nm	(4.1–5.1 kpm = 30–37 lbftf)
bolts, front housing and housing half	20–25 Nm	(2.0–2.5 kpm = 14–18 lbftf)

The following special tools are required for work on the clutch, gearbox, auxiliary gearbox, differential carriers, wheel carriers, power take-off differential carriers, power take-off auxiliary gearbox.

		Clutch	Gearbox	Auxiliary gearbox	Diff. carriers	Wheel carriers	Power take-off auxiliary gearbox	Power take-off diff. carriers
1426	Drift	X						
1784	Drift		X				X	
1801	Standard handle	X	X	X	X		X	X
1817	Extractor		X					
1821	Extractor					X		
1845	Press tool			X	X			
2014	Drift		X	X			X	
2022	Sleeve		X	X		X	X	X
2039	Drift			X				
2097	Extractor			X		X		
2116	Puller		X	X				
2132	Drift		X			X		
2261	Extractor		X	X	X		X	X
2267	Drift			X				X
2284	Retainer				X			
2291	Drift			X				
2337	Drift			X				
2370	Extractor				X	X		
2392	Extractor				X			
2395	Drift		X	X	X			
2404	Spanner				X			
2413	Drift					X		
2490	Drift							X
2520	Stand		X	X				
2564	Drift	X	X					
2567	Extractor				X			
2584	Sleeve					X		
2600	Measuring fixture				X			
2636	Holder				X			
2685	Adjusting ring				X			
2686	Press tool				X			
2806	Drift			X	X			
2837	Counterhold			X	X			X
2841	Socket spanner				X			
4030	Extractor	X	X					X
4090	Extractor	X	X					
6011	Drift		X					
6012	Drift		X					
6024	Drift		X					
6100	Extractor		X					
6101	Fixture		X					
6102	Sleeve		X		X			
6103	Press tool		X					
6104	Drift		X					
6105	Drift		X					
6108	Drift		X				X	
6109	Plate			X			X	
6110	Sleeve			X			X	X
6111	Sleeve			X				
6112	Fixture				X			
6113	Measuring tool				X			
6114	Drift				X			
6115	Drift				X			
6116	Drift			X	X			
6117	Sleeve					X		
6120	Guide			X				
6122	Ring			X				X
6126	Bleeder tool				X	X		
6128	Spanner	X	X	X				
6129	Lifting eyelet	X	X	X				
6131	Guide pin				X	X		
6133	Gauge				X	X		
6135	Spanner				X	X		
6136	Lifting tool	X	X	X				
6137	Lifting eyelet		X	X				
6140	Fixture			X				
6141	Separating bolt				X	X	X	
6145	Centring drift	X						
6146	Parallel block				X			

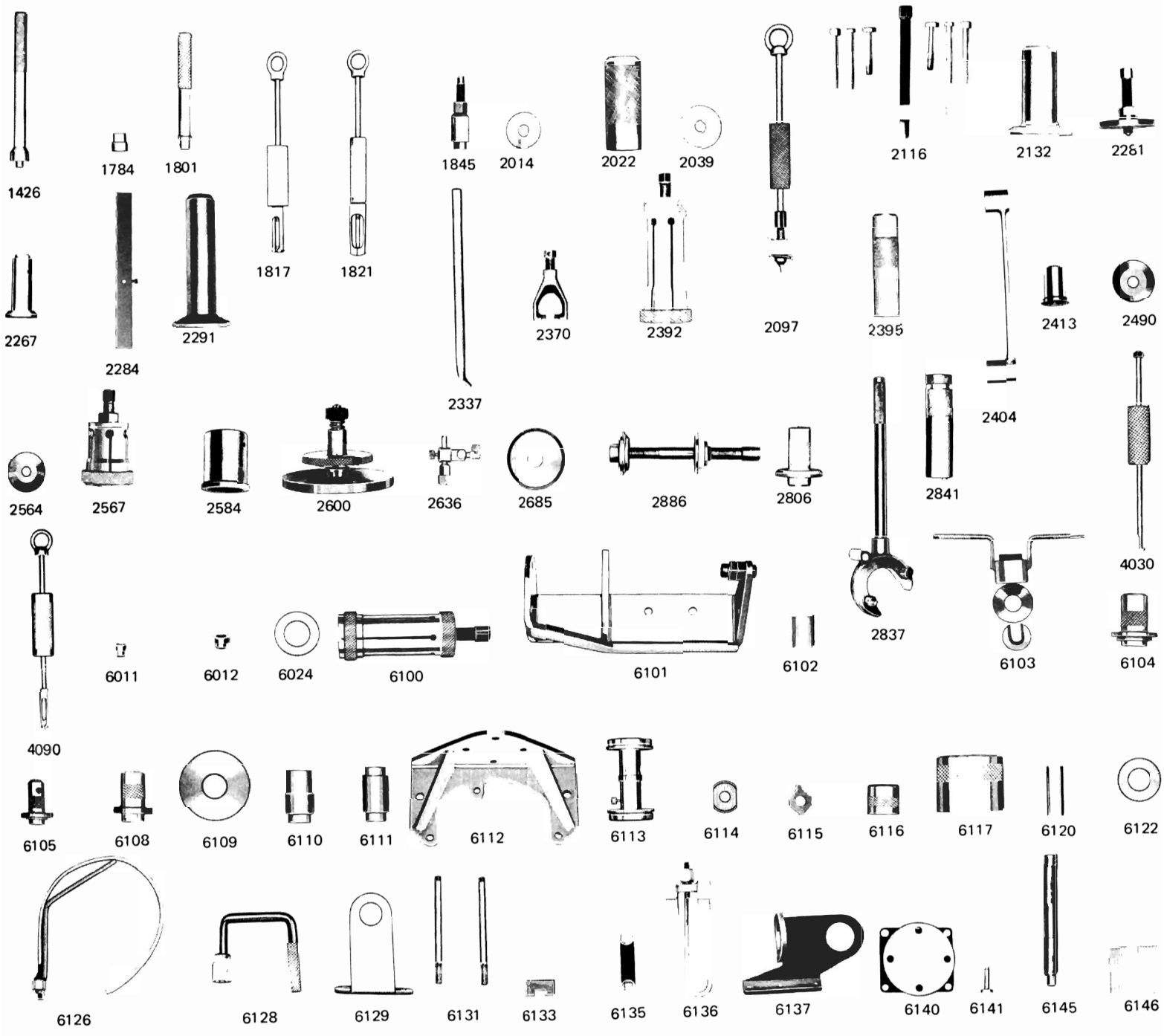


Fig. 41-1. Special tools

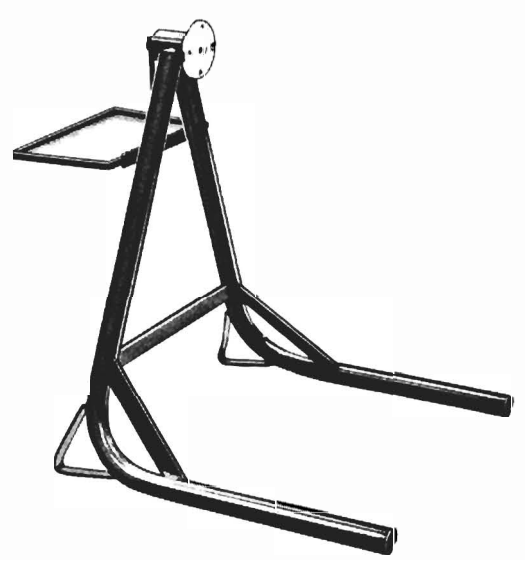


Fig. 40-2. Stand 2520 used together with 6101, 6112, 6140

GROUP 48 POWER TAKE-OFF

Description

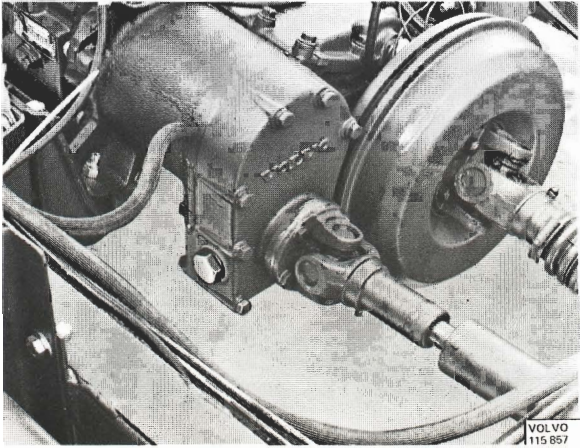


Fig. 48-1. Power take-off

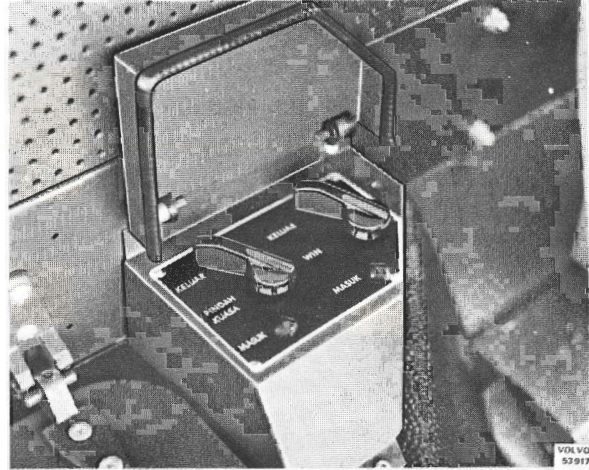


Fig. 48-2. Control for power take-off

POWER TAKE-OFF

For driving optional equipment, for example, a winch, a power take-off can be connected to the auxiliary gearbox. This type of power take-off is seen in Fig. 48-1.

The construction of the power take-off can be seen from Illustration 48-A. The power take-off housing is of aluminium and consists of two halves. Journalled in the housing is an input and an output shaft. On the

input shaft is a flange, which is meshed with the drive gear of the auxiliary gearbox. The output shaft is driven via a gear on the input and the output shafts which are in constant mesh.

The power take-off is engaged by a control, Fig. 42-2, located at the side of the engine casing, which is connected to the vehicle vacuum system. When the power take-off is engaged, see Fig. 48-3 and 48-4, its bellows are actuated by a vacuum and the flange engages with the auxiliary gearbox drive gear.

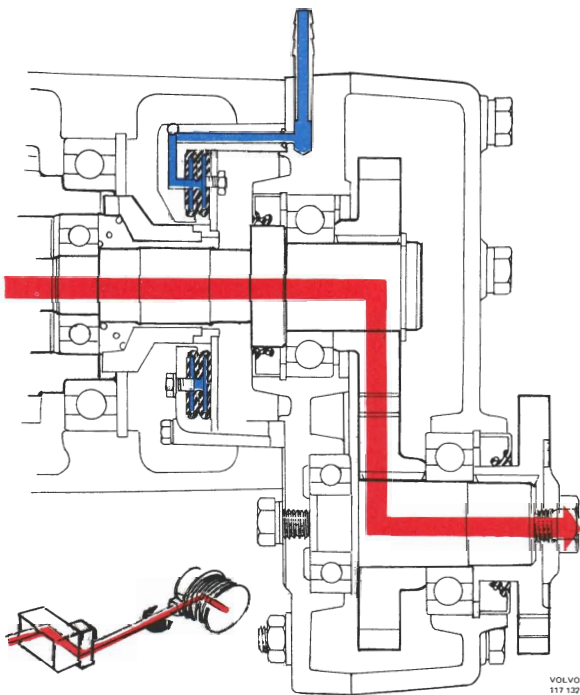


Fig 48-3 Pouver take-off is engaged

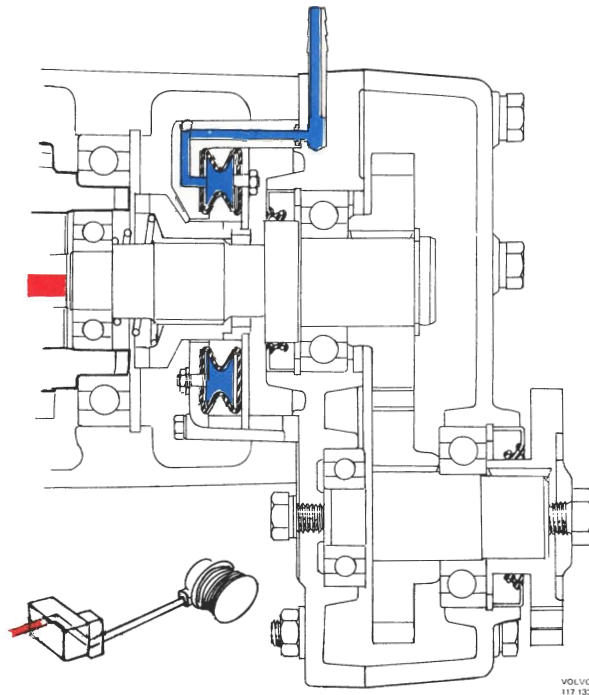


Fig 48-1 Power take-off is disengaged

Service procedures

Work which can be done in the vehicle

Replacing the O-ring on the control crank

1. Place a suitable tool under the handle, and pull the handle out of the housing.
2. Replace the O-ring on the handle Fig. 48-5 and coat it with a little grease.
3. Press the handle into the housing. Check to make sure that the differential lock can be engaged and disengaged.

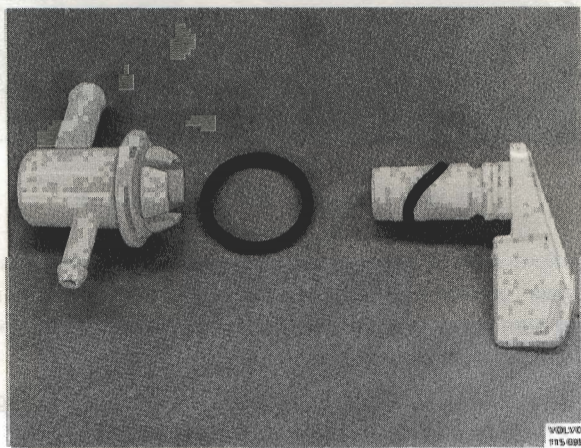


Fig. 48-4. Power take-off controls

Replacing power take-off control

1. Place a suitable tool under the knob and pull the knob out of the housing.
2. Remove the four screws securing the plate.
3. Remove the lock ring which holds the control housing to the controls panel.
3. Screw loose the panel see Fig. 48-5. Disconnect the hoses from the housing.
4. Remove the knob from the new control.
5. Place a new O-ring on the housing and fit the housing on the panel. Fit the lock ring.
6. Connect up the hoses. Fit the panel. Screw tight the plate.
7. Press the knob into the housing. Check the function of the power take-off.

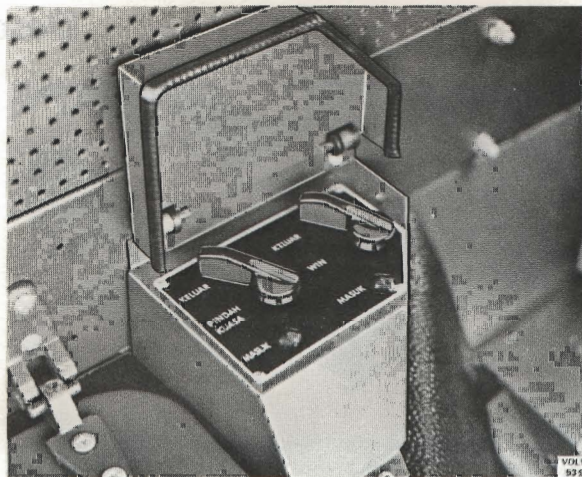


Fig. 48-5. Removing the housing

Removing of power take-off from auxiliary gearbox

1. Remove the propeller shaft.
2. Drain the oil from the power take-off by removing the screw (2, Fig. 48-6).
3. Remove the bolts securing the cover in the power take-off housing.

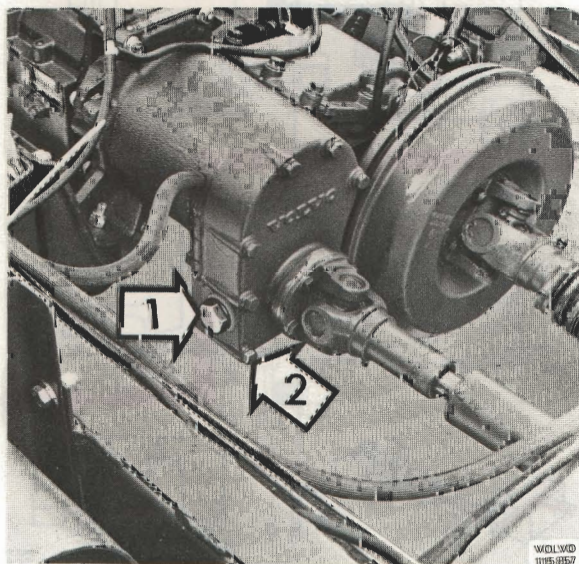


Fig. 48-6. Drain the oil

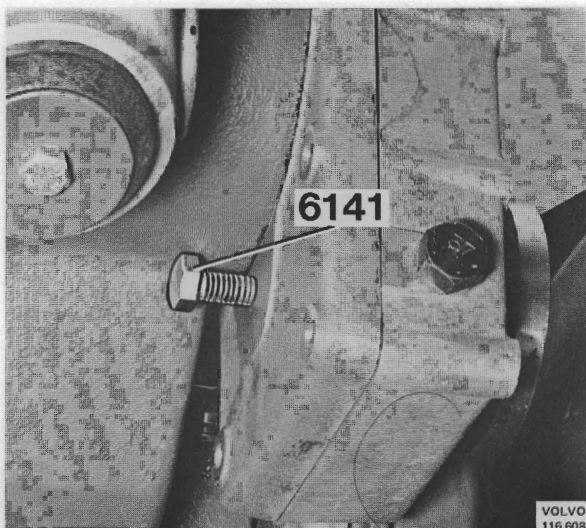


Fig. 48-7. Removing cover

4. Remove the plug, on the power take-off housing. Screw in the separating bolt 6141, Fig. 48-7 and press the cover from the housing. Remove the bolt and push in the plug again.
5. Remove both the inhex bolts, Fig. 48-8, securing the housing to the auxiliary gearbox.

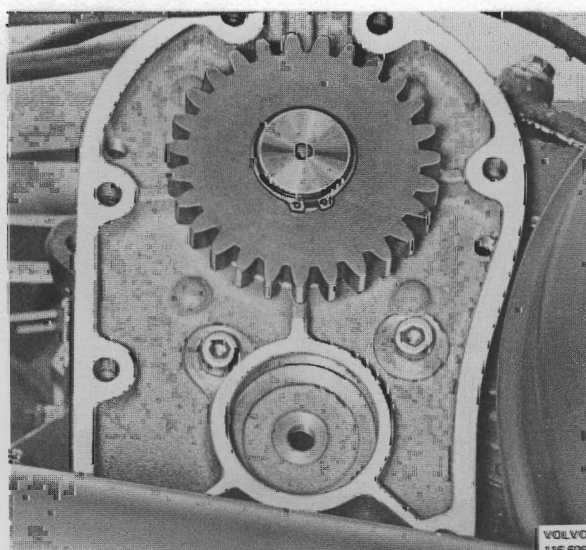


Fig. 48-8. Remove the inner bolts

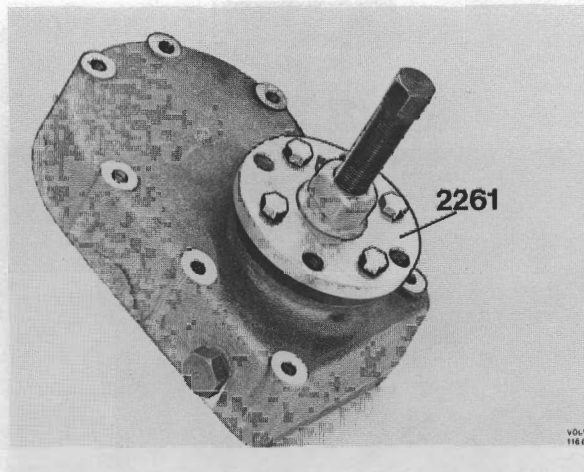


Fig. 48-9. Removing flange

Disassembling the power take-off

Special tools: 1784, 1801, 2014, 2022, 2261, 2873.

Rear housing half

1. Clean the power take-off. Fit counterhold 2873 on the flange and remove the bolt and washer securing the flange.
2. Pull off the flange using 2261, see Fig. 48-9.
3. Press out the output shaft and bearing with 1784, see Fig. 48-10.
4. Remove the key from the shaft.
5. Place the shaft in 2022 and press off the bearing using 1784, see Fig. 48-11.

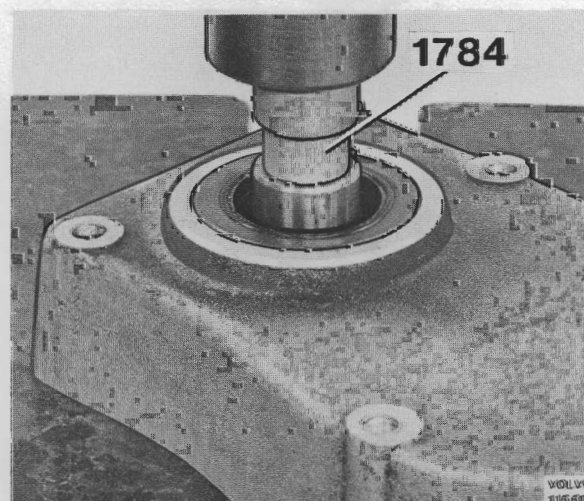


Fig. 48-10. Removing shaft

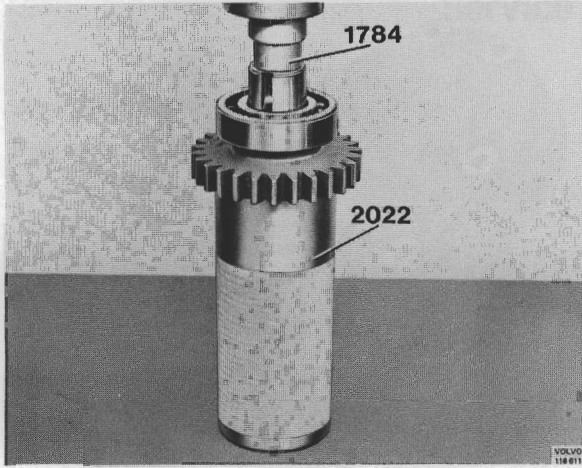


Fig. 48-11. Removing bearing

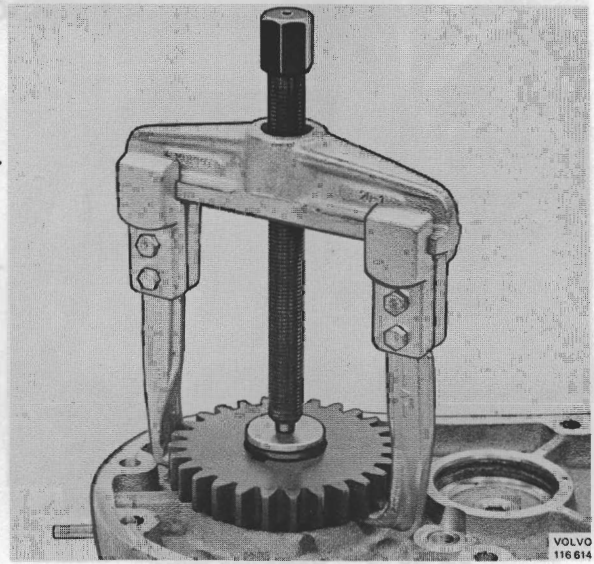


Fig. 48-14. Removing the drive

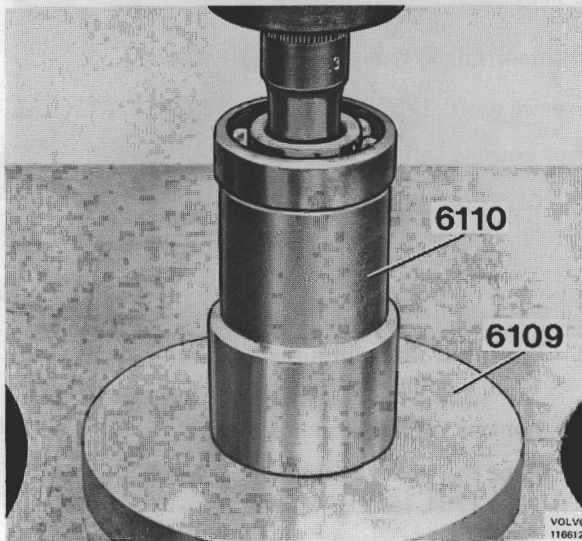


Fig. 48-12. Removing the inner bearing

Removing of power take-off from auxiliary

6. Place the shaft in 6110 and press off the inner bearing, see Fig. 48-12.
7. Remove the circlip in the housing and press out the seal with 1801 + 2014, see Fig. 48-13.

Front housing half

1. Remove the circlip on the input shaft and pull off the drive with a standard puller, see Fig. 48-14.

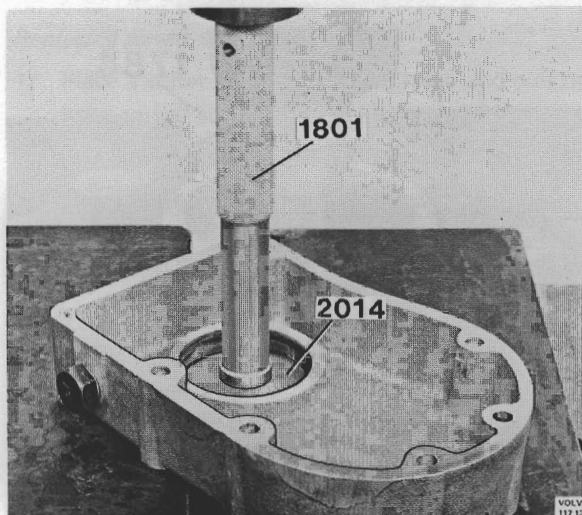


Fig. 48-13. Removing the seal

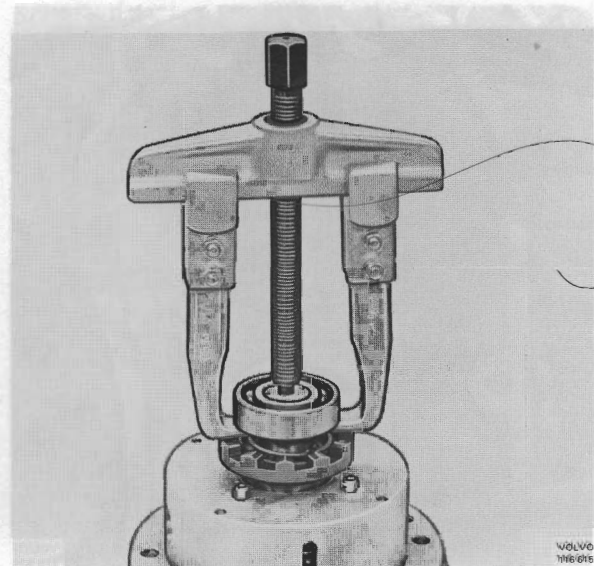


Fig. 48-15. Removing bearing

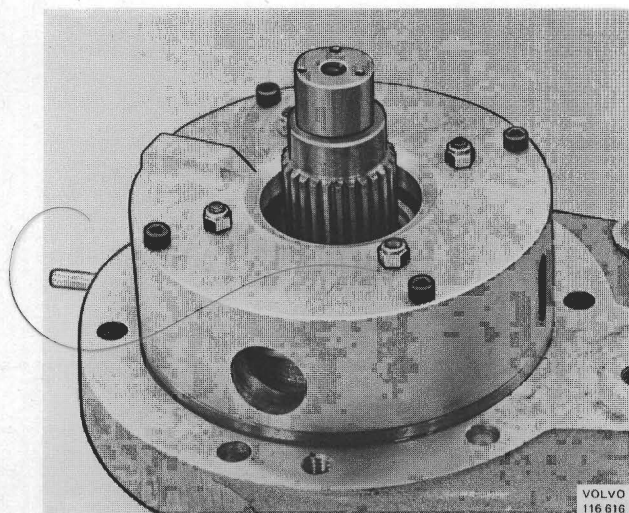


Fig. 48-16. Removing the bolts

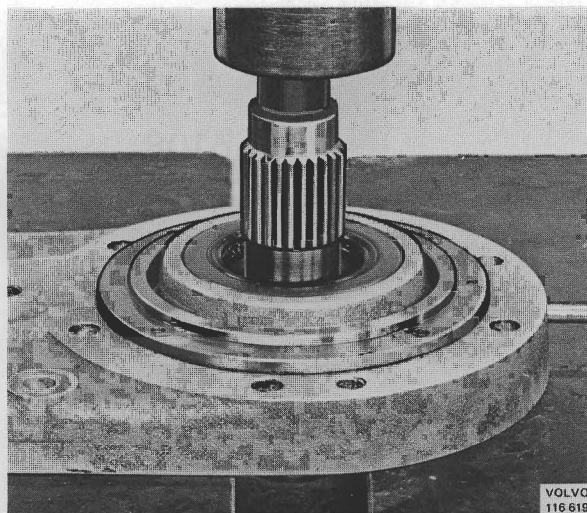


Fig. 48-18. Pressing out the shaft

2. Pull the support bearing off the shaft with a standard puller, see Fig. 48-15. Remove the spring and flange.
3. Remove the retaining bolts (inhex 3 mm = 1/8") holding the control housing, see Fig. 48-16. Remove the housing.
4. Remove the nuts securing the thrust plate, Fig. 48-17, to the bellows.
5. Remove the nuts securing the bellows to the control housing and take out the bellows.

6. Remove the circlip from the input shaft. Press out the shaft and bearing, see Fig. 48-18, from the housing.
7. Remove the key from the shaft.
8. Place the shaft in 2022 and press off the bearing using 1784, see Fig. 48-19.
9. Remove the circlip from the housing and press out the seal with 1801 + 2014.

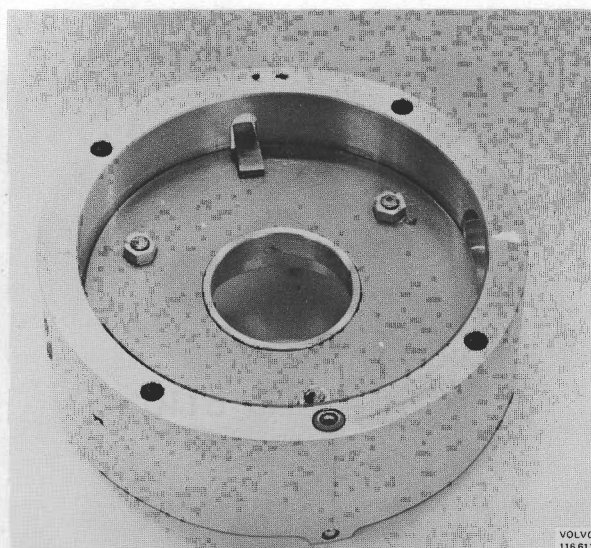


Fig. 48-17. Removing the nuts

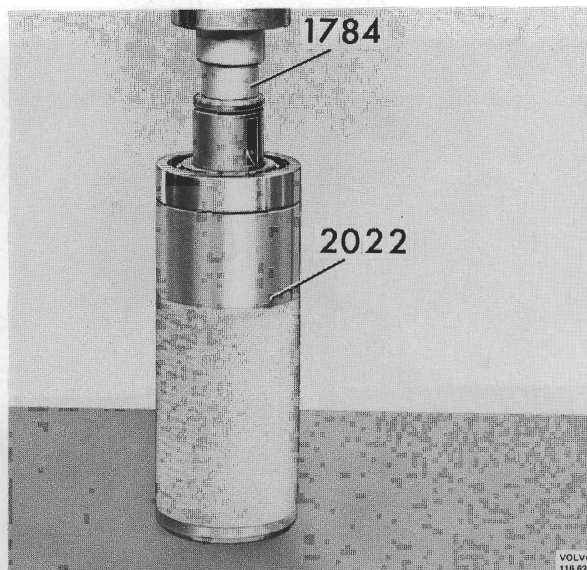


Fig. 48-19. Removing the bearing

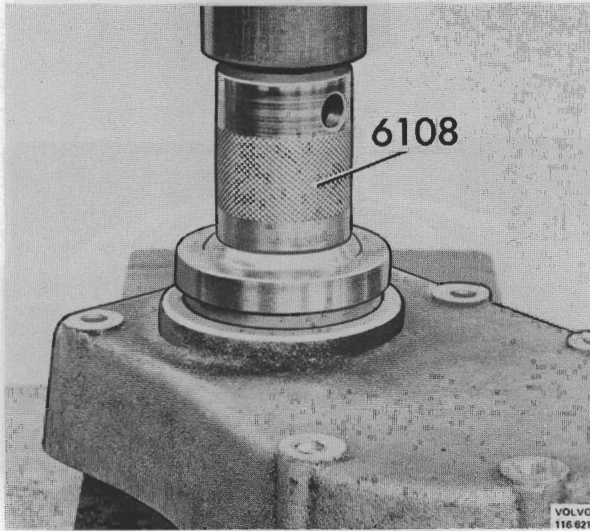


Fig. 48-20. Pressing in the seal

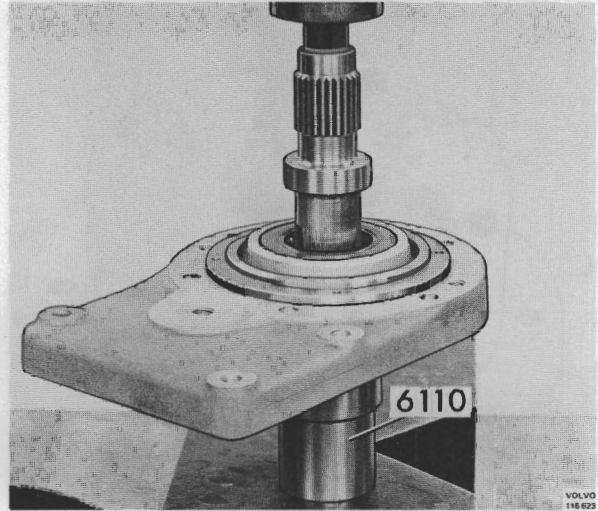


Fig. 48-22. Pressing in the shaft

Checking and replacing parts

Clean all parts and check them for damage and wear. All damaged or worn parts should be replaced, but sealing rings, O-rings and gaskets must always be replaced. When replacing sealing rings, check carefully the surfaces which have been covered by these rings. If a surface is scored or damaged in any other way, then the particular component with the damaged surface must be replaced.

Assembling

Special tools: 1801, 2014, 2022, 6108, 6110

Assembling the front housing half

1. Place the circlip nearest the sealing in the housing.
2. Place the sealing in the housing with 6108, see Fig. 48-20.
3. Press the bearing into the housing using 1801 + 2014, see Fig. 48-21. Place the circlip which secures the bearing.
4. Place the housing on 6110, see Fig. 48-22, and press in the input shaft.

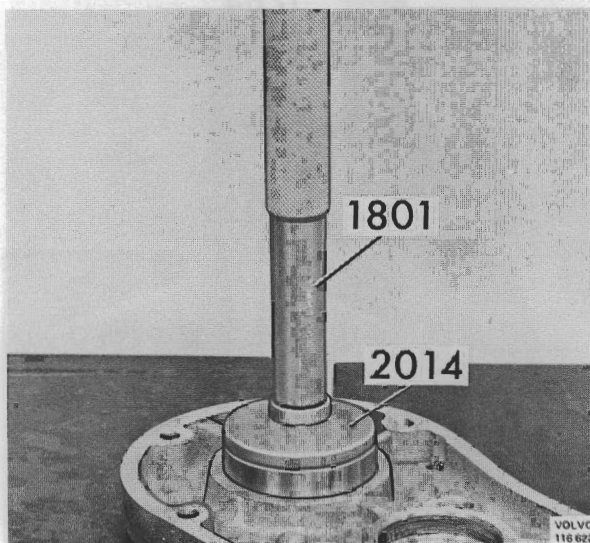


Fig. 48-21. Pressing in the bearing

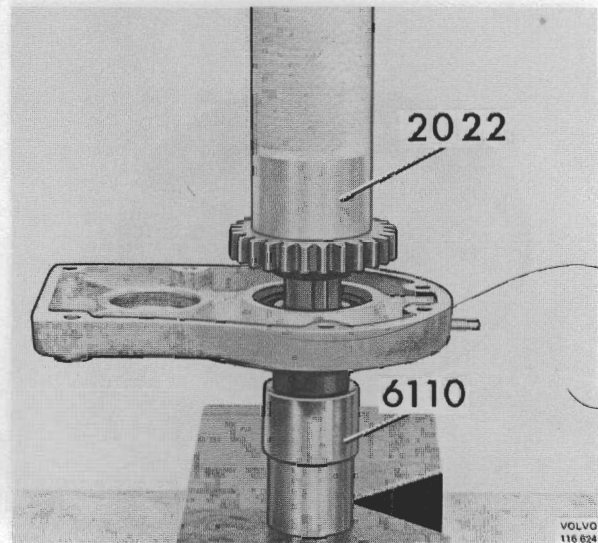


Fig. 48-23. Pressing on the wheel

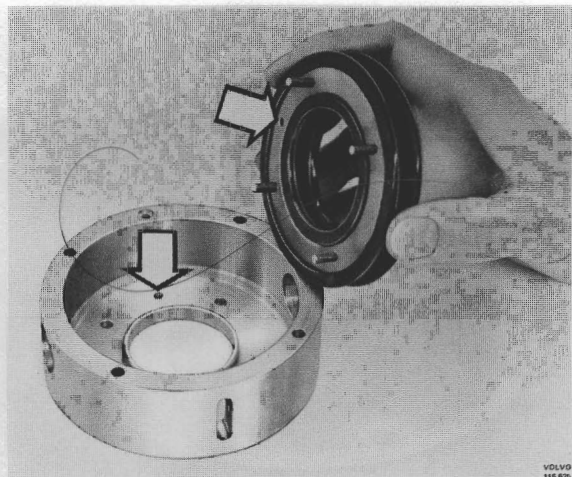


Fig. 48-24. Removing the bellows

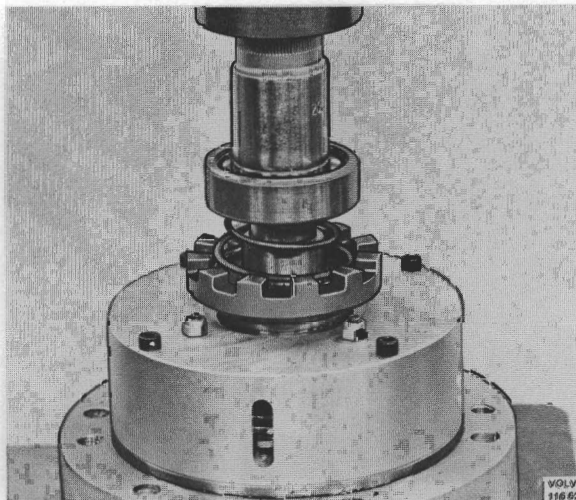


Fig. 48-26. Pressing on the bearing

5. Secure the key for the gear wheel. Place the housing on 6110 and press on the gear wheel with 2022, see Fig. 48-23. Secure the circlip for the gear.
6. Place the bellows on the control housing.
NOTE! Make sure that the hole in the bellows is opposite the hole in the housing, see Fig. 48-24. Tighten up the bellows.
7. Make sure the bushing is firmly in position by peening it at three points. Place the plate in position and tighten it with the bellows.

8. Place a new O-ring on the control housing, see Fig. 48-25. Assemble the control housing to the housing half. Make sure that the air duct is located properly.
9. Place the flange and the thrust spring on the input shaft, see Fig. 48-26.
10. Press on the support bearing andpeen it with three punch pops, see Fig. 48-27.

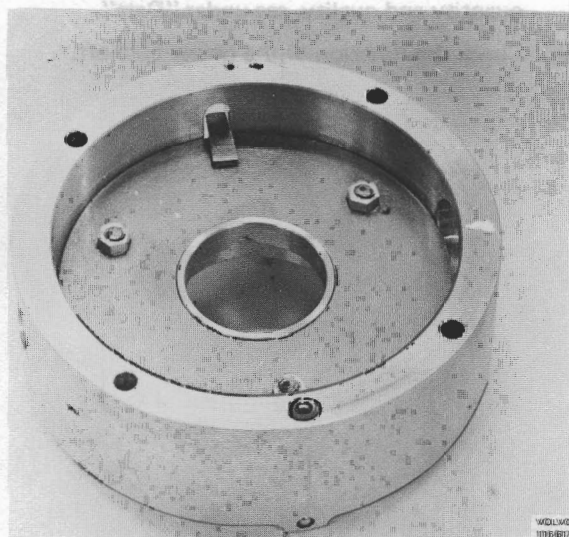


Fig. 48-25. Fitting the O-ring

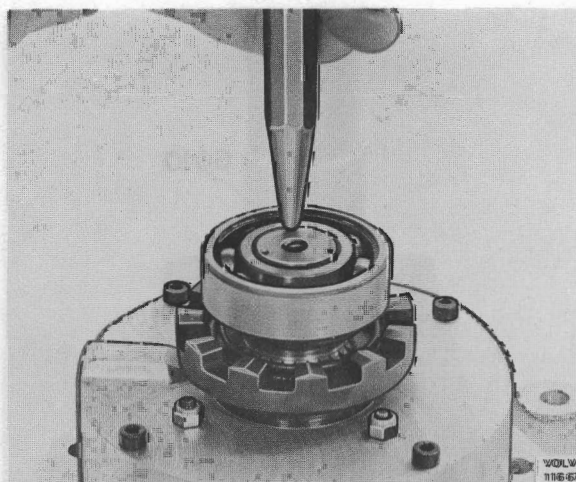


Fig. 48-27. Peening the bearing

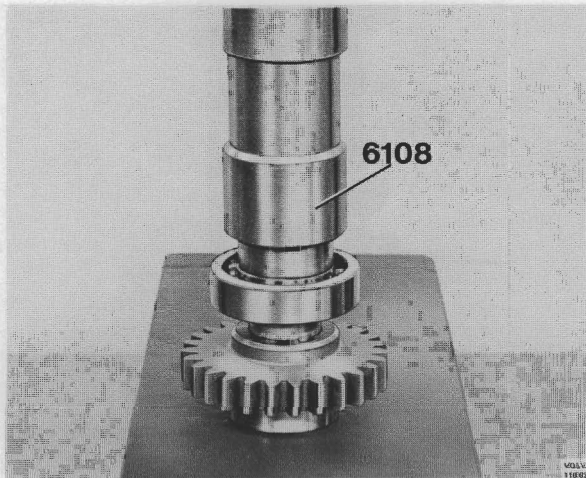


Fig. 48-28. Pressing on the wheel

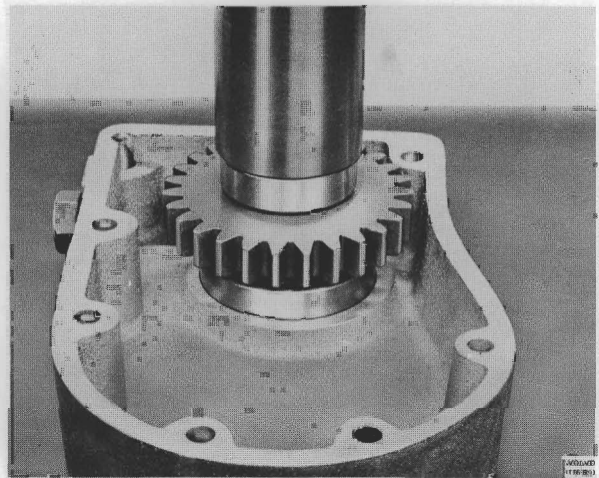


Fig. 48-30. Pressing on the shaft

Rear housing half

1. Press the support bearing on the output shaft.
2. Press on the gear wheel with 6110, see Fig. 48-28.
3. Press on the rear bearing with 6110, see Fig. 48-29. Fix the flange key in position.
4. Fit the circlip on the housing half.
5. Press the seal into the housing with 6108. Coat the seal with grease.
6. Press the output shaft into the housing, see Fig. 48-30.
7. Press the flange on the output shaft. Place the washer on the flange and tighten up the bolt to a torque of 41-51 Nm (4.1-5.1 kpm = 30-37 lbftf).

Installing the power take-off on the auxiliary gearbox

1. Clean the contact surface on the auxiliary gearbox and coat it with sealing agent.
2. Fit the front housing half on the gearbox. Tighten the bolts to a torque of 20-25 Nm (2.0-2.5 kpm = 14-18 lbftf).
3. Coat the rear housing half contact surface with sealing agent. Mount the housing on the gearbox, turn the flange while putting the housing halves together. Tighten the bolts to a torque of 20-25 Nm (2.0-2.5 kpm = 14-18 lbftf). Fit the ventilation hose.
4. Fit the propeller shaft and tighten the bolts to a torque of 55-65 Nm (5.5-6.5 kpm = 40-47 lbftf).
5. Fill the power take-off with oil. Concerning quantity and quality, see under "Data".
6. Check the function of the power take-off.

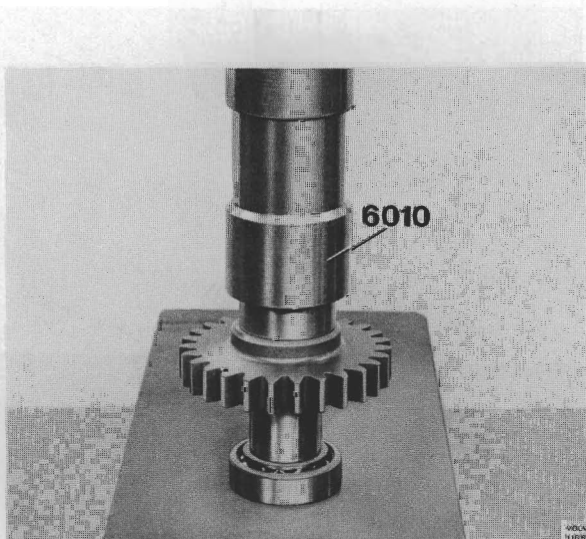
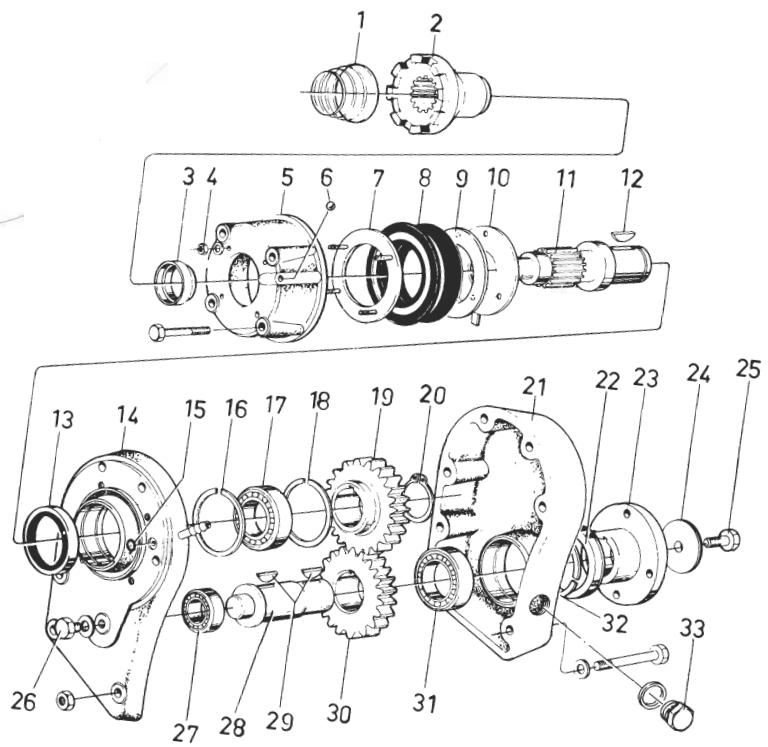


Fig. 48-29. Pressing on the bearing

Illustration 48-A. Power take-off

Power take-off

- 1 Spring
- 2 Flange
- 3 Bushing
- 4 Nut
- 5 Central housing
- 6 Ball
- 7 Attaching plate
- 8 Bellows
- 9 Support plate
- 10 Trust plat
- 11 Input shaft
- 12 Key
- 13 Seal
- 14 Housing
- 15 O-ring
- 16 Circlip
- 17 Bearing
- 18 Circlip
- 19 Drive wheel
- 20 Circlip
- 21 Housing
- 22 Bearing
- 23 Flange
- 24 Washer
- 25 Screw
- 26 Screw
- 27 Bearing
- 28 Output shaft
- 29 Key
- 30 Wheel
- 31 Bearing
- 32 Circlip
- 33 Screw

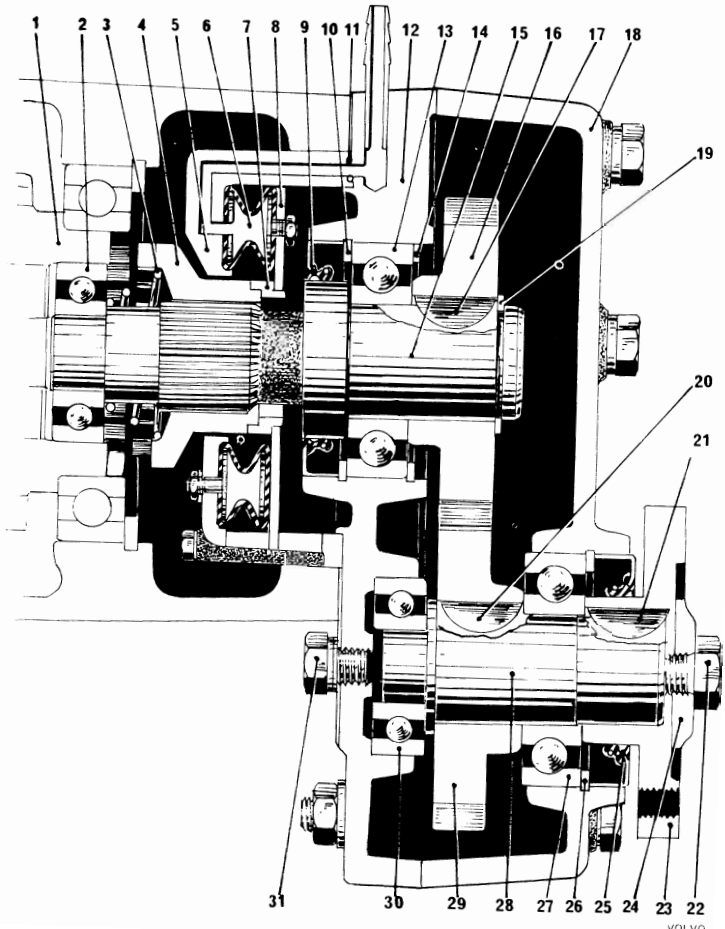


VOLVO
117 197

Illustration 48-B. Power take-off

Power take-off

- 1 Drive gear and auxiliary gearbox
- 2 Bearing
- 3 Spring
- 4 Flange
- 5 Control housing
- 6 Bellows
- 7 Bushing
- 8 Thrust plate
- 9 Seal
- 10 Circlip
- 11 O-ring
- 12 Housing
- 13 Bearing
- 14 Circlip
- 15 Input shaft
- 16 Drive wheel
- 17 Key
- 18 Housing
- 19 Circlip
- 20 Key
- 21 Key
- 22 Screw
- 23 Flange
- 24 Washer
- 25 Seal
- 26 Circlip
- 27 Bearing
- 28 Output shaft
- 29 Wheel
- 30 Bearing
- 31 Screw



VOLVO
117 134