

Document Title: Description	Function Group: 400	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Description

The engine output torque is transferred to the transmission via the torque converter. The converter has a fixed stator. The stator multiplies the torque. The multiplication is at its greatest when the engine is running at high speed and the turbine rotor is stationary, e.g. when starting the machine. The torque from the torque converter passes through the transmission and dropbox to the drive axles. In the differential gear the torque is divided out to the planetary hub gears and the wheels. The transmission has four speed gears and two directional gears.

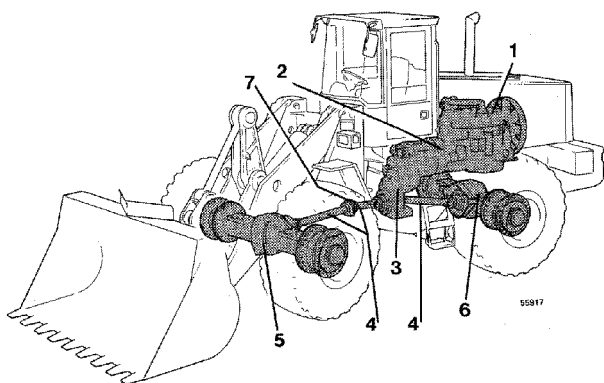


Figure 1
Power transmission, principle diagram

1	Engine
2	Torque converter
3	Transmission with dropbox
4	Propellar shaft
5	Front axle
6	Rear axle
7	Support Bearing

Document Title: APS (Automatic Power Shift)	Function Group: 420	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

APS (Automatic Power Shift)

Description

L150 and L180 are as standard provided with APS (Automatic Power Shift), which is included in the control unit of the Contronic system.

2nd gear is the basic gear and the gear in which the machine normally starts when operating with the selector in the "A" (Automatic) position. During engine braking the accelerator control is fully released and the downshifting / engine braking button, SW105, is pressed in. Downshifting takes place at the correct moment for the greatest possible engine braking from 4th via 3rd to 2nd. If 1st gear is required, press in the kick-down button and 1st gear will be engaged, if the travelling speed is below 10 km/h (6 mph). This takes place regardless of which gear was engaged initially.

Upshifting from 2nd to 3rd reverse takes place at a comparatively high speed. In that way the operator can decide when upshifting should occur with the aid of the accelerator control.

If the downshifting / engine braking button, SW105, is kept pressed in while accelerating, upshifting is prevented, see also [Invalid linktarget] .

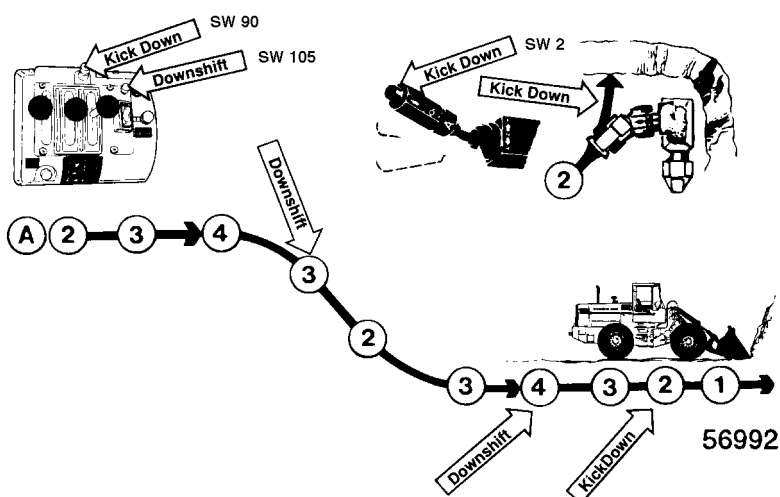


Figure 1
Gear shifting, general principle

Description of function of manual gear shifting

Gear shifting

Gear selector control positions 1, 2 and 3 are manual positions, i.e. the operator selects the gear he or she prefers.

Over-speeding protection

During downshifting the control programme always checks that the speed is not too high for the selected gear. In which case the engaged gear remains engaged until the speed has dropped to within the permissible range.

Kick-down function

Kick-down can only be activated in selector position 2.

1st gear is engaged if the speed is below 10 km/h (6 mph) within 5 seconds from when the kick-down switch is activated. 1st gear remains engaged for at least 5 seconds, then upshifting to 2nd gear takes place when the gear-shifting point has been reached. When changing travelling direction, the kick-down function ceases immediately and upshifting to 2nd gear takes place.

Changing travelling direction

The machine starts off in the new direction in the same gear as before the new direction was selected.

Description of function during automatic gear shifting

Start (selector position A)

When starting from stationary, the machine moves off in 2nd gear. If the machine is already moving, 3rd gear will be engaged.

Gear shifting

Gear shifting is automatic. Conditions for gear shifting are a combination of travelling speed and engine speed. Gear shifting takes place between gears:

Forward: 2nd-3rd-4th
Reverse: 2nd-3rd

Gear shifting down to 1st takes place only after the kick-down switch has been activated.

Upshifting to 2nd then takes place automatically or when changing travelling direction.

The gear-shifting points vary depending on whether the engine is pulling or braking, according to the table shown below.

Gear shifting	L150	L180
1 - 2	5.0 - 6.0	5.0 - 5.5
2 - 3	7.0 - 10.0	8.0 - 10.5
3 - 4	15.0 - 18.5	16.0 - 19.0
4 - 3	11.0 - 16.0	13.5 - 18.0
3 - 2	6.0 - 9.0	6.5 - 9.5
2 - 1 (Kick-down)	10.0	10.0

Kick-down function

Kick-down means that the operator requests gear shifting to 1st gear by activating the kick-down switch.

1st gear will be engaged, if the speed is below 10 km/h (6 mph) within 5 seconds from when the kick-down switch is activated.

1st gear remains engaged for at least 5 seconds, then upshifting takes place according to the gear-shifting programme.

When changing travelling direction the kick-down function ceases immediately and upshifting to 2nd takes place.

Changing travelling direction

At low speed a change of direction takes place in 2nd gear and at higher speed in 3rd gear and downshifting to 2nd only takes place when the machine has stopped and before it begins to move off in the opposite direction.

Speeds below approx. 18 km/h (11.2 mph):

2nd forward to 2nd reverse

3rd forward to 2nd reverse

4th forward to 2nd reverse

Speeds above approx. 18 km/h (11.2 mph):

3rd forward to 3rd reverse to 2nd reverse

4th forward to 3rd reverse to 2nd reverse

NOTE!

4th gear is blocked in connection with reverse gear, otherwise downshifting from reverse to forward takes place according to the description above.

Document Title: Transmission, Checking oil pressure	Function Group: 421	Information Type: Service Information	Date: 2014/6/9 0
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Transmission, Checking oil pressure

Op nbr 42102

11 666 017 Pressure gauge, range 0 – 0.6 MPa (0 – 87 psi)

11 666 018 Pressure gauge, range 0 – 2.5 MPa (0 – 63 psi)

11 666 037 Hose

The following applies when checking:

Temperature:	Normal working temperature
Speed:	High idling speed
Main pressure (neutral):	1.37 - 1.58 MPa (199 - 229 psi)
Clutch pressure 1st–4th:	1.37 - 1.58 MPa (199 - 229 psi)
Clutch pressure Forward/Reverse:	1.37 - 1.58 MPa (199 - 229 psi)
Torque converter pressure (out, neutral):	0.20 - 0.50 MPa (29 - 73 psi)
Lubricating oil pressure (neutral):	0.16 - 0.22 MPa (23 - 32 psi)

NOTE!

In order to check the clutch pressure for the 4th gear without activating the automatic shifting, the ECU must first be disconnected.

1. Disconnect connector EY (blue leads) from the circuit board.
- 2.

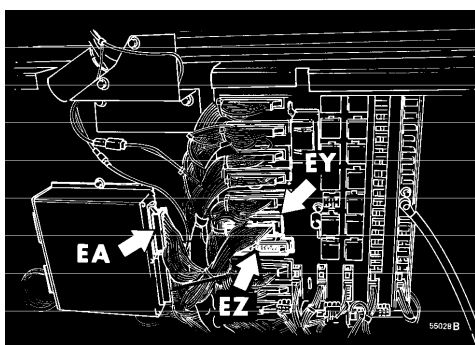


Figure 1
Electrical distribution box behind lining on rear cab wall

1	Connector EA on ECU (yellow)
2	Connector EZ on circuit board (yellow)

3. Disconnect connector EA (yellow) from the control unit and connect it to connector EZ (yellow) on the circuit board.
- 4.

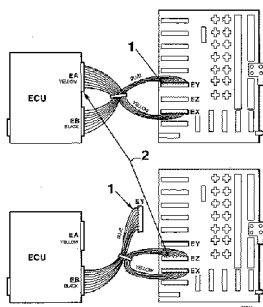


Figure 2
Changing over to operating with ECU disconnected, detail

Main pressure

5. Directional gear in neutral position. The main pressure is measured at item G, see [Figure 3](#).

Clutch pressure, 1 – 4th gear

6. NOTE!

When measuring clutch pressure, apply service brakes and parking brake. Also make sure that the transmission disengage function is not activated. Check in both forward and reverse positions.

Speed gears 1, 2, 3 or 4 (certain markets only 3) should be selected and the clutch pressures measured at the panel, outlets A – D, see [Figure 3](#).

Clutch pressure, forward and reverse gear.

7. Directional gear in forward and reverse positions respectively. The clutch pressures for the respective gears are measured at items E and F, see [Figure 3](#).

8.

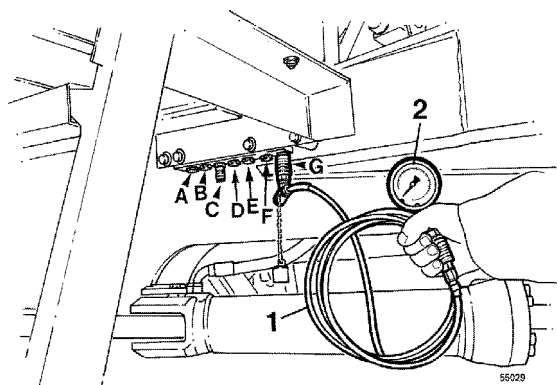


Figure 3
Pressure outlet

1	11 666 035
2	11 666 018
A	1st gear
B	2nd gear
C	3rd gear
D	4th gear
E	Reverse gear
F	Forward gear
G	Main pressure, neutral

Checking torque converter pressure and lubricating oil pressure

9. Check torque converter pressure and lubricating oil pressure with selector in neutral position and engine at high idling speed. Connect the pressure gauge on the left side of the transmission, see [Figure 4](#) and read off the pressure.

NOTE!

The torque converter pressure is dependent on the temperature, speed and resistance in the system and these factors vary, but the torque converter pressure is limited at the lower end by the lubricating oil pressure and at the upper end by the safety valve which opens at 0.8 MPa (116 psi).

10.

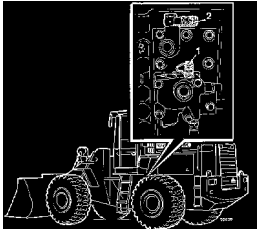


Figure 4
Pressure outlets

1	Lubricating oil pressure
2	Torque converter pressure

	Lubricating oil pressure	Torque converter pressure	Main pressure	Clutch pressure F 1 R 2 3 4
N	X	X	X	0 0 0 0 X 0
1F	X	X	X	X X 0 0 0 0
2F	X	X	X	X 0 0 X 0 0
3F	X	X	X	X 0 0 0 X 0
4F	X	X	X	X 0 0 0 0 X
1R	X	X	X	0 X X 0 0 0
2R	X	X	X	0 0 X X 0 0
3R	X	X	X	0 0 X 0 X 0
4R	X	X	X	0 0 X 0 0 X

X = Pressure
0 = Without pressure

Document Title: Transmission, Removing and fitting	Function Group: 421	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Transmission, Removing and fitting

Op nbr 4217042172

999 3621 Lifting eye right

999 3622 Lifting eye left

E 616 Trolley (or 1206 without pipe bow)

E 985 Hose

Ratchet block, 1500 kg (3308 lb), 2 pcs

Ratchet block, 750 kg (1654 lb)

Square pipe, 60x60x4 mm, length approx. 2.5 m (8 ft 2 in), 2 pcs

NOTE!

Plug all pipes, hoses and connections when removing.

Removing

1. Release any pressure in the brake and hydraulic systems. Remove seat and cab floor.
2. Drain hydraulic and transmission oils.

NOTE!

Use E 985 when draining hydraulic oil tank.

3.

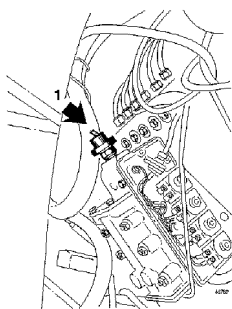


Figure 1

1	Sensor for transmission main pressure (Principle diagram)
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4. Loosen the front propeller shaft from the transmission drive flange. Remove the rear propeller shaft. Weight approx. 38 kg (84 lb).
- 5.

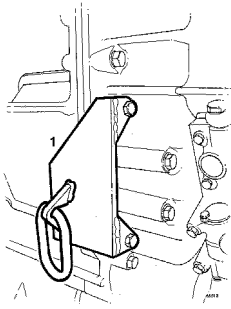


Figure 2

1	3621
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6. Remove the pumps from the transmission.
7. Disconnect lines, pipes, cabling etc. from the transmission.
Detach the electrical leads at the gear selector valve, and remove the sensor for the main pressure, see Fig. **Figure 1**.
- 8.

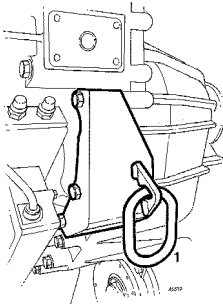


Figure 3

1	3622
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9. Fit 3621 and 3622, see Fig. **Figure 2** and **Figure 3**.
10. Connect a hoist according to **Figure 4**.
NOTE!
Transmission weight approx. 850 kg (1874 lb).
11. Take the load off the transmission mounting brackets and remove them.
12. Block up the engine against the rear axle mounting and detach the transmission from the flywheel housing.
13. Lift the machine and position supports under the rear axle so that the ground clearance becomes at least 63 cm (25 in) under the lowest point of the frame.
14. Lower the transmission to approx. 10 cm (4 in) above the ground. Connect the ratchet block, see **Figure 4**, in order to be able to incline the transmission at the same time as it is lowered onto E 616 with the gear selector valve upward.
15. Pull out the transmission.

Fitting

16. Move the transmission in under the machine.

17. Connect the lifting device according to Fig. **Figure 4**.
18. Lift the transmission into position. Tighten the nuts and bolts against the flywheel housing.
Tightening torque 54 N m (40 lbf ft).
19. Remove any supports from under the engine.
Fit the mounting brackets and lower the transmission. Tighten the mounting brackets finally.
Tightening torque:
Mounting bracket – transmission: **430 N m (317 lbf ft)**
Mounting bracket – frame: **220 N m (162 lbf ft)**
20. Remove the lifting device.
21. Fit front and rear propeller shaft.
22. Lower the machine.
23. Fit the pumps.
24. Connect hoses, lines, cabling, sensors and pipes. The electrical leads for the gear selector valve are connected according to the instructions on the inside of the protective cover.
25. Fit cab floor and seat.
26. Fill with oil and check the oil level in the transmission and the hydraulic tank. Start and check the hydraulic pressures, check that there are no leaks.
- 27.

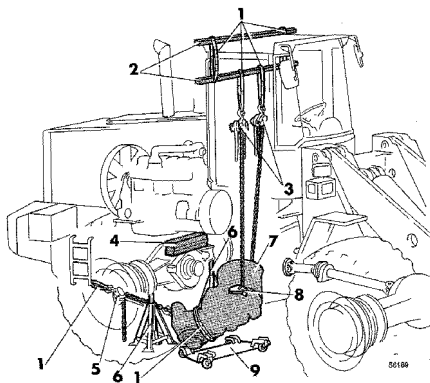


Figure 4

1	Sling
2	Steel girders
3	Ratchet block 1500 kg (3308 lb)
4	Support for engine
5	Ratchet block 750 kg (1654 lb)
6	Axle stand
7	999 3621
8	999 3622
9	E 616

Document Title: Differential carrier assembly EV85, L150 up to and incl. se. no. 1233	Function Group: 460	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Differential carrier assembly EV85, L150 up to and incl. se. no. 1233

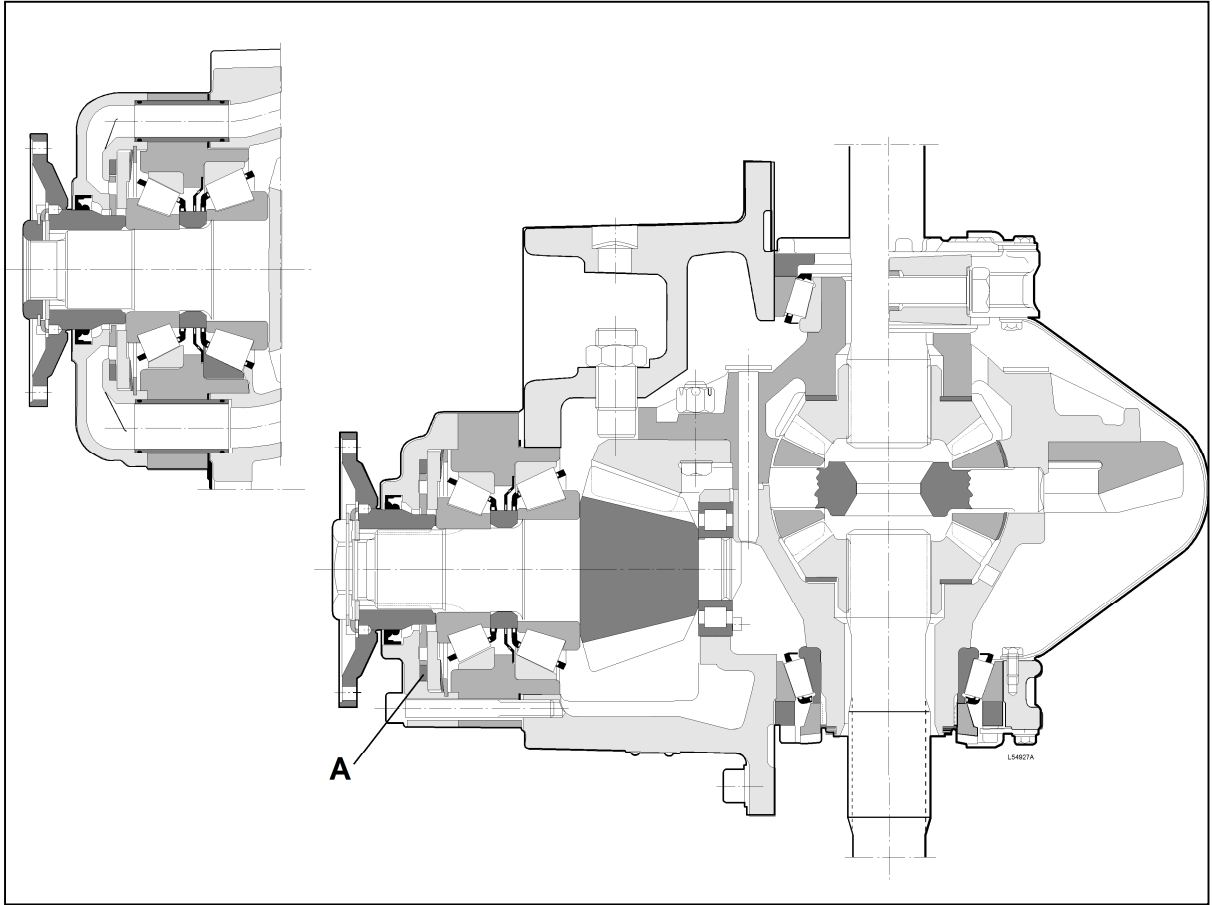


Figure 1
Differential carrier assembly EV85

L150 up to and incl. se. no. 1233

A	Cooling pump, oil cooled brakes
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Document Title: Differential carrier assembly, AWB40, (L150 w.e.fr. se. no. 1234 and L180)	Function Group: 460	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Differential carrier assembly, AWB40, (L150 w.e.fr. se. no. 1234 and L180)

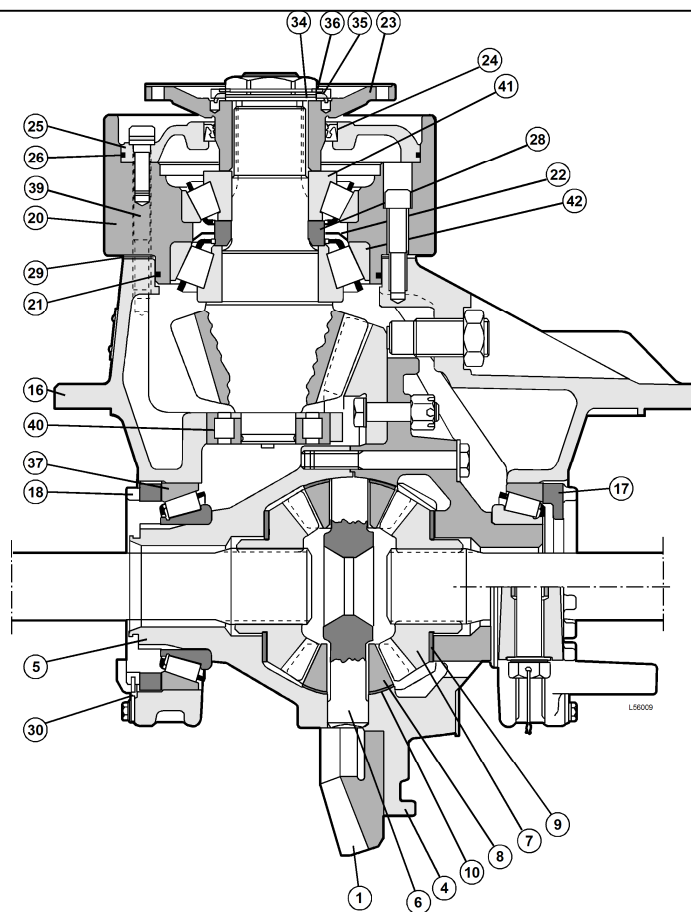


Figure 1
Differential carrier assembly, AWB40

(L150 w.e.fr. se. no. 1234 and L180)

A	Cooling pump, oil cooled brakes (optional equipment)
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Document Title: Differential carrier assembly, Changing L150 w.e.fr. se. no. 1234 and L180 (AWB40)	Function Group: 460	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Differential carrier assembly, Changing L150 w.e.fr. se. no. 1234 and L180 (AWB40)

Op nbr 46501

[999 2628 Lifting chain](#)

[E 616 Trolley](#)

[E 1370 Support](#)

[Allen key 14 mm](#)

[Combination spanner 41 mm](#)

[Sleeve 41 mm \(1.164 in\)](#)

[Shackle 16 mm \(0.630 in\), 4 pcs](#)

[Sling 6 metre \(20 ft\)](#)

[Sling 12 metre \(24 ft\)](#)

[Torque multiplier](#)

[Buzzer alternatively indicating lamp](#)

Removing

1. Lock the steering joint.
- 2.

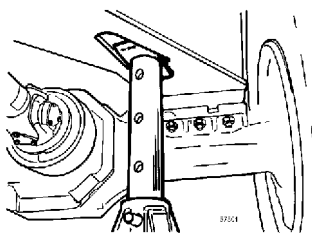


Figure 1
Supporting machine

3. Raise the front wheels with the aid of the lifting frame.
Position support under the frame of the machine, see [Figure 1](#).
- 4.

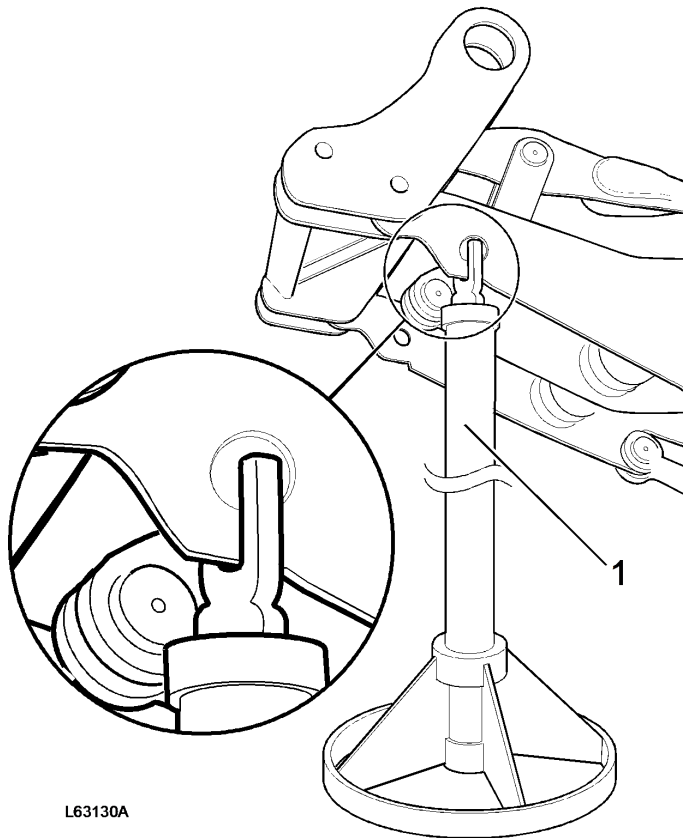


Figure 2
Securing lifting frame

1	E 1370
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5. Raise the lifting frame and position support, see [Figure 2](#).
Lower the lifting frame onto the support and tilt the bucket fully forward.
6. Remove the front mudguards and front wheels.
7. Drain the oil from the axle.
8. Remove plate guard for the brake pipes.
9. Tie up the propeller shaft and remove the propeller shaft flange bolted joint by the front axle.
10. Remove the hub retainers, half shafts and thrust washers.
11. Remove electrical leads and hoses to differential lock and brake. Use protective plugs or fit an ejector.
12. Remove the protecting plates over the front axle attaching bolts.
- 13.

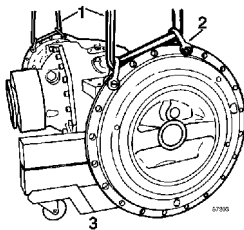


Figure 3
Removing front axle

1	Sling 12 metre (40 ft)
2	Shackle 16 mm (0.630 in), 4 pcs
3	E 616

14. Connect a hoist to the front axle and remove the attaching bolts.
Required lifting capacity approx. 600 kg (1323 lb). Lower the axle on E 616 and pull out the axle housing.

15.

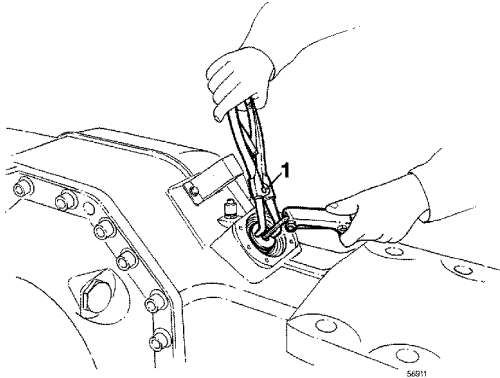


Figure 4

1	Hook spanner or angled lock ring pliers
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16. Remove the lock screw and screw in the diaphragm sleeve sufficiently far so that the dog clutch half will clear the differential bearing cap.
17. Remove the differential from the axle housing.
Weight approx. 200 kg (441 lb).

18.

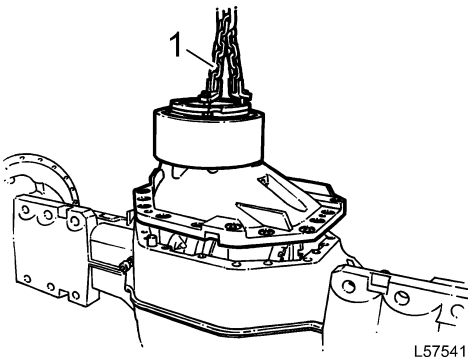


Figure 5
Removing differential carrier assembly

1	2628
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19. Clean the differential and the axle housing contact surfaces.

Fitting

20. Apply sealing compound (silicone) to the axle housing sealing surfaces and fit the differential carrier assembly.
Tighten the bolts to 350 N m (258 lbf ft).
21. Position the axle housing on E 616 and roll it in under the machine.
Lift and secure the axle housing against the frame.
Tighten the bolts to 1170 N m (863 lbf ft).

Fit protecting plates over the bolt heads.

22. Fit the half shafts in the axle housing.
23. Fit brake discs and O-rings on the axle housing.
- 24.

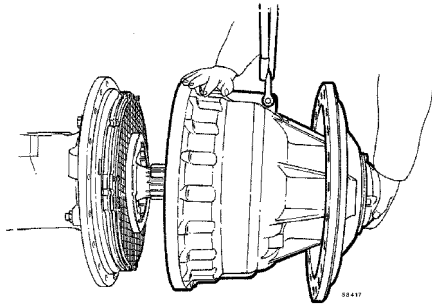


Figure 6
Fitting hub retainer

25. Fit the hub retainers.
Tighten the bolts to 310 N m (229 lbf ft).
26. Rotate the pinion shaft and place the differential lock drive flange in maximum engagement by screwing the diaphragm sleeve counter-clockwise until the differential lock drive flange is in maximum engagement, see [Figure 7](#).
Check by rotating one of the front wheels of the machine forward and backward.
27. Then screw the sleeve clockwise four turns so that the differential lock becomes disengaged.
Lock the pushrod with the stop screw.
Tighten the stop screw to 30 N m (22 lbf ft).

28.

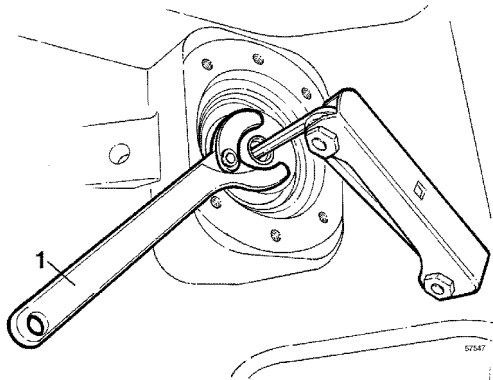


Figure 7
Adjusting differential lock

1	Hook spanner
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29. Fit support washer, diaphragm and thrust washer.
Bolt on the cover.
NOTE!
The convex side of the support washer should be turned toward the diaphragm and the cover filter turned downward, see [\[Invalid linktarget\]](#) item 16.
30. Connect electrical leads and hoses to differential lock and brake. Clamp the leads and hoses.
- 31.

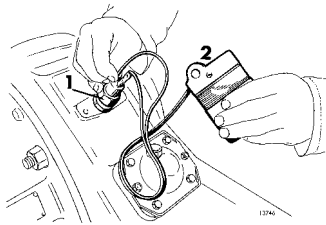


Figure 8
Adjusting switch

1	Microswitch
2	Buzzer alternatively indicating lamp

32. Screw in the microswitch so that it just closes the circuit. Then screw out 1/4 of a turn.
Lock the microswitch with the nut.
Fit the protective cover over the microswitch.
33. Loosen the support bearing and fit the propeller shaft flange.
Tighten down the support bearing again.
34. Fit the protecting plates for the brake pipes.
35. Fill oil in the front axle.
36. Fit front wheels and mudguards.
37. Remove support, axle stands and steering joint lock.

Document Title: Fitting rear axle	Function Group: 460	Information Type: Service Information	Date: 2014/6/9 0
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Fitting rear axle

Op nbr 46008

999 3742 Sleeve

1. Place the axle in position under the machine.
Connect a hoist, see Fig. [\[Invalid linktarget\]](#). Axle weight including mounting brackets approx. 1550 kg (3418 lb).
2. Lift the axle with the lifting device and secure the axle with a jack in order to prevent it from turning while it is being lifted. Fit the attaching bolts. Tighten the bolts to 804 N m (593 lbf ft)
3. Place the wheels in position.
Tighten the nuts to 600 N m (443 lbf ft).
4. Connect brake hose, cabling to temperature senso, lubricating oil pipes and the hose from the breather filter to the axle.
5. Connect the propeller shaft to the rear axle, see [Figure 1](#).
Tighten the bolts to 57 N m (42 lbf ft).
6. Lubricate the rear axle mounting bearings. Remove any supports.
7. Bleed rear brake circuit.
- 8.

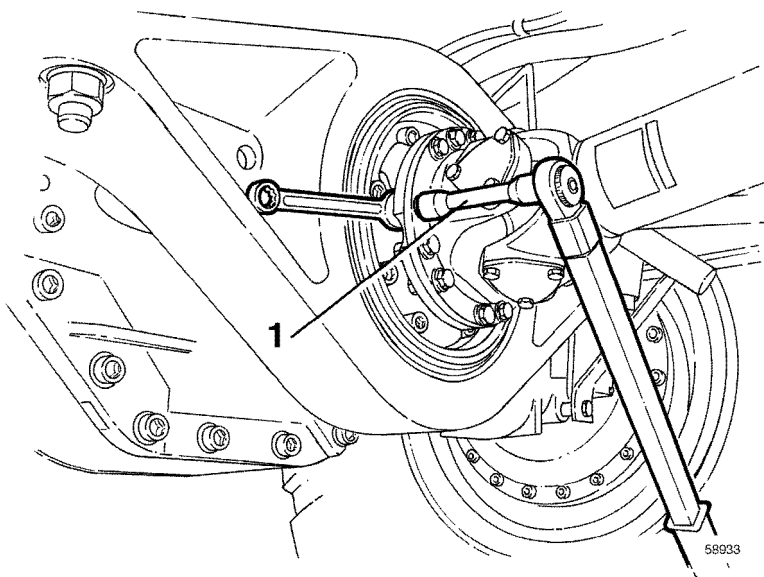


Figure 1
Attaching propeller shaft

Document Title: Hub reduction, Changing seal, One side L150 up to and incl. se. no. 1233 (with drive axles AH65 and 70)	Function Group: 460	Information Type: Service Information	Date: 2014/6/9 0
Profile:			

Hub reduction, Changing seal, One side L150 up to and incl. se. no. 1233 (with drive axles AH65 and 70)

Op nbr 46643

E 765 Spanner (rear axle)

E 1109 Spanner (front axle)

Spring balance 0 – 25 kg (0 – 55 lb)

Bolt M 14 length 90 mm

Bolt M 16 length 70 mm (rear axle)

Bolt M 18 length 100 mm (front axle)

Screw stud 5/8" UNC length 200 mm, 2 pcs

Shackle M 10

Removing

1. Lift and support the axle.
2. Release the pressure in the brake system by depressing the brake pedal 30 - 40 times, so that the hissing sound ceases and no counter pressure can be felt in the pedal.
- 3.

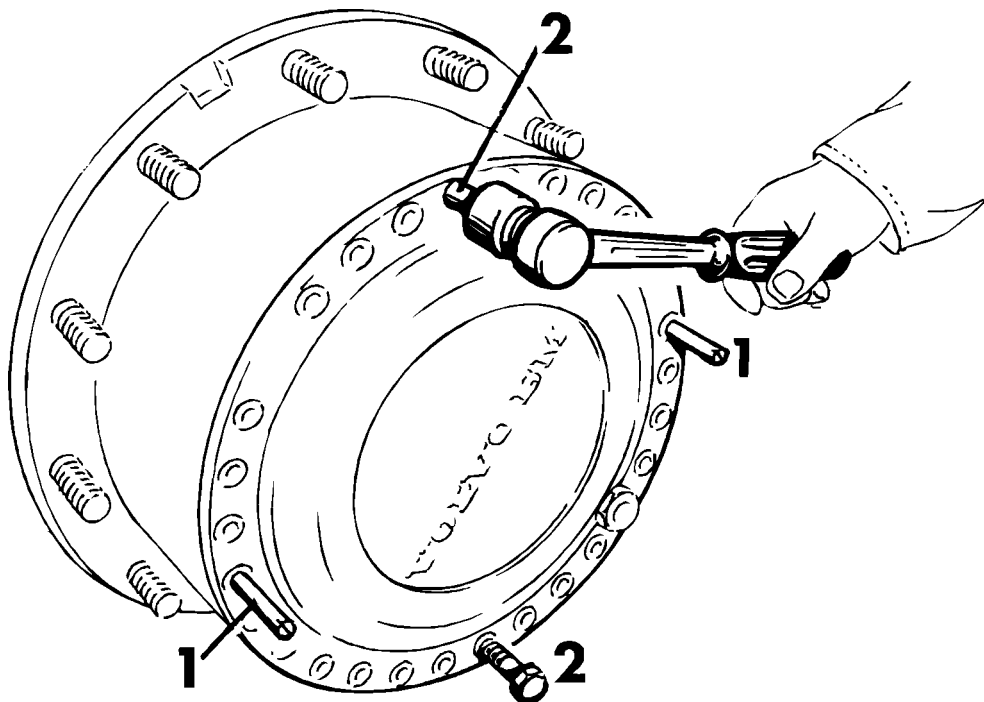


Figure 1

Rear axle:

1	Bolt M14 length 90 mm
2	Bolt M16 length 70 mm

Front axle:

1	Bolt M14 length 90 mm
2	Bolt M18 length 100 mm)
4	Drain the oil from the hub reduction.

4. Remove the wheel.
Weight approx. 700 kg (1544 lb) (26.5 x 25, filled with air).
5. Drain the oil from the hub reduction.
6. Loosen the planetary retainers, see [Figure 1](#).
7. Connect a hoist to the planetary retainers, see [Figure 2](#).
Remove the planetary retainer and the sun gear.
Weight approx. 40 kg (88 lb), rear and approx. 75 kg (165 lb) front.
- 8.

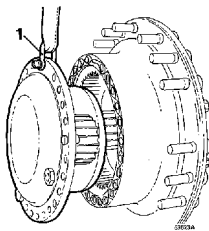
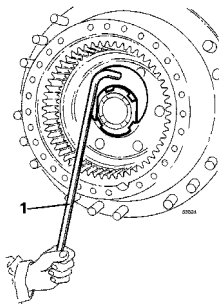


Figure 2

1	Shackle M10
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9. Connect a hoist to the hub, see [Figure 5](#).
10. Remove the lock washer for the lock nut.
NOTE!
On the front axle the hub nut is secured with lock screws.
11. Remove the hub nut, see [Figure 3](#).
- 12.



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