VOLVO SERVICE

PART 4

POWER TRANSMISSION

C3-series

# SERVICE MANUAL

# CONTENTS

## GROUP 40 GENERAL



## GROUP 41 CLUTCH



## GROUP 42 MANUAL GEARBOX



## GROUP 45 PROPELLER SHAFTS



## GROUP 46 REAR AXLE AND FRONT AXLE



## GROUP 48 POWER TAKE-OFF

# 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 (0.020–0.060") | (in stages 0.1 mm – 0.0039") |
| cover – input shaft, alt. | 0.4–1.0 (0.016–0.039") | (in stages 1 mm = 0.0039") |
| cover – bearing, countershaft, alt. | 0.5–1.5 (0.020–0.060") | (in stages 0.1 mm = 0.0039") |
| cover – bearing, output shaft | 0.4–1.0 (0.016–0.039") | (in stages 0.1 mm = 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 (0.029–0.039") | (in stages 0.04 mr = 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 rafio | 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 elearances, duivegear bearing | 0.03–0.08 mm | |
| Tightening torques: | | |
| not, out put shatt | 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 rafio | 1:1 | |
| Oil change quantityc | 0,2 litre | (0,4 pints) |
| Tightening torques: | | |
| bolf, outpot shaff | 41–51 Nm | (4.1–5.1 kpm = 30–37 lbftf) |
| bolf, 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 | | | |

# Description

The power transmission for the 2-axle vehicle consists of a clutch, gearbox, auxiliary gearbox, propeller shaft sections and a front and rear axle with differential carries and wheel carries, see Fig. 40–3. In addition to an extra rear axle on 3-axle trucks, there is a power take-off for driving this rear axle. The description and repair instructions for these components are to be found in their respective groups.

In order to prevent dirt and impurities from getting into the evacuation systems in the auxiliary gearbox, gearbox, front and rear axle casings, evacuation is by means of a common hose which runs up to the engine compartment, see Fig. 40–4. Extra sealing has been introduced between the engine and clutch casing and the casing has an evacuation which is connected to the other evacuation system. The sealing between the engine and casing consists of a plate with two washers, see Fig. 40–5. The plate is situated between the oil sump and the engine block and the washers are placed between the reinforcing bracket and the sump, see Fig. 40–6.

The cylinder for engaging the front wheels and the cylinders for operating the differential locks for the front and rear differential carriers are operated by vacuum and for this reason the frame crossmembers have been utilized as vauum reservoirs, see Fig. 40–7.

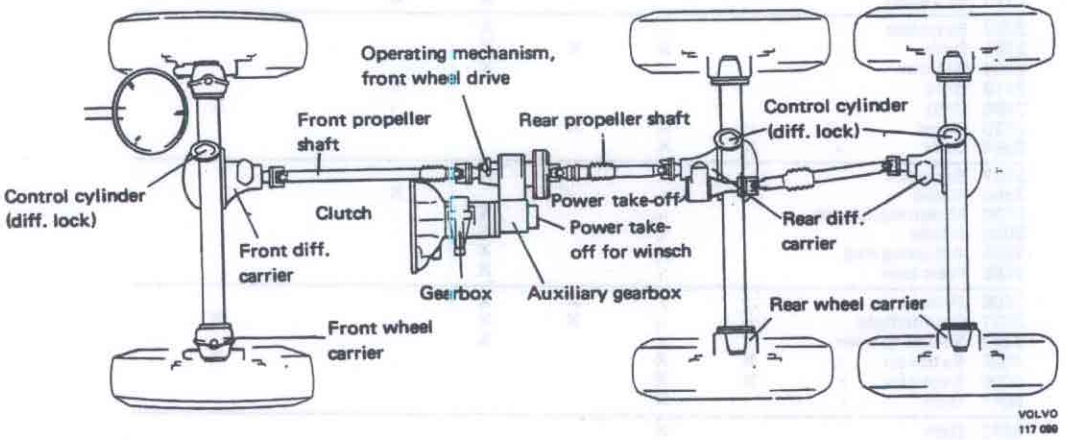


Fig. 40–3. Power transmission

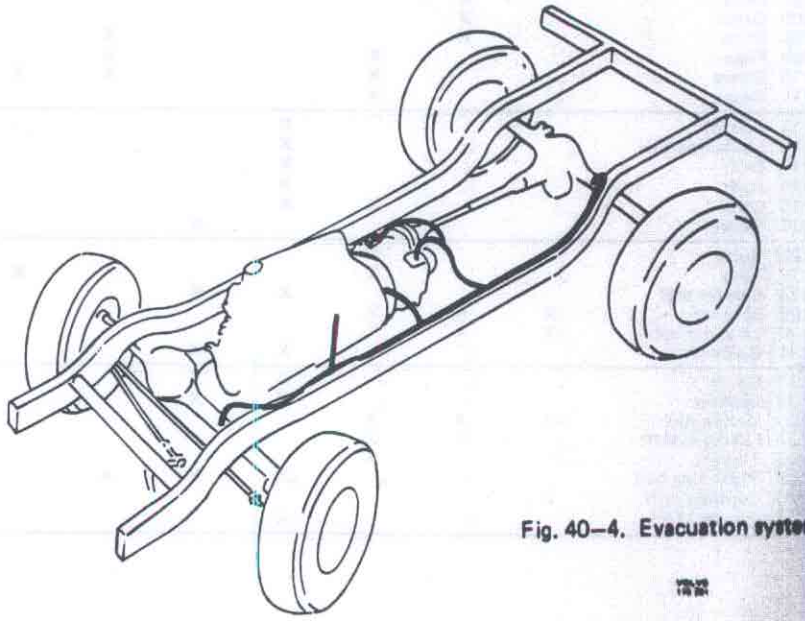

Fig. 40–4. Evacuation systems

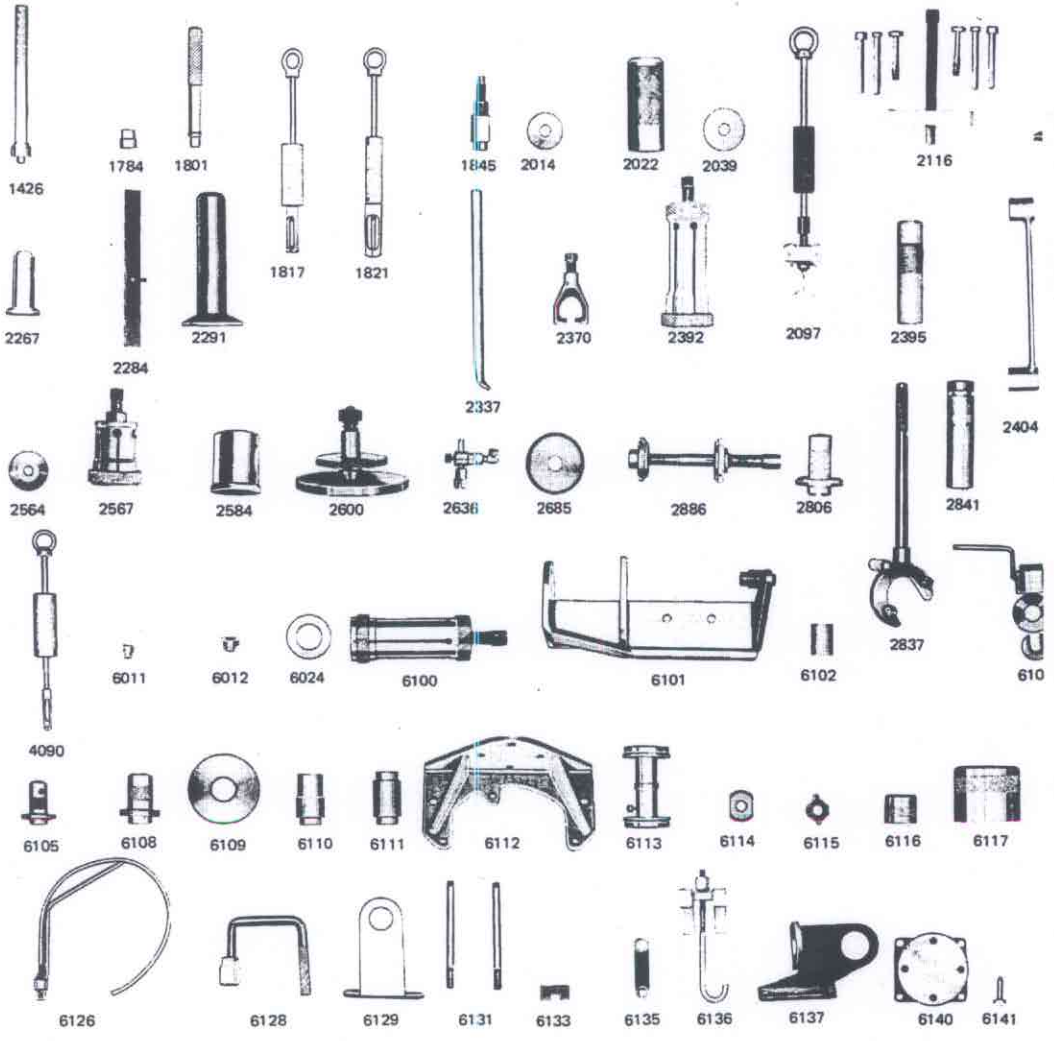


Fig. 41–1. Special tools

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