

Construction Equipment

Document Title: Description	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The machine is a four-wheel drive loader with articulated frame steering.

The engine is a six-cylinder, four-stroke, direct-injection, turbocharged, diesel engine with the designation TD63KBE (L90C), TD73KDE (L120C).

The transmission is hydro-mechanical of the power shift type, where all gears are in constant mesh, with the designation HT131 for L90C and HT205 for L120C.

Between the engine and the transmission there is a single stage hydraulic torque converter.

Front and rear axles have fully floating drive shafts with planetary type gears in the hubs. The front axle is provided with a differential lock.

The service brakes are wet type disc brakes, built integrally with the planetary gear in each wheel hub. The parking brake on L90C is of the disc brake type and it is positioned externally on the transmission output shaft. The parking brake on L120C is of the wet type disc brake and positioned inside the transmission on the output shaft.

The steering system is hydrostatic with a variable axial piston pump and two hydraulic cylinders (steering cylinders).

For further description of function and components, see the respective sections.



Figure 1 Loader L90C / L120C





Document Title: Product identification plates	Information Type: Service Information	Date: 25.04.2013
Profile:		

Product identification plates

The illustration below shows which plates should be fitted on the machine and where they are positioned.

When ordering spare parts and in all enquiries by telephone or correspondence, the model designation and Product Identification Number, (PIN) should be stated.

When applicable, any information on the additional plate, "INCL. PARTS" should be stated.

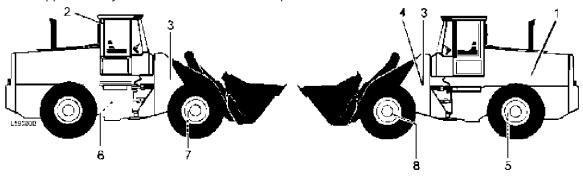


Figure 1
Product identification plates

- 1. Engine type designation, part and serial numbers are stamped into the side of the cylinder block (left side of machine)
- 2. Cab type, type approval and serial number are positioned by the right roof post inside the cab.
- 3. Product plate with Product Identification Number, PIN for the complete machine (shows model designation, engine manufacturer and serial number). The plate is fitted on the left side of the front frame. Model designation and serial number are also visibly stamped-in on the right side of the front frame.
- 4. Additional plate to product plate, which shows machine weight, engine output, year of manufacture and has a space for the CE mark (only EU/EEA countries), is positioned below the product plate.
- 5. Rear drive axle product and serial numbers are positioned on the right side of the axle housing.
- 6. Transmission product and serial numbers are positioned on the right side of the transmission.
- 7. Front drive axle product and serial numbers are positioned on the axle housing (above the differential lock connector).
- 8. Component plate with Component Identification Number, CIN for differential carrier assembly is positioned on the lower part of the differential casing.



Document Title: Volvo standard tightening torques	Information Type: Service Information	Date: 25.04.2013
Profile:		

Volvo standard tightening torques

The tightening torques in the following tables apply to bolts with a tensile strength as shown below. The tables are to be considered as a general instruction for the tightening torque of nuts and bolts unless otherwise stated.

NOTICE

For flange head bolts type U6FS the values should be increased by 10 %. Nuts and bolts must be cleaned and lubricated with oil.

TENSILE STRENGTH 8.8 Metric coarse and fine threads

Threads	N m	kgf m	lbf ft
M6	10 ±2	1.0 ±0.2	7.4 ±3.5
M8	24 ±5	2.4 ±0.5	18 ±3.5
M10	48 ±10	4.8 ±1.0	35 ±7.4
M12	85 ±18	8.5 ±1.8	63 ±13.0
M14	140 ±25	14.0 ±2.5	103 ±18.0
M16	220 ±45	22.0 ±4.5	160 ±33.0
M20	430 ±85	43.0 ±8.5	320 ±63.0
M24	740 ±150	74.0 ±15.0	550 ±110.0

TENSILE STRENGTH 10.9 Metric coarse and fine threads

Threads	N m	kgf m	lbf ft
M6	12 ±2	1.2 ±0.2	9 ±1.5
M8	30 ±5	3.0 ±0.5	22 ±3.5
M10	60 ±10	6.0 ±1.0	44 ±7.5
M12	105 ±20	10.5 ±2.0	78 ±14.5
M14	175 ±30	17.5 ±3.0	130 ±22
M16	275 ±45	27.5 ±4.5	204 ±33
M20	540 ±90	54.0 ±9.0	400 ±66
M24	805 ±160	80.5 ±16.0	594 ±118

UNC threads, coarse pitch

Threads	N m	kgf m	lbf ft
1/4"	9 ±2	0.9 ±0.2	6.6 ±1.5
5/16"	18 ±4	1.8 ±0.4	13 ±3.0
3/8"	33 ±8	3.3 ±0.8	24 ±5.9
7/16"	54 ±14	5.4 ±1.4	40 ±10
1/2"	80 ±20	8.0 ±2.0	59 ±15
9/16"	120 ±30	12.0 ±3.0	89 ±22
5/8"	170 ±40	17.0 ±4.0	130 ±30

3/4"	300 ±70	30.0 ±7.0	220 ±52
7/8"	485 ±115	48.5 ±11.5	360 ±85
1"	725 ±175	72.5 ±17.5	530 ±130





Document Title: Time Guide	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Time Guide

Regarding: L90C

16 Lubricants, fuels and other liquids

Op.no.	Time (h)	Operation
16234	1,75	Hydraulic oil tank, changing oil and filter excl. cleaning tank
16236	2,5	Hydraulic oil tank, changing oil and filter incl.cleaning tank
16238	1,5	Transmission, changing oil and filter and cleaning suction strainer
16259	1,5	Axles, changing oil

17 General

17101	0,5	Arrival inspection, according to programme
17102	1,5	Delivery inspection, according to programme
17202	3,5	Warranty inspection 100 hours, according to service programme
17204	8	Warranty inspection 1000 hours, according to service programme
17307	1,5	Maintenance service, every 250 hours
17310	3	Maintenance service, every 500 hours
17312	5	Maintenance service, every 1000 hours
17314	8	Maintenance service, every 2000 hours

21 Engine, general

21002	1,75	Compression test, engine at operating temperature
21070	5,5	Engine, removing
21071	40	Engine removed, general overhaul
21072	6	Engine, fitting
21102	8	Cylinder head, replacing gasket
21118	10	Cylinder heads all, replacing gaskets
21168	4	Cylinder heads all removed, decarbonizing and grinding in valves
21171	0,5	Cylinder head removed, pressure testing each
21180	4,5	Cylinder heads all, removing
21182	7	Cylinder heads all, fitting
21207	4	Cylinder block, liners removed, milling

		of all liner locations	
21211	0,5	Cylinder, cylinder heads removed, measuring wear in all cylinders	
21310	14	Cylinder liner and piston, replacing one	
21318	24	Cylinder liners and pistons, replacing all	
21412	1,5	Valves, adjusting	
21421	0,25	Valve cover, fitting new gasket each	
21427	0,5	Inspection cover, fitting new gasket	
21430	14	Valves, decarbonizing and grinding	
21436	0,5	Valve covers all, fitting new gasket	
21493	4	Rocker arm mechanism removed, reconditioning	
21502	6	Timing gear cover, fitting new gasket in machine	
21530	6,5	Timing gear, replacing in machine	
21532	8	Timing gear case, fitting new gasket in machine	
21614	2,5	Crankshaft, replacing front oil seal	
21618	12	Crankshaft, replacing rear oil seal	
21640	14	Flywheel housing and sump gasket, replacing	
21702	5	Sump gasket, replacing incl cleaning oil strainer	

22 Lubrication and oil system

22106	0,25	Oil pressure relief valve, replacing
22114	6	Oil pump, replacing
22306	1,5	Oil cooler, replacing

23 Fuel system, general

23301	0,25	Fuel system, bleeding
23302	0,75	Feed pump, replacing
23304	0,5	Feed pump, checking feed pressure
23307	0,25	Feed pump, cleaning glass bowl and strainer
23314	5	Fuel filters all, replacing
23315	0,25	Fuel filter extra, replacing
23397	0,25	Feed pump removed, reconditioning
23410	3	Fuel tank, replacing
23601	0,5	Idling speed, checking and adjusting
23602	0,5	Stall speed, checking
23630	1,5	Injection timing, checking and adjusting
23644	1	Injection timing, checking
23673	2	Injection pump, replacing incl setting injection timing
23702	1,5	Injectors, replacing all
23704	0,75	Injector, replacing one
23707	0,25	Overflow valve, replacing
23716	1,5	Injectors, replacing copper sleeve in

		machine
23718	0,5	Delivery pipe, replacing one
23720	0,5	Pressure equalizer, replacing
23780	2	Injectors removed, reconditioning all

25 Inlet and exhaust systems

25102	1	Induction manifold, replacing gasket
25104	2	Exhaust manifold, replacing gasket
25220	1,5	Silencer, replacing
25221	0,5	Exhaust pipe, flexible tube, replacing
25571	1	Turbo charger, replacing
25573	2	Turbo charger removed, reconditioning
25601	0,5	Air cleaner, cleaning filter element
25602	0,25	Air cleaner, checking prssure drop indicator
25603	0,25	Air cleaner, primary filter replacing
25604	0,25	Air cleaner, secondary filter replacing
25606	0,75	Pre-heating coil, replacing

26 Cooling system

26104	1	Coolant, changing
26108	3	Radiator, replacing
26112	1	Radiator hose upper, replacing
26114	1	Radiator hoses lower, replacing
26202	1,5	Coolant pump, replacing
26271	1,5	Coolant pump removed, reconditioning
26298	1	Thermostat, replacing
26312	0,75	Fan belt and/or alternator belt, replacing
26322	1	Fan belt and/or alternator-, compressor belt, replacing all belts

27 Engine control

27321	0,75	Stop magnet, replacing
27323	0,5	Electrical engine shut down, check and
		adjusting

31 Battery and mounting parts

31102	1	Batteries, replacing
31103	0,5	Main switch, replacing
31106	0,5	Earth lead to battery, replacing
31108	1	Starter motor lead to battery, replacing

32 Alternator and charge regulator

32102		Alternator, replacing incl function check (no measuring instrument)
32125	0,5	Alternator, replacing carbon brush kit in machine

32205	0,5	Charging regulator, replacing
	· ·	

33 Starting system, general

33118	0,75	Starter motor, replacing
33401	0,5	Starter lock, replacing

35 Lighting

35224	0,5	Head lamp assy, replacing one incladjusting
35316	0,5	Rear lamp, replacing one
35318	0,25	Rear lamp, replacing glass or bulb
35656	0,5	Work lighting, replacing one head lamp assy
35657	0,5	Work lighting, replacing one insert

36 Other electrical equipment, general

36102	0,25	Flasher unit, replacing relay
36110	0,75	Flasher switch, replacing
36117	0,25	Flasher lamp, replacing glass or bulb
36202	0,25	Horn, replacing
36203	0,5	Reverse alarm, replacing
36216	0,75	Horn switch, replacing
36301	0,5	Windscreen wiper rear, replacing motor
36302	0,75	Windscreen wiper front, replacing motor
36303	0,75	Windscreen wiper, replacing switch
36404	0,25	Switch, replacing
36408	0,25	Brake light switch, replacing
36720	0,5	ECU, replacing
36721	0,5	CU 8, replacing

37 Cables and fuses, general

37201	1	Printed cercuit board, replacing
1		

38 Instruments, sender units, warning systems

38603	0,5	Transmission oil pressure sensor, replacing
38604	0,5	Transmission temperature sensor, replacing
38605	0,5	Transmission, revolution sensor, replacing
38606	0,5	Engine temperature sensor, replacing
38607	0,5	Engine oil pressure sensor, replacing
38611	0,75	Fuel level sender, replacing
38704	0,5	Transmission temperature gauge, replacing
38705	0,5	Information display, replacing
38706	0,5	Engine temperature gauge, replacing

38711	0,5	Fuel level gauge, replacing
38720	0,5	Tachometer, replacing

39 Other equipment, e.g. radio and voltage conv.

1 3 3 3 0 1 1 Voltage conventer, replacing	39301	0.5	Voltage converter, replacing
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42 Transmission, general

42102	0,75	Hydraulic transmission, check oil pressure
42104	2	Oil pump, replacing
42106	1,5	Oil cooler, replacing
42108	3	Gear selector valve, replacing
42109	1	Gear selector valve removed, reconditioning
42118	16	Converter, replacing
42123	1	Lubrication and converter pressure valve, replacing
42141	1	Oil distributor and seals, replacing f and r or 1:st and f or 3:rd and f
42142	2	Oil distributor and seals, replacing 1st and 2nd or 2nd and reverse
42143	3	Oil distributor and seals, replacing 3rd and 4th or 4th and reverse
42147	0,75	Gear selector, replacing
42148	0,75	Gear selector valve, replacing one solenoid
42154	1	Seal for rear output shaft, replacing
42171	40	Transmission removed, reconditioning
42173	9	Transmission, removing (together with engine)
42174	10	Transmission, fitting (together with engine)

43 Gearbox, mechanical

43402	2	Dropbox, replacing seal for front otput shaft
43404	1	Dropbox, replacing seal for rear output shaft
43429	4	Dropbox removed, reconditioning
43473	4	Dropbox, fitting
43474	4	Dropbox, removing

45 Propeller shaft incl. bearings and mounting

45101	0,25	Propeller shaft and intermediate bearing, checking radial clearance
45102	2	Support or intermediate bearing, replacing
45104	1,5	Propeller shaft, rear, replacing
45107	1,5	Propeller shaft, in frame joint, replacing

45110 2 Propeller shaft, front, replacing

46 Drive axles, general

461	Null	Front axle
46101	4	Axle, replacing
46111	5	Centre gear , removing and fitting
46112	6	Centre gear removed, reconditioning
46114	2	Pinion front, fitting new gasket
46142	6	Hub retainer, reconditioning one side
46143	4	Hub, replacing seal
46151	6	Differential lock, replacing selector fork and clutch sleeves and adjusting
46152	0,25	Differential lock front, repacking excladjusting
46153	1	Differential lock, adjusting engagement
463	Null	Rear axle
46301	8	Axle, replacing
46311	8	Centre gear, removing and fitting
46312	6	Centre gear removed, reconditioning
46314	2	Pinion rear, fitting new gasket
46342	6	Hub retainer, reconditioning one side
46343	4	Hub, replacing seal

51 Wheel brake, all

516	Null	Front axle
51601	0,5	Brake linings, checking wear
51604	4	Brake discs, replacing on both sides
51650	3	Brake piston, replacing seals
517	Null	Rear axle
51701	0,5	Brake linings, checking wear
51704	4	Brake disc, replacing both sides
51750	3	Brake piston, replacing seals

52 Hydraulic brake system

52001	0,5	Brake system, checking function, hydraulic
52002	0,5	Brake system, checking function, retardation
52004	0,5	Brake system, adjusting unloading pressure
52005	0,5	Brake system, check and adjusting pressure in circuit
52037	1	Brake system, bleeding
52509	1,25	Foot brake valve removed, reconditioning
52701	0,5	Accumulator removed, checking charging pressure
52702	0,5	Accumulator, replacing
52704	2	Hydraulic pump, replacing

55 Parking brake incl.control system

55002	0,5	Parking brake, adjusting
55004	1,5	Parking brake mechanical, replacing brake caliper
55005	3	Parking brake, replacing brake disc
55014	1,5	Parking brake, replacing brake pads

64 Steering

64121	1,5	Adjustable steering column, replacing
64503	0,25	Steering system, checking working pressure
64506	1,75	Steering cylinder, replacing
64510	2	Hydraulic pump, replacing
64515	0,5	Steering system, checking and adjusting standby pressure
64520	3	Steering system, checking and adjusting shock and anti-cavitation-
64521	1,5	Valve block, replacing
64528	0,75	Steering system, checking and adjusting working pressure
64554	2	Steering cylinder, replacing link bearings
64560	3	Steering cylinder, repacking in machine
64571	2,5	Hydraulic pump, replacing
64573	2	Hydraulic pump removed ,reconditioning
64577	1,75	Steering cylinder removed, reconditioning incl replacing bearings
64581	1,5	Steering valve removed, reconditioning
64582	2	Steering valve, replacing
64793	1	Auxiliary steering, replacing hydraulic pump

74 Frame joint, general

74105	0,5	Frame joint, checking clearance
74136	12	Frame joint, replacing bearings

75 Axle suspension, general

75501	0,75	Axle suspension, measuring axial and radial clearanse
75502	1	Axle suspension, adjusting axial clearance

77 Wheel, Tyre, Hub, Crawler/Track

77101	0,75	Wheel, removing and fitting
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81 Cab, general

81815	1,75	Cab	suspension,	rubber	element
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replacing

83 Doors and Covers

83104	1,5	Door, replacing
83106	0,75	Door lock, replacing
83114	0,5	Door, replacing sealing strip

84 Outside trim parts, Glass, Sealing, Mouldings

84302	6	Windscreen, replacing
84312	1	Rear window, replacing
84313	1	Side windov, replacing
84348	1	Door window, replacing

87 Air Conditioning unit

87201	0,25	Cab filter, replacing
87304	1	Radiator, replacing
87306	1	Fan motor, replacing
87308	0,75	Heat control valve, replacing
87309	0,75	Heat control, replacing
87402	1	Refrigerant, draining
87403	1	Cooling unit, performance test
87405	1,75	Refrigerant, filling excl vacuum pumping
87406	4	Compressor, replacing incl draining and filling
87407	1	V-belt, replacing
87411	3	Receiver, replacing incl draining and filling
87412	4	Evaporator, replacing incl draining and filling
87413	3,5	Expansion valve, replacing incl draining and filling
87414	1	Thermostat, replacing
87415	1	Compressor, replacing shaft seal (compressor removed)
87416	1	Compressor, replacing magnetic clutch (compressor removed)
87417	1,75	Compressor, replacing magnetic clutch in machine
87419	0,5	Compressor, replacing valve plate (compressor removed)

91 Working hydraulic and servo system

91105	2	Lhidraulis tank raplasing inlet hase for
91102	2	Hydraulic tank, replacing inlet hose for
		pump
91111	2	Oil cooler, replacing
91138	5	Hydraulic oil tank, replacing
91201	5	Control valve, replacing
91202	4	Control valve removed, reconditioning

91204	0,75	Control valve, low pressure valve, replacing
91209	0,5	Shock valve, tilt function, checking and adjusting
91211	0,75	Shock valve lift function, adjusting
91302	1	Oil pump, checking and adjusting unloading pressure
91304	1	Oil pump, checking and adjusting working pressure
91310	3	Oil pump, replacing
91311	1	Oil pump removed, reconditioning
91454	0,5	Servo valve, adjusting control
91455	0,5	Servo pressure, checking and adjusting
91457	0,5	Servo pressure, check
91458	3	Servo valve, replacing
91460	2	Servo pump, replacing
91462	0,5	Pressure limiting valve, replacing
91463	0,75	Servo pressure, checking by spool valve in control valve
91475	2	Servo valve removed, reconditioning
91601	0,5	Boom suspension system, checking function
91602	0,75	Accumulator, check and adjusting
91603	1	Accumulator, reconditioning
91604	1,5	Boom suspension system, checking closing pressure
91605	1	Boom suspension system, checking opening pressure

94 Unit for load handling

94502	2	Lift frame, replacing bearing in lower bucket- or implement attachment
94503	0,25	Implement attachment, measuring clearence of lower bearing
94504	4	Lift cylinder, replacing
94505	4	Lift cylinder, repacking in machine
94506	3	Lift cylinder removed, repacking
94508	2	Tilt cylinder, replacing
94509	4	Tilt cylinder, repacking in machine
94510	3	Tilt cylinder removed, repacking
94511	1	Implemental attachment, replacing hydraulic cylinder
94516	4	Lift frame, replacing bearing in upper mounting "O"
94524	3	Tilt cylinder, replacing bearing in machine "E-F"
94545	2,5	Implemental attachment/bucket attachment, replacing bushes "A"
94554	1	Implement attachment, replacing
94562	2	T-link upper, replacing "HIJ"
94563	0,75	T-link upper removed, replacing

		bearings "HIJ"
94564	1	T-link, lower, replacing "IB"
94566	2,5	Tilt link, replacing "GH"
94567	0,75	Tilt link removed, replacing bearings "GH"
94568	3	Tilt arm, replacing bearing "GDF"
94569	2	Tilt arm, replacing "GDF"



Construction Equipment

Document Title: Section 4 Poutransmission	Function Group: 080	Information Type: Service Information	Date: 25.04.2013
Profile:			

Section 4 Power transmission

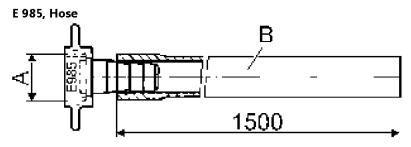


Figure 1 E 985

- A. Hose coupling Ø 1/2" BSP
- B. PVC-hose, 1/2"

Construction Equipment

Document Title: Section 5 Brakes	Information Type: Service Information	Date: 25.04.2013
Profile:		

Section 5 Brakes

E 1234, Nipple

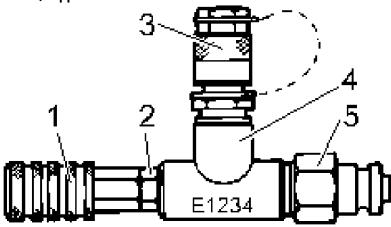


Figure 1 E 1234

- 1. 999 3522-3
- 2. Standard pipe bushing, 1/4" R 1/8" BSP
- 3. Measuring nipple, part No. 930032
- 4. Standard T-pipe, 1/4" BSP
- 5. Nipple according to available pump. e.g. 999 3070B

E 1281 Nipple

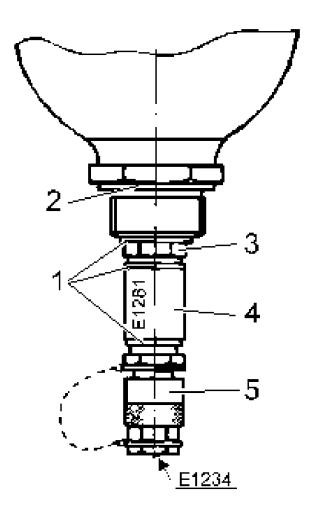


Figure 2 E 1281

- 1. Sealing washer
- Accumulator with, M16 x 1.5 internal threads 2.
- 3. Nipple, part No. 957030
- 4.
- Socket, standard 1/4" BSP Measuring nipple, part No. 930032N



Document Title: Recommended lubricants	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Recommended lubricants

Oil

	Oil grade	Rec	omm	end	led v	isco	sity a	t amb	ient	tem	per	atui	res												
		°C	-30		-20		-10	10 0		10	+20		+20		+20		+20		+20		+20 +30		+4	0	+50
			-22		-4		+14	+32	+	50	+6	8	+8	6	+1	04	+12								
Engine Engine oil			SAI	E 5V	N/30)		-																	
For severe conditions				SA	E 10	W /3	30																		
	API CE					SAE	15W	/40																	
recommended to give optimum	(CCMC D4) and ACEA							SAE	30																
service life	E3-96 (CCMC D5)									SA	E 4	0													
Axles	Volvo WB 101																								
	For trade names and				•				•																
Hub gears	quality requirements of the oil, see																								
	"Specifications axles in																								
	the Operator"s Manual.																								
Transmission	Transmission fluid		SAI	E 5V	N/30)																			
which meets Allison C4				SA	AE 10W																				
Dropbox	norm (DDAD C4) or Engine oil				SAE 10W/30																				
	which meets Allison C4						SAE 1	15W/40																	
	norm (DDAD C4) or							SAE	30																
	meets MIL 2104E.																								
Hydraulic system	Hydraulic oil					ISO	VG 4	6																	
Steering system	Viscosity acc. to ISO						IS	o vg (8				•												
Break system Working hydraulics	Quality acc to ISO HV							I	so v	'G 10	00														
Working hydraulies	OR		SAI	E 5V	N/30)	'																		
	Engine oil				SAE	10	W/30		•	•															
	min. requirement API SE/CD					SAE	15W	/40																	
Note! As an alternative	Note! As an alternative			SAE 30																					
	BP Biohyd SES 46 and								S	AE 4 0	0				•										
	Panolin HLP synth 46																								
	can also be used.	0.0	1 22				1.0		-	10	+-		+				 								
		°C	-30		-20	_	-10	0	_	10	+2		+3		+4		+50								
		°F	-22		-4		+14	+32	+	50	+6	ర	+8	6	+1	U4	+12 2								

Grease

Grease on lithium basis with EP additives and consistency NLGI No. 2.



If the machine is provided with automatic greasing, other recommended lubricants apply.

Cooling system

Volvo original coolant (anti-freeze) Volvo original corrosion additives USA: Coolant norm ASTM D4985

Fuel system

Quality requirements:

The fuel should at least meet the legal requirements, and national and international standards for marketed fuels, e.g. EN590 (with nationally adapted temperature requirements), ASTM D 975 No 1D and 2D, JIS KK 2204.

Sulphur content:

According to legal requirements (the sulphur content must not exceed 0.5 percent by weight).



Construction Equipment

Document Title: Manual release of parking brake	Information Type: Service Information	Date: 25.04.2013
Profile:		

Manual release of parking brake

Applies to L90C with electrically operated parking brake and L120C. Block the wheels to prevent the machine from rolling.

If the parking brake cannot be released with the parking brake control, it is possible to release it manually as follows:

L90C

Release the parking brake by slackening lock nut A and then turning adjusting screw B counter-clockwise until the parking brake has been released, see Figure [?]

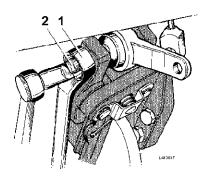


Figure 1 Releasing parking brake, L90C

- 1. Lock nut
- 2. Adjusting screw

It is now possible to move the machine **but the parking brake is not working**. The towed machine can now only be braked via the towbar from the towing vehicle.

When restoring the parking brake, it should be adjusted so that there is a clearance of approx. 0.25 mm (0.010 in) between the brake disc and the brake pads when the bake is released. The clearance between the brake disc and the brake pad can only be adjusted when the engine is running and the parking brake has been released with hydraulic pressure.

If the machine is left after towing/recovering without the parking brake having been restored, this fact must be indicated by attaching a notice to the steering wheel with information that the parking brake has been released manually and that it is not working.



Construction Equipment

Document Title: Removing propeller shafts	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Removing propeller shafts



When the propeller shafts have been removed, the parking brake does not work!

- 1. Place the machine in service position.
- 2. Block the wheels to prevent the machine from rolling.
- 3. Remove the propeller shafts.

If the machine is left with the propeller shafts removed, this fact must be indicated by attaching a notice to the steering wheel stating that the propeller shafts have been removed.



Document Title: Towing	ı ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Towing



Before any further action is taken when preparing for towing or recovering, the parking brake must be applied and the wheels blocked to prevent the machine from rolling. The greatest care must be taken during work with towing/recovering to avoid injuries or, in the worst case, fatality.

Measures for towing/recovering.

For towing/recovering the engine should, if possible, be started, in order for the brake and the steering functions to operate satisfactorily.



If the engine cannot be started.

As the function of the brakes and the steering will be limited, when the engine is not running, the machine may only be towed in an emergency and only the shortest possible distance under the supervision of trained personnel. If possible, transport the machine on a trailer. To release the parking brake, see manual release of parking brake for the respective machine types.

Recovering

Use a towbar for towing the machine to a suitable place or trafficable road. The towbar should be connected to the towing device according to Figure [?].

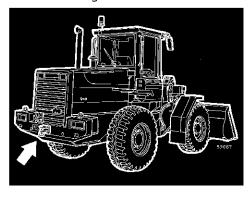


Figure 1 Towing device

NOTICE

The lifting eyes must not be used for recovering.

Towing

If the machine, after recovery, must be towed to a workshop, use a towbar connected to the towing device as above, or a wire rope attached to the eyes inside the front axle attachment to the frame.

NOTICE

If the brakes do not work (the engine cannot be started) a towbar must always be used.

The towing vehicle must be at least as heavy as the towed machine and have sufficient engine power and braking capacity

to pull and brake both machines on any inclines which will be encountered.

Always tow the shortest possible distance, otherwise the transmission may be damaged.

At a towing distance exceeding 10 km (6 miles), or at a speed above 10 km/h (6 mph), both the front and rear propeller shafts must be removed, see "Removing propeller shafts". Or alternatively the machine should be transported on a trailer.

After towing/recovering

The following safety measures should be taken before the towbar or wire rope is disconnected after towing/recovering:

- 1. If possible place the machine on level ground.
- 2. Apply the parking brake.
- 3. Block the wheels to prevent the machine from rolling.



Construction Equipment

Document Title: Transporting wheel loader on another vehicle	Information Type: Service Information	Date: 25.04.2013
Profile:		

Transporting wheel loader on another vehicle

In cases where the wheel loader is transported on another vehicle or by railroad, it is important that the opening at the end of the exhaust pipe is covered with a cap or some other protection. This is particularly important if the opening at the end of the exhaust pipe is pointing forward in the travelling direction, see Figure [?] . This is to avoid damage to the turbocharger bearings, which may occur, if the turbocharger rotates without lubrication.

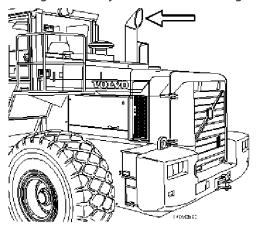


Figure 1



Construction Equipment

Document Title: Cleanliness, brake and hydraulic systems	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Cleanliness, brake and hydraulic systems

In all work on these systems the greatest possible cleanliness must be exercised. Wipe off all pipe and hose connections before disconnecting them and remove flakes of paint etc. Plug all pipes, hoses, cylinders etc. immediately after they have been disconnected. Never install an hydraulic hose which has not been sealed with plugs until it has been thoroughly cleaned.



Construction Equipment

Document Title: Electric welding	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Electric welding

Before carrying out electric welding on the machine or attachments connected to the machine, the battery disconnect switch must be turned off or the battery earth lead disconnected.

Connect the welding unit as close as possible to the point of welding.



Service Information

Document Title: Repairing hydraulic system	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Repairing hydraulic system

When replacing a pump or after other repair work to the hydraulic system, where air may have entered the system, the points below should be followed:

- 1. Start the engine and run it at low idling for approx. 10 minutes without actuating any hydraulic functions.
- 2. Actuate all hydraulic functions a few times with the engine running at low idling.



The hydraulic cylinders must not be operated against their end-of-stroke positions.

3. Operate all hydraulic functions (the hydraulic cylinders against their end-of-stroke positions) causing overflow a few times at a raised engine speed, approx. 20 - 25 r/s (1200 - 1500 rpm).



Service Information Construction Equipment

Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

L90C is equipped with an engine with the designation TD63KBE.

L120C is equipped with an engine with the designation TD73KDE.

Both engines are six-cylinder, four-stroke, direct injected, turbocharged diesel engines and both are of the low-emission version.



Document Title: Engine, installing	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Engine, installing

Op nbr 21072

Lifting sling. 3 m (10 ft) Shackle 3/8" Ratchet block, 750 kg (1653 lb)

1. Connect a lifting device to the engine according to Figure [?]. Weight: approx. 750 kg (1653 lb)

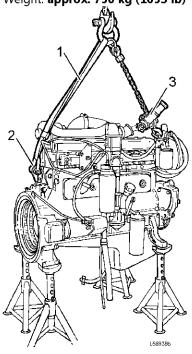


Figure 1
Connecting lifting device

- 1. Lifting sling, 3 m (10 ft)
- 2. Shackle 3/8"
- 3. Ratchet block 750 kg (1653 lb)
- 2. Lift the engine into the machine.

NOTICE

Make sure that the hoses for the air conditioning (if installed) are not damaged.

- Align the engine against the transmission and install the bolts.
 Tightening torque: 85 ±8 N m (63 ±6 lbf ft)
 Remove any supports from under the transmission.
- 4. Install the bolts between the engine mountings and the rubber elements. Tightening torque: 220 ±22 N m (162 ±16 lbf ft)

- 5. Bolt the transmission oil cooler onto the bracket on the engine.
- 6. Install the hub for the fan belt pulley, bracket and tensioning pulley.
- 7. Bolt on the compressor (if installed) for the air conditioning and install its drive belt and the fan belts.
- 8. Install the stays between the engine and the air-guide ring.
- 9. Install the fan.
- 10. Install the coolant pipe between the coolant pump and the transmission oil cooler, replace the O-ring.

 Connect the expansion tank and the climate control system hose to the pipe and the coolant filter (if installed) hose.
- 11. Bolt the fuel system water trap onto the bracket on the frame. Connect the fuel lines to the feed pump and the injection pump.
- 12. Connect the cable harness to B+ on the alternator, connector BB to the stop solenoid and SE1 to the temperature sensor.
 - Clamp the cable harness with the screw clips.
- 13. Connect the accelerator control to the injection pump.
- 14. Bolt the preheating element relay bracket and bracket for air conditioning receiver drier (if installed) onto the bracket on the engine inlet pipe. Connect the lead to the preheating element.
- 15. Connect the ground lead to the starter motor (black terminal).

 Connect the red leads of the cable harnesses to the starter motor (red terminal).
- 16. Connect the leads to the oil pressure sensor and to the air cleaner indicator and clamp the cable harness with the screw clips.
- 17. Install the upper radiator hose.
- 18. Install the breather filter and bolt on the pump for the secondary steering (if installed).
- 19. Lift the hood assembly into position, see Figure [?].

Weight: approx. 100 kg (220 lb)

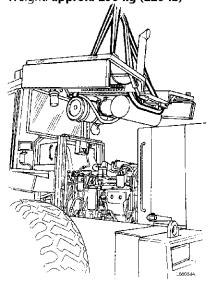


Figure 2
Installing hood assembly

20. Connect the following:

- O The exhaust pipe to the silencer.
- O The hoses, 3 pcs, to the expansion tank.
- O The hose to the hydraulic tank breather filter.
- O The inlet hose to the turbocharger.
- O The hose to the air cleaner indicator.
- 21. Install the hood plates on both sides of the hydraulic tank and the cover on top.
- 22. Fill with coolant.

Capacity: 53 litres (14 US gal)

Fill engine oil.

Capacity: 16 litres (4.2 US gal)

23. Remove the frame joint lock. Start the engine and check that there are no leaks.





Document Title: Engine, removing	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Engine, removing

Op nbr 21070

Lifting sling, 3 m (10 ft) Shackle 3/8" Ratchet block, 750 kg (1653 lb)

- 1. Secure the frame joint with the frame joint lock.
- 2. Turn off the battery disconnect switch.

AWARNING

There is a danger of scalding when removing the expansion tank cap (radiator cap), as the cooling system is pressurised when hot.

Remove the cap for the expansion tank and drain the coolant.

Capacity: 53 litres (14 US gal)

Drain the engine oil.

Capacity: 16 litres (4.2 US gal)

- 4. Remove the cover above the hydraulic tank and the hood plates on both sides of the tank.
- 5. Disconnect the following:
 - O The exhaust pipe from the silencer.
 - O The hoses from the expansion tank, 3 pcs.
 - O The hose from the hydraulic tank breather filter.
 - O The inlet hose from the turbocharger.
 - O The hose from air cleaner indicator.
- 6. Lift away the hood plate above the engine and the side covers as one unit together with the silencer, the air cleaner and the expansion tank, see Figure [?].

Weight: approx. 100 kg (220 lb)

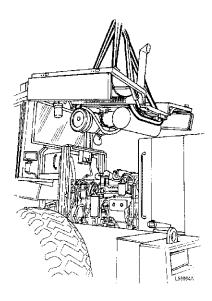


Figure 1
Removing hood plate

- 7. Open the side covers on both sides of the hydraulic tank and remove the lower cover plates.
- 8. Disconnect the accelerator control from the injection pump.
- 9. Disconnect the required electrical cables and clamps from:
 - O the starter motor
 - O the preheating element
 - O the alternator
 - O the temperature sensor
 - O the oil pressure sensor and the stop solenoid.
- 10. Detach the preheating element relay bracket and the bracket for the air conditioning receiver drier, if applicable, from the bracket by the engine inlet manifold.

Lay the receiver drier on the frame but without disconnecting the hoses.

AWARNING

Do not disconnect hoses for the air conditioning (if installed), as the gas will then leak out.

Detach the air conditioning compressor (if installed) complete with bracket and hoses and place it on the fuel tank.

- 12. Detach the bracket for the engine oil and coolant draining hoses.

 Disconnect the fuel lines from the injection pump and the feed pump.

 Detach the water trap and place it on the frame.
- 13. Swing out the radiator and condenser (if installed). Remove the fan. Remove the attaching stays, 3 pcs, for the air-guide ring. Remove the fan belts.
- 14. Remove the fan belt pulley complete with hub, bracket and tensioning pulley, see Figure [?].

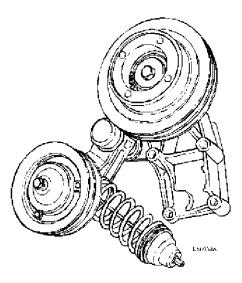


Figure 2
Fan belt pulley complete with hub, bracket and tensioning pulley

- 15. Remove the axle breather filter and detach the secondary steering pump (if installed).
- 16. Detach the electrical lead for the air cleaner indicator from the tank.
- 17. Connect a lifting device to the engine, see Figure [?]. Remove the bolts between the engine mountings and the rubber elements. Remove the bolts between the engine and the transmission.

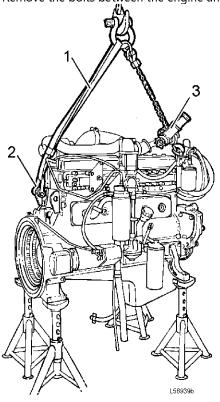


Figure 3 Connecting lifting device

- 1. Lifting sling, 3 m (10 ft)
- 2. Shackle 3/8"
- 3. Ratchet block 750 kg (1653 lb)
- 18. Block up the transmission against the front rear axle suspension, see Figure [?].

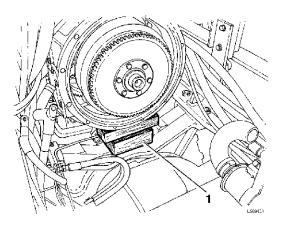


Figure 4 Blocking up transmission

- 1. Wooden blocks
- 19. Lift away the engine, see Figure [?]. Weight: approx. 750 kg (1653 lb)

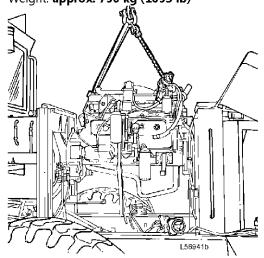


Figure 5 Lifting out engine



Service Information

Document Title: Specifications, capacities	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities

Engine, when changing oil incl. filter(s)	16 dm³ (litres) (42 US gal)
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Document Title: Specifications, general	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Engine	
Type designation	TD63KBE, part No. 8188100
Flywheel output at 35 r/s (2100 rpm)	113 kW (154 hp) SAE J 1349 Net 113 kW (154 hp) DIN 70020
Output gross at 35 r/s (2100 rpm)	118 kW (162 hp) SAE J 1349 Gross
Torque max. at 18.3 r/s (1100 rpm)	690 N m (509 lbf ft) SAE J 1349 Net 695 N m (513 lbf ft) SAE J 1349 Gross 690 N m (509 lbf ft) DIN 70020
Number of cylinders	6
Cylinder bore	98.43 mm (3.937 in)
Stroke	120 mm (4.78 in)
Cylinder capacity, total	5.48 dm ³ (litres) (334 in3)
Compression ratio	18.3 : 1
Compression pressure at starter motor revolutions, 3.3 r/s (200 rpm)	2.4 MPa (24 bar) (348 psi)
Max. permissible pressure difference between the cylinders at starter motor revolutions	0.3 MPa (3 bar) (44 psi)
Order of injection	1-5-3-6-2-4
Idling speed, low (serial No. –14314)	11.2 ±0.5 r/s (670 ±30 rpm) (435 ±20 Hz)
Idling speed, low (serial No. 14315–)	11.2 ±0.8 r/s (670 ±50 rpm) (438 ±30 Hz)
Idling speed, high (serial No. –14314)	39.7 ±1.0 r/s (2380 ±60 rpm) (1546 ±40 Hz)
Idling speed, high (serial No. 14315–)	40.3 ±1.0 r/s (2420 ±60 rpm) (1574 ±40 Hz)
Stall speed with torque converter (serial No. –14314)	35 ±1.25 r/s (2100 ±75 rpm) (1365 ±50 Hz)
Stall speed with torque converter (serial No. 14315–)	36.5 ±1.3 r/s (2190 ±75 rpm) (1425 ±50 Hz)
Stall speed with torque converter + working hydraulics (serial No. –14314)	26.5 ±1.7 r/s (1600 ±100 rpm) (1040 ±65 Hz)
Stall speed with torque converter + working hydraulics (serial No. 14315–)	26.7 ±1.7 r/s (1600 ±100 rpm) (1043 ±65 Hz)



Service Information

Document Title: Specifications, tightening torques	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, tightening torques

	N m	kgf m	lbf ft
Engine – transmission	85 ±8	8.5 ±0.8	63 ±6
Engine mounting – rubber element	220 ±22	22.0 ±2.2	162 ±16



Service Information

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Engine, standard	660 kg (1455 lb)
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Service Information Construction Equipment

Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Valve system		
Valve clearance, (warm or cold engine):		
inlet valve	0.40 mm (0.016 in)	
exhaust valve	0.55 mm (0.022 in)	



Document Title: Valves, adjusting	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Valves, adjusting

Op nbr

999 3590 Gear

NOTICE

Clean around valve covers before beginning the adjustment.

- 1. Remove valve covers.
- 2. Rotate the crankshaft with gear 999 3590, see Figure [?] .

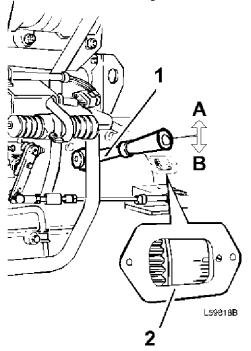


Figure 1

1	999 3590 (with ratchet handle)
2	Flywheel marking, L90C On L120C the flywheel marking can be found under the cover next to the flywheel ring gear.
Α	Direction of rotation

3. Rotate the flywheel in the direction of rotation of the engine until the piston in the number 1 cylinder is at T.D.C. (0° on the flywheel and the valves of the number 6 cylinder "are rocking").

Adjust the valves 1, 2, 3, 6, 7 and 10, see Figure [?] and Figure [?].

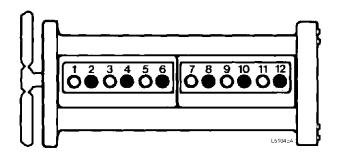


Figure 2 Valve clearance (warm and cold engine)

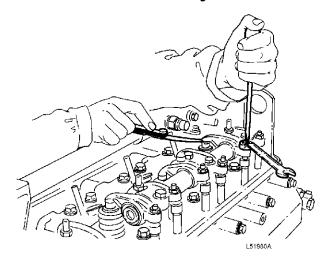


Figure 3 Valve adjustment

4. Rotate the flywheel one further turn in the direction of rotation of the engine (0° on the flywheel and the valves of the number 1 cylinder "are rocking").

Adjust the valves 4, 5, 8, 9, 11 and 12, see Figure [?] and Figure [?].

5. Install valve covers together with new seals.



Service Information

Construction Equipment

Document Title: Specifications, general	Function Group:	Information Type:	Date:
	220	Service Information	25.04.2013
Profile:			

Specifications, general

L90C

Lubrication system			
Oil pressure	395 – 545 kPa		
	(3.95 – 5.45 bar) (57 – 79 psi)		
Oil pressure minimum, idling	130 kPa (1.3 bar) (19 psi)		
Relief valve[1] ^① "blue", opening pressure	470 kPa (4.7 bar) (68 psi)		
Piston cooling valve[2] ① "red", opening pressure	240 kPa (2.4 bar) (35 psi)		

^[1] The valve is in one piece and cannot be taken apart. Valve marked "blue" is positioned nearest to the cylinder block.

^[2] The valve is in one piece and cannot be taken apart.



Service Information

Document Title: Specifications, tightening torques	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, tightening torques

	N m	kgf m	lbf ft
Oil sump	24	2.4	18



Document Title: Oil pump, removing and installing	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Oil pump, removing and installing

Op nbr

999 6860 Puller

Removing

- 1. Remove the fuel tank and the guard plate, see "Fuel tank, removing and installing".
- 2. Drain the oil from the engine.

Oil capacity L90C: **16 litres (4.2 US gal)**Oil capacity L120C: **24 litres (6.3 US gal)**

- 3. Remove the oil sump.
- 4. Pull the oil pump drive gear off the shaft according to Figure [?].

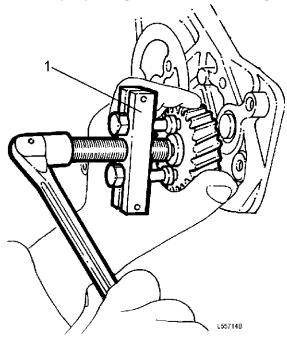


Figure 1

- 1. 999 6860
- 5. Slacken the bolts for the oil pump and remove it.

Installing

6. Bolt on the oil pump.

₇ **AWARNING**

Risk of burns, use protective gloves.

Heat the oil pump drive gear to 180 \pm 20 °C (356 \pm 36 °F) and tap the gear onto the shaft with a plastic hammer. A feeler gauge with a thickness of 1.0 mm (0.040 in) should be inserted between the drive gear and the bracket when assembling, see Figure [?].

Clearance drive gear – bracket: **1.0 – 1.5 mm (0.040 – 0.060 in)**

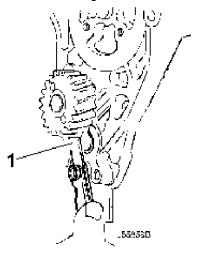


Figure 2

- 1. Feeler gauge, 1.0 mm (0.040 in)
- 8. Clean the sealing faces on the oil sump and the cylinder block.
- 9. Place a new gasket on the oil sump with a little sealant at the joints.
- 10. Install the oil sump and pull the bolts. Tightening torque: 24 N m (18 lbf ft)
- 11. Fill engine oil.

Oil capacity L90C: **16 litres (4.2 US gal)**Oil capacity L120C: **24 litres (6.3 US gal)**

- 12. Install the fuel tank and the guard plate, see "Fuel tank, removing and installing".
- 13. Start the engine and run it until it is warm. Check that there are no leaks.



Document Title: Fuel system, air bleeding	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Fuel system, air bleeding

Op nbr 23301

- 1. Loosen the bleeder screw on the filter head. Pump with the hand pump until fuel free from air bubbles flows out. Tighten the bleeder screw.
- 2. Start the engine and check that there are no leaks.

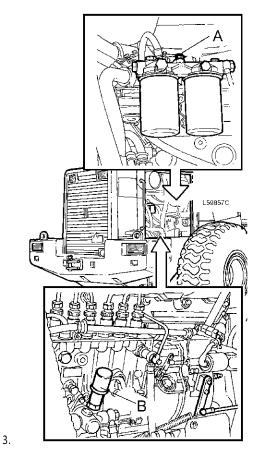


Figure 1 Fuel system, air bleeding

- A. Bleeder screw, filter head
- B. Hand pump, feed pump



Document Title: Feed pump, checking feed pressure	Information Type: Service Information	Date: 25.04.2013
Profile:		

Feed pump, checking feed pressure

Op nbr 23304

11 666 020 Pressure gauge, 600 kPa (6 bar) (87 psi) 11 666 037 Hose 999 3871 Nipple 999 3720 Nipple



Observe the greatest possible cleanliness when working on the fuel system.

L90C

- 1. Position the machine on level ground and stop the engine. Apply the parking brake. Open the engine hood on the right side of the machine.
- 2. Remove the bleeder screw from the filter housing. If the machine is equipped with extra filter, it is the ordinary filter housing that is referred to.

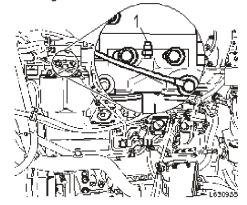


Figure 1

- 1. Bleeder screw
- 3. Install nipple 999 3871 on the bleeder screw and connect the pressure gauge with the hose.

NOTICE

Make sure the hose has been cleaned.

- 4. Start the engine and leave it running for half a minute at approx. 1000 rpm. Release the accelerator pedal and run the engine at idling speed for one minute. Read off the feed pressure.

 Feed pressure: 130 180 kPa (19 26 psi)
- 5. Make a further check of the feed pressure with the engine at full load.

6. Run the engine until it reaches stall speed and at that moment read off the pressure gauge. The pressure must not be less than 100 kPa (14.5 psi) during the test.

NOTICE

Bear in mind that the pressure gauge indication may be delayed because of the length and diameter of the hose, temperature and poorly cleaned hose.

At a too high pressure:

If the pressure is too high, the overflow valve needs to be replaced.

At a too low pressure:

If the feed pressure is too low, the cause may be a clogged suction line, faulty feed pump, clogged fuel filters or faulty overflow valve.

Check the filters by measuring the feed pressure before the filters (1) using nipple 999 3720. The plate (2) may possibly have to be loosened to make sufficient room for the nipple and the hose.

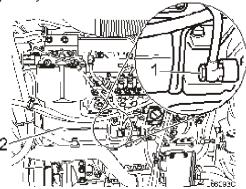


Figure 2

- 7. Rectify any faults and again check the feed pressure.
- 8. Remove the measuring nipple and re-install the bleeder screw.



Service Information

Construction Equipment

Document Title: Specifications, general	Function Group: 233	Information Type: Service Information	Date: 25.04.2013
Profile:			

Fuel feed pump	
Туре	Piston pump
Feed pressure	130 – 180 kPa (1.3 – 1.8 bar) (19 – 26 psi)



Document Title: Fuel tank, removing and installing	Function Group: 234	Information Type: Service Information	Date: 25.04.2013
Profile:			

Fuel tank, removing and installing

Op nbr 23410

3/8" Shackle, 2 pcs

Ratchet block, 750 kg (1653 lb), 2 pcs

Sling, 2 metre (7 ft)

Sling, 4 metre (13 ft)

Removing

- 1. Loosen the connection to the fuel tank filler pipe.
- Remove the guard plate under the fuel tank. Use a jack as an aid.
 Guard plate weight: approx. 60 kg (132 lb)
- 3. Hinge up the radiator casing. Install a shackle and a lifting sling (2 m (6.5 ft)) to the right lifting eye on the tank, see Figure [?]

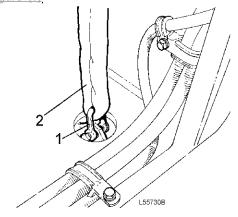


Figure 1
Supporting machine

- 1. 3/8" Shackle
- 2. Lifting sling, 2 m (6.5 ft)
- 4. Open the left engine cover. Install a shackle to the left lifting eye on the tank and connect a ratchet block. Create a space by the left lifting eye by detaching the air conditioning compressor (if applicable) and placing it over the frame.
- 5. Connect a ratchet block to the lifting sling in the right lifting eye and position a lifting sling (4 m (13 ft)) over the radiator frame and connect the ratchet blocks to the lifting sling, see Figure [?] and Figure [?].

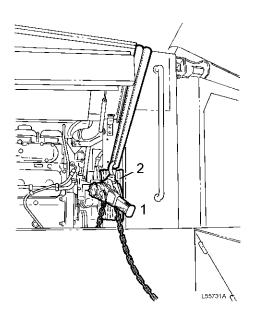


Figure 2

- 1. Ratchet block, 750 kg (1653 lb)
- 2. Rag as protection against chafing

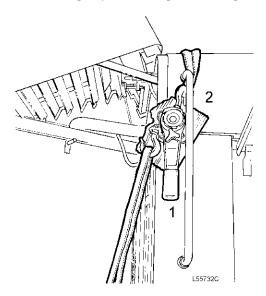


Figure 3

- 1. Ratchet block, 750 kg (1653 lb)
- 2. Rag as protection against chafing
- 6. Disconnect the fuel lines from the tank.
- 7. Disconnect the cable harness to the fuel level sensor and remove the filler pipe.
- 8. Remove the tank front attaching bolts (2 pcs by engine mounting).
- 9. Remove the rear attaching bolts of the tank, see $\underline{\mbox{Figure}}$.

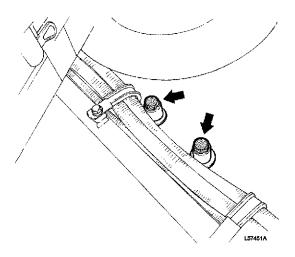


Figure 4
Fuel tank rear attaching bolts

10. Lower the tank.
Weight: approx. 80 kg (176 lb)

Installing

- 11. Lift the fuel tank into position. Weight: approx. 80 kg (176 lb)
- 12. Install the fuel tank and tighten down the attaching bolts. Tightening torque: $85 \pm 8 \text{ N m } (63 \pm 6 \text{ lbf ft})$ Remove the lifting devices.
- 13. Connect and clamp the cable harness to the fuel level sensor.
- 14. Connect the fuel hoses to the tank.
- 15. Install the guard plate below the tank.

 Tightening torque: 85 ±8 N m (63 ±6 lbf ft)
- 16. Install the filler pipe on the fuel tank
- 17. Bleed the fuel system, see "Fuel system, air bleeding".
- 18. Start the engine and check that there are no fuel leaks.
- 19. Restore the machine.



Service Information

Document Title: Specifications, capacities	Information Type: Service Information	Date: 25.04.2013
Profile:		

Specifications, capacities

L90C

Fuel tank	210 dm³ (litres) (55 US gal)
-----------	------------------------------



Service Information

Document Title: Specifications, tightening torques	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, tightening torques

	N m	kgf m	lbf ft
Fuel tank	85 ±8	8.5 ±0.8	63 ±6



Service Information

Document Title: Specifications, weights	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Fuel tank	80 kg (176 lb)
-----------	----------------



Service Information

Document Title: Checking speed with a frequency meter	l	Information Type: Service Information	Date: 25.04.2013
Profile:			

Checking speed with a frequency meter

Op nbr

Frequency meter

If the machine is not equipped with a display unit and a service display unit is not available, the speed can be checked with a frequency meter. The signal which is measured is the signal to the control unit (ECU) from the speed sensor.

The following applies when checking:		
L90C:	Serial No. –14314	Serial No. 14315–
Low idling speed:	435 ±20 Hz	438 ±30 Hz
High idling speed:	1546 ±40 Hz	1574 ±40 Hz
L120C:	Serial No. –11663	Serial No. 11664–
Low idling speed:	435 ±20 Hz	438 ±30 Hz
High idling speed:	1515 ±40 Hz	2962 ±40 Hz

Normal working temperature.

Units using a lot of electricity and the air conditioning (if applicable) should be turned off.

Conversio	Conversion factor, frequency to engine speed:		
L90C:			
r/s	= frequency reading x 0.0256		
rpm	= frequency reading x 1.54		
L120C			
r/s	= frequency reading x 0.0132		
rpm	= frequency reading x 0.79		

- 1. Remove the lining by the electrical distribution box.
- 2. Disconnect the connector OA from the circuit board.
- 3. The frequency (the speed) is checked in the connector OA pin 1 (signal) and pin 2 (chassis connection), see Figure [?]

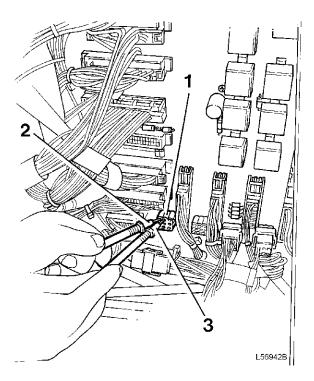


Figure 1
Checking speed with a frequency meter

- 1. Connector OA
- 2. Signal (+)
- 3. Chassis connection (–)

NOTICE

The travelling speed of the machine may be checked in the same connector (OA) pin 4 (signal) and pin 2 (chassis connection).

Conversion factor, frequency to speed (km/h)	
L90C	= frequency reading x 0.0246
L120C	= frequency reading x 0.0166

When checking the idling speed, see also "Idling speed, checking and adjusting", points 2 and 3.





Document Title: Idling speed, checking and adjusting	Function Group: 236	Information Type: Service Information	Date: 25.04.2013
Profile:			

Idling speed, checking and adjusting

Op nbr 23601

999 3721 Service display unit

Used when the machine is not fitted with its own display unit (optional equipment).

The following applies when checking:		
L90C:	Serial No. –14314	Serial No. 14315–
Low idling speed:	670 ±30 rpm	670 ±50 rpm
High idling speed:	2380 ±60 rpm	2420 ±60 rpm
L120C:	Serial No. –11663	Serial No. 11664–
Low idling speed:	670 ±30 rpm	670 ±50 rpm
High idling speed:	2330 ±60 rpm	2345 ±60 rpm

Normal working temperature.

Units using a lot of electricity and the air conditioning (if applicable) should be turned off.

With effect from January 1996 engine TD63KBE (111858–) and TD73KDE (83674–) are provided with protection against unauthorised interference with injection pumps. Adjusting the high idling speed must only be carried out by diesel workshops authorised by Bosch.

1. Select information about the engine and engine speed on the display unit, see Figure [?].

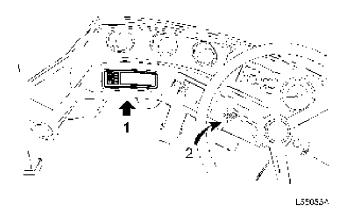


Figure 1 Measuring idling speed

- 1. Display unit (optional equipment)
- 2. Point of connection for service display unit, 999 3721 (under the instrument panel)

Low idling speed, checking, adjusting

2. Check that the governor lever fits up against adjusting screw (3), Figure [?]. Start the engine and read off the low idling speed on the display unit. Adjustment is carried out with adjusting screw (3). Lock the adjusting screw with

the nut and check the speed.

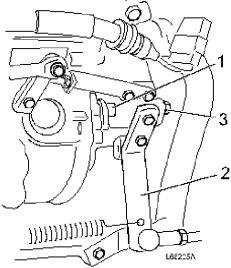


Figure 2 Adjusting idling speed

- 1. Adjusting screw, high idling speed (security seal installed since January 1996)
- 2. Governor control arm, accelerator control
- 3. Adjusting screw, low idling speed

High idling speed, checking, adjusting

3. Check that the governor lever is limited by adjusting screw (1), see Figure [?], with the engine turned off and the accelerator pedal fully depressed. Start the engine, depress the accelerator pedal fully and read off the high idling speed on the display unit. Adjustment is carried out with adjusting screw (1), after the security seal has been broken.

NOTICE

Adjusting a pump fitted with a security seal must only be carried out by diesel workshops authorised by Bosch.

After the adjustment has been carried out, lock the adjusting screw with the nut and check the speed and fit a new security seal to the adjusting screw and the nut.





Document Title: Injection timing, checking and adjusting	•	 Date: 25.04.2013
Profile:		

Injection timing, checking and adjusting

Op nbr 23630

999 3590 Gear 998 7057 Injection timing tool 999 3824 Bolt (only for pump fitted with security seal)

Pump timing on engine:

L90C, engine TD63KBE, 13° 0.5° B.T.D.C. **L120C**, engine TD73KDE, 9° B.T.D.C.



Dirt and dust particles must not enter the injection pump.

Checking timing, alternative 1

1. Remove the cover over the flywheel marking (3) Figure [?] . Remove the cover and install the tool 999 3590 together with ratchet handle against the flywheel ring gear (4).

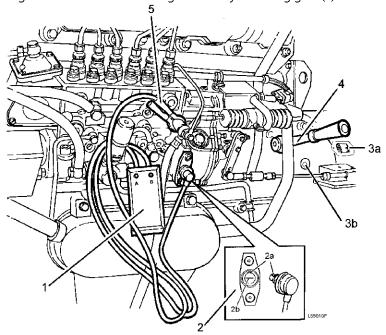


Figure 1 Checking timing

- 1. Injection timing tool, 998 7057
- 2. Timing attaching point on injection pump and sensor on injection timing tool
 - a. Pin aligned with attaching point
 - b. Guide in attaching point on injection pump

- 3. Flywheel marking
 - a. L90C
 - b. L120C
- 4. Gear 999 3590 with ratchet handle
- 5. Chassis connection
- 2. Remove the plug from the governor housing, install the sensor on injection timing tool 998 7057 (2) Figure [?] and connect the injection timing tool chassis connection (5).



Some oil will run out of the pump and this needs to be collected in a suitable vessel.

3. Rotate the crankshaft in the direction of rotation of the engine until both the light emitting diodes on the injection timing tool light up, Figure [?]. Read off the flywheel graduation, (3) Figure [?].

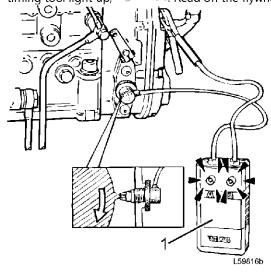


Figure 2 Checking timing (Principle diagram)

- 1. Injection timing tool 998 7057
- 4. Should the crankshaft be rotated too far, it must be rotated back against the direction of rotation of the engine approx. 1/4 of a turn, and then rotated forward until the light emitting diodes light up. Read off the flywheel graduation.
- 5. After checking or adjusting is completed, remove the injection timing tool sensor and re-install the plug in the governor housing. Remove 999 3590 and install the cover. Install the cover over the flywheel marking.

Checking timing, alternative 2

6. Remove the cover over the flywheel marking (3) Figure [?] . Remove the cover and install the tool 999 3590 together with ratchet handle against the flywheel ring gear (4).

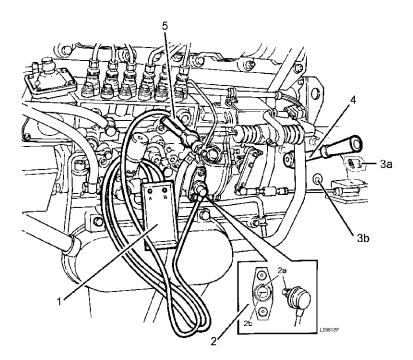


Figure 3
Checking timing

- 1. Injection timing tool, 998 7057
- 2. Timing attaching point on injection pump and sensor on injection timing tool
 - a. Pin aligned with attaching point
 - b. Guide in attaching point on injection pump
- 3. Flywheel marking
 - a. L90C
 - b. L120C
- 4. Gear 999 3590 with ratchet handle
- 5. Chassis connection
- 7. Remove the plug from the governor housing, install the sensor on injection timing tool 998 7057 (2) Figure [?] and connect the injection timing tool chassis connection (5).

NOTICE

Some oil will run out of the pump and this needs to be collected in a suitable vessel.

- 8. Remove the valve cover for the number 1 cylinder.
- 9. Rotate the crankshaft using 999 3590 until the piston in the number 1 cylinder is in its compression stroke, (0° on the flywheel and the valves for the number 1 cylinder closed). Check that the flywheel marking is visible by the arrow in the flywheel housing, (3) Figure [?].
- 10. Then rotate the crankshaft against the direction of rotation of the engine approx. 1/4 of a turn, and thereafter rotate the crankshaft forward until both the light emitting diodes light up, Figure [?]. Read off the flywheel graduation.

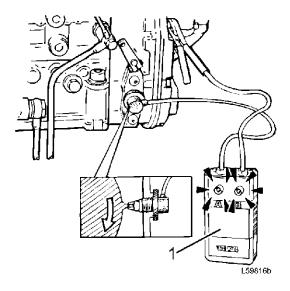


Figure 4 Checking timing (Principle diagram)

- 1. Injection timing tool 998 7057
- 11. After checking or adjusting is completed, remove the injection timing tool sensor and re-install the plug in the governor housing. Remove 999 3590 and install the cover over the flywheel marking. Remove the cover (5) Figure [7], on the governor housing on the pump, top up with an amount of engine oil corresponding to that which has run out and install the cover.

Adjusting injection timing

12. Remove the cover over the flywheel marking (3) Figure [?] . Remove the cover and install the tool 999 3590 together with a ratchet handle against the flywheel ring gear (4).

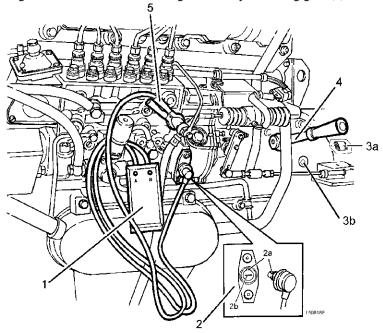


Figure 5 Checking timing

- 1. Injection timing tool, 998 7057
- 2. Timing attaching point on injection pump and sensor on injection timing tool
 - a. Pin aligned with attaching point
 - b. Guide in attaching point on injection pump

- 3. Flywheel marking
 - a. L90C
 - b. L120C
- 4. Gear 999 3590 with ratchet handle
- 5. Chassis connection
- 13. Remove the plug from the governor housing, install the sensor on injection timing tool 998 7057 (2) Figure [?] and connect the injection timing tool chassis connection (5).



Some oil will run out of the pump so it needs to be collected in a suitable vessel.

- 14. Remove the valve cover for the number 1 cylinder.
- 15. Rotate the crankshaft using 999 3590 until the piston in the number 1 cylinder is in its compression stroke, (0° on the flywheel and the valves for the number 1 cylinder closed). Check that the flywheel marking is visible by the arrow in the flywheel housing, (3) Figure [?].
- 16. Rotate the crankshaft against the direction of rotation of the engine approx. 1/4 of a turn.
- 17. Rotate the crankshaft forward until the number of degrees on the flywheel, as indicated in the specifications, are aligned with the pointer in the flywheel housing. Remove the guard over the pump coupling.
- 18. Slacken the pump coupling clamping bolt and rotate the pump coupling approx. 1/4 of a turn in the direction of rotation of the pump, Figure [?].

If the clamping bolt is sealed, 999 3824 must be used to remove the lock sleeve before the clamping bolt can be slackened.

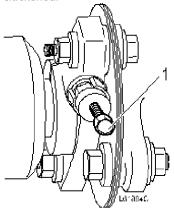


Figure 6
Removing lock sleeve over clamping bolt

1. 999 3824

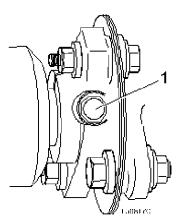


Figure 7 Pump coupling

- 1. Clamping bolt
- 19. Tighten the pump coupling clamping bolt until the coupling just about can be rotated against the direction of rotation.

NOTICE

The pump coupling must always be rotated against the direction of rotation when adjusting the injection angle in order to eliminate the clearance between the timing gears.

- 20. Rotate the pump coupling against the direction of rotation until both the light emitting diodes on the injection timing tool 998 7057 light up. Tighten down the pump coupling.
 - If the pump coupling is rotated too far, the adjustment must be done over again according points 18 20.

Tightening torque: 60 ±5 N m (44 ±3.7 lbf ft)

Remember to re-install the lock sleeve (if applicable).

- 21. Check the injection timing by rotating the crankshaft against the direction of rotation of the engine approx. 1/4 of a turn and then rotating the crankshaft in the direction of rotation of the engine until both the light emitting diodes on the injection timing tool 998 7057 light up. Read off the flywheel graduation, (3) Figure [7].
- 22. After checking or adjusting is completed, remove the injection timing tool sensor and re-install the plug in the governor housing. Remove 999 3590 and install the cover. Install the cover over the flywheel marking.



Service Information

Construction Equipment

Document Title: Specifications, general	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Injection pump	
Туре	In-line pump
Make	Bosch
Designation	PE 6 P 110A / 320 RS 3266
Timing	13° ±0.5° B.T.D.C.
The pump element lift above the basic circle at the beginning of the injection	2.45 mm (0.096 in)
Governor	RQV 350 - 1100 - PA 1182
The injection pump element has no starting groove	



Service Information

Construction Equipment

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Injectors			
Туре	Multi-hole nozzle (6 holes)		
Make	Bosch		
Nozzle holder, designation	KBEL 98 P101		
Nozzle, designation	DLLA 145 P466		
Identification code	658		
Opening pressure 24 MPa (240 bar) (3481 psi)			
Setting pressure, for new spring	24.5 – 25.3 MPa (245 – 253 bar) (3553 – 3669 psi)		



Service Information

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

Turbocharger	
Designation	TO 4E / 40 / 0,58-62 - 7,5 °CB



Service Information Construction Equipment

Document Title: Specifications, general	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Air cleaner	
Air cleaning in three stages:	Cyclone cleaner – primary filter – secondary filter



Service Information

Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Intercooler	
Туре	Liquid / air cooled with separate coolant pump



Service Information

Document Title: Specifications, capacities	Information Type: Service Information	Date: 25.04.2013
Profile:		

Specifications, capacities

L90C

Cooling system (total) 53 dm³ litres (14 US gal)



Service Information

Document Title: Specifications, general	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Cooling system		
Туре	Closed system	
Radiator cap valve opens at	50 kPa (0.50 bar) (7.3 psi)	

Document Title: Coolant pump for intercooler, removing and installing	262	Information Type: Service Information	Date: 25.04.2013
Profile:			

Coolant pump for intercooler, removing and installing

Op nbr 26203

Removing

1. Open the left engine cover.

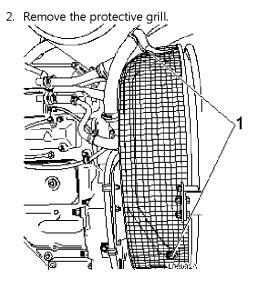


Figure 1 Protective grill

3. Plug the two upper draining holes on the pump. Use plastic plugs part No. 11030155-3.

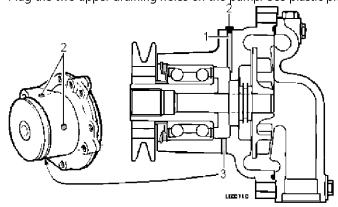


Figure 2 Plug the upper draining holes

- 1. Upper draining holes
- 2. 11030155-3 Plastic plugs
- 3. Lower draining holes
- 4. Disconnect the hoses from the pump.



Use pair of hose pliers to prevent the coolant in the hoses from running out.

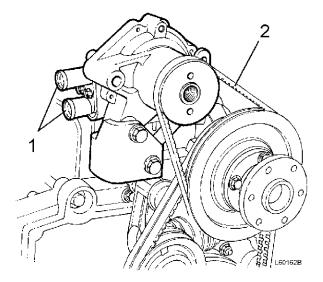


Figure 3

- 1. Hose connections
- 2. Belt for coolant pump
- 5. Slacken the belt tension and remove the belt for the coolant pump.
- 6. Remove the bolts for the pump and lift it away.

Installing

- 7. Bolt on the coolant pump for the intercooler.
- 8. Install the belt for the coolant pump and adjust the belt tension.

 At the correct belt tension it should be possible to deflect the belt approx. 15 mm (0.60 in) applying a fairly hard pressure.
- 9. Re-install the hoses on the coolant pump connections.
- 10. Start the engine and check that there are no leaks.



Document Title: Coolant pump for intercooler, reconditioning	Information Type: Service Information	Date: 25.04.2013
Profile:		

Coolant pump for intercooler, reconditioning

Op nbr

999 3673 Fixture, bolt, drilled-through bolt, drift 999 8039 Drift Kukko 20 - 1 Puller

Dismantling

1. Remove the end plate and the pipes from the end plate.



Mark housing and end plate.

2. Press out the impeller and the shaft, see $\underline{\mbox{Figure}}$ [?].

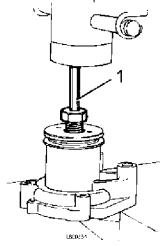


Figure 1

- 1. 999 3673 Drift, drilled-through bolt
- 3. Remove the belt pulley, see Figure [?].

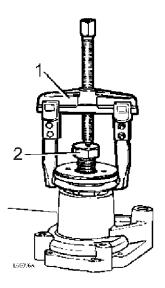


Figure 2

- 1. Kukko, 20 - 1
- 2. 999 3673 Bolt
- 4. Remove lock ring (2) for the bearing, spacer sleeve (10), washer (3) and protective plate (9) Figure [?] and Figure [?]

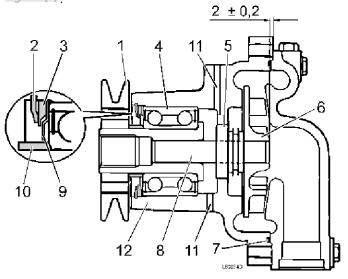


Figure 3 Coolant pump

- Belt pulley Lock ring 1.
- 2.
- Washer 3.
- 4. Bearing
- 5. Seal
- Impeller 6.
- 7. O-ring
- Shaft 8.
- 9. Protective plate
- 10. Spacer sleeve
- 11. Draining hole
- Pump housing 12.

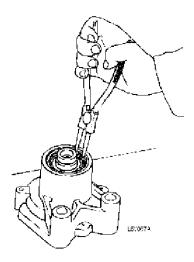


Figure 4

5. Press out the bearing and the bearing journal, see Figure [?].

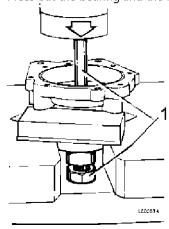


Figure 5

- 1. 999 3673 Bolt and drift
- 6. Remove the seal and enlarge the existing draining holes (11) in the pump housing by drilling to \emptyset 7 mm (0.276 in). See Figure [?].
- 7. Clean and check the parts as regards wear or other damage.

Assembling

8. Apply grease to the bearing journal and press the bearing onto the journal, see Figure [?].



Press in the inner race for the bearing.

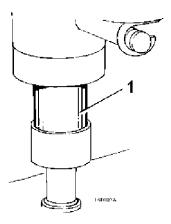


Figure 6

- 1. Pipe, Ø 31 mm (1.220 in).
- 9. Apply grease to the bearing location and press the bearing together with the bearing journal into the pump housing, see Figure [?].

NOTICE

Press in the outer race for the bearing.

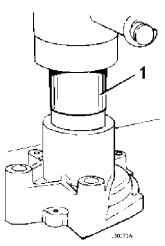


Figure 7

- 1. Pipe, Ø 60 mm (2.362 in).
- 10. Install the protective plate (9), washer (3), spacer sleeve (10) and lock ring (2), Figure [?].

NOTICE

The chamfer on the spacer sleeve and the lugs on the lock ring should be turned toward the bearing.

11. Press on the belt pulley with the aid of a suitable piece of pipe, see Figure [?].

NOTICE

Position a support against the bearing journal, e.g. a piece of pipe with an inside diameter of 27 mm (1.063 in) and an outside diameter of 34 mm (1.339 in).

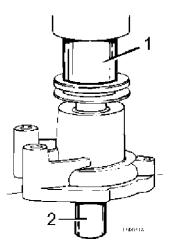


Figure 8

- 1. Suitable piece of pipe
- 2. Support against the bearing journal, e.g. a piece of pipe with an inside diameter of 27 mm (1.063 in) and an outside diameter of 34 mm (1.339 in).
- 12. Apply a thin layer of locking fluid, type normal, on the contact face of the coolant seal.
- 13. Press in the coolant seal using tool 999 8039, see Figure [?]. Check that the shaft does not move from its position inside the bearing journal. If required use the bolt from tool 999 3673 to fix the shaft in position.

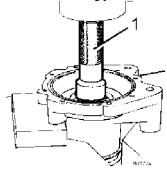


Figure 9 Pressing in coolant seal

- 1. 999 8039
- 14. Press the impeller onto the pump shaft, see Figure [?]. Screw in bolt 999 3673 against the pump shaft.
 Use 999 3673, fixture and a spacer, e.g. a washer.
 Pressing-in measurement: 2 ±0.2 mm (0.080 ±0.008 in)

NOTICE

The spacer should have a thickness of 2 mm (0.080 in) and a greater inside diameter than the diameter of the pump shaft. With the spacer between fixture and impeller the correct pressing-in measurement is obtained.

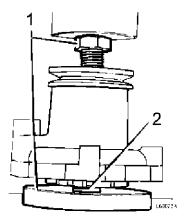


Figure 10

- 1. 999 3673 Bolt, fixture
- 2. Spacer, e.g. a washer
- 15. Install the end plate according to markings. Use a new O-ring. Install the pipes together with new seals.





Document Title: Coolant pump, removing and installing	Information Type: Service Information	Date: 25.04.2013
Profile:		

Coolant pump, removing and installing

Op nbr 26202

1/2" hose, 2 m (6.5 ft)

Removing

1. Drain the coolant from the radiator and the engine. Use a 1/2" hose, one end of which is pushed onto the valve while the other end is placed in a suitable vessel.

Coolant capacity L90C: approx. 53 litres (14 US gal)
Coolant capacity L120C: approx. 65 litres (17.2 US gal)

NOTICE

The cap on the expansion tank must first be removed.

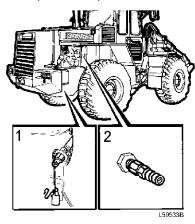


Figure 1 Draining coolant

- 1. Draining coolant from the radiator
- 2. Draining coolant from the engine
- 2. Detach the radiator casing. Raise the radiator casing and block it in the upper position, see Figure [?].

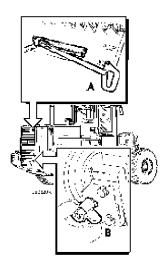


Figure 2 Hinge up the radiator casing.

- 3. Swing out the radiator and the condenser.
- 4. Unscrew the six bolts on the fan and remove the fan rearward.

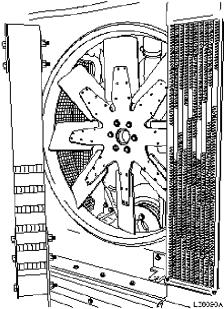


Figure 3 Removing fan

5. Loosen the hose clip and remove the grille for the fan, see $\frac{\text{Figure }}{?}$.

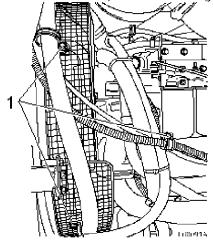


Figure 4

- 1. Attachments for grille and hose clips
- 6. Remove the bolts for the coolant pipe.
- 7. Remove the bolts for the coolant pump and lift it out.

Installing

- 8. Carefully clean all sealing surfaces and contact faces.
- 9. Replace the O-ring on the oil cooler pipe and the seals on the thermostat housing pipe.
- 10. Bolt on the coolant pump together with the bracket for the protective grill.
- 11. Install the grille for the fan and re-install the hose clip.
- 12. Install the fan from behind.
- 13. Swing in the radiator and the condenser. Close the radiator casing and block it.

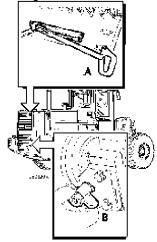


Figure 5

The handle (A) for the lock must be moved forward before it is possible to close the radiator casing.

14. Fill with coolant.

Coolant capacity L90C: approx. 53 litres (14 US gal)
Coolant capacity L120C: approx. 65 litres (17.2 US gal)

15. Start the engine and run it until warm. Check that there are no leaks.



Construction Equipment

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Thermostat		
Туре	Piston-type thermostat	
Number of	1	
Begins to open at	82 °C (180 °F)	
Fully open at	95 °C (203 °F)	



Document Title: Stop solenoid	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Stop solenoid

A new type stop solenoid has been introduced w.e.fr. the following serial numbers:

Machine	W.e.fr. serial No.	
L90C	14569 (EU), 62605 (US), 70060 (Brazil)	
L120C	11577 (EU), 61797 (US), 70075 (Brazil)	

On machines with the older type stop solenoid the solenoid is positioned on the engine. On machines with the new stop solenoid it is positioned on the inside of the right side of the radiator "bow".

The engine injection pump is provided with a stop solenoid which is energised via the ignition switch SW1 and the electronic control unit CU8.

The purpose of CU8 is to provide a ground connection for the pulling coil and for the holding coil in stop solenoid MA64.

Depending on the position of the key in the ignition switch and the output signal from the ECU, voltage is available at the different terminals on CU8 as follows:

Ignition switch in position	Terminal	Voltage to the electronic control unit CU8
0	1	0 V
	2	0 V
	7.8 58	24 V
	6, 12	24 V
	3, 9	24 V
	11	24 V
1, 2 or 3	1	24 V
	2	0 V (24 V at engine shut down (power down))
	7.8 58	24 V
	6, 12	24 V
	3, 9, 11	0 V (Pulling position, MA64) 0.3 seconds
	3, 9	24 V (holding position, MA64)
	11	0 V (holding position, MA64)

Stopping engine

With the ignition switch in position 0 the current to terminal 1 on the electronic control unit CU8 is interrupted. This in turn interrupts the current to stop solenoid MA64 and the solenoid control spring moves the injection pump to the stop position.

Starting engine

With the ignition switch in position 1, 2 or 3 current is supplied to terminal 1 on the electronic control unit CU8. Stop solenoid MA64 is now supplied with current via terminals 6 and 12 on the electronic control unit CU8. The stop solenoid MA64 is energised and the injection pump takes up the normal running position.

Stop solenoid MA64

The stop solenoid consists of two coils, one pulling coil (approx. 1 Ω) and one holding coil (approx. 55 Ω). When the stop solenoid is energised, the pulling and holding coils obtain a stronger current (approx. 20 A) during a very short time (approx. 0.5 s) and then the pulling coil is disconnected. The holding coil now receives current of approx. 0.5 A and the holding coil keeps the stop solenoid in the normal running position.

The pulling coil of stop solenoid MA64 is disconnected because its ground connection via the electronic control unit CU8 is

interrupted (terminals 3, 9 to 5, 10).

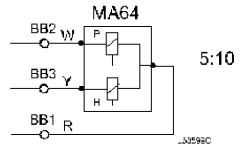


Figure 1

Sto	Stop solenoid MA64		
Р	P Pulling coil (approx. 1 Ω)		
Н	H Holding coil (approx. 55 Ω)		

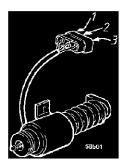


Figure 2 Connector and cable marking (earlier type)

- 1. Red (R), positive feed
- 2. White (W), ground (pulling coil)
- 3. Yellow (Y), ground (holding coil)

Construction Equipment

Document Title: Stop solenoid, adjusting stroke (Solenoid positioned on the engine)	273	Information Type: Service Information	Date: 25.04.2013
Profile:			

Stop solenoid, adjusting stroke

Op nbr

L90C

1. The stroke is limited by limiting screw (1), which is used for making adjustments. Stroke **max. 25 mm (1 in)**

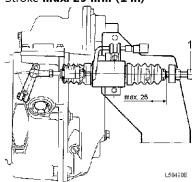


Figure 1 Stroke, L120C

Construction Equipment

Document Title: Stop solenoid, adjusting stroke stroke or />(solenoid positioned on inside of the radiator "bow")	273	Information Type: Service Information	Date: 25.04.2013
Profile:			

Stop solenoid, adjusting stroke

Op nbr

1. Adjust the distance between lever (1) and stop (2) on the injection pump, with the aid of the adjusting nuts on control cable (3).

The lever should just touch the stop.

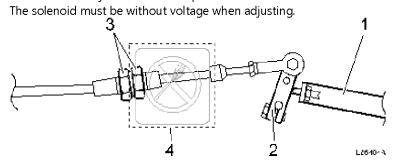


Figure 1

- 1. Lever
- 2. Stop
- 3. Control cable
- 4. Guard



Construction Equipment

Document Title: Stop solenoid, fault-tracing tips	Information Type: Service Information	Date: 25.04.2013
Profile:		

Stop solenoid, fault-tracing tips

If the stop solenoid does not remain in its running position when the ignition key is turned to position 1, this may be due to:

- O Electrical fault.
- O Open circuit in the solenoid holding coil.
- O Incorrectly adjusted linkage, so that the injection pump internal stop position limits the stroke of the solenoid. This means that the solenoid does not take up the holding position. The solenoid disengages the holding position after approx. 0.3 seconds.

If the stop solenoid remains in its running position when the ignition key is turned to position 0, this may be due to:

- O Binding injection pump governor.
- O Faulty stop solenoid.
- O Faulty control unit for the electrical key-turn engine stop.



Service Information

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

Cold-starting device	
Preheating element positioned in the inlet manifold	



Service Information

Document Title: Electrical distribution box in cab	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Electrical distribution box in cab

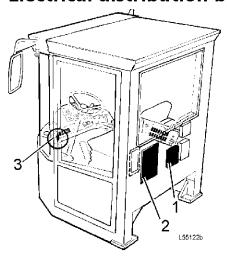


Figure 1

- 1. Control unit (ECU)
- 2. Circuit board
- 3. Display unit

The main part of the electrical system on the machine is concentrated to the cab. This means that the components are protected against moisture and dirt.

Fuses, relays and control unit (ECU / Electronic Control Unit) are positioned in an electrical distribution box behind the operator seat, see Figure [?]. Each cable, connector and connector pin are systematically marked.



Service Information

Document Title: Electrical repair kit	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Electrical repair kit

The electrical repair kit (part No. 999 3880), which is common to Volvo"s wheel loaders, articulated haulers and excavators, contains tools, cable terminals and an instructions video tape.



Service Information Construction Equipment

Document Title: General description	Function Group: 300	Information Type: Service Information	Date: 25.04.2013
Profile:			

General description

The machine is equipped with a 24 V electrical system including an alternator. The two 12 V the batteries each of 105 Ah (L90C) or 140 Ah (L120C) are connected in series and positioned on either side of the rear frame, behind the rear wheels.



Service Information

Document Title: Special instructions for	·	Information Type: Service Information	Date: 25.04.2013
working on the electrical system			
Profile:			

Special instructions for working on the electrical system

- 1. Fully charged and otherwise satisfactory batteries, should always be used when testing the electrical system.
- 2. Test the batteries with an acid tester and a load tester. The battery disconnect switch should be turned off.
- 3. When installing a battery, make sure that the battery is connected with the correct polarity.
- 4. When replacing batteries connected in series, these should have the same capacity, for example two 140 Ah batteries. The batteries should be of the same age (be equally good), this is because the charging current required for a battery to reach a certain voltage, changes with the age of the battery.
- 5. If a booster battery is necessary for starting the engine, the instructions according to the Operator's Manual must unconditionally be followed.
 - See also "Starting with booster batteries"
- 6. Before any tests are carried out on alternator or regulator, the batteries and the electrical leads must be checked for insulation, poor contacts and corrosion. Check the alternator belts. All possible faults as described above must be corrected before beginning the electrical checks.
- 7. During all testing of alternating current equipment, "secure" connections must be used. A lead, which works loose, can cause destruction of both alternator and regulator.
- 8. If the current output terminal of the alternator should be connected to ground, this will damage the alternator and may also damage the regulator.
- 9. Never disconnect the main lead of the alternator or the lead to its field winding, while the engine is running. Both alternator and regulator may be damaged.
- 10. Before removing or installing components in the electrical system, the ground connection should be interrupted or the battery disconnect switch should be turned off.
- 11. Before carrying out electric welding on the machine or attachments connected to the machine, turn off the battery disconnect switch or disconnect the battery cable connected to ground. Connect the welding unit as close as possible to the point of welding.



Service Information

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

System voltage	24 V





Document Title: Safety when working with batteries	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Safety when working with batteries

Batteries contain sulphuric acid which is very corrosive to the human body and parts of machinery. In addition, batteries give off hydrogen gas when they are loaded (supplying electricity) or being charged.

Together with the oxygen in the air hydrogen gas forms a very explosive mixture.

This combination, **corrosive acid and explosive gas**, means a high risk of accidents during all work with lead-acid batteries used in vehicles.

Therefore, it is very important that you exercise care and follow the rules stated below when you are working with batteries.

When charging batteries, follow the instructions given below.

• Batteries give off explosive gases. Never smoke around any batteries.

Risk of explosion

When a battery is being charged, an explosive mixture of oxygen and hydrogen gas is formed. A short circuit, an open flame or a spark near the battery can cause a powerful explosion. Always switch off the charging current before loosening the charging lead clips. Ventilate well, especially if the battery is charged in a confined space.



Figure 1

Do not smoke near batteries.

- Begin by disconnecting the earth lead in order to remove a battery. To reduce the risk of sparks which can cause fire, always connect the earth lead last when fitting a battery.
- Never tilt a battery to any great extent in any direction. Battery electrolyte may leak out.

Corrosive sulphuric acid

The battery electrolyte includes corrosive sulphuric acid. Electrolyte spilled on bare skin must be removed immediately. Wash with soap and plenty of water. If electrolyte gets into your eyes or any other sensitive part of the body, rinse off immediately with plenty of water and seek medical advice immediately.

- Do not connect a discharged battery in series with a fully charged one. There is a risk that the batteries may explode.
- Make sure that metal objects (such as tools, rings, watch straps etc.) do not come into contact with battery terminals.
 There is a risk of injury and fire.
- Always cover the top of the battery with a rag or other non-conducting material when you work in the proximity of batteries.
- Always re-install the pole stud protections to the batteries.
- Batteries contain substances dangerous to the environment. They must therefore, when subject to disposal, be treated according to local and national regulations.



Construction Equipment

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

Battery	
Number of	Two (connected in series)
Battery disconnect switch (Ground connection)	Connected to negative terminal
Voltage	12 V
Capacity	105 Ah / battery
Battery electrolyte density at fully charged battery	1.275–1.285
The battery should be recharged at a density of	1.250



Construction Equipment

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Alternator with regulator		
Туре	Alternating current	
Designation	A14 N 118 M 28V 60A	
Output (rated output)	1680 W	
Voltage, at +20 °C (68 °F)	28.5 ±0.15 V	
Current, max.	60 A	
Resistance across rotor winding	13.5 Ω	
Resistance in stator winding	0.12 Ω	



Document Title: Alternator 100 A, checking and adjusting voltage	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Alternator 100 A, checking and adjusting voltage

Op nbr

- 1. Run the engine for approximately five minutes.
- 2. Check the voltage at an engine speed above 25 r/s (1500 rpm).



Any units using electricity should be switched off.

3. The voltage should be 28.0 V.

In case of deviation, adjust the voltage with the adjusting screw on the alternator, see Figure [?].

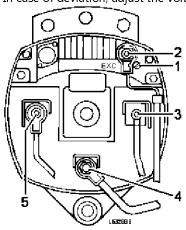


Figure 1 Alternator, 100 A

- 1. Screw for adjusting voltage
- 2. EXC
- 3. B- Ground (-)
- 4. B+
- 5. 61



Construction Equipment

Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

An alternator with a rating of 100 A is available for machines equipped with units using more electricity than normal. The output voltage from the alternator is adjustable and after repair work it is necessary to check and if required adjust the voltage.



Service Information

Document Title: Specifications, general	Function Group: 331	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Starter motor	
Designation	KB 24V 5.4 kW
Output	5.4 kW (7.3 hp)



Service Information

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Light bulbs	Watt	Socket
Travel lights, asymmetric	75/70	P 43t - 38 (H4)
Working lights, front (halogen)	70	PK 22 s (H3)
Parking lights	4	BA 9 s
Tail lights	10	BA 15 s
Working lights, rear (halogen)	70	PK 22 s (H3)
Cab light	10	BA 15 s
Speedometer	2	BA 9 s
Instrument lighting	2	BA 9 s
Control lamp panel	20 x 1.2	W 2 x 4.6 d
Guide light in switches	1.2	W 2 x 4.6 d
Side lights	5	SV 8.5
Stop lights	21	BA 15 s
Direction indicators, rear	21	BA 15 s
Direction indicators, side	21	BA 15 s



Document Title: Headlights, adjusting	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Headlights, adjusting

Op nbr 35202

Check the headlight adjustment by placing the machine on level ground in front of a wall. The distance L is measured between the headlights and the wall, see Figure [?].

Adjust the upper boundary H of the low beams. Switch on the high beams and check the distance B between the centres of the light beams on the wall.

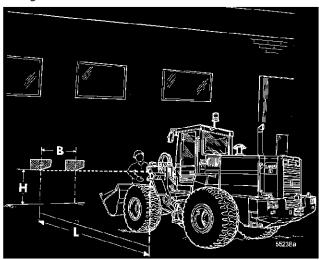


Figure 1 Headlight adjustment

L90C	
L	= 5.00 m (16 ft 5 in)
Н	= 1.55 m (5 ft 1 in)
В	= 1.64 m (5 ft 6.6 in)

L120C	
L	= 5.00 m (16 ft 5 in)
Н	= 1.70 m (5 ft 6.9 in)
В	= 1.93 m (6 ft 4 in)



Document Title: General description of the control unit (ECU)	Information Type: Service Information	Date: 25.04.2013
Profile:		

General description of the control unit (ECU)

Through information about engine speed, travelling speed and the operator's requirements (via the selections made with the gear selector control and the shift mode selector, SW143), the operator can check and control the gear-shifting programme of the machine.

The control programme contains special functions for manual and automatic gear shifting, engine retarding, changing travelling direction and kick-down. The programme contains functions for protecting engine and transmission and monitors functions continuously making sure that input and output signals are reasonable.

The control unit also checks instrument monitoring, the operator"s engagement of certain functions, the central warning with its sensors and certain optional equipment.

A display unit may also be connected to the control unit so that the operator can be made aware of the monitoring information.

On the control unit there is also a light-emitting diode for information about certain basic functions.

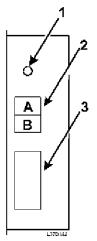


Figure 1
Short end of ECU

- 1. Light-emitting diode
- 2. Switches
- 3. Connector IC

□ Optional equipment

The control unit must be coded for different versions of the machine.

At one of the short ends of the control unit there is a cover which can be unscrewed. Under this cover there are two rotary switches, A and B.

Each switch can be set to 10 different positions (0 - 9).

For L90C/L120C applies:

	Switches	
	Α	В
L90C	0	8

L120C	0	9
	•	

The setting of the switches to the correct machine code is required if the machine is to change gear at the correct point in time.

Setting of the switches to a machine code which has not been defined means that it is not possible to engage a gear.

See also under "Light emitting diode function" and "Initial display" on the display unit.

Light emitting diode function

When current is switched on, the light emitting diode should light for approx. 2 seconds and then go out. If there is a fault in the control unit the light emitting diode will remain on.

The light emitting diode indicates faults in some functions by lighting up for 4 seconds and then showing a certain numbers of 0.5 second flashes. Thereafter the indication is repeated.

Gear selector control fault	1 flash
Gear solenoid fault	2 flashes
Voltage below 19 V	3 flashes
Voltage above 31 V	4 flashes
Not defined machine code	5 flashes

The engine speed sensor is always checked after the engine has been started in that the light emitting diode flashes when the engine speed exceeds 400 rpm. This check indication stops once the gear selector has been used for the first time after the engine was started.

The travelling speed sensor is always checked when the gear selector control is in position F1 when the speed exceeds 4 km/h (2.5 mph). The light emitting diode flashes continuously when there is no fault.

There is also a check of the kick-down and transmission disengagement functions in that continuous flashes are shown as long as the controls are in the engaged position.

APS II, description

L90C and L120C are as standard equipped with gear shift mode selector APS II (Automatic Power Shift), which is included in the Contronic system. Various settings can be selected to suit different operating and working conditions. This is done with mode selector SW143, on the front panel.

The following positions are available:

LIGHT: (the first position)	The machine shifts at low engine speed, suitable for transport operation without load.
LIGHT: (second position)	The machine shifts at slightly higher engine speed compared with the first position, suitable for transport operation and lighter loading-carrying operations.
NORMAL:	This position is used for "normal handling" and operation.
HEAVY:	The machine does not shift until higher engine speed and this position is suitable for heavier operation.
MAN:	The gears are selected manually by the operator using the gear selector control.

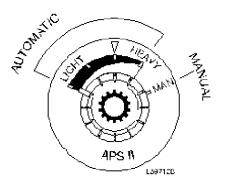


Figure 2
Mode selector SW143 positioned on the front panel

General description of the function of the control unit: (Applies both to manual and automatic gear shifting)

The gear positions of the control unit can be defined as follows:

Forward gears	= F1, F2, F3, F4
Reverse gears	= R1, R2, R3
Neutral	= N

Neutral means that all gear-shift solenoids (S1 – S5) are without voltage.

The gear-shifting diagram Figure [?] shows the solenoids which are energised for the respective gears. For example: For gear 1F S1, S3 and S4 are energised.

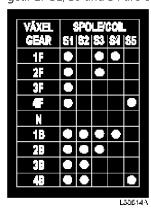


Figure 3 Gear-shifting diagram

Solenoid	Activated	Deactivated
S1	Drive	Neutral
S2	Reverse	Forward
S3	Low	High
	(1st gear – 2nd gear)	(3rd gear – 4th gear)
S4	1st	2nd
S5	4th	3rd

Transmission disengagement

If the operator has selected transmission disengagement and the pressure monitor in the brake system is activated, the voltage to the drive solenoid (S1) is cut off, while S2 – S5 remain energised, depending on the selected gear.

Engine overspeeding protection

When the engine reaches a certain upper speed limit, an immediate upshift takes place regardless of whether the operator has selected automatic or manual gear shifting.

Transmission overspeeding protection

When the output speed reaches a certain upper limit, an immediate upshift takes place regardless of whether the operator has selected automatic or manual gear shifting.

Engine shut down (power down) when changing travelling direction

L90C: Engine shut down (power down) when changing travelling direction is omitted.

L120C: Engine shut down (power power) takes place when operating in 3rd or 4th gear and a change in travelling direction is selected and the travelling speed of the machine exceeds approx. 18 km/h (11.2 mph) and the engine speed exceeds approx. 1750 rpm. (The engine and travelling speed limits vary depending on the ECU version.)

Engine shut down (power down)

The control unit can be programmed to reduce the engine speed in case of too low engine oil pressure, too high coolant temperature or too high transmission oil temperature.

Blocking of 4th gear

The 4th gear is blocked when engaging CDC to prevent upshifting to 4th gear.

This feature has been omitted w.e.fr.:

L90C serial No. 15577 (EU), 63250 (US) L120C serial No. 12728 (EU), 62349 (US)

Limp-Home operation

The machine can also be operated with the ECU disconnected. Certain basic functions are still connected to the central warning and the instruments, but the disconnection must all the same be seen as an emergency and is not to be used for continuous operation. With the ECU disconnected the gear shifting is manual with four forward and reverse gears (on certain markets there are three forward and reverse gears). On machines equipped with secondary steering, only two gears (1st and 2nd gear) forward/reverse can be used in this situation, see also ---- not implemented: INTXREF ----:

Description of function of manual gear shifting

Mode selector SW143 set to position "MAN"

The gears are selected manually by turning the gear selector to the required gear position.

Changing travelling direction

After changing travelling direction, the machine starts off in the previously selected gear.

NOTICE

As a safety feature upshifting to a higher gear takes place if certain critical engine and travelling speeds are exceeded.

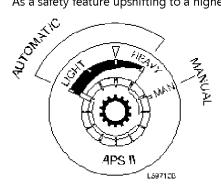


Figure 4
Mode selector SW143 positioned on the front panel

Description of function of automatic gear shifting

Mode selector SW143 set within the "AUTOMATIC" sector.

Start

The gear selector placed in the 3rd or 4th gear positions.

When starting from stationary, this takes place in 2nd gear and if the machine is rolling in 3rd gear.

Gear shifting

Gear shifting is automatic. The conditions for gear shifting are a combination of the mode selector position SW143, travelling speed and engine speed.

Shifting between the gears,

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

Reverse: 2nd gear - 3rd gear

Downshifting to 1st gear does not take place until the kick-down switch has been pressed.

Upshifting to 2nd gear takes place if the kick-down switch is pressed again or if certain critical engine or travelling speeds are exceeded.

The gear-shifting points vary depending on whether the engine is pulling or retarding.

Kick-down function

Kick-down means shifting down to 1st gear by switching on the kick-down function with SW2C on the gear selector control, or SW90 on the control lever carrier. The actual engagement of the 1st gear depends on the setting of the mode selector and the engine and travelling speeds.

1st gear will be engaged, if the machine has a sufficiently low speed, or if the speed becomes sufficiently low within 8 seconds after that the kick-down function was selected. The engagement of the 1st gear is indicated by a short pip signal from the buzzer.

In order to again upshift to 2nd gear, the kick-down button must be actuated once more.

Changing travelling direction

If a change of travelling direction is selected at a lower speed, the slowing down takes place in 2nd gear, if the speed is too high, 3rd gear will be engaged first and then when the speed has reduced, 2nd gear will be engaged.

Engine retarding / downshifting

2nd gear is the basic gear in which the machine always starts, when the selector control is in the 3rd or 4th gear position. To slow down the machine through engine retarding, let up the accelerator control fully and press the engine retarding/downshift button SW105. Downshifting then takes place in stages, with one gear for each time the button is pressed, from 4th to 3rd and after pressing the button again from 3rd to 2nd if the speed then is below 22 km/h (13.7 mph).

For further downshifting to 1st gear, see "Kick-down function".

If the engine retarding/downshifting button, SW105, is kept pressed in while at the same time the accelerator pedal is pressed down, upshifting is prevented.



As a safety feature upshifting to a higher gear takes place if certain critical engine and travelling speeds are exceeded.



Document Title: Limp-Home operation	Information Type: Service Information	Date: 25.04.2013
Profile:		

Limp-Home operation

In case of a fault in the control unit, it is possible to rearrange the connections and operate the machine and change gears manually.

Because of the connection changes certain functions are lost as the control unit is disconnected (by-passed).

With the control unit disconnected (by-passed) the following functions change:

Gear shifting: Gear shifting is done manually with 4 Forward/Reverse gears, 3 gears on certain markets. Machines equipped with secondary steering can only be operated in 1st and 2nd gear.

Preheating: The automatic timing is lost, which means that preheating is only obtained as long as the switch is actuated.

CDC (**lever steering**): Automatic gear shifting and blocking of 4th gear are lost, speed gears can be selected with the ordinary gear selector control.

Dual control: Automatic gear shifting is lost, speed gears can be selected with the ordinary gear selector control.

The following monitored functions remain / are obtained:

- O Central warning, is warning with a fixed light, for brake pressure, engine oil pressure and steering pressure (machines with secondary steering)
- O Coolant temperature, instrument indication
- O Transmission oil temperature, instrument indication
- O Engine oil pressure, control lamp
- O Brake pressure, control lamp
- O Transmission oil filter, control lamp
- O Steering pressure, control lamp (machines with secondary steering)
- O Charging, control lamp
- O Parking brake, control lamp

The following monitored functions are lost:

- O Central warning for coolant temperature, transmission oil temperature, transmission oil pressure and applied parking brake when gear is engaged.
- O Display unit
- O Buzzer for central warning
- O Coolant temperature, control lamp
- O Transmission oil pressure, control lamp
- O Air cleaner, control lamp
- O Fuel gauge
- O Speedometer
- O Buzzer for low brake pressure and gear engaged

Functions which are disconnected:

- O Intermittent wiper
- O Engine shut down (power down) when changing travelling direction
- O Overspeed protection for engine and transmission
- O Transmission disengagement
- O Downshifting / engine retarding
- O Kick-down
- O Secondary steering
- O Boom Suspension System, single-acting lifting is not disconnected

Re-arranging connections for Limp-Home operation:

See Figure [?] and ---- not implemented: INTXREF ----: , ---- not implemented: INTXREF ----: , ---- not implemented: INTXREF ----: ,

Disconnect connector EY (blue cables) from the circuit board.

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

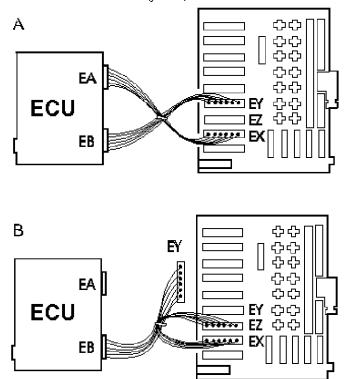


Figure 1 Limp-Home operation

- A. Normal connection
- B. Re-arranged connections for Limp-Home operation

Removing control unit

In order to be able to remove the control unit, connectors EB and IC must also be disconnected from the control unit in addition to the re-arranging of connections for Limp-Home operation.

L68480A





Document Title: Monitored functions	Information Type: Service Information	Date: 25.04.2013
Profile:		

Monitored functions

Functions included in the central warning

- O Filter indication, transmission
- O Engine coolant temperature
- O Transmission oil temperature
- O Engine oil pressure
- O Transmission oil pressure
- O Brake pressure
- O Parking brake and simultaneous operation
- O Secondary steering
- O Too high speed/gear
- O Axle oil temperature

Filter indication, transmission

At pressure above alarm trigger point and transmission oil temperature above 60 °C (140 °F):

- O The warning lamp lights up
- O The central warning flashes for 30 seconds

Sensor check: Short circuit and engine turned off:

O With the ignition switch in position 1 the warning lamp lights up

Coolant temperature (instrument indication)

At temperature above alarm trigger point, approx. 103 °C (217 °F):

- O Warning lamp lights up
- O Central warning flashes
- O Buzzer sounds

Sensor check; Open circuit, short circuit:

- O Warning lamp flashes
- O Instrument oscillates at minimum indication

Transmission oil temperature (instrument indication)

At temperature above alarm trigger point, approx. 121 °C (250 °F):

- O Warning lamp lights up
- O Central warning flashes

Sensor check; Open circuit, short circuit:

- O Warning lamp flashes
- O Instrument oscillates at minimum indication

Engine oil pressure monitor

At pressure below alarm trigger point, 80 kPa (0.8 bar) (11.6 psi)

- O The warning lamp lights up
- O Central warning flashes

Sensor check; Open circuit in the sensor circuit:

O With the ignition switch in position 1 and engine turned off the warning lamp flashes

Transmission oil pressure

At a pressure below alarm trigger point (varying with the speed):

Speed	Transmission oil pressure	
approx. 700 rpm	approx. 0.7 MPa (7 bar) (102 psi)	
approx. 1200 rpm	approx. 1.25 MPa (12.5 bar) (181 psi)	

- O Warning lamp lights up
- O Central warning flashes

Sensor check; Open circuit, short circuit:

O With the ignition switch in position 1 and engine turned off the warning lamp flashes

Brake pressure

At a pressure below alarm trigger point, approx. 9 MPa (90 bar) (1305 psi)

- O Engine turned off
 - O Warning lamp lights up
- O Engine running
 - O Warning lamp lights up
 - O Central warning flashes
- O Engine running, gear engaged
 - O Warning lamp lights up
 - O Central warning flashes
 - O Buzzer sounds

Parking brake

If the parking brake is applied and a gear is engaged while the engine is running, the central warning lamp will be triggered and if one attempts to move off, also the buzzer will sound at the same time.

Axle oil temperature

At an oil temperature above the alarm trigger point (1st level), approx. 110 °C (230 °F):

O Warning lamp lights up

At an oil temperature above alarm trigger point (2nd level), approx. 140 °C (284 °F):

- O Warning lamp lights up
- O Central warning flashes
- O Buzzer sounds

Sensor check: Open circuit, short circuit in the sensor circuit:

O Warning lamp flashes

Functions not included in the central warning

Air filter monitoring

Alarm at a too large partial vacuum, approx. 5 kPa (0.05 bar) (0.7 psi)

O Warning lamp lights up

Sensor check; Open circuit and the engine turned off:

O Warning lamp flashes

Fuel level (instrument indication)

Sensor check; Open circuit:

O Instrument oscillates at minimum indication





Document Title: Other electrical functions (controlled by the control unit)	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Other electrical functions (controlled by the control unit)

Speed indication □

Current speed is shown on the instrument.

Preheating

In the engine induction manifold there is an electrical heating element which is used for preheating the induction air to the engine to facilitate starting a cold engine, or to aid the engine in quicker reaching its working temperature.

Preheating:

The preheating is connected by turning the ignition switch to position 2 and pressing SW25.

The preheating time is dependent on the coolant temperature. Temperatures from -10 °C to +30 °C (+14 °F to +86 °F):

- O Will result in preheating times varying from 10 to 50 seconds.
- O Temperatures below –10 °C (+14 °F) will result in a warming-up time of 50 seconds.

Automatic heating:

While starting, the heating will be connected automatically if the temperature is between -10 °C and +10 °C (+14 °F and +50 °F).

- O Will result in preheating times varying from 10 to 50 seconds.
- O Temperatures below –10 °C (+14 °F) will result in a warming-up time of 50 seconds.

Additional heating:

- O Is activated via the display unit: "ADDITIONAL HEATING".
- O While activated, additional heating is obtained after the engine has started. The heating time varies between 40 to 20 seconds. It is automatically repeated up to a maximum of four times, unless the coolant temperature before that has reached +35 °C (+95 °F).

Sensor check (coolant temperature); Open circuit, short circuit:

O Will always result in 50 seconds of preheating regardless of coolant temperature, when the preheating is activated manually.

Secondary steering□

Engagement of pump at too low a steering pressure Alarm at too low steering pressure:

- O Warning lamp lights up
- O Central warning flashes

Sensor check; Engine turned off and differential pressure sensor or steering pressure sensor open:

Warning lamp flashes

Boom Suspension System □

Activation:

- O The Boom Suspension System is activated by pressing the activation switch with the engine running.
- O The Boom Suspension System is deactivated by pressing the activation switch once more or by turning off the

engine.

Function:

- 1. Function selector, Boom Suspension System:
- 2. Gear-dependent:
 - O The Boom Suspension System will be engaged in gear positions 2, 3, and 4, the control lamp will be alight. When downshifting to position 1, the Boom Suspension System will be disengaged and the control lamp will be flashing.
- 3. Speed-dependent:
 - O The Boom Suspension System will be engaged when the speed exceeds 5 km/h (3.1 mph) (regardless of gear). The control lamp will be alight.
 - O Below 5 km/h (3.1 mph) the Boom Suspension System will be disengaged and the control lamp will be flashing.

Wiper

Intermittent wiping:

- O On time 0.5 second
- O Off time 5.0 seconds

Windscreen washer□:

O Is connected when the washer control is actuated and remains on for 5.0 seconds after the control has been released.





Document Title: Units connected to the control unit	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Units connected to the control unit



Units marked with an \square are optional equipment.

Temperature sensors (analogue)

Coolant temperature Transmission oil temperature Axle oil temperature, front Axle oil temperature, rear

Pressure sensor (analogue)

Transmission oil pressure

Level sensor (analogue)

Fuel level

Pressure monitors

Brake pressure
Parking brake
Engine oil pressure
Air filter, pressure drop
Transmission disengagement
Filter indication, transmission

Secondary steering, steering pressure ☐ See Section 6
Secondary steering, differential pressure ☐ See Section 6

Frequency sensors

Engine speed

Output speed, transmission (the travelling speed of the machine)

Controls/switches

Gear selector control (F, R, 1, 2, 3, Automatic, Kick-down)

Kick-down switch

Downshifting, engine retarding

Relay for preheating

Washer

Intermittent wiper

Secondary steering, test□

CDC (Comfort Drive Control)□

Dual control, F/RD

Boom Suspension System^{II}, activation

Boom Suspension System \square , function selector

APS II, Mode selector

Gear shifting solenoids

Transmission (S1, S2, S3, S4, S5)

Relays

Preheating

Secondary steering

Engine shut down (power down) when changing travelling direction

Wiper (intermittent, washer)

Boom Suspension System□

Control lamps

Central warning

Engine oil pressure

Transmission oil pressure

Coolant temperature

Transmission oil temperature

Brake pressure

Steering pressure

Air filter

Boom Suspension System \square

Axle oil temperature (common to front and rear axles)

Secondary steering

Buzzer

Reinforced central warning

Instruments

Speedometer₀

Coolant temperature

Transmission oil temperature

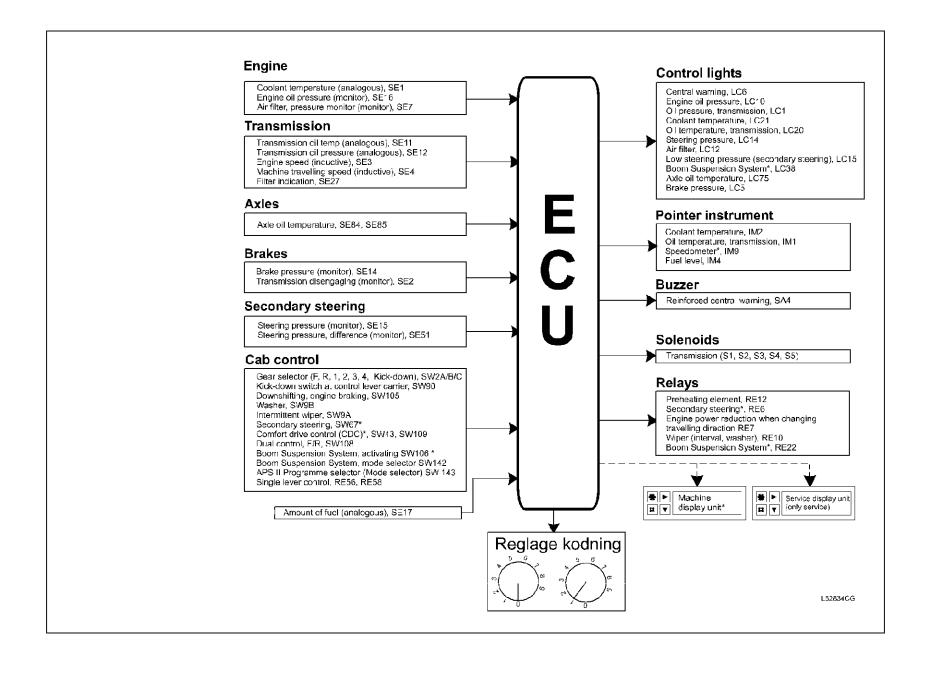
Fuel level

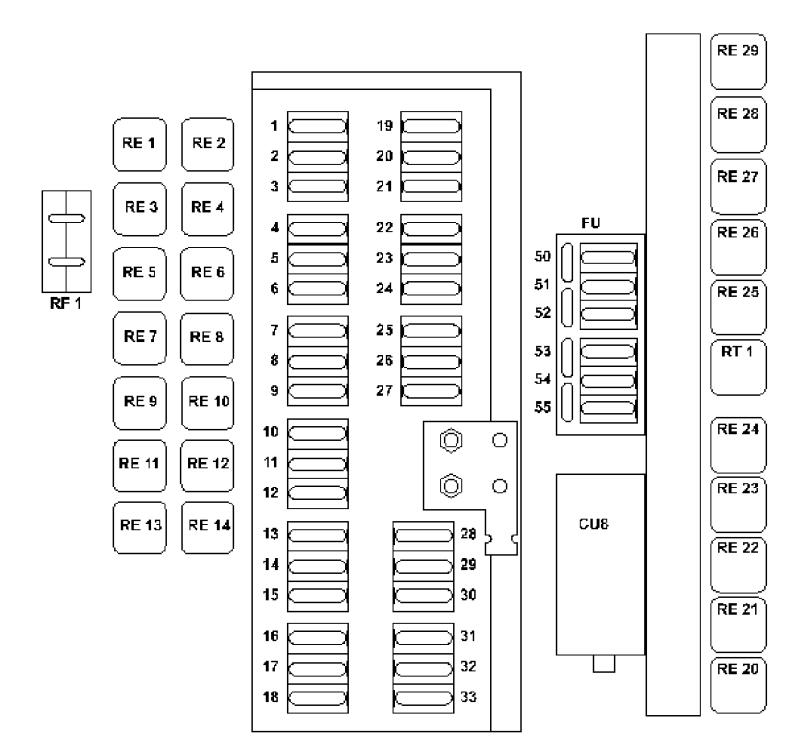
Display unit (installed in machine)

Display unit for operator information [

Service display unit

Plug-in display unit for authorised service personnel







Service Information

Document Title: Air conditioning	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Diode	Diode	
22:7	DI1.30	Quenching diode for MA17	
	Sensors		
22:6	SE21	Thermostat AC	
22:6	SE22	AC pressure monitor	
	Magnet		
22:6	MA17	Compressor clutch, AC	
	Motor		
22:3	MO1	Cab fan	
	Relays		
22:6	RE44	AC safety	
22:5	RE48	AC safety	
	Switches		
22:3	SW6	Cab fan	
22:4	SW7	AC	
	Fuse		
22:1	FU1	Cab fan / AC	

 $[\]square$) Optional equipment

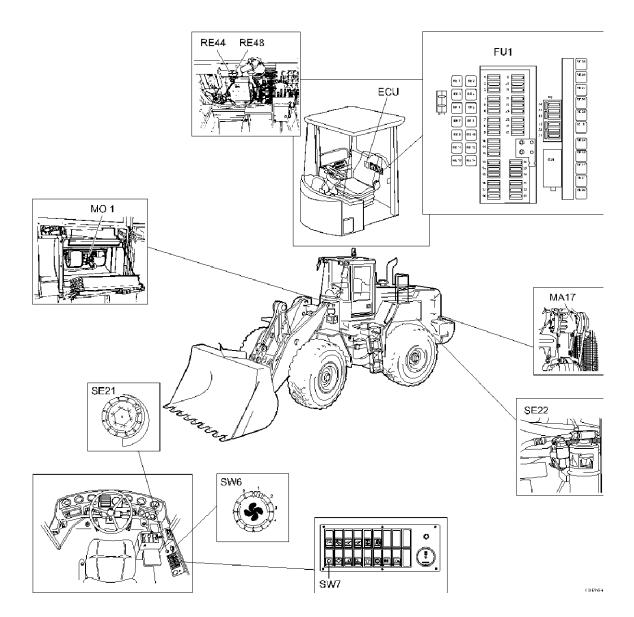


Figure 1



Service Information

Document Title: Air conditioning □	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Air condi	tioning□			
Item	Diode	Diode		
22:7	DI1.30	Quenching diode for MA17		
	Sensors			
22:6	SE21	Thermostat AC		
22:6	SE22	AC pressure monitor		
	Magnet			
22:6	MA17	Compressor clutch, AC		
	Motor			
22:3	MO1	Cab fan		
	Relays			
22:6	RE44	AC safety		
22:5	RE48	AC safety		
22:7	RT11	Smooth start, compressor		
	Switches			
22:7	SW1	Ignition switch		
22:3	SW6	Cab fan		
22:4	SW7	AC		
	Fuses			
22:1	FU1	Cab fan / AC		
22:6	FU50	Stop solenoid		
22:7	FU51	Compressor, loud tone horn		

 $[\]square$) Optional equipment

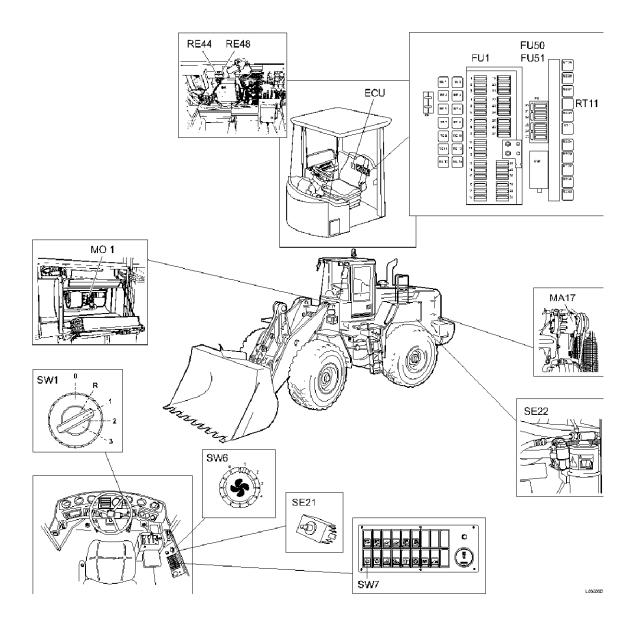


Figure 1



Service Information

Document Title: Automatic greasing	Information Type: Service Information	Date: 25.04.2013
Profile:		

Automatic greasing

Item	Motor	
27B:6-8	MO13	Automatic greasing pump unit□
	Relay	
27B:7	RE29	Automatic greasing
	Switches	
247B:1-2	SW2	Gear selector control
27B:7	SW144	Automatic greasing
	Sensor	
27B:7	SE113	Pressure monitor, automatic greasing
	Fuses	
27B:5	FU20	Feed, optional equipment
27B:1	FU29	Gear shifting
27B:5	FU54	Compressor, seat with air suspension / Compressor, loud tone horn / Filter indication transmission filter
27B:5	FU55	Magnetising 100 A alternator□
27B:6	FU58	Unassigned, optional equipment
27B:6	FU59	Automatic greasing□

 $[\]square$) Optional equipment

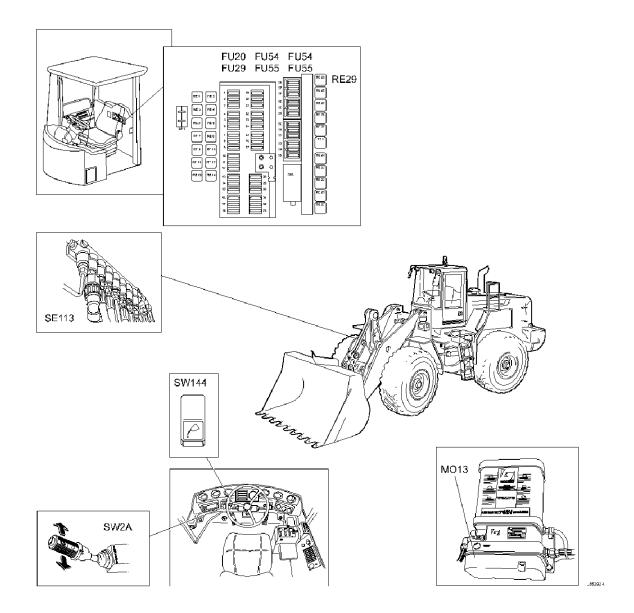


Figure 1





Document Title: Boom Suspension System	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Boom Suspension System

Item	Diodes	
19:4	Di7.5	Quenching diode, Boom Suspension System
19:4	DI4.20	Boom Suspension System□ / Single-acting lifting function□

	Electronic control unit	
19:1-3	ECU	Control unit

	Control lamp	
19:1	LC380	Boom Suspension System

	Magnets, solenoid valves	
19:6, 19:7	MA55	Boom Suspension System□ / Single-acting lifting function
19:5	MA59	Boom Suspension System

	Relay	
19:5	RE22	Boom Suspension System

	Switches	
19:6, 19:7	SW970	Single-acting lifting function
19:3	SW1060	Boom Suspension System
19:2	SW1420	Boom Suspension System, function selector

	Fuses	
19:2, 19:6	FU310	Boom Suspension System
19:1	FU10	Feed, switches, sensors

^{□)} Optional equipment

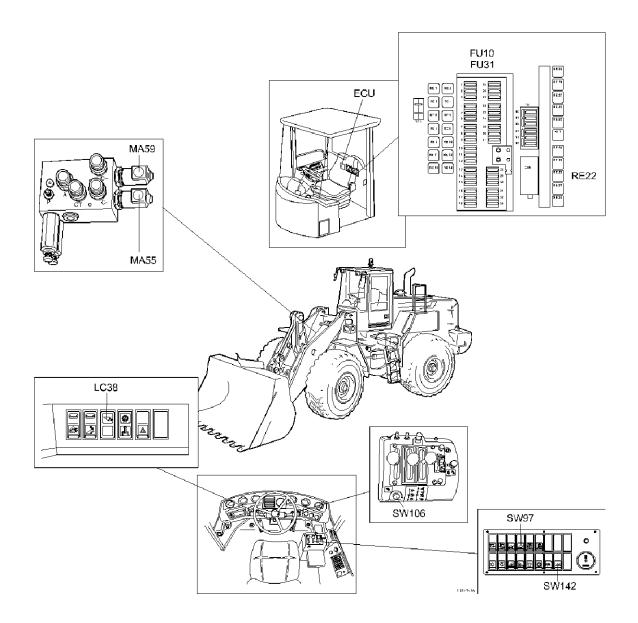


Figure 1





Document Title: Boom Suspension System	ļ '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Boom Suspension System

Item	Diodes	
19:4	Di7.5	Quenching diode, Boom Suspension System
19:4	DI4.20	Boom Suspension System□ / Single-acting lifting function
	Electronic control unit	
19:1-3	ECU	Control unit

	Sensor	
19:5	SE129	Boom Suspension System

	Control lamp	
19:1	LC38□	Boom Suspension System

	Magnets, solenoid valves	
19:6, 19:7	MA55	Boom Suspension System□ / Single-acting lifting function□
19:5	MA59	Boom Suspension System

	Relay	
19:5	RE22	Boom Suspension System

	Switches	
19:6, 19:7	SW970	Single-acting lifting function
19:3	SW1060	Boom Suspension System
19:2	SW1420	Boom Suspension System, function selector

	Fuses	
19:2, 19:6	FU310	Boom Suspension System
19:1	FU10	Feed, switches, sensors

\square) Optional equipment

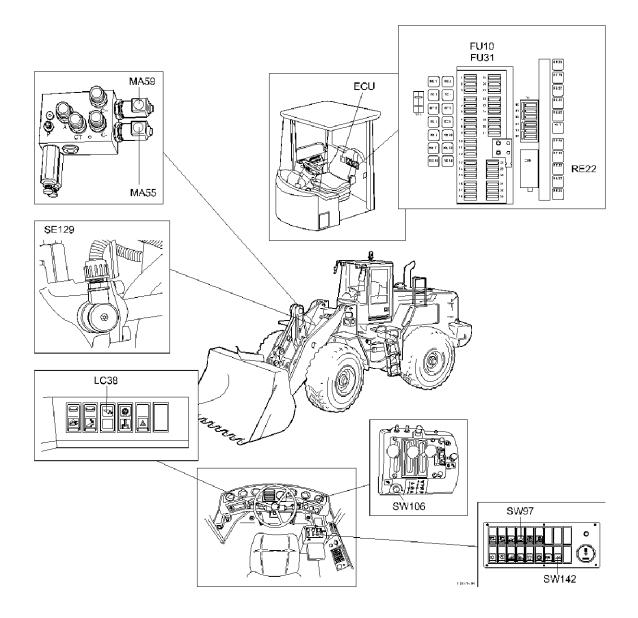


Figure 1



Document Title: Code key for diodes	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Code key for diodes

Diodes on circuit board

DIODE No.	Function	
Di2.1	Reverse drive signal	
Di2.2	Forward drive signal	
Di2.3	Delayed disengagement of speed gears when changing travelling direction	
Di2.4	Delayed disengagement of speed gears when changing travelling direction	
Di2.5	Quenching diode, gear shifting solenoid	
Di2.6	Quenching diode, gear shifting solenoid	
Di2.7	Quenching diode, gear shifting solenoid	
Di2.8	Quenching diode, gear shifting solenoid	
Di2.9	Quenching diode, gear shifting solenoid	
Di2.10	Reverse drive signal	
Di2.11, 2.13	Signal CDC / dual control	
Di2.12	Forward drive signal	
Di2.13	Priority for ordinary gear selector control	
Di2.14	Secondary steering, two-speed during Limp-Home operation	
Di3.1	Quenching diode, preheating	
Di3.2	Quenching diode, stop solenoid	
Di3.3	Preheating in starting position	
Di4.1	Other machine types	
Di4.2	Quenching diode MA tilting	
Di4.3	Quenching diode MA lifting	
Di4.4	Control diode, pressure draining	
Di4.5	Control diode, pressure draining	
Di4.6	Quenching diode, secondary steering	
Di4.7	Quenching diode, MA floating	
Di5.1	Control lamp, working lights	
Di5.2	Control lamp, working lights	
Di5.3	Guide lights (voltage reduction)	
Di5.4	Guide lights (voltage reduction)	
Di5.5	Guide lights (voltage reduction)	
Di5.6	Guide lights (voltage reduction)	
Di5.7	Guide lights (voltage reduction)	
Di5.8	Working-light dependent parking lights	
Di7.1	Control diode, central warning, brake pressure	
Di7.2	Control diode, central warning, steering pressure	
Di7.3	Control diode, central warning, engine oil pressure	
Di7.4	Zener diode, instrument feed, Limp-Home operation	

Di7.5	Quenching diode, Boom Suspension System

Diodes outside circuit board

Di1.30 (on CU4)	Air conditioning□, quenching diode, MA17
Di1.40	Air conditioning□, blocking diode
Di2.20	CDC []
Di2.21	Dual control Forward/Reverse 🏻
Di2:46	Single lever control, dual control
Di2:47	Single lever control, dual control
Di2:48	Single lever control, dual control
Di2:49	Single lever control, dual control
Di2:50	Single lever control, dual control
Di2:51	Single lever control, dual control Forward/Reverse
Di2:52	Single lever control, dual control Forward/Reverse
Di2:53	Single lever control, dual control Forward/Reverse
Di2:54	Single lever control
Di2:55	Single lever control
Di2:56	Quenching diode, MA160
Di4:10	3rd-4th/5th hydraulic function
DI4.20	Boom Suspension System□ / Single-acting lifting function□
Di4:22	Quenching diode MA 3rd function





Document Title: Codes used in wiring diagrams	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Codes used in wiring diagrams

ВА	Battery
С	Condenser
CU	Electronic control unit
DI	Diode
ECU	Electronic control unit
FU, FH	Fuse
HE	Heater radiator
IM	Instruments
LA	Lamp
LC	Control lamp
MA	Magnet, solenoid valve
МО	Engine
R	Resistor/Rheostat
RE	Relay
RF	Flasher relay
S	Gear shifting solenoid
SA	Signal (alarm)
SE	Sensor
SW	Switches

Ground connection

31	Rear wall in cab, left side
31B	Rear wall in cab, left side
31C	Rear wall in cab, left side
31CA	Rear wall in cab, left side
31CU	Rear wall in cab, left side
31D	Rear wall in cab, left side
31F	Rear wall in cab, left side
31L	Rear wall in cab, left side
31R	Rear wall in cab, left side
31R2	Rear wall in cab, left side
31S	Rear wall in cab, left side
31F1	Font frame, inside, right side
31F2	Front frame, inside, in connecting box
31F3	Front frame, inside, left side, by connecting box
31B1	Rear frame, rear left cab mounting
31B2	Rear frame, left side by oil filters

31B3	Rear frame, left side by battery disconnect switch	
Grounding points	Grounding points	
31	On circuit board	
31DI	On circuit board	
31EA	On circuit board	
31EP	On circuit board	

Battery

E	3A1
E	3A2

Condenser

C2.1	Delayed disengagement, when changing travelling direction
------	---

Electronic control units

CU3	CDCII
CU8	Key-turn engine stop
CU20	CDCI Ramp generator
CU21	Mode selector
CU22	CDCI Ramp generator
ECU	Control unit

Heater radiator

HE1	Preheating coil
HE2	Cigarette lighter
HE3	Heated seat□

Instruments

IM1	Transmission oil temperature
IM2	Coolant temperature
IM3	Hour recorder
IM4	Fuel gauge
IM9	Speedometer□

Fuse holder, circuit board

FU1	20 A	Cab fan / air conditioning□
FU2	10 A	Wiper and washer□, front, horn
FU3	5 A	Wiper, washer□, rear / Heated seat□ L90C Serial No. 15414– (EU), 63162– (US) L120C Serial No. 12536– (EU), 62302– (US)
FU4	10 A	Working lights front
FU5	20 A	Working lights rear, rotating warning beacon□
FU6	10 A	Working lights front, extra□
FU7	5 A	Hazard flashers
FU8	15 A	Travel lights / Parking lights
FU9	10 A	Cigarette lighter

FU10	5 A	Feed switches, sensors
FU11	5 A	Reversing alarm□ / Cab light
FU12	10 A	Feed voltage converter□
FU13	5 A	Preheating
FU14	10 A	Feed ignition switch
FU15	15 A	Starter inhibitor
FU16	5 A	Feed ECU
FU17	5 A	Feed voltage converter□
FU18	5 A	Transmission disengagement / Differential lock
FU19	5 A	Parking lights, front left and rear right
FU20	5 A	Feed optional equipment□
FU21	5 A	Direction indicators / Stop lights
FU22	5 A	Bucket positioner and boom kick-out / Floating position / Additional hydraulic function / Downshifting
FU23	5 A	High beam right
FU24	5 A	Secondary steering□
FU25	5 A	Low beam left
FU26	5 A	Low beam right
FU27	5 A	Parking lights front right and rear left
FU28	5 A	High beam left
FU29	5 A	Gear shifting
FU30	5 A	Engine shut down (power down) when changing travelling direction
FU31	10 A	Single-acting lifting□ / Boom Suspension System□
FU32	5 A	Heated seat□ /Rider truck safety norm□ L90C Serial No. –15413 (EU), –63161 (US) L120C Serial No. –12535 (EU), –62301 (US)
FU33	5 A	Separate attachment locking

Fuse holder, separate

FU50	15 A	Stop solenoid
FU51	15 A	Compressor, loud tone horn
FU52	10 A	Compressor operator seat with air suspension
FU53	5 A	Time relay rider truck safety norm
FU54	5 A	Compressor operator seat with air suspension / Compressor loud tone horn / Filter ind. transm. filter
FU55		Magnetising 100 A alternator□
FU58		Unassigned, optional equipment
FU59		Automatic greasing 🛘

In-line fuses

FH1	5 A	Preheating, control lamp (positioned at the rear by the heater radiator)
FH2	5 A	Secondary steering (positioned by steering pump / secondary steering pump)
FH3	55A	Preheating, element (positioned at the rear by the heater radiator)
FH5	5 A	Voltage converter / Ground connection

Lamps

LA1	Guide lights, switches and instrument lighting (10–25 pcs)
LA2	Side-marking light, front right□
LA3	Side-marking light, front left□
LA4	Parking light, front right
LA5	Tail light, left
LA6	Tail light, right
LA7	Parking light, front left
LA8	Low beam, right
LA9	Low beam, left
LA10	High beam, left
LA11	High beam, right
LA12	Working light, cab front, left
LA13	Working light, cab front, right
LA14	Working light, front mudguard, left□
LA15	Working light, front mudguard, right□
LA16	Working lights, attachments□
LA22	Working light, cab rear, left□
LA23	Working light, cab rear, right□
LA26	Working light, radiator casing, left
LA27	Working light, radiator casing, right
LA29	Stop light, left
LA30	Stop light, right
LA31	Interior light, cab
LA34	Direction indicator, rear left
LA35	Direction indicator, front left
LA36	Direction indicator, front right
LA37	Direction indicator, rear right
LA38	Rotating warning beacon□
LA39	Number plate lighting 🛘

Control lamps

LC1	Transmission oil pressure
LC2	Differential lock
LC4	High beams
LC5	Brake pressure
LC6	Central warning
LC8	Direction indicators
LC9	Parking brake
LC10	Engine oil pressure
LC11	Charging
LC12	Air filter
LC13	Preheating
LC14	Low steering pressure, (secondary steering)
LC15	Secondary steering system
LC20	Transmission oil temperature
LC21	Coolant temperature
LC31	Filter indication, transmission

LC33	Working lights
LC35	Rotating warning beacon
LC38	Boom Suspension System□
LC75	Axle oil temperature
LC79	CDCI

Magnets, solenoid valves

MA9	Differential lock
MA17	Compressor, air conditioning□
MA19	Detent solenoid, tilting
MA20	Detent solenoid, lifting
MA21	Detent solenoid, floating position
MA28	CDCII
MA36	Optional hydraulic function, 3rd-4th□
MA37	Optional hydraulic function, 5th 🛘
MA41	Floating position
MA 51	Attachment locking
MA52	Raised servo pressure□
MA55	Boom Suspension System□ / Single-acting lifting function□
MA59	Boom Suspension System□
MA64	Stop solenoid
MA67	Parking brake
MA76	Detent solenoid, 3rd function
MA160	Activation of single lever control

Motors

MO1	Fan, cab	
MO2	Windscreen wiper	
MO3	Rear window wiper	
MO4	Washer, front□	
MO5	Washer, rear	
МО7	Secondary steering□	
МО9	Compressor, loud tone horn	
MO10	Compressor, seat with air suspension□	
MO13	Automatic greasing pump unit 🛘	

Resistors

R2.1	Delayed disengagement of speed gears when changing travelling direction	
R2.2	Loading resistor, gear selector control	
R7.1	Loading resistor, brake pressure	
R7.2	Loading resistor, engine oil pressure	
R7.3	Loading resistor, air filter indication	
R7.4	Loading resistor, charging (magnetising)	
R7.5	Transmission oil temperature	
R7.6	Coolant temperature	
R7.7	Central warning	
R7.8	Instrument feed	

R8	Rheostat, instrument lighting
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Relays

RE1	Rucket positioner			
RE2	Bucket positioner Boom kick-out			
RE3	Unloading ignition switch			
RE4	Unloading ignition switch			
RE5	Working lights front, extra□			
RE6	Secondary steering			
RE7	Engine shut down (power down) when changing travelling direction			
RE8	Unassigned			
RE9	Reversing alarm			
RE10	Intermittent wiper			
RE11	Delayed disengagement of speed gears when changing travelling direction			
RE12	Preheating			
RE13	Starter inhibitor			
RE14	Unloading ignition switch / Starter motor			
RE20	Dual control Forward/Reverse□			
RE21	Dual control Forward/Reverse□			
RE22	Boom Suspension System□			
RE23	Seat with air suspension□			
RE24	Activation central warning, rider truck safety norm□			
RE25	Loud tone hom□			
RE27	Filter indication, transmission			
RE28	Parking brake			
RE29	Automatic greasing			
RE30	CDCI			
RE31	CDCI			
RE40	Preheating□ on engine (positioned by heating element)			
RE41	Secondary steering (positioned by secondary steering pump)			
RE44	Air conditioning, AC-safety□			
RE48	Air conditioning, AC-safety□			
RE49	Unassigned□			
RE56	Single lever control, reverse gear relay			
RE57	Single lever control, protective relay			
RE58	Single lever control, forward gear relay			
RE59	Single lever control, protective relay			
RF1	Flasher relay, direction indicators, hazard flashers			
RT1	Time relay, rider truck safety norm			
RT11	Smooth start, AC-compressor			
	Smooth start, Ac compressor			

Gear shifting solenoids

S1	Gear shifting N - D
S2	Gear shifting F - R
S3	Gear shifting 3rd / 4th - 2nd / 1st
S4	Gear shifting 2nd - 1st
S5	Gear shifting 3rd - 4th

Horn (alarm)

SA1	Horn
SA3	Reversing alarm□
SA4	Buzzer, central warning
SA6	Buzzer, rider truck safety norm□

Sensor

SE1	Coolant temperature	
SE2	Transmission disengagement	
SE3	Speed sensor	
SE4	Speed sensor	
SE5	Operator seat, rider truck safety norm□	
SE6	Mechanical or hydraulic parking brake	
SE7	Air filter	
SE11	Transmission oil temperature	
SE12	Transmission oil pressure	
SE 14	Brake pressure	
SE15	Steering pressure□	
SE16	Engine oil pressure	
SE17	Fuel level	
SE18	Differential lock	
SE21	Thermostat, air conditioning	
SE22	Pressure, Air conditioning□	
SE29	Stop lights	
SE33	Boom kick-out	
SE35	Bucket positioner	
SE51	Differential pressure, secondary steering□	
SE61	Floating position	
SE62	CDCII	
SE72	Filter indication, transmission	
SE84	Axle oil temperature, front axle	
SE85	Axle oil temperature, rear axle	
SE113	Pressure monitor, automatic greasing	
SE129	Pressure monitor, Boom Suspension System□	

Switches

SW1	Ignition switch
SW2	Gear selector control
SW2A	Directional shifting, Forward/Reverse
SW2B	Speed gear
SW2C	Kick-down
SW4	Transmission disengagement
SW6	Cab fan
SW7	Air conditioning□
SW8	Hazard flashers
SW9A	Windscreen wiper / Intermittent wiper
SW9B	Washer front□

SW9C	Horn		
SW9D	High and low beams		
SW9E	Direction indicators		
SW10	Differential lock		
SW12	Wiper / Washer□, rear		
SW14	Rotating warning beacon□		
SW17	Bucket positioner		
SW18	Boom kick-out		
SW19	Optional hydraulic function, 3rd-4th□		
SW19A	Optional hydraulic function, 3rd-4th-5th□		
SW20	Parking lights / travel lights		
SW21	Loud tone horn□		
SW22	Working lights, front (standard + extra□)		
SW23	Working lights, rear (standard + extra□)		
SW25	Preheating		
SW26	Battery disconnect switch		
SW30	CDCI		
SW43	Forward/Reverse (CDC)		
SW60	Floating position		
SW67	Test, secondary steering□		
SW88	Detent circuit, 3rd function□		
SW90	Kick-down by control lever carrier		
SW91	Raised servo pressure□		
SW92	Attachment locking		
SW97	Single-acting lifting function□ / Boom Suspension System□		
SW105	Downshifting, engine retarding		
SW106	Boom Suspension System□, activation		
SW107	Dual control□		
SW108	Forward/Reverse□ (dual control)		
SW109	Kick-down, CDC□		
SW116	Parking brake		
SW137	Emergency stop, control lever lockout 3rd function□		
SW142	Boom Suspension System□, function selector		
SW143	Mode selector		
SW144	Automatic greasing		
SW149	Single lever control, activation		
SW150	Single lever control, dual control Forward/Reverse		





Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Batteries	
1:1	BA1 and BA2	Battery

	Electronic control unit	
1:8 - 1:9	ECU	Control unit

	Relays	
1:4	RE3	Unloading ignition switch
1:5	RE4	Unloading ignition switch

	Switches	
1:4	SW1	Ignition switch
1:1	SW26	Battery disconnect switch

	Fuses	
1:3	FU14	Feed ignition switch
1:8	FU16	Feed ECU

	Miscellaneous	
1:1	Starter motor	
1:1	Alternator	

Ignition switch function

As the key is turned in the ignition switch, different contact pins become connected. With the key in position 0 contact pins 30 and P are connected. If the key is turned to position 3 contact pins 30, DR and 50 will be connected. The table shows which contact pins are connected at the respective key positions.

Key position	Connec	Connected contact pins					
0	30	Р					
R	30	Р	R				
1	30		R	DR	15		
2	30			DR	15	19	
3	30			DR			50

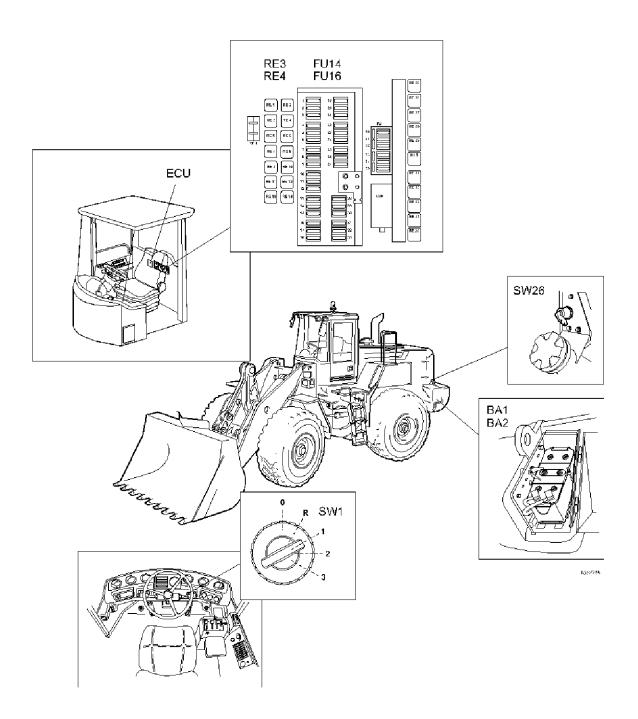


Figure 1





Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Compone	ent location			
Item	Electronic control unit			
2:3	ECU	Control unit		
	Motors	Tarri		
2:10	MO1	Cab fan		
2:1-4	MO2	Windscreen wiper		
2:6	MO3	Rear window wiper		
2:5	MO40	Washer, front		
2:7	MO50	Washer rear		
	Relays			
2:9	RE90	Reversing alarm		
2:2	RE10	Intermittent wiper front		
	11 (1)			
	Horn (alarms)	To the state of th		
2:9	SA1	Horn		
2:2	SA3 🛘	Reversing alarm		
	Switches			
2:10	SW6	Cab fan		
2:2	SW9A	Windscreen wiper / Intermittent wiper front		
2:5	SW9B	Washer, front		
2:5	SW9C	Horn		
2:6-7	SW12	Rear window wiper / Washer rear□		
	F			
	Fuses			
2:9	FU1	Cab fan / ACII		
2:1	FU2	Windscreen wiper / washer front□ / Horn		
2:6	FU3	Rear window wiper / washer rear		
2:8	FU9	Cigarette lighter		
2:9	FU11	Reversing alarm□ / Cab light		
	Heating element			
2:8	HE2	Cigarette lighter		

\square) Optional equipment

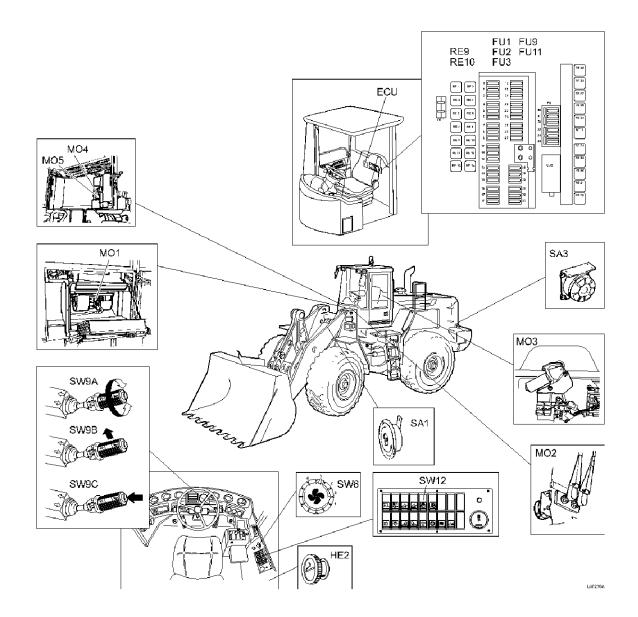


Figure 1



Document Title: Component location	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Diodes	
3:4	Di2.1	Reverse drive signal
3:4	Di2.2	Forward drive signal
3:4	Di2.3	Delayed disengagement of speed gears when changing travelling direction
3:5	Di2.4	Delayed disengagement of speed gears when changing travelling direction
3:2	Di2.10	Reverse drive signal
3:2	Di2.11	Signal to CDC / Dual control, priority for ordinary gear selector control
3:2	Di2.12	Forward drive signal
3:2	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control
3:6	Di2.14	Secondary steering, two-speed during Limp-Home operation

	Electronic control units		
3:2-6	ECU	Control unit	
3:8-10	CU21	Mode Selector	

	Condenser								
3:4	C2.1	Delayed	disengagement	of	speed	gears	when	changing	travelling
		direction							

	Resistors	
3:4	R2.1	Delayed disengagement of speed gears when changing travelling direction
3:7	R2.2	Loading resistor, gear selector control

	Relay								
3:5	RE11	Delayed	disengagement	of	speed	gears	when	changing	travelling
		direction							

	Switches	
3:1	SW2A	Directional gear Forward/Reverse
3:6	SW2B	Speed gear
3:6	SW2C	Kick-down
3:7	SW90	Kick-down
3:9	SW143	Mode Selector

	Fuses	
3:8	FU10	Feed switches, sensors
3:1	FU29	Gear shifting

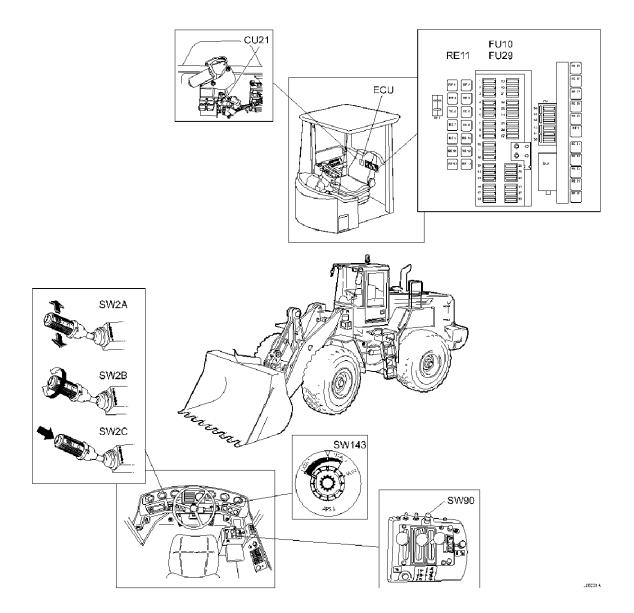


Figure 1





Document Title: Component location	ļ ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Diodes	
4:1	Di2.5	Quenching diode gear shifting solenoids
4:2	Di2.6	Quenching diode gear shifting solenoids
4:3	Di2.7	Quenching diode gear shifting solenoids
4:3	Di2.8	Quenching diode gear shifting solenoids
4:4	Di2.9	Quenching diode gear shifting solenoids

	Electronic control unit		
4:1-4, 4:7	ECU	Control unit	

	Sensors		
4:6	SE2	Transmission disengagement	
4:10	SE18	Differential lock	

	Control lamp	
4:10	LC2	Differential lock

	Solenoid valve	
4:8	MA9	Differential lock

	Gear shifting	Gear shifting solenoids	
4:1	S1	Gear shifting N - D	
4:2	S2	Gear shifting F - R	
4:3	S3	Gear shifting 1st - 2nd/3rd - 4th	
4:4	S4	Gear shifting 1st - 2nd	
4:5	S5	Gear shifting 3rd - 4th	

	Relay	
4:9	RE8□	Unassigned

	;	Switches	
4:6		SW4	Transmission disengagement
4:8	:	SW10	Differential lock

	Fuse	
4:5	FU18	Feed transmission disengagement / differential lock

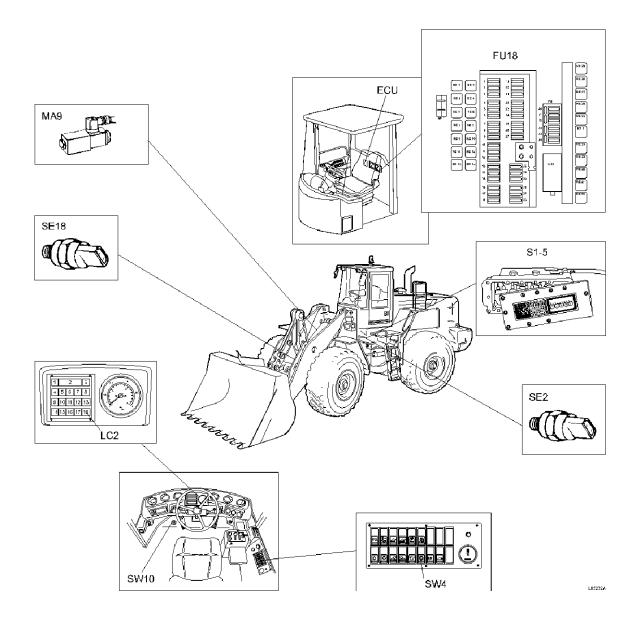


Figure 1





Document Title: Component location	ļ ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Diodes	
5:7	Di3.1	Quenching diode preheating element
5:9	Di3.2	Quenching diode engine shut down when changing travelling direction
5:2	Di3.3	Feed switch for heating element in starting position

	Electronic control units	
5:5 - 8	ECU	Control unit
5:10	CU8	Key-turn engine stop

	Control lamp	
5:7	LC13	Preheating

	Solenoid valve	
5:10	MA64	Key-turn engine stop

	Relays	Relays	
5:9	RE7	Engine shut down (power down)	
5:6	RE12	Unloading, ECU	
5:3	RE13	Starter inhibitor	
5:2	RE14	Unloading ignition switch / Starter motor	
5:6	RE40	Activation, heating element	

	Switches	
5:1	SW1	Ignition switch
5:5	SW25	Preheating
5:8	SW105	Downshifting, engine retarding

	Fuses		
5:6	FU13	Preheating	
5:3	FU15	Start	
5:9	FU30	Engine shut down (power down)	
5:10	FU50	Key-turn engine stop	
5:7	FH1	Preheating, control lamp	
5:7	FH3	Preheating, element	

	Heating element	
5:7	HE1	Heating element

	Miscellaneous
5:2	Starter motor

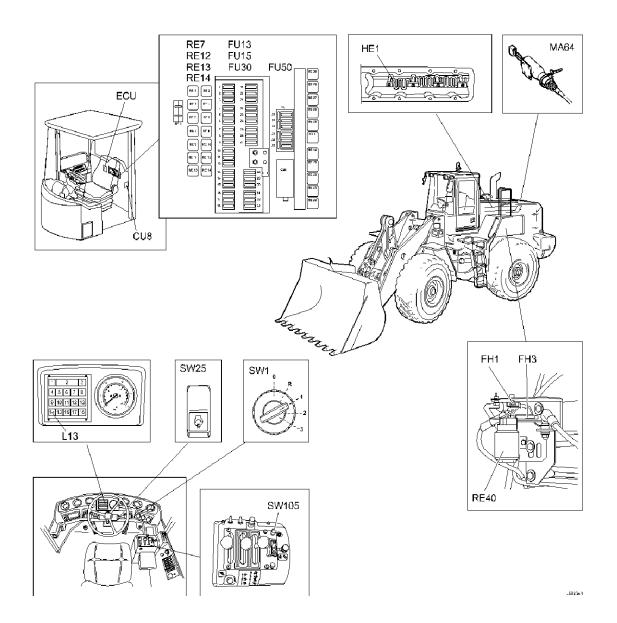


Figure 1



Construction Equipment

Document Title: Component location	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Diodes	
6:3	Di4.1	Quenching diode MA19
6:3	D4.2	Quenching diode MA19
6:5	Di4.3	Quenching diode MA20
6:7	Di4.7	Quenching diode MA41
6:10	Di4.22	Quenching diode MA76

	Sensors	
6:4	SE33	Boom kick-out
6:2	SE35	Bucket positioner
6:7	SE61	Floating position

	Magnets, sole	Magnets, solenoid valves	
6:3	MA19	Detent solenoid, tilting position	
6:5	MA20	MA20 Detent solenoid, lifting position	
6:8	MA21	Detent solenoid, floating position	
6:6, 6:10	MA36□	Optional hydraulic function, 3rd-4th□	
6:10	MA370	Optional hydraulic function, 5th	
6:7	MA41	Floating position	
6:10	MA760	Detent solenoid, 3rd function□	

	Relays	
6:2-3	RE1	Bucket positioner
6:4 - 5	RE2	Boom kick-out

	Switches		
6:2	SW17	Bucket positioner	
6:4	SW18	Boom kick-out	
6:6	SW190	Optional hydraulic function, 3rd-4th□	
6:6	SW60	Floating position	
6:10	SW88	Detent circuit, 3rd hydraulic function	
6:10	SW137	Emergency stop, control lever lockout 3rd hydraulic function	

	Fuse	
6:1, 6:9	FU22	Bucket positioner and boom kick-out / Floating position / Additional
		hydraulic function□ / Downshifting

\square) Optional equipment

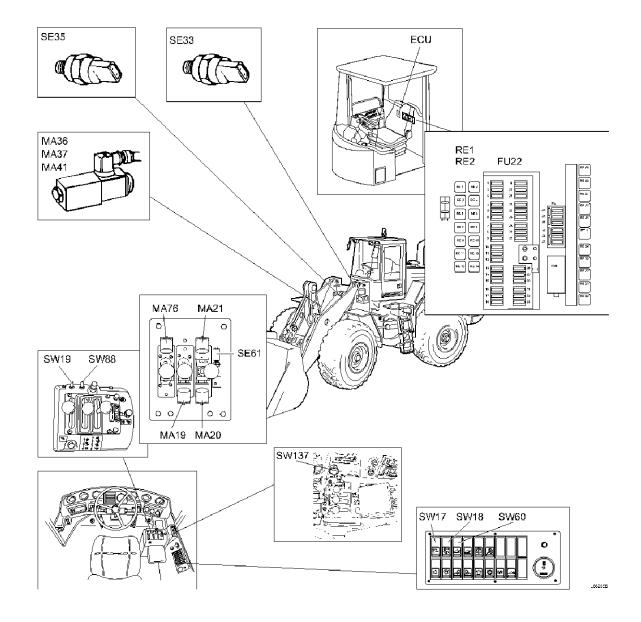


Figure 1



Document Title: Component location	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Diodes	
7:3	Di4.4	Control diode pressure draining
7:3	D4.5	Control diode pressure draining
7:8	Di4.6	Quenching diode secondary steering

	Control unit	
7:6-7	ECU	Control unit

	Sensors	Sensors	
7:5	SE15□	Steering pressure	
7:4	SE510	Differential pressure, secondary steering	

	Control lamps	
7:7	LC14	Low steering pressure
7:9	LC15	Secondary steering

	Magnets, solenoid valves	
7:3	MA510	Attachment locking
7:2	MA520	Raised servo pressure

	Motor	
7:8	MO70	Secondary steering

	Relays	
7:8	RE6□	Secondary steering
7:8	RE410	Secondary steering

	Switches	
7:6	SW670	Secondary steering test
7:2	SW910	Raised servo pressure
7:3	SW92□	Attachment locking

	Fuses	
7:4	FU240	Secondary steering
7:1	FU330	Attachment locking
7:9	FH20	Secondary steering

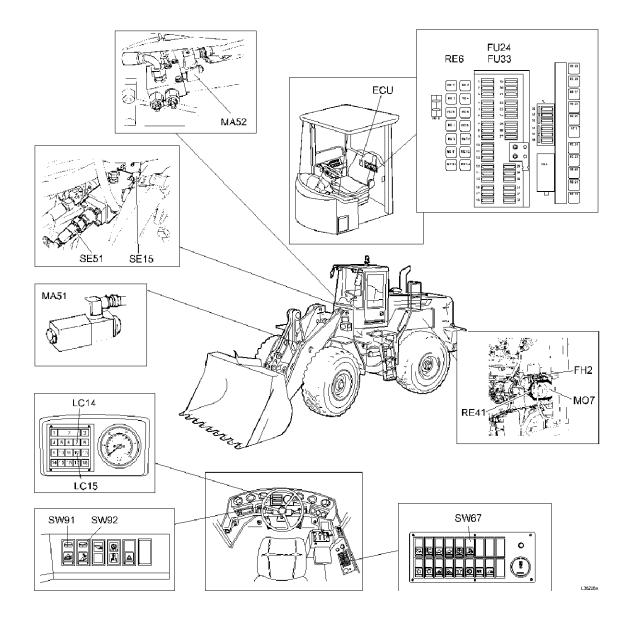


Figure 1



Document Title: Component location	Information Type: Service Information	Date: 25.04.2013
Profile:		

Component location

Item	Diodes	
7:3	Di4.4	Control diode pressure draining
7:3	D4.5	Control diode pressure draining
7:8	Di4.6	Quenching diode secondary steering

	Control unit	
7:6-7	ECU	Control unit

	Sensors	
7:5	SE150	Steering pressure
7:4	SE510	Differential pressure, secondary steering

	Control lamps	
7:7	LC14	Low steering pressure
7:9	LC15	Secondary steering

	Magnets, solenoid valves	
7:3	MA510	Attachment locking
7:2	MA520	Raised servo pressure

	Motor	
7:8	MO70	Secondary steering

	Relays	
7:8	RE6□	Secondary steering
7:8	RE410	Secondary steering

	Switches	
7:6	SW670	Secondary steering test
7:2	SW910	Raised servo pressure
7:3	SW92□	Attachment locking / AHC

	Fuses	
7:4	FU240	Secondary steering
7:1	FU330	Attachment locking / AHC
7:9	FH20	Secondary steering

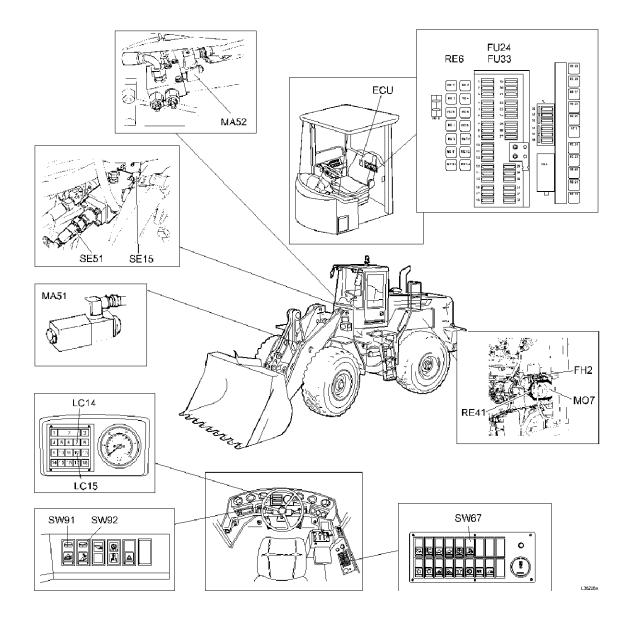


Figure 1





Document Title: Component location	!	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Diodes	
8:4	Di5.3	Voltage reduction guide lights, panels 1, 4
8:4	Di5.4	Voltage reduction guide lights, panels 1, 4
8:4	Di5.5	Voltage reduction guide lights, panels 1, 4
8:4	Di5.6	Voltage reduction guide lights, panels 1, 4
8:4	Di5.7	Voltage reduction guide lights, panels 1, 4

	Control lamp	
8:9	LC4	High beams

	Lamps	
8:3-4, 8:6	LA1	Guide lights, switches and instrument lighting, number varies depending on equipment
8:3-4, 8:6	LA1	Panel No. 1, connector SB10, 8-14 pcs lamps
8:3-4, 8:6	LA1	Panel No. 2, connector R13, 3 pcs lamps
8:3-4, 8:6	LA1	Panel No. 3, connector DA14, speedometer
8:3-4, 8:6	LA1	Panel No. 4, connector L7, 0-3 pcs lamps
8:4	LA20	Side-marking light, front right
8:2	LA30	Side-marking light, front left
8:3	LA4	Parking light front right
8:4	LA5	Tail light left
8:3	LA6	Tail light right
8:2	LA7	Parking light front left
8:8	LA8	Low beam right
8:7	LA9	Low beam left
8:9	LA10	High beam left
8:8	LA11	High beam right
8:10	LA31	Interior light, cab
8:5	LA39A□	Number plate lighting
8:5	LA39B□	Number plate lighting

	Resistor	
8:5	R8	Rheostat, instrument lighting

	Switches	
8:2	SW20	Parking lights / travel lights
8:8	SW9D	High and low beams

	Fuses	
8:1	FU8	Parking lights / travel lights

8:2	FU19	Parking lights, front left, rear right
8:8	FU23	High beam right
8:7	FU25	Low beam left
8:7	FU26	Low beam right
8:3	FU27	Parking lights, front right, rear left
8:9	FU28	High beam left

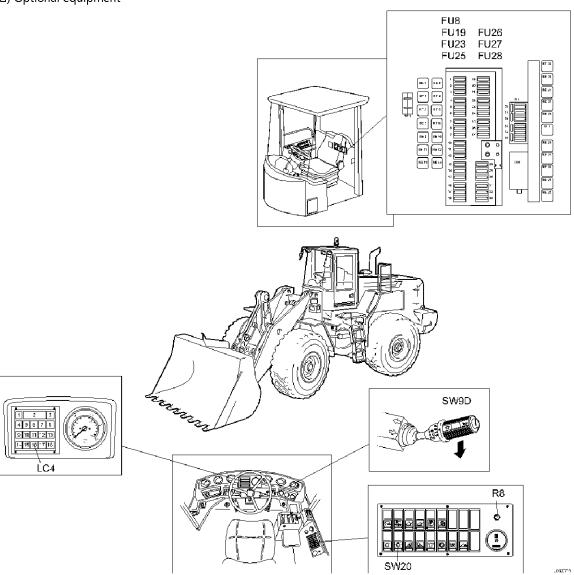


Figure 1



Document Title: Component location	Information Type: Service Information	Date: 25.04.2013
Profile:		

Component location

Item	Diodes	
9:4	Di5.1	Working lights control lamp
9:4	D5.2	Working lights control lamp
9:3	Di5.8	Working-light dependent parking lights

	Control lamps	
9:4	LC33 Working lights	
9:7	LC35	Rotating warning beacon

	Lamps	
9:2	LA12	Working light, cab, front left
9:2	LA13	Working light, cab, front right
9:3	LA14□	Working light, front mudguard, left
9:4	LA15□	Working light, front mudguard, right
9:3	LA16□	Working lights, attachment
9:6	LA220	Working light, cab, rear left
9:6	LA23□	Working light, cab, rear right
9:5	LA26	Working light, radiator casing, left
9:5	LA27	Working light, radiator casing, right
9:7	LA38□	Rotating warning beacon

	Relay	
9:3	RE50	Working lights, front, extra

	Switches	
9:7	SW140	Rotating warning beacon
9:2	SW22	Working lights, front, standard + extra
9:5	SW23	Working lights, rear, standard + extra

	Fuses	
9:1	FU4	Working lights, front
9:4	FU5	Working lights, rear, rotating warning beacon
9:3	FU60	Working lights front, extra

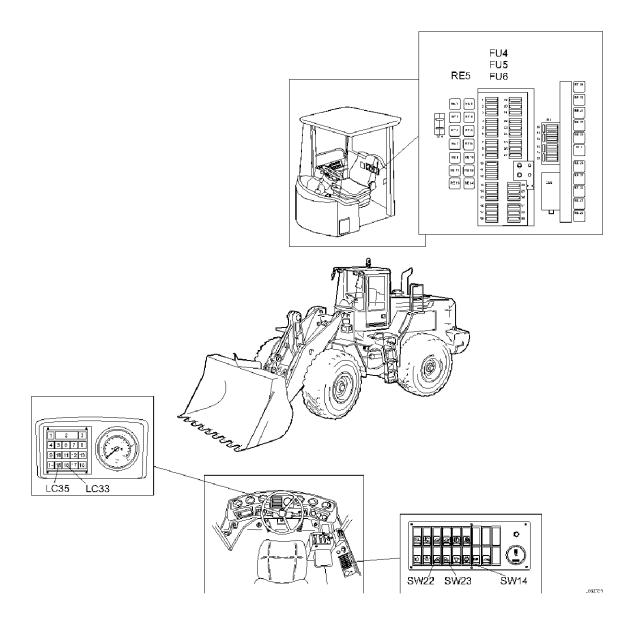


Figure 1



Service Information

Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Compone	ent location	
Item	Flasher relay	
10:5	RF1	Flasher relay, direction indicators, hazard flashers
	Sensor	
10:1	SE29	Stop lights
	Control lamp	
10:3	LC8	Direction indicators
	Lamps	
10:2	LA29	Stop light, left
10:2	LA30	Stop light, right
10:8	LA34	Direction indicator, rear left
10:7	LA35	Direction indicator, front left
10:6	LA36	Direction indicator, front right
10:7	LA37	Direction indicator, rear right
	Switches	
10:4-6	SW8	Hazard flashers
10:7	SW9E	Direction indicators
	Fuses	
10:3	FU7	Hazard flashers
10:1	FU21	Direction indicators / Stop lights

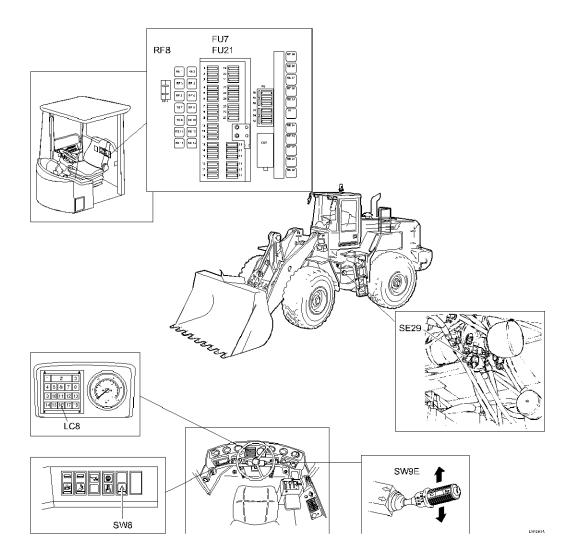


Figure 1



Construction Equipment

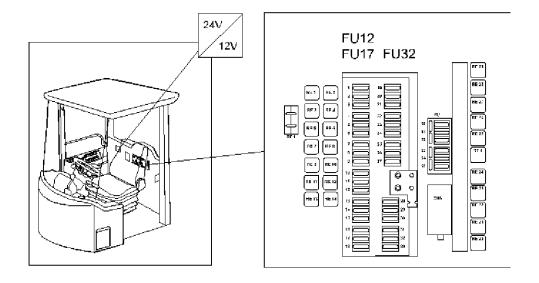
Document Title: Component location	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Voltage converter
11:2	Voltage converter, radio

	Heating elemer	neating element	
11:7	HE3 🛘	Heated seat	

	Fuses	
11:1	FU120	Voltage converter, radio
11:2	FU170	Voltage converter, radio
11:7	FU32	Heated seat



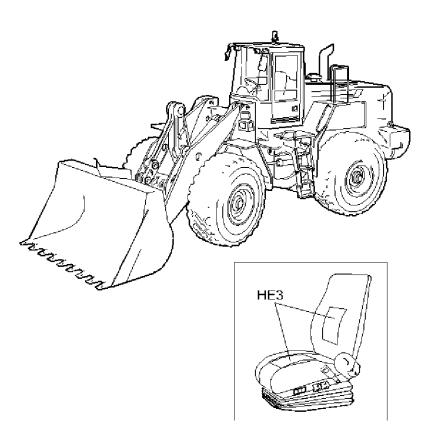


Figure 1

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Construction Equipment

Document Title: Component location	! · · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Voltage converte	Voltage converter		
11:2	Voltage converter	; radio		
	Batteries			
11:1	BA1 and BA2	Battery		
	Heating element			
11:7	HE3 🛘	Heated seat		
	Switch			
11:1	SW26	SW26 Battery disconnect switch		
	Fuses			
11:1	FU120	Voltage converter, radio		
11:2	FU170	Voltage converter, radio		
11:8	FU32	Heated seat		
11:1	FH5	Voltage converter, ground connection		

 $[\]square$) Optional equipment

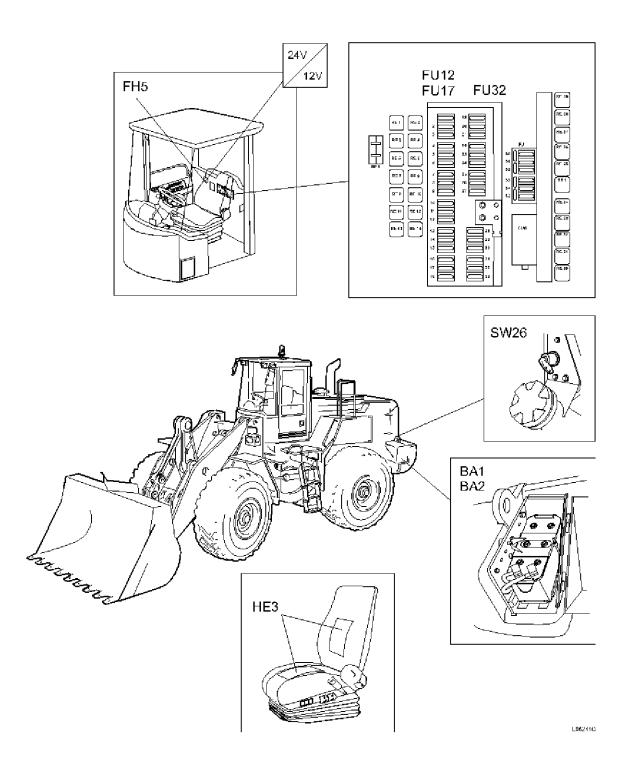


Figure 1



Construction Equipment

Document Title: Component location	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Voltage conver	Voltage converter		
11:2	Voltage converte	er, radio		
	Batteries			
11:1	BA1 and BA2		Battery	
	Heating elemer	Heating element		
11:7	HE3 🛘	Heate	d seat	
	Switch			
11:1	SW26	Batter	y disconnect switch	
	Fuses			
11:1	FU120	Voltag	Voltage converter, radio	
11:2	FU170	Voltag	ge converter, radio	
11:7	FU3	Heate	Heated seat	

Voltage converter, ground connection

FH5

11:1

 $[\]square$) Optional equipment

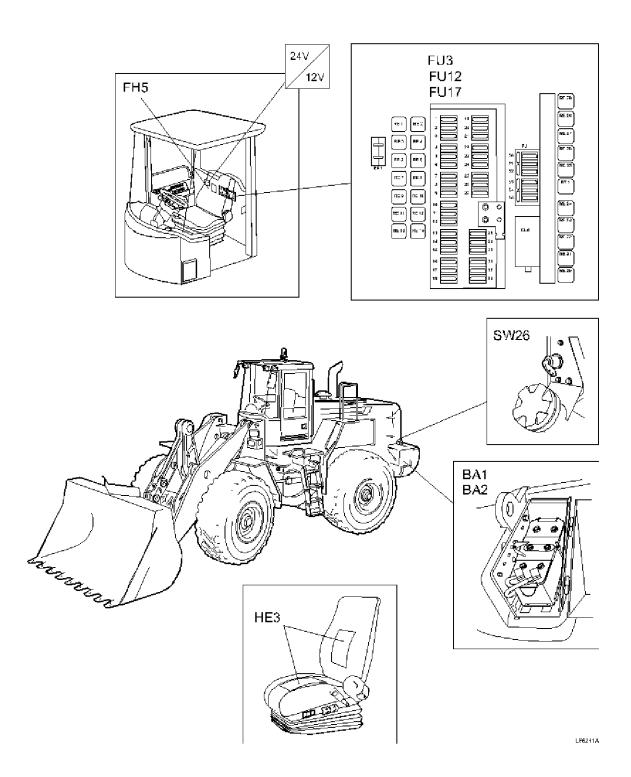


Figure 1



Service Information Construction Equipment

Document Title: Component location	Information Type: Service Information	Date: 25.04.2013
Profile:		

Item	Voltage converter	Voltage converter		
11:2	Voltage converter, rac	Voltage converter, radio		
	Batteries			
11:1	BA1 and BA2	Battery		
	T			
	Heating element			
11:7	HE3 🛘	Heated seat		
	Switch			
11:1	SW26	Battery disconnect switch		
		<u> </u>		
	Fuses			
11:1	FU12D	Voltage converter, radio		
11:2	FU170	Voltage converter, radio		
11:7	FU3	Heated seat		
11:1	FH5	Voltage converter, ground connection		

 $[\]square$) Optional equipment

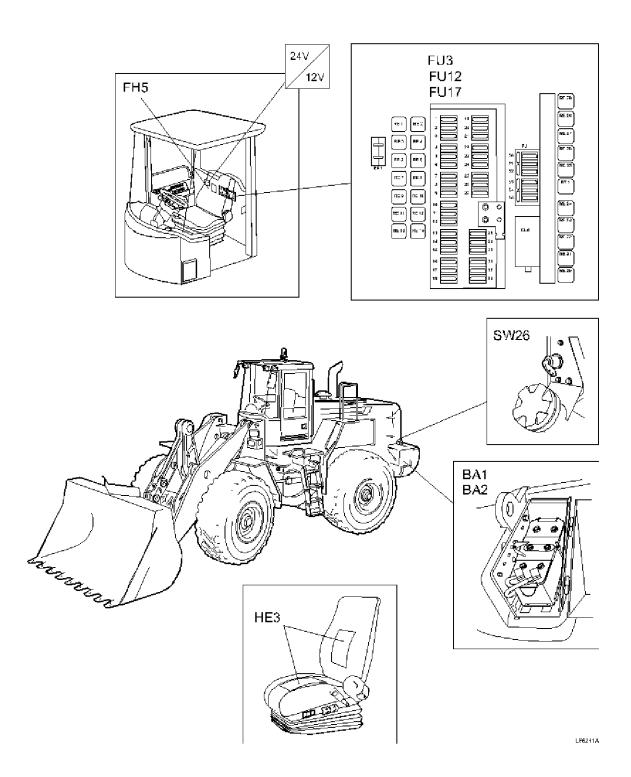


Figure 1



Service Information Construction Equipment

Document Title: Component location	Information Type: Service Information	Date: 25.04.2013
Profile:		

Item	Voltage converter	Voltage converter		
11:2	Voltage converter, rac	Voltage converter, radio		
	Batteries			
11:1	BA1 and BA2	Battery		
	T			
	Heating element			
11:7	HE3 🛘	Heated seat		
	Switch			
11:1	SW26	Battery disconnect switch		
		<u> </u>		
	Fuses			
11:1	FU12D	Voltage converter, radio		
11:2	FU170	Voltage converter, radio		
11:7	FU3	Heated seat		
11:1	FH5	Voltage converter, ground connection		

 $[\]square$) Optional equipment

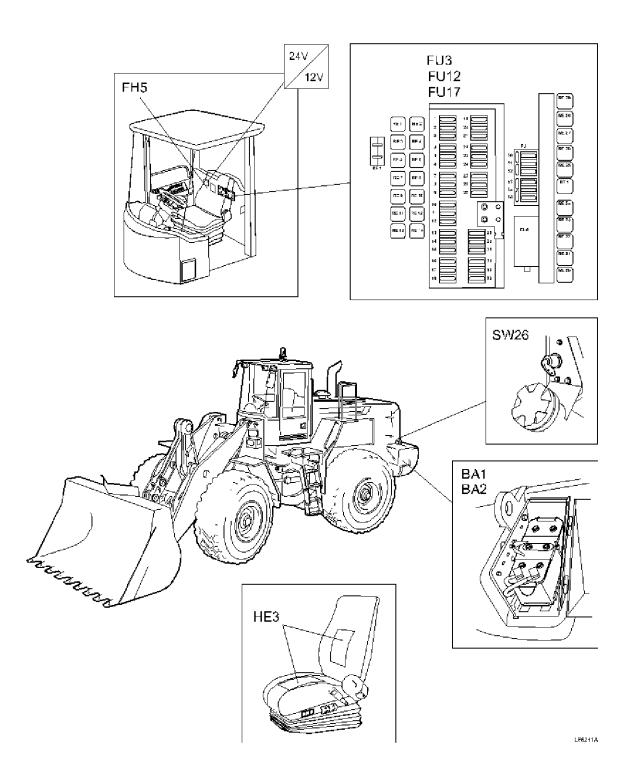


Figure 1



Service Information

Document Title: Component location	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Item	Electronic cont	rol unit
12:2-7	ECU	Control unit
	Alarm	
12:2	SA4	Buzzer, central warning
	Sensors	
12:4	SE1	Coolant temperature
12:6	SE7	Air filter
12:2	SE16	Engine oil pressure
12:6	SE17	Fuel level
	Instruments	
12:5	IM2	Coolant temperature
12:9	IM3	Hour recorder
12:5	IM4	Fuel gauge
	Control lamps	
12:2	LC6	Central warning
12:3	LC10	Engine oil pressure
12:9	LC11	Charging
12:7	LC12	Air filter
12:4	LC21	Coolant temperature
	Resistors	
12:3	R7.2	Loading resistor, engine oil pressure
12:8	R7.3	Loading resistor, air filter indication
12:9	R7.4	Loading resistor, charging (magnetising)
	Fuse	
12:1	FU10	Feed switches, sensors

Miscellaneous

Alternator

12:9

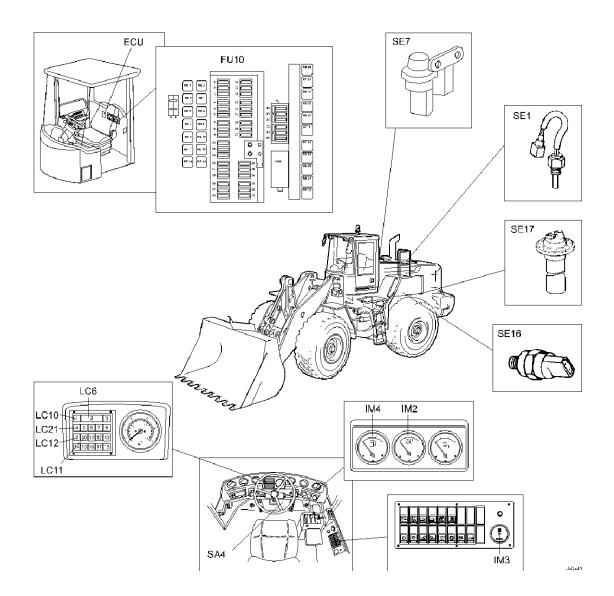


Figure 1



Service Information

Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Electronic control unit	
13:2-7	ECU	Control unit

	Sensors	Sensors	
13:2	SE3	Engine speed	
13:3	SE4	Speed	
13:5	SE11	Transmission oil temperature	
13:3	SE12	Transmission oil pressure	
13:7	SE72	Filter indication, transmission	

	Instruments	
13:5	IM1	Transmission oil temperature
13:2	IM90	Speedometer

	Control lamps	
13:3	LC1	Transmission oil pressure
13:5	LC20	Transmission oil temperature
13:6	LC31	Filter indication, transmission

	Relay	
13:7	RE27	Filter indication, transmission

	Fuses	
13:8	FU20	Feed, optional equipment
13:8	FU54	Filter indication, transmission

 \square) Optional equipment

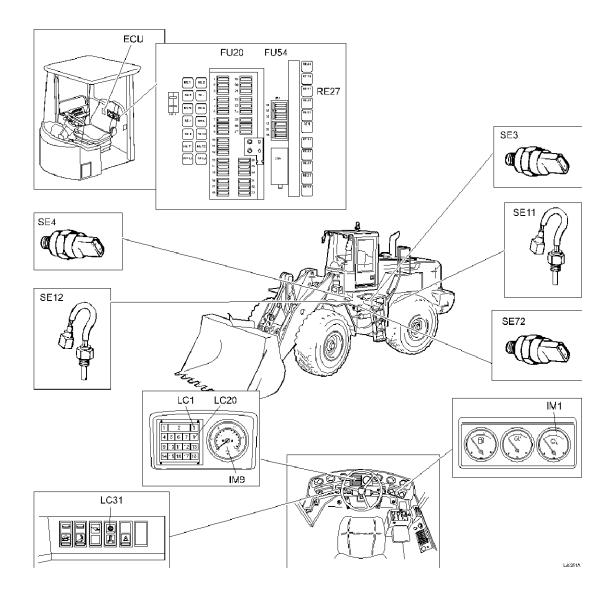


Figure 1



Service Information

Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Electronic control unit	
13:2-7	ECU	Control unit

	Sensors	Sensors	
13:2	SE3	Engine speed	
13:3	SE4	Speed	
13:5	SE11	Transmission oil temperature	
13:3	SE12	Transmission oil pressure	
13:7	SE72	Filter indication, transmission	

	Instruments	
13:5	IM1	Transmission oil temperature
13:2	IM90	Speedometer

	Control lamps	
13:3	LC1	Transmission oil pressure
13:5	LC20	Transmission oil temperature
13:6	LC31	Filter indication, transmission

	Relay	
13:7	RE27	Filter indication, transmission

	Fuses	
13:8	FU20	Feed, optional equipment
13:8	FU54	Filter indication, transmission

 \square) Optional equipment

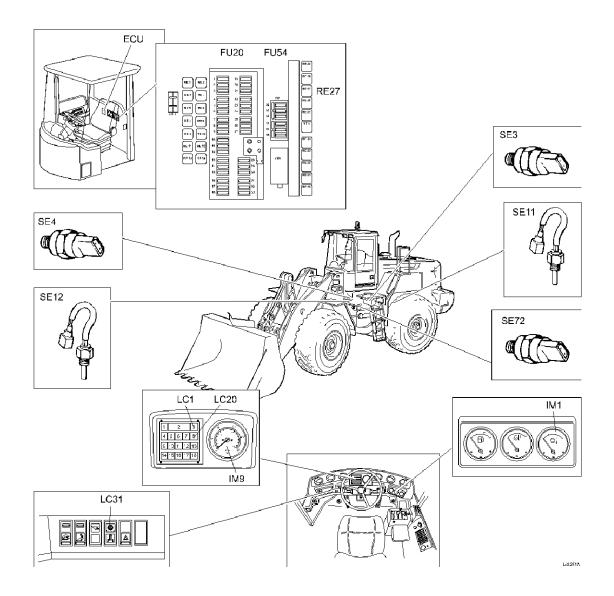


Figure 1



14:2

Service Information

Document Title: Component location	Function Group: 370	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Component location

SE85

Item	Electronic cor	Electronic control unit	
14:1-6	ECU	Control unit	
	Sensors	Sensors	
14:5	SE 14	Brake pressure	
14:1	SE84	Oil temperature, front axle	

	Control lamps	
14:5	LC5	Brake pressure
14:1	LC75	Axle oil temperature

Oil temperature, rear axle

	Resistor	
14:6	R7.1	Loading resistor, brake pressure

	Fuse	
14:6	FU10	Feed, switches, sensors

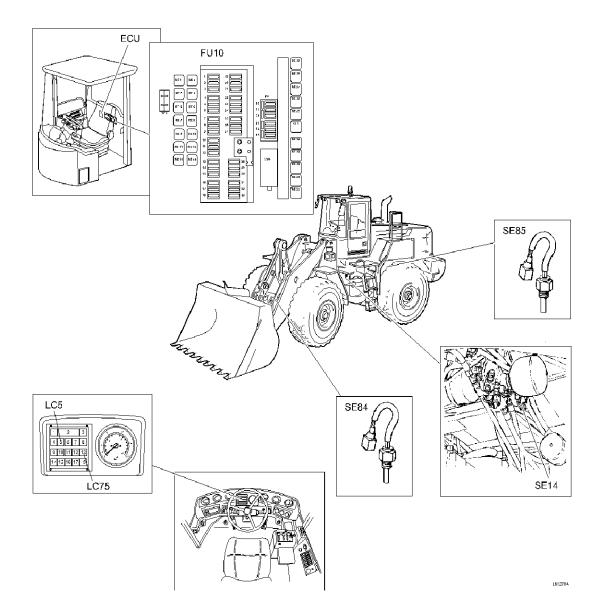


Figure 1



Service Information

Document Title: Component location	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Circuit 15:1-2 = mechanical parking brake. Circuit 15:3-7 = hydraulic parking brake

Item	Electronic con	atrol unit
		Control unit
15:1, 15:4	ECU	Control unit
	Relay	
15:6	RE28	Parking brake
	Switch	
15:5-6	SW116	Parking brake
	Sensor	
15:1, 15:4	SE6	Parking brake
	Control lamp	
15:2, 15:4	LC9	Parking brake
	Solenoid valve	e
15:4	MA67	Parking brake
	Fuse	
15:5	FU32	Parking brake

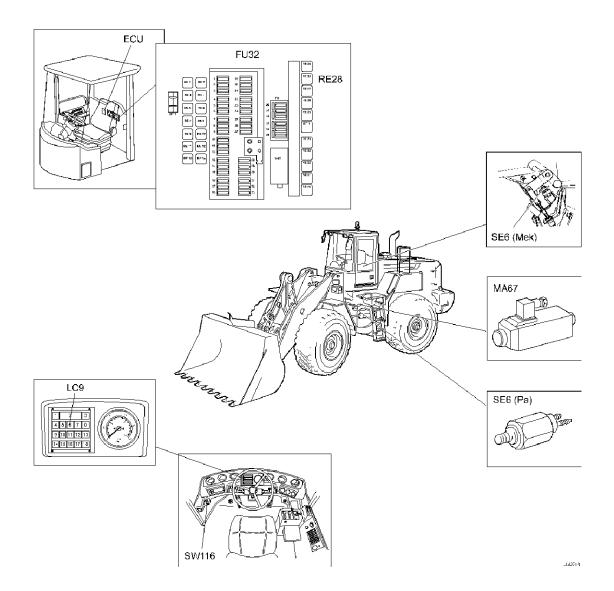


Figure 1



Service Information

Construction Equipment

Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Component location

Item	Sensors	
23:1, 23:5	SE5	Operator seat, rider truck safety norm
23:2, 23:6	SE6	Mechanical / hydraulic parking brake

	Horn (alarm)	
23:3, 23:7	SA6	Buzzer

	Magnet	
23:8	MA67	Parking brake

	Relays	
23:3, 23:7	RE24	Activation central warning, rider truck safety norm□
23:9	RE28	Parking brake
23:1-4, 23:5-8	RT1	Time relay, rider truck safety norm

	Switch	
23:9	SW116	Parking brake

	Fuses	
23:2, 23:6	FU32	Heated seat□ / rider truck safety norm
23:1, 23:5	FU53	Time relay, rider truck safety norm

□) Optional equipment



There are two connectors CUC.

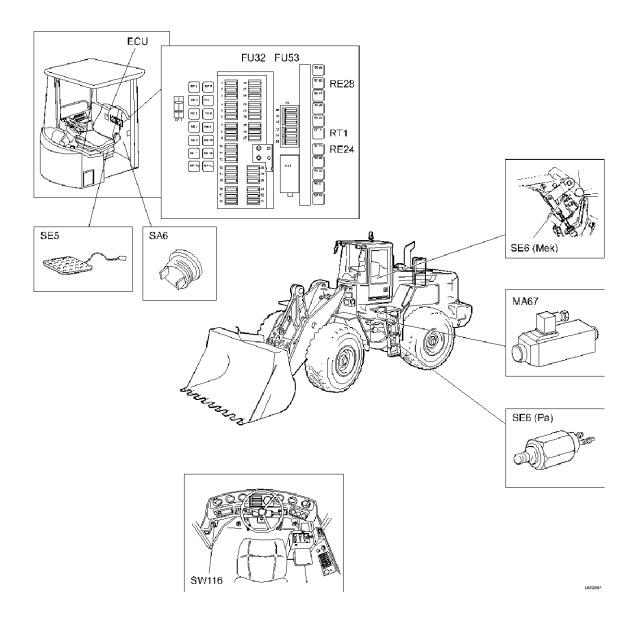


Figure 1

Service Information

Construction Equipment

Document Title: Component location	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

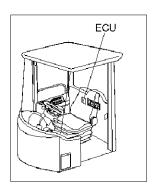
Component location

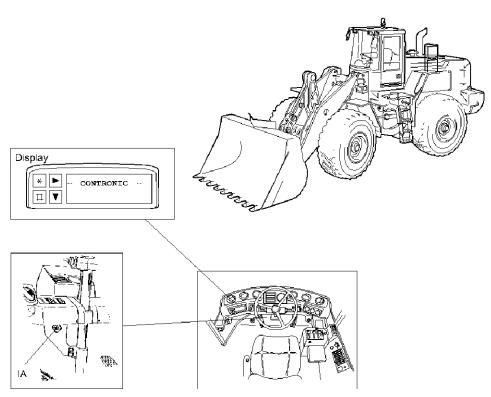
Item	Display □	
25:2-8	Display unit	Operator display unit

	Electronic control unit	
25:5-8	ECU	Control unit

	Connector		
25:9	IA	Connector for service display unit	

□) Optional equipment









Document Title: Dual control	Information Type: Service Information	Date: 25.04.2013
Profile:		

Dual control□

Item	Diodes	
21:4	Di2.1	Reverse drive signal
21:4	Di2.2	Forward drive signal
21:5	Di2.3	Delayed disengagement of speed gears when changing travelling direction
21:4	Di2.4	Delayed disengagement of speed gears when changing travelling direction
21:3	Di2.10	Reverse drive signal
21:3	Di2.11	Signal to CDC / dual control
21:3	Di2.12	Forward drive signal
21:3	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control
21:6	Di2.14	Secondary steering, two-speed during Limp-Home operation
21:3	Di2.21	Dual control

	Electronic control unit		
21:3-7	ECU	Control unit	

	Resistors	
21:4	R2.1	Delayed disengagement of speed gears when changing travelling direction
21:7	R2.2	Loading resistor, gear selector control

	Relays			
21:5	RE11	Delayed disengagement of speed gears when changing travelling direction		
21:5	RE200	Dual control, priority for ordinary gear selector control		
21:4	RE210	Dual control, activation		

	Switches		
21:2	SW2A	Gear selector control	
21:6	SW2B	Speed gear	
21:6	SW2C	Kick-down	
21:7	SW90	Kick-down	
21:4-5	SW1070	Dual control, activation	
21:3	SW1080	Dual control, Forward/Reverse	

	Fuse	
20:1	FU29	Gear shifting

	Condenser								
20:5	C2.1	Delayed	disengagement	of	speed	gears	when	changing	travelling

direction

\square) Optional equipment

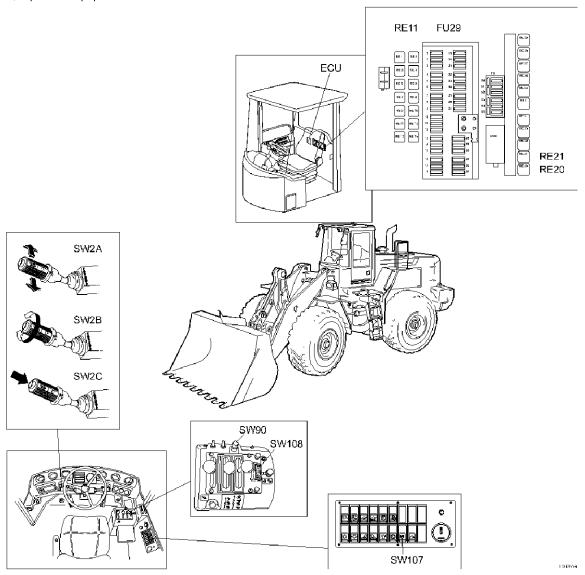


Figure 1

Document Title: Explanations of wiring	·	Information Type: Service Information	Date: 25.04.2013
diagrams (lead and component marking)			
Profile:			

Explanations of wiring diagrams (lead and component marking)

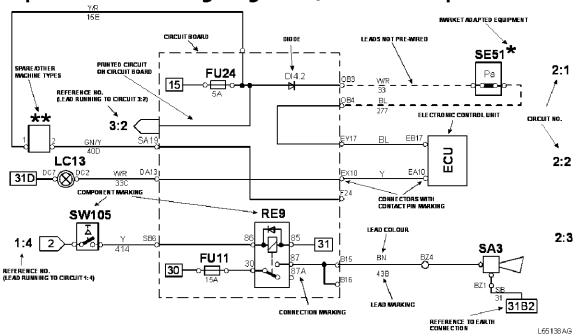


Figure 1
Examples of lead and component marking

Colour marking of leads in wiring diagrams

The leads are marked with numbers and letters or only numbers. In addition they have different colour designations. For example: 59 W/SB.

The lead is marked 59 and is white/black.

The following colours are used in the wiring diagram: Different combinations occur.

SB	= black
R	= red
GN	= green
BL	= blue
Υ	= yellow
W	= white
BN	= brown
GR	= grey
Р	= pink

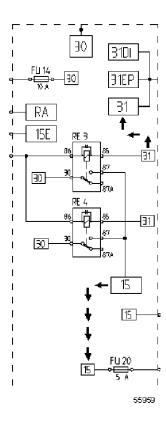


Figure 2
Example showing current direction

Current direction (boxes are connected to each other, not drawn in diagrams)

Positive feed

30 Voltage directly from battery

15E Voltage via ignition switch

15EA Voltage via ignition switch

15 Voltage via ignition switch, dependent on relays RE3/RE4

RA Voltage via ignition switch, radio position

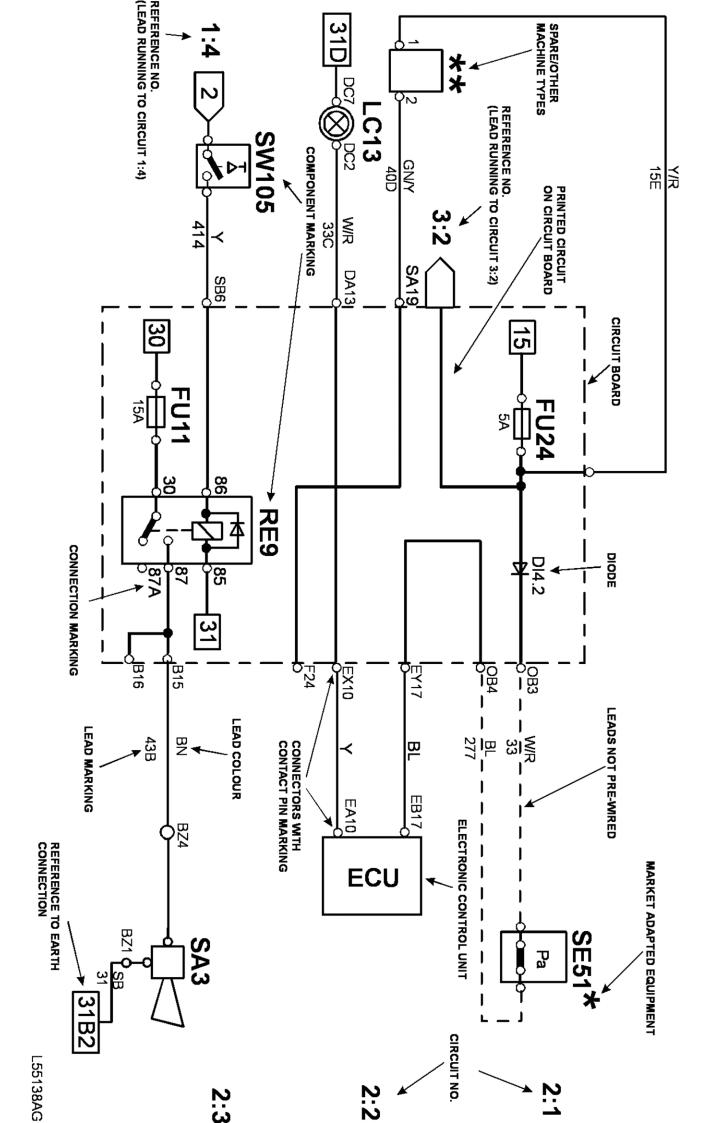
30 Current direction is from large to small box. Boxes with the same designation are connected to each other on the circuit board (via printed circuits).

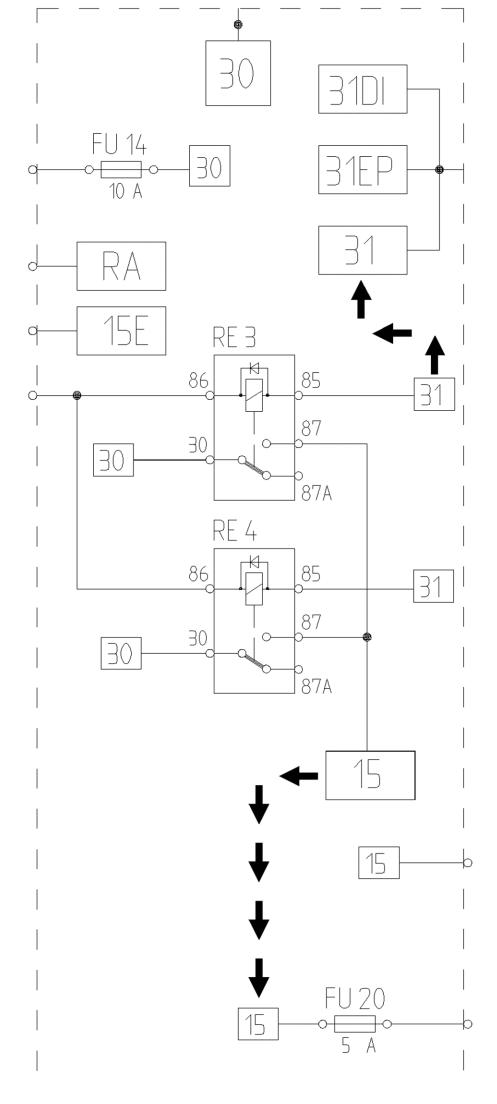
Ground connections

31 Ground connection

31xx Designation "xx" on the ground connection shows for example from which cable harness the cable originates.

31xx Current direction is from small to large box. Boxes with the same designation are connected to each other on the circuit board (via printed circuits).









Document Title: Lever steering, CDC	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lever steering, CDC

Item	Diodes	Diodes	
20:3	Di2.20□	CDC	
20:4	Di2.1	Reverse drive signal	
20:4	Di2.2	Forward drive signal	
20:5	Di2.3	Dly. dsenga. of gears when chng. direction	
20:5	Di2.4	Dly. dsenga. of gears when chng. direction	
20:3	Di2.10	Reverse drive signal	
20:3	Di2.11	Signal to CDC / dual control	
20:3	Di2.12	Forward drive signal	
20:3	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control	
20:6	Di2.14	2.14 Secondary steering, two-speed during Limp-Home operation	

	Electronic con	Electronic control units		
20:7	CU3 🛮	Steering lever, CDC		
20:3-7	ECU	Control unit		
20:8	CU20	CDC, ramp generator		

	Sensor	
20:1	SE62 CDC, lowered arm rest	

	Control lamp	
20:8	LC7900	CDC

	Solenoid valve		
20:10	MA280	CDC, control valve	

	Resistors	
20:4	R2.1 Dly. dsenga. of gears when chng. direction	
20:7	R2.2	Loading resistor, gear selector control

	Relays	
20:5	RE11	Dly. dsenga. of gears when chng. direction
20:4	RE300	CDC, priority for ordinary gear selector I
20:4	RE310	CDC, activation

	Switches	
20:2	SW2A	Directional gear, Forward/Reverse
20:6	SW2B	Speed gear
20:7	SW2C	Kick-down
20:4-5	SW300	CDC, activation

20:3	SW430	CDC, Forward/Reverse	
20:7	SW90	Kick-down	
20:7	SW109	Kick-down, CDC	

	Fuse	
20:1	FU29	Gear shifting

	Condenser	
20:5	C2.1	Dly. dsenga. of gears when chng. direction

\square) Optional equipment

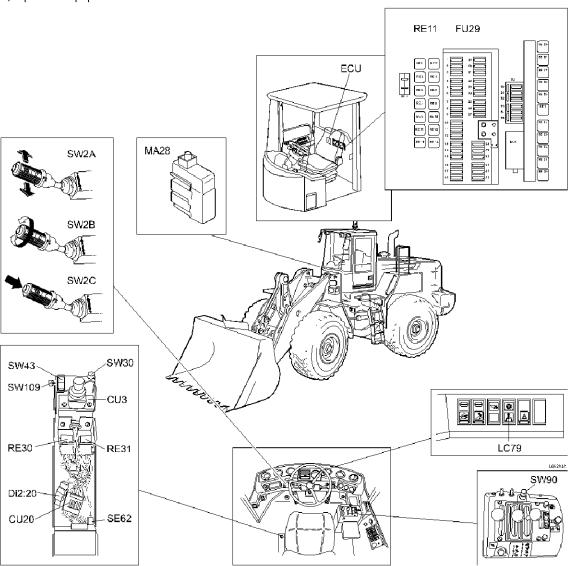


Figure 1





Document Title: Lever steering, CDC	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lever steering, CDC

Item	Diodes	Diodes	
20:3	Di2.20□	CDC	
20:4	Di2.1	Reverse drive signal	
20:4	Di2.2	Forward drive signal	
20:5	Di2.3	Dly. dsenga. of gears when chng. direction	
20:5	Di2.4	Dly. dsenga. of gears when chng. direction	
20:3	Di2.10	Reverse drive signal	
20:3	Di2.11	Signal to CDC / dual control	
20:3	Di2.12	Forward drive signal	
20:3	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control	
20:6	Di2.14	Sec. steering, two-speed during Limp-Home	

	Electronic cor	Electronic control units		
20:7	CU3 🛮	CDC, lever		
20:3-7	ECU	Control unit		
20:8	CU22	CDC, ramp generator		

	Sensor	
20:1	SE620 CDC, lowered arm rest	

	Control lamp		
20:6	LC7900	CDC	

	Solenoid valve		
20:10	MA280	CDC, control valve	

	Resistors	
20:4	R2.1 Dly. dsenga. of gears when chng. direction	
20:7	R2.2 Loading resistor, gear selector control	

	Relays	
20:5	RE11	Dly. dsenga. of gears when chng. direction
20:4	RE300	CDC, priority for ord. gear selector control
20:3	RE310	CDC, activation

	Switches		
20:2	SW2A	Directional gear, Forward/Reverse	
20:6	SW2B	Speed gear	
20:7	SW2C	Kick-down	
20:4-5	SW300	CDC, activation	

20:3	SW430	CDC, Forward/Reverse	
20:7	SW90	Kick-down	
20:7	SW109	Kick-down, CDC	

	Fuse	
20:1	FU29	Gear shifting

	Condenser	
20:5	C2.1	Dly. dsenga. of gears when chng. direction

\square) Optional equipment

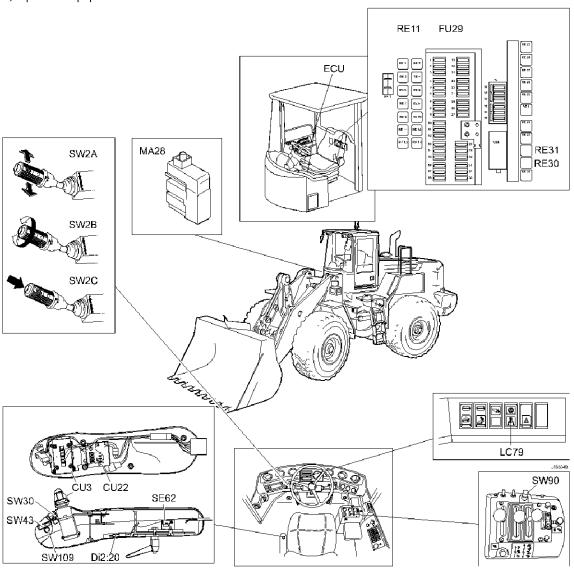


Figure 1





Document Title: Lever steering, CDC	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lever steering, CDC

Item	Diodes		
20:3	Di2.200	CDC	
20:4	Di2.1	Reverse drive signal	
20:4	Di2.2	Forward drive signal	
20:5	Di2.3	Dly. dsenga. of gears when chng. direction	
20:5	Di2.4	Di2.4 Dly. dsenga. of gears when chng. direction	
20:3	Di2.10	Reverse drive signal	
20:3	Di2.11	Signal to CDC / dual control	
20:3	Di2.12	Forward drive signal	
20:3	Di2.13 Signal to CDC / Dual control, priority for ordinary gear selector control		
20:6	Di2.14 Sec. steering, two-speed during Limp-Home		

	Electronic cor	Electronic control units		
20:7	CU3 🛮	CDC, lever		
20:3-7	ECU	Control unit		
20:8	CU22	CDC, ramp generator		

	Sensor		
20:1	SE620	CDC, lowered arm rest	

	Control lamp	
20:6	LC7900	CDC

	Solenoid valve	
20:10	MA280	CDC, control valve

	Resistors	
20:4	R2.1 Dly. dsenga. of gears when chng. direction	
20:7	R2.2	Loading resistor, gear selector control

	Relays	
20:5	RE11	Dly. dsenga. of gears when chng. direction
20:4	RE300	CDC, priority for ord. gear selector control
20:3	RE310	CDC, activation

	Switches	
20:2	SW2A	Directional gear, Forward/Reverse
20:6	SW2B	Speed gear
20:7	SW2C	Kick-down
20:4-5	SW300	CDC, activation

20:3	SW430	CDC, Forward/Reverse	
20:7	SW90	Kick-down	
20:7	SW109	Kick-down, CDC	

	Fuse	
20:1	FU29	Gear shifting

	Condenser	
20:5	C2.1	Dly. dsenga. of gears when chng. direction

\square) Optional equipment

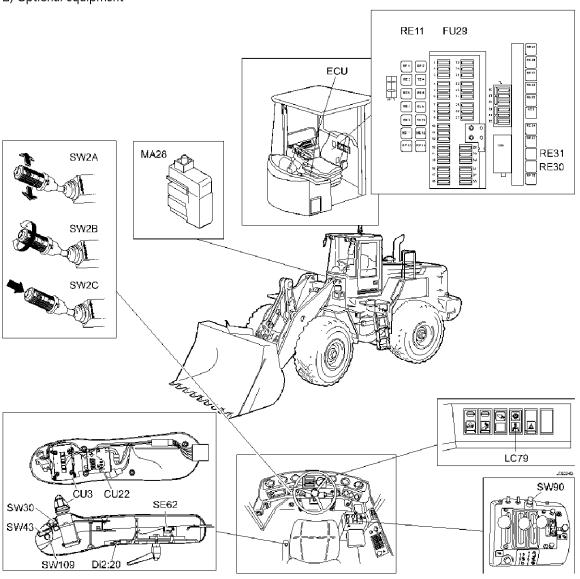


Figure 1





Document Title: Limp-Home operation, gear shifting	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Limp-Home operation, gear shifting

Item	Diodes	
16:4	Di2.1	Reverse drive signal
16:4	Di2.2	Forward drive signal
16:4	Di2.3	Delayed disengagement of speed gears when changing travelling direction
16:4	Di2.4	Delayed disengagement of speed gears when changing travelling direction
16:5	Di2.5	Quenching diode, gear shifting solenoid
16:3	Di2.6	Quenching diode, gear shifting solenoid
16:7	Di2.7	Quenching diode, gear shifting solenoid
16:6	Di2.8	Quenching diode, gear shifting solenoid
16:6	Di2.9	Quenching diode, gear shifting solenoid
16:2	Di2.10	Reverse drive signal
16:2	Di2.11	Signal to CDC / dual control
16:2	Di2.12	Forward drive signal
16:2	Di2.13	Signal to CDC / dual control
16:7	Di2.14	Secondary steering, two-speed during Limp-Home operation

	Resistors	
16:4	R2.1	Delayed disengagement of speed gears when changing travelling direction
16:7	R2.2	Loading resistor, gear selector control

	Relay	
16:5	RE11	Delayed disengagement of speed gears when changing travelling direction

	Switches	
16:1	SW2A	Directional gear, Forward/Reverse
16:6	SW2B	Speed gear
16:7	SW2C	Kick-down
16:7	SW90	Kick-down

	Fuse	
16:1	FU29	Gear shifting

	Gear shifting solenoids	
16:5	S1	Gear shifting N – D
16:3	S2	Gear shifting F – R
16:7	S3	Gear shifting, 1st gear – 2nd gear / 3rd gear – 4th gear

16:6	S4	Gear shifting 1st – 2nd
16:6	S5	Gear shifting 3rd – 4th

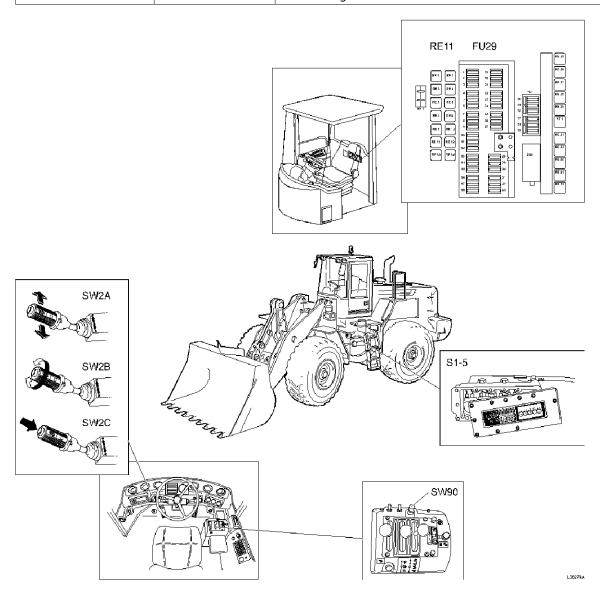


Figure 1





Document Title: Limp-Home operation, monitoring	Information Type: Service Information	Date: 25.04.2013
Profile:		

Limp-Home operation, monitoring

Item	Diodes	
18:7	Di7.1	Control diode, central warning, brake pressure
18:5	Di7.2	Control diode, central warning, steering pressure
18:6	Di7.3	Control diode, central warning, engine oil pressure
18:1	Di7.4	Zener diode, instrument feed

	Sensors	
18:3	SE1	Coolant temperature
18:2	SE11	Transmission oil temperature
18:7	SE 14	Brake pressure
18:4	SE150	Steering pressure
18:5	SE16	Engine oil pressure

	Instruments	
18:2	IM1	Transmission oil temperature
18:3	IM2	Coolant temperature

	Control lamps	
18:7	LC5	Brake pressure
18:6	LC6	Central warning
18:6	LC10	Engine oil pressure
18:5	LC14	Low steering pressure

	Resistors	
18:2	R7.5	Transmission oil temperature
18:3	R7.6	Coolant temperature
18:6	R7.7	Central warning
18:1	R7.8	Feed, instruments

	Fuse	
18:4	FH240	Secondary steering

□) Optional equipment

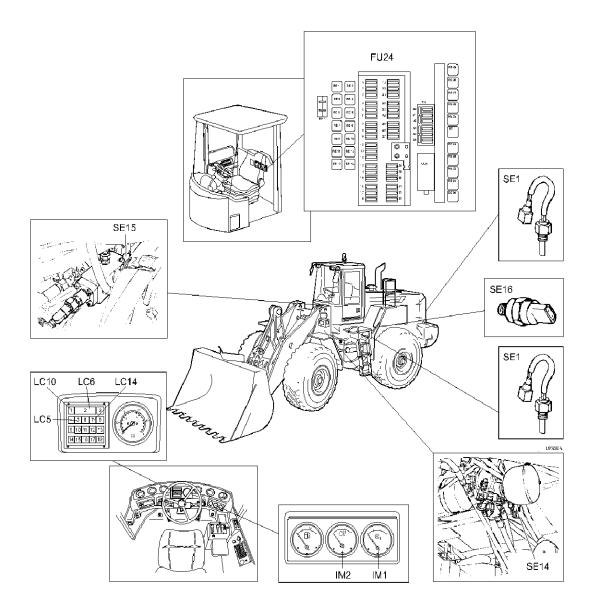


Figure 1



Service Information

Document Title: Limp-Home operation, preheating	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Limp-Home operation, preheating

Item	Diodes	
17:5	Di3.1	Quenching diode, heating element
17:3	Di3.3	Feed, switch for heating element in starting position

	Control lamp	
17:5	LC13	Preheating

	Relays	
17:4	RE12	Unloading, ECU
17:4	RE40	Preheating

	Switches	
17:1	SW1	Ignition switch
17:3	SW25	Preheating

	Fuses	
17:5	FH1	Preheating, control lamp
17:5	FH3	Preheating, element
17:4	FU13	Preheating

	Heating element	
17:5	HE1	Preheating coil

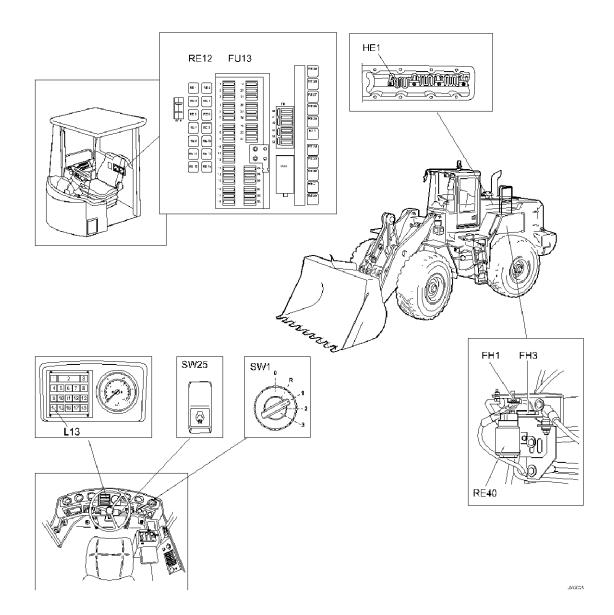


Figure 1





Document Title: List of circuits	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

List of circuits

List of circuits (numerical)

Circuit no.	Function	
1:1	Battery / Starter motor	
1:2	Alternator	
1:2 - 7	Ignition switch / Feed / Ground connection	
1:7	Feed (Optional equipment)	
1:8 - 10	Feed / Ground connection ECU	
2:1 - 4	Windscreen wiper, intermittent wiper, front	
2:5	Washer front / Horn	
2:6	Wiper rear	
2:7	Washer rear	
2:8	Cigarette lighter	
2:9	Reversing alarm	
2:10	Cab fan	
3:1 - 3	Gear shifting, Forward/Reverse	
3:4 - 6	Gear shifting, Forward/Reverse Gear shifting speed selection / Kick-down	
3:7	Kick-down (CDC)	
3:8 - 10	Mode selector	
3.6 - 10	Widde Selector	
4:1 - 4	Gear shifting, feed from ECU to solenoids	
4:5 - 7	Transmission disengagement	
4:8 - 10	Differential lock	
5:1	Ignition switch	
5:2	Starter motor, control circuit	
5:3	Starter inhibitor	
5:4	Cold-starting device	
5:5 - 7	Preheating, element	
5:8	Downshifting, engine retarding	
5:9 - 10	Engine shut down (power down)	
5:10	Key-turn engine stop	
6:1 - 3	Bucket positioner	
6:4 - 5	Boom kick-out	
6:6	Optional hydraulic function, 3rd-4th	
6:7 - 9	Floating position	

6:10	Optional hydraulic function 3rd - 4th - 5th	
0.10	Optional hydraune function std 4th 5th	
7:1 - 3	Separate attachment locking	
7:4 - 9	Secondary steering	
7.1. 3	Secondary Secondary	
8:1	Feed, travel lights / parking lights	
8:2	Parking light, front left	
8:2	Side light, front left	
8:3	Tail light, right	
8:3	Parking light, front right	
8:3 - 4	Guide light, switches	
8:4	Side light, front right	
8:4	Tail light, left	
8:5	Number plate lighting / Rheostat instrument lighting	
8:6	Instrument lighting	
8:7	Low beam, left	
8:8	Low beam, right	
8:8	High beam, right	
8:9	High beam, left / Control lamp high beams	
8:10	Interior light, cab	
9:1	Feed, working light, front	
9:2	Working lights, cab, front	
9:3	Working light, front mudguard, left	
9:3	Working lights, attachments	
9:4	Working light, front mudguard, right	
9:4	Feed, working lights rear	
9.5	Working lights, radiator casing	
9:6	Working lights, cab rear	
9:7	Rotating warning beacon	
10:1	Stop lights, sensor	
10:2	Stop lights	
10:3 - 5	Warning beacon	
10:6	Direction indicator, front right	
10:7	Direction indicator, rear right	
10:7	Direction indicator, front left	
10:8	Direction indicator, rear left	
11:1	Voltage converter	
11:3 - 5	Radio	
11:7	Heated seat	
12:1	Unassigned	
12:2 - 3	Engine oil pressure	
12:4 - 5	Coolant temperature	
12:5 - 6	Fuel level	
12:6	Air filter indication	
	7.11 III.CO III.COCOTO	

12:9	Alternator / Control lamp charging					
12:10	Hour recorder					
12.10	Trout recorder					
13:2	Speed sensor, engine					
13:3	Speed sensor / Speedometer					
13:4	Transmission oil pressure					
13:5 - 6	Transmission oil temperature					
13:7 - 8	Transmission oil filter indication					
15.7 - 8	Transmission on the indication					
14:1	Axle oil temperature, front axle					
14:2	Axle oil temperature, rear axle					
14:5 - 6	Brake pressure					
14.5 - 0	blake plessure					
15:1 - 2	Parking brake, mechanically operated					
15:4 - 7	Parking brake, mechanically operated Parking brake, electrically operated					
15.4 - /	Parking brake, electrically operated					
16:1	Feed gear selector control					
16:2	Gear shifting, reverse					
16:3						
	Delayed disengagement, when shifting Forward/Reverse					
16:4	Gear shifting, forward					
16:5 - 7	Gear shifting, speed selection					
17:1 - 2	Ignition switch					
17:3 - 5	Preheating					
18:1	Feed, instruments					
18:2	Transmission oil temperature					
18:3	Coolant temperature					
18:4	Steering pressure					
18:5	Engine oil pressure					
18:6	Brake pressure					
18:7	Central warning, control lamp					
19:1 - 6	Boom Suspension System					
19:6	Single-acting lifting function (Boom Suspension System)					
19:6 - 7	Single-acting lifting function					
20:1 - 2	Gear selector control, Forward/Reverse					
20:3 - 10	Lever steering					
21:1 - 2	Gear selector control, Forward/Reverse					
21:3 - 4	Dual control Forward/Reverse					
21:5 - 7	Gear selector control, speed gears					
22:1	Feed, cab fan and air conditioning					
22:2 - 3	Cab fan					
22:4 - 8	Air conditioning					
ZZ.4 - 0	All whattoning					

23:1 - 4	Parking brake alarm / Rider truck safety norm, mechanically operated parking brake			
23:5 - 8	Parking brake alarm / Rider truck safety norm Electro-hydraulically operated parking brake			
24:1	Feed to loud tone horn and air-suspended seat			
24:2 - 3	Loud tone horn			
24:4 - 5	Air-suspended seat			
25:1 - 8	Display unit			
25:9	Connector for display unit			
27B:1 - 10	Automatic greasing			
30:1 - 2	Magnetising, alternator 100 A			
31:1 - 7	Single lever control, gear shifting			
32:1 - 10	Single lever control, CDC, 4 gears			
33:1 - 10	Single lever control, servo hydraulics			

List of circuits (alphabetical)

Function	Circuit no.
Air conditioning	22:4 - 8
Air filter indication	12:6
Air-suspended seat	24:4 - 5
Alternator	1:2
Alternator / Control lamp charging	12:9
Automatic greasing	27B:1 - 10
Axle oil temperature, front axle	14:1
Axle oil temperature, rear axle	14:2
Battery / Starter motor	1:1
Boom kick-out	6:4 - 5
Boom Suspension System	19:1 - 6
Brake pressure	14:5 - 6
Brake pressure	18:6
Bucket positioner	6:1 - 3
Cab fan	2:10
Cab fan	22:2 - 3
Central warning, control lamp	18:7
Cigarette lighter	2:8
Cold-starting device	5:4
Connector for display unit	25:9
Coolant temperature	12:4 - 5
Coolant temperature	18:3
Delayed disengagement, when shifting Forward/Reverse	16:3
Differential lock	4:8 - 10
Direction indicator, front left	10:7

Direction indicator, front right	10:6
Direction indicator, rear left	10:8
Direction indicator, rear right	10:7
Display unit	25:1 - 8
Downshifting, engine retarding	5:8
Dual control Forward/Reverse	21:3 - 4
Engine oil pressure	12:2 - 3
Engine oil pressure	18:5
Engine shut down (power down) when changing travelling direction	5:9 - 10
Feed (Optional equipment)	1:7
Feed / Ground connection ECU	1:8 - 10
Feed gear selector control	16:1
Feed to loud tone horn and air-suspended seat	24:1
Feed, cab fan and air conditioning	22:1
Feed, instruments	18:1
Feed, travel lights / parking lights	8:1
Feed, working light, front	9:1
Feed, working lights rear	9:4
Floating position	6:7 - 9
Fuel level	12:5 - 6
Gear selector control, Forward/Reverse	20:1 - 2
Gear selector control, Forward/Reverse	21:1 - 2
Gear selector control, speed gears	21:5 - 7
Gear shifting speed selection / Kick-down	3:4 - 6
Gear shifting, feed from ECU to solenoids	4:1 - 4
Gear shifting, forward	16:4
Gear shifting, Forward/Reverse	3:1 - 3
Gear shifting, reverse	16:2
Gear shifting, speed selection	16:5 - 7
Guide light, switches	8:3 - 4
Heated seat	11:7
High beam, left / Control lamp high beams	8:9
High beam, right	8:8
Hour recorder	12:10
Ignition switch	5:1
Ignition switch	17:1 - 2
Ignition switch / Feed / Ground connection	1:2 - 7
Instrument lighting	8:6
Interior light, cab	8:10
Key-turn engine stop	5:10
Kick-down (CDC)	3:7
Lever steering	20:3 - 10
Loud tone horn	24:2 - 3
Low beam, left	8:7
Low beam, right	8:8
Magnetising, alternator 100 A	30:1 - 2
Mode selector	3:8 - 10
Number plate lighting / Rheostat instrument lighting	8:5

Optional hydraulic function 3rd - 4th - 5th	6:10
Optional hydraulic function, 3rd-4th	6:6
Parking brake alarm / Rider truck safety norm, Electro-hydraulically operated parking brake	23:5 - 8
Parking brake alarm / Rider truck safety norm, mechanically operated parking brake	23:1 - 4
Parking brake, electrically operated	15:4 - 7
Parking brake, mechanically operated	15:1 - 2
Parking light, front left	8:2
Parking light, front right	8:3
Preheating	17:3 - 5
Preheating, element	5:5 - 7
Radio	11:3 - 5
Reversing alarm	2:9
Rotating warning beacon	9:7
Secondary steering	7:4 - 9
Separate attachment locking	7:1 - 3
Side light, front left	8:2
Side light, front right	8:4
Single lever control, CDC, 4 gears	32:1 - 10
Single lever control, gear shifting	31:1 - 7
Single lever control, servo hydraulics	33:1 - 10
Single-acting lifting function	19:6 - 7
Single-acting lifting function (Boom Suspension System)	19:6
Speed sensor / Speedometer	13:3
Speed sensor, engine	13:2
Starter inhibitor	5:3
Starter motor, control circuit	5:2
Steering pressure	18:4
Stop lights	10:2
Stop lights, sensor	10:1
Tail light, left	8:4
Tail light, right	8:3
Transmission disengagement	4:5 - 7
Transmission oil filter indication	13:7 - 8
Transmission oil pressure	13:4
Transmission oil temperature	13:5 - 6
Transmission oil temperature	18:2
Unassigned	12:1
Voltage converter	11:1
Warning beacon	10:3 - 5
Washer front / Horn	2:5
Washer rear	2:7
Windscreen wiper, intermittent wiper, front	2:1 - 4
Wiper rear	2:6
Working light, front mudguard, left	9:3
Working light, front mudguard, right	9:4
Working lights, attachments	9:3
Working lights, cab rear	9:6

Working lights, cab, front	9:2
Working lights, radiator casing	9.5



Service Information

Construction Equipment

Document Title:	· ·	Information Type: Service Information	Date:
Loud tone horn□, seat with air	370	Service Information	25.04.2013
suspension □			
Profile:			

Loud tone horn□, seat with air suspension□

Item	Motors		
24:3	MO9	Compressor, loud tone horn	
24:5	MO10	Compressor, operator seat	

	Relays	
24:5	RE23	Compressor, operator seat
24:3	RE25	Compressor, loud tone horn

	Switch	
24:3	SW21	Loud tone horn

	Fuses	
24:1	FU20	Compressor, operator seat / Compressor, horn
24:3	FU51	Compressor, loud tone horn
24:5	FU52	Compressor, operator seat
24:2	FU54	Compressor, operator seat / Compressor, horn

 $[\]square$) Optional equipment

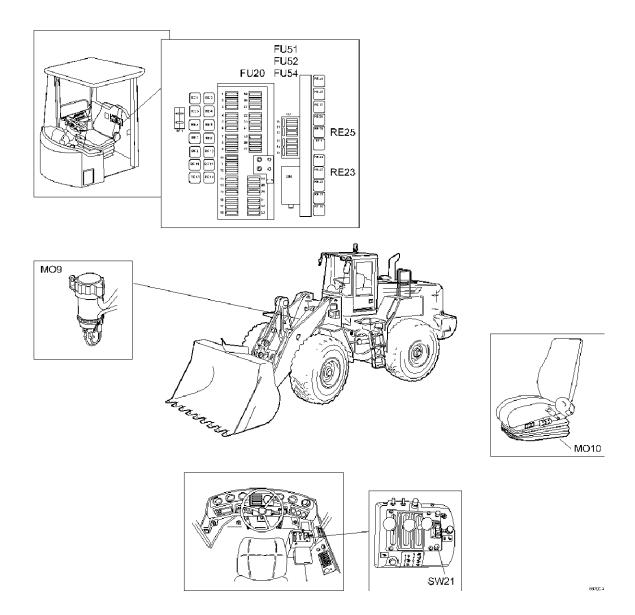


Figure 1



Service Information

Construction Equipment

Document Title: Magnetising, alternator □	100	- 1	•	Information Type: Service Information	Date: 25.04.2013
Profile:					

Magnetising, 100 A alternator□

Item	Fuses	
30:1	FU20	Feed, optional equipment
30:1	FU54	Compressor, seat with air suspension / Compressor, loud tone horn / Filter indication transmission filter
30:1	FU55	Magnetising, 100 A alternator

	Miscellaneous	
30:2	Alternator 100 A	

 $[\]square$) Optional equipment

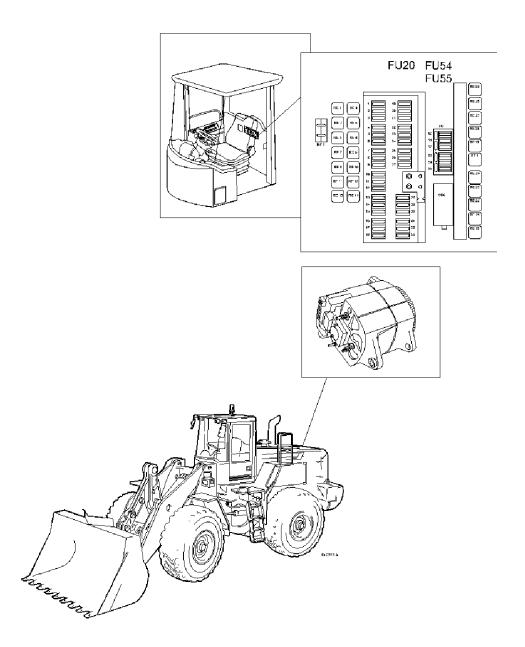


Figure 1



Service Information

Document Title: Single lever control, CDC, 4 gears	Information Type: Service Information	Date: 25.04.2013
Profile:		

Single lever control, CDC, 4 gears

Item	Diodes	
32:4	Di2.1	Reverse drive signal
32:4	Di2.2	Forward drive signal
32:5	Di2.3	Dly. dsenga. of gears when chng. direction
32:5	Di2.4	Dly. dsenga. of gears when chng. direction
32:3	Di2.10	Reverse drive signal
32:3	Di2.11	Signal to CDC / Dual control, priority for ordinary gear selector control
32:3	Di2.12	Forward drive signal
32:3	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control
32:6	Di2.14	Sec. steering, two-speed during Limp-Home
32:3	Di2.20	CDC

	Electronic control units	
32:3-8	ECU	Control unit
32:8	CU3	CDCII

	Condenser	
32:4	C2.1	Dly. dsenga. of gears when chng. direction

	Resistors	
32:4	R2.1	Dly. dsenga. of gears when chng. direction
32:7	R2.2	Loading resistor, gear selector control

	Sensor	
32:1	SE62	CDCII

	Magnet	
32:10	MA280	CDCII

	Control lamp	
32:6	LC79	CDCD

	Relays	
32:5	RE11	Dly. dsenga. of gears when chng. direction
32:4	RE30	CDCII
32:3	RE31	CDCII

	Switches	
32:2	SW2A	Directional gear, Forward/Reverse

32:6	SW2B	Speed gear
32:6	SW2C	Kick-down
32:4	SW30	CDCII
32:4	SW43	Forward/Reverse CDCII
32:7	SW90	Kick-down
32:8	SW109	Kick-down, CDC□

	Fuse	
32:1	FU29	Gear shifting

□) Optional equipment

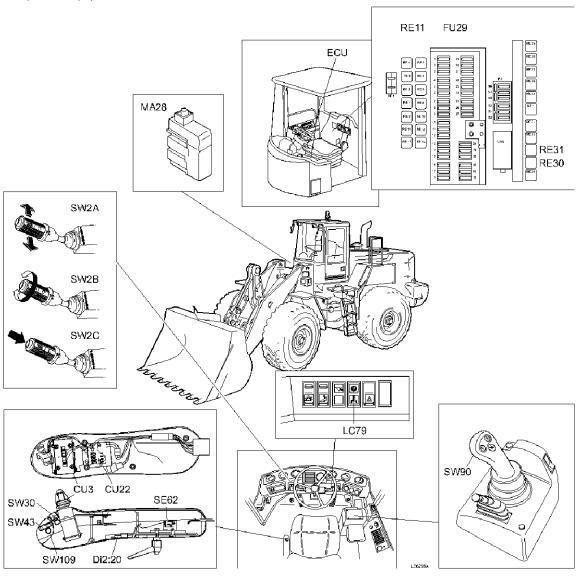


Figure 1





Document Title: Single lever control, gear shifting	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Single lever control, gear shifting

Item	Diodes	
31:4	Di2.1	Reverse drive signal
31:4	Di2.2	Forward drive signal
31:5	Di2.3	Dly. dsenga. of gears when chng. direction
31:4	Di2.4	Dly. dsenga. of gears when chng. direction
31:2	Di2.10	Reverse drive signal
31:2	Di2.11	Sig. to CDC / Dual ctrl, pri. for ord. gr selector
31:2	Di2.12	Forward drive signal
31:2	Di2.13	Signal to CDC / Dual control, priority for ordinary gear selector control
31:6	Di2.14	Secondary steering, two-speed during Limp-Home operation
31:5	Di2.46	Single lever control, dual control
31:5	Di2.47	Single lever control, dual control
31:6	Di2.48	Single lever control, dual control
31:6	Di2.49	Single lever control, dual control
31:7	Di2.50	Single lever control, dual control
31:7	Di2.51	Single lever control, dual control
31:5	Di2.52	Single lever control, dual control
31:7	Di2.53	Single lever control, dual control

	Electronic control unit	
31:2-6	ECU	Control unit

	Condenser	
31:4	C2.1	Dly. dsenga. of gears when chng. direction

	Resistors	
31:4	R2.1	Dly. dsenga. of gears when chng. direction
31:7	R2.2	Loading resistor, gear selector control

	Relays	
31:5	RE11	Dly. dsenga. of gears when chng. direction
31:3	RE20	Dual control Forward/Reverse
31:2	RE21	Dual control Forward/Reverse
31:5	RE56	Single lever control, reverse gear relay
31:6	RE57	Single lever control, protective relay
31:7	RE58	Single lever control, forward gear relay
31:6	RE59	Single lever control, protective relay

Switches	
Switches	

31:1	SW2A	Directional gear, Forward/Reverse
31:5	SW2B	Speed gear
31:6	SW2C	Kick-down
31:7	SW90	Kick-down
31:2-3	SW107	Dual control
31:1	SW149	Activation of single lever control
31:5-7	SW150	Single lever control, dual control Forward/Reverse

	Fuse	
31:1	FU29	Gear shifting

□) Optional equipment

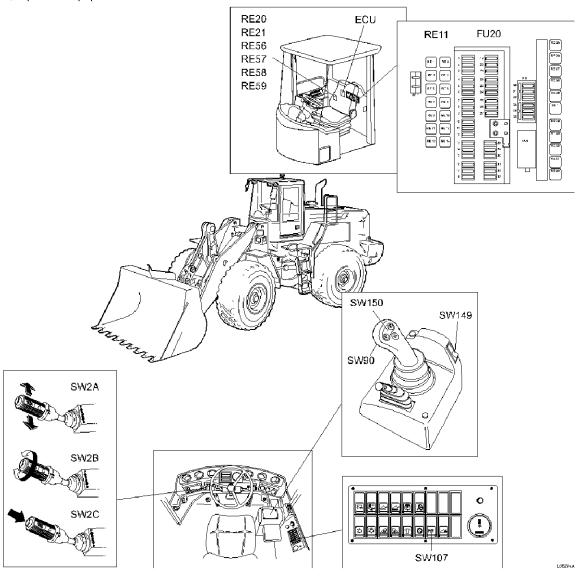


Figure 1





Document Title: Single lever control, servo hydraulics	,	Information Type: Service Information	Date: 25.04.2013
Profile:			

Single lever control, servo hydraulics

Item	Diodes	
33:9	Di2.56 Quenching diode	
33:3	Di4.1	Other machine types
33:3	Di4.2	Quenching diode MA19
33:5	Di4.3 Quenching diode MA20	
33:8	Di4.7	Quenching diode MA41
33:10	Di4.22	Quenching diode MA76

	Sensors	
33:4	SE33	Boom kick-out
33:2	SE35	Bucket positioner
33:7	SE61	Floating position

	Magnets, sole	Magnets, solenoid valves		
33:3	MA19	9 Detent solenoid, tilting position		
33:5	MA20	Detent solenoid, lifting position		
33:8	MA21	Detent solenoid, floating position		
33:6	MA36□	Optional hydraulic function, 3rd-4th□		
33:7	MA41	Floating position		
33:10	MA76□	Detent solenoid, 3rd function		
33:10	MA160	Activation of single lever control		

	Relays	
33:2-3	RE1	Bucket positioner
33:4	RE2	Boom kick-out

	Switches		
33:2	SW17	Bucket positioner	
33:4	SW18	Boom kick-out	
33:6	SW19□	Optional hydraulic function, 3rd-4th□	
33:6	SW60	Floating position	
33:10	SW88	Detent circuit, 3rd function	
33:10	SW137	Emergency stop, control lever lockout 3rd function	
33:1	SW149	Activation of single lever control	

	Fuses	
33:9	FU10	Feed, switches, sensors
33:1	FU22	Bucket positioner and boom kick-out / Floating position / Additional hydraulic function \square / Downshifting

\square) Optional equipment

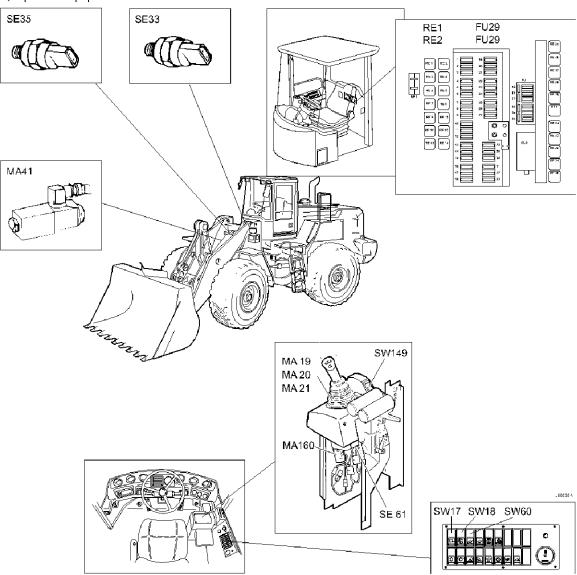


Figure 1



Service Information Construction Equipment

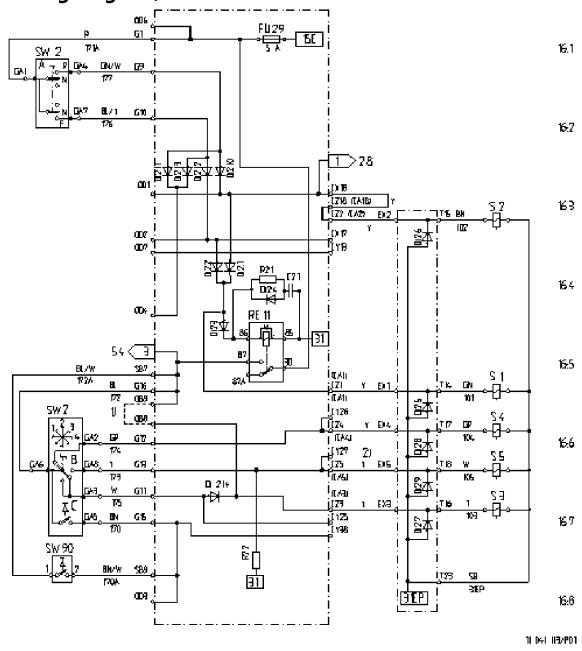
Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Fuses		
Current rating	5 A	
	10 A	
	15 A	
	20 A	
Preheating, cold start	55 A	

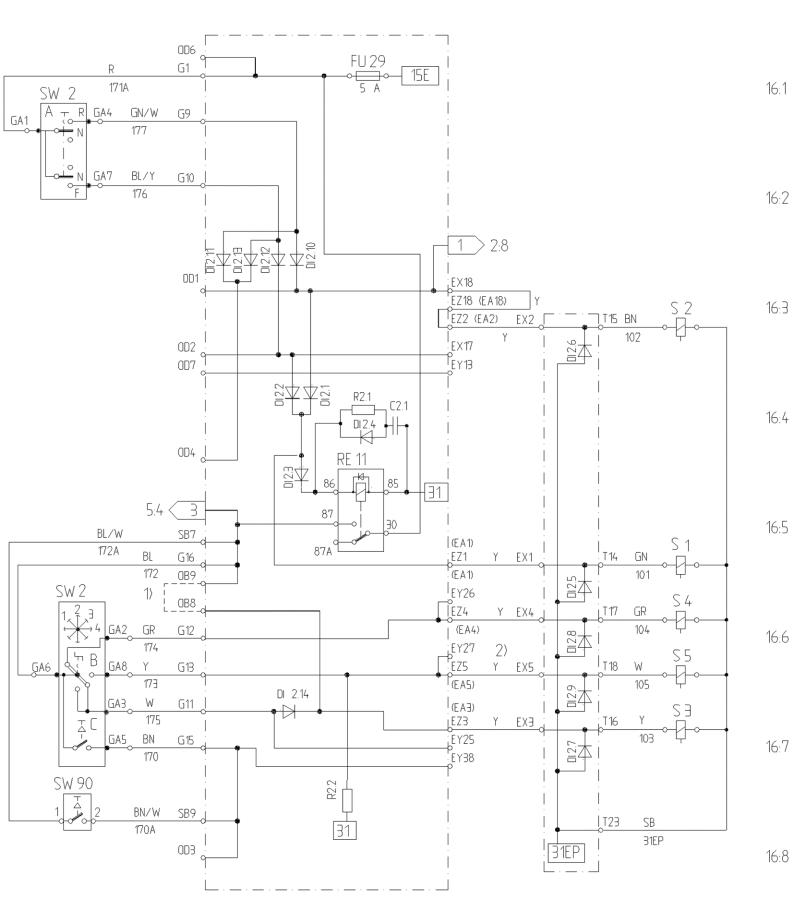
Document Title: Wiring diagram, circuit 16:1 — 16:8	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 16:1 — 16:8



L61448a

Figure 1 Wiring diagram, circuit 16:1 — 16:8



11 041 113/P01

Document Title: Wiring diagram, circuit 17:1 — 17:5	Function Group: 370	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Wiring diagram, circuit 17:1 — 17:5

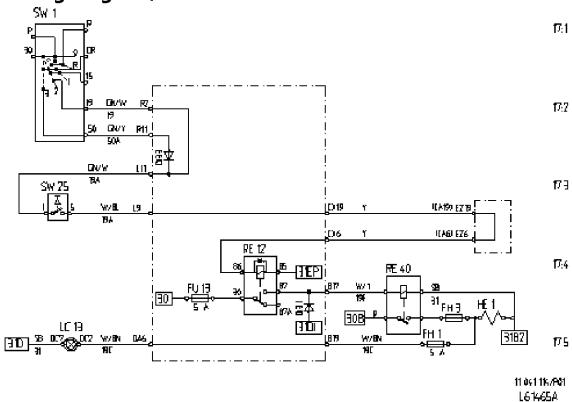
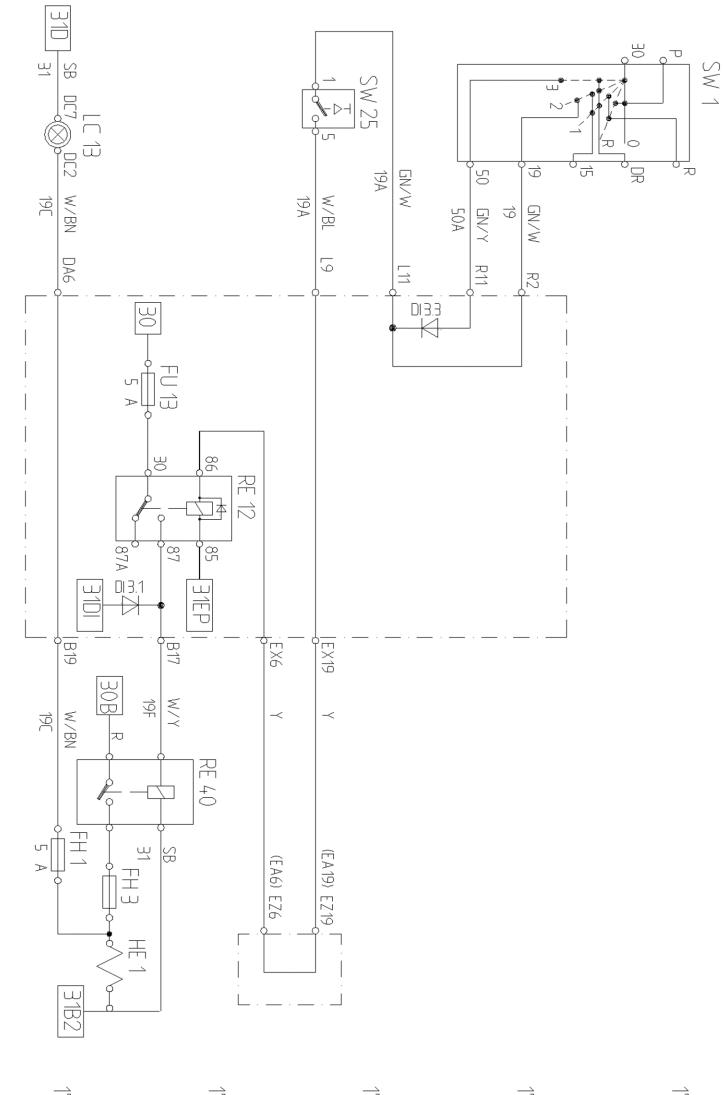


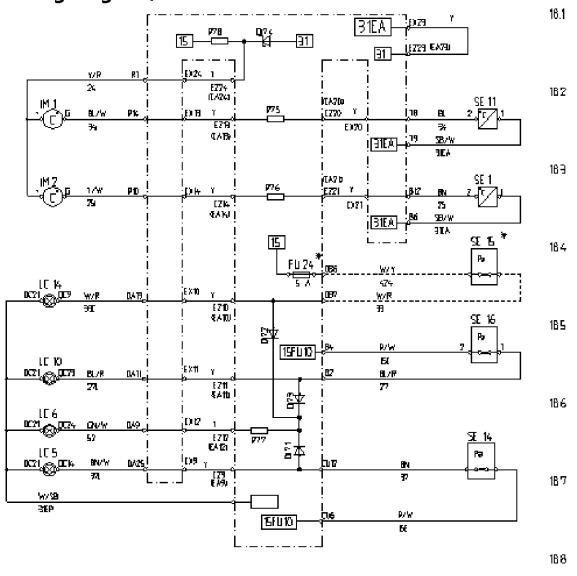
Figure 1
Wiring diagram, circuit 17:1 — 17:5



11 041 114/P01 L61465A

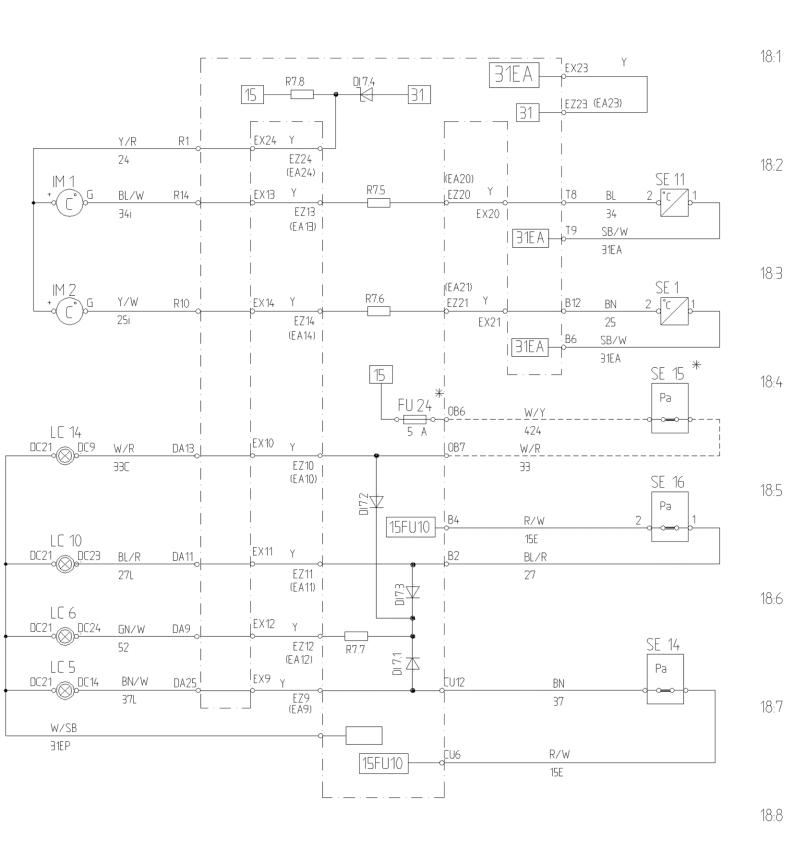
Document Title: Wiring diagram, circuit 18:1 — 18:8	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 18:1 — 18:8



11 041 **5**6/PD1 161466a

Figure 1 Wiring diagram, circuit 18:1 — 18:8



11 041 156/P01 l61466a



Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 3:1 — 3:10	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 3:1 — 3:10

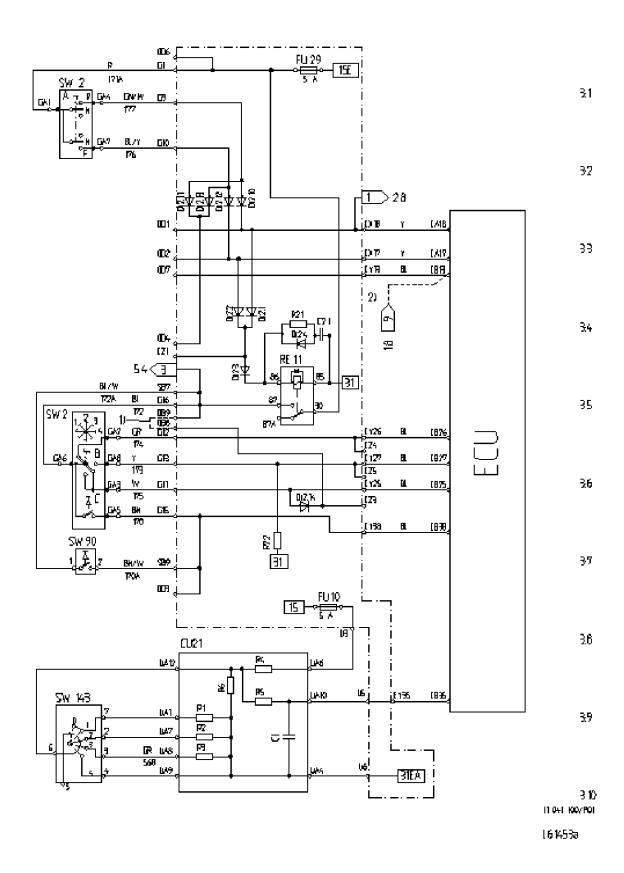
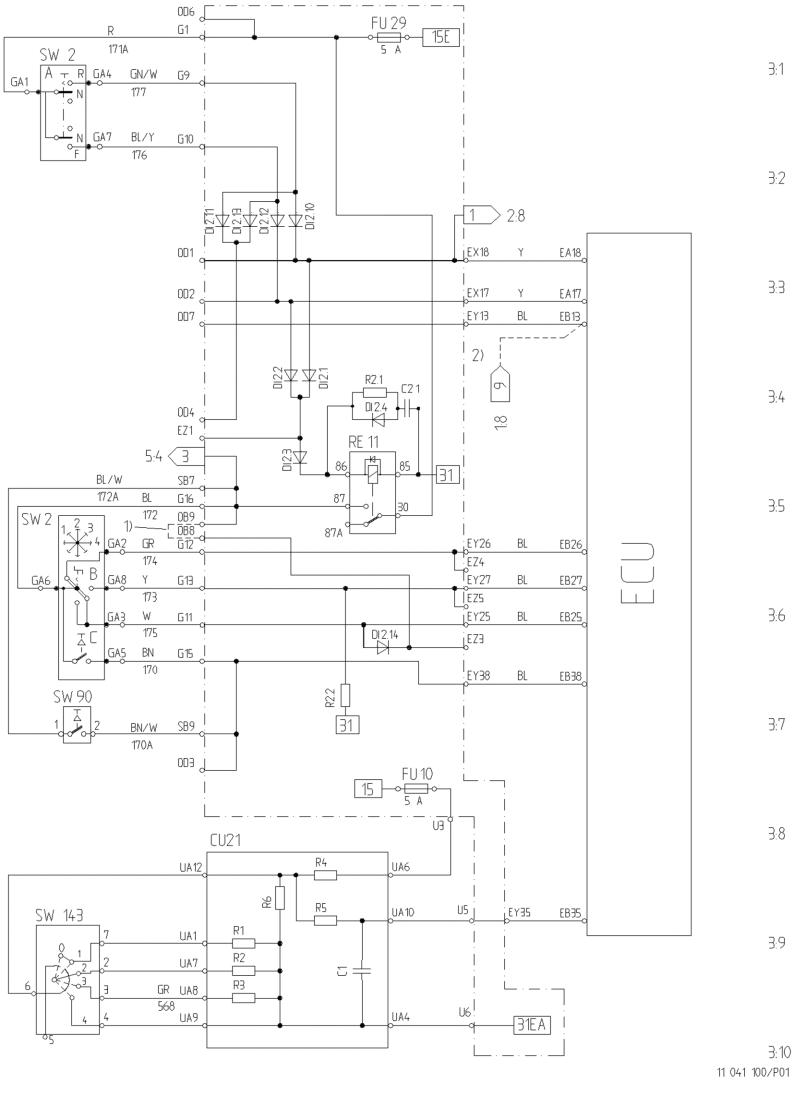


Figure 1
Wiring diagram, circuit 3:1 — 3:10



L61453a



Document Title: Wiring diagram, circuit 4:1 — 4:10	l '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 4:1 — 4:10

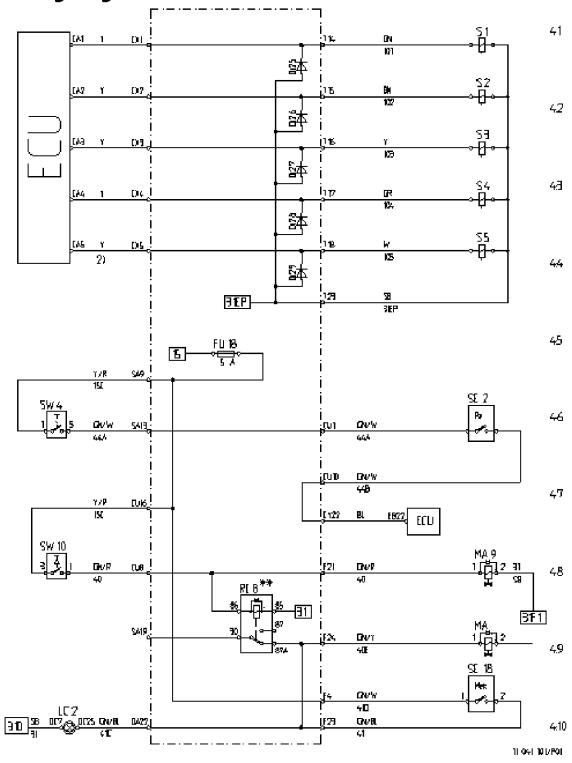
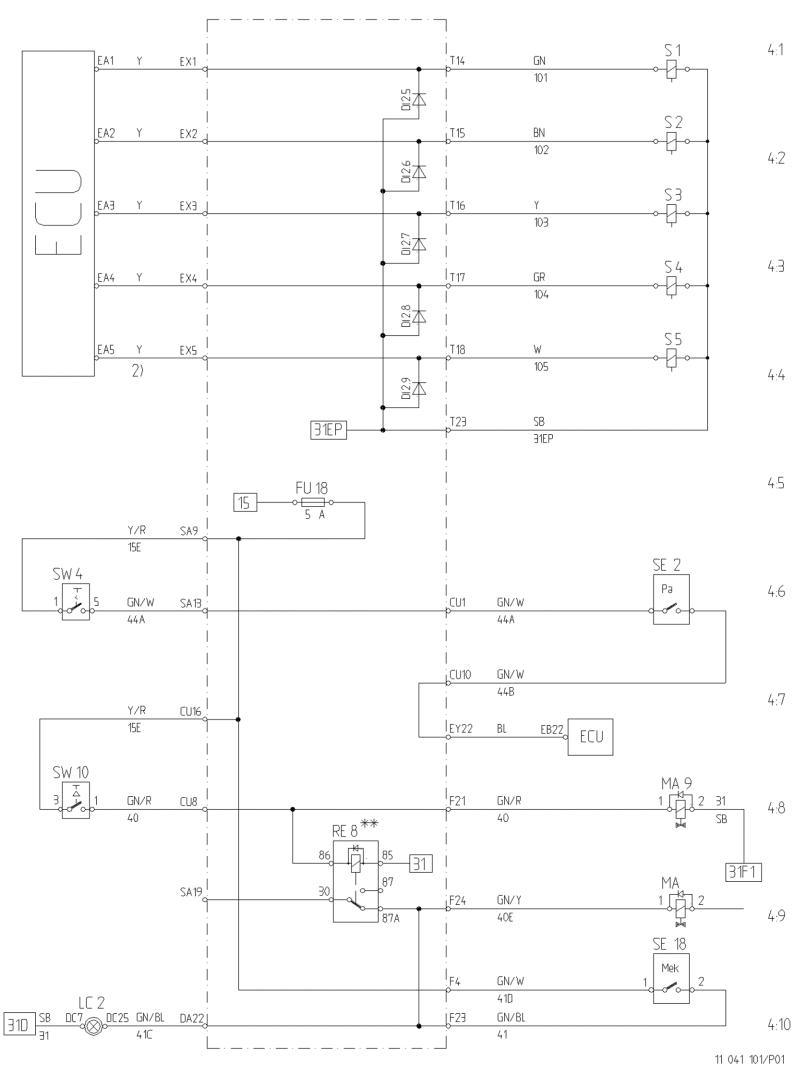


Figure 1 Wiring diagram, circuit 4:1 — 4:10





Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 5:1 — 5:10	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 5:1 — 5:10

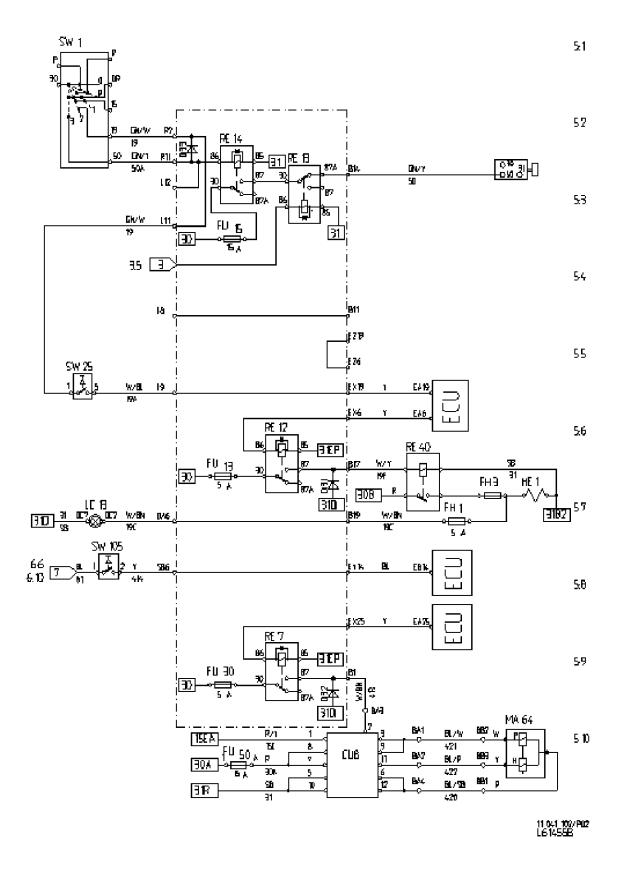
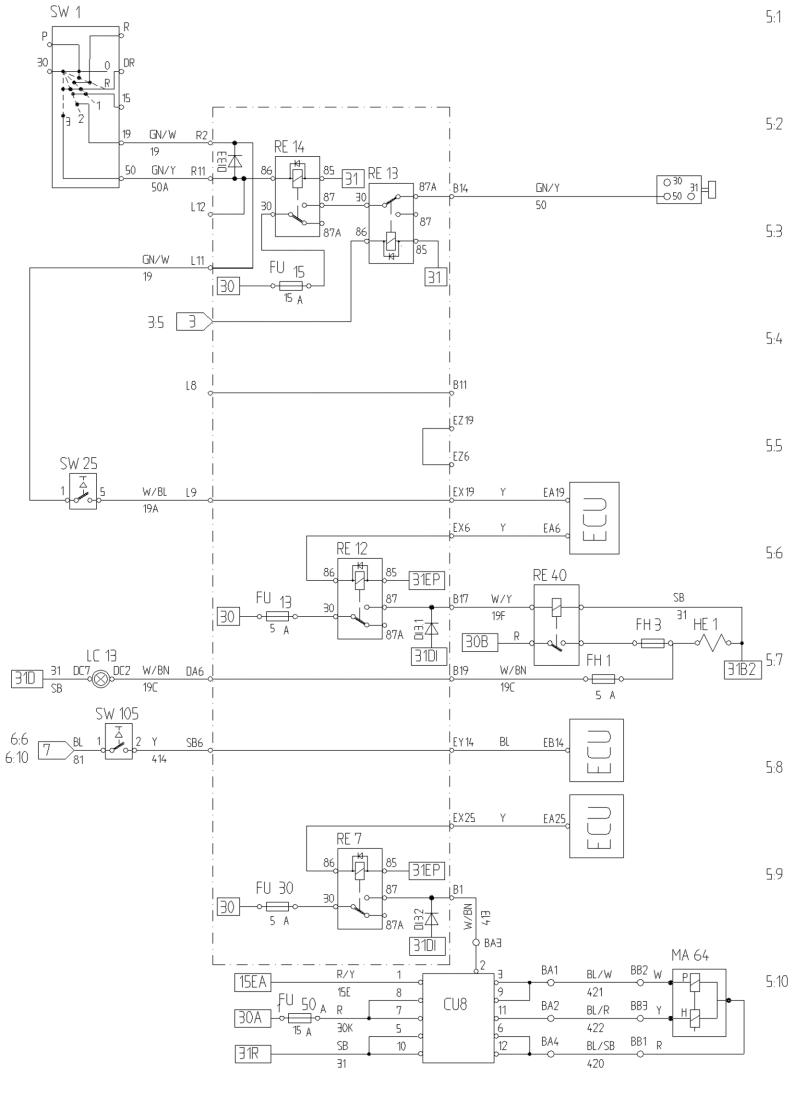


Figure 1 Wiring diagram, circuit 5:1 — 5:10





Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 6:1 — 6:10	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 6:1 — 6:10

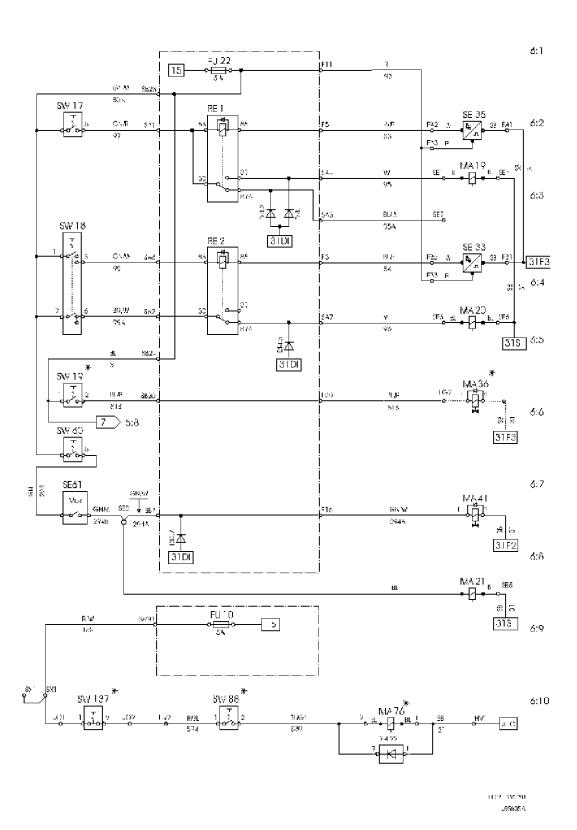
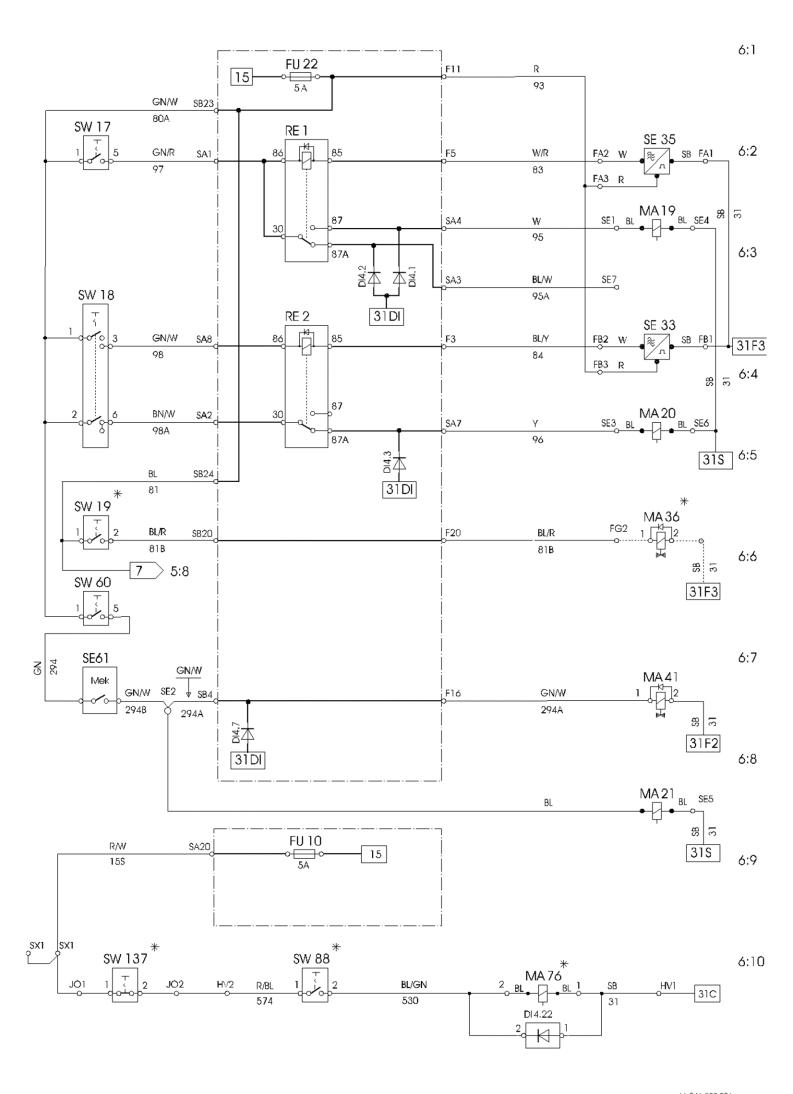


Figure 1 Wiring diagram, circuit 6:1 — 6:10



L61447a



Construction Equipment

Document Title: Wiring diagram, circuit 7:1 — 7:10	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 7:1 — 7:10

L90C Serial No. –14561 (EU) L120C Serial No. –11624 (EU)

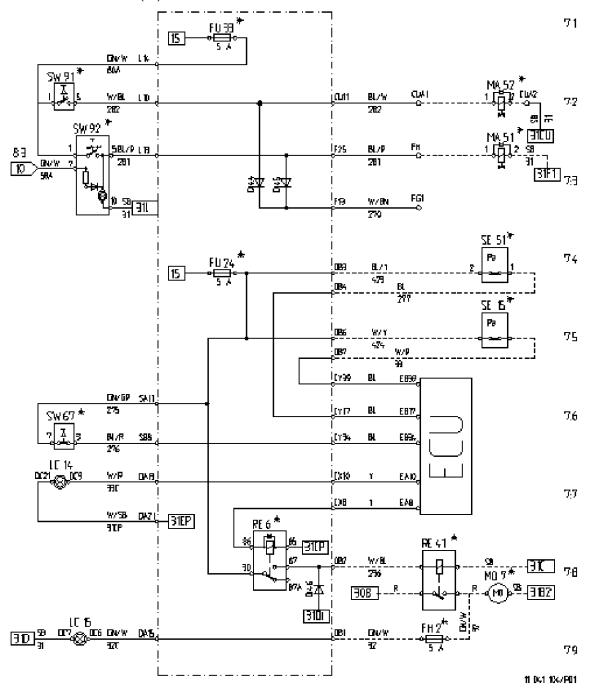
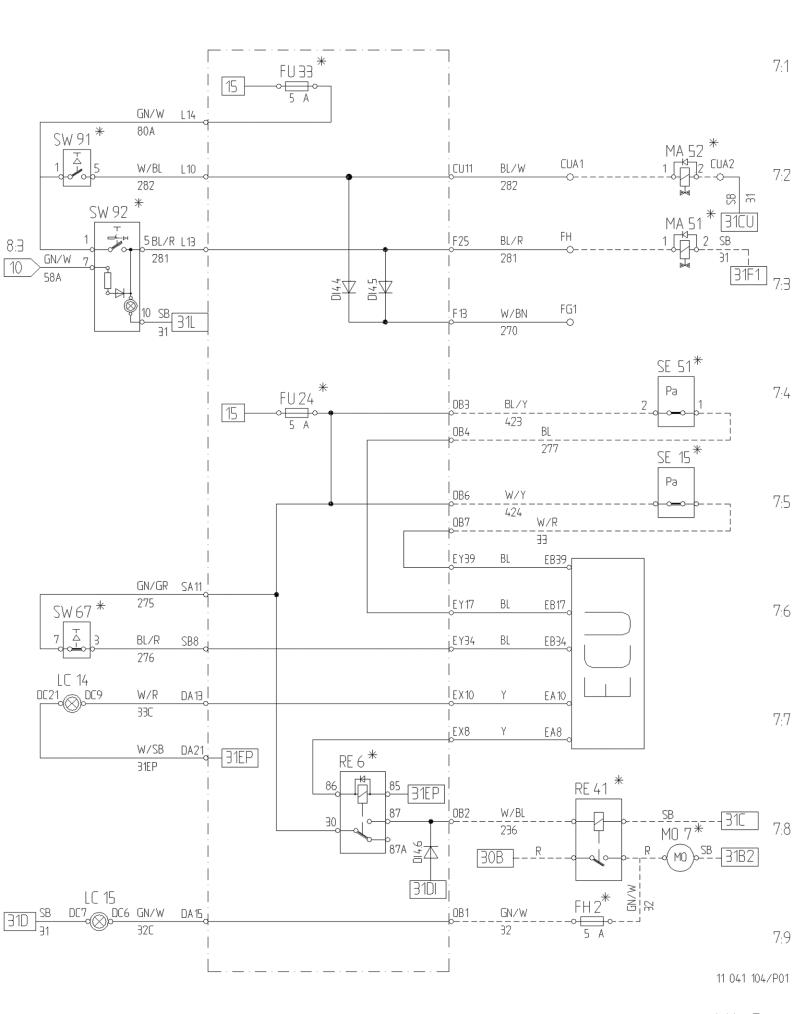


Figure 1 Wiring diagram, circuit 7:1 — 7:10





Document Title: Wiring diagram, circuit 7:1 — 7:10	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 7:1 — 7:10

L90C Serial No. 14562– (EU) L120C Serial No. 11625– (EU)

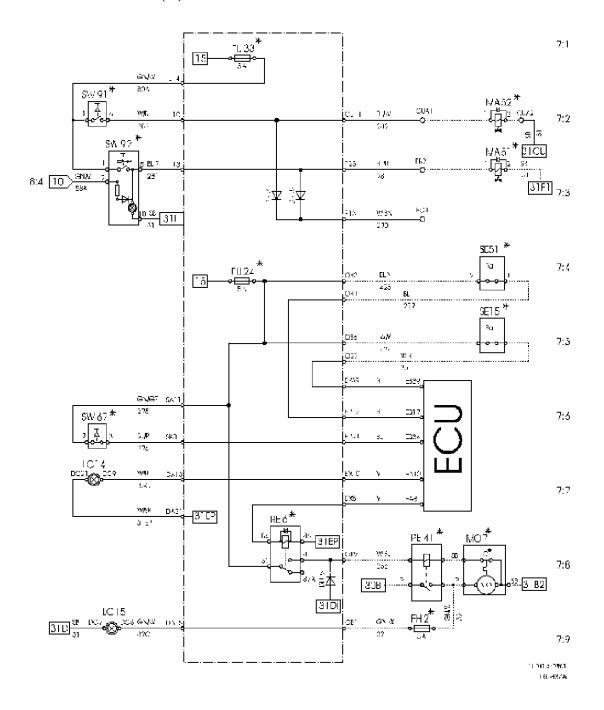
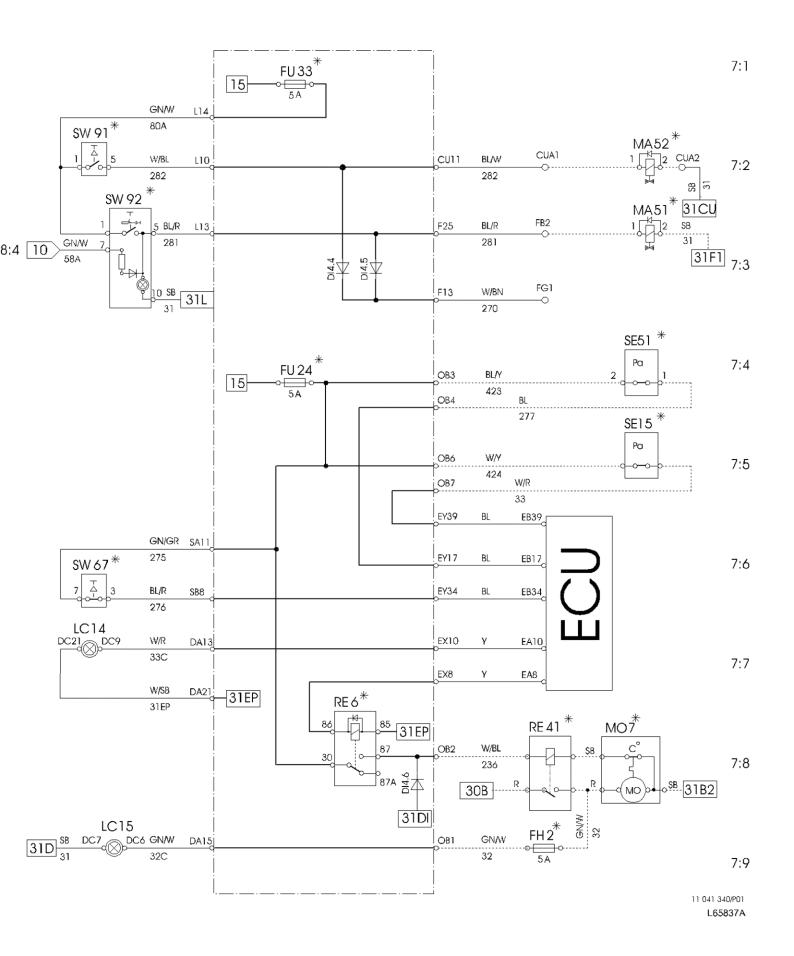


Figure 1 Wiring diagram, circuit 7:1 — 7:10





Document Title: Wiring diagram, circuit 8:1 — 8:10	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 8:1 — 8:10

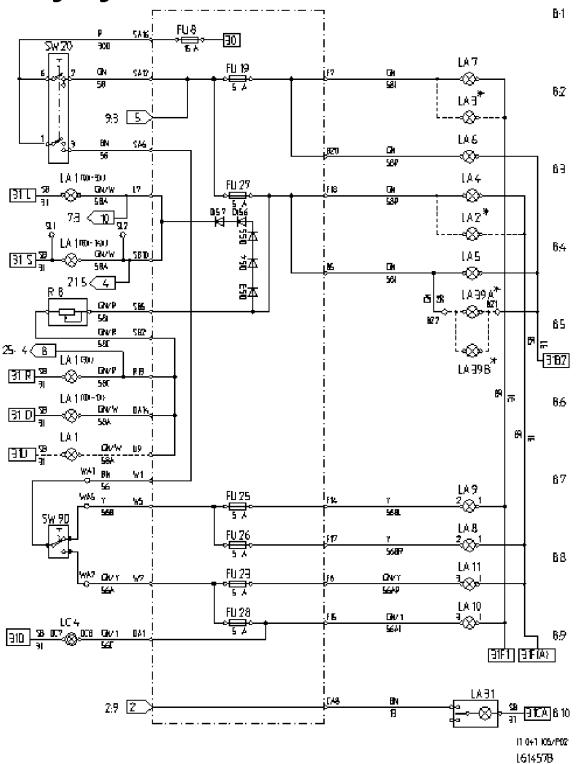
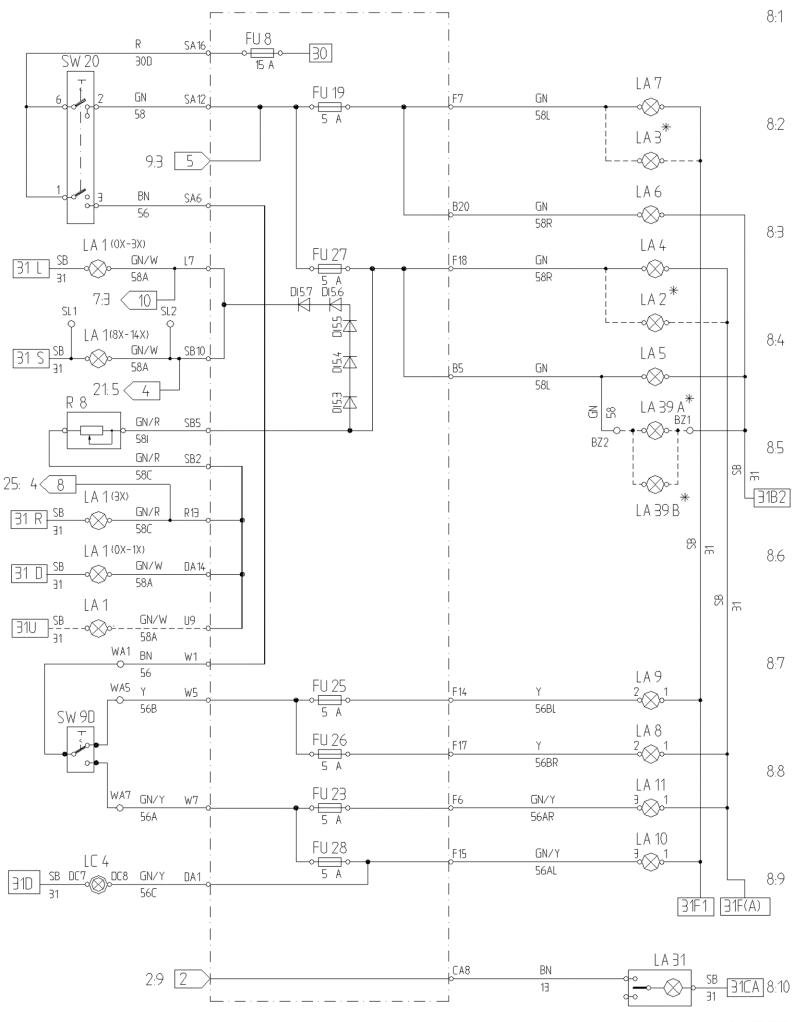


Figure 1 Wiring diagram, circuit 8:1 — 8:10



11 041 105/P02 L61457B

Document Title: Wiring diagram, circuit 9:1 — 9:7	l '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 9:1 — 9:7

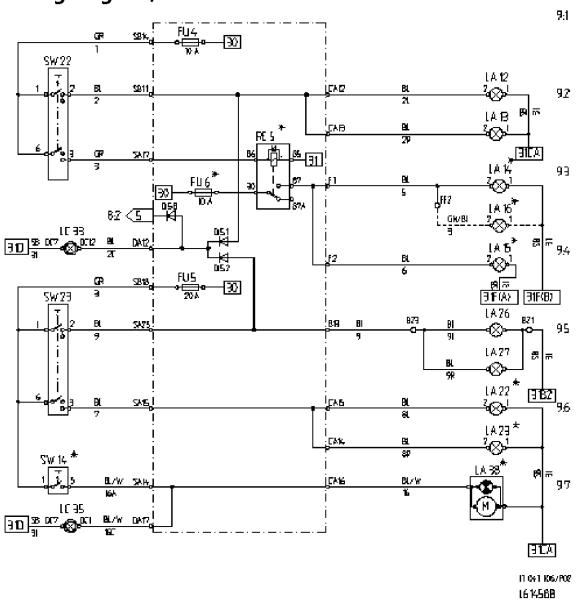
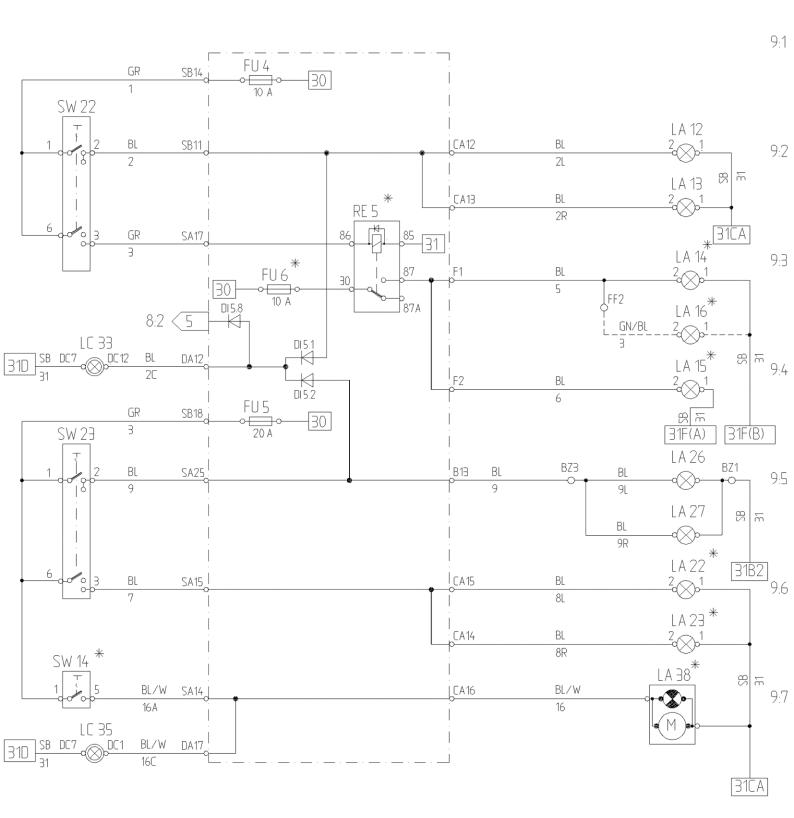


Figure 1
Wiring diagram, circuit 9:1 — 9:7



11 041 106/P02 L61458B

Document Title: Wiring diagram, circuit 10:1 — 10:8	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 10:1 — 10:8

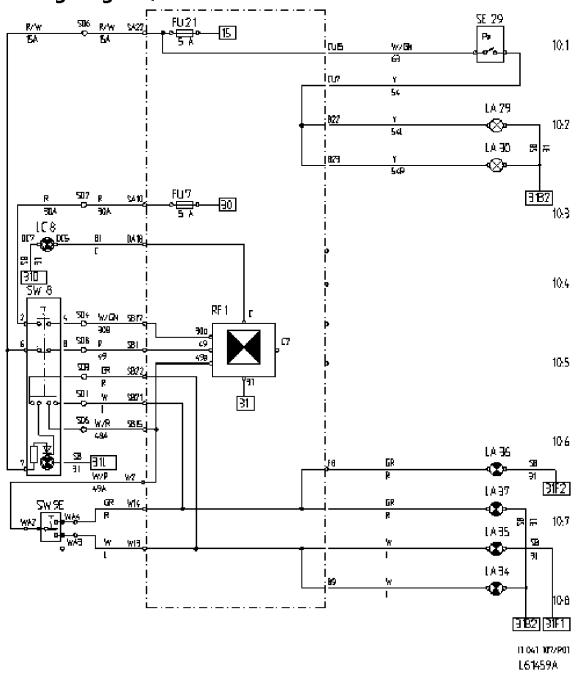
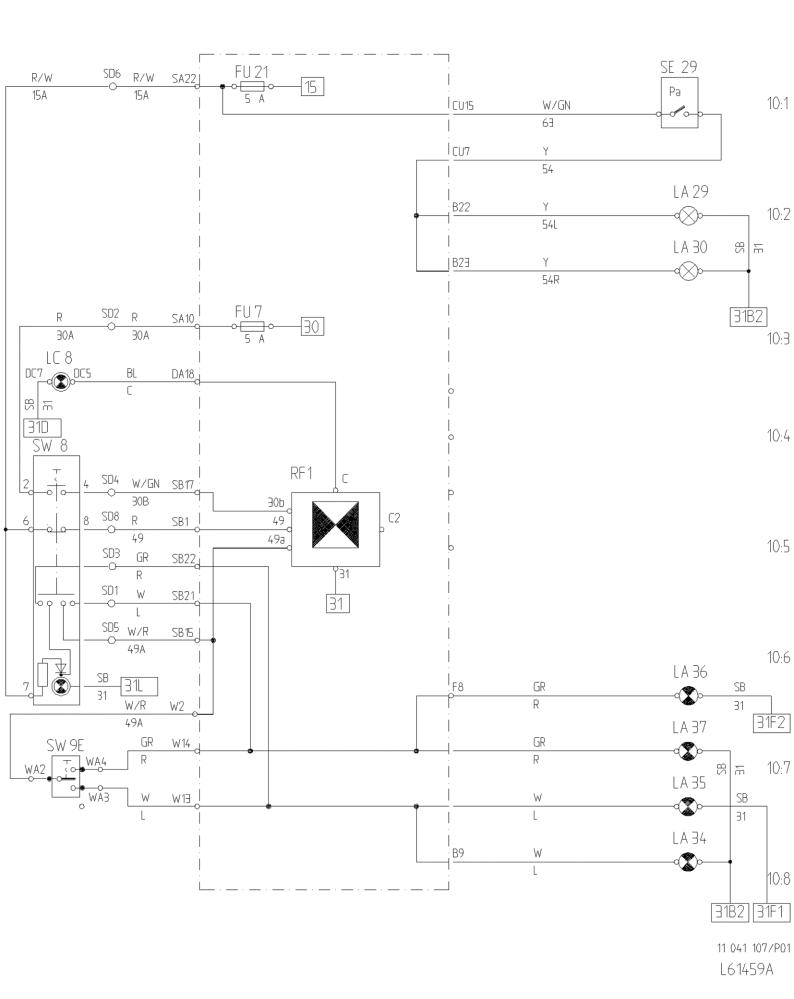


Figure 1
Wiring diagram, circuit 10:1 — 10:8





Document Title: Wiring diagram, circuit 11:1 — 11:7	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 11:1 — 11:7

L90C Serial No. –14965 (EU) L120C Serial No. –12009 (EU)

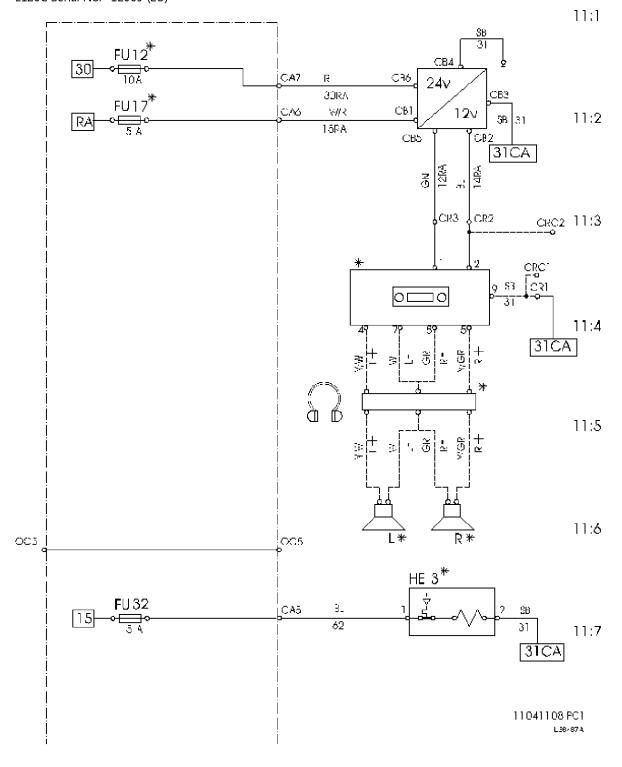
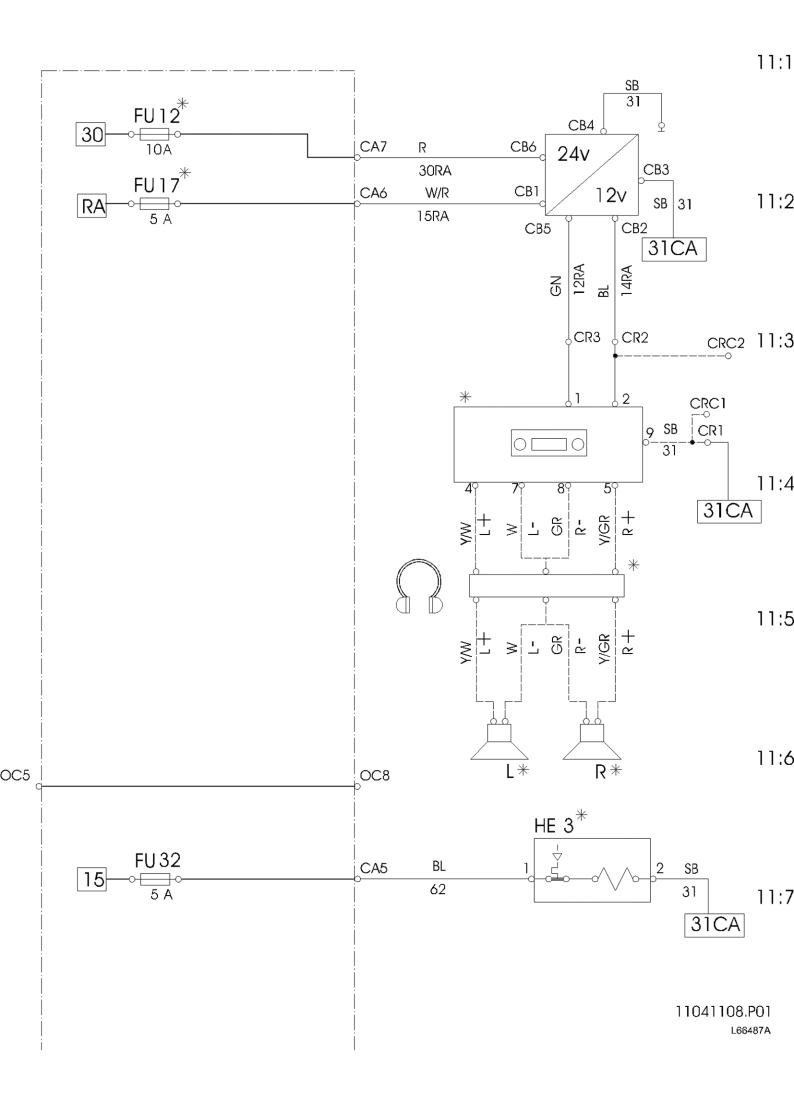


Figure 1 Wiring diagram, circuit 11:1 — 11:7





Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 11:1 — 11:7	· ·	/	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 11:1 — 11:7

L90C Serial No. 14966–15413 (EU) L120C Serial No. 12010–12535 (EU)

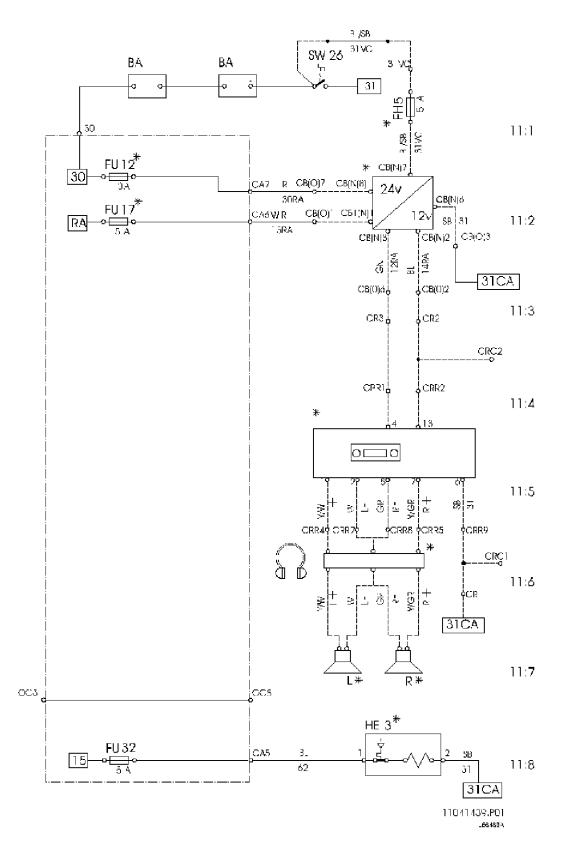
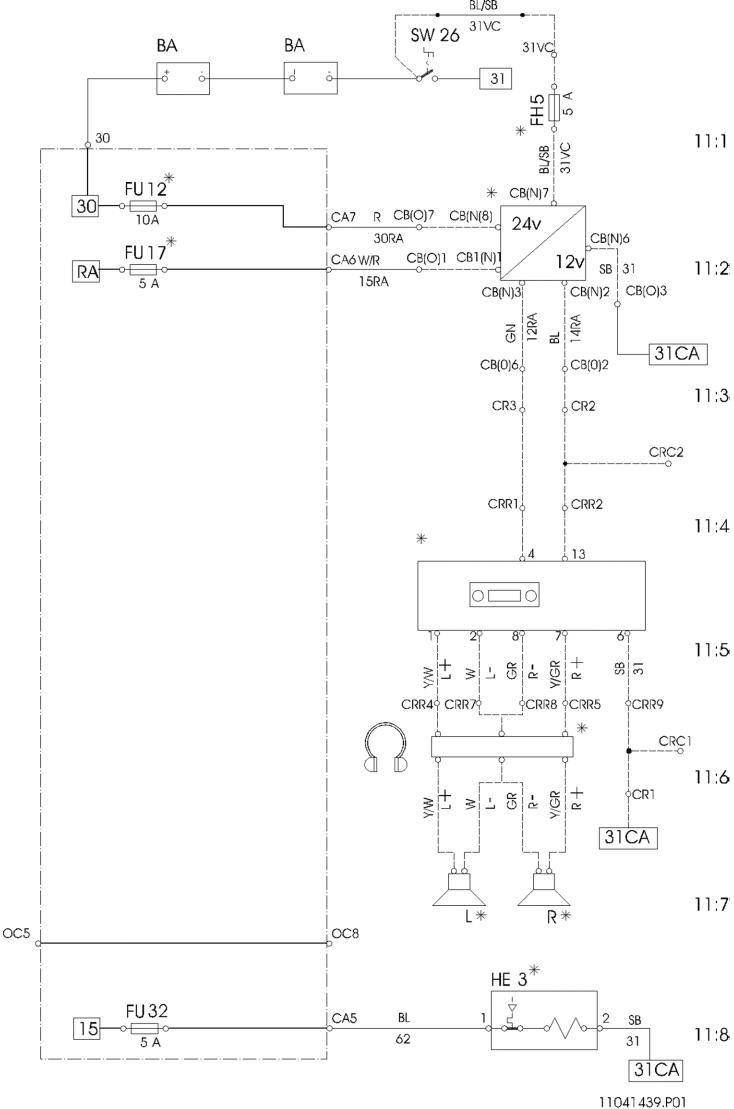


Figure 1 Wiring diagram, circuit 11:1 — 11:7





Service Information Construction Equipment

Document Title: Wiring diagram, circuit 11:1 — 11:7	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 11:1 — 11:7

L90C Serial No. 15414-15714 (EU) L120C Serial No. 12536-12873 (EU)

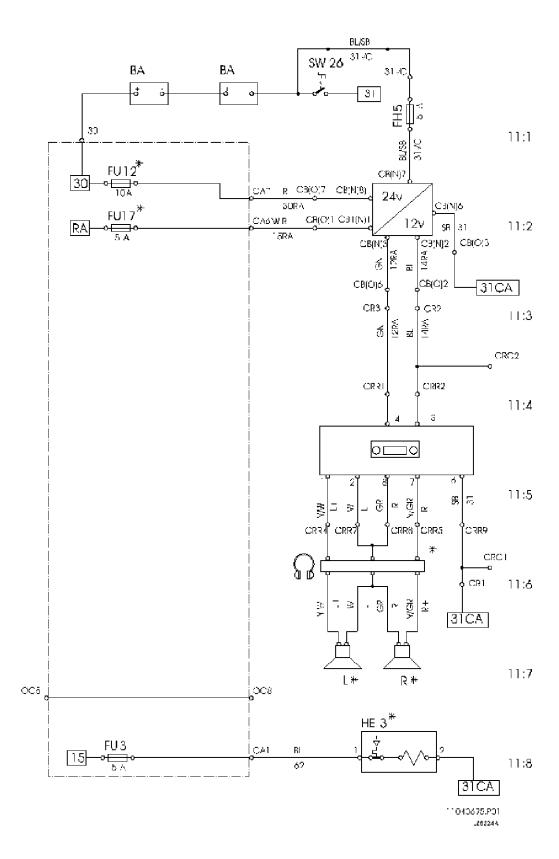
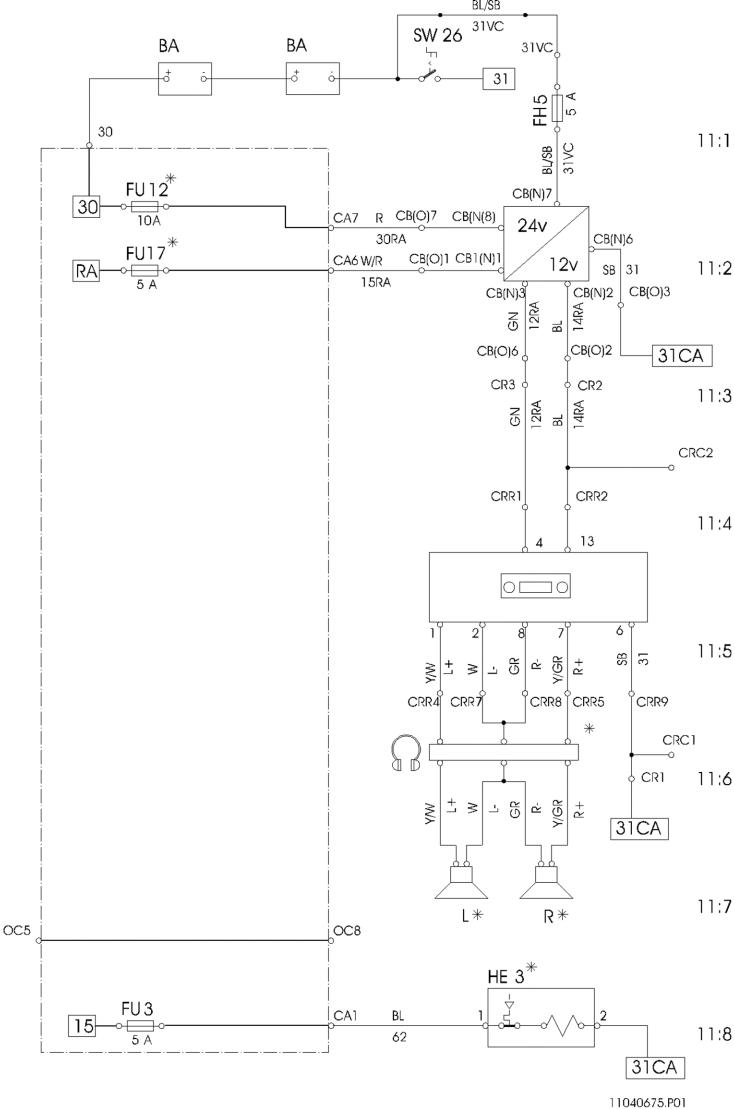


Figure 1 Wiring diagram, circuit 11:1 — 11:7



11040675.P0



Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 11:1 — 11:7	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 11:1 — 11:7

L90C Serial No. 15715–16004 (EU) L120C Serial No. 12874–13149 (EU)

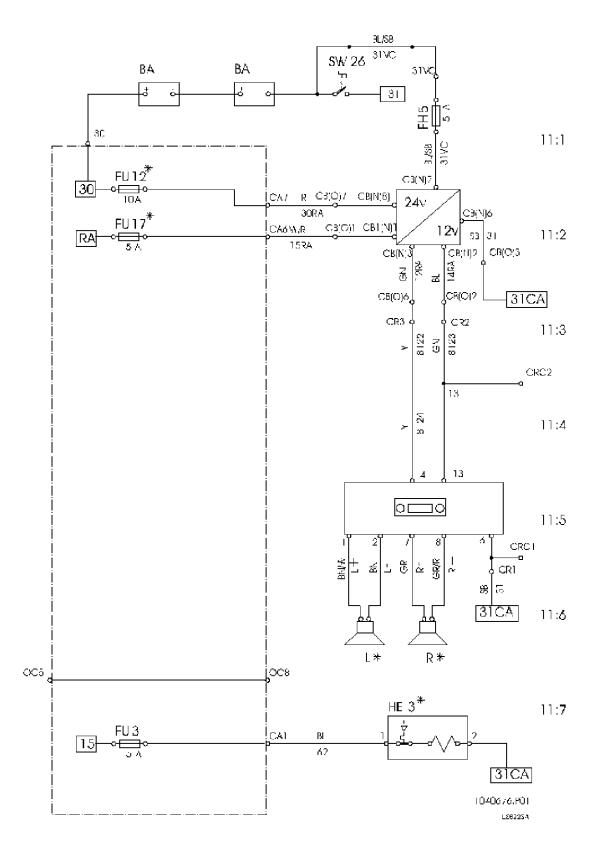
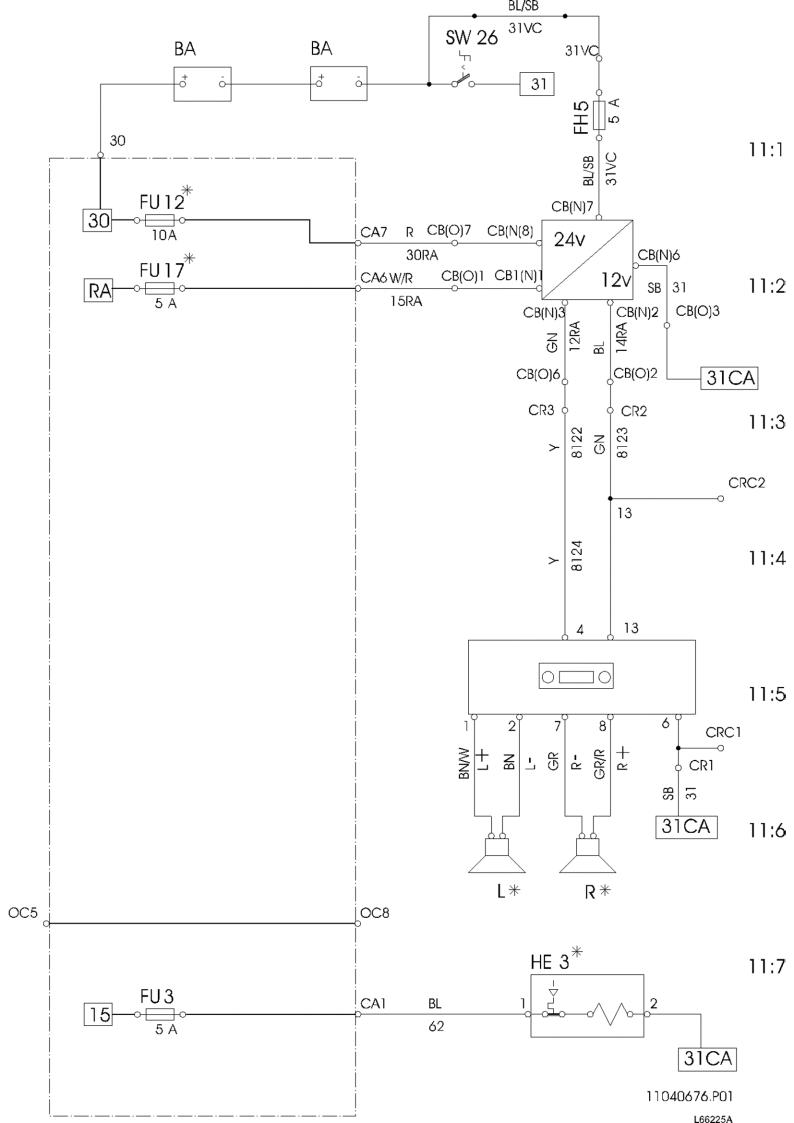


Figure 1
Wiring diagram, circuit 11:1 — 11:7





Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 11:1 — 11:7	· ·	/	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 11:1 — 11:7

L90C Serial No. 16005– (EU) L120C Serial No. 13150– (EU)

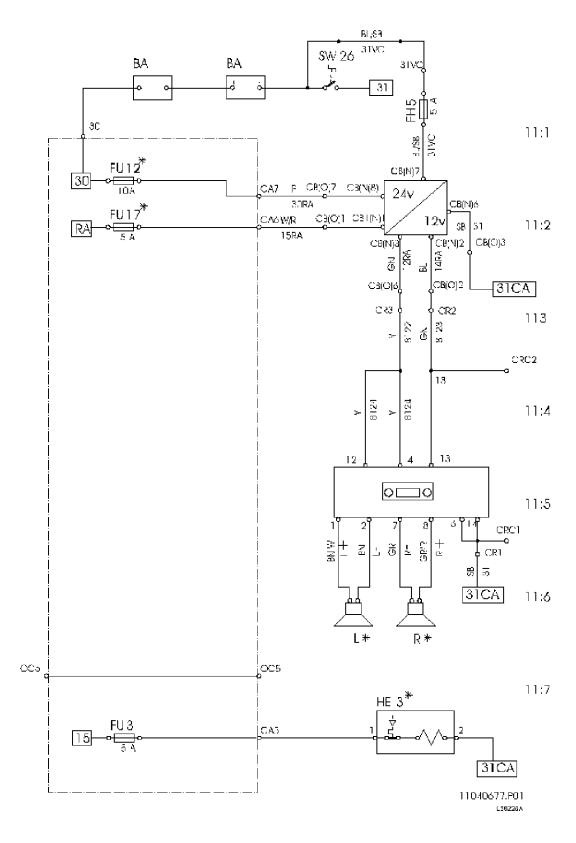
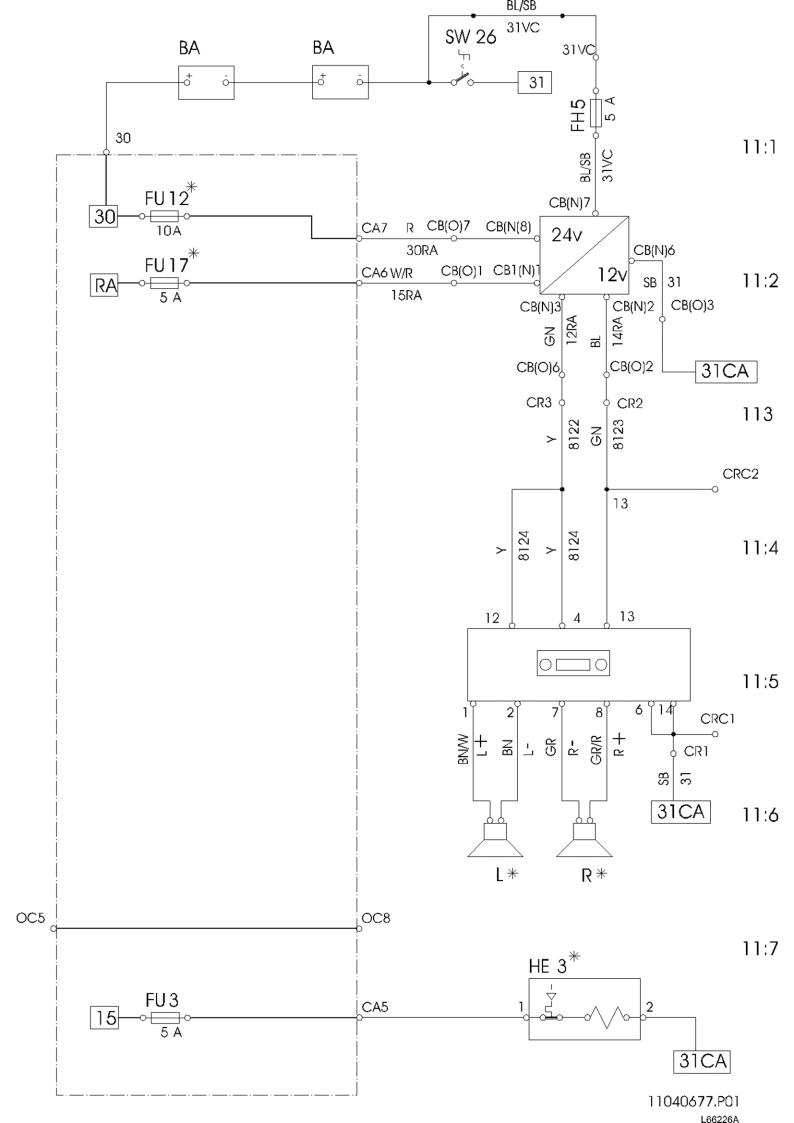


Figure 1
Wiring diagram, circuit 11:1 — 11:7





Document Title: Wiring diagram, circuit 12:1 — 12:10	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 12:1 — 12:10

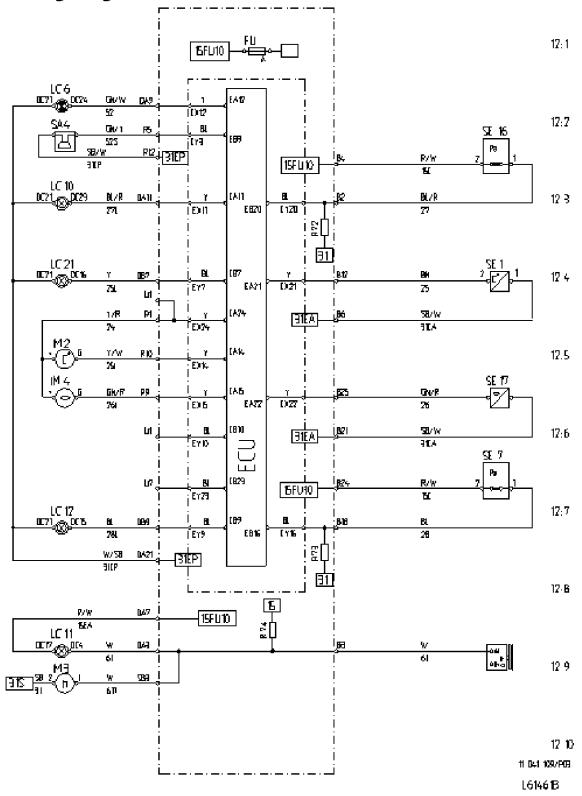
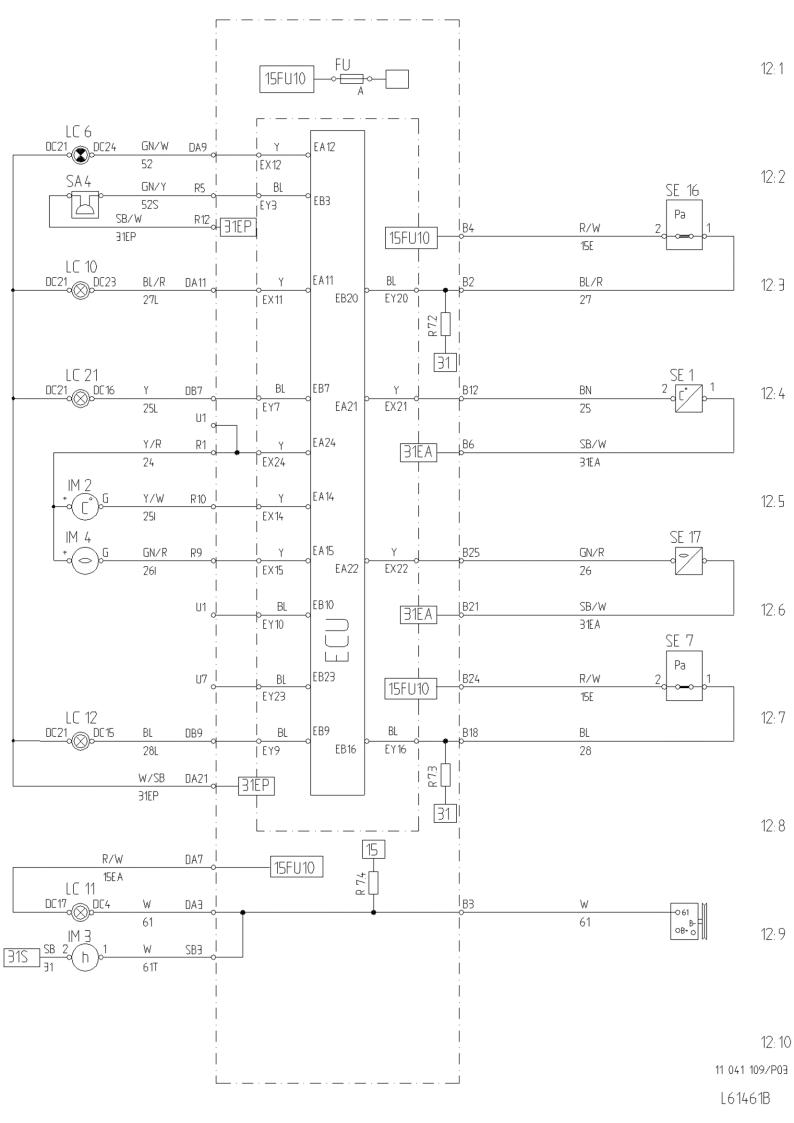


Figure 1 Wiring diagram, circuit 12:1 — 12:10



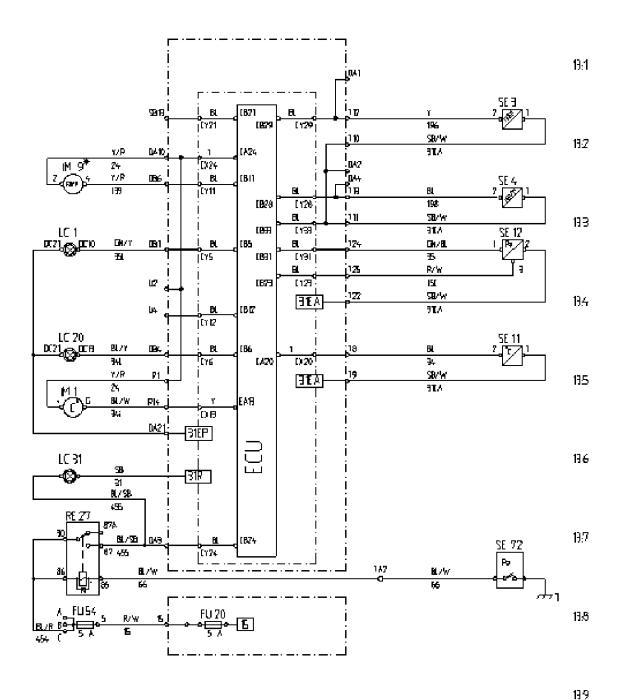


Service Information Construction Equipment

Document Title: Wiring diagram, circuit 13:1 — 13:10	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

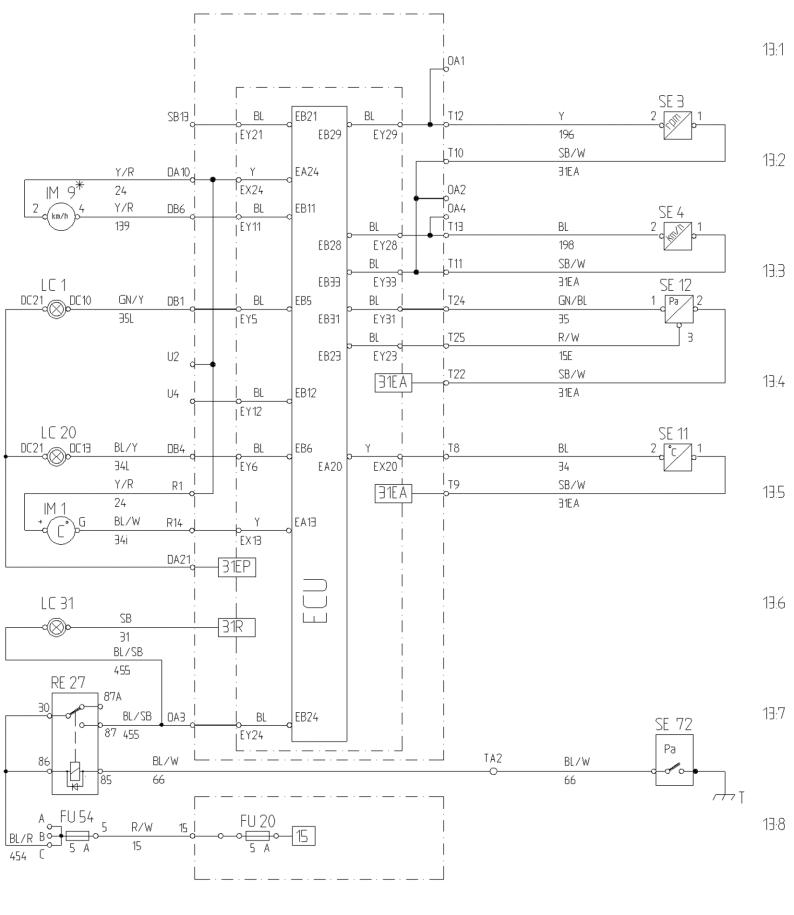
Wiring diagram, circuit 13:1 — 13:10

HT131 Serial No. -10690 (EU) HT205 Serial No. -10627 (EU)



19:10 11 041 1107P01 161462A

Figure 1 Wiring diagram, circuit 13:1 — 13:10



13:9

13:10

11 041 110/P01 L61462A

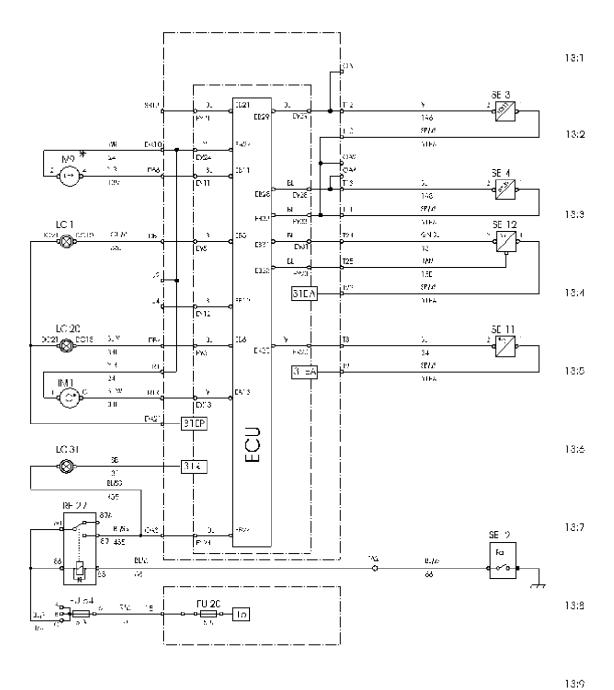


Service Information Construction Equipment

Document Title: Wiring diagram, circuit 13:1 — 13:10	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 13:1 — 13:10

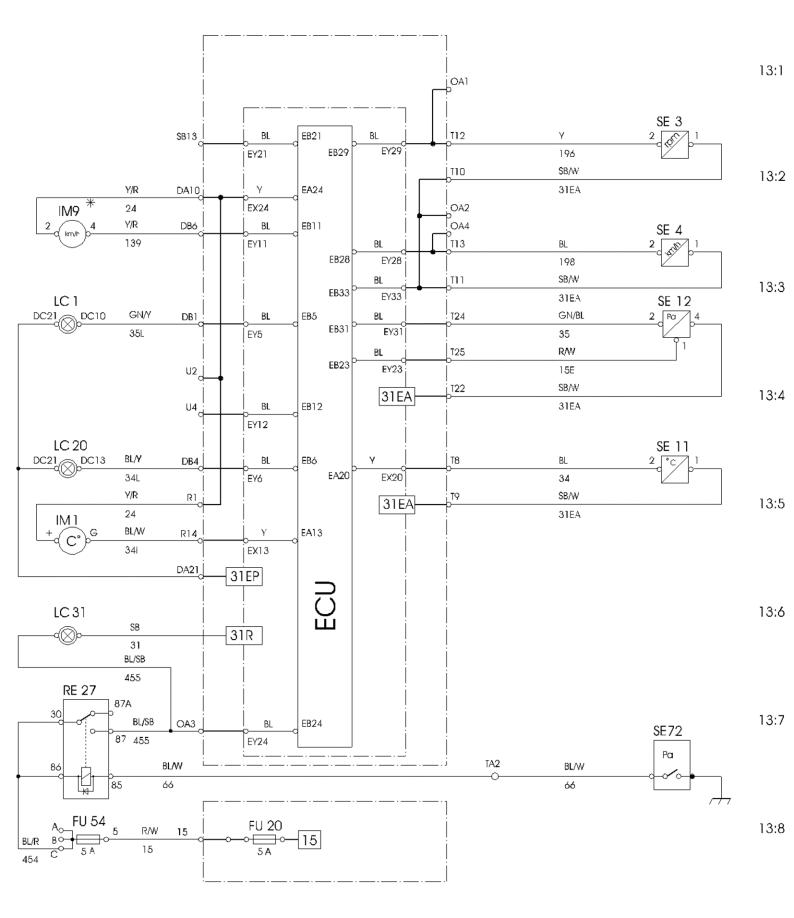
HT131 Serial No. 10691– (EU) HT205 Serial No. 10628- (EU)



13:10

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Figure 1 Wiring diagram, circuit 13:1 — 13:10



13:10

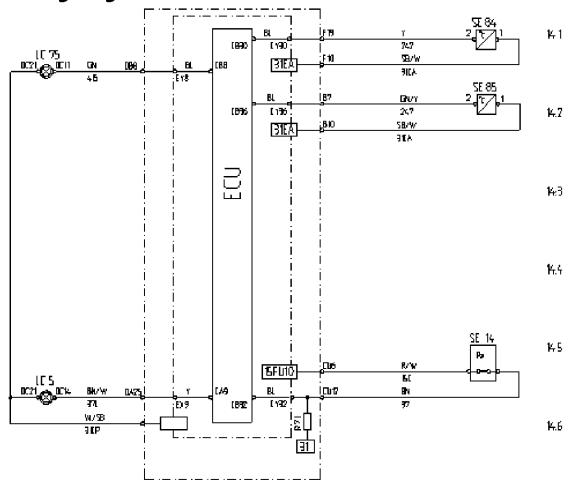
13:9





Document Title: Wiring diagram, circuit 14:1 — 14:10	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 14:1 — 14:10

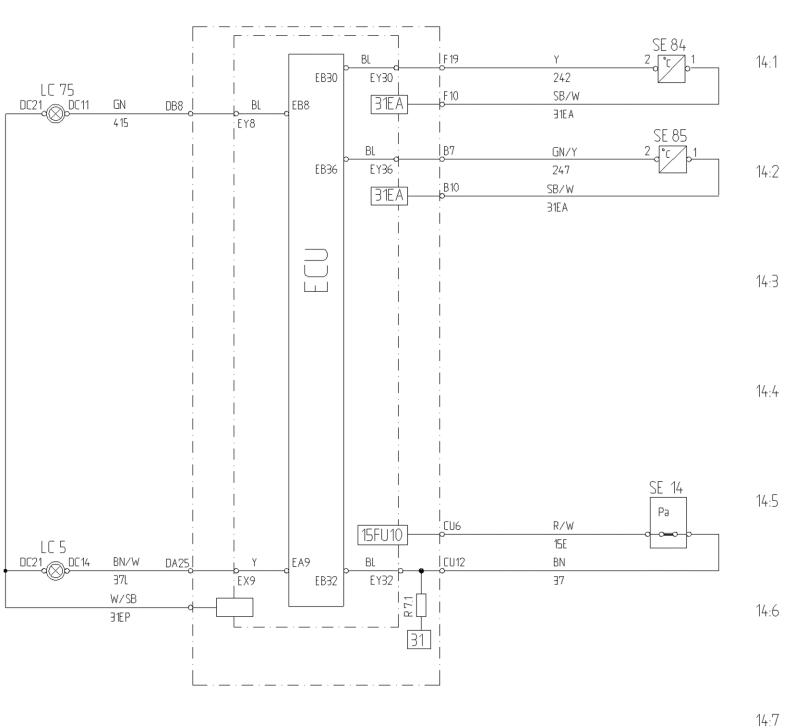


14.7

14.6

14.9

14-10 11-041-155-7901 1-61463A Figure 1 Wiring diagram, circuit 14:1 — 14:10



14:8

14:9

Document Title: Wiring diagram, circuit 15:1 — 15:7	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 15:1 — 15:7

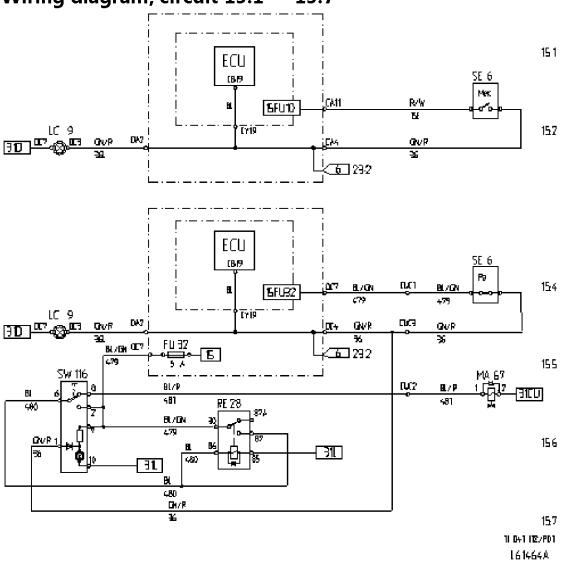


Figure 1
Wiring diagram, circuit 15:1 — 15:7

11 041 112/P01 L61464A

Document Title: Wiring diagram, circuit 19:1 — 19:7	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 19:1 — 19:7

L90C Serial No. –16167 (EU)

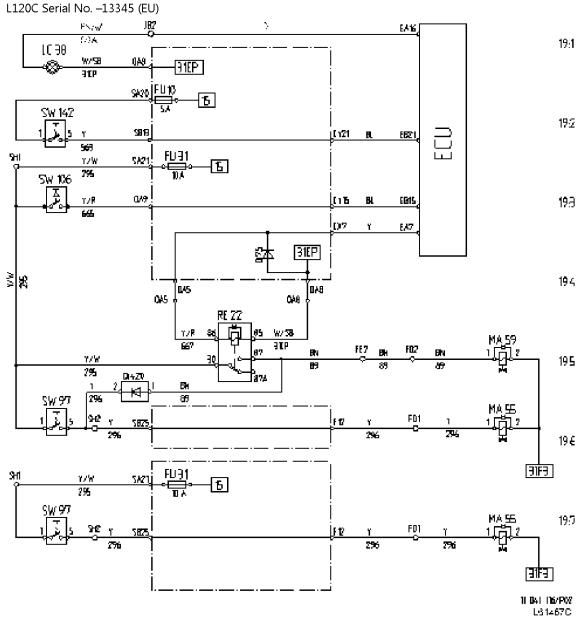
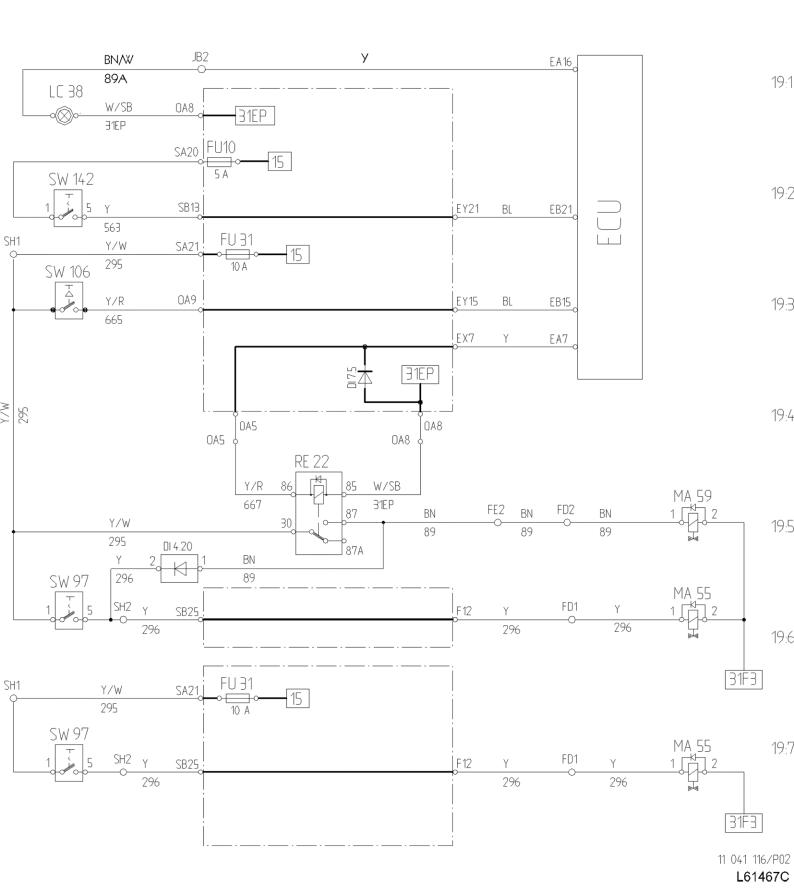


Figure 1 Wiring diagram, circuit 19:1 — 19:7



Document Title: Wiring diagram, circuit 19:1 — 19:7	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 19:1 — 19:7

L90C Serial No. 16168– (EU)

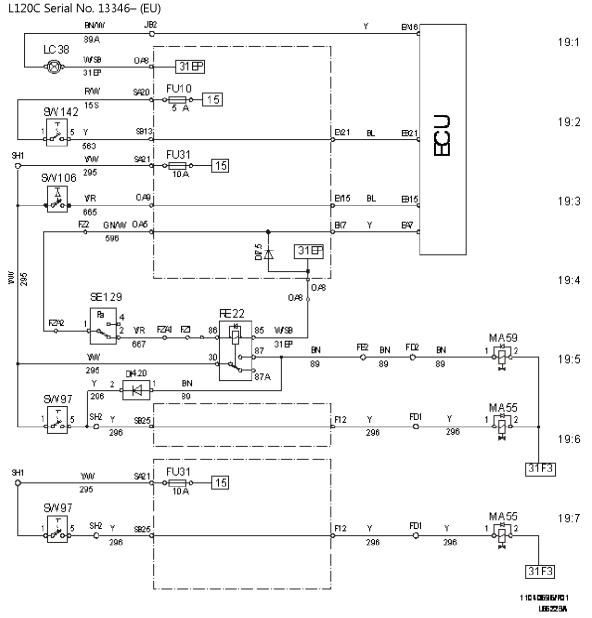
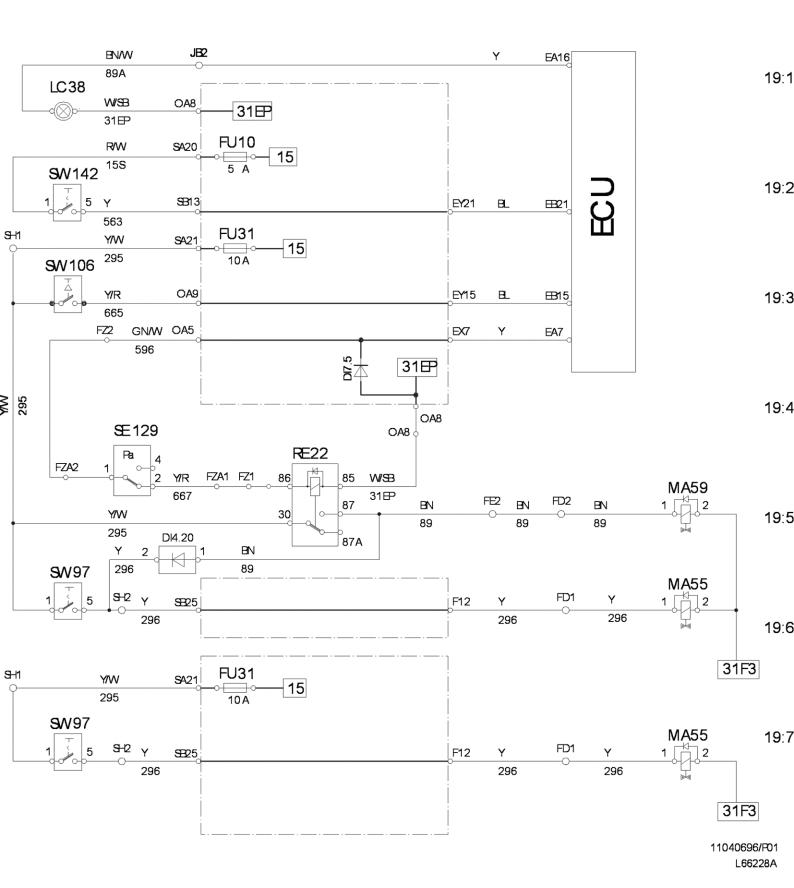


Figure 1 Wiring diagram, circuit 19:1 — 19:7



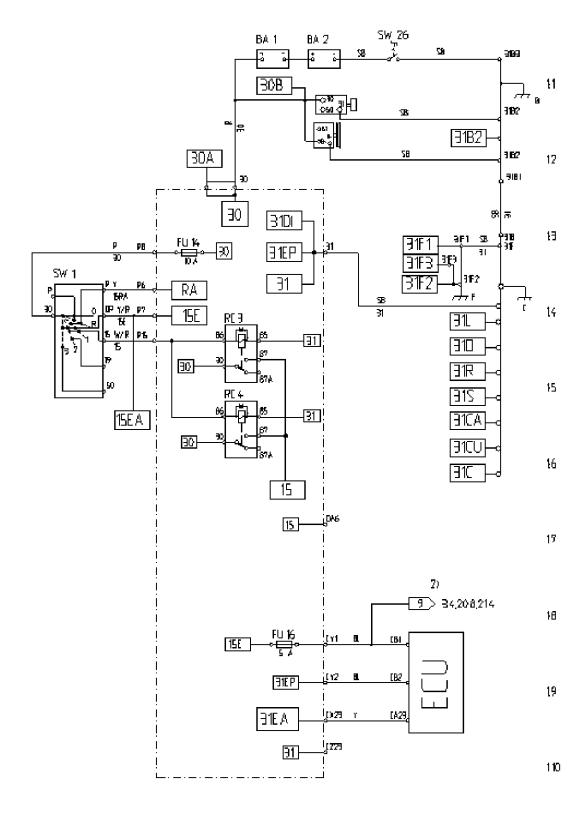


Service Information

Construction Equipment

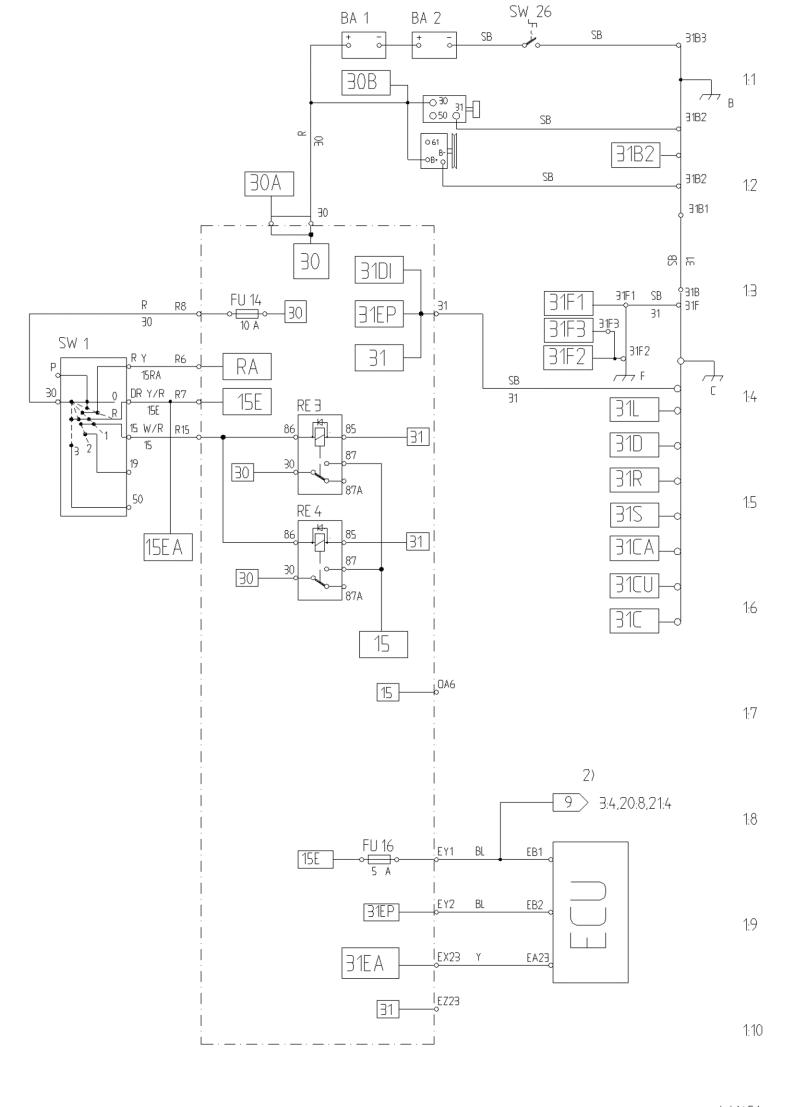
Document Title: Wiring diagram, circuit 1:1 — 1:10	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 1:1 — 1:10



L61451a

Figure 1 Wiring diagram, circuit 1:1 — 1:10



Document Title: Wiring diagram, circuit 20:1 — 20:7	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 20:1 — 20:7

L90C Serial No. –13624 (EU), –62177 (US) L120C Serial No. –10615 (EU), –61470 (US)

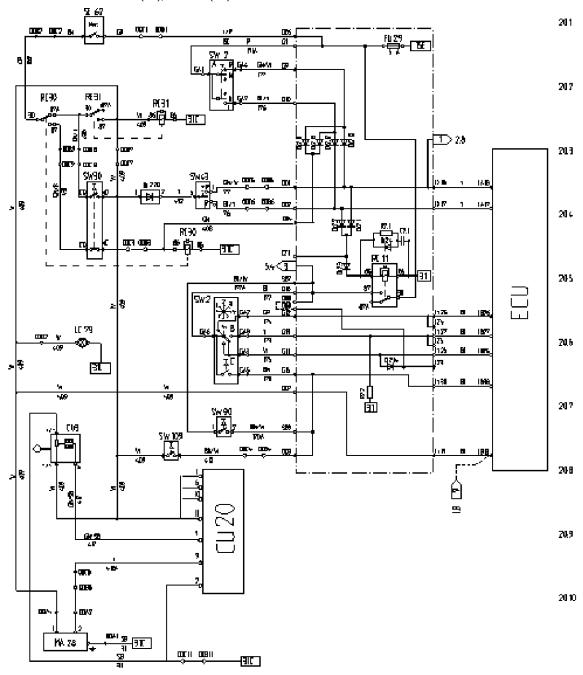
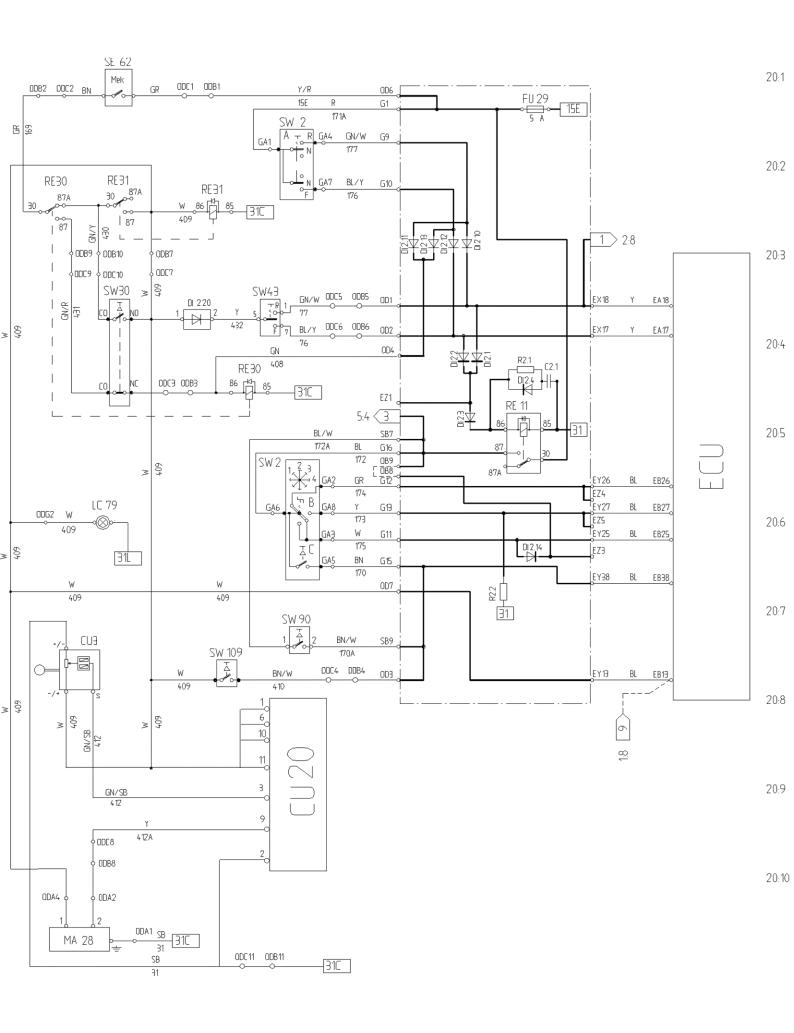


Figure 1
Wiring diagram, circuit 20:1 — 20:7



Document Title: Wiring diagram, circuit 20:1 — 20:7	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 20:1 — 20:7

L90C Serial No. 13625–15576 (EU), 62178–63249 (US) L120C Serial No. 10616–12727 (EU), 61471–62348 (US)

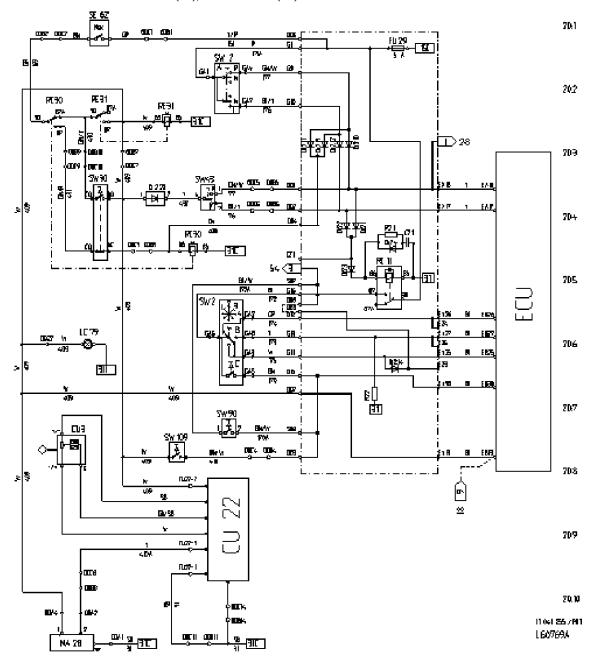
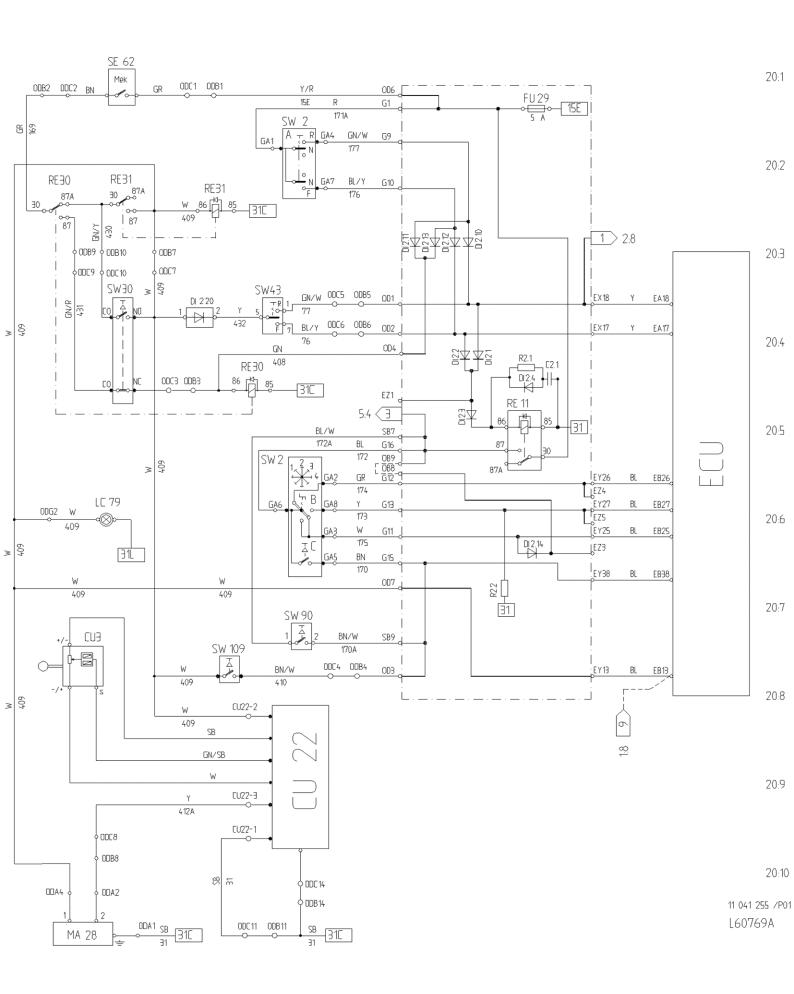


Figure 1
Wiring diagram, circuit 20:1 — 20:7



Document Title: Wiring diagram, circuit 20:1 — 20:7	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 20:1 — 20:7

L90C Serial No. 15577– (EU), 63250– (US) L120C Serial No. 12728– (EU), 62349– (US)

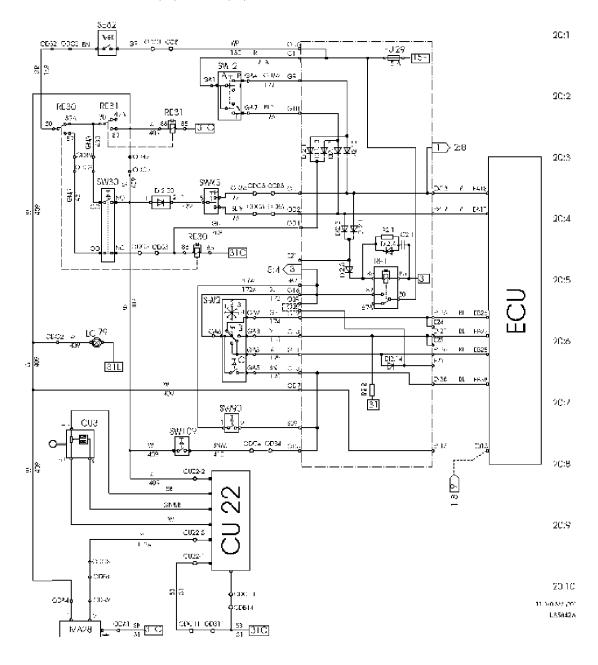
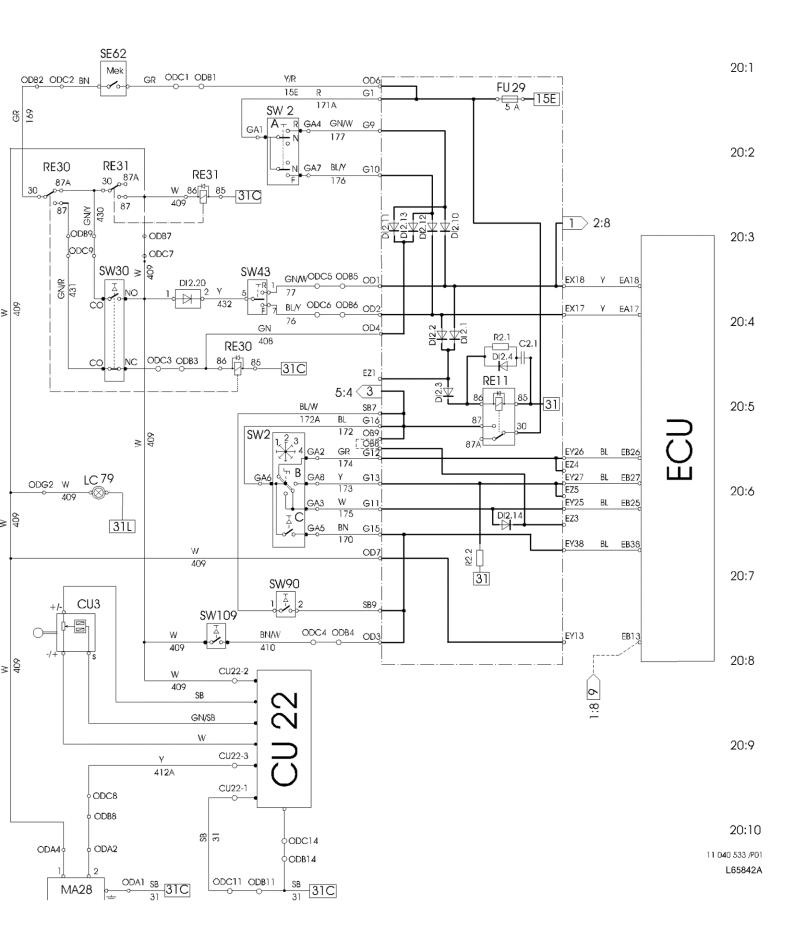


Figure 1
Wiring diagram, circuit 20:1 — 20:7





Document Title: Wiring diagram, circuit 21:1 — 21:7	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 21:1 — 21:7

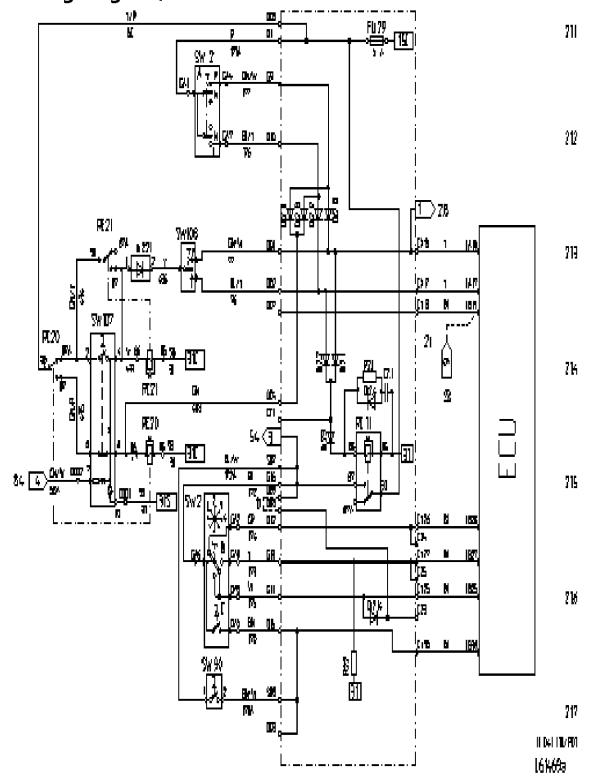
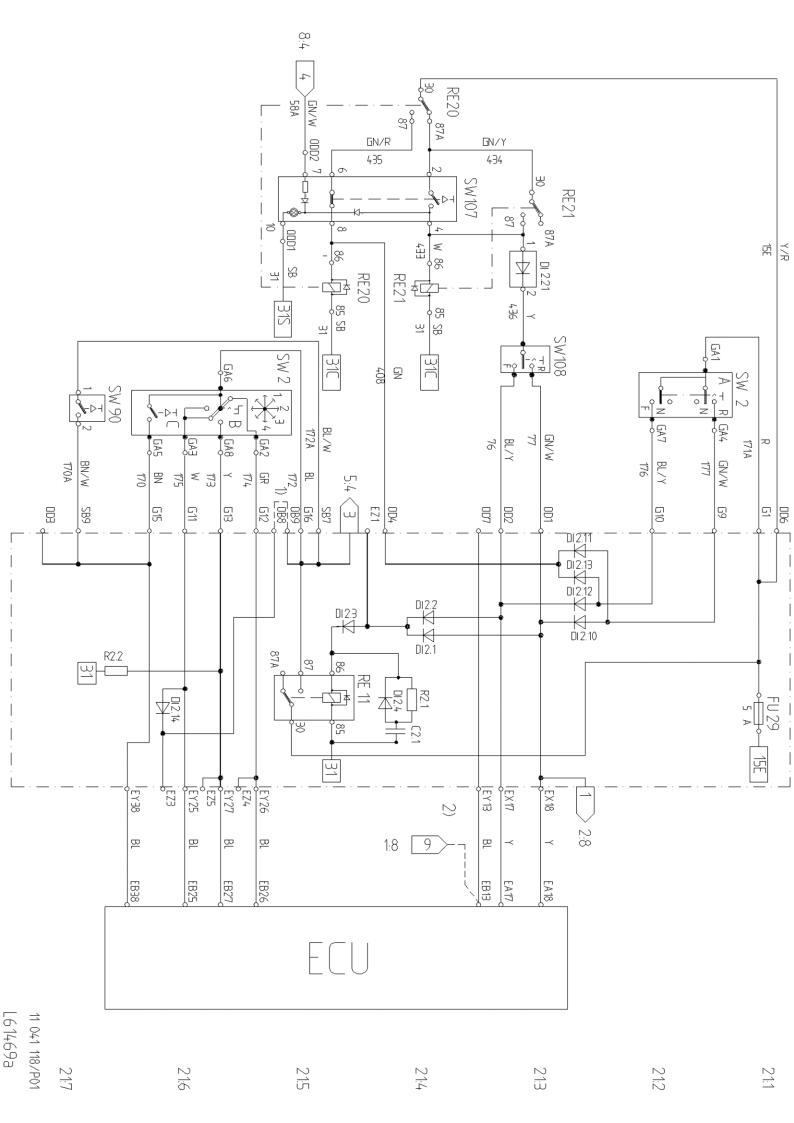
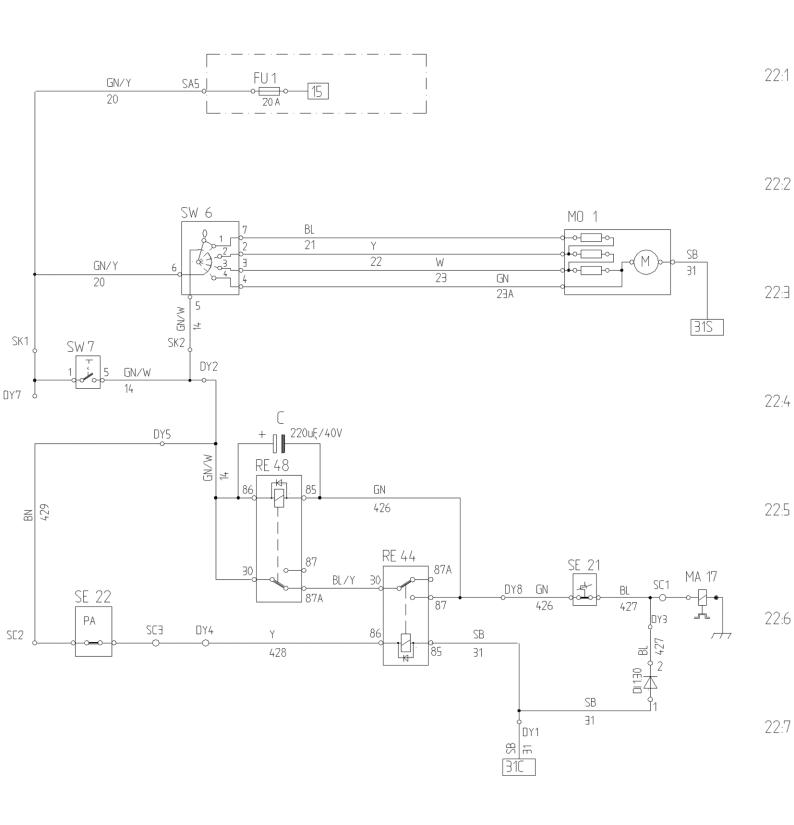


Figure 1 Wiring diagram, circuit 21:1 — 21:7





22:8 11 041 119/P01 L61449a

Document Title: Wiring diagram, circuit 22:1 — 22:8	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 22:1 — 22:8

L90C Serial No. 15745 – (EU) L120C Serial No. 12904 – (EU)

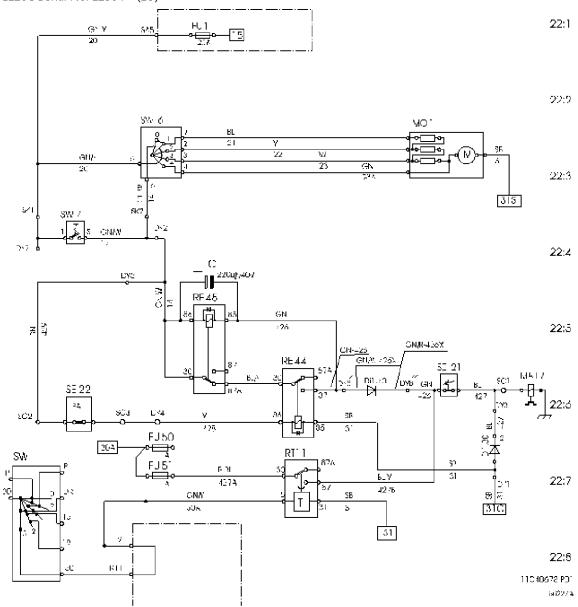
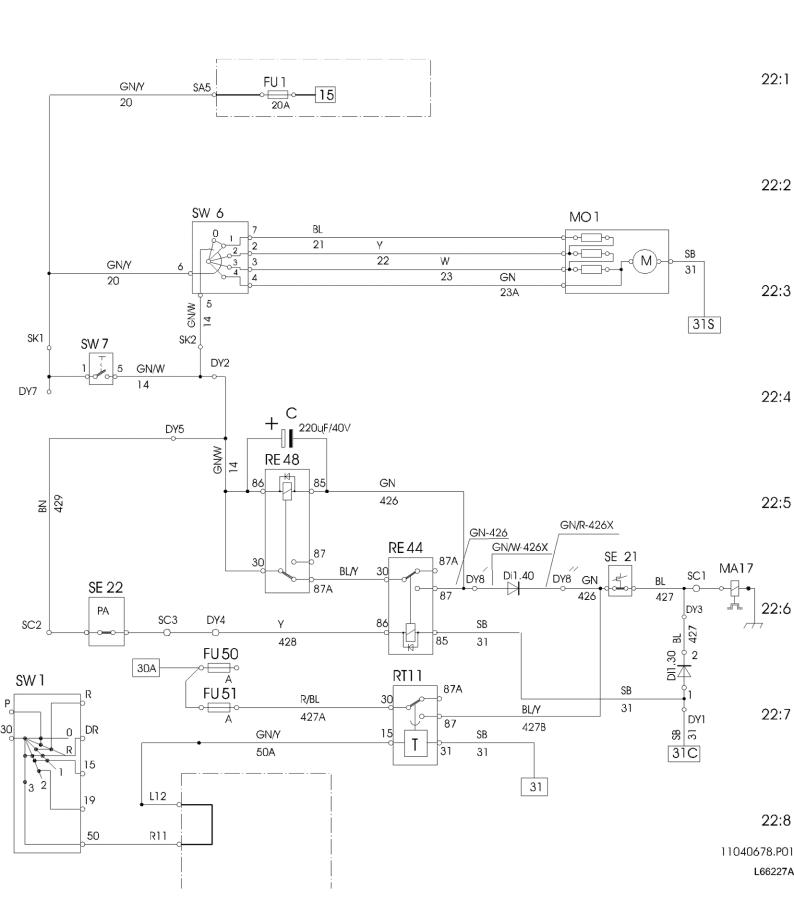


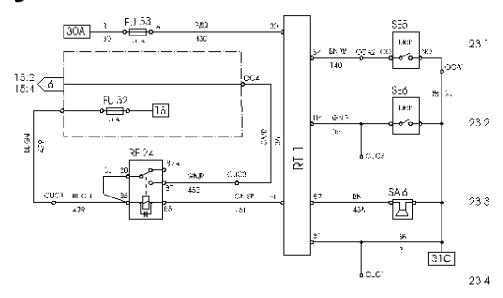
Figure 1
Wiring diagram, circuit 22:1 — 22:8





Document Title: Wiring diagram, circuit 23:1 — 23:8	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 23:1 — 23:8



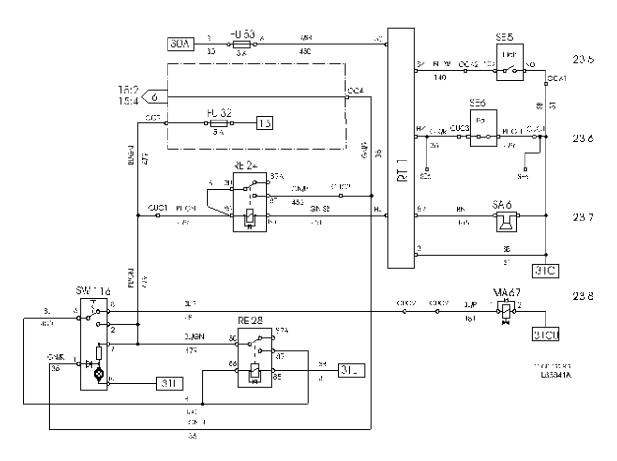
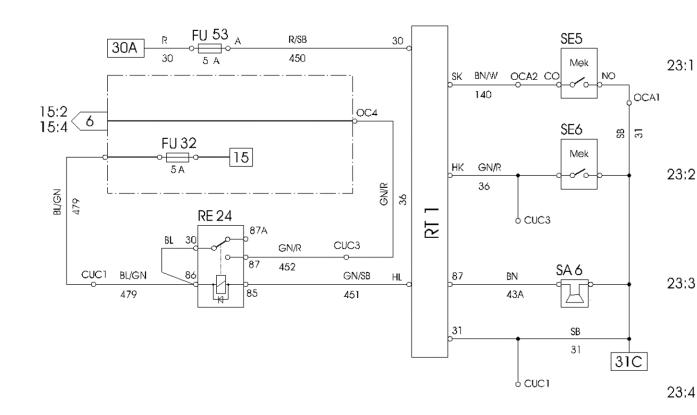
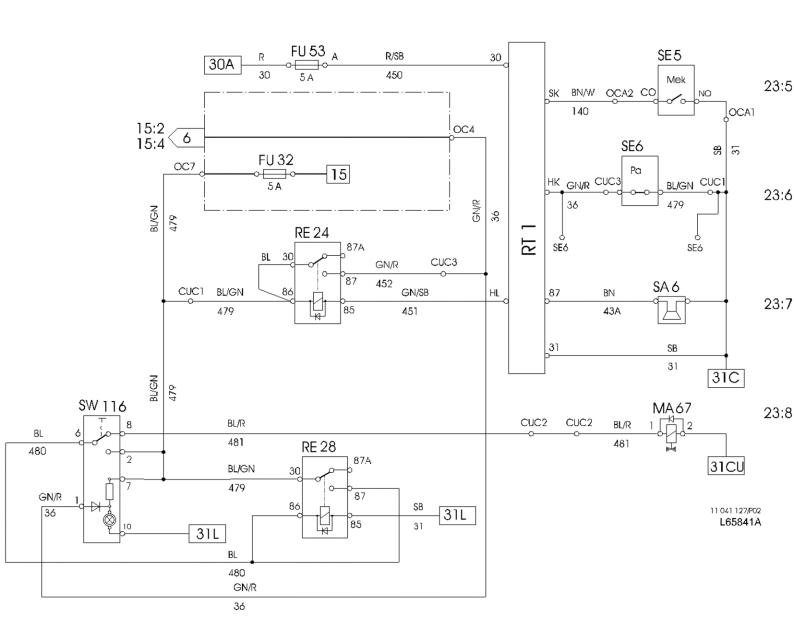


Figure 1 Wiring diagram, circuit 23:1 — 23:8





Document Title: Wiring diagram, circuit 24:1 — 24:6	· ·	 Date: 25.04.2013
Profile:		

Wiring diagram, circuit 24:1 — 24:6

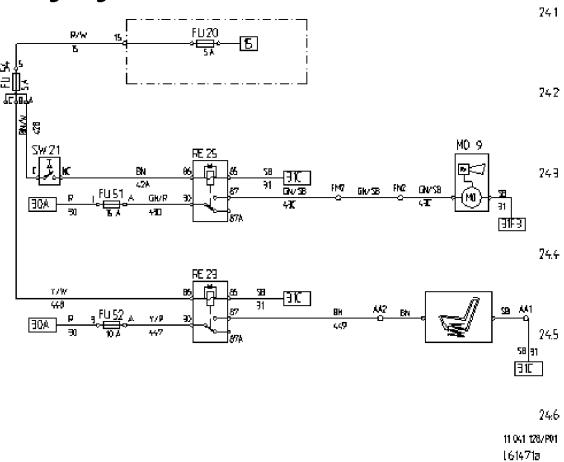
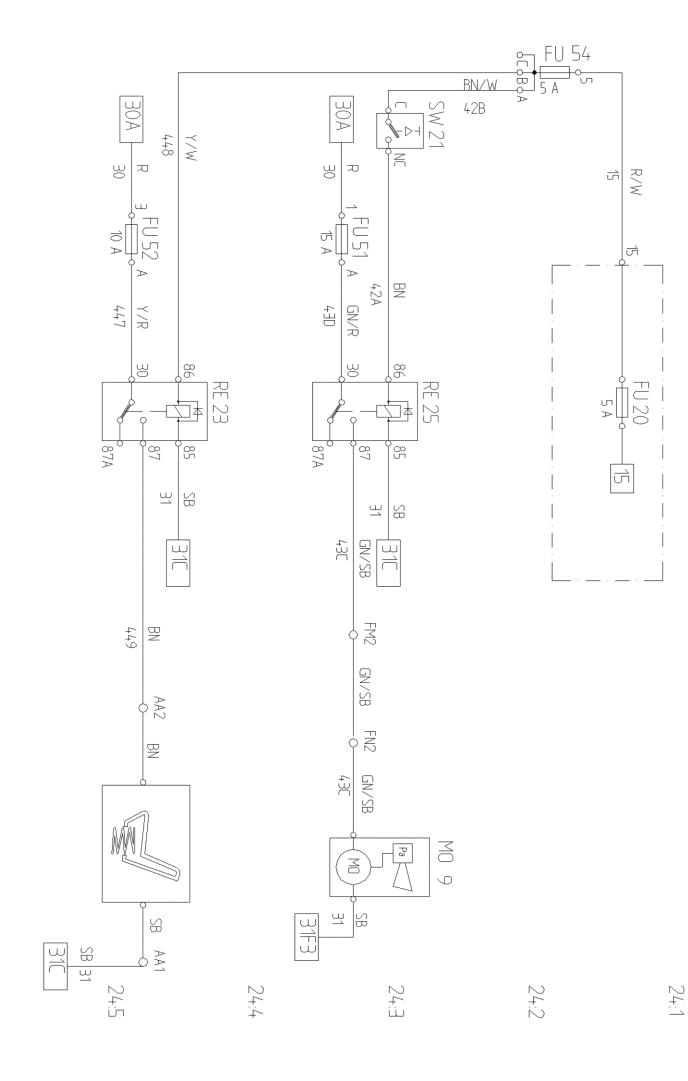


Figure 1 Wiring diagram, circuit 24:1 — 24:6



24:6

11 041 128/P01

L61471a



Service Information

Document Title: Wiring diagram, circuit 25:1 — 25:9	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 25:1 — 25:9

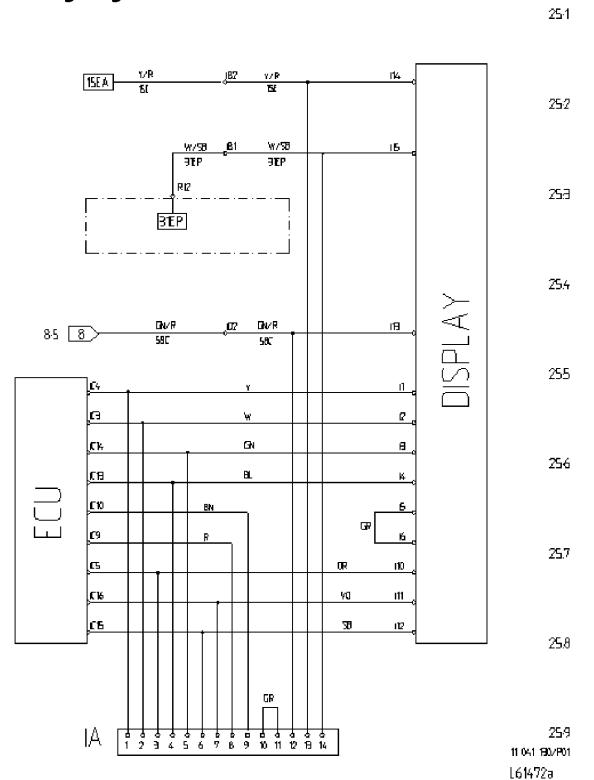
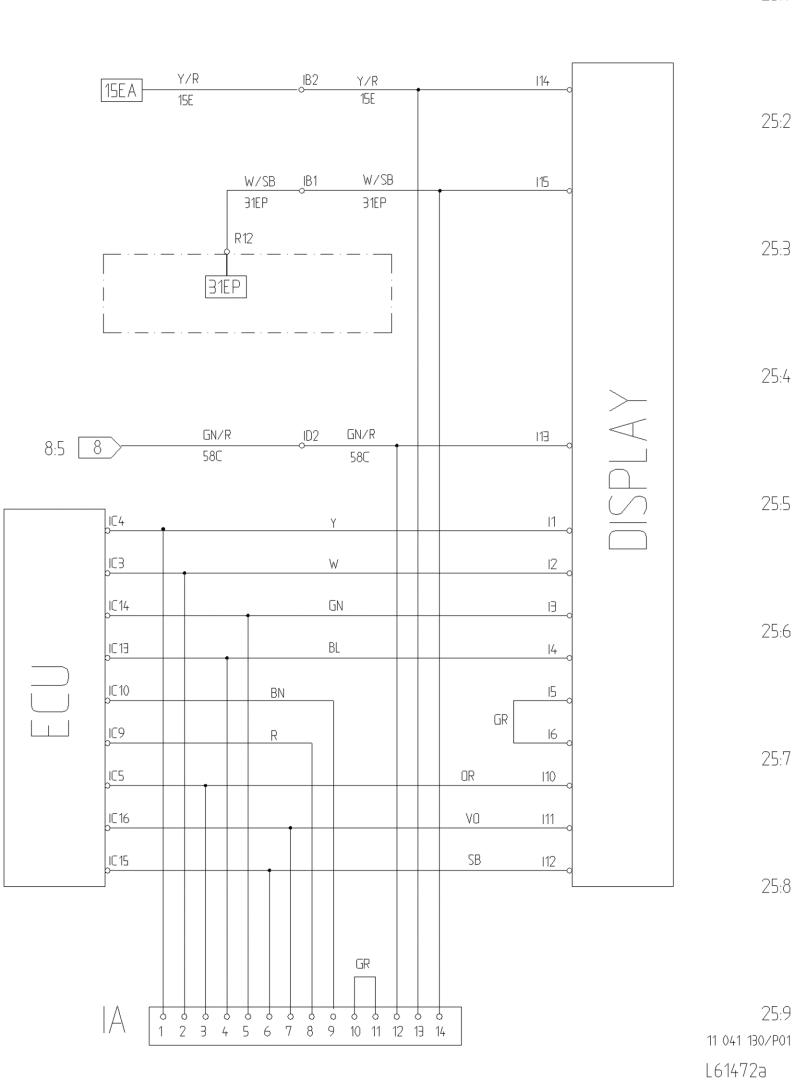
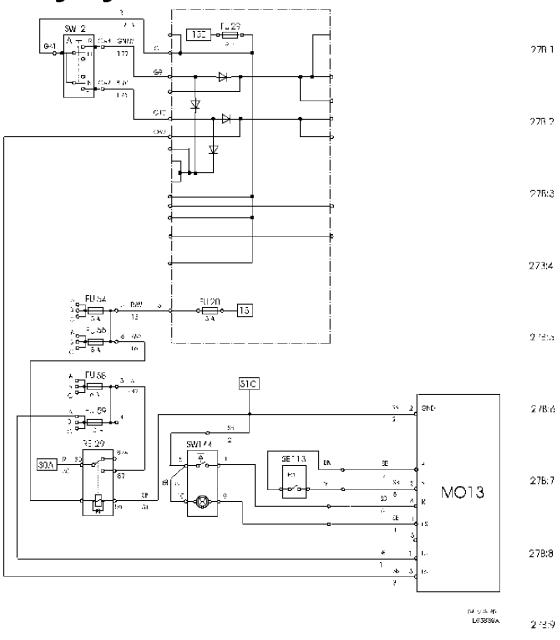


Figure 1 Wiring diagram, circuit 25:1 — 25:9



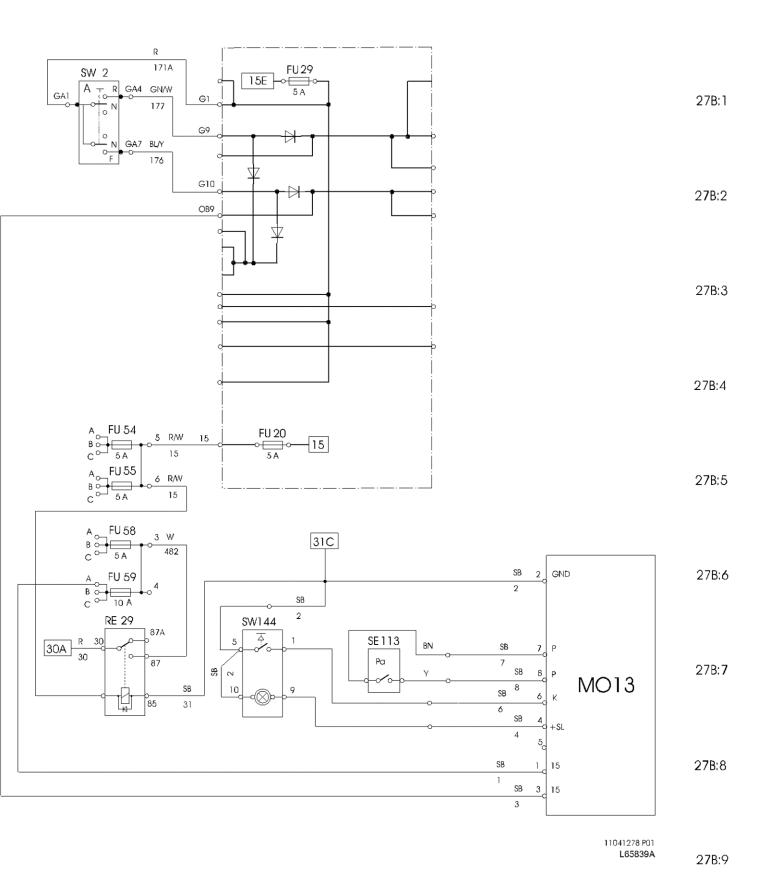
Document Title: Wiring diagram, circuit 27B:1 — 27B:10	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 27B:1 — 27B:10



27B:10

Figure 1
Wiring diagram, circuit 27B:1 — 27B:10



27B:10



Service Information Construction Equipment

Document Title: Wiring diagram, circuit 2:1 — 2:10	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 2:1 — 2:10

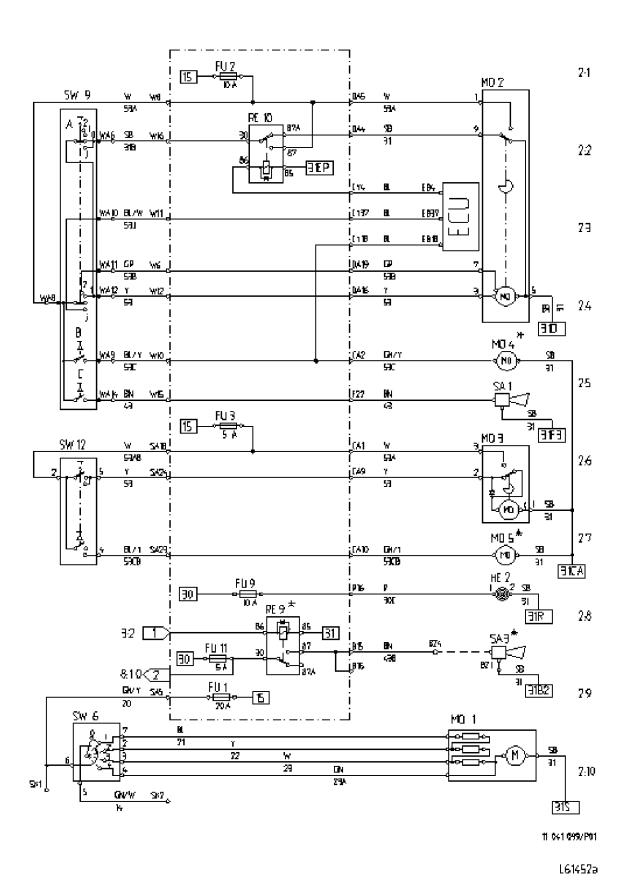
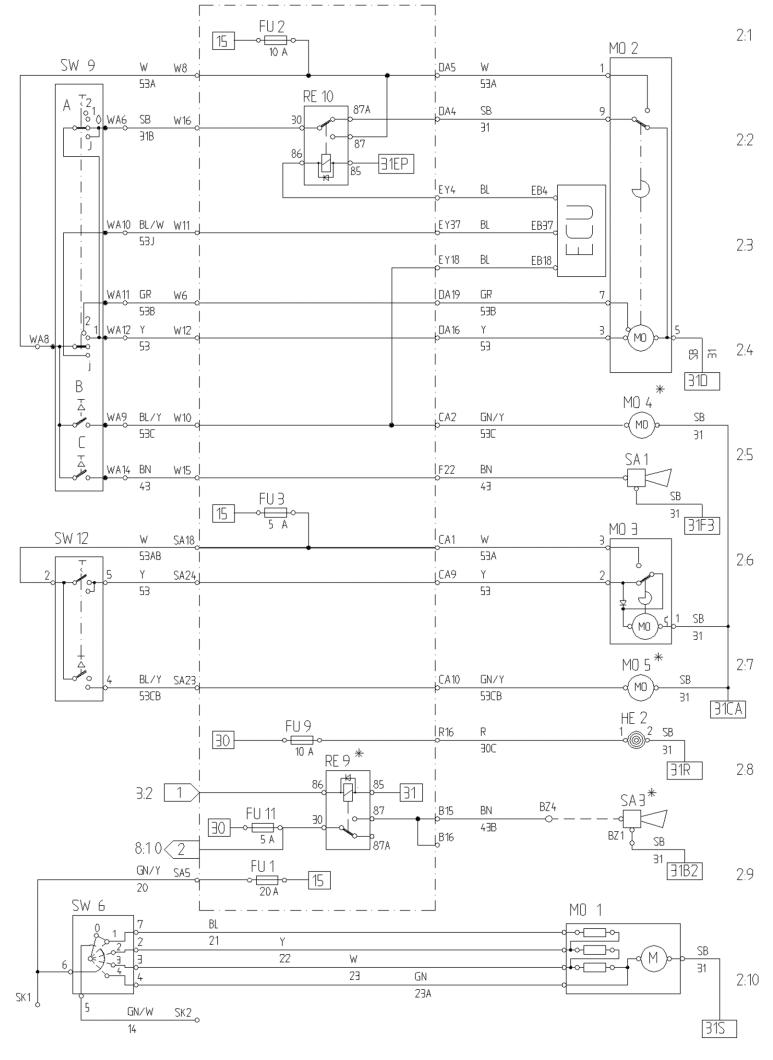


Figure 1 Wiring diagram, circuit 2:1 — 2:10



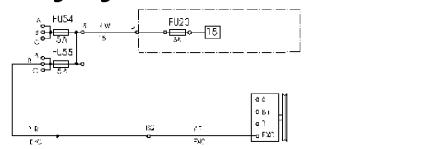
11 041 099/P01



Service Information

Document Title: Wiring diagram, circuit 30:1 — 30:10	Information Type: Service Information	Date: 25.04.2013
Profile:		

Wiring diagram, circuit 30:1 — 30:10



30:3

30:1

30:2

30:4

30:5

30:6

30:7

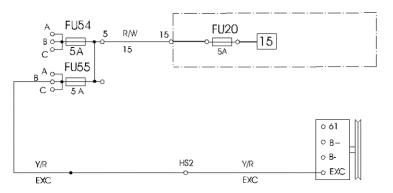
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50.9

*3*0 10

1134-35490 L38036A

Figure 1 Wiring diagram, circuit 30:1 — 30:10



30:1

30:2

30:3

30:4

30:5

30:6

30:7

30:8

30:9

30:10

11041354P01 L65836A



Service Information

Construction Equipment

Document Title: Wiring diagram, circuit 31:1 — 31:7	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 31:1 — 31:7

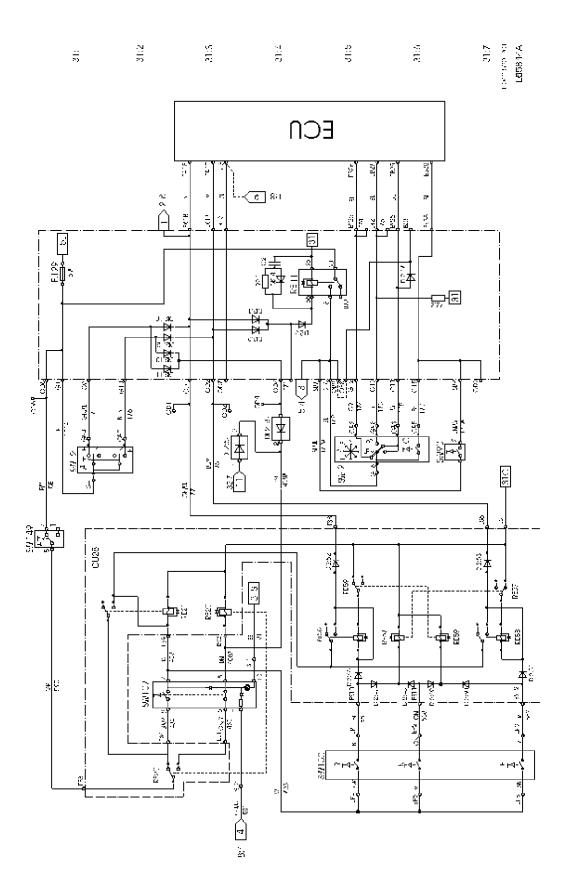
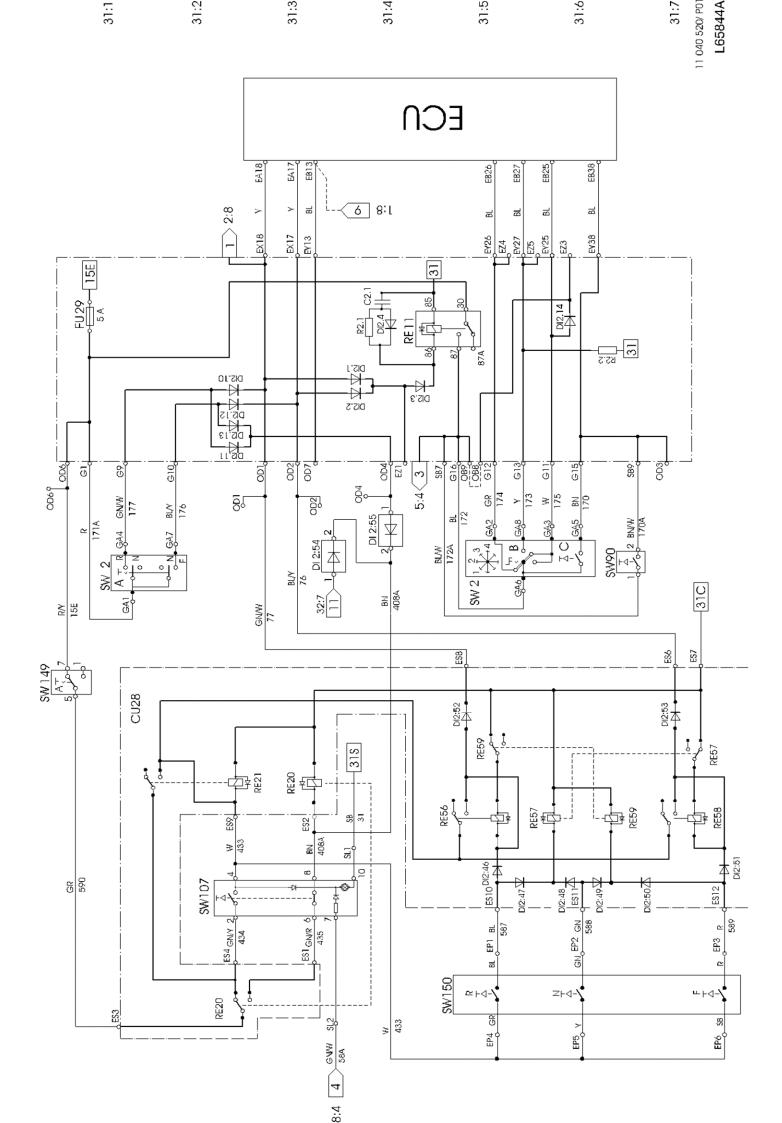


Figure 1 Wiring diagram, circuit 31:1 — 31:7



Document Title: Wiring diagram, circuit 32:1 — 32:10	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 32:1 — 32:10

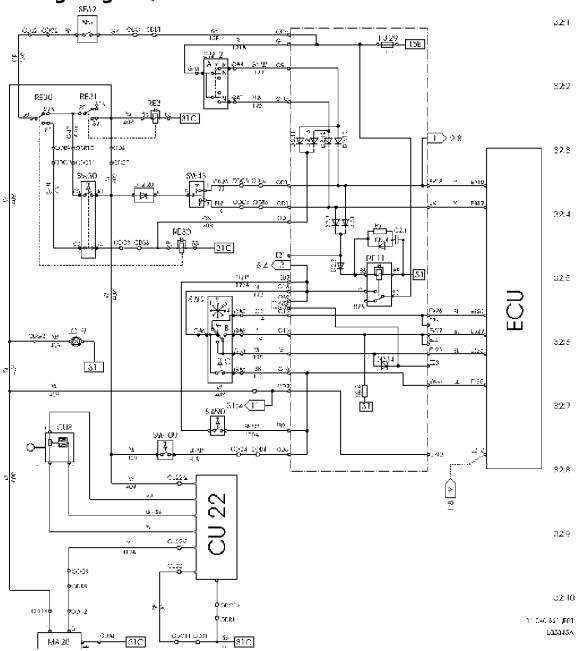
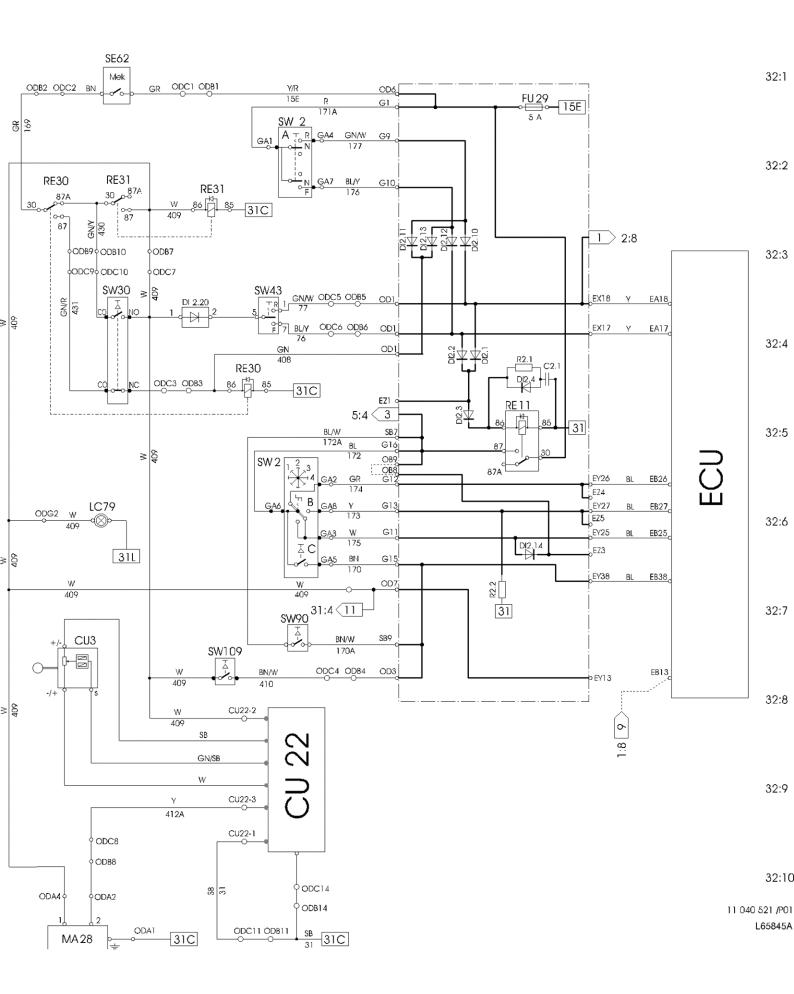


Figure 1
Wiring diagram, circuit 32:1 — 32:10





Service Information Construction Equipment

Document Title: Wiring diagram, circuit 33:1 — 33:10	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wiring diagram, circuit 33:1 — 33:10

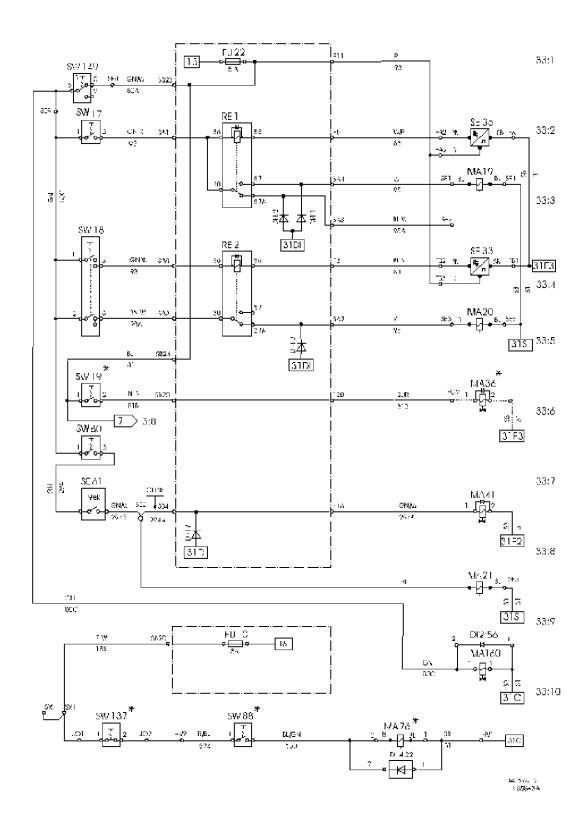
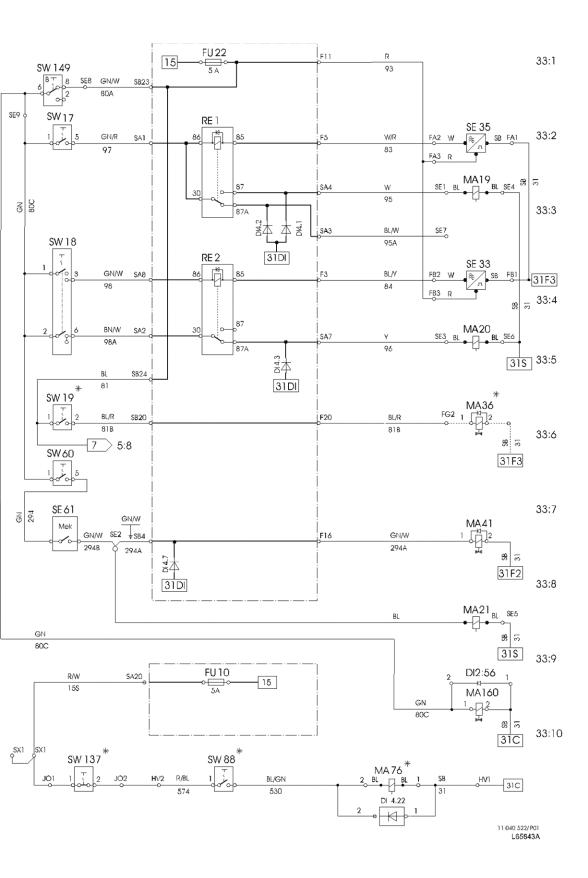


Figure 1
Wiring diagram, circuit 33:1 — 33:10





Service Information

Document Title: Instruments and controls	Information Type: Service Information	Date: 25.04.2013
Profile:		

Instruments and controls



Units marked with an \square are optional equipment.

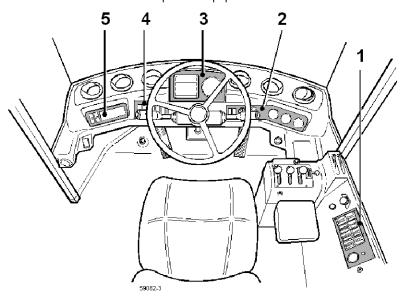


Figure 1 Instrument panels

- 1. Right instrument panel (switches, gauges)
- 2. Front right instrument panel (gauges)
- 3. Centre instrument panel (control lamps, gauges)
- 4. Front left instrument panel (switches)
- 5. Display unit (see Operator's Manual for L90C and L120C respectively)

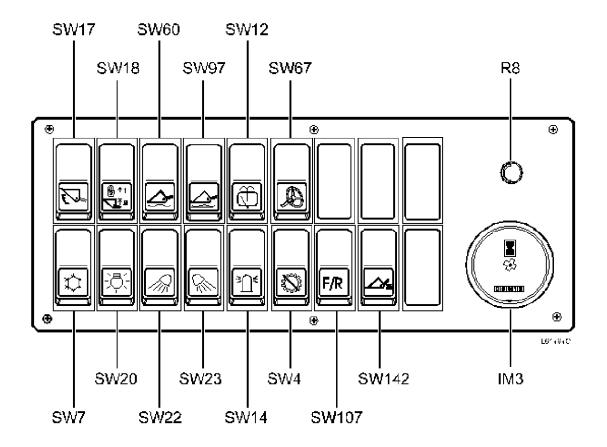


Figure 2 Right instrument panel

Switches	3	Rheost	at
SW4	Transmission disengagement	R8	Instrument lighting
SW7	Air conditioning□		
SW12	Rear window wiper	Instrum	ent
SW14	Rotating warning beacon□	IM3	Hour recorder
SW17	Bucket positioner		
SW18	Combined switch for detent function lifting / boom kick-out		
SW20	Lights		
SW22	Front working lights		
SW23	Rear working lights		
SW60	Floating position		
SW67	Secondary steering system, function test□		
SW97	Single-acting lifting function□		
SW107	Dual control Forward/Reverse□		
SW142	Boom Suspension System□		

 \square) Optional equipment

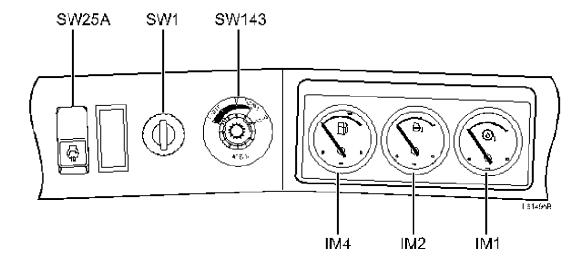


Figure 3
Front right instrument panel

NOTE: The gauges indicate at "12 o"clock" for a few seconds when the ignition switch is turned on.

Switches	Switches	
SW25A	Preheating□	
SW1	Ignition switch	
SW142	Mode selector	
Instruments		
IM1	Temperature gauge, transmission oil	
IM2	Temperature gauge, engine coolant	
IM4	Fuel gauge	

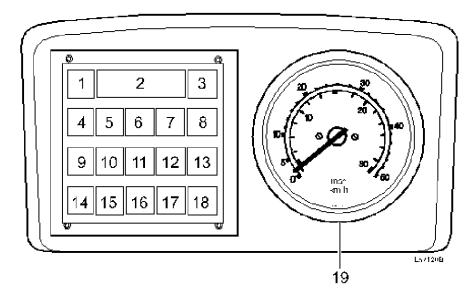


Figure 4 Centre instrument panel

NOTE: Control lamps 1 - 5, 7 - 9 and 13 light for three seconds as a test and the gauges indicate at "12 o"clock" for a few seconds when the ignition switch is turned on.

Control lamps					
1	LC10	Lubricating oil pressure, engine	10	LC11	Charging
2	LC6	Central warning lamp	11	LC8	Direction indicators

3	LC1	Oil pressure, transmission	12	LC15	Secondary steering
4	LC21	Coolant temperature, engine	13	LC75	Axle oil temperature
5	LC5	Low brake pressure	14	LC13	Preheating element□
6	LC9	Parking brake	15	LC35	Rotating warning beacon
7	LC14	Secondary steering□	16	LC33	High beams
8	LC20	Temperature, transmission oil	17	LC4	Working lights
9	LC12	Air filter, engine	18	LC2	Differential lock
Instru	Instrument				
19	IM9	Speedometer□			

\square) Optional equipment

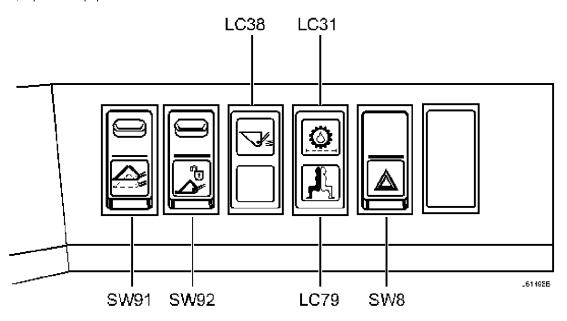


Figure 5 Front left instrument panel

Switches	
SW8	Hazard flashers
SW25A	Preheating□
SW91	Raised servo pressure□
SW92	Separate attachment locking□
Control lamps	
LC31	Transmission filter indication
LC38	Boom Suspension System□
LC79	CDCII

□) Optional equipment

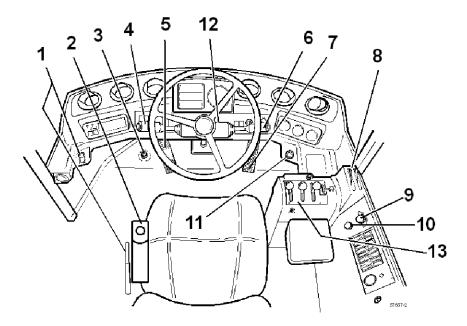


Figure 6 Other controls

- 1. Parking brake, electronically operated is optional equipment on L90C
- 2. Lever steering (CDC)□
- 3. Differential lock
- 4. Gear selector control
- 5. Brake pedal
- 6. Headlight dipper switch / direction indicators / horn / windscreen wiper/washer
- 7. Accelerator pedal
- 8. Control, climate control system□
- 9. Switch, fan control
- 10. Thermostat, air conditioning□ (not available on later machines)
- 11. Hand throttle
- 12. Steering wheel adjustment
- 13. Control lever carrier, see Figure [?]

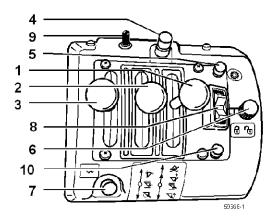


Figure 7
Controls, control lever carrier

- 1. Lever, lifting and lowering functions
- 2. Lever, tilting function
- 3. Lever, 3rd / 4th hydraulic function□
- 4. Kick-down
- 5. Down-shifting switch, engine retarding
- 6. Control lever lockout
- 7. Boom Suspension System D

- 8. Dual control, Forward/Reverse□
- 9. 3rd / 4th hydraulic function
- 10. Loud tone horn



Service Information

Construction Equipment

Document Title: Air conditioning, pressure monitor, SE22, checking	Information Type: Service Information	Date: 25.04.2013
Profile:		

Air conditioning, pressure monitor, SE22, checking

Op nbr



In order to check the pressure monitor, work has to be carried out on the AC system that in many countries requires special competence.

Low-pressure function	closes at	max. 0.3 MPa (44 psi)
	interrupts at	0.1–0.2 MPa (15–29 psi)
High-pressure function	closes at	1.4-1.8 MPa (203-261 psi)
	interrupts at	2.1–2.5 MPa (305–363 psi)



Service Information

Construction Equipment

Document Title:	Function Group:	Information Type:	Date:
Air conditioning,	386	Service Information	25.04.2013
thermostat, SE21,			
checking			
Profile:			

Air conditioning, thermostat, SE21, checking

Op nbr

11 666 141 Temperature sensor



The thermostat should be set to max. cooling.

- 1. Switch on the air conditioning.
- 2. Measure the temperature with the temperature sensor (11 666 141) after the evaporator.

 The thermostat should switch off the compressor at a temperature of 1–3 °C (34–37 °F).

 If the thermostat cuts out too late, that is, not until the temperature has dropped below 1 °C (34 °F), check that the thermostat sensing body fits up against the output pipe from the evaporator and that the sensing body is protected with sealing compound or corresponding material.



Document Title: Air filter, SE7, checking	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Air filter, SE7, checking

Op nbr

11 666 140 Multimeter

- 1. Run the engine at low idling.
- 2. Disconnect the air cleaner ejector hose and plug the opening.

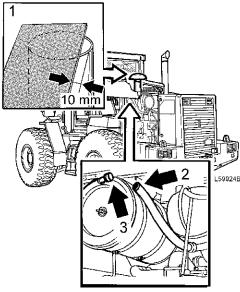


Figure 1

- 1. Piece of board
- 2. Ejector hose
- 3. Plug
- 3. Remove the air intake hood (1) and cover the air filter inlet with a stiff piece of board. Leave an air slot of 10 mm (0.40 in).
- 4. Gradually increase the engine speed. The control lamp should light up just below 16 r/s (1000 rpm)
- 5. If the lamp does not light up, fuse FU10 may have blown. Check that the fuse is conducting current and measure the voltage across the sensor directly by the connections.

Voltage in the case of open air intake:24-28 V

Voltage in the case of partially covered air intake: 0 V

It is also possible to check the sensor with the aid of a vacuum hand pump. The sensor should then close at a partial vacuum of 4–6 kPa (0.6–0.9 psi).





Document Title:	Function Group:	Information Type:	Date:
Axle oil temperature, SE84	386	Service Information	25.04.2013
and SE84, checking			
checking			
Profile:			

Axle oil temperature, SE84 and SE84, checking

Op nbr

11 666 140 Multimeter

Alternative 1

1. Remove the sensor.



Approx. 20-25 litres (5.3-6.6 US gal) of oil will run out. Collect the oil in a suitable vessel.

Place the sensor in a suitable vessel containing water. Heat the water and check the water temperature and the resistance in the sensor during the warming of the sensor. The temperature relative to the resistance should be as follows:

Temperature °C (F°)	Resistance (Ω)
0 (32)	2600
10 (50)	2119
20 (68)	1655
30 (86)	1250
40 (104)	924
50 (122)	675
60 (140)	492
70 (158)	359
80 (176)	265
90 (194)	196
100 (212)	147

2. Restore the machine.

Alternative 2

3. The temperature of the oil can also be checked by measuring the temperature directly on the sensor and adding approx. 5 °C (9 °F) to get the temperature of the oil or by measuring the temperature of the oil through the plug hole in the axle.



Service Information Construction Equipment

Document Title: Boom kick-out, SE33, checking	Information Type: Service Information	Date: 25.04.2013
Profile:		

Boom kick-out, SE33, checking

Op nbr

11 666 140 Multimeter

1. Turn the ignition key to position 1. Switch on switch SW18 and lower the lifting arm. Measure the voltage at pin F3 on the circuit board. Voltage: battery voltage ±10%

- 2. Place the machine in service position.
- 3. Remove the cover over the connecting box in the front frame.

Check the voltage in the red cable (FB3) to the sensor.

Voltage: 24-28 V

Check that the ABC link of the lifting frame covers the sensor and check that the distance between the sensor body and the lifting frame does not exceed 8 mm (0.315 in).

- 4. Measure the voltage drop between pins FB1 and FB2. Voltage drop: <2.4 V
- 5. Restore the machine.



Document Title: Brake pressure, SE14, checking	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Brake pressure, SE14, checking

Op nbr

11 666 140 Multimeter

11 666 141 Temperature sensor

11 666 019 Pressure gauge 0-6 MPa (0-870 psi)

11 666 020 Pressure gauge 0-25 MPa (0-3626 psi)

11 666 018 Pressure gauge 0-2.5 MPa (0-363 psi)

11 666 037 Hose

12 967 108 Tachometer

- 1. Apply the parking brake.
- 2. Connect the pressure gauge (11 666 020) to the foot brake valve.

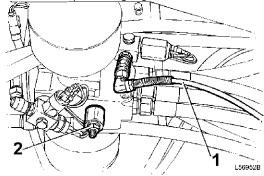


Figure 1

- 1. Hose 11 666 037 with pressure gauge 11666 020
- 2. Adjusting screw, unloading pressure
- 3. Depress the foot brake pedal several times until the pressure in the circuit is less than 3.5 MPa (508 psi). Check that the warning lamp for low brake pressure is alight.
- 4. Start the engine. Check that the warning lamp is extinguished when the pressure has risen to 9 \pm 0.9 MPa (1305 \pm 131 psi).
- 5. If the warning lamp does not light up, fuse FU10 may have blown. Check the fuse and then measure the voltage across the sensor directly at the connections.

Voltage at low pressure (< 3.5 MPa (508 psi)): **24–28 V**

Voltage at 9 ±0.9 MPa (1305 ±131 psi): 0 V



Service Information Construction Equipment

Document Title: Bucket positioner, SE35, checking	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Bucket positioner, SE35, checking

Op nbr

11 666 140 Multimeter

- 1. Place the machine in service position.
- 2. Turn the ignition key to position 1. Switch on switch SW17.
- 3. Remove the cover over the connecting box in the front frame. Check the voltage in the red cable (FB3) to the sensor. Voltage: 24-28 V
- 4. Tilt fully inward (rearward) and measure the voltage at pin FA2. Voltage: battery voltage ±10%
- 5. Tilt fully outward (forward) and measure the voltage at pin FA2.

If the value is incorrect, check that the sensor is firmly fixed and that the distance to the indicator rod does not exceed 8 mm (0.315 in).



Service Information

Construction Equipment

Document Title: Differential pressure, SE51, checking	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Differential pressure, SE51, checking

Op nbr

11 666 140 Multimeter

- 1. Disconnect connector OB from the circuit board. Measure the resistance between pins OB3 and OB4. Resistance: 0 Ω
- 2. Start the engine and measure again.

Resistance: ∞ (OL)

If incorrect values are recorded, the sensor should be removed. Check that the sensor when removed interrupts when the pin is pressed in 1-2 mm (0.04–0.08 in).



Service Information

Construction Equipment

Document Title: Engine speed, SE3, checking	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Engine speed, SE3, checking

Op nbr

<u>11 666 140 Multimeter</u> <u>12 967 108 Tachometer</u>

- 1. Disconnect the connections to the engine speed sensor (SE3) and measure the internal resistance of the sensor. Internal resistance: **1080** \pm **20** Ω
- 2. Attach a small piece of reflective tape on the engine oscillation damper. Attach the tachometer (12 976 108) sensor to the partition by the fan with the aid of the magnetic base. Route the cable to the sensor so that it cannot get caught in the drive belts.
- 3. Start the engine and read off the speed at low idling.
- 4. Disconnect connector OA from the circuit board and with the frequency meter measure the value from the sensor between pins OA1 and OA2. The frequency reading (F) can then be converted to engine speed as shown below.

L90C	
engine speed (rpm)	$= F \times 1.54$
engine speed (r/s)	= F × 0.0256

L120C	
engine speed (rpm)	$= F \times 0.79$
engine speed (r/s)	= F × 0.0132

- 5. Compare the calculated speed with the value from the tachometer. If the values do not agree, this may be caused by the sensor being dirty or that its distance to the gear wheel is incorrect.
- 6. Measure again at several different speeds.
- 7. Restore the machine.



Document Title: Engine temperature, SE1, checking	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Engine temperature, SE1, checking

Op nbr

11 666 140 Multimeter 11 666 141 Temperature sensor

Alternative 1

- 1. Drain off approx. 30 litres (8 US gal) of coolant.
- 2. Remove the sensor and immerse it in water contained in a suitable vessel. Heat the water and check the water temperature and the resistance in the sensor during the warming of the sensor. The temperature relative to the resistance should be as follows:

Temperature °C (F°)	Resistance (Ω)
0 (32)	2600
10 (50)	2119
20 (68)	1655
30 (86)	1250
40 (104)	924
50 (122)	675
60 (140)	492
70 (158)	359
80 (176)	265
90 (194)	196
100 (212)	147

3. Restore the machine.

Alternative 2

4. Measure the engine temperature with temperature sensor 11 666 141.

Measure the temperature directly on the sensor body, or alternatively on a shiny surface directly on the cylinder block.

Add approx. 5 °C (9 °F) to the measured temperature to obtain **the coolant** temperature (If the engine has been turned off less than approx. 12 hours).

5. Disconnect the connections to the sensor and measure the resistance which should be as follows:

Temperature °C (F°)	Resistance (Ω)
0 (32)	2600
10 (50)	2119
20 (68)	1655

30 (86)	1250
40 (104)	924
50 (122)	675
60 (140)	492
70 (158)	359
80 (176)	265
90 (194)	196
100 (212)	147





Document Title: Fuel level, SE17, checking	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Fuel level, SE17, checking

Op nbr

11 666 140 Multimeter

Alternative 1

- 1. Empty the tank.
- 2. Disconnect connector B from the circuit board. Measure the resistance between pins B25 and B21. Resistance with empty tank: **61.2** \pm **2.1** Ω
- 3. Fill the tank until half full and measure again. Tank half full L90C: 105 litres (27.7 US gal) Resistance with the tank half full L90C: 33.5 Ω

Tank half full L120C: **127 litres (33.5 US gal)** Resistance with the tank half full L120C: **31.1** Ω

- 4. Fill the tank until it is full and measure again. Resistance with full tank: 1.5 Ω
- 5. Restore the machine.

Alternative 2

- 6. Remove the level sensor.
- 7. Turn the level sensor upside down. Check that the float slides down to the bottom of the sensor.
- 8. Measure the resistance across the sensor. Resistance with the sensor upside down: 1.5 \pm 0.7 Ω
- 9. Turn the sensor the right way round and again measure the resistance. Resistance with sensor turned the right way round: **61.2** \pm **2.1** Ω
- 10. Restore the machine.



Service Information

Document Title: Parking brake pressure, SE6, checking	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Parking brake pressure, SE6, checking

Op nbr

<u>11 666 140 Multimeter</u> <u>11 666 020 Pressure gauge 0–25 MPa (0–3626 psi)</u> <u>11 666 037 Hose</u>

Applies only to machine with hydraulic parking brake.

- 1. Place the machine on level ground and block the wheels so that the machine cannot start rolling.
- 2. Connect the pressure gauge 11 666 020 to the connection by the solenoid valve for the parking brake.
- 3. Operate the switch for the parking brake several times until the pressure on the pressure gauge shows less than 3.5 MPa (508 psi). Set the switch in the not applied position (= released parking brake).
- 4. Start the engine and read off the pressure on the pressure gauge when the control lamp (on the instrument panel) for the parking brake is extinguished. The lamp should be extinguished when the pressure is 9 ±0.9 MPa (1305 ±131 psi).
- 5. If the control lamp for the parking brake does not light up at all, this may be because fuse FU32 has blown. Check the fuse and repeat the check of SE6. Measure the voltage across the sensor SE6 directly at the connections. At low pressure the voltage should be 24–28 V. When the pressure is 9 ±0.9 MPa (1305 ±131 psi) the voltage should have dropped to 0 V.
- 6. Restore the machine.



Service Information

Construction Equipment

Document Title: Steering pressure, SE15, checking	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Steering pressure, SE15, checking

Op nbr

11 666 140 Multimeter

- Disconnect connector OB from the circuit board. Measure the voltage between pin OB6 and OB7 on the circuit board. The engine must be turned off and the ignition key in position 1.
 Voltage: 0 V
- 2. Start the engine and measure again.

Voltage: 24-28 V

If an incorrect reading has been obtained and the steering otherwise seems free from faults, measure again directly at the sensor connections.



Document Title: Stop lights, SE29, checking	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Stop lights, SE29, checking

Op nbr

11 666 140 Multimeter 11 666 018 Pressure gauge 0–2.5 MPa (0–363 psi) 11 666 037 Hose

1. Connect the pressure gauge (11 666 018) to the pressure outlet on the foot brake valve.

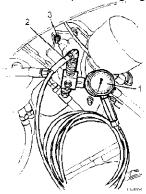


Figure 1

- 1. 11 666 018
- 2. 11 666 037
- 3. Adjusting screw
- 2. Disconnect connector CU from the circuit board. Measure the resistance between pins CU7 and CU15. Resistance: **∞ (OL)**
- 3. Carefully depress the foot brake pedal.



The pressure gauge may be damaged if the brake pedal is depressed too hard.

When the pressure is 0.3–0.6 MPa (44–87 psi) the resistance should drop to 0 Ω . If an incorrect value is recorded, measure again directly at the sensor to exclude broken cables.



Document Title: Transmission disengagement, SE2, checking	386	Information Type: Service Information	Date: 25.04.2013
Profile:			

Transmission disengagement, SE2, checking

Op nbr

<u>11 666 140 Multimeter</u> <u>11 666 018 Pressure gauge (0–2.5 MPa) (0–363 psi)</u> <u>11 666 037 Hose</u>

1. Connect the pressure gauge at the connection on the foot brake valve.

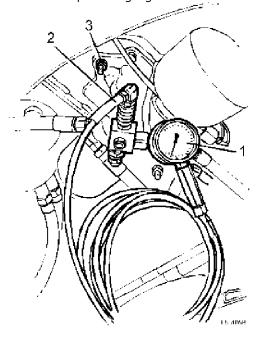


Figure 1

- 1. 11 666 018
- 2. 11 666 037
- Adjusting screw
- Check that SW4 (transmission disengagement) is not actuated.
 Measure the resistance between pin CU1 and pin CU10. With the brake not actuated the resistance should be infinite.
- 3. Carefully depress the brake pedal and read off the pressure on the pressure gauge.



If the foot brake pedal is depressed too hard the pressure gauge may be damaged.

At 2 ± 0.3 MPa (290 ± 44 psi) the sensor should close and the resistance should now be approx. 0 Ω .



Document Title: Transmission oil pressure, SE12, checking	Information Type: Service Information	Date: 25.04.2013
Profile:		

Transmission oil pressure, SE12, checking

Op nbr

<u>11 666 140 Multimeter</u> <u>11 666 018 Pressure gauge 0–2.5 MPa (0–363 psi)</u> <u>11 666 037 Hose</u>

1. Connect the pressure gauge (11 666 018) to the outlet for the main transmission pressure.

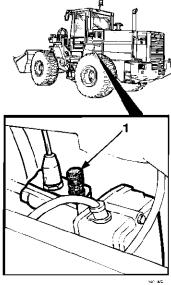


Figure 1

- 1. Outlet for main pressure
- 2. Measure the voltage between ground and pin T24 (blue/green cable) on the circuit board. The engine must be turned off and the ignition key in position 1.

Voltage: 1.0 V

3. Start the engine and read off the pressure on the pressure gauge. Measure the voltage between ground and pin T24 again.

The voltage (U) can be converted to pressure (P) as follows:

 $P = 5 \times (U - 1.0)$

Example:

The voltage (U) at T24 is 4.6 V.

The pressure (P) will then be $5 \times (4.2 - 1.0) = 16.0$ bar (1.6 MPa) or (232 psi)

If the pressure gauge reading agrees with the calculated pressure ±2%, the sensor is functioning as it should.



Service Information

Construction Equipment

Document Title: Transmission oil temperature, SE11, checking	,	Information Type: Service Information	Date: 25.04.2013
Profile:			

Transmission oil temperature, SE11, checking

Op nbr

11 666 140 Multimeter

1. Remove the sensor and immerse it in water contained in a suitable vessel. Heat the water and check the water temperature and the resistance in the sensor during the warming of the sensor. The temperature relative to the resistance should be as follows:

Temperature °C (F°)	Resistance (Ω)	
0 (32)	2600	
10 (50)	2119	
20 (68)	1655	
30 (86)	1250	
40 (104)	924	
50 (122)	675	
60 (140)	492	
70 (158)	359	
80 (176)	265	
90 (194)	196	
100 (212)	147	



Service Information

Document Title: Travelling speed, SE4, checking	l '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Travelling speed, SE4, checking

Op nbr

<u>11 666 140 Multimeter</u> <u>12 967 108 Tachometer</u>

Alternative 1

1. Disconnect sensor SE3 and instead install SE4 in its place. Then follow the description for the checking of SE3.

Alternative 2

- 2. Disconnect the connections to the sensor and measure its internal resistance. Internal resistance: 1080 $\pm 20~\Omega$
- 3. Attach a small piece of reflective tape on the front propeller shaft.

 Attach the tachometer (12 976 108) sensor to the rear frame with the aid of the magnetic base.
- 4. Disconnect connector OA from the circuit board and with a frequency meter measure the value from the sensor between pins OA4 and OA2. Operate the machine and compare the frequency readings from the tachometer and the senor respectively. The values must be the same.



The tachometer may give inaccurate values if the sensor is exposed to sunlight while taking readings.



Document Title: Contronic Service Display Unit	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Contronic Service Display Unit

The service display unit makes it possible to obtain read-outs of.

- O input and output signals from the ECU
- O certain stored values
- O current settings
- O current values from certain electrical monitors and sensor of the machine.

With the aid of the service display unit it is possible to change settings and set stored values to zero.

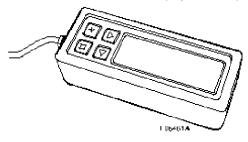


Figure 1 Service Display Unit 999 3721

Connection

The service display unit 999 3721 is connected to the socket under the instrument panel to the left of the steering wheel column.

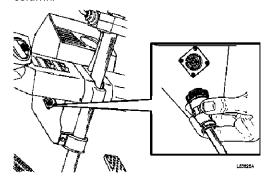
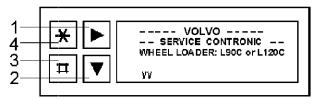


Figure 2

Switching on

The service display unit is switched on by pressing the keys lacksquare and lacksquare at the same time.



- 1. SELECTION OF FUNCTION GROUP
- 2. SELECTION OF SUB MENU WITHIN THE SAME FUNCTION GROUP
- 3. ## AFFECTS THE INFORMATION
- 4. X AFFECTS THE INFORMATION

General

- O The top line on the screen shows the name of the selected function group and any alarm messages.
- O Five different languages can be selected (English, Swedish, German, French, and Spanish)
- O Two different sets of units may be selected (°C, km, bar or °F, mile, psi).

Function groups

The different functions are divided into the following six function groups.

- Initial display and settings
- 2. General operating information, stop-watch and service interval
- 3. Engine
- 4. Electrical system
- 5. Transmission
- 6. Axles / Brakes

Alarm messages

Alarm messages are shown on the top line regardless of the selected function group. The alarm text is shown for 1 second, then the selected functional check is shown for 2 seconds and then the alarm text is shown again and so on. The alarm text will be flashing as long as the fault remains with the exception of certain memory functions (m).

Alarm messages with (m-function) are shown until the ignition switch key is turned to the "0" position.

Alarm messages		
Engine, temp. high	Brake pressure, low	
Engine, temp. ER (m)	Parking brake (applied)	
Engine, pressure low	Fuel level, low (25%)	
Engine, pressure ER	Fuel level, ER (m)	
Voltage, high (>31V)	Steering pressure, low	
Voltage, low (<19 V)	Steering pressure, ER	
Transmission, ER	Clean, air filter	
Transmission, temp. high	Air filter, ER	
Transmission, temp. ER (m)	Next service	
Transmission, pressure low	High speed, gear	
Transmission, pressure ER (m)	Axle temp. high	
Transmission filter	Axle temp. ER	
Transmission filter ER		

Text explanations

ER = faulty sensor circuit

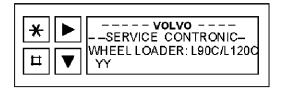
ERo = Open circuit in the sensor circuit

ERs = Short circuit in sensor circuit

m = Memory function for errors not occurring at the moment

Displayed texts

Initial information



WHEEL LOADER: L???? = Incorrect coding of ECU

YY = Programme version

★ = Used for showing ECU part number
 ‡ = Used for showing programme version date

The arrows between the figures show how to press to move from Initial Information to Setup and so on



Language / unit selection

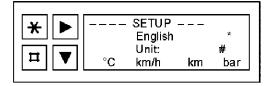


Figure 5

Language is selected with the $\frac{\mathbf{X}}{\mathbf{X}}$ key Units are selected with the $\stackrel{\mathbf{L}}{\mathbf{L}}$ key



Setup of machine hours

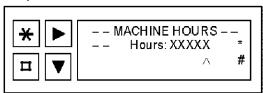


Figure 6

XX = Number of hours

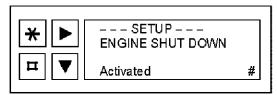
 \blacksquare = Used for selecting the digit which is to be altered

X = Used for changing the selected digit (max. 59999 hours)

^ = Digit indicator (cursor)



Setup of engine shut down (power down)



Activated = Function activated

Not activated = Function is not activated

= Used for activating and de-activating the function

Here the engine shut down is triggered by high coolant temperature, high transmission temperature or low oil pressure. See also ---- not implemented: INTXREF ----: .



Setup of additional heating

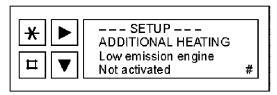


Figure 8

See also ---- not implemented: INTXREF ----: .



Setup of date/time

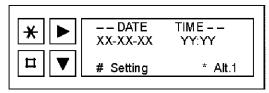


Figure 9

X = Selection of display alternatives (six different)

= Setup of time and date (changes are made in the same way as setup of machine hours

XX = Date

YY = Real time, clock



Operating information

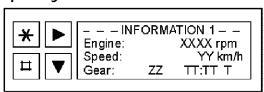


Figure 10

XX = Engine speed

YY = Travelling speed

ZZ = Engaged gear (N, F1, F2, F3, F4, R1, R2, R3)

YY = Real time, clock



Stop-watch, trip meter, cycle counter

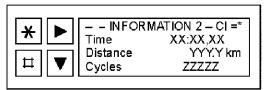


Figure 11

XX = Time (hours, minutes, seconds)

YY = Travelling distance

ZZ = Cycles, number of Forward/Reverse shifts divided by 2 Time/distance/cycles are set to zero by pressing the **X** key.



Service interval

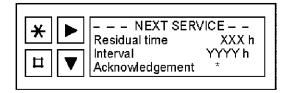


Figure 12

XX = Residual time to next service.

YY = Interval, means which of the services (100, 250, 500, 1000 or 2000) that is to be carried out next. When there are 8 hours left, the display will show "NEXT SERVICE" on the top line.

To remove this information, press the \mathbf{X} key.

The information ceases automatically after 8 hours.



Engine

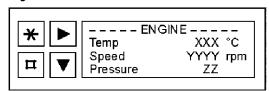


Figure 13

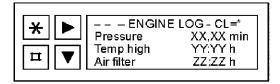
XX = Engine temperature, or ERo/ERs when the sensor circuit is faulty

XX = Engine speed

ZZ = Normal/low/ER (Engine oil pressure)



Engine log



XX = Time with low oil pressure

YY = Time with temperature above 95 °C (203 °F)

ZZ = Time with high pressure drop across air cleaner

Data is reset with the 🗙 key



Electrical system

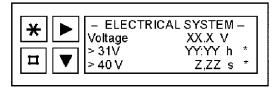


Figure 15

XX = System voltage

YY = Time in minutes with voltage above 31 V

ZZ = Time in seconds with voltage above 40 V

Data is reset with the X key



Electric on/off input

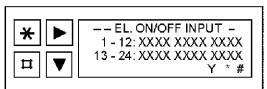


Figure 16

X = 1 or 0 depending on whether the respective input signal has or has not been activated. (1 = 24 V, 0 = 0 V) Y = APS II, Mode selector, setting modes (1, 2, 3, 4, M) EB 35 (see circuit 3:9)

Column	А	Position on display 1-12, 13-24, 25-26	
	В	Signal input terminal / terminal on ECU	
	С	Function	
	D	Indicated by: O engine turned off O all systems without pressure O normal working temperature O switch not actuated / in neutral position	

E	Actuation of switch, signal from sensors etc.
F	Indication at operation / signal according to column E

Indication:

- 0 = No signal into ECU at terminal according to column B. 1 = Signal into ECU at terminal according to column B.

Α	В	С	D	E	F	Circuit
1	EA17	Gear selector control position N		Gear selector control position F	1	3:1-3:3
2	EA18	Gear selector control position N		Gear selector control position R	1	3:1-3:3
3	EA19	Preheating		Ignition switch in position 2 and actuation of switch for preheating	1	5:5-5:7
4	EB13	Blocking of 4th gear	0	When CDC is activated (machine equipped with CDCI)	1	3:3-3:4 20:8
5	EB14	Downshifting, engine retarding	0	When actuating switch for downshifting, engine retarding	1	5:8
6	EB15	Boom Suspension System, BSSD	0	When actuating switch for Boom Suspension System□	1	19:3
7	EB16	Air cleaner indicator	1	Open sensor circuit or clogged filter with engine running.	0	12:7
8	EB17	Secondary steering system sensor for flow and differential pressure	1	Engine running and normal steering pressure Engine running and too low steering pressure		7:5-7:6
9	EB18	Windscreen washer	0	When actuating switch for windscreen washer.	1	2:3
10	EB19	Parking brake	0	Applied parking brake	1	15:1-15:4
11	EB20	Sensor for engine oil pressure	1	Open sensor circuit or engine running and normal oil pressure Engine running and too low oil pressure	0	12:3
12	EB21	Boom Suspension System, gear- dependent	0	Boom Suspension System, speed-dependent	1	19:2-19:3
13	EB22	Transmission disengagement	0	Actuated switch for transmission disengagement and application of brakes, min. brake pressure 2 MPa (20 bar) (290 psi)	1	4:7
14	EB32	Sensor for brake pressure	1 Brake pressure min. 8.0–9.0 MPa (80–90 bar) (1160–1305 psi)		0	14:6
15	EB24	Filter indication, transmission, SE72	dication, transmission, SE72 0 Clogged transmission filter		1	13:7
16	EB25	Gear selector control position F/R 1 and F/R 2	0	Gear selector control in position F/R 1 or F/R 2	1	3:6
17	EB26	Gear selector control position F/R 1	0	Gear selector control in position F/R 1	1	3:5
18	EB27	Gear selector control position F/R A	0	Gear selector control in position (SW143 in automatic) F/R 4	1	3:6
19	EB34	Secondary steering, checking	1	When actuating test switch secondary steering	0	7:6-7:7
20	EB37	Intermittent wiper for windscreen	0	When actuating switch for intermittent wiper	1	2:1-2:4
21	EB38	Kick-down	0	With gear engaged and actuating switch for kick-down (button pressed in)	1	3:7
22	EB39	Secondary steering, sensor for press	1	At normal steering pressure	0	7:5
23	EC1					
24	EC2					
	•	•	•	•		•



Electric on/off output

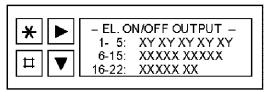


Figure 17

X = 1 or 0 depending on whether the respective discontinued signals have been activated or do not. Y = Blank / o / s / m / M:

Blank	= No error
o	= Open circuit
s	= Short circuit
m	= Memory function if any errors have occurred since the ignitions switch was turned on (key turned from "O"-postion)
М	= Memory function for previous errors

Column	A	Position on display 1-5, 6-15, 16-22
	В	Signal input terminal / terminal on ECU
	С	Function
	D	Indicated by: O engine turned off O all systems without pressure O normal working temperature O switch not actuated / in neutral position
	E	Actuation of switch, signal from sensors etc.
	Indication at operation/signal according to column E	

Indication:

0 = No signal into ECU at terminal according to column B.

1 = Signal into ECU at terminal according to column B.

Α	В	С	D	E	F	Circuit
1	EA1	Gear shifting solenoid S1	0	When F/R 1st, 2nd, 3rd or 4th gear is selected	1	4:1
2	EA2	Gear shifting solenoid S2	0	When R 1st, 2nd or 3rd gear selected	1	4:2
3	EA3	Gear shifting solenoid S3	0	When F/R 1st or 2nd gear selected	1	4:2
4	EA4	Gear shifting solenoid S4	0	When F/R 1st gear selected	1	4:3
5	EA5	Gear shifting solenoid S5	0	When 4th gear is selected. The machine must be operated at high speed in gear position F4 (A) to engage 4th gear. If the machine is equipped with CDC 4th gear cannot engage while CDC remains activated. Alternative mode selector SW143 in manual	1	4:4
6	EA6	Relay, preheating	0	When preheating is connected (this only	1	5:6

takes place if the engine temperature is below 30 °C) (86 °F)

				Delait 30 C) (00 1)		
7	EA7	Relay, BSS	0		1	19:1-19:6
8	EA8	Relay, secondary steering	0	Engine turned off and test button for secondary steering actuated. Loss of steering pressure while operating, travelling speed above 5 km/h (3.1 mph)	1	7:7
9	EA9	Lamp, brake pressure	1		0	14:5-14:6
10	EA10	Lamp, steering pressure	0	Engine turned off and faulty sensor circuit Operating at above 5 km/h (3.1 mph), secondary steering activated and ordinary steering pressure is or has been below 400 kPa (4 bar) (58 psi)	1	7:6-7:7
11	EA11	Lamp, engine oil pressure	0	Engine off and faulty sensor circuit Engine running and too low oil press.	1	12:3
12	EA12	Lamp, central warning	0	Engine turned off O too high temperature in engine, transmission, axles Engine running O too high temperature in engine, transmission, axles O low oil pressure in engine, transmission, axles O pressure drop across transm. oil filter O gear engaged and applied p-brake O too high speed in engaged gear O secondary steering activated	1	12:2-12:9
13	EA25	Relay, engine shut down	0	When changing travelling direction at a travelling speed above 14 km/h (8.7 mph) and at an engine speed above 30 r/s (1800 rpm). Engine shut-down function switched on, engine speed above 25 r/s (1500 rpm) and high engine temperature, high transmission temperature or low engine oil pressure	1	5:9-5:10
14	EB3	Buzzer	0	Engine running and too high temperature in engine or axles Applied parking brake, gear engaged and the machine is moving		12:2
15	EB4	Relay, intermittent wiper	0	Intermittent wiper switched on (indication takes place at intervals of 5 s)	1	2:2
16	EB5	Lamp, transmission oil pressure	0	Faulty sensor circuit or engine running and too low transmission oil pressure	1	13:3-13:4
17	EB6	Lamp, transmission oil temperature	0	Faulty sensor circuit or too high transmission oil temperature	1	13:5
18	EB7	Lamp, coolant temperature	0		1	12:4
20	EB9	Lamp, air cleaner	0	Faulty sensor circuit or engine running and clogged air cleaner	1	12:7
21	EA16	Lamp, Boom Suspension System	0	Activated Boom Suspension System	1	19:1
22	EC6	Unassigned				



Transmission

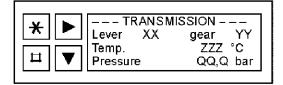


Figure 18

XX = Gear selector position (F1, F2, F3, FA, R1, R2, R3, RA, N)

YY = Engaged gear (F1, F2, F3, F4, R1, R2, R3, N)

ZZ = Temperature, or ERo/ERs when the sensor circuit is faulty

QQ = Main pressure, or ERo/ERs when the sensor circuit is faulty



Transmission log

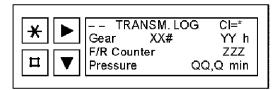


Figure 19

XX = Selected gear

YY = Operated hours in selected gear

ZZ = Number of Forward/Reverse shifts

QQ = Time with low main pressure

Select gear with the key

Data is reset with the **X** key



Axles / Brakes

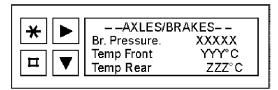


Figure 20

XX = Normal / low

YY = Temperature front axle, or ERo/ERs when the sensor circuit is faulty

ZZ = Temperature rear axle, or ERo/ERs when the sensor circuit is faulty



Axle log



Figure 21

XX = Selected temperature 110/140 °C (230/284 °F)
YY = Time with temperature above "xx" on front axle
ZZ = Time with temperature above "xx" on rear axle
Select temperature with the ‡ key
Data is reset with the \$\frac{1}{2}\$ key



Brake test



Figure 22

XX = Travelling speed YY = Retardation

ZZ = Retardation constant



Brake test log

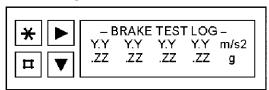


Figure 23

YY = Retardation

ZZ = Retardation constant



The display shows the values from the four latest measured brake applications with the latest value furthest to the left.



Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

Loader L90C is equipped with transmission HT131. Loader L120C is equipped with transmission HT205. Both the HT131 and HT205 are hydro-mechanical four-speed transmissions of the power shift type, with torque converter, cylindrical spur gearings and hydraulically controlled disc clutches.

The power from the engine to the wheels is transferred hydraulically and mechanically through the transmission, via a torque converter which adapts the output torque according to requirements.

The clutch drums for the different gears rotate freely on the clutch shafts. When a gear is engaged, the clutch drum which transfers the power mechanically is connected to the respective clutch shaft by the disc clutches actuated at the time. The mechanical power transmission in the transmission takes place via gears which are in constant mesh.

L90C is equipped with AWB30 drive axles. L120C is equipped with an AWB31 drive axle at the front and an AWB30 drive axle at the rear. The front axle is equipped with a differential lock.

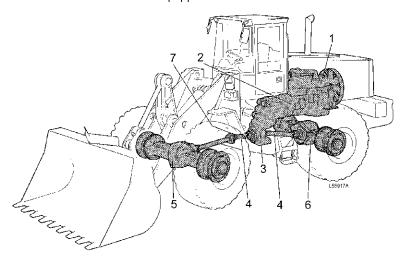


Figure 1
Power transmission, principle diagram

- 1. Engine
- 2. Torque converter
- 3. Transmission with dropbox
- 4. Propeller shaft
- 5. Front axle
- 6. Rear axle
- 7. Support bearing



Service Information

Document Title: Trouble-shooting tips	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Trouble-shooting tips

The machine has poor traction power

The fault may lie in the engine or in the transmission.

Check the following:

- O The engine stall speed, see Section 2.

 If the stall speed is too low, the fault is probably in the engine.
- O If the engine stall speed is within the specifications or higher, the fault is probably in the transmission.
- O Check that the 1st gear is correctly applied (engaged). If the traction power is poor in combination with the transmission running hot, the fault may be in the torque converter.
- O As a first measure check the torque converter pressure.

It is not possible to engage a gear

If a gear does not engage (does not become applied), this may be due to the following:

- O Electrical fault.
- O Faulty gear selector valve.
- Hydraulic or other fault in the clutch shaft.

Check main pressure and clutch pressure for the clutch in question.

If the main pressure is correct, but the clutch pressure is too low, this may be caused by a leak between oil distributor and clutch shaft or a fault in the gear selector valve.

If the main pressure is correct, but there is no clutch pressure, this may be due to an electrical fault or a fault in the gear selector valve.

A temporary loss of power (loss of pressure) may be caused by the following:

- O Electrical fault (poor contact) etc.
- O Binding valve spool in the gear selector valve.
- O Leakage between oil distributor and clutch shaft (correct function when the oil is cold, loss of power when the oil is warm).



Service Information

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

Specifications, general

Disengagement function	
Pressure sensor (SE 2), closing pressure (positioned on the foot brake valve)	2.0 ±0.3 MPa (20 ±3 bar) (290 ±44 psi)



Service Information

Construction Equipment

Document Title: Specifications, general	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Torque converter		
Туре	Single stage	
Designation	FS W3004076	
Torque multiplication, when stalling	2.66 : 1	
Torque converter , safety valve 1.0 MPa (10 bar) (145 psi)		

L120C

Torque converter		
Туре	Single stage	
Designation	FS 340 7036	
Torque multiplication, when stalling	2.85:1	
Torque converter , safety valve	0.84 ±0.18 MPa (8.4 ±1.8 bar) (122 ±26 psi)	



Service Information

Document Title: Specifications, capacities (dm <super>3 = litre)<!-- super--></super>	420	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities (dm

L90C

Transmission, total	33 dm ^{3 (8.7} US ^{gal)}
Transmission, when changing incl. filter	21 dm ^{3 (5.5} US gal)

L120C

Transmission, total	45 dm ^{3 (11.9} US gal)
Transmission, when changing incl. filter	35 dm ^{3 (9,2} US ^{gal)}





Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

L90C

Transmission		
Туре	Hydro-mechanical	
Make	Volvo	
Designation	HT131	
Product number	30897	
Number of gears	4 forward, 3 reverse[1] ①	
Gear-shifting system	Electro-hydraulic	

Speed range (tyres 20.5–25)	
1st	0- 7.1 km/h (0- 4.4 mph)
2nd	0–13.3 km/h (0– 8.3 mph)
3rd	0–27.7 km/h (0–17.2 mph)
4th	0-38.2 km/h (0-23.7 mph)

L120C

Transmission	
Туре	Hydro-mechanical
Make	Volvo
Designation	HT205
Product number	30887
Number of gears	4 forward, 3 reverse[2] ①
Gear-shifting system	Electro-hydraulic

Speed range (tyres 20.5–25)	
1st	0- 7.3 km/h (0- 4.5 mph)
2nd	0-13.3 km/h (0- 8.3 mph)
3rd	0–25.2 km/h (0–15.7 mph)
4th	0-35.2 km/h (0-21.9 mph)

[1]4th gear in reverse is blocked via the control unit (ECU)

[2]4th gear in reverse is blocked via the control unit (ECU)



Service Information

Document Title: Specifications, weights	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

L90C

Transmission, incl. pumps	730 kg (1609 lb)
mansinission, inc. pumps	730 kg (1009 lb)

L120C

Transmission, incl. pumps	840 kg (1852 lb)
---------------------------	------------------



Document Title: Gear selector valve, description	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Gear selector valve, description

The gear selector valve has two different types of spools, where the N/D spool differs from the others.

NOTICE

It is possible to install the spools (not the N/D spool) the wrong way round. The spools must be turned with the shorter end toward the solenoid.

When the solenoid is not energised, the control side of the valve spool is connected to the tank via the solenoid (connection 2–3). The return spring, which is positioned at the opposite end, presses the valve spool against the solenoid, see Figure [?]. When the solenoid is energised, the solenoid core closes connection 3 to the tank, the connection from the pump to the valve spool is opened (connection 1–2) and the valve spool is pressed over to the opposite side.

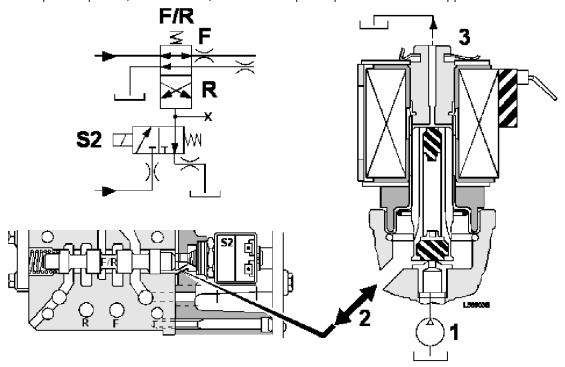


Figure 1

- 1. Pressure connection from transmission pump
- 2. Connection to valve spool
- 3. Return to tank

Gear-shifting diagram

The gear-shifting diagram shows the solenoids which are energised for the respective gears. For example: For gear 1F S1, S3 and S4 are energised.

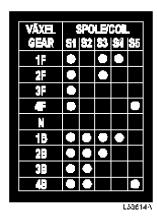


Figure 2 Gear-shifting diagram

Solenoid	Energised	Not energised
S1	Drive	Neutral
S2	Reverse	Forward
S3	Low (1st gear – 2nd gear)	High (3rd gear – 4th gear)
S4	1st	2nd
S5	4th	3rd



Document Title: Limp-Home operation	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Limp-Home operation

Op nbr

930032 Nipple. 2 pcs. operating forward. 4 pcs operating rearward 11 666 037 Hose, 1 pc, operating forward, 2 pcs operating rearward



With the Limp-Home operation connected, the gear will be engaged directly as the engine is started. Therefore, keep the service brakes applied when starting the engine.

Limp-Home operation forward

1. Remove plug N/D from the gear selector valve, Figure [?] and install nipple part No. 930032.

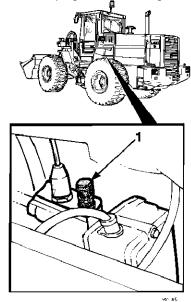


Figure 1
Pressure outlet main pressure, L90C

1 Pressure outlet main pressure

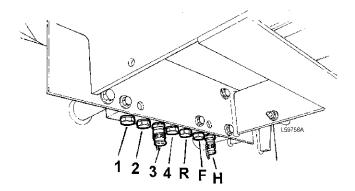


Figure 2 Pressure outlet main pressure, L120C

H Pressure outlet main pressure

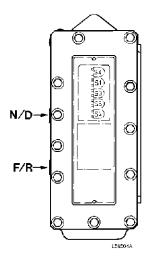


Figure 3
Gear selector valve
N/D Valve spool, neutral – drive
F/R Valve spool, forward – reverse

- 2. Connect a hose part No. 11 666 037 between the pressure outlet for main pressure and N/D.
- 3. Keep the gear selector control in neutral position, and start the engine. 3rd gear forward will now be engaged.
- 4. After Limp-Home operation, restore with the plug for N/D.

Limp-Home operation rearward

5. Remove plugs N/D and F/R from the gear selector valve $\frac{\text{Figure}}{2}$ and install nipple part No. 930032.

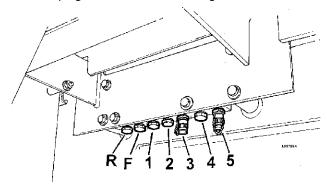


Figure 4

Pressure outlet, 3rd gear (provided with quick-action coupling)

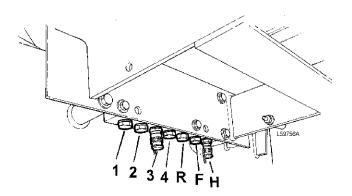


Figure 5
Pressure outlet main pressure, L120C

3 Pressure outlet, 3rd gear

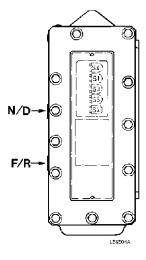


Figure 6 Gear selector valve

N/D	Valve spool, neutral – drive	
F/R	Valve spool, forward – reverse	

- 6. Connect a hose part No. 11 666 037 between the outlet for main pressure on the checking panel and the outlet N/D on the gear selector valve and connect the other hose between the pressure outlet for the 3rd gear clutch on the checking panel and the outlet F/R on the gear selector valve.
- 7. Keep the gear selector control in neutral position, and start the engine. 3rd gear in reverse will now be engaged.
- 8. After Limp-Home operation, restore with plugs.



Service Information

Construction Equipment

Document Title: Specifications, general	!	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Oil pressure, at high idling speed		
Main pressure	1.45-1.68 MPa (14.5-16.8 bar) (210-244 psi)	
Clutch pressure, gears 1 – 4, F – R	1.35–1.58 MPa (13.5–15.8 bar) (196–229 psi)	
Torque converter pressure, out	0.57–0.69 MPa (5.7–6.9 bar) (83–100 psi)	
Lubricating oil pressure	0.35-0.45 MPa (3.5-4.5 bar) (51-65 psi)	

L120C

Oil pressure, at high idling speed		
Main pressure	1.37–1.58 MPa (13.7–15.8 bar) (199–229 psi)	
Clutch pressure, gears 1 – 4, F – R	1.37–1.58 MPa (13.7–15.8 bar) (199–229 psi)	
Torque converter pressure, out	0.20- 0.50 MPa (2.0 - 5.0 bar) (29 - 73 psi)	
Lubricating oil pressure	0.16-0.22 MPa (1.6-2.2 bar) (23-32 psi)	



Document Title: Symbol diagram HT131, L90C	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Symbol diagram HT131, L90C

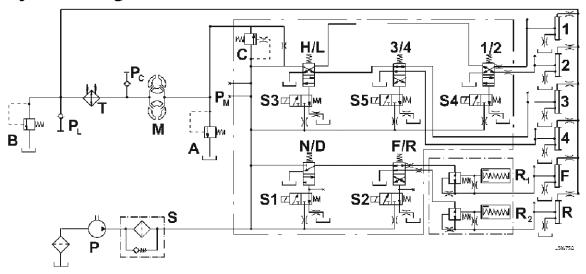
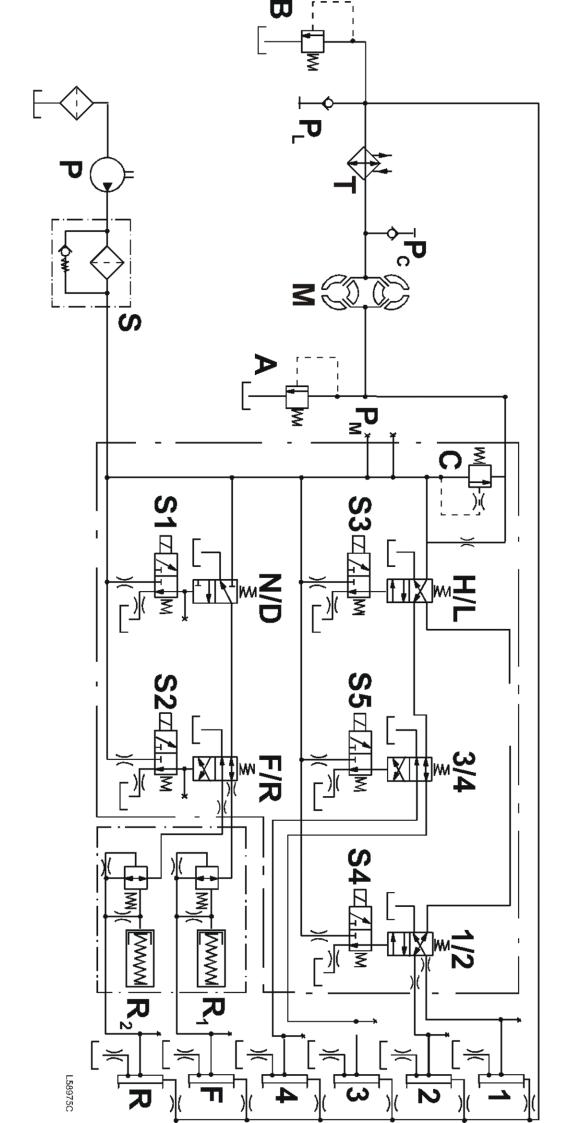


Figure 1 Symbol diagram HT131

Α	Pressure-limiting valve, input torque converter pressure
В	Pressure-limiting valve, lubricating oil pressure
С	Pressure-limiting valve, clutch pressure
PM	Checking point, main pressure
PC	Checking point, torque converter pressure
PL	Checking point, lubricating oil pressure
N/D	Selector spool, neutral – drive
F/R	Selector spool, forward – reverse
H/L	Selector spool, high – low
1/2	Selector spool, 1st – 2nd
3/4	Selector spool, 3rd – 4th
R1	Damping valve, forward gear
R2	Damping valve, reverse gear
S1	Solenoid, neutral – drive
S2	Solenoid, forward – reverse gear
S3	Solenoid, high – low gear
S4	Solenoid, 1st – 2nd gears
S5	Solenoid, 3rd – 4th gears
1	1st gear disc clutch
2	2nd gear disc clutch
3	3rd gear disc clutch

4	4th gear disc clutch
F	Forward gear disc clutch
R	Reverse gear disc clutch
М	Torque converter
Р	Pump
S	Filter
Т	Oil cooler





Document Title: Symbol diagram HT205, L120C	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Symbol diagram HT205, L120C

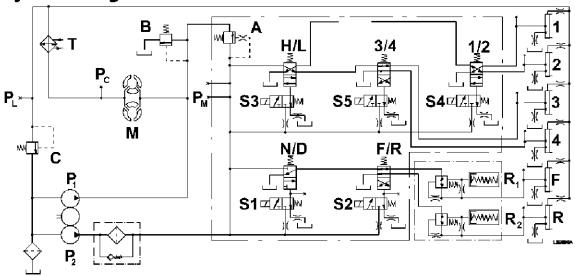
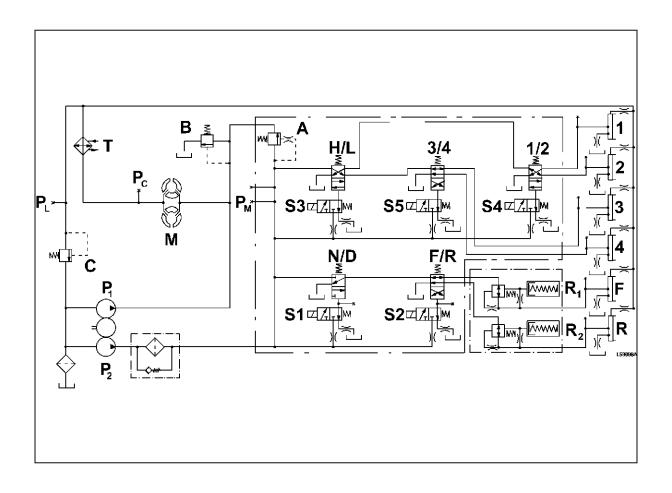


Figure 1 Symbol diagram HT205

Pressure-limiting valve, clutch pressure
Safety valve, torque converter
Pressure-limiting valve, lubricating oil pressure
Checking point, main pressure
Checking point, torque converter pressure
Checking point, lubricating oil pressure
Selector spool, neutral – drive
Selector spool, forward – reverse
Selector spool, high – low
Selector spool, 1st – 2nd
Selector spool, 3rd – 4th
Damping valve, forward clutch
Damping valve, reverse clutch
Solenoid, neutral – drive
Solenoid, forward – reverse gear
Solenoid, high – low gear
Solenoid, 1st – 2nd gears
Solenoid, 3rd – 4th gears
1st gear disc clutch
2nd gear disc clutch
3rd gear disc clutch

4	4th gear disc clutch	
F	Forward gear disc clutch	
R	Reverse gear disc clutch	
P ₁ , P ₂	Pumps	
М	Torque converter	
Т	Oil cooler	
S	Filter	





Document Title: Transmission, checking oil pressure	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Transmission, checking oil pressure

Op nbr 42102

11 666 017 Pressure gauge, measuring range 0–0.6 MPa (0–87 psi) 11 666 018 Pressure gauge, measuring range 0–2.5 MPa (0–363 psi) 11 666 037 Hose 999 3721 Service display unit 930032 Measuring nipple

The following applies when checking:

Normal operating temperature and check the pressure throughout the whole speed range.

Use measuring nipple 930032 where it is not already installed.

NOTICE

When checking pressure, apply the service brake and the parking brake. Also make sure that the switch for the transmission disengagement **is not** actuated.

NOTICE

The Mode Selector (SW143) must be set to the MAN position.

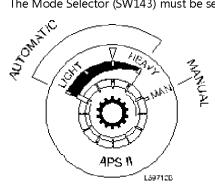


Figure 1 Mode selector (SW143)

L90C

Main pressure (alternative 1)

- 1. The main pressure can be read off with the aid of the service display unit.
- 2. Connect service display unit 999 3721 to connector IA on the steering wheel column.
- 3. The gear selector must be in neutral and check the pressure throughout the whole speed range. Main pressure: **1.45–1.68 MPa (210–244 psi)**

Main pressure (alternative 2)

4. Connect pressure gauge 11 666 018 to the pressure outlet on the gear selector valve, positioned behind the cover on the left side, see Figure [?].

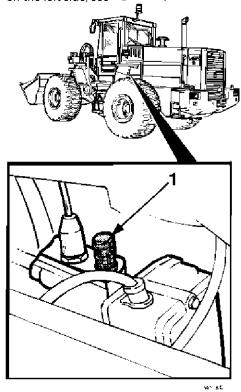


Figure 2 Gear selector valve

- 1. Pressure outlet main pressure
- 5. The gear selector must be in neutral and check the pressure throughout the whole speed range. Main pressure: **1.45–1.68 MPa (210–244 psi)**

Clutch pressure, gears 1 - 4

- 6. Connect pressure gauge 11 666 018 to pressure outlet item 1, 2, 3, or 4, Figure [?].
- 7. The gear selector must be in the respective gear positions, check the pressure both in forward and reverse positions and throughout the whole speed range.

 Clutch pressure: 1.35–1.58 MPa (196–229 psi)

Clutch pressure, forward and reverse gears

- 8. Connect pressure gauge 11 666 018 to pressure outlet items F or R, see Figure [?].
- The gear selector must be in the forward and reverse gear positions with 3rd gear selected and check the pressure throughout the whole speed range.
 Clutch pressure: 1.35–1.58 MPa (196–229 psi)

Lubricating oil pressure

10. Connect pressure gauge 11 666 017 to the pressure outlet for lubricating oil pressure, item 5 Figure [?]. High idling speed.

Lube oil pressure: 0.35-0.45 MPa (51-65 psi)

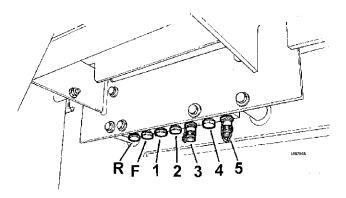


Figure 3 Under the entry step on the left side of the machine

R	Pressure outlet reverse gear
F	Pressure outlet forward gear
1	Pressure outlet 1st gear
2	Pressure outlet 2nd gear
3	Pressure outlet, 3rd gear (provided with quick-action coupling)
4	Pressure outlet 4th gear
5	Pressure outlet, lubricating oil pressure (provided with quick-action coupling)

Torque converter pressure

11. Connect pressure gauge 11 666 017 to the pressure outlet on the torque converter valve, positioned behind the cover on the right side.

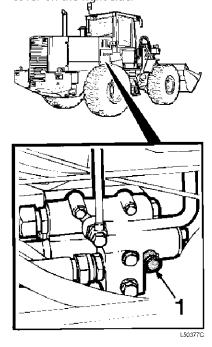


Figure 4
1 Pressure outlet, torque converter valve

12. The gear selector must be in neutral, high idling speed.
Torque converter pressure: **0.57–0.69 MPa (83–100 psi)**

Press	sure diagram				
	Lubricating pressure	oil	Torque converter pressure	Main pressure	Clutch pressure

				F	В	1	2	3	4
N	Х	Х	Х	0	0	0	0	Х	0
1F	Х	Х	Х	Х	0	Х	0	0	0
2F	Х	Х	Х	Х	0	0	Х	0	0
3F	Х	Х	X	Х	0	0	0	Х	0
4F	Х	X	X	Χ	0	0	0	0	Х
1R	Х	X	X	0	Χ	Х	0	0	0
2R	Х	X	X	0	Χ	0	Х	0	0
3R	Х	X	X	0	Χ	0	0	Χ	0
4R	Х	X	X	0	Χ	0	0	0	Х

X = Pressure

0 = Without pressure

Any operating problems caused by internal leakage in the gear selector valve or between the clutch shaft and the oil distributor can be detected if all pressures for the transmission are checked at the same time as above.

L120C

Main pressure (alternative 1)

- 14. The main pressure can be read off with the aid of the service display unit.
- 15. Connect service display unit 999 3721 to connector IA on the steering wheel column.
- 16. The gear selector must be in neutral and check the pressure throughout the whole speed range. Main pressure: **1.37–1.58 MPa (199–229 psi)**

Main pressure (alternative 2)

17. Connect pressure gauge 11 666 018 to the pressure outlet for the main pressure.

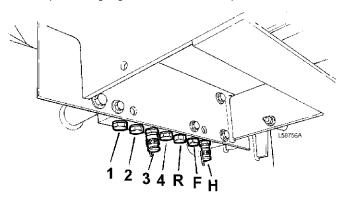


Figure 5
Under the entry step on the right side of the machine

1	Pressure outlet 1st gear
2	Pressure outlet 2nd gear
3	Pressure outlet, 3rd gear (provided with quick-action coupling)
4	Pressure outlet 4th gear
R	Pressure outlet reverse gear
F	Pressure outlet forward gear
Н	Pressure outlet main pressure (provided with quick-action coupling)

18. The gear selector must be in neutral and check the pressure throughout the whole speed range. Main pressure: **1.37–1.58 MPa (199–229 psi)**

Clutch pressure, gears 1 - 4

- 19. Connect pressure gauge 11 666 018 to the pressure outlet (1, 2, 3 or 4, on certain markets only 3) see Figure ??.
- 20. The gear selector must be in the respective gear positions, both in forward and reverse positions and check the pressure throughout the whole speed range.

 Clutch pressure: 1.37–1.58 MPa (199–229 psi)

Clutch pressure, forward and reverse gears

- 21. Connect pressure gauge 11 666 018 to the pressure outlet (F or R), see Figure [?].
- 22. The gear selector must be in the forward and reverse gear positions with 3rd gear selected and check the pressure throughout the whole speed range.

Clutch pressure: 1.37-1.58 MPa (199-229 psi)

Torque converter pressure and lubricating oil pressure

23. Connect pressure gauge 11 666 017 on the left side of the transmission.

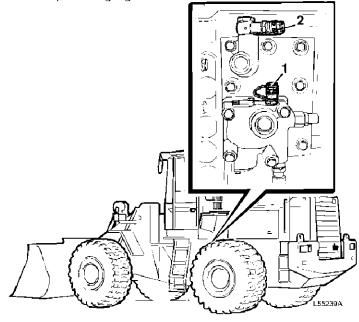


Figure 6

- 1. Lubricating oil pressure
- 2. Torque converter pressure
- 24. The gear selector must be in neutral, high idling speed.

NOTICE

The torque converter pressure is dependent on temperature, speed and the resistance in the system which varies, but is limited at the low end by the lubricating oil pressure and at the high end by the safety valve, which opens at 0.8 MPa (116 in).

Torque converter pressure: **0.20–0.50 MPa (29–73 psi)** Lube oil pressure: **0.16–0.22 MPa (23–32 psi)**

Press	Pressure diagram									
	Lubricating of pressure	il	Torque converter pressure	Main pressure	Clutch	ı pres	sure			
					F	1	В	2	3	4

N	Х	Х	х	0	0	0	0	Х	О
1F	x	X	x	Х	Χ	0	0	0	0
2F	x	X	x	Х	0	0	Х	0	0
3F	Х	х	Х	Х	0	0	0	Χ	0
4F	x	Х	x	Х	0	0	0	0	X
1R	X	X	X	0	Χ	Χ	0	0	0
2R	X	X	X	0	0	Χ	Х	0	0
3R	Х	Х	Х	0	0	Х	0	Χ	0
4R	Х	Х	х	0	0	Х	0	0	X

X = Pressure

0 = Without pressure

Any operating problems caused by internal leakage in the gear selector valve or between the clutch shaft and the oil distributor can be detected if all pressures for the transmission are checked at the same time as above.



Service Information

Document Title: Transmission, description	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Transmission, description

Design

The transmission is a four-speed hydro-mechanical transmission of the power shift type, and is made up of three main parts:

- O A front part with torque converter, transmission oil pump and two power take-offs for driving hydraulic pumps.
- O An intermediate part (gearbox) with spur gearings for forward and reverse drive and gears 1–4, hydraulic clutches for the spur gearings and a control valve for the same.
- O A rear/lower part ("dropbox") which consists of a transfer gear and parking brake.

The hydraulic transfer of power is via a torque converter which, in addition to transferring the torque, also multiplies the torque.

The mechanical transfer of the torque is via the clutch shafts, where the gears for the directional and speed gears are in constant mesh. The gears on the clutch shafts rotate freely, but are locked with hydraulic pressure in different gear combinations for the different gears.

Gear shifting

The gear shifting is electro hydraulic. In order to engage the required gear, current has to be connected to one or more of the solenoids in the gear selector valve. The solenoids actuate the gear selector valve spools, which in their turn control the oil flow to the clutch shafts.

The spools in the gear selector valve have two positions: They are actuated hydraulically in one direction by the solenoids and in the other direction (the resting position) by a spring.

The neutral spool and the forward/reverse spool can, in case of an electrical fault, also be actuated hydraulically for limphome operation after re-arranging some electrical connections.





Document Title: Transmission, installing	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Transmission, installing

Op nbr 42172

E 985 Hose

Ratchet block, 1500 kg (3307 lb), 1 pc

Sling, 1000 kg (2205 lb)

Lifting eyes, M16

1. Connect the lifting device according to Figure [?].

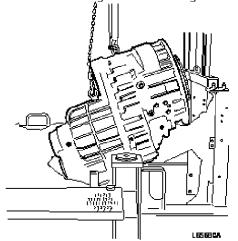


Figure 1

- Lift the transmission into position.
 Install the attaching bolts against the flywheel housing.
 Tightening torque: 54 N m (40 lbf ft)
- Remove any supports from under the engine and install the transmission mountings.
 Tightening torque mounting transmission: 430 N m (317 lbf ft)
 Tightening torque mounting frame: 220 N m (162 lbf ft).
- 4. Remove the lifting device from the transmission.
- 5. Install the front and rear propeller shafts.
- 6. Install the pumps on the transmission.
- 7. Connect the hoses, the cable harnesses, the sensors and the pipes.
- 8. Install the hydraulic tank, the hood and the cab, see Cab, installing, Section 8.

Fill and check the oil level in the transmission and the hydraulic tank.
 Start and check the hydraulic pressures (see ---- not implemented: INTXREF ----:).
 Check that there are no leaks.



Service Information

Document Title: Transmission, removing	Information Type: Service Information	Date: 25.04.2013
Profile:		

Transmission, removing

Op nbr 42170

E 985 Hose

Ratchet block, 1500 kg (3307 lb), 1 pc

Sling, 1000 kg (2205 lb)

Lifting eyes, M16



Plug all pipe, hoses and connections when removing.

- 1. Release any pressure in the brake and hydraulic systems by depressing the brake pedal 30–40 times and by moving the control levers on the control lever carrier to their end positions several times.
- 2. Drain the hydraulic and transmission oils.

 Use E 985 when emptying the hydraulic oil tank.
- 3. Remove the cab, see Cab, removing, Section 8.
- 4. Remove the cover above the hydraulic tank and the hood plates on both sides of the tank.
- 5. Disconnect the following:
 - O The exhaust pipe from the silencer.
 - O The hoses from the expansion tank, 3 pcs.
 - O The hose from the hydraulic tank breather filter.
 - O The inlet hose from the turbocharger.
 - O The hose from the dust indicator.
- 6. Lift away the hood plate above the engine and the side covers as one unit together with the silencer, the air cleaner and the expansion tank.

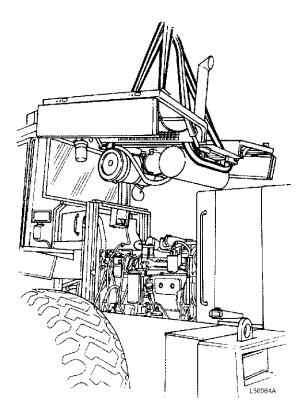


Figure 1 Removing hood plate

- 7. Open the side covers on both sides of the hydraulic tank and remove the lower cover plates.
- 8. Lift away the hydraulic tank together with the frame around the tank.

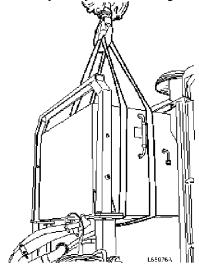


Figure 2 Removing hydraulic tank

- Detach the front propeller shaft from the drive flange on the transmission.
 Remove the rear propeller shaft.
 Propeller shaft weight: approx. 38 kg (84 lb)
- 10. Remove the pumps from the transmission.
- 11. Disconnect leads, lines, pipes, cable harnesses etc. from the transmission
- 12. Install two M16 eyes at the top of the transmission.

13. Connect a lifting device according to Figure [?]. Transmission weight: approx. 850 kg (1874 lb)

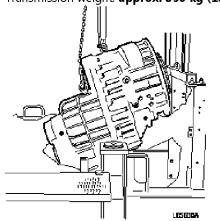


Figure 3

- 14. Transfer the weight of the transmission to the lifting device. Remove the transmission mountings.
- 15. Support the engine against the rear axle mounting and detach the transmission from the flywheel housing.
- 16. Pull the transmission forward and lift it out.



Service Information

Construction Equipment

Document Title: Specifications, capacities (dm < super > 3 = litre) < / super >	434	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities (dm

L90C

Dropbox when changing oil	4.7 dm ^{3 (1.2} US ^{gal)}
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Service Information

Document Title: Specifications, weights	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Dropbox	165 kg (364 lb)
Бгорьох	103 kg (304 lb)



Service Information

Construction Equipment

Document Title: Drive axles, description	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Drive axles, description

Axles AWB30 and AWB31 have floating half shafts and hub reduction gears of planetary gear type with built-in oil cooled disc brakes.

The brakes are hydraulically controlled and integrated with the hub reduction gears so that the brakes utilise the gear ratio provided by the planetary gears.

A pump impeller is installed on either side of the brake discs. These impellers throw the axle oil across the surface of the brake discs to cool the brakes and to circulate the oil in the axle. The axles have a common oil space for the hub reduction gears and the differential carrier assembly.

Certain axles can be provided with separate circulation oil pump on the pinion shaft and then in combination with an external oil cooler.

The front axle version of the axles is provided with an hydraulically operated a dog clutch type differential lock. Alternatively certain axle versions can be equipped with a limited slip differential.

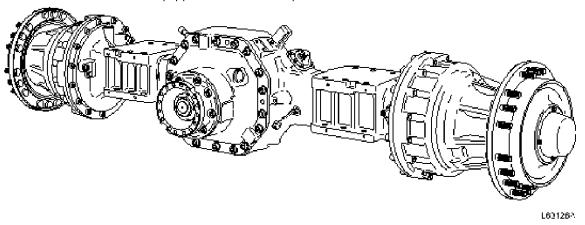


Figure 1
Drive axle AWB31





Document Title:	Function Group:	Information Type:	Date:
Rear		Service Information	25.04.2013
axle suspension, measuring axial and radial clearance			
Profile:			

Rear axle suspension, measuring axial and radial clearance

Op nbr 46001

Indicator gauge with magnetic base

Axial clearance

- 1. Raise the machine off the ground until the weight is taken off the axle.

 Use ratchet blocks between the axle and the frame for pulling the axle forward and rearward respectively.
- 2. Position a indicator gauge between the flange on the rear bearing and the axle mounting. Set the indicator gauge to zero.

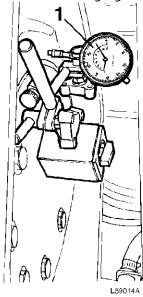


Figure 1

- 1. Indicator gauge with magnetic base
- 3. Press the axle against the front axle mounting and read off the axial clearance on the indicator gauge. Axial clearance: **max. 0.50 mm (0.020 in)**

Radial clearance

- 4. Position the indicator gauge between the flange on the front bearing and the underside of the axle mounting. Lift the machine at the rear frame and read off the radial clearance on the indicator gauge.

 Radial clearance: max. 0.50 mm (0.020 in)
- 5. Position the indicator gauge between the flange on the rear bearing and the underside of the axle mounting. Lift the machine at the rear frame and read off the radial clearance on the indicator gauge.

 Radial clearance: max. 0.25 mm (0.010 in)



Service Information

Construction Equipment

Document Title: Rear axle suspension, description	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Rear axle suspension, description

The differential carrier housing and the rear axle housing have replaceable wear sleeves.

The axial clearance of the rear axle bridge can be adjusted with the aid of shims.

The bushings in the rear axle suspension are made from steel, but a plastic version is also available. The plastic bushings have a longer service life and are intended for use when handling abrasive material, e.g. fine sand.

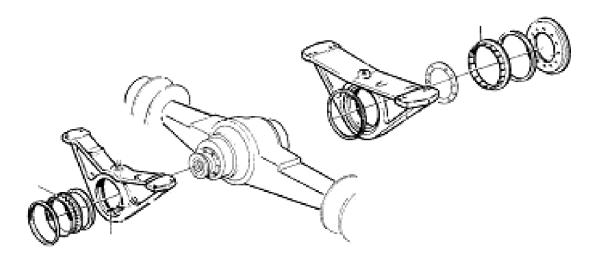


Figure 1 Rear axle suspension

L90C

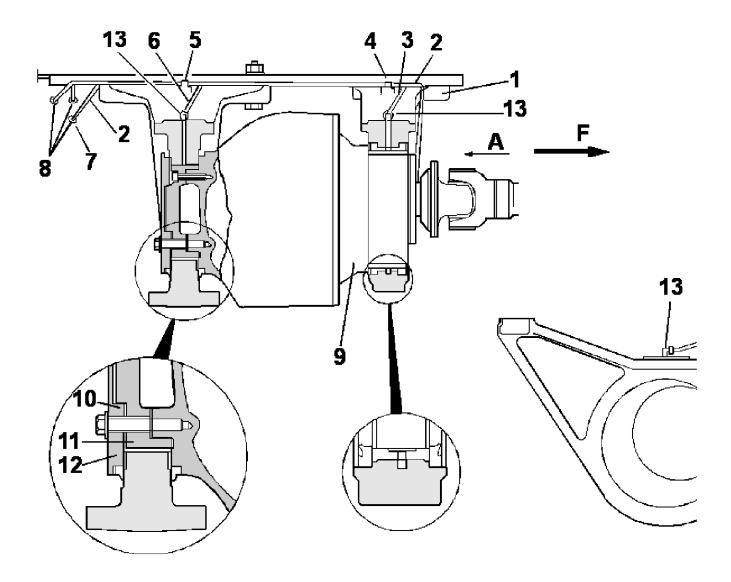


Figure 2 Rear axle suspension, L90C

F	Travelling direction
1	Rear axle front bridge
2	Lower lubrication pipe for the rear axle front bridge
3	Upper lubrication pipe for the rear axle front bridge
4	Clamp
5	Clamp
6	Lubrication pipe for the rear axle rear bridge
7	Nipple, lower lubrication pipe for the rear axle front bridge
8	Nipple
9	Differential carrier assembly
10	Shims for adjusting the axial clearance of the rear axle bridge
11	Pivot pin
12	Flange
13	Nipple

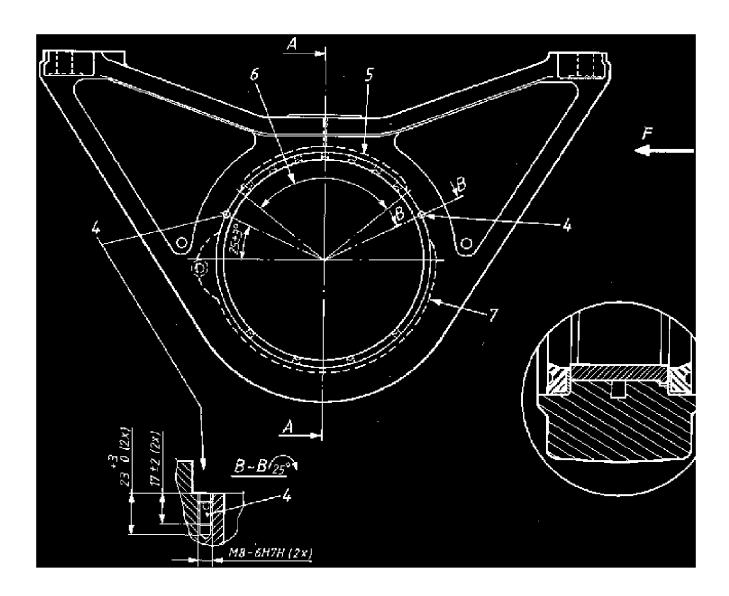


Figure 3 Rear axle front bridge, complete, L90C

F	Travelling direction
1	Rear axle bridge
2	Seal ring
3	Bearing ring
4	Lock screw
5	Lubrication grooves for rear axle bridge
6	Lubrication grooves in bushing

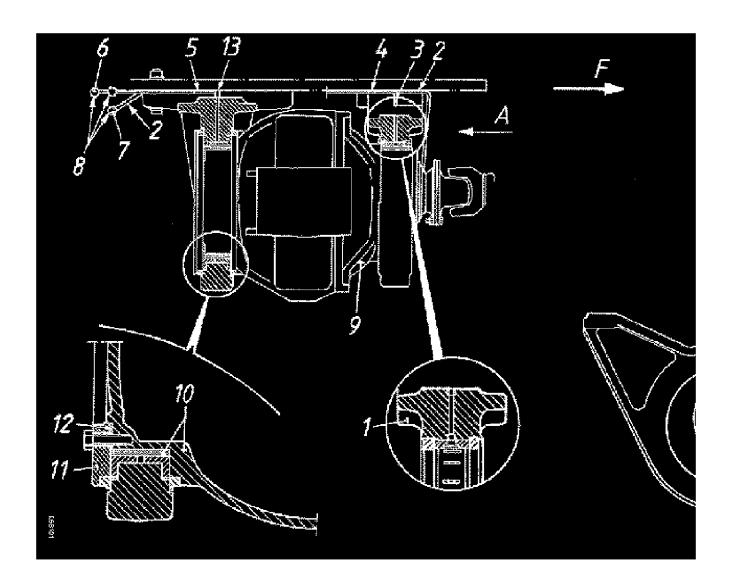


Figure 4 Rear axle suspension, L120C

F	Travelling direction
1	Rear axle front bridge
2	Lower lubrication pipe for the rear axle front bridge
3	Upper lubrication pipe for the rear axle front bridge
4	Clamp
5	Clamp
6	Lubrication pipe for the rear axle rear bridge
7	Nipple, lower lubrication pipe for the rear axle front bridge
8	Nipple
9	Differential carrier assembly
10	Rear axle housing with wear ring
11	Flange
12	Shims for adjusting the axial clearance of the rear axle bridge
13	Nipple

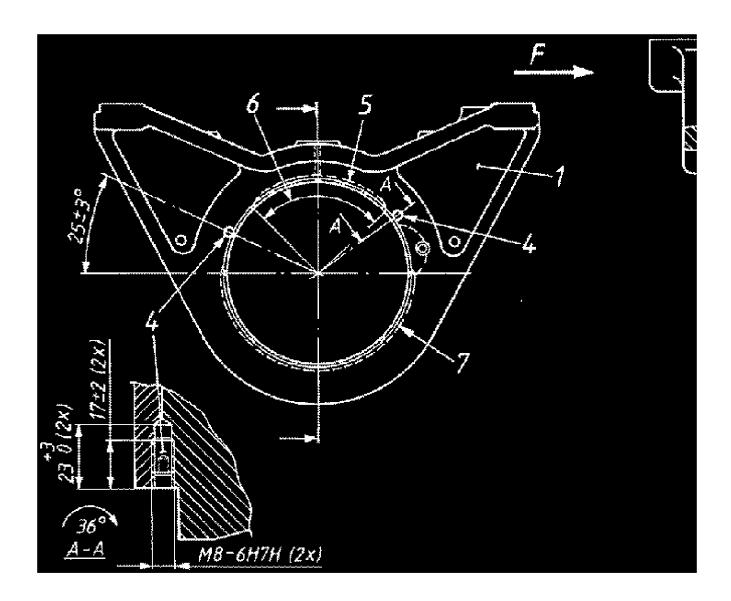
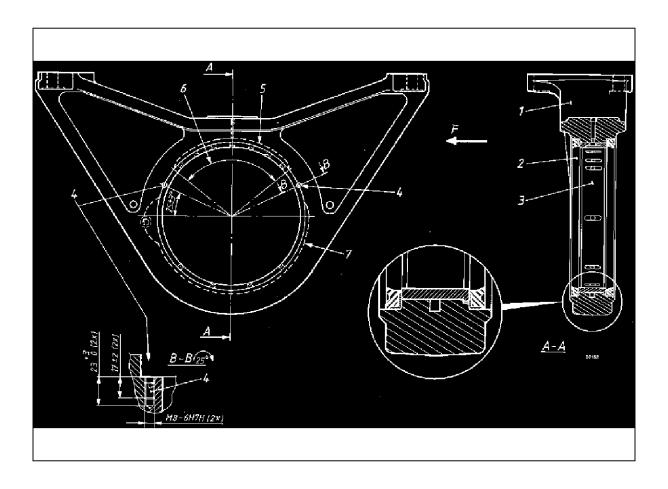
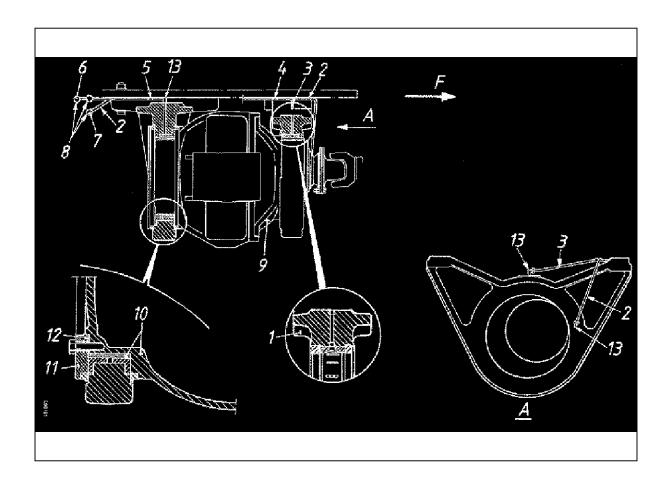
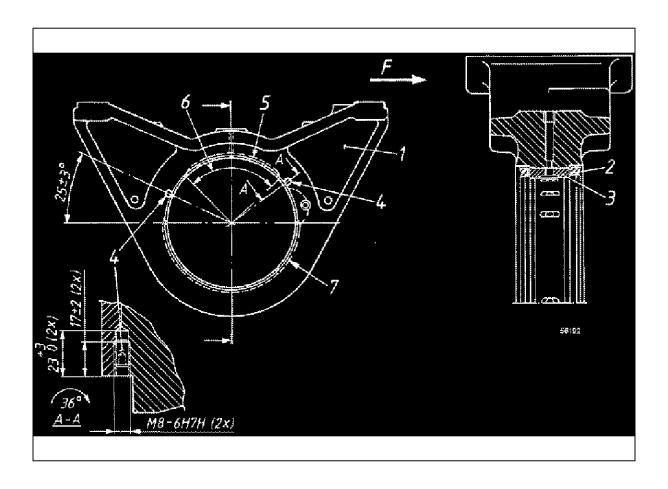


Figure 5
Rear axle front bridge, complete, L120C

F	Travelling direction
1	Rear axle bridge
2	Seal ring
3	Bearing ring
4	Lock screw
5	Lubrication grooves for rear axle bridge
6	Lubrication grooves in bushing











Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Drive axles	
Туре	Fully floating drive shafts and hub reductions of the planetary gear type
Make	Volvo
Designation	
front	AWB30 (Prod. No. 23821)
rear	AWB30 (Prod. No. 23822)
Gear ratio, total	
front	18.37 : 1
rear	18.37 : 1
Differential lock	Front axle
operation	Electro-hydraulic

Drive axles	
Туре	Fully floating drive shafts and hub reductions of the planetary gear type
Make	Volvo
Designation	
front	AWB31 (Prod. No. 23846)
rear	AWB30 (Prod. No. 23847)
Gear ratio, total	
front	18.37 : 1
rear	18.37 : 1
Differential lock	Front axle
operation	Electro-hydraulic



Service Information

Construction Equipment

Document Title: Specifications, weights	Function Group: 460	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Front bridge, rear axle	90 kg (198 lb)
Rear bridge, rear axle	165 kg (364 lb)

Front bridge, rear axle	90 kg (198 lb)
Rear bridge, rear axle	190 kg (419 lb)



Document Title: The axial clearance of the	!	Information Type: Service Information	Date: 25.04.2013
rear axle bridge, adjusting			
Profile:			

The axial clearance of the rear axle bridge, adjusting

Op nbr

1. Measure the distance from face (1) on the bushing to face (2) for the shims.

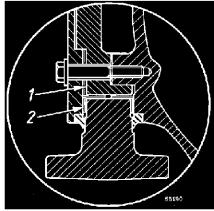


Figure 1 L90C

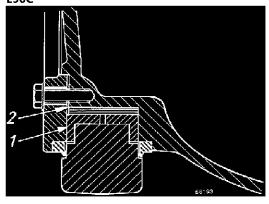


Figure 2 L120C

2. Install the shims according to the following example:

Shims (overall thickness)	2.70 mm (0.106 in)
Measured distance between the faces	– 2.25 mm (0.089 in)
Clearance	= 0.45 mm (0.018 in)

3. Check the clearance according to ---- not implemented: INTXREF ----: .



Document Title: Wear ring (differential carrier assembly), replacing	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Wear ring (differential carrier assembly), replacing

Op nbr

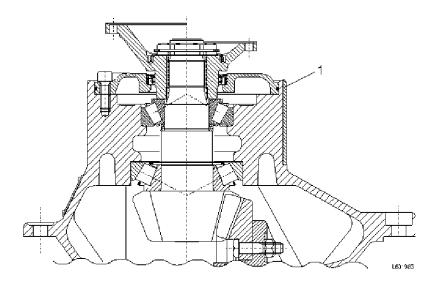


Figure 1

1. Wear ring

Removing

1. Grind a groove in the old wear ring and crack it with a cold chisel.

Installing

- 2. Heat the new wear ring in an oven or in oil to 175 °C (347 °F).
- 3. Install the new wear ring on the differential carrier housing.





Document Title: Front axle, installing	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Front axle, installing

Op nbr 46103

999 3831 Support 999 3742 Sleeve

Sling, 2 m (6.5 ft), 2 pcs

Sling, 6 m (20 ft), 2 pcs

Torque multiplier

1. Position the axle in the correct position under the machine.

Connect a lifting device.

Axle weight: approx. 1500 kg (3307 lb)

2. Lift the axle with the lifting device and secure it with a jack to prevent it from turning while it is being lifted. Install the attaching bolts.

Tightening torque: 804 N m (593 lbf ft)

3. Connect the propeller shaft to the front axle.

Install the attaching bolts.

Tightening torque: 50 N m (37 lbf ft)

4. Fill the front axle with oil.

Oil capacity: approx. 36 litres (9.5 US gal)

5. Install the front wheels.

Tightening torque: 600 N m (443 lbf ft)

Install the mudguards.

- 6. Remove the support from under the lifting frame, the axle stands and the steering joint lock.
- 7. Bleed the front brake circuit (see Brake system, air bleeding, Section 5).



Document Title: Front axle, removing	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Front axle, removing

Op nbr 46102

999 3831 Support 999 3742 Sleeve

Sling, 2 m (6.5 ft), 2 pcs

Sling, 6 m (20 ft), 2 pcs

Torque multiplier

- 1. Lock the steering joint.
- 2. Raise the front wheels off the ground with the aid of the lifting arms. Position supports under the lashing eyes in the front frame.

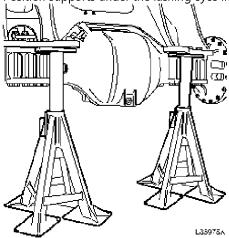


Figure 1

3. Raise the lifting arms and position support (999 3831) under the lifting frame, see Figure [?]. Lower the lifting arms onto the support and tip the bucket forward to the fully dumped position.

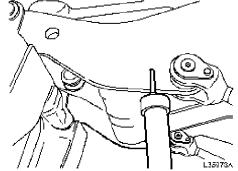


Figure 2

- 4. Remove the front mudguards and the front wheels.
- Drain the oil from the axle.
 Oil capacity: approx. 36 litres (9.5 US gal)
- 6. Tie up the propeller shaft and remove the bolts from the propeller shaft flange against the front axle.
- 7. Depress the brake pedal fully and block it with a suitable spacer. With the brake pedal fully depressed the oil in the hydraulic tank is prevented from running out to the respective brake pistons.

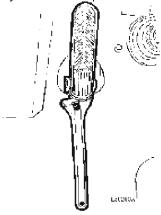


Figure 3 Blocked brake pedal

NOTICE

The brake pedal has to remain blocked until the front axle is back in position again.

- 8. Disconnect electrical leads and hoses from the differential lock and the brake and disconnect the breather hose from the axle. Use protective plugs for plugging all hoses.
- Connect a lifting device to the front axle and remove the attaching bolts.
 Front axle weight: approx. 1500 kg (3307 lb)
- 10. Lower the axle onto pallets on two pallet trolleys. Secure the axle (with for example a jack) so that it cannot tip. Pull out the axle.



Service Information Construction Equipment

Document Title: Specifications, capacities (dm < super > 3 = litre) < / super >	461	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities (dm

Front axle, total when changing oil	36 dm ^{3 (9.5} US gal)
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Service Information

Document Title: Specifications, weights	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Front axle (Serial No. –13000)	1082 kg (2385 lb)
Front axle (Serial No. 13001–)	1028 kg (2266 lb)

Front axle	1140 kg (2513 lb)
11 Ont axic	1140 kg (2515 lb)





Document Title: Rear axle, installing	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Rear axle, installing

Op nbr 46303

999 3742 Sleeve

Position the axle in the correct position under the machine.
 Connect a lifting device.
 Axle weight including mountings: approx. 1550 kg (3417 lb)

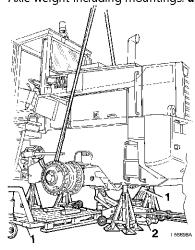


Figure 1 Connect a lifting device.

2. Lift the axle with the lifting device and secure it with a jack to prevent it from turning while it is being lifted. Install the attaching bolts.

Tightening torque: 804 N m (593 lbf ft)

3. Install the wheels.

Tightening torque: 600 N m (443 lbf ft)

- 4. Connect the brake hose, the cable harness to the temperature sensor, the lubricating oil pipes and the hose to the breather filter on the axle.
- Connect the propeller shaft to the rear axle.
 Tightening torque: 57 N m (42 lbf ft)

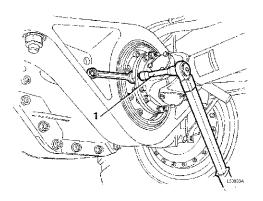


Figure 2 Attaching propeller shaft

- 1. 999 3742
- 6. Lubricate the rear axle suspension. Remove any supports.
- 7. Bleed the rear brake circuit (see **Brake system, air bleeding, Section 5**).



Document Title: Rear axle, removing	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Rear axle, removing

Op nbr 46302

999 3742 Sleeve

- 1. Raise the rear wheels and position supports below the rear frame.
- 2. Disconnect the propeller shaft from the differential carrier assembly.

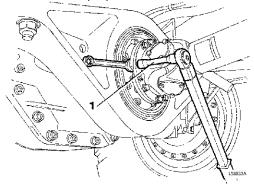


Figure 1
Disconnecting propeller shaft

- 1. 999 3742
- 3. Release the pressure in the brake system by depressing the brake pedal several times (30-40 times).
- 4. Depress the brake pedal fully and block it with a suitable spacer. With the brake pedal fully depressed the oil in the hydraulic tank is prevented from running out to the respective brake pistons.

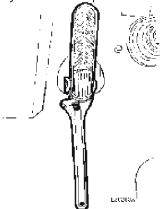


Figure 2 Blocked brake pedal



The brake pedal has to remain blocked until the front axle is back in position again.

- 5. Disconnect the lubricating oil pipes from the axle mountings and the brake hose from the brake pipe on the axle. Use protective plugs.
 - Disconnect the cable harness from the axle temperature sensor and the hose from the breather filter.
- 6. Remove the rear wheels.
- 7. Connect a lifting device to the axle.

Position a jack during the axle.

Axle weight including mountings: approx. 1550 kg (3417 lb)

Remove the bolts between axle mounting and frame.

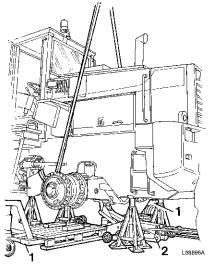


Figure 3 Lowering axle

- 1. Pallet trolley
- 2. Jack for securing the axle
- 8. Secure the axle with the jack under the axle so that the axle will not tip. Lower the axle onto pallets on two pallet trolleys.

 Pull out the axle.

NOTICE

Make sure that the front axle mounting does not slip off the axle.

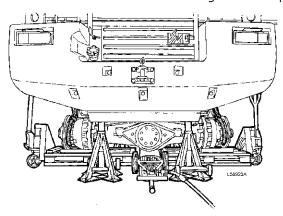


Figure 4



Service Information Construction Equipment

Document Title: Specifications, capacities (dm < super > 3 = litre) < / super >	463	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities (dm

Rear axle, total when changing oil	41 dm ^{3 (10.8} US gal)
3 3	



Service Information

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Rear axle (Serial No. –13000)	1136 kg (2504 lb)
Rear axle (Serial No. 13001–)	1036 kg (2284 lb)

Rear axle (Serial No. –9900)	1070 kg (2359 lb)
Rear axle (Serial No. 9901–)	1028 kg (2266 lb)



Document Title: Differential lock, adjusting	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Differential lock, adjusting

Op nbr 46805

999 3831 Support 11 666 140 Multimeter

- 1. Lift both front wheels off the ground until they can be rotated freely. Position supports under the front axle.
- 2. Position support 999 3831 under the lifting frame.

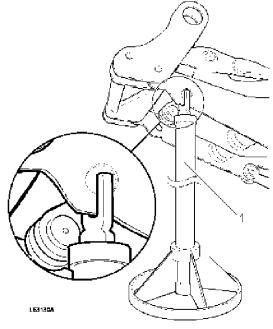


Figure 1

- 1. 999 3831
- 3. Clean the axle around the protective casing and the cap over the differential lock.
- 4. Remove the protective casing over the differential lock sensor and remove the connector.

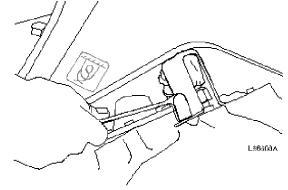


Figure 2

5. Disconnect the hydraulic hose from the cover over the differential lock and plug the hose.



Collect the oil which runs out in a suitable vessel.

6. Remove the cap, the washer, the diaphragm and the diaphragm seat over the differential lock diaphragm sleeve.

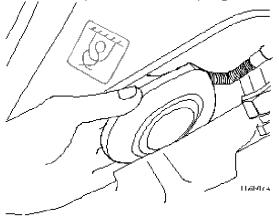


Figure 3

7. Loosen the selector bar lock screw with the aid of a 5 mm hexagon key.

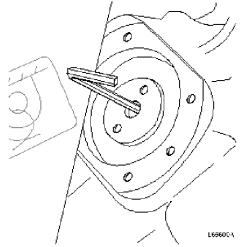


Figure 4

8. Screw the diaphragm sleeve counter-clockwise until the two dog clutch halves come tooth against tooth. Then screw the sleeve clockwise 1.5 to 2 revolutions, so that dog clutch halves are moved away from each other. Check by rotating one of the wheels back and forth.

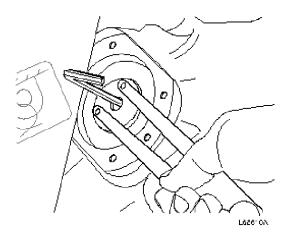


Figure 5 Adjusting diaphragm sleeve

- 9. Then screw the diaphragm sleeve clockwise four revolutions so that the differential lock is disengaged and then lock the selector bar with the lock screw.
- 10. Install the diaphragm seat and the diaphragm.

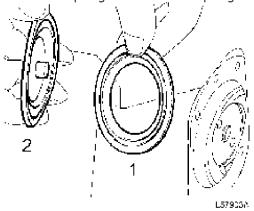


Figure 6
Installing diaphragm seat and diaphragm

- 1. Diaphragm seat
- 2. Diaphragm
- 11. Fix the washer in the cover with some petroleum jelly. Then re-fit the cover. Check that the differential lock is disengaged by rotating one of the wheels.
- 12. Connect the hydraulic hose to the cover.
- 13. Adjust the differential lock sensor as follows: Loosen the lock nut and screw in the sensor until it just closes the current circuit. Check with 11 666 140. Then unscrew the sensor 1/4 of a turn and lock it with the lock nut. Re-install the protective casing.

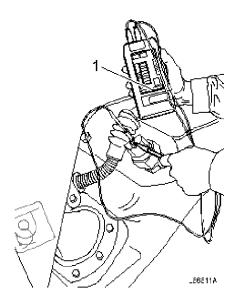


Figure 7 Adjusting sensor

- 1. 11 666 140
- 14. Remove the support from under the lifting frame and remove any supports from under the front axle.



Document Title: Description	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

Service brakes

The machine is provided with an all-hydraulically controlled brake system divided into two circuits, where one circuit acts on the front axle brakes and the other circuit on the rear axle brakes.

Both the front and rear axles are provided with wet disc brakes.

The system also consists of an hydraulic oil pump, a brake valve and accumulators.

The hydraulic oil pump serves both the brake and the servo systems and is mounted in tandem with the steering pump. The oil is drawn from the hydraulic oil tank.

Each circuit has its own accumulator. These are precharged with nitrogen gas and their purpose is to store energy and to safeguard braking capacity with a good margin.

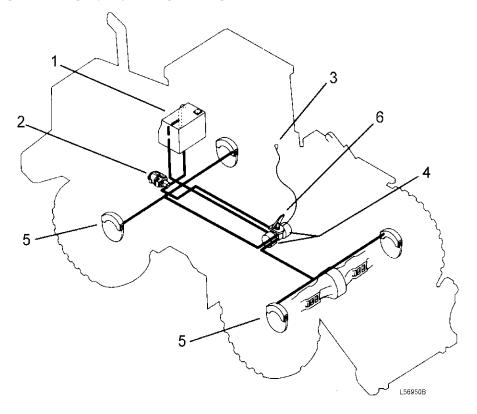


Figure 1 Brakes (principle diagram)

- 1. Hydraulic tank
- 2. Brake pump
- 3. Warning lamp for low brake pressure
- 4. Accumulator
- 5. Wet disc brakes
- 6. Brake valve

If the pressure in the accumulator circuit for some reason drops below 9 MPa (1305 psi) this will be indicated by the brake system warning lamp lighting up and the central warning will come into action and if the gear selector is moved to the forward or reverse drive positions the buzzer will sound. If the machine is equipped with a display unit (optional equipment),

this will also show a warning of low brake pressure.

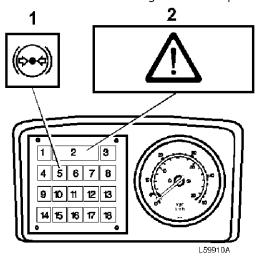


Figure 2 Instrument panel

- 1. Warning lamp, low brake pressure (LC6)
- 2. Central warning (LC9)

Brake valve

The brake valve includes control valve, unloading valve and foot brake valve.

The purpose of the control valve is to divide the oil flow from the pump to the brake system and the servo system.

The purpose of the unloading valve is to distribute the oil flow to the different brake circuits and control the pressure in the system.

The foot brake valve is divided into two circuits, where one of the circuits acts on the front axle brakes and the other on the rear axle brakes.

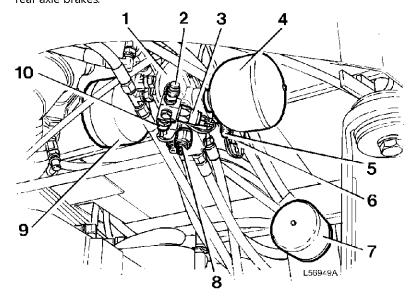


Figure 3 Brake valve

- 1. Brake valve
- 2. Pressure outlet for checking output brake pressure to circuit
- 3. Pressure sensor, transmission disengagement (SE2)
- 4. Accumulator, rear circuit (S1)
- 5. Pressure outlet, unloading pressure
- 6. Pressure sensor, low brake pressure (SE14)

- Accumulator for hydraulic parking brake (S3) L90C Serial No. –15289 (EU), –62960 (US), –70176 (Brazil) 7. L120C Serial No. –12376 (EU), –62083 (US), –70172 (Brazil)
- Adjusting screw, unloading pressure Accumulator, front circuit (S2) 8.
- 9.
- 10. Pressure sensor, stop lights (SE29)



Document Title: Function	Information Type: Service Information	Date: 25.04.2013
Profile:		

Function

Charging, brake in resting position

When the engine has stated, the oil flow from pump (1) enters the brake valve through connection P.

The oil flow from the pump is greater than the amount restriction (2) will let through. This will cause piston (3) in the control valve to begin to open and oil is supplied to the servo system via the connection marked N.

All oil to the brake system passes through restriction (2). If the system pressure is below 12 MPa (1740 psi), unloading spool (4) will be in its upper position. The oil is supplied to the unloading spool via duct (5). From there the oil is conducted to the control valve and in at the back of piston (3). The oil is also conducted through the duct in the unloading spool to the top of the spool.

From restriction (2) the oil also flows through non-return valve (6). Through duct (7) the oil is conducted out to the parking brake circuit. Non-return valve (9) lets the oil flow through to accumulator (11) at the connection marked S1 and via a duct on to spool (13) in the foot brake valve.

Non-return valve (10) lets the oil flow through to accumulator (12) at the connection marked S2 and via a duct on to spool (14) in the foot brake valve.

When the pressure has risen to the accumulator precharging pressure, approx. 5 MPa (725 psi), the nitrogen gas will be compressed by the flowing into the accumulators at the same time as the pressure in the system rises.

During the charging stage the pressure is the same on both sides of piston (15). The system pressure acts directly on unloading spool (4) and works against spring (16).

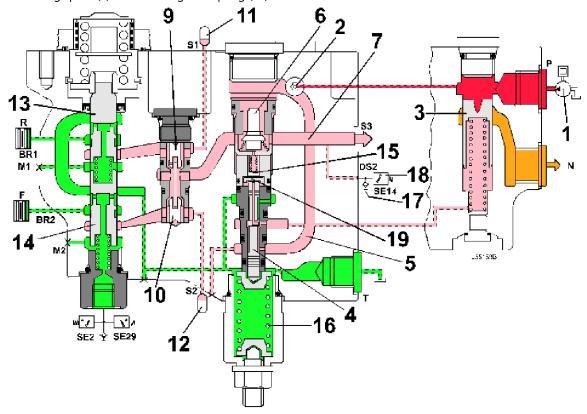


Figure 1 Charging

1	Brake and servo pump
2	Restriction (behind plug)

3	Piston
4	Unloading spool
5	Duct
6	Non-return valve
7	Duct
9	Non-return valve
10	Non-return valve
11	Accumulator, rear circuit
12	Accumulator, front circuit
13	Spool, rear circuit
14	Spool, front circuit
15	Piston
16	Spring
17	Checking point
18	Pressure sensor, low system pressure
19	Stroke limiter
А	To hydraulic parking brake (optional equipment L90C, standard equipment L120C)
N	To the servo system
Orange	= Servo pressure
Pink	= Build-up of pressure
Green	= Return pressure

Unloading, brake in resting position

When the accumulators (one for each brake circuit) fill up with oil, the pressure in the system rises at the same time towards the max. pressure, 15.5 MPa (2248 psi). The oil which exerts pressure on unloading spool (4) overcomes the force of spring (16) and the spool is displaced downward. The space above unloading spool (4) will then have a return connection to tank. The spool will be kept in the lower position by the system pressure which acts on piston (15). The "active" area of the piston is slightly larger than the corresponding area on the spool. The space behind piston (3) in the control valve will also have a return connection to tank. The pressure required to keep the valve open is reduced. This means non-return valve (6) will be closed by the system pressure.

In this situation the entire oil flow from pump (1) passes piston (3) and moves on to the servo system.

When the brakes are used and the accumulated pressure drops to approx. 12 MPa (1740 psi), unloading spool (4) will be displaced upward because of the spring force.

The return connection to tank through unloading spool (4) will be closed and the oil will be conducted to the underside of piston (3) in the control valve. This will cause the pressure at the top of the piston to rise and the pump flow will be charging the brake system via non-return valve (6). The difference between the unloading pressure and the cut-in pressure is determined by the area difference on piston (15) and unloading spool (4).

Brake in resting position (not actuated)

When the foot brake valve is not actuated, return springs (19 and 20) are pressing spools (13 and 14) upward. Pressure ducts (21 and 22) will then be closed and the brake connections marked B1 and B2 will be connected to tank from the connection marked T via ducts in the valve housing, see Figure [?].

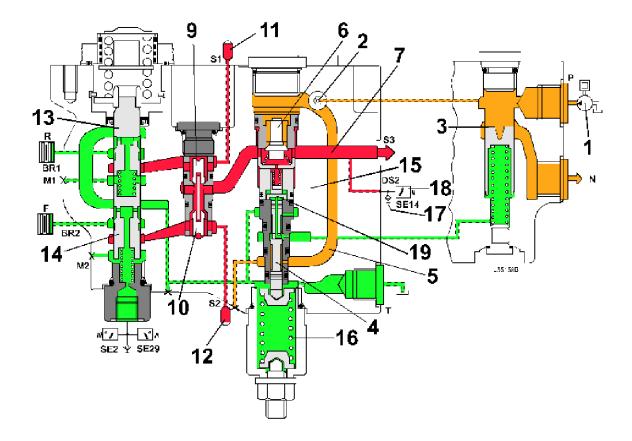


Figure 2 Unloading

1	Brake and servo pump
2	Restriction (behind plug)
3	Piston
4	Unloading spool
5	Duct
6	Non-return valve
7	Duct
9	Non-return valve
10	Non-return valve
11	Accumulator, rear circuit
12	Accumulator, front circuit
13	Spool, rear circuit
14	Spool, front circuit
15	Piston
16	Spring
17	Checking point
18	Pressure sensor, low system pressure
19	Return spring, rear circuit
20	Return spring, front circuit
21	Pressure duct, rear circuit
22	Pressure duct, front circuit
23	Stroke limiter
N	To the servo system
Orange	= Servo pressure

Red	= System pressure
Green	= Return pressure

Partial brake application

If the brake pedal is partially depressed, spring (23) will be pretensioned. Spools (13 and 14) will then be displaced downward, closing the tank connection from the brakes and oil from pressure ducts (21 and 22) can flow out to the brakes via the connections marked B1 and B2. This causes the brakes to be applied and the pressure at connections B1 and B2 to rise.

When this pressure corresponds to the force at which spring (23) has been pretensioned, the pressure will aid return spring (19) in pushing up spool (13) and spring (20) in pushing up spool (14). In this way the oil flow to the brakes is closed and a brake application corresponding to the depression of the brake pedal is obtained.

Full brake application

The downward movement of the foot brake pedal is limited by the foot brake pedal adjusting screw, see Figure [?]. When the pedal is depressed to the end position, the valve still takes up a partial brake application position and the pressure out to the brakes is limited to approx. 8 MPa (1160 psi).

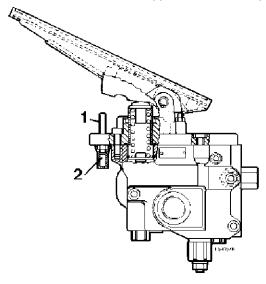


Figure 3

- 1. Adjusting screw for output brake pressure
- 2. Security seal

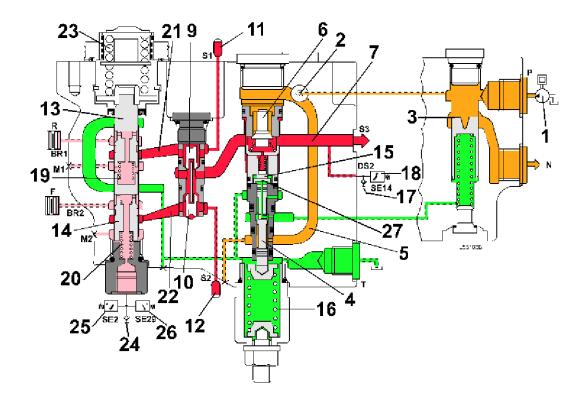


Figure 4 Partial brake application

1	Brake and servo pump
2	Restriction
3	Piston
4	Unloading spool
5	Duct
6	Non-return valve
7	Duct
9	Non-return valve
10	Non-return valve
11	Accumulator, rear circuit
12	Accumulator, front circuit
13	Spool, rear circuit
14	Spool, front circuit
15	Piston
16	Spring
17	Checking point
18	Pressure sensor, low system pressure
19	Return spring, rear circuit
20	Return spring, front circuit
21	Pressure duct, rear circuit
22	Pressure duct, front circuit
23	Spring
24	Checking point
25	Pressure sensor, transmission disengagement
26	Pressure sensor, stop lights
27	Stroke limiter

Orange	= Servo pressure
Pink	= Partial pressure
Red	= System pressure
Green	= Return pressure



Document Title: Hydraulic diagram	· '	Information Type: Service Information	Date: 25.04.2013
Profile:			

Hydraulic diagram

L90C

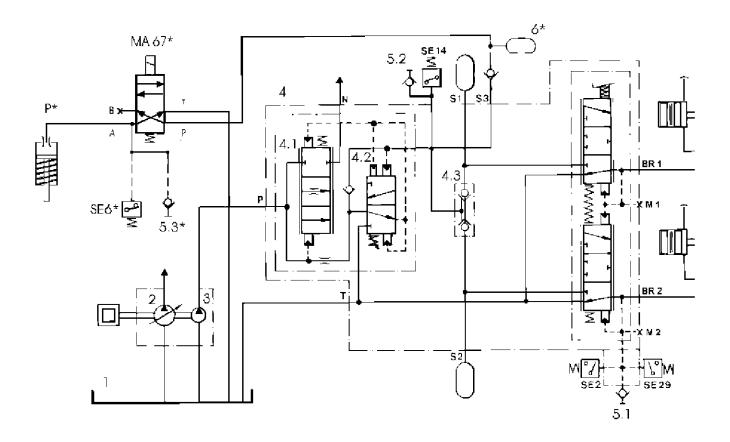


Figure 1 Hydraulic diagram, brake system L90C

MA67 (Optional equipment)	Solenoid valve, parking brake
S1	Accumulator, rear circuit (1.0 dm³ = 61 in3)
S2	Accumulator, front circuit (1.0 dm³ = 61 in3)
SE2	Pressure sensor, transmission disengagement
SE6 (Optional equipment)	Pressure sensor, control lamp parking brake
SE14	Pressure sensor, control lamp low brake pressure, 7.2–8.8 MPa (1044–1276 psi)
SE29	Pressure sensor, stop lights
F	Front axle

В	Rear axle
N	To the servo system
P (Optional equipment)	Hydraulically operated parking brake
1	Hydraulic oil tank
2	Hydraulic pump, steering
3	Hydraulic pump, brake and servo system
4	Brake valve
4.1	Control valve, brake and servo systems
4.2	Unloading valve for brake pressure, 15–15.5 MPa (2176–2248 psi)
4.3	Non-return valves
5.1	Pressure outlet, circuit pressure
5.2	Pressure outlet, unloading pressure
5.3 (Optional	Pressure outlet, parking brake
equipment)	
6 (Optional	Accumulator, hydraulic parking brake (0.5 dm³ = 30 in3)
equipment)	Serial No. –15289 (EU), –62960 (US), –70176 (Brazil)

L120C

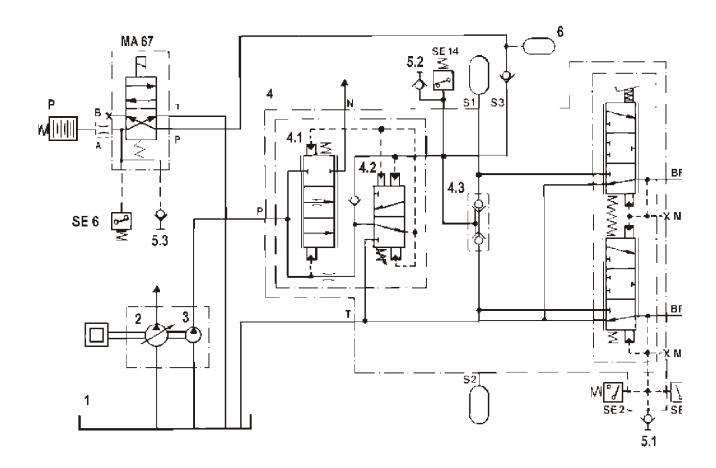
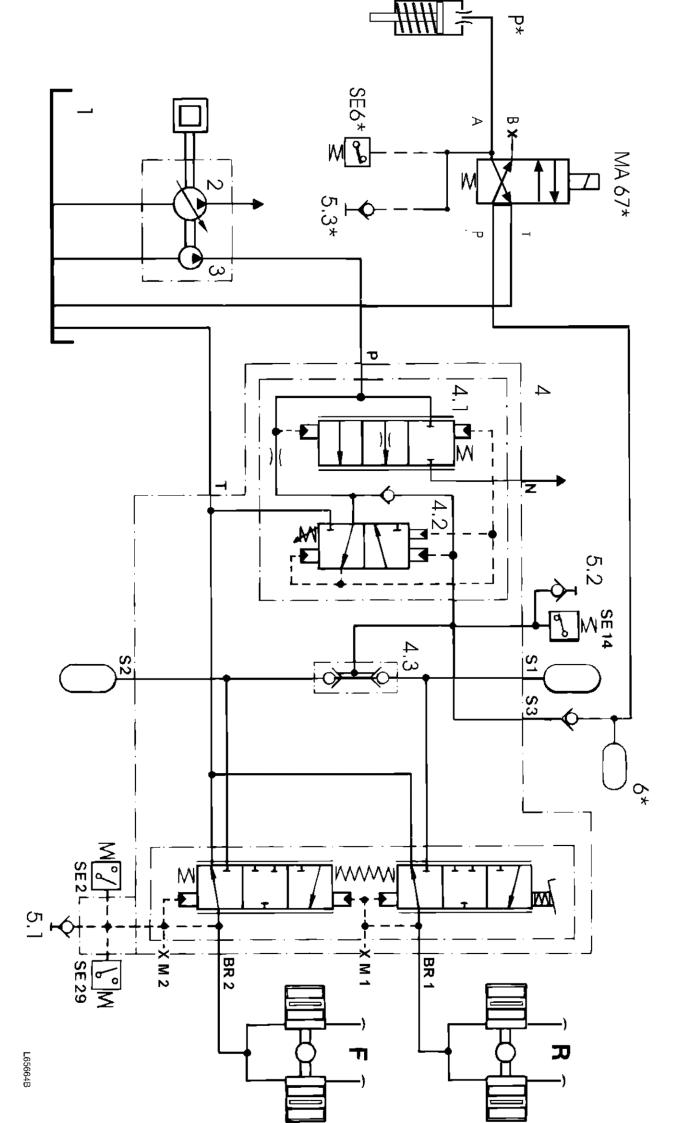
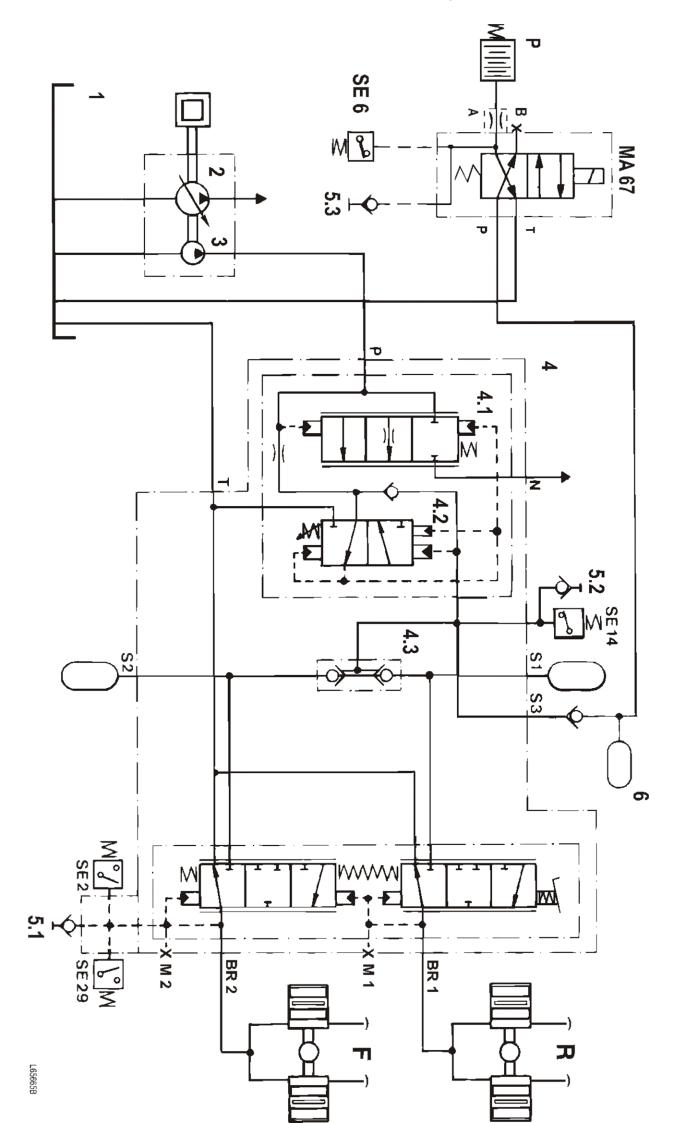


Figure 2 Hydraulic diagram, brake system L120C

MA67	Solenoid valve, parking brake
------	-------------------------------

S1	Accumulator, rear circuit (1.0 dm³= 61 in3)
S2	Accumulator, front circuit (1.0 dm³= 61 in3)
SE2	Pressure sensor, transmission disengagement
SE6	Pressure sensor, control lamp parking brake
SE14	Pressure sensor, control lamp low brake pressure, 7.2–8.8 MPa (1044–1276 psi)
SE29	Pressure sensor, stop lights
F	Front axle
В	Rear axle
N	To the servo system
Р	Hydraulically operated parking brake
1	Hydraulic oil tank
2	Hydraulic pump, steering
3	Hydraulic pump, brake and servo system
4	Brake valve
4.1	Control valve, brake and servo systems
4.2	Unloading valve for brake pressure, 15–15.5 MPa (2176–2248 psi)
4.3	Non-return valves
5.1	Pressure outlet, circuit pressure
5.2	Pressure outlet, unloading pressure
5.3	Pressure outlet, parking brake
6	Accumulator, hydraulic parking brake (0.5 dm³= 30 in3) Serial No. –12376 (EU), –62083 (US), –70172 (Brazil)







Document Title: Brake	·	Information Type: Service Information	Date: 25.04.2013
discs, checking wear (with built-in wear indicator)			
Profile:			

Brake discs, checking wear (with built-in wear indicator)

Op nbr 5160151701

999 3831 Support

The following applies when checking:

Brakes: Applied



Exercise cleanliness when working with the brakes.

1. Start the engine and charge the accumulators. Raise the lifting arms. Secure the lifting arms with support 999 3831, see Figure [?]

Stop the engine and apply the brake.

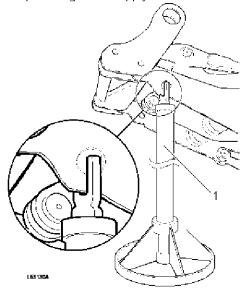


Figure 1

1. 999 3831 Support



The brake must be applied during the entire wear check.

2. Remove the plug from the wear indicator, see $\underline{\mbox{Figure}}$?] .

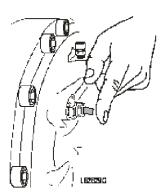


Figure 2

- 1. Plug
- 3. Press in the wear indicator pin against stop, see Figure [?] .

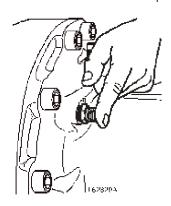


Figure 3 Pressing in wear indicator pin

4. The brake disc wear is indicated by the position of the flat surface of indicator pin B relative to the flat surface A on the nipple, see Figure [?]

The position of the flat surface of the pin varies depending on how much the brake disc is worn. With a new brake disc and the indicator pin pressed right in, there is still a distance of 2.3 mm (0.09 in) between the flat surface of the pin and the flat surface of the nipple.

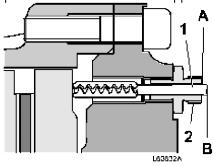


Figure 4 Checking brake disc wear

- A. Flat surface on nipple.
- B. Flat surface on indicator pin
- 1. Wear indicator pin
- 2. Nipple
- 5. The brake disc is worn out and must be replaced, when the flat surface B on the indicator pin is flush with the flat surface A on the nipple, see see Figure [?].

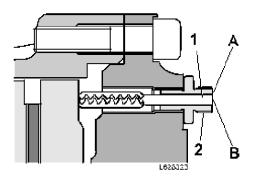


Figure 5 Brake disc worn out

- A. Flat surface on nipple.
- B. Flat surface on indicator pin
- 1. Wear indicator pin
- 2. Nipple
- 6. Install the plug on the wear indicator. Let up the brake pedal.
- 7. Check the other brake discs in the same way.
- 8. Remove any supports and lower the lifting frame.



Document Title: Brake discs, checking wear (without built-in wear indicator)	510	Information Type: Service Information	Date: 25.04.2013
Profile:			

Brake discs, checking wear (without built-in wear indicator)

Op nbr 5160151701

999 3790 Gauge or 999 3789 Depth gauge 999 3831 Support

The following applies when checking:

Brakes: Applied

It should be possible to insert the gauge 999 3790 down between brake piston and thrust plate. At one end the gauge 999 3790 is marked "CHANGE" at the other end it is marked "STOP".

CHANGE: Means that the brake disc needs to be replaced. The thickness of the gauge is 8.3 mm (0.327 in). STOP: Means to the brake disc must be replaced, before the machine may be operated. The thickness of the gauge is 8.0 mm (0.315 in).

NOTICE

Exercise cleanliness when working with the brakes.

1. Start the engine and charge the accumulators. Raise the lifting arms. Secure the lifting arms with support 999 3831, see Figure [?] Stop the engine and apply the brake.

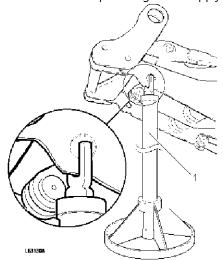


Figure 1

1. 999 3831 Support



The brake must be applied during the entire wear check.

Earlier type

2. Remove the plug from the hub retainer.

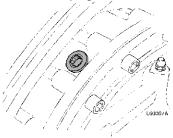


Figure 2 Position of plug

On the right side displaced forward, on the left side displaced rearward.

3. With the brake applied, check the distance between thrust plate and brake piston using gauge 999 3790, see Figure [?] and Figure [?].



The thickness of the gauge is 0.8 mm (0.031 in) greater than the distance between the friction surfaces on the thrust plate and the brake piston. This corresponds to the real thickness of the brake disc.

If the "CHANGE" end of the gauge is easy to insert, the brake disc is acceptable.

If the "CHANGE" end of the gauge is hard to insert or does not go down, the brake disc must be replaced.

If the "STOP" end of the gauge cannot be inserted, the brake disc must be replaced immediately before the machine may be operated.

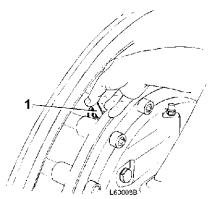


Figure 3 Checking brake disc wear

1. 999 3790

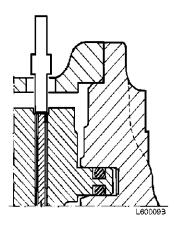


Figure 4 Checking brake disc wear

Later type

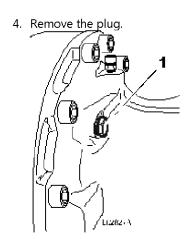


Figure 5

- 1. Plug
- 5. Install 999 3789 and check the brake disc wear by determining how much pin (1) protrudes outside plate (2). The plate is marked "CHANGE" and "STOP". If the end of the pin is level with either of the surfaces marked "CHANGE" or "STOP" on the plate, the brake disc must be replaced. If level with "CHANGE" the brake disc must be replaced soonest.

If level with "STOP" the brake disc must be replaced immediately.

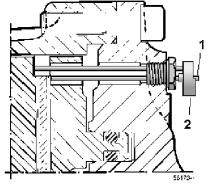


Figure 6

- 1. Pin
- 2. Plate

Checking wear continued

- 6. Install the plug.
- 7. Check the other brake discs in the same way.
- 8. Remove any supports and lower the lifting frame.



Document Title: Brake discs, replacing (with built-in wear indicator)	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Brake discs, replacing (with built-in wear indicator)

Op nbr 51704

999 3802 Lifting yoke 999 3875 Setting tool

Removing

NOTICE

As spare part, the brake disc is supplied without an impeller. Therefore move the impeller over to the new disc and centre it. Use new bolts, lock nuts and spring pins which are supplied together with the new disc.

- 1. Raise the machine and position supports under the axle. Remove the wheels.
- 2. Drain the oil from hub reduction gears and the axle housing.

Oil capacity AWB30: approx. 41 litres (10.8 US gal)

Oil capacity AWB31: approx. 36 litres (9.5 US gal)

- 3. Release the pressure in the brake system by depressing the brake pedal 30-40 times.
- 4. Mark the position of the hub reduction gear relative to the axle housing and connect lifting yoke 999 3802 to the hub reduction gear. Remove the attaching bolts and the hub reduction gear. Hub reduction gear weight: **approx. 250 kg (551 lb)**

NOTICE

In some cases the half shaft and the brake disc may be left in the hub reduction gear.

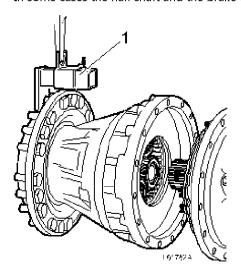


Figure 1
Removing hub reduction gear

1. 999 3802

Remove the brake disc.Remove the brake plate and the guide pins.

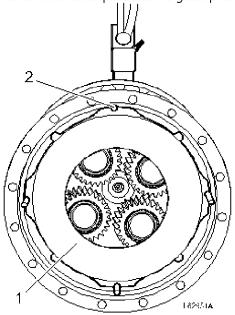


Figure 2 Brake plate and guide pins.

- 1. Brake plate
- 2. Guide pin
- 6. Slacken the lock nuts. Unscrew the adjusting screws for the brake piston approx. one turn, see Figure [?]. Clean and check the parts as regards wear and damage.

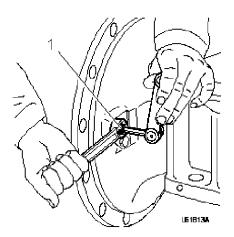


Figure 3

- 1. Adjusting screws with lock nuts
- 7. On certain axles, the wear indicator pin must be installed from the hub side. Check if this is the case.

 The brake piston must in these cases be removed and the seal rings be replaced, see ---- not implemented:

 INTXREF ----:

Centring impeller on brake disc

- 8. Remove the impeller from the old brake disc.
- 9. Centre the impeller on the new brake disc as follows:

- O Position the new disc on a level surface with an impeller half on either side. Centre the impeller halves on the disc by tapping in two spring pins 6.35 x 24 mm in two opposing bolt holes.
- O Install the bolts in the remaining two holes.
 - Tightening torque:12 N m (8.9 lbf ft)
- O Tap out the spring pins and install bolts. Tightening torque: **12 N m (8.9 lbf ft)**

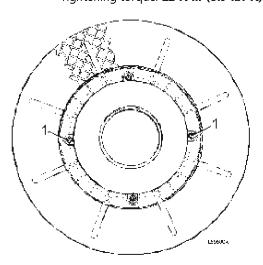


Figure 4 Centring pump impeller halves on brake disc

1. Spring pins for centring pump impeller halves.



Applies only to axles which are not provided with wear indicators during production and certain axles, where the wear indicators must be installed from the hub side. Otherwise continue under the heading ---- not implemented: INTXREF ----:

Brake piston, removing and installing

10. Depress the brake pedal fully and block it with a suitable spacer. With the brake pedal fully depressed the oil in the hydraulic tank is prevented from running out to the respective brake pistons.

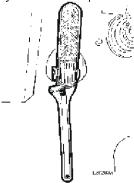


Figure 5 Blocked brake pedal

NOTICE

The brake pedal has to remain blocked until the front axle is back in position again.

11. Slacken the bleeder screw.

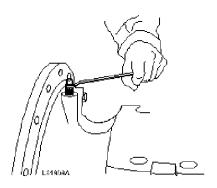


Figure 6 Slackening bleeder screw

12. Remove the brake piston, see Figure [?].

Brake piston weight: **approx. 17 kg (37 lb)**Clean and check the parts as regards wear and damage.

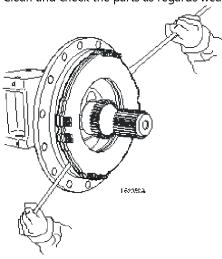


Figure 7 Removing brake piston

13. Apply grease to the O-rings and the brake piston. Install the O-rings on the brake piston.

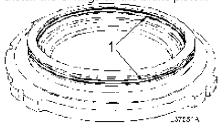


Figure 8

1. O-rings

14. In cases where the wear indicator pin cannot be installed after that the brake piston has been installed; Adjust the length of the wear indicator pin to 89 mm (3.50 in) (basic setting).

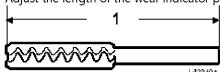


Figure 9
Basic setting of wear indicator

- 1. 89 mm (3.50 in)
- 15. Install the wear indicator pin.

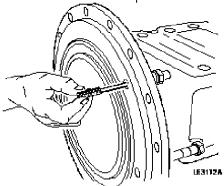


Figure 10 Installing wear indicator pin

16. Install the brake piston, Figure [?].

Any extra recesses in the brake piston must not coincide with the hole for the wear indicator. Install the bleeder screw.

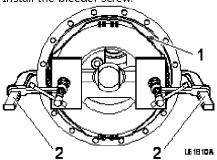


Figure 11 Installing brake piston

- 1. Hole for wear indicator
- 2. C-clamps

Installing

17. Install the O-ring on the axle housing. Install the brake disc.

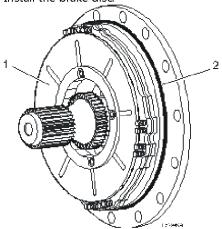


Figure 12 Installing brake disc (principle diagram)

1. Brake disc

2. O-ring

18. Install the brake plate and the four guide pins.

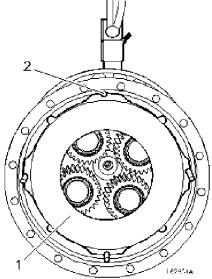


Figure 13

- 1. Brake plate
- 2. Guide pins
- Connect lifting yoke 999 3802 to the hub reduction gear.
 Hub reduction gear weight: approx. 250 kg (551 lb)
 Install the hub reduction gear.

NOTICE

Check that the guide pins in the hub reduction gear engages the recess in the brake piston.

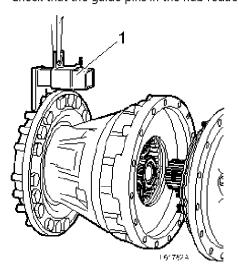


Figure 14 Installing hub reduction gear

- 1. 999 3802
- 20. Bolt on the hub reduction gear.Tightening torque: 310 N m (229 lbf ft)



Brake piston, adjusting stroke

- 21. Start the engine and charge the brake system. Stop the engine and apply the foot brake.
- 22. Screw in the adjusting screws against the brake piston which has been applied. Then unscrew them 1/2 a turn. Lock the adjusting screws with the lock nuts.

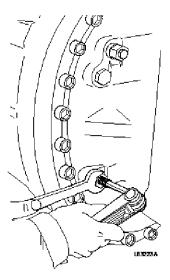


Figure 15

23. Bleed the brake circuit, see ---- not implemented: INTXREF ----: .



This work only needs to be carried out if a new brake disc has been installed.

Setting of wear indicator

24. When applicable, remove the wear indicator.

NOTICE

The brake must remain applied until the wear indicator has been adjusted and setting tool 999 3875 has been removed.

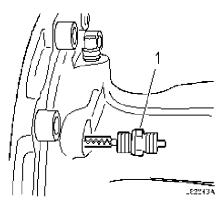


Figure 16 Removing wear indicator

- 1. Wear indicator
- 25. Adjust the length of the wear indicator pin to 89 mm (3.50 in) (basic setting).

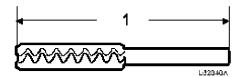


Figure 17 Basic setting of wear indicator

1. 89 mm (3.50 in)

26. Install the wear indicator.

Install setting tool 999 3875 for the wear indicator and tighten until it bottoms.

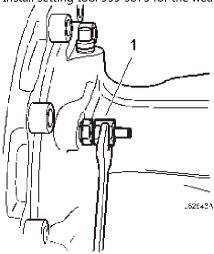


Figure 18 Setting of wear indicator

1. 999 3785

- 27. Remove the setting tool, while the brakes are still applied. Install and tighten down the plug on the wear indicator.
- 28. Release the brake.
- 29. Fill the axle with oil.

Oil capacity AWB30: approx. 41 litres (10.8 US gal) Oil capacity AWB31: approx. 36 litres (9.5 US gal)

- 30. Fit the wheels and remove the supports from under the axle.
- 31. Test the function.



Document Title: Brake discs, replacing (without built-in wear indicator)	510	Information Type: Service Information	Date: 25.04.2013
Profile:			

Brake discs, replacing (without built-in wear indicator)

Op nbr 5170451604

999 3802 Lifting yoke

Hexagon socket 14 mm

Removing



As spare part, the brake disc is supplied without an impeller. Therefore move the impeller over to the new disc and centre it. Use new bolts, lock nuts and spring pins which are supplied together with the new disc.

- 1. Raise the machine and position supports under the axle. Remove the wheels.
- 2. Drain the oil from hub reduction gears and the axle housing.

Oil capacity AWB30: approx. 41 litres (10.8 US gal)

Oil capacity AWB31: approx. 36 litres (9.5 US gal)

- 3. Release the pressure in the brake system by depressing the brake pedal several times (30–40 times), so that the hissing sound stops and no counter pressure can be felt in the pedal.
- 4. Remove the guard plates for the brake pipes from the axle housing. Loosen the lock nuts and unscrew the brake piston adjusting screws approx. one turn.

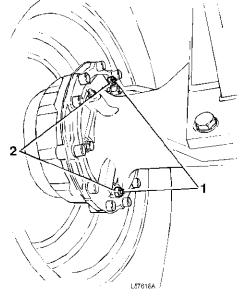


Figure 1

1. Adjusting screws

- 2. Lock nuts
- 5. Mark the position of the hub reduction gear relative to the axle housing. Connect lifting yoke 999 3802 to the hub reduction gear. Remove the bolts and lift away the hub reduction gear without pulling out the half shaft.

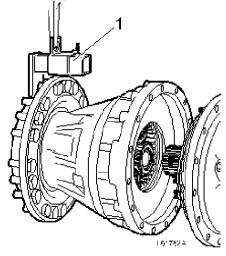


Figure 2 Removing hub reduction gear

- 1. 999 3802
- 6. Remove the brake disc.
- 7. Clean and check the parts as regards wear.

Centring impeller on brake disc

8. Position the new disc on a level surface with an impeller half on either side. Centre the pump impeller halves on the disc by knocking in two 6.35 x 24 mm spring pins in two opposing bolt holes.

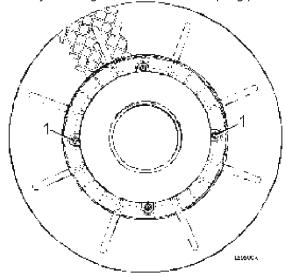


Figure 3 Centring pump impeller halves on brake disc

- 1. Spring pins
- 9. Install the bolts in the empty holes and tighten the lock nuts. Tightening torque: 12 N m (8.9 lbf ft)
- 10. Knock out the spring pins and install the bolts and tighten the lock nuts. Tightening torque: 12 N m (8.9 lbf ft)

Installing

11. Install the brake disc together with the impeller and a new O-ring. Check that the brake piston return springs (16 pcs) are undamaged and that they are correctly positioned in the brake piston.

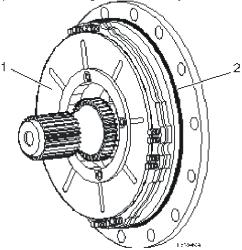


Figure 4
Installing brake disc (principle diagram)

- 1. O-ring
- 2. Brake disc together with pump rotor
- 12. Install the hub reduction gear, according to the markings on gear and the axle housing.

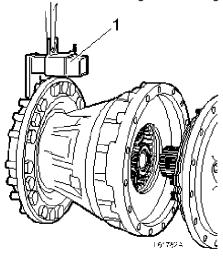


Figure 5 Installing hub reduction gear

- 1. 999 3802
- 13. Bolt on the hub reduction gear.

Tightening torque: 290 ±20 N m (214 ±15 lbf ft)

14. Fill the axle with oil.

Oil capacity AWB30: approx. 41 litres (10.8 US gal)
Oil capacity AWB31: approx. 36 litres (9.5 US gal)

15. Start the engine and run it until full brake pressure has been reached. Apply the service brakes and screw in the adjusting screws right in against stop while the service brakes are applied. Then unscrew the bolts 1/2 a turn and lock with the lock nuts. Stop the engine, re-install the brake pipe guard plates.

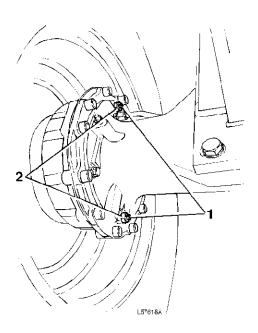


Figure 6

- Adjusting screws Lock nuts 1.
- 2.
- 16. Fit the wheels and remove the supports from under the axle.
- 17. Test the function.



Service Information

Construction Equipment

Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Wheel brake		
Туре	Dual circuit all-hydraulic wet disc brakes	
Brake lining area per wheel	1290 cm ^{2 (200 in2)}	
Brake disc, minimum thickness	7.2 mm (0.283 in)	
Brake disc, thickness, new disc	8.5 mm (0.335 in)	
Accumulator capacity, number of	1.0 dm³ (litre) (61 in3), 2 pcs	
Precharging pressure, new accumulator	5 MPa (50 bar) (725 psi)	
Minimum permissible precharging pressure	3.5 MPa (35 bar) (508 psi)	



Service Information

Construction Equipment

Document Title: Wear indicator, description	<u>'</u>		Date: 25.04.2013
Profile:			

Wear indicator, description

In connection with the introduction of a paper/sinter type brake disc a built-in mechanical wear indicator in the axle housing was introduced.

The wear indicator consists of a pin which has been pressed into a spring pin, to a depth adapted to the respective hub reduction gears.

The wear indicator is installed firmly fixed in the axle housing and is to be used for checking the wear of the individual brake discs.



Document Title: Brake system, air bleeding	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Brake system, air bleeding

Op nbr 52037

Plastic hose, inside diameter approx. 6 mm (0.24 in), length approx. 1 m (39.4 in)

The brake system is divided into two separate circuits. This means that if work has been carried out on one circuit only (a line has been disconnected etc.) only this circuit needs to be bled for air.



Oil under high pressure!

Check the oil level in the hydraulic oil tank.
 Oil capacity L90C: 95 litres (25.1 US gal)

Oil capacity L120C: 145 litres (38.3 US gal)

2. Depress the brake pedal fully and block it in that position with a suitable spacer.

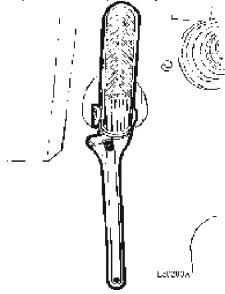


Figure 1
Brake pedal blocked (principle diagram)

- 3. Start the engine and run it at low idling speed.
- 4. Install the plastic hose and carefully slacken the bleeder screw. Tighten the bleeder screw when oil free of air flows out.

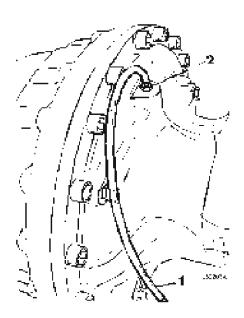


Figure 2 Air bleeding brakes

- 1. Plastic hose
- 2. Bleeder screw
- Stop the engine. Adjust the oil level in the hydraulic oil tank.
 Oil capacity L90C: 95 litres (25.1 US gal)
 Oil capacity L120C: 145 litres (38.3 US gal)
- 6. Test the function.



Document Title: Brake system, retardation, checking function	Information Type: Service Information	Date: 25.04.2013
Profile:		

Brake system, retardation, checking function

Op nbr 52002

999 3721 Service display unit

The following applies when checking:

- O The machine must be without load.
- O The travelling speed of the machine must exceed 20 km/h (12.4 mph).
- O The ground must be level and have good friction, dry asphalt, dry concrete or other equivalent surface.
- O The brake application must be carried out without the wheels locking.
- O During the brake application the pedal must not be "pumped" up and down or released.
- O Select together with the management a place where the bake test can be carried out without the risk of accidents, e.g. being run-into from behind.



Brake test must only be carried out in a place where there is no risk of accidents!

- 1. Connect the service display unit to the socket by the steering column bracket.
- 2. Start the engine and switch on the service display unit.
- 3. Select the function group "AXLES/BRAKES".

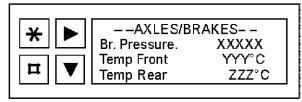


Figure 1

4. With the function key select the sub menu "BRAKE TEST"

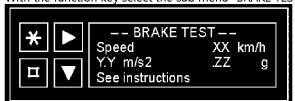


Figure 2

5. Turn the gear selector control to position A (Automatic).

- 6. If the menu for brake test has been selected, the buzzer will give off a short signal when the travelling speed of the machine exceeds 20 km/h (12.4 mph), the bake test can then be carried out.
- 7. Brake the machine as hard as possible without releasing the pedal.
- 8. Read off the value for the retardation.
- 9. With the function key select the sub menu "BRAKE TEST LOG". The display unit will show the four latest measured values with the latest value furthest to the left.

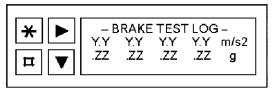


Figure 3

10. If the latest measured retardation is less than 4.75 m/s² (0.48 g), the test should carried out again.

Should this test too show up a value less than 4.75 m/², the brake system should be checked according to ---- not implemented: INTXREF ----: and ---- not implemented: INTXREF ----: .



Document Title: Checking function	Function Group: 520	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Checking function

Op nbr 52001

<u>11 666 020 Pressure gauge 0–25 MPa (0–3626 psi)</u> 11 666 037 Hose

The following applies when checking:

Temperature: Normal working temperature

Speed: Low idling speed

Unloading pressure (maximum pressure):15-15.5 MPa (2176-2248 psi)

Cut-in pressure: 12-13 MPa (1740-1885 psi)

Checking

1. Release the pressure in the brake system by depressing the brake pedal 30-40 times.

L90C Serial No. –15289 (EU), –62960 (US), –70176 (Brazil) L120C Serial No. –12376 (EU), –62083 (US), –70172 (Brazil)

Machine with hydraulic parking brake: turn the ignition key to position 1 and operate the parking brake several times.

2. Connect the pressure gauge to the pressure outlet on the brake valve.

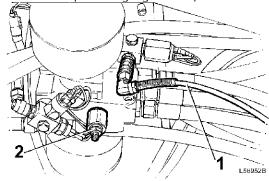


Figure 1 Connecting pressure gauge

- 1. Hose 11 666 037 with pressure gauge 11666 020
- 2. Adjusting screw, unloading pressure
- 3. Start the engine and run it at low idling. The pressure gauge will show a rapid rise in pressure up to the lowest pressure at which any of the accumulators are precharged. Thereafter the pressure rises slowly. Check that the warning lamp for low brake pressure is extinguished at approx. 9 MPa (1305 psi).

Precharging pressure: min. 3.5 MPa (508 psi)

Maximum pressure: 15.0-15.5 MPa (2176-2248 psi)



If one of the accumulators has lost its entire precharging pressure, this cannot be detected through this check.

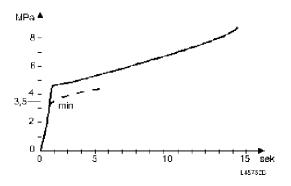


Figure 2 Diagram, brake pressure

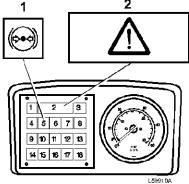


Figure 3 Instrument panel

- 1. Warning lamp, low brake pressure (LC6)
- 2. Central warning (LC9)
- 4. Any adjustment of the unloading pressure (maximum pressure) is done with the adjusting screw on the underside of the foot brake valve, item 2 Figure [?].
- 5. Brake a few times with the engine running at low idling. When the pressure has dropped to approx. 12 MPa (1740 psi), the brake pump should cut in so that the pressure again rises to max. value in the brake system.
- 6. Run the engine until max. pressure has been reached and then stop it. Maximum pressure: **15.0–15.5 MPa** (**2176–2248 psi**)
- 7. Stop the engine and brake carefully until the pressure has dropped to 13 MPa (1885 psi). Then check that there are at least four "full brake applications" (i.e. the pedal should be trodden right down and then slowly let up fully), before the pressure has dropped to 9 MPa (90 bar = 1305 psi) and the warning lamp for low brake pressure lights up.

If the pressure has dropped below 9.0 MPa (1305 psi) it is an indication of a fault in the brake system, which among other things may be caused by:

- O air in the brake lines, see also ---- not implemented: INTXREF ----: .
- O too low precharging pressure or no precharging pressure in one of the accumulators, caused for example by faulty diaphragm, see also Accumulator, checking.
- 8. Depress the brake pedal several times and check that the pressure stops temporarily at the lowest recorded accumulator pressure. Release the pressure in the brake system according to point 1.

 If the precharging pressure in any of the accumulators has dropped below 3.5 MPa (508 psi), it must be replaced.





Document Title: Foot brake pedal, adjusting angle and pedal free travel	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Foot brake pedal, adjusting angle and pedal free travel

Op nbr

- 1. Remove the foot brake pedal in order to adjust the pedal angle.
- 2. Move the bolt under the pedal to adjust the pedal to angles of 35°, 40°, 45° or 50°. Item A in Figure [?] corresponds to a pedal angle of 45°.

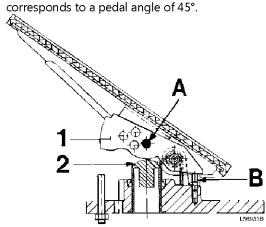


Figure 1 Adjusting foot brake pedal angle

3. Adjust "the pedal free travel" by screwing on adjusting screw (B) until the clearance between brake pedal (1) and piston (2) is 0.4 ± 0.2 mm (0.016 ± 0.008 in).



Document Title: Pressure in circuit, checking and adjusting	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Pressure in circuit, checking and adjusting

Op nbr 52005

<u>11 666 020 Pressure gauge 0–25 MPa (0–3626 psi)</u> <u>11 666 037 Hose</u>

The following applies when checking:

Temperature: Normal working temperature

Pressure in brake circuits: 8 ± 0.5 MPa (1160±73 psi)



Before the check is carried out, the system must be free from air, see ---- not implemented: INTXREF ----: .



Oil under high pressure!

1. Release the pressure in the brake system by depressing the brake pedal 30-40 times.

L90C Serial No. –15289 (EU), –62960 (US), –70176 (Brazil) L120C Serial No. –12376 (EU), –62083 (US), –70172 (Brazil)

Machine with hydraulic parking brake: turn the ignition key to position 1 and operate the parking brake several times.

2. Connect a pressure gauge to the pressure outlet for the rear brake circuit on the brake valve.

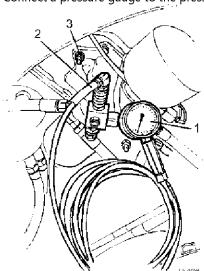


Figure 1 Measuring pressure in brake circuit

- 1. 11 666 020
- 2. 11 666 037

- 3. Adjusting screw
- 3. Start the engine, charge the brake system accumulators and then stop the engine.
- 4. Depress the brake pedal so that it stops against the adjusting screw, see Figure [?]. At the same time check that the pressure does not exceed 8.5 MPa (1233 psi).
- 5. Adjust the pressure in the circuit as follows: Depress the brake pedal fully so that it stops against the adjusting screw. Break the security seal on the adjusting screw, see Figure [?], and adjust the pressure in the brake circuit. Release the brake pedal and fit a new security seal to the adjusting screw.

NOTICE

The adjustment should preferably be carried out by two persons.

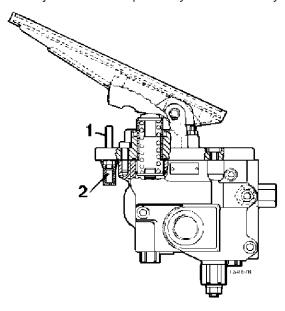


Figure 2

- 1. Adjusting screw for output brake pressure
- 2. Security seal



Service Information Construction Equipment

Document Title: Specifications, general	· •	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Foot brake valve / unloading valve			
Designation	LT 17 MFA - 3X / 080 / 02 MSO 11		
System pressure, unloading pressure	15.0–15.5 MPa (150–155 bar) (2176–2248 psi)		
System pressure, cut-in pressure	12.0-13.0 MPa (120-130 bar) (1740-1885 psi)		
Max. output brake pressure	7.4–8.6 MPa (74–86 bar) (1073–1247 psi)		
Low-pressure indication	8.1–9.9 MPa (81–99 bar) (1175–1436 psi)		





Document Title: Accumulator, checking (removed)	Function Group: 527	Information Type: Service Information	Date: 25.04.2013
Profile:			

Accumulator, checking (removed)

Op nbr 52701

11 666 020 Pressure gauge 0–25 MPa (0–3626 psi) 11 666 037 Hose 999 3070B Hydraulic jack (only the pump) 999 3335 Hose 999 3522 Quick-action coupling E 1234 Nipple E 1281 Nipple

NOTICE

In all work on these systems the greatest cleanliness must be exercised. Wipe off all pipe and hose connections before disconnecting them. Plug all pipes, hoses etc. immediately after they have been disconnected.

If the functional check of the brake system shows that one or more of the accumulators have a too low or no precharging pressure at all, it is possible to check them separately as follows:

Removing



Even if the engine is stopped there is a remaining accumulated pressure in the brake system of approx. 15 MPa (2176 psi). If the system is opened without having first released the pressure, oil under high pressure will jet out.

Release the pressure in the brake system by depressing the brake pedal 30-40 times.

2. Carefully disconnect the accumulator connecting pipes and plug the connections.



There may be a remaining pressure in the brake system.

3. Remove the accumulators.

Pressure testing

4. Test the accumulators one at a time.

Connect the testing equipment according to Figure [?].

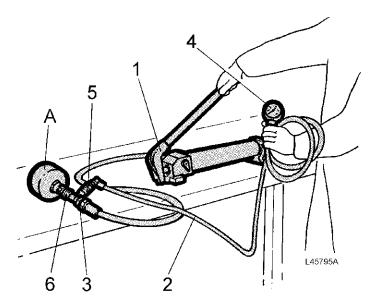


Figure 1 Checking removed accumulator

- A. Accumulator
- 1. 999 3070B
- 2. 11 666 035
- 3. E 1234
- 4. 11 666 019
- 5. 999 3522
- 6. E 1281
- 5. Pump oil into the accumulator.

The pressure will, after a few pump stokes, rise quickly up to the precharging pressure and then rise slowly. Precharging pressure: **min. 3.5 MPa (508 psi)**

If the precharging pressure is less than 3.5 MPa (508 psi), the accumulator must be discarded, see ---- not implemented: INTXREF ----: .

Installing

- 6. Install the accumulators.
- 7. Start the engine and leave it running at a raised speed until the unloading pressure is 15–15.5 MPa (2176–2248 psi).
- 8. Make a functional check according to ---- not implemented: INTXREF ----: .



Document Title: Discarded accumulators	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Discarded accumulators

Op nbr



A discarded accumulator, which has not been punctured, may be highly pressurised and must always be handled carefully. If the accumulator is exposed to high temperatures, for example in a waste incineration plant, there is a risk of injuries.

1. An accumulator which is to be discarded, must be made harmless.

This is done by carefully puncturing the accumulator with a Ø 3 mm (1/8") drill bit, see Figure [?].

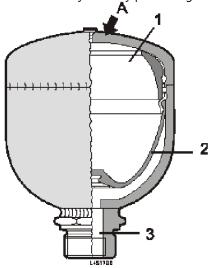


Figure 1 Accumulator

- A. Drill here, using a Ø 3 mm (1/8") drill bit
- 1. Space for nitrogen gas
- 2. Rubber diaphragm
- 3. Connection for oil



Service Information Construction Equipment

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Hydraulic oil pump (in common with servo system)			
Type Vane pump			
Designation	V10 - 1B5B - 41B - 20R - 090 / 02 - 318820 BR		

L120C

Hydraulic oil pump (in common with servo system)		
Type Vane pump		
Designation	V10 - 1B5B - 41B - 20L - 090 / 02 - 318820 BL	



Document Title: Description	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The parking brake on L90C is of the disc brake type and it is positioned externally on the transmission front output shaft.

Mechanically operated parking brake

The parking brake is operated mechanically. Application and release is via a brake stay which actuates the brake caliper.

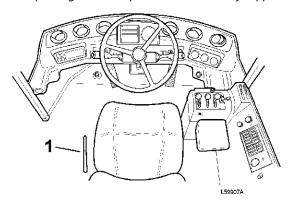


Figure 1
Mechanically operated parking brake

Standard equipment L90C

1. Parking brake control

Electrically operated parking brake, optional equipment

The parking brake is operated electrically with a switch on the instrument panel. The parking brake is applied through an hydraulically operated spring brake cylinder which actuates the brake caliper. The parking brake is released by hydraulic pressure.

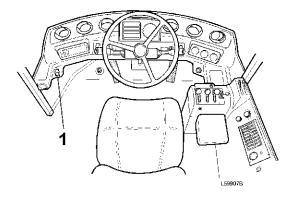


Figure 2
Electrically operated parking brake

Optional equipment L90C

1. Switch SW116



Applies to electrically operated parking brake. When stopping the engine (the ignition key is turned to position 0) the parking brake is automatically applied. When the engine is restarted, the parking brake must be released by first moving the switch SW116 to position 1 (applied parking brake) and then back to position 0 (released parking brake).



Service Information

Construction Equipment

Document Title: Description	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The parking brake on L120C is of the wet disc brake type and it is positioned inside the transmission on the output shaft. The parking brake is operated electrically with a switch on the instrument panel. The parking brake is applied through spring pressure against the disc brake thrust plate. The parking brake is released by hydraulic pressure.

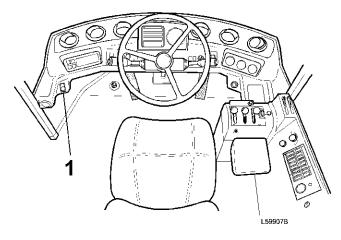


Figure 1
Electrically operated parking brake

1. Switch SW116

NOTICE

When stopping the engine (the ignition key is turned to position 0) the parking brake is automatically applied. When the engine is restarted, the parking brake must be released by first moving the switch SW116 to position 1 (applied parking brake) and then back to position 0 (released parking brake).



Document Title:	Function Group:	Information Type:	Date:
Parking brake	550	Service Information	25.04.2013
(mechanically operated), checking and adjusting			
Profile:			

Parking brake (mechanically operated), checking and adjusting

Op nbr 55002

Socket screwdriver bit



Place the machine on level ground and put blocks in front of and behind the wheels, to prevent the machine from rolling.

Checking the adjustment of the handle

- 1. Remove the plastic casing over the parking brake control.
- Remove the lock pin between the control cable and the handle and depress the handle fully.
 Check that the hole in the control cable and the hole in the handle coincide.
 Any adjustment should be done with the adjusting nut. Re-install the lock pin after the adjustment has been carried out.

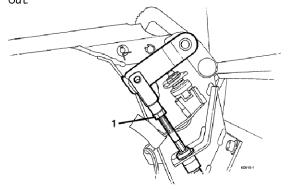


Figure 1
Checking the adjustment of the handle

- 1. Adjusting nut
- 3. Re-install the plastic casing over the parking brake control.

Checking and adjusting parking brake

- 4. Remove the blocks in front of the wheels. Start the engine and check that the parking brake can hold the machine stationary in 3rd gear with the engine at full throttle.
 - Any adjustment is done on the parking brake on the front output shaft of the transmission.
 - 1. Release the pull rod for the parking brake by removing the cotter pin and the link pin.
 - 2. Screw in the adjusting screw until both brake pads fit up against the brake disc.

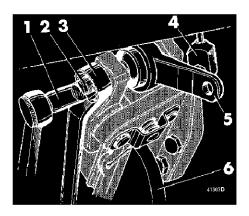


Figure 2 Adjusting parking brake

- 1. Socket screwdriver bit
- 2. Adjusting screw
- 3. Combination spanner
- 4. Pull rod
- 5. Lever
- 6. Brake disc
- 3. Slacken the adjusting screw until there is a clearance of 0.25 mm (0.010 in) on either side of the brake disc. This corresponds to a 1/5 of a turn on the adjusting screw.
- 4. Lock the adjusting screw and adjust the pull rod until the hole in the rod aligns with the hole in the lever.
- 5. Re-install the link pin and secure with a cotter pin.



Document Title: Parking brake, replacing discs	Function Group: 550	Information Type: Service Information	Date: 25.04.2013
Profile:			

Parking brake, replacing discs

Op nbr

999 3582 Spanner 999 3586 Tooth segment 999 3590 Gear 999 3742 Sleeve

Kukko 20 - 3 Puller

Kukko 3 - 200 Puller

Drain the oil from the transmission.
 Oil capacity: approx. 55 litres (14.5 US gal)



The pressure hose may contain pressurised oil.

Disconnect the parking brake pressure hose from the transmission housing. Plug the connections.

- Detach the propeller shaft from the transmission, using 999 3742.
 Propeller shaft weight: approx. 38 kg (84 lb)
 Suspend the propeller shaft to one side on the frame.
- 4. Remove the locking device and the nut. Remove the drive flange.

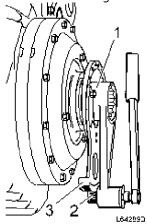


Figure 1

- 1. 999 3582
- 2. 999 3590
- 3. 999 3586

- 5. Block the wheels of the machine with blocks to prevent the machine from rolling.
- 6. Release the parking brake according to **Manual release of parking brake, Section 1**.

A CAUTION

If the wheels of the machine are not blocked, the machine may begin to roll.

7. Remove the attaching bolts for the brake housing.

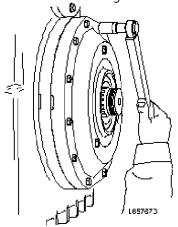


Figure 2

- 8. Lift out the brake housing together with cover. Weight: **approx. 30 kg (66 lb)**
- 9. Remove the O-ring from the brake housing.
- 10. Pull off the bearing.

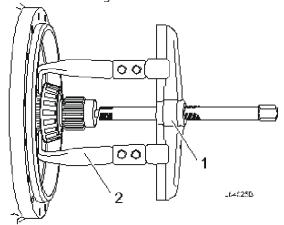


Figure 3

- 1. Kukko 20 3
- 2. Kukko 3 200
- 11. Replace all discs, seven friction discs and six steel discs.

 Position the discs with every second friction and every second steel disc beginning innermost with a friction disc.

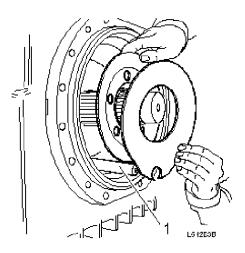


Figure 4 Installing discs

- 1. Guide pin
- 12. Heat the bearing in an oven to approx. 100 °C (212 °F) and re-install the heated bearing on the shaft. Make sure that the bearing fits up against the shoulder.

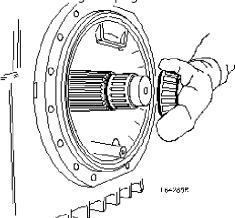


Figure 5 Installing bearings

13. Install the new O-ring on the brake housing and lubricate it with petroleum jelly.

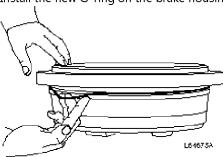


Figure 6

14. Lift the brake housing together with cover back into the transmission and tighten the bolts crosswise. Brake housing weight: approx. 30 kg (66 lb) Tightening torque: 45 N m (33 lbf ft)

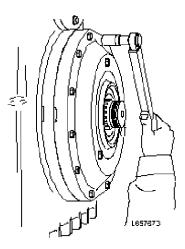


Figure 7

- 15. Reconnect the parking brake pressure hose.
- 16. Restore the parking brake, see Manual release of parking brake, Section 1.
- 17. Re-install the drive flange.

Tightening torque: 600 N m (443 lbf ft)



The tools raise the torque on the nut by 15 times.

Torque read off on the torque wrench: 40 N m (30 lbf ft)

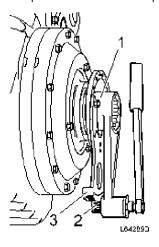


Figure 8

- 1. 999 3582
- 2. 999 3590
- 3. 999 3586
- 18. Re-install the propeller shaft on the transmission.
- Fill the transmission with oil.
 Oil capacity: approx. 55 litres (14.5 US gal)
- 20. Start the engine and check that there are no leaks. Check the oil level in the transmission.



Service Information

Document Title: Specifications, general	,	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Parking brake	
Туре	Mechanically or alternatively electrically operated disc brake, positioned externally on the transmission front output shaft.
Brake linings	
thickness	10 mm (0.40 in)
thickness, min.	2 mm (0.08 in)
Brake disc	
thickness	22 mm (0.87 in)
thickness, min.	18 mm (0.71 in)
max. permissible wear	4 mm (0.16 in)



Service Information

Construction Equipment

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Parking brake	
Туре	Electrically operated wet type disc brake, positioned inside the transmission on the output shaft.
Brake linings	
thickness, min.	4.5 mm (0.177 in)
Control pressure	12.0–15.5 MPa (120–155 bar) (1740–2248 psi)



Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

The loader is provided with hydrostatic articulated frame steering consisting of pump, steering valve (ORBITROL) and two cylinders. The L120C also has a shift valve for disconnecting the piston rod end of the cylinders, during lighter steering conditions.

The machine can be equipped with lever steering (CDC) and secondary steering.

The steering system hydraulic pump, which is driven via the right power take-off on the transmission, is a so called load-sensing axial piston pump. The pump for the brake and servo systems is mounted in tandem with the steering pump. The working hydraulics and the brake systems have the hydraulic oil tank in common.

The outlet ports on the steering valve are connected to the piston end of one of the steering cylinders and the piston rod end of the other steering cylinder.

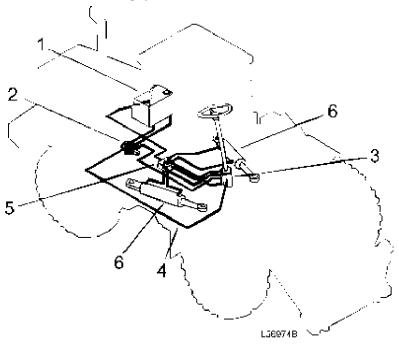


Figure 1 Load-sensing hydrostatic steering system L90C

- 1. Hydraulic tank
- 2. Steering pump
- 3. Steering valve
- 4. Load-sensing (LS) line
- 5. Valve block with anti-cavitation valves and back-up valve for return pressure
- 6. Steering cylinders



Document Title: Hydraulic diagram, basic machine	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Hydraulic diagram, basic machine

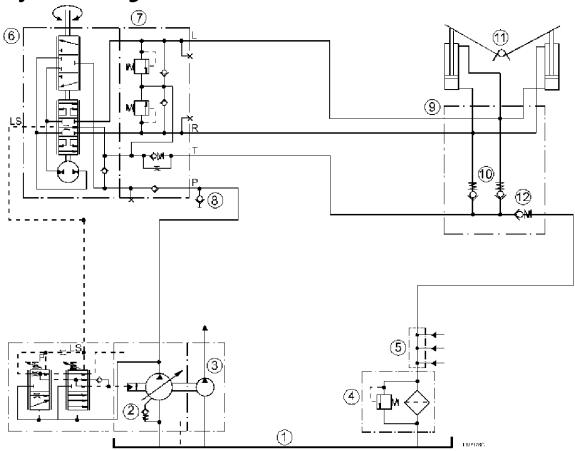
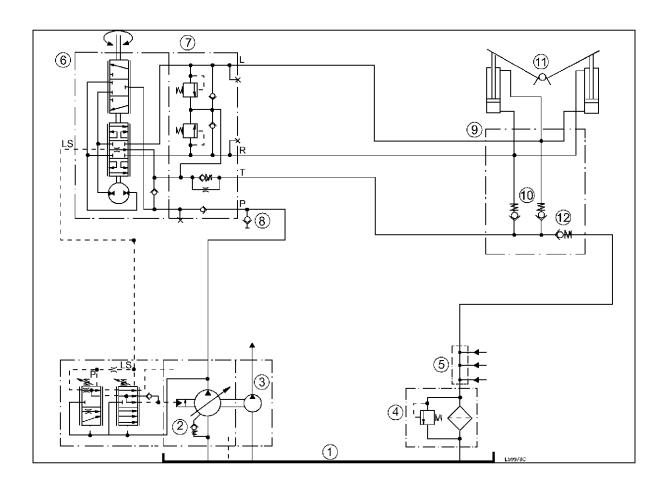


Figure 1

- 1. Hydraulic oil tank
- 2. Steering pump with pressure/flow compensator
- 3. Brake and servo pump
- 4. Return-oil filter
- 5. Return from brake and hydraulic systems
- 6. Steering valve
- 7. Valve block with shock and anti-cavitation valves, 24 MPa (240 bar) (3481 psi) opening pressure at 10 dm³ (litres) (2.6 US gal) per minute
- 8. Pressure outlet
- 9. Valve block
- 10. Anti-cavitation valves
- 11. Steering cylinders
- 12. Back-up valve for return pressure, 0.6 MPa (6 bar) (87 psi)





Document Title: Hydraulic diagram, lever steering (CDC)	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Hydraulic diagram, lever steering (CDC)□

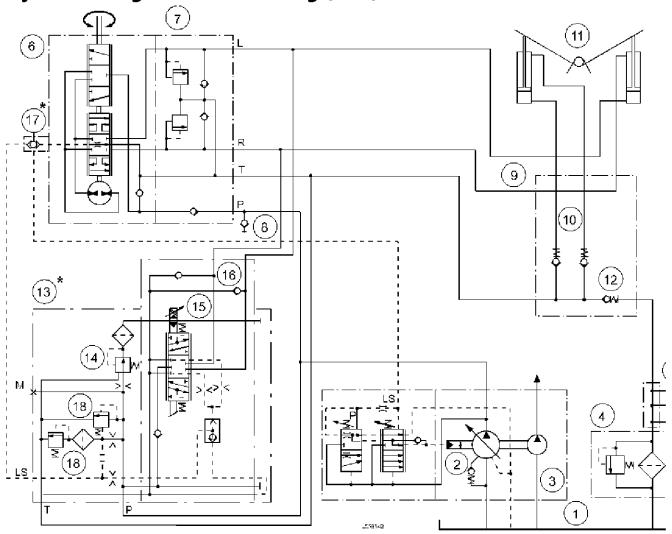
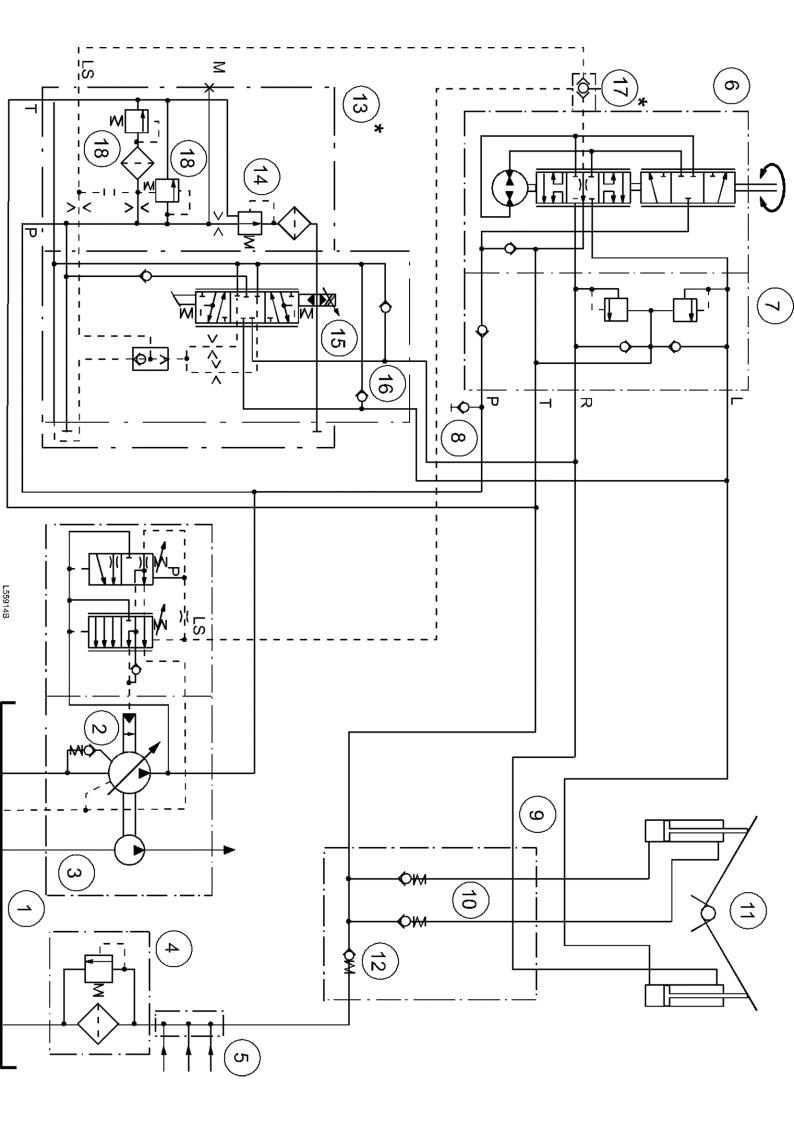


Figure 1 Lever steering

- 1. Hydraulic oil tank
- 2. Steering pump with pressure/flow compensator
- 3. Brake and servo pump
- 4. Return-oil filter
- 5. Return from brake and hydraulic systems
- 6. Steering valve
- 7. Valve block with shock and anti-cavitation valves, 24 MPa (240 bar) (3481 psi) opening pressure at 10 dm³(litres) (2.6 US gal) per minute
- 8. Pressure outlet
- 9. Valve block
- 10. Anti-cavitation valves

- 11. Steering cylinders
- 12. Back-up valve for return pressure, 0.6 MPa (6 bar) (87 psi)
- 13. Valve, lever steering□
- 14. Pressure-reducing valve, 2.0 MPa (20 bar) (290 psi)
- 15. Control spool for steering right left
- 16. Anti-cavitation valves
- 17. Shuttle valve for LS-pressure, lever steering alternatively steering wheel steering \(\Dag{\text{D}} \)
- 18. Pressure-limiting valves, blocked

 $\hfill\square$ Optional equipment





Document Title: Hydraulic diagram, lever steering (CDC) and secondary steering	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Hydraulic diagram, lever steering (CDC)□ and secondary steering□

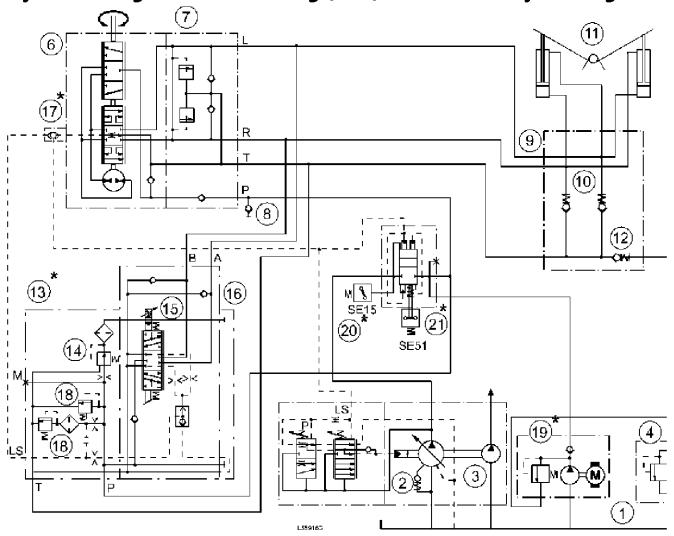
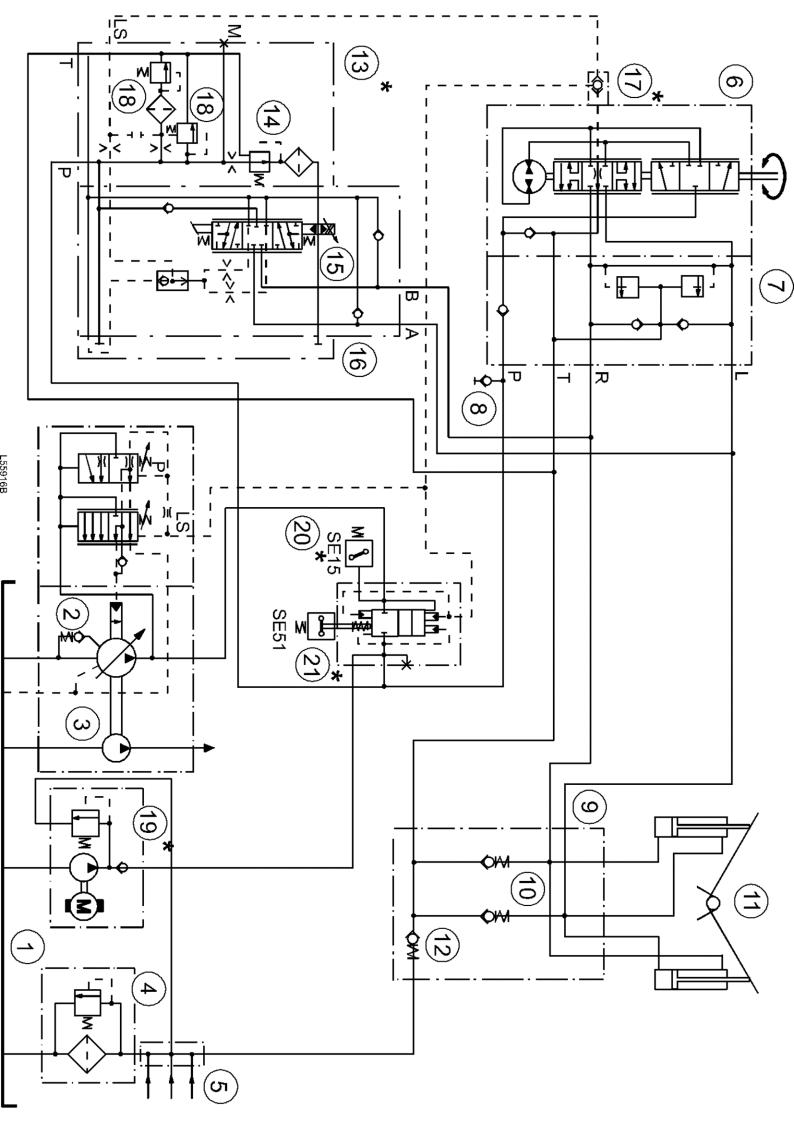


Figure 1 Lever steering and secondary steering

- 1. Hydraulic oil tank
- 2. Steering pump with pressure/flow compensator
- 3. Brake and servo pump
- 4. Return-oil filter
- 5. Return from brake and hydraulic systems
- 6. Steering valve
- 7. Valve block with shock and anti-cavitation valves, 24 MPa (240 bar) (3481 psi) opening pressure at 10 dm³(litres) (2.6 US gal) per minute
- 8. Pressure outlet

- 9. Valve block
- 10. Anti-cavitation valves
- 11. Steering cylinders
- 12. Back-up valve for return pressure, 0.6 MPa (6 bar) (87 psi)
- 13. Valve, lever steering□
- 14. Pressure-reducing valve, 2.0 MPa (20 bar) (290 psi)
- 15. Control spool for steering right left
- 16. Anti-cavitation valves
- 17. Shuttle valve for LS-pressure, lever steering alternatively steering wheel steering D
- 18. Pressure-limiting valves, blocked
- 19. Pump for secondary steering with built-in pressure-limiting valve, 5.5–6.0 MPa (55–60 bar) (798–870 psi) [1]
- 20. SE15, pressure sensor, primary steering system
- 21. SE51, flow and differential pressure sensor

☐ Optional equipment





Document Title: Hydraulic secondary steering	diagram, g□	·	Information Type: Service Information	Date: 25.04.2013
Profile:				

Hydraulic diagram, secondary steering□

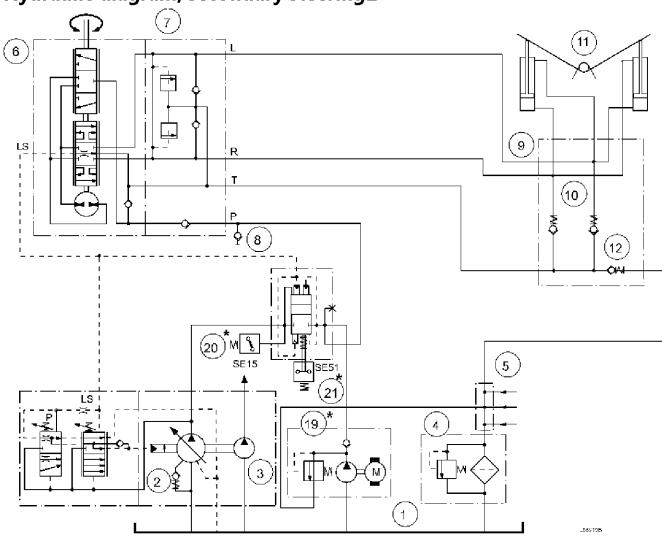
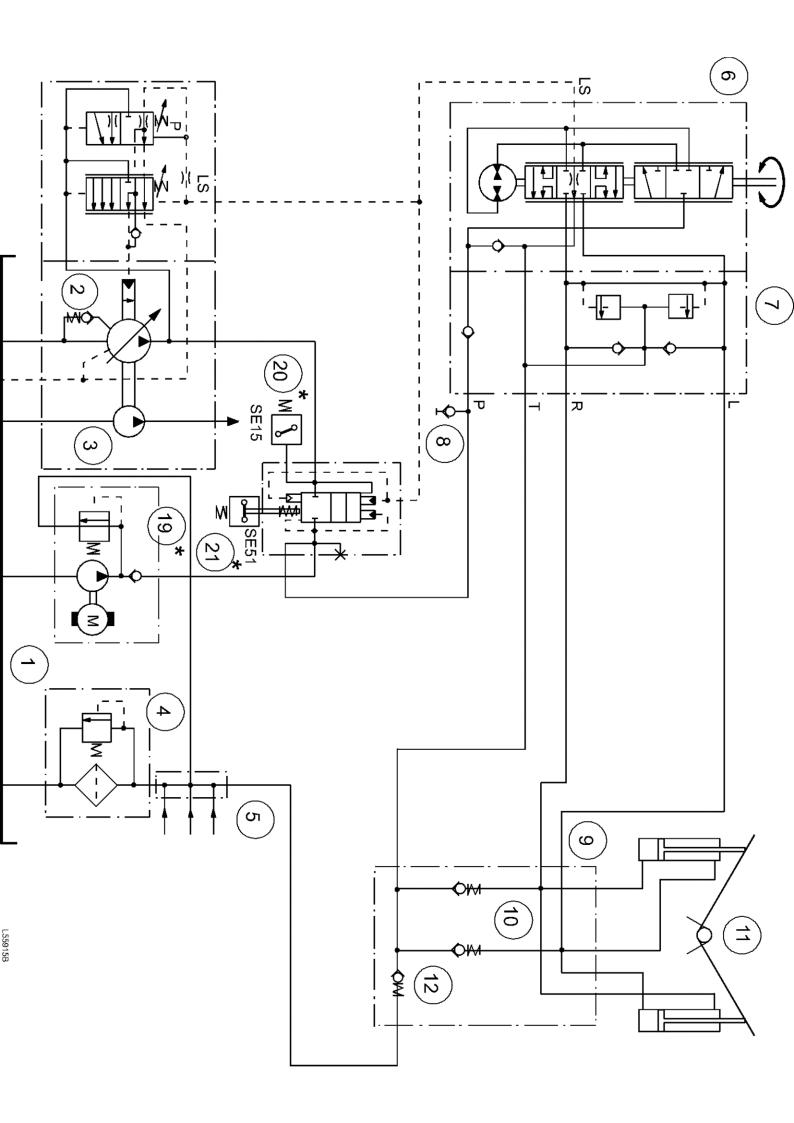


Figure 1
Secondary steering

1	Hydraulic oil tank
2	Steering pump with pressure/flow compensator
3	Brake and servo pump
4	Return oil filter
5	Return from brake and hydraulic systems
6	Steering valve (ORBITROL)
7	Valve block with shock and anti-cavitation valves, 24 MPa (240 bar) (3481 psi) opening pressure at 10 dm³ (litres) (2.6 US gal) per minute
8	Pressure outlet

9	Valve block
10	Anti-cavitation valves
11	Steering cylinders
12	Back-up valve for return pressure, 0.6 MPa (6 bar) (87 psi)
19	Pump for secondary steering with built-in pressure-limiting valve, 5.5–6.0 MPa (55–60 bar) (798–870 psi)
20	SE15, pressure sensor, primary steering system
21	SE51, flow and differential pressure sensor

☐ Optional equipment





Service Information

Construction Equipment

Document Title: Specifications, general	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Steering		
Туре	Load-sensing hydrostatic	
Steering arc	±40°	
Number of steering wheel revolutions, total	4.15 revolutions	
Time for steering, end position – end position, low idling speed	6.2 s (approx.)	
Time for steering, end position – end position, high idling speed	2.5 s (approx.)	



Service Information

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Oil pump		
Туре	Axial piston pump, variable displacement	
Designation	PVE21RTA9 - 2 - 30 - CVP - 12 - 311 - 02 - 305825	
Flow at 35.0 r/s, (2100 rpm) and 10 MPa (100 bar) (1450 psi) pressure	91 litres (24 US gal) per minute	
Working pressure, high idling speed	21 ±0.35 MPa (210 ±3.5 bar) (3046 ±51 psi)	
Stand-by pressure, low idling speed	3.0 ±0.3 MPa (30 ±3 bar) (435 ±44 psi)	

Steering valve		
Туре	Closed centre	
Designation	OSPL 630 LS	

Valve block	
Designation	OVPL 28

Shock valves	
Number of valves	Two
Opening pressure at 10 dm³(litres) (2.6 US gal) per minute	28 MPa (280 bar) (4061 psi)

Steering cylinder		
Туре	Double-acting	
Piston rod diameter	40 mm (1.57 in)	
Inside diameter / stroke	70/419 mm (2.76/16.50 in)	



Document Title: Stand-by pressure and working pressure, checking and adjusting	Function Group: 645	Information Type: Service Information	Date: 25.04.2013
Profile:			

Stand-by pressure and working pressure, checking and adjusting

Op nbr 6451564528

11 666 019 Pressure gauge 0–6 MPa (0–870 psi) 11 666 020 Pressure gauge 0–25 MPa (0–3626 psi) 11 666 035 Hose

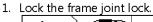
The following applies when checking:

Temperature: Normal operating temperature

Stand-by pressure (Op. No. 64515)



Under no circumstances must the steering wheel be touched while checking the stand-by pressure. The slightest deviation from neutral position will cause the pressure to rise and this may lead to damage to the pressure gauge.



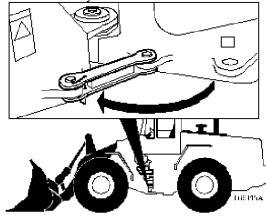


Figure 1

2. Connect pressure gauge 11 666 019 (0-6 MPa) (0-870 psi) to the pressure outlet on the steering valve.

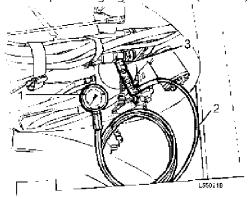


Figure 2 Checking stand-by pressure

- 1. 11 666 019 (0–6 MPa) (0–870 psi)
- 2. 11 666 035
- 3. Pressure outlet
- 3. Start the engine and run it at low idling.
- 4. Check the stand-by pressure with the steering in neutral position (steering not actuated). Stand-by pressure:3.0 \pm 0.3 MPa (435 \pm 44 psi)

Adjusting

5. Any adjustment is carried out through the right cover behind the cab on the steering pump flow compensator. Remove the plug (hex socket 3/16") over the adjusting screw and adjust the pressure (hex socket 1/4"). Lock the plug with paint after adjusting.

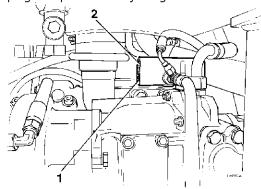


Figure 3 Adjusting stand-by pressure

1. Stand-by pressure (lower adjusting position)

Working pressure (Op. No. 64528)

6. Lock the frame joint lock.

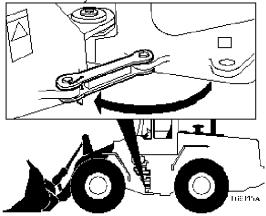


Figure 4

7. Connect pressure gauge 11 666 020 (0–25 MPa) (0–3626 psi) to the pressure outlet on the steering valve. Start the engine and run it at high idling.

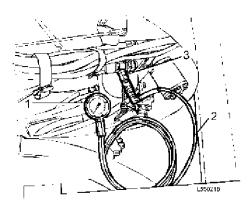


Figure 5 Checking working pressure

- 1. 11 666 020 (0–25 MPa) (0–3626 psi)
- 2. 11 666 035
- 3. Pressure outlet
- 8. Steer against full lock position and check the working pressure. Working pressure: 21 ± 0.35 MPa (3046 ± 51 psi)

Adjusting

9. Any adjustment is carried out with the screw on the steering pump pressure compensator. Lock the screw with paint after adjusting.

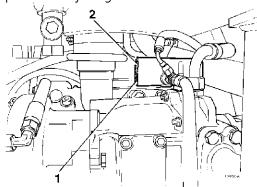


Figure 6
Adjusting working pressure

2 Working pressure (upper adjusting position)



Service Information

Document Title: Steering description	cylinder,	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:				

Steering cylinder, description

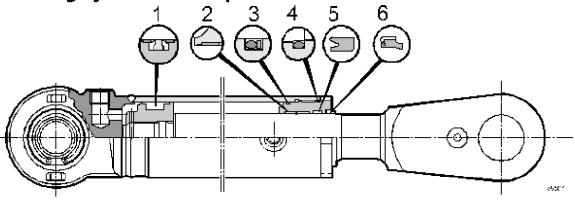


Figure 1 Steering cylinder, L90C/L120C

- 1. Piston seal
- 2. Bakelite bushings
- 3. O-ring with support ring
- 4. O-ring
- 5. Seal
- 6. Scraper seal



Document Title: Steering cylinder, replacing	Information Type: Service Information	Date: 25.04.2013
Profile:		

Steering cylinder, replacing

Op nbr 64554

999 3725 Draw bolt 999 3722 Support 999 3712 Socket 999 3714 Draw bolt 999 3717 Quick nut 999 3686 Plate 11 667 050 Drift plate

Removing

- 1. Steer the machine to full lock away from the side where the steering cylinder, which is to be removed, is installed. Remove the cover plate between the cab and the frame.
- 2. Remove the lubrication pipe and the nipple.

NOTICE

Use a long 12 mm socket with a max. outside diameter of 17 mm (0.67 in), for the rear steering cylinder pin.

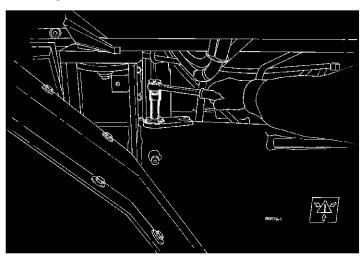


Figure 1 Removing grease nipple

3. Remove the lock ring for the steering cylinder front pin.
Carefully clean the part of the pin that protrudes from the piston rod clevis.
Remove the pin, using 999 3725 and 999 3722.

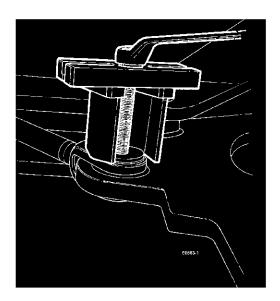


Figure 2 Removing front pin

- 4. Disconnect the hydraulic hoses from the steering cylinder.

 Push the piston rod into the steering cylinder. Drain the oil into a suitable vessel.

 Plug all connections.
- 5. Remove the locking device for the steering cylinder rear pin. Pull out the pin, using 999 3725 and 999 3722.

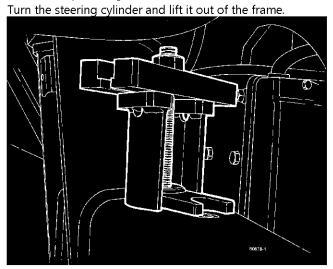


Figure 3 Removing rear pin

Replacing link bearing for steering cylinder piston rod in front frame

6. Pull out the link bearing, using 999 3714, 999 3712, 11 667 050 and 999 3717.

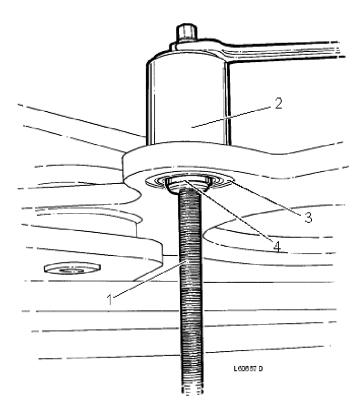


Figure 4 Replacing link bearing

- 1. 999 3714
- 2. 999 3712
- 3. 11 667 050
- 4. 999 3717
- 7. Pull in the new link bearing using the same tools as when pulling it out.



The bearing is to be centred in the frame.

Installing

- 8. Lift the steering cylinder into the frame. Install the link bearing seals and align the cylinder with the hole in the frame.
- 9. Install the rear pin, using 999 3686, 999 3714 and 999 3725.

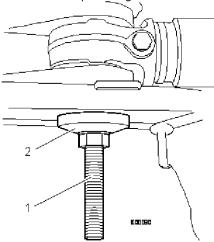


Figure 5 Installing rear pin

- 1. 999 3714 / 999 3725
- 2. 999 3686
- 10. Pull out the piston rod and align it with the hole in the frame. Install the spacers.
- 11. Install the guide bolt in the clevis and install the front pin.



The installation is facilitated if the pin is cooled beforehand.

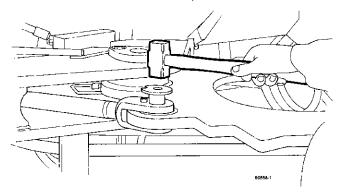


Figure 6 Installing front pin

- 12. Install the grease nipple in the pin.
- 13. Connect the hydraulic hoses to the steering cylinder.
 Install the lubrication pipe for the rear steering cylinder pin.
 Lubricate the pins.
- 14. Start the engine and at low idling gently steer the machine in both directions. Then gradually increase to full steering wheel lock a few times and gradually increase the engine speed to bleed the steering cylinder of air.
- 15. Check that there are no leaks. Install the cover plate.



Construction Equipment

Document Title: Steering pump, description	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Steering pump, description

Steering pump

The pump is a nine-cylinder axial piston pump with variable flow. The working principle of such a pump is shown in Figure [?]

Drive shaft (9) rotates and causes cylinder drum (6), pistons (7) and swash plate (8) to rotate in the same direction. The stroke of the pistons is dependent on the angle of yoke (10). The angle is determined by the difference between the pressure from spring (11) and the oil pressure on control piston (12). When the piston is in its innermost position it passes, during its movement outward, a bow-shaped groove (4) in distributor plate (5). The oil is sucked (or more correctly, is forced by atmospheric pressure) from inlet port (3) via inlet groove (4) into the cylinder. When the piston has passed its outermost position and is on its way into the cylinder, the oil is forced out through outlet groove (2) and further on to outlet port (1).

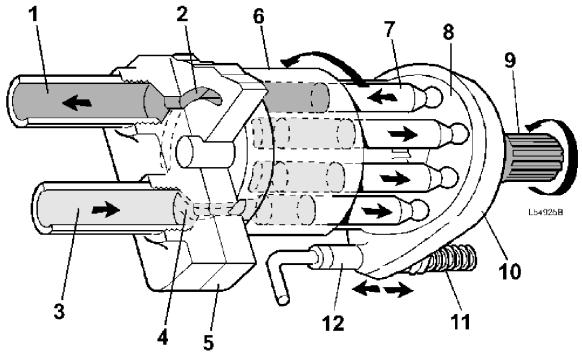


Figure 1
Steering pump (principle diagram)

- Outlet port
- 2. Outlet groove in distribution plate
- 3. Inlet port
- 4. Inlet groove in distribution plate
- 5. Distribution plate
- 6. Cylinder drum
- 7. Piston
- 8. Swash plate
- 9. Drive shaft
- 10. Yoke
- 11. Spring
- 12. Control piston

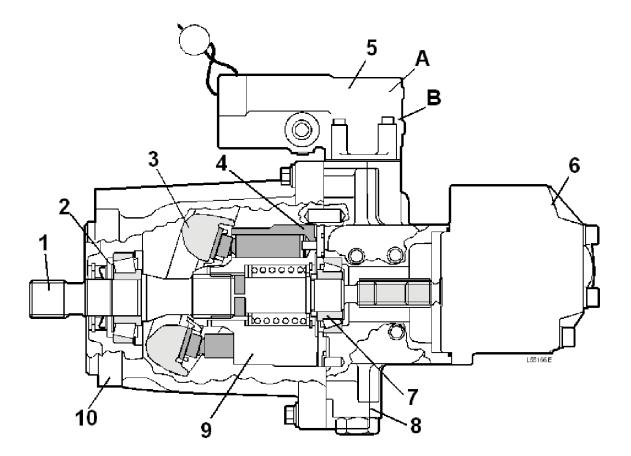


Figure 2 Steering pump

- A. Pressure compensator
- B. Flow compensator
- 1. Drive shaft
- 2. Bearing
- 3. Yoke
- 4. Distribution plate
- 5. Pressure and flow compensator
- 6. Pump, brake and servo systems
- 7. Bearing
- 8. End plate
- 9. Pump unit (with cylinder drum and pistons)
- 10. Housing

Pressure / flow compensator

The purpose of the flow compensator is to reduce the pump displacement when the steering is not used. In neutral only a stand-by pressure and no flow is then obtained.

The purpose of the pressure compensator is to control the pump via the control piston, so that the maximum pressure is limited.

Neutral position

Steering valve C is in neutral position. LS-line (9) is then without pressure. Pressure builds up in outlet line (5) and pressure line (8). Pressure compensator spool (2) is kept in the lower position by spring (1). Spring (12) balances the flow compensator valve spool so that oil can pass out to control piston (7) which reduces the angle of the yoke. The pressure from the pump is controlled to a value which depends of the force of spring (12) plus the pressure in LS-line (9), which in neutral is the same as the pressure in the line to the tank from the steering valve. This creates a pressure difference between lines (9) and (5). Any adjustment is done with adjusting screw (13).

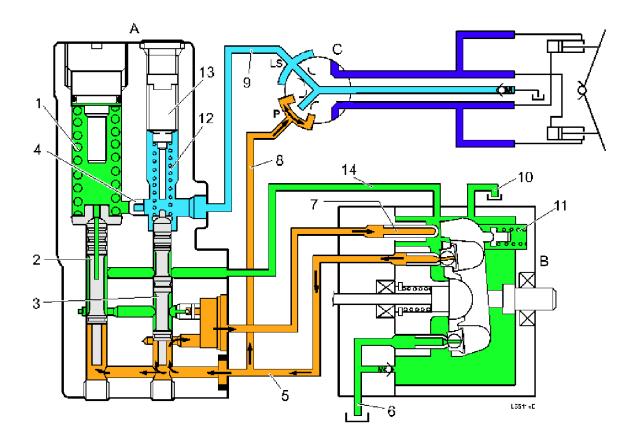


Figure 3 Neutral position (stand-by) L90C

Α	Pressure / flow compensator	9	Load-sensing (LS) line
В	Pump	10	Draining to tank
С	Steering valve	11	Spring
1	Spring	12	Spring
2	Pressure compensator spool	13	Adjusting screw
3	Flow compensator spool	14	Draining to pump
4	Restriction (plug serial No. 12363–)		
5	Outlet from pump	Green	= Return, without pressure
6	Inlet to pump	Blue	= Raised return pressure
7	Control piston	Violet	= Oil closed in
8	Pressure line	Orange	= Stand-by pressure

Steering

LS-line (9) becomes connected to the pressure line in steering valve (C), thus the pressure at the top of flow compensator spool (3) together with the spring force presses the spool into a balanced position against the pressure in outlet line (5). The oil behind control piston (7) is now drained back to the pump housing via spools (3) and (2) and the yoke is angled to give maximum flow with the aid of spring (11).

When the pump supplies the correct flow, spool (3) is balanced by the pressure in the LS-line plus the spring against the output pressure from the pump.

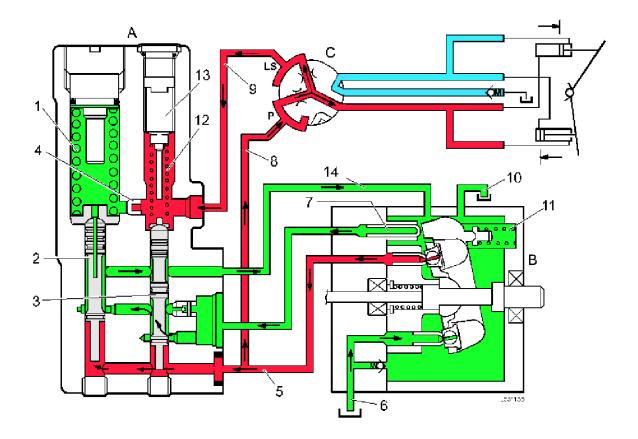


Figure 4 Steering, normal L90C

Α	Pressure / flow compensator	10	Draining to tank
В	Pump	11	Spring
С	Steering valve	12	Spring
1	Spring	13	Adjusting screw
2	Pressure compensator spool	14	Draining to pump
3	Flow compensator spool		
4	Restriction (plug serial No. 12363–)	Red	= Oil under pressure
5	Outlet from pump	Green	= Return, without pressure
6	Inlet to pump	Blue	= Raised return pressure
7	Control piston		
8	Pressure line		
9	Load-sensing (LS) line		

Steering against end position

The pressure in LS-line (9) rises, so that the pressure together with the spring force manages to press flow compensator valve spool (3) towards the closed position (downward). The pressure on the underside of pressure compensator spool (2) strives to move the spool towards the open position so that the oil passes by spool (3) and on to control piston (7). The angle of the yoke is reduced and thereby the flow, while the maximum pressure is maintained.

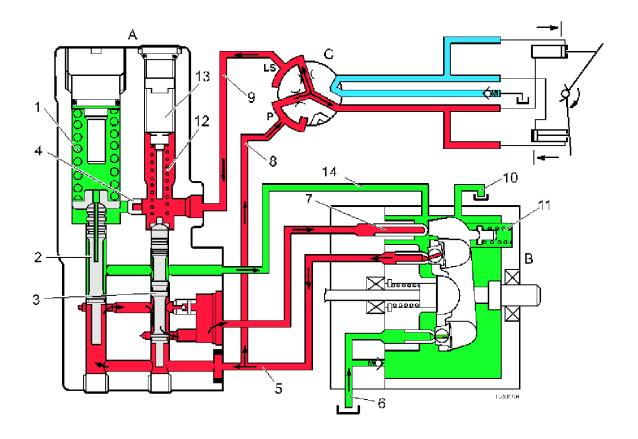


Figure 5 Steering against end position, L90C

Α	Pressure / flow compensator	10	Draining to tank
В	Pump	11	Spring
С	Steering valve	12	Spring
1	Spring	13	Adjusting screw
2	Pressure compensator spool	14	Draining to pump
3	Flow compensator spool		
4	Restriction (plug serial No. 12363–)	Red	= Oil under pressure
5	Outlet from pump	Green	= Return, without pressure
6	Inlet to pump	Blue	= Raised return pressure
7	Control piston		
8	Pressure line		
9	Load-sensing (LS) line		



Construction Equipment

Document Title: Steering reconditioning (removed)	pump,	•	Information Type: Service Information	Date: 25.04.2013
Profile:				

Steering pump, reconditioning (removed)

Op nbr 64573

6999 001 Handle

6999 004 Handle

6999 025 Plate

6999 044 Plate

6999 050 Plate

6999 062 Plate

Kukko 15-17 Puller plate

Kukko 21-6 Puller

Kukko 21-7 Puller

Kukko 22-2 Puller

NOTICE

The tolerances of the pump are very small and therefore the greatest possible cleanliness is required. Clean the pump thoroughly before beginning reconditioning.

Dismantling

- 1. Remove the brake/servo system oil pump and drive shaft.
- 2. Mark all parts so that they can be assembled in the same relative position. Remove the valve block including the gasket and the O-ring.

Also remove the retainer.

NOTICE

The position of the gasket.

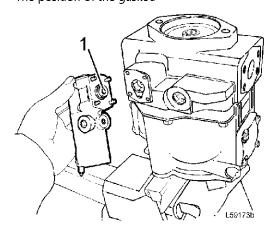


Figure 1 Removing valve block

1. Retainer

3. Remove the end plate from the pump housing and lift out the control piston.

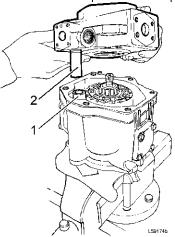


Figure 2

- 1. Control piston
- 2. Guide stud
- 4. Remove the distribution plate.

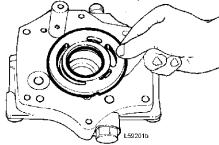


Figure 3

5. Only remove the control piston guide stud if it is damaged.

If the guide stud needs to be removed, the end plate should be secured in a vice provided with protective jaws. Then loosen the guide stud counter-clockwise.

The stud is locked with locking fluid medium and the end plate may have to be heated to approx. 120 °C (248 °F) to counteract the locking fluid.

Remove the O-ring from the guide stud.

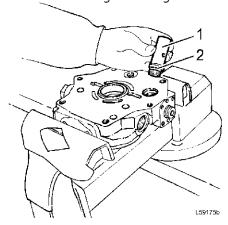


Figure 4

1. Guide stud

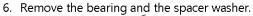




Figure 5 Removing bearing and spacer washer

7. Carefully lift the complete pump unit out of the housing. Take care of the three guide pins.

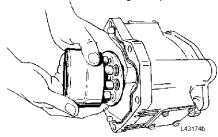


Figure 6

8. Mark the pistons relative to the cylinder drum (use a marker pen or similar). Pull the swash plate together with the pistons out of the cylinder drum. Remove the ring.

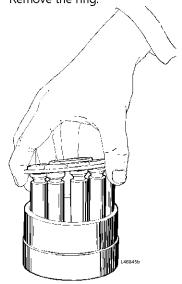


Figure 7

9. Check that the length of the three guide pins is 28.33-28.83 mm (1.116-1.13 psi). If this is not the case, the pump unit must be replaced.



Figure 8
Checking the guide pin lengths

10. Remove the side covers and the O-rings.

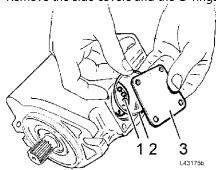


Figure 9

- 1. Bearing
- 2. O-ring
- 3. Cover
- 11. Remove the bearings.

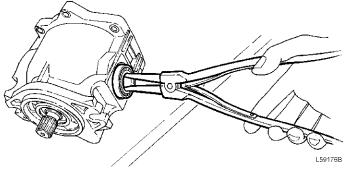


Figure 10

12. Angle the yoke as much as possible. Wriggle the yoke so that it does not get stuck and at the same time lift the yoke by the bearing stud.

NOTICE

The shaft may have to be lifted out of the bearing race. Then remove the shaft together with the bearing, the spring and the guide.

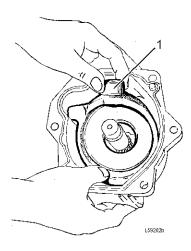


Figure 11

- 1. Bearing stud
- 13. Pull the bearing race out of the pump end plate.

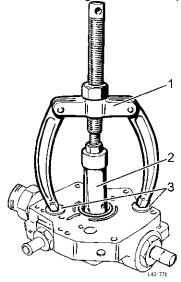


Figure 12

- 1. Kukko 22-2
- 2. Kukko 21-6
- 3. Washers (as protection)
- 14. Pull the bearing race out of the housing.

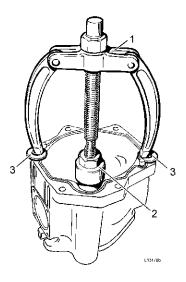


Figure 13

- 1. Kukko 22-2
- 2. Kukko 21-7
- 3. Washers (as protection)
- 15. Remove the seal ring from the housing with the aid of for example a drift. Do not remove the lock ring.
- 16. Press the bearing off the pump shaft.

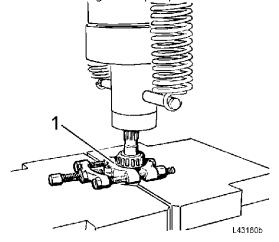


Figure 14

1. Kukko 15-17

Cleaning and inspecting

17. Wash all parts.



Do not use washing fluid which may contain water.

When blowing clean with air, use dehumidified compressed air.

18. Inspect and replace all damaged and worn parts.

Assembling

- 19. Lubricate the parts with hydraulic oil.
- 20. Press the bearing on the pump shaft.

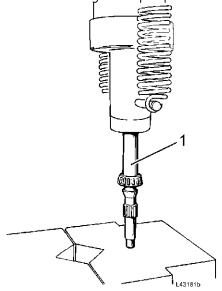


Figure 15

- 1. Pipe, inside diameter 26 mm (1.024 in)
- 21. Drive the seal ring into the housing.

 Drive the ring until it stops against the lock ring.

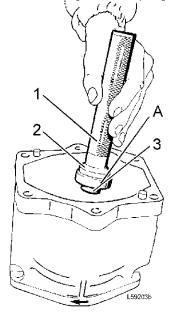


Figure 16

- 1. 6 999 004 Handle
- 2. 6 999 044 Plate
- 3. 6 999 025 Plate
- A. Seal ring
- 22. Drive the bearing race into the housing.

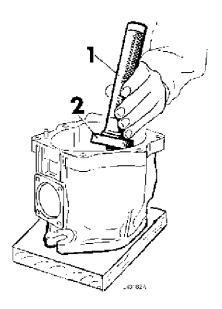


Figure 17

- 1. 6 999 001 Handle
- 2. 6 999 062 Plate
- 23. Drive the bearing race into the end plate.

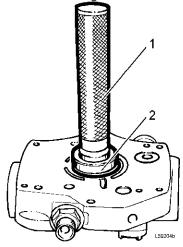


Figure 18

- 1. 6 999 001 Handle
- 2. 6 999 050 Plate
- 24. Install shaft, spring together with guide and finally the yoke in the housing.

 Angle the yoke as much as possible. Wriggle the yoke so that it does not get stuck and at the same time hold up the yoke by the bearing stud. Lower the yoke into position.

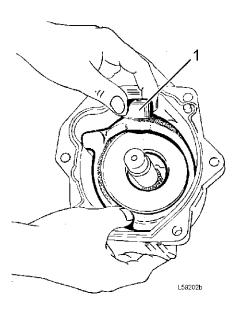


Figure 19

- 1. Bearing stud
- 25. Install the bearing for the yoke (the chamfer of the inner bearing race against the yoke). Install O-rings and covers on both sides.

Tighten the bolts.

Tightening torque: 20 N m (15 lbf ft)

1 2 3
L43175b

Figure 20

- 1. Bearing
- 2. O-ring
- 3. Cover
- 26. Place the ring in the cylinder drum and then install the guide pins.

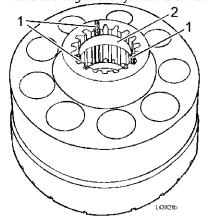


Figure 21

- 1. Guide pins
- 2. Ring
- 27. Position the retainer for the swash plate on the guide pins.

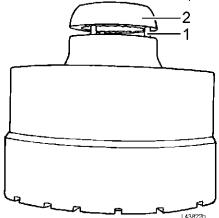


Figure 22

- 1. Guide pin
- 2. Retainer
- 28. Position the pistons together with the swash plate in the cylinder drum.

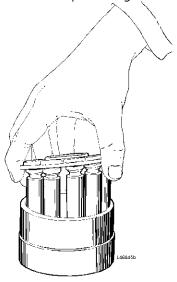


Figure 23

29. Place the pump unit on a sleeve or a suitable piece of pipe.

Lift and position the housing on the pump unit by simultaneously rotating the shaft.

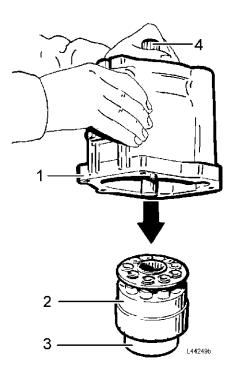


Figure 24

- 1. Housing
- 2. Pump unit
- 3. Suitable piece of pipe
- 4. Input shaft
- 30. When the pump unit is in position, it should be approx. 3 mm (0.12 in) below the face for the gasket on the end plate.

Check this with the aid of a steel ruler and a feeler gauge.

NOTICE

Take care so as not to disturb the position of the parts in the pump unit.

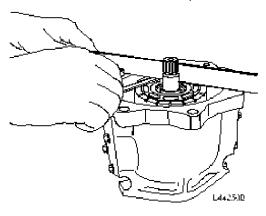


Figure 25

Adjusting pump shaft axial clearance

31. Install a spacer washer with a known thickness and the bearing on the shaft. Make a note of the washer thickness. Install the end plate without a gasket on the housing and rotate the shaft so that the bearings are rolled in. At the same time tighten the attaching bolts by hand, to approx. 0.5 N m (0.37 lbf ft). Check that the slot between housing and end plate is equally large all the way round.

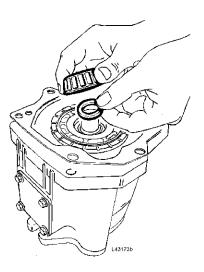


Figure 26
Installing spacer washer and bearing

32. Measure and note the clearance. Remove the end plate.

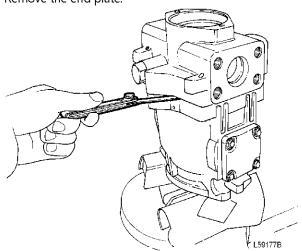


Figure 27 Check the clearance

- 33. Measure and note the thickness of the gasket.
- 34. Select a suitable spacer washer as follows:

The measurement between housing and end plate (without gasket) should be 0.05 to 0.09 mm (0.002 to 0.004 in) greater than the thickness of the gasket (= preload). This is achieved by selecting a suitable spacer washer. Example:

Spacer washer (point 31)	+	3.88
Clearance (point 32)	_	0.50
Preload (point 34)	+	0.07
Gasket (point 33)	+	0.52
Select a spacer washer with a thickness of:	=	3.97

According the example above you should select a spacer washer with a thickness of 3.97 ± 0.02 mm. Spacer washers are included in the bearing set.

Assembling, continued

35. Position the spacer washer (the thickness of which was calculated in point 34) with the inner chamfer of the ring turned towards the fillet radius of the shaft and install the bearing.

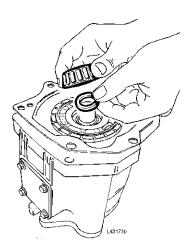


Figure 28
Installing spacer washer and bearing

36. If the control piston guide stud was removed, install the guide stud and the O-ring. Lock the threads with locking fluid medium.

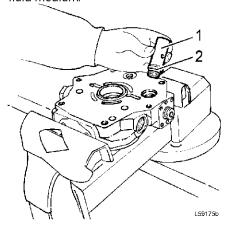


Figure 29

- 1. Guide stud
- 2. O-ring
- 37. "Attach" the distribution plate to the end plate with the aid of a little oil.

Assemble the end plate and the housing using the same gasket as when calculating the spacer washer in point 34. Tighten the bolts.

Tightening torque: 33 N m (24 lbf ft)

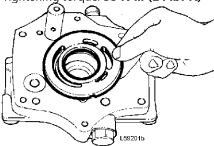


Figure 30

38. Position the retainer together with the lock ring and new O-rings on the valve block, see Figure [?]. Install the valve block on the pump housing together with a new O-ring and gasket.

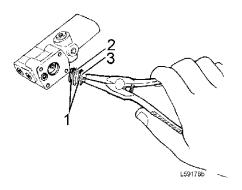


Figure 31

- 1. O-ring
- 2. Lock ring
- 3. Retainer
- 39. Fill the pump housing with approx. 0.2 litre (0.4 US pint) of hydraulic oil and rotate the pump shaft a few revolutions. Then measure the torque required to rotate the pump shaft. The torque must not exceed $8 N \underline{m}$ (5.9 lbf ft).

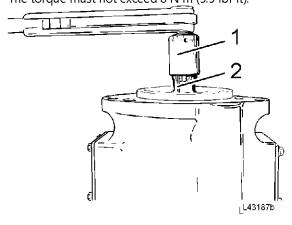


Figure 32

- 1. Socket 24 mm
- 2. Steel wire (soft-annealed) \emptyset 2 mm (0.08 in)



Construction Equipment

Document Title: Steering valve, reconditioning (removed)	Information Type: Service Information	Date: 25.04.2013
Profile:		

Steering valve, reconditioning (removed)

Op nbr 64581

999 3460 Fitting tool 6999 007 Handle 6999025 Plate 6999 034 Plate

Dismantling

 Mark the parts of the steering valve in relation to each other to facilitate assembling. Secure the steering valve in a vice. Use soft protective jaws. Remove the cover.

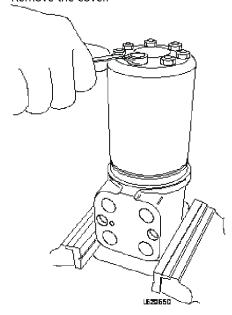


Figure 1

2. Remove the rotor set, see Figure [?], the rotor shaft and the distributor plates. Remove the O-ring.

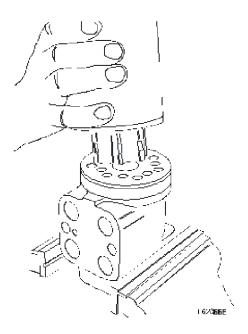


Figure 2 Removing rotor set

Remove the cross pin.Remove the steering valve from the vice and take out the ball.

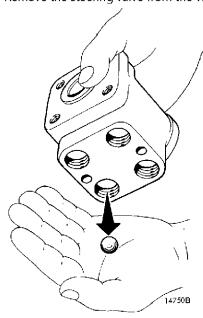


Figure 3 Removing ball

4. Remove the inner and the outer spools.

NOTICE

Do not pull at the outer spool. There is then a risk that the spools separate causing the return springs to lock the inner spool in the housing.

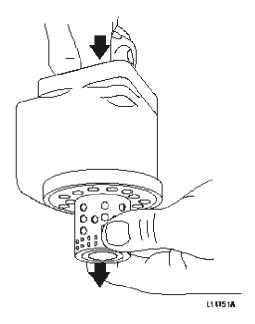


Figure 4
Removing inner and outer spools

5. Remove the axial disc, the needle bearing, the bearing race and the ring.

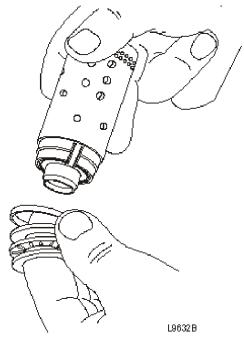


Figure 5
Removing needle bearing and ring

- 6. Remove the inner and outer seals.
- 7. Carefully press the inner spool out of the outer.

Remove the leaf springs.

Clean and inspect all parts as regards damage or wear.

Replace damaged or worn parts.

Replace all seals and washers.

Any minor burrs can be removed with a fine-grained whetstone.

Lapping paste must not under any circumstances be used.

Lubricate all parts with hydraulic oil before assembling.

Assembling

8. Install the outer seal ring, see Figure [?].

Secure the valve housing in the vice. Use soft protective jaws.

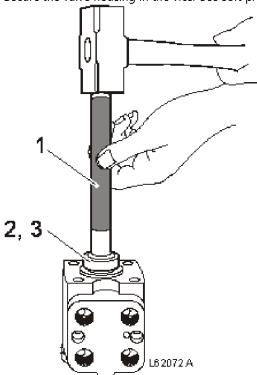


Figure 6 Installing seal ring

- 1. 6999 007
- 2. 6999 025
- 3. 6999 034

9. Installing inner seal, earlier type

Position the assembled seal on the spindle of the tool.

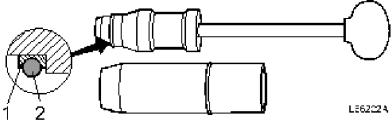


Figure 7
Position of seal on the tool (999 3460), earlier type

1	Support ring
2	O-ring

Insert the spindle of the tool in the sleeve. Carefully move the tool down into the valve housing until the tool locates in the lower hole. Press down the spindle of the tool to the bottom while rotating the spindle. Hold the sleeve in position and pull out the spindle while turning it.

Remove the sleeve and check that the seal is correctly positioned.

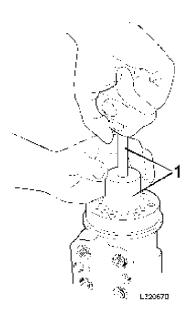


Figure 8
Installation of inner seal, earlier type

1. 999 3460

Installing inner seal, later type

Position the assembled seal on the drift plate and press the seal into the housing.

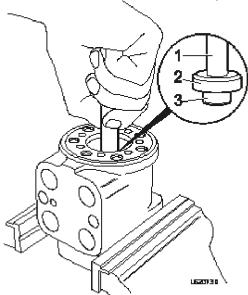


Figure 9 Installation of inner seal, later type

- 1. 6999 007
- 2. 6999 025
- 3. 6999 034
- 10. Assemble the inner and outer spools so that the slots for the leaf springs align and the T-shaped slot (A) in the inner spool comes opposite the small holes (B) in the outer spool. Check that the punch marks on top of the spools align.

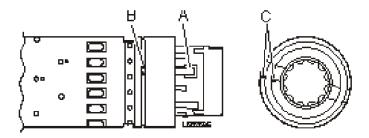


Figure 10

- A. T-shaped groove (inner spool)
- B. Hole (outer spool)
- C. Punch marks
- 11. Install the leaf springs. Make sure to position the leaf springs correctly.

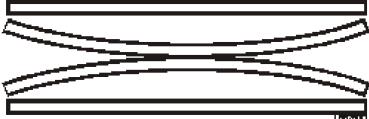


Figure 11 Position of leaf springs

12. Install the axial disc, the needle bearing, the bearing race and the ring on the inner and the outer spools.



Install the bearing race with the chamfer toward the inner spool. Install the cross pin on the inner and outer spools.

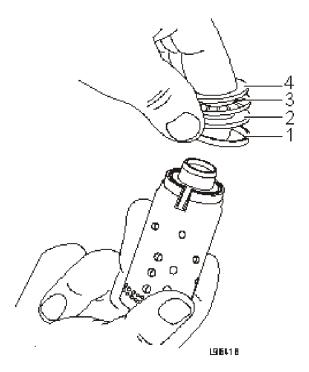


Figure 12 Position of axial disc, needle bearing, bearing race and ring.

- 1. Ring
- 2. Bearing race
- 3. Needle bearing

4. Axial disc

13. Install the inner and the outer spools in the valve housing. Rotate the inner and the outer spools, so that their cross pin comes at 90° relative to surface "A".



If the inner and the outer spools are incorrectly positioned, the steering valve may function as a engine and causing the machine to self-steer.

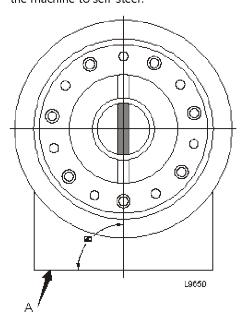


Figure 13
Inner and outer spools and position of cross pin in valve housing

14. Install the O-ring. Install the distributor plates so that the holes where the ducts open out align with the corresponding holes in the valve housing.

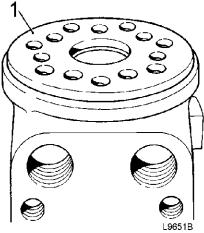


Figure 14
Distributor plate on valve housing

15. Install the rotor shaft. Install the O-ring and the metering unit so that two of the rotor tooth tips come parallel with surface "A".

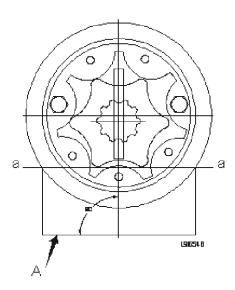


Figure 15
Rotor set position relative to valve housing

16. Install the cover and the bolts.

Install the ball through pressure connection (P) and then install the bolt together with the locking pin. Lightly shake the valve and listen for whether the ball can move freely.

Tighten the bolts crosswise.

Tightening torque: 30-35 N m (22-26 lbf ft)

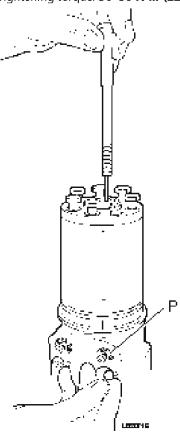


Figure 16
Position of ball in valve housing



Construction Equipment

Document Title: Steering valve, description	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Steering valve, description

The steering valve is of the non reaction type with closed centre. The steering valve has a load-sensing pressure outlet (LS) from which a LS-pressure is supplied to the flow compensator on the pump.

Function

While the steering wheel is not actuated, the steering valve remains in neutral position, which means a closed centre. The pump is in the angled-down position and only supplies a stand-by pressure. Turning the steering wheel in either direction causes the inner spool to turn in relation to the outer spool. When this turning movement has reached 1.5°, the ducts to the metering unit and the load-sensing port (LS) begin to open. The pressure from the steering pump is conducted directly to the load-sensing port, which causes the pump to angle up and begin to supply a flow. Via the metering unit oil is supplied to the steering cylinders in proportion to the steering wheel movement. When the steering wheel is no longer turned (held still), the inner and outer spools spring back to the closed position and the pump will then only supply a stand-by pressure.

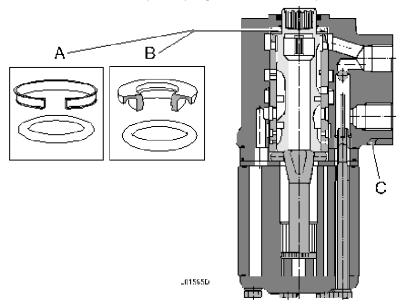


Figure 1

Steering valve

- A. Earlier type seal
- B. Later type seal
- C. Punched-in marking, week/year (e.g. 416 = week 41 year 1996)

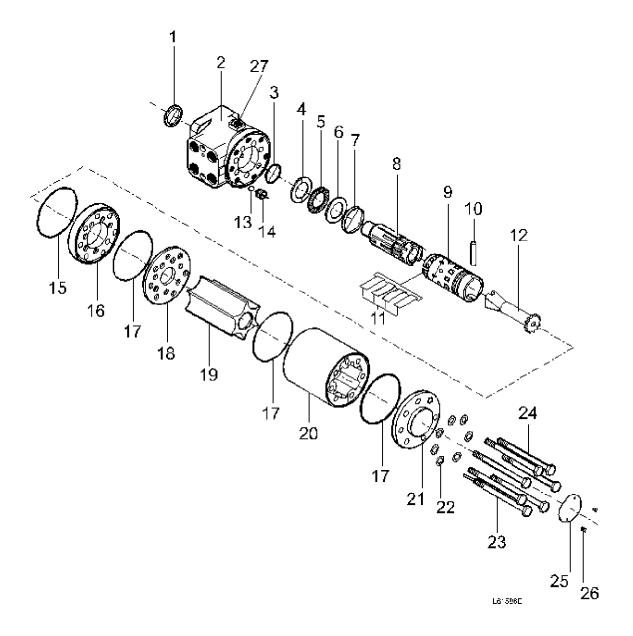


Figure 2

Steering valve

1	Seal	15	O-ring
2	Valve housing	16	Distributor plate
3	O-ring/support ring	17	O-ring
4	Axial disc	18	Distributor plate
5	Needle bearing	19	Rotor
6	Bearing race	20	Rotor ring
7	Ring (holder)	21	Cover
8	Inner valve spool	22	Washer
9	Outer valve spool	23	Bolt with guide pin
10	Cross pin	24	Bolt (6 pcs)
11	Leaf springs (4 pcs)	25	Type plate
12	Rotor shaft	26	Blind rivet
13	Ball (non-return valve)	27	LS-connection (load-sensing pressure outlet)
14	Bushing		

Items 19 and 20 = measuring unit



Construction Equipment

Document Title: Description	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

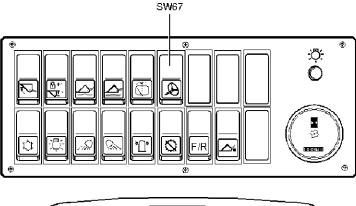
Description

The system includes an electrically driven hydraulic pump, which is controlled by the ECU. The position of the pump is shown in Figure [?].

The ECU obtains signals from test switch SW67, two sensors, SE15 and SE51, and the travelling speed sensor, SE4.

The flow and the differential pressure sensor SE51 registers the flow from the ordinary steering pump and also the difference between the main pressure and the LS-pressure.

Pressure sensor SE15 registers the main pressure. The position of the sensors is shown in Figure [?].



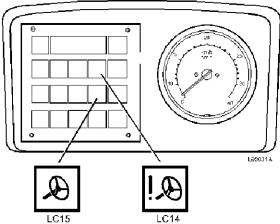


Figure 1

LC14:	Control lamp, red, warns against fault in the primary steering system	
LC15:	Control lamp, amber, indicates that the secondary steering pump starts	
SW67:	Test switch for the secondary steering system	

Before starting the engine

If test switch SW67, flow and differential pressure sensor SE51 or pressure sensor SE15 are connected, the ECU indicates that the equipment is installed.

The ECU checks the sensor circuits. With the ignition switch in position 1 and the engine turned off, control lamp LC14 flashes in case of an open circuit in either of the sensor circuits.

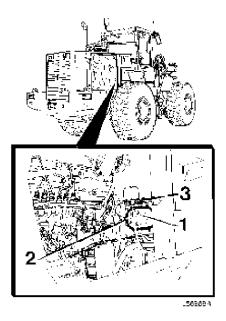


Figure 2

- 1. Secondary steering pump
- 2. RE41
- 3. FH2

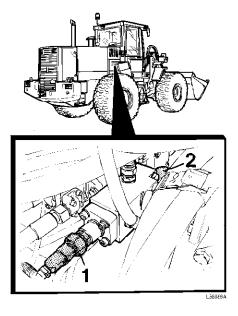


Figure 3

- 1. Flow and differential pressure sensor, SE51
- 2. Pressure sensor, SE15

While operating

If the flow and differential pressure sensor SE51 is activated, i.e. the sensor circuit is closed, the secondary steering pump will start if the speed exceeds 5 km/h (3.1 mph).

Control lamp LC15 lights up and the pump will be running as long as the sensor is closed.

In case of loss of steering pressure for the primary steering, the flow and differential pressure sensor SE51 and the ordinary steering pressure sensor SE15 will close. This will cause the secondary steering pump to start, if the speed exceeds 5 km/h (3.1 mph). Control lamps LC14 and LC15 light up at the same time as the central warning lamp LC6 begins to flash. In this case the pump will be running as long as the speed remains above 5 km/h (3.1 mph).

Valve with flow and differential pressure sensor SE51.

The valve and functional diagram show the situation before start.

Before starting, valve poppet (1) is kept in the closed position by spring (5) via guide (4) and piston (2). At the same time the guide keeps pin (3) in place, which means that sensor SE51 is closed. Pressure sensor SE15 is also closed.

After starting sensor SE15 is open as long as the steering pressure at connection PP exceeds 0.4 MPa (58 psi).

Sensor SE51 becomes open when pin 3 is pushed outward against SE51. The pin can be actuated in two ways, by the flow or by the pressure.

When the motor is started, valve poppet (1) is pressed outward (against SE51) and connection PP–PU is opened. When the steering pump flow through connection PU exceeds 10 dm³ (2.6 US gal) per minute, valve poppet (1) is kept in the open position and pin (3) is pressed outward (against SE51) via piston (2). This function depends on the pressure difference between the steering pressure and the LS-pressure.

At connection PU there is either stand-by pressure or steering pressure. The pressure actuates piston (2) which is pressed against guide (4), pin (3) and spring (5). The LS-pressure enters the valve via connection LS and tries to press the piston in the opposite direction. When the difference between the steering pressure and the LS-pressure is greater than 0.7 MPa (102 psi) the spring will be compressed and the pin will open sensor SE51.

The LS-pressure also actuates pin 3 directly and when the LS-pressure exceeds 7 MPa (1015 psi), the pin, via the guide, will compress the spring regardless of the steering pressure and thus the sensor will open. This happens, for example, when steering against full lock position at which point the steering pressure and the LS-pressure reach the same value.

The secondary steering cuts in if the travelling speed of the machine exceeds 5 km/h (3.1 mph) and the oil flow from the primary steering pump is less than approx. 10 dm³ (litres) (2.6 US gal) per minute at the same time as the pressure difference between the steering pressure and the LS-pressure is less than 0.7 MPa (7 bar) (102 psi) and the LS-pressure is less than 7 MPa (70 bar) (1015 psi).

NOTICE

As the LS-pressure reduces, the need of differential pressure increases to prevent the secondary steering from starting.

NOTICE

When preparing for "Limp-Home operation" the secondary steering system is disconnected and gears 3 and 4 are blocked.

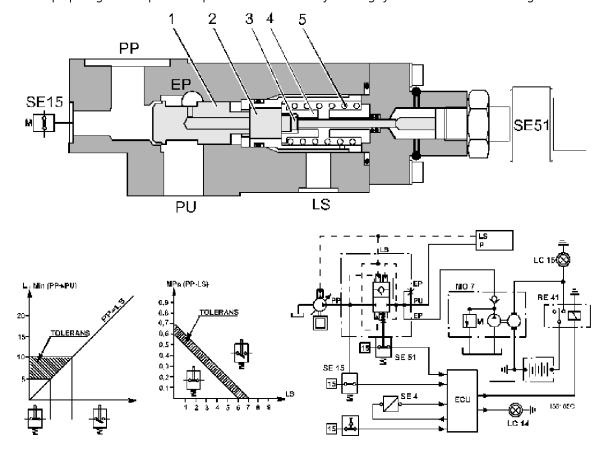
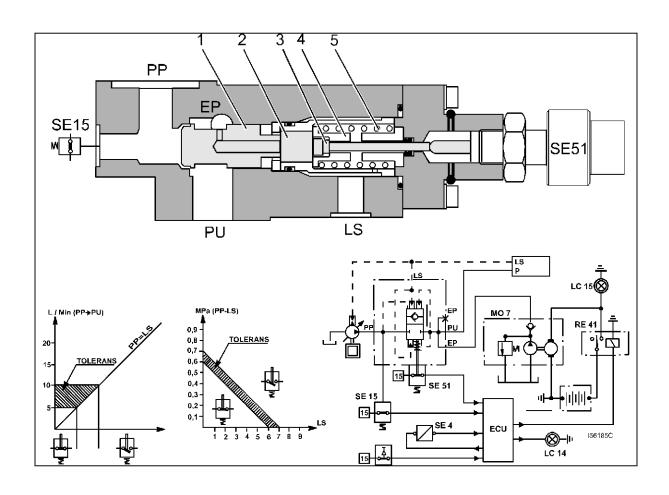


Figure 4

Valve with flow and pressure diagram and functional diagram

- Poppet Piston 1.
- 2.
- 3. Pin
- 4. Guide
- Spring 5.



L61447a



Construction Equipment

Document Title: Function test	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Function test

The testing of the secondary steering system is carried out with a stationary machine and the engine turned off. The ignition switch must be in position 1. When switch SW67 is pressed down, the connection to the ECU is interrupted. When sensors SE15 and SE51 are closed, the secondary steering pump will start and control lamp LC15 lights up. The pump will be running as long as the switch is kept pressed down.

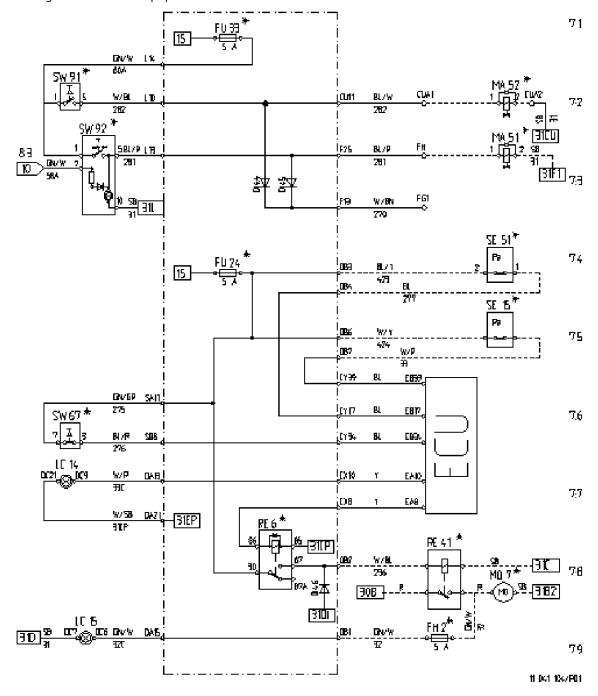
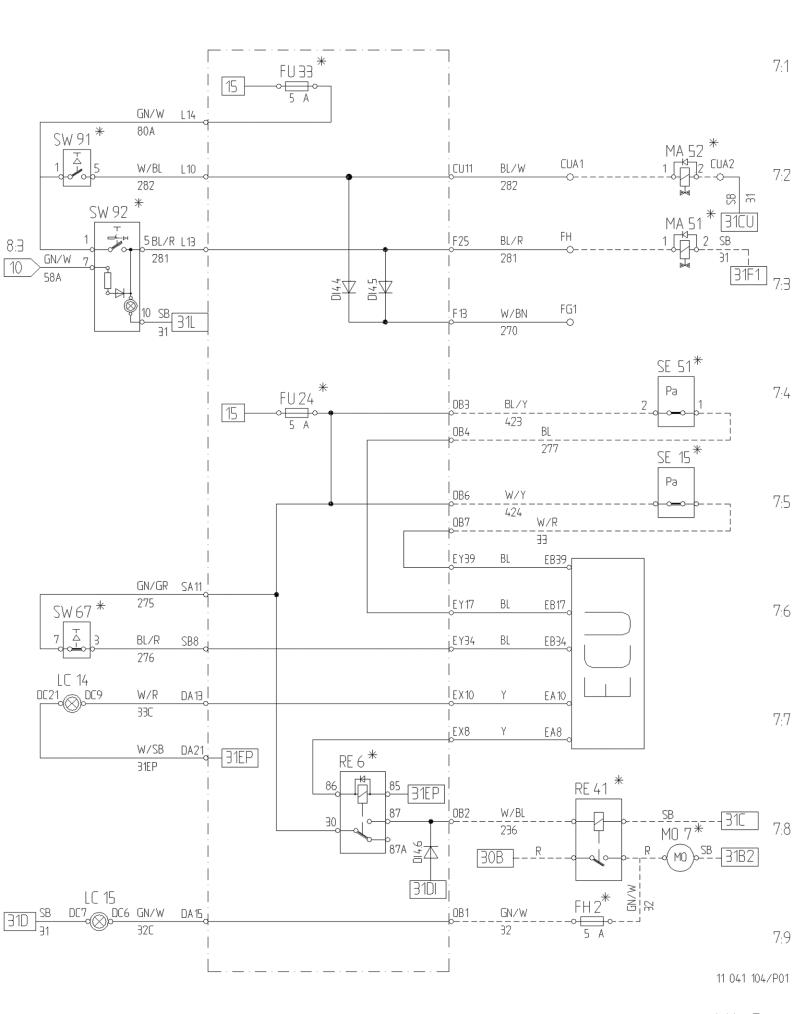


Figure 1 Wiring diagram, circuit 7:1 — 7:9





Document Title: Description of function	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description of function

The equipment is connected to the circuit board in connector OD.

With the ignition key in position 1 and the arm rest lowered, voltage is available at switch SW30 via fuse FU29, sensor SE62 and relay RE30 (30 - 87A).

When switch SW30 is actuated, current is fed to the coil in relay RE31. Relay RE31 is energised and then obtains holding current via terminals 30 - 87 (RE31).

Relay RE31 (30 - 87) also feeds current to switch SW43 for shifting forward/reverse, control lamp LC79, ECU connection EB13, causing engagement of the 4th gear to be blocked. Current is also fed to switch SE109 (kick-down) and the control lever CU3 for steering.

When CU3 is actuated current is supplied to solenoid valve MA28 and the steering function is engaged (the machine begins to steer).

If the arm rest is raised, sensor SE62 interrupts the current to the coil in relay RE31. Relay RE 31 is energised and the current to CU3 is interrupted and the lever steering is disengaged.

If the ordinary gear selector control SW2A is moved to Forward or Reverse, the coil in relay RE30 receives current. Relay RE30 is energised and the lever steering is disengaged.

Example: Gear selector control SW2A is moved to position F (forward). The coil in relay RE30 receives current via fuse FU29, switch SW2A (GA1 - F) and diode DI2:13. Relay RE30 is energised and then receives holding current via connection 30 - 87 (RE30) and switch SW30. When relay RE30 is energised the current to the coil in relay RE31 is interrupted and the lever steering is disengaged.

The lever steering must be engaged again with switch SW30, with the arm rest lowered and the gear selector control in neutral. When switch SW30 is actuated, the current to the coil in relay RE30 is interrupted and the relay is energised. The coil in relay RE31 now receives current which means that the lever steering is engaged as described earlier.

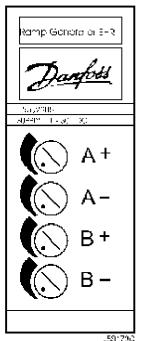


Figure 1

Ramp generator CU20, adjusting screws

A +	Start damping left
A –	Stop damping left
B+	Start damping right
B -	Stop damping right

Ramp generator

CU20

With the aid of of the ramp generator a more comfortable steering action is achieved in that the signal to MA28 is dampened both when starting and stopping the steering. The damping (the ramp) is adjustable from 0 to 0.7 seconds.

CU22

NOTICE

On machines with serial numbers with effect from 960101 the ramp generator has been replaced with a circuit board. The ramp is not adjustable.

CU22 has a fixed damping set to approx. 0.2 s.

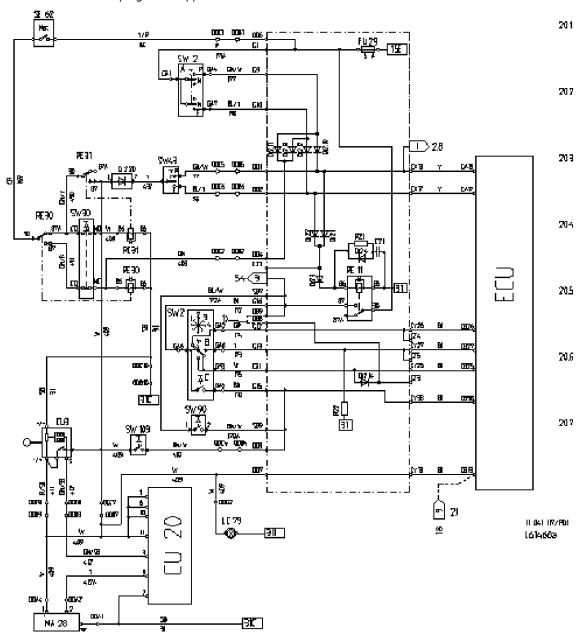


Figure 2 Wiring diagram, lever steering CU20

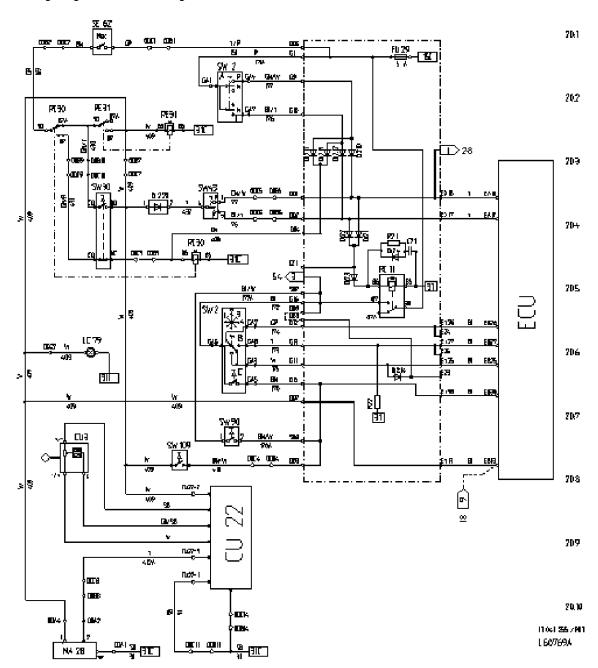


Figure 3
Wiring diagram, lever steering CU22

Gear shifting, forward or reverse

With the ignition key in position 1, lowered arm rest and engaged lever steering, voltage is available at switch SW43 via fuse FU29, sensor SE62, relay RE30 (30 - 87A) relay RE31 (30 - 87) and diode DI2:20.

Gear shifting forward

If switch SW43 is moved to position F (forward), current is supplied to connection EA17 on the ECU and to the coil in relay RE11 which is energised.

Gear shifting reverse

If switch SW43 is moved to position R (reverse), current is supplied to connection EA18 on the ECU and to the coil in relay RE11 which is energised.

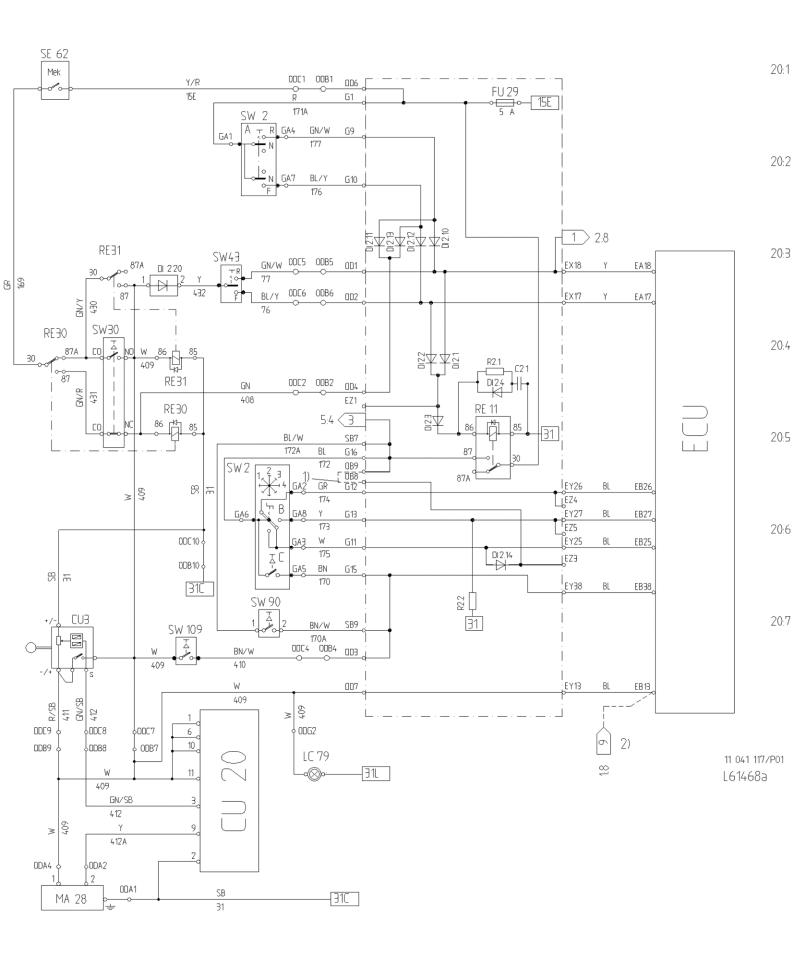
Relay RE11

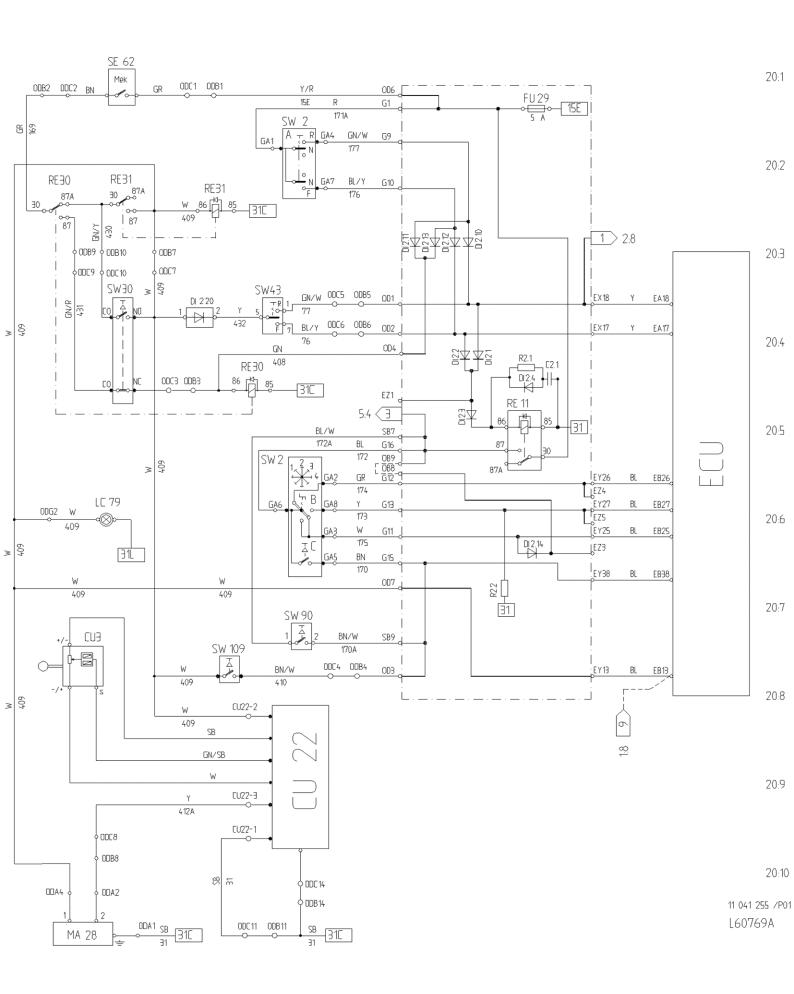
When relay RE11 is energised, current is fed to gear selector control SW2B for the speed gears (1-4), switch SW2C (kick-

down), switch SW90 (kick-down) and relay RE13 (circuit 5:4) via connection 30 - 87 (RE11).

Kick-down

When either of switches SW2C, SW90 or SW109 are actuated, current is fed to connection EB38 on the ECU.







Document Title: Description, general	Function Group: 660	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description, general

The equipment allows steering, Forward/Reverse shifting and engagement of kick-down to be performed via controls positioned in the left arm rest.

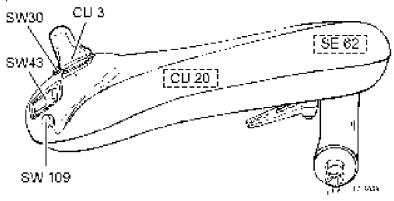


Figure 1 Arm rest. CDC

CU3	Steering lever
SW30	Engagement, CDC
SW43	Gear shifting, Forward/Reverse
SW109	Kick-down
SE62	Engagement, CDC in arm rest
CU20	Ramp generator, alternatively CU22 on later machines

During transport operation on a public highway, the steering wheel must be used and the lever steering be disengaged.

The steering lever has two adjusting screws for adjusting the steering speed. Ramp generator, CU20 has adjusting screws for damping right and left. On later machines the ramp generator is built onto a circuit board CU22. CU22 is not adjustable, but has a fixed ramp (damping).

NOTICE

On earlier machines the ramp generator CU20 is installed in the electrical distribution box.

The lever steering control valve is positioned under the cab on the right side. The control valve is connected in parallel with the primary steering valve.

The shuttle valve for the LS-pressure is positioned by the primary steering valve.

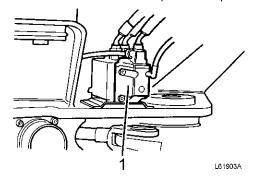


Figure 2

1. MA28, CDC

The ordinary gear selector control has priority over the Forward/Reverse switch on the arm rest. This means that the lever steering will be disengaged if the gear lever is moved forward or rearward.

When the lever steering is engaged, a control lamp on the panel on the left side will be alight.

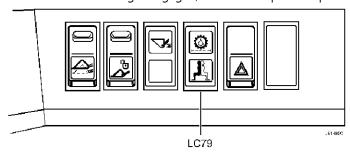


Figure 3

LC79	Control lamp, CDC

Engagement, operation and disengagement

To engage the lever steering the arm rest must first be lowered thus closing sensor SE62. Check that the ordinary gear selector control is in neutral and at the same time turn its handle to the required position. Normally position 4 (Automat) is selected. Also select gear-shift mode programme with SW143 programme selector, se APS II (Automatic Power Shift with Mode Selector).

The 4th gear is blocked while the lever steering is engaged.

The lever steering can now be engaged with switch SW30 on the arm rest. The green control lamp LC79 on the left panel should be alight.

To steer, move the steering lever to the required position. The steering speed increases proportionally to the deflection of the lever. To end the steering movement, move the lever with a distinct movement back to neutral.

Select forward gear, neutral and reverse gear with switch SW43. The kick-down function is engaged with switch SW109 on the side of the arm rest. It is still also possible to use the ordinary switch for kick-down.

The lever steering can be disengaged by raising the arm rest or by moving the ordinary gear selector control to the forward or reverse position.

The lever steering must again be engaged with switch SW30 if the ordinary gear selector control has been used.

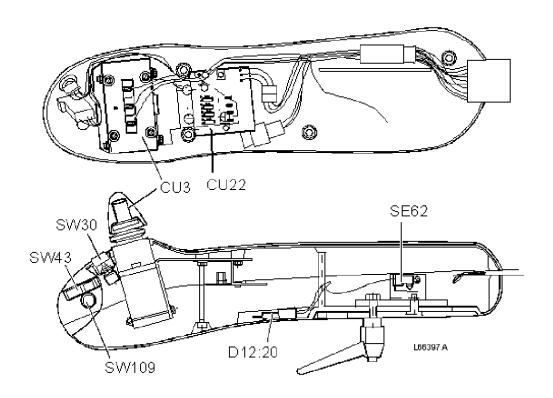


Figure 4 Arm rest, CDC

CU3	Steering lever
SW30	Engagement, CDC
SW43	Gear shifting, Forward/Reverse
SW109	Kick-down
SE62	Engagement, CDC in arm rest
CU22	Ramp generator, alternatively CU20 on earlier machines
DI2:20	Blocking diode, CDC



Document Title: Hydraulic description	system,	•	Information Type: Service Information	Date: 25.04.2013
Profile:				

Hydraulic system, description

The pump pressure is conducted to the steering valve and the control valve. The pressure to valve spool (15) is reduced down to approx. 2 MPa (290 psi) by pressure-reducing valve (14).

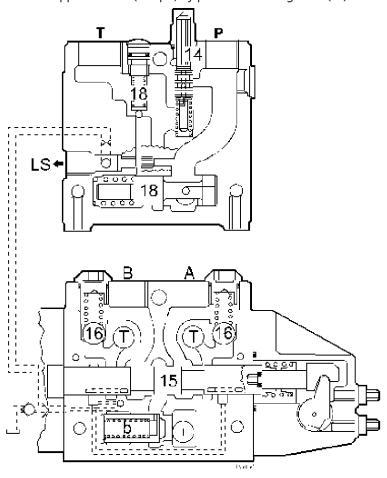


Figure 1
Control valve, lever steering

14	Pressure-reducing valve
15	Control spool
16	Anti-cavitation valves
18	Pressure-limiting valves, blocked
b	Non-return valve
Α	Outlet, steering to the left
В	Outlet, steering to the right

Pressure-limiting valves (18) are blocked in the closed position and therefore have no function in the system.

When the stand-by pressure has been built up, the pump will angle down to "0 flow". When the steering lever is actuated, an electrical signal is passed via ramp generator CU20 or CU22 to control unit MA28 on the control valve. Oil is admitted onto

valve spool 15, which is moved and opens for a controlled oil flow to the steering cylinders.

The position sensor sends signals back to the control unit and indicates the position of the spool. Oil is admitted until the valve spool has been moved a distance corresponding to the lever deflection.

The flow compensator on the pump is actuated by the LS-pressure and adapts the flow and pressure from the pump to the existing need.

Control valve

When the steering lever is actuated, an electrical signal is passed via ramp generator CU20 or CU22 to control unit (25) on the control valve (11 V or lower for steering to the left and 13 V or higher for steering to the right).

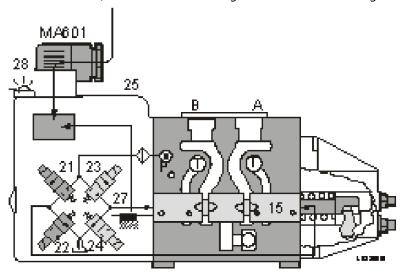


Figure 2
Control valve with control unit

15	Control spool
21-24	Solenoid valve
25	Control unit CU3
27	Position sensor
28	Light-emitting diode

Two of the solenoid valves (21 - 22 or 23 - 24) in the control unit become energised, which means that oil is admitted at one end of control spool (15), which in turn is moved and opens for a controlled flow to one of the steering cylinders. Position sensor (27) sends signals back to the control unit and indicates the position of the spool. The oil continues to be admitted until control spool (15) has been moved a distance corresponding to the deflection of the steering lever and the required steering speed has been reached.

When the spool has taken up the position which corresponds to the signal to the control unit, the control unit interrupts the feed to solenoid valves (21 or 23) depending on the steering direction.

On the control unit on the control valve there is a light-emitting diode (28) which gives off a green light when steering. Should the control spool stick in the actuated position, when the steering lever is returned to neutral, the diode changes to red. If such a fault should arise, the machine continues to steer, even though the steering lever is not actuated.



Document Title: Lever steering, adjusting steering speed	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lever steering, adjusting steering speed

Op nbr

1. The basic setting of the steering speed is 3.5–4.0 seconds between full steering locks (at 1500 rpm). The steering speed is adjusted by screwing the adjusting screws clockwise (to increase the speed) or counterclockwise (to reduce the speed).

The steering speed to the left and the right respectively should as far as possible be the same and the lever must be fully deflected when the adjustment is carried out.

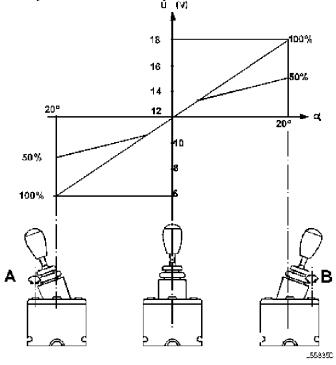


Figure 1
Adjusting screws, steering speed

- A. Steering to the left
- B. Steering to the right



Document Title: Lever steering, checking and adjusting control valve	660	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lever steering, checking and adjusting control valve

Op nbr

Lever for mechanical actuation of control valve spool (to be found in the tool bag of the machine).

Checking

- 1. Install the lever for mechanical actuation of the CDC valve which is positioned under the cab on the right side of the machine.
- 2. Turn the ignition key to position 1 and engage the lever steering with SW30.
- Check that the lever for mechanical actuation does not oscillate.
 If the lever moves in either direction, the electronic and the hydraulic neutral position is not the same and the lever oscillates back and forth.

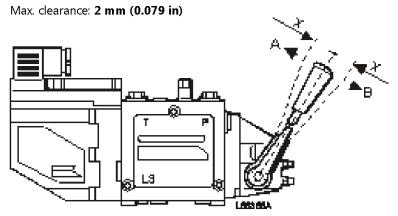


Figure 1

Х	Max. 2 mm (0.079 in)
Α	Steering to the left
В	Steering to the right

Adjusting

4. Any adjustment is carried out with adjusting screw 1. Screw counter-clockwise or clockwise depending on whether the lever oscillates in the A or the B direction. 1/2 a turn on the adjusting screw corresponds to a lever movement of 3 mm (0.118 in).

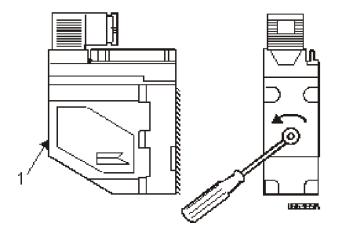


Figure 2
Adjusting lever movement in the A-direction

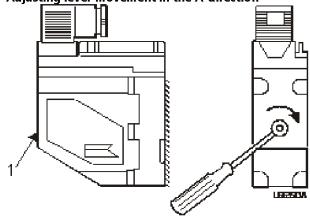


Figure 3 Adjusting lever movement in the B direction





Document Title: Steering lever C checking input/output voltage	CU3,	Information Type: Service Information	Date: 25.04.2013
Profile:			

Steering lever CU3, checking input/output voltage

Op nbr

- 1. Lower the arm rest and remove the plastic casing and the aluminium cover.
- 2. Turn the ignition key to position 1 and engage the lever steering with SW30.
- 3. The voltage at the steering lever CU3 and at MA28 must be approx. 24 V. Measure at connection 11 on ramp generator CU20/CU22 and at connection 1 on MA28.
- 4. Checking output voltage in green/black lead (412).

 Measure at connection 3 on ramp generator CU20/CU22.
 - A. Steering lever CU3 in neutral position approx. 12 V.
 - B. Move the steering lever to the right. The output voltage in the green/black lead (412) should increase gradually as the steering lever is moved to the end position. The voltage at the end position should be 15–18 V depending on how the steering speed is adjusted with adjusting screw B.
 - C. Move the steering lever to the left. The output voltage in the green/black lead (412) should gradually reduce as the steering lever is moved to the end position. The voltage at the end position should be 9–6 V depending on how the steering speed is adjusted with adjusting screw A.



New connection of steering lever CU3 where the built-in microswitch is not used.

- 5. Check the output signal from ramp generator CU20/CU22 in yellow lead (412A). Measure at connection 9 on the ramp generator or at connection 2 on MA28.
 - A. Move the lever quickly to the right and check that the signal is dampened. Steer to end position and release the steering lever. The signal should then reduce gradually. The damping (the ramp) is adjustable between 0 and 0.7 seconds for the starting and stopping signals.

NOTICE

CU22 has a ramp which is not adjustable. It has a fixed setting of approx. 0.2 seconds for starting and stopping.

- B. Move the lever quickly to the left and check that the signal is dampened. Steer to end position and release the steering lever. The signal should then increase gradually.
- 6. Check the ground connection for MA28 and for ramp generator CU20/CU22.
 - A. Turn the ignition key to position 0.
 - B. Disconnect the connector from MA28 on the control valve and check with an ohmmeter that there is a connection between the connector and ground connection 31C. Measure at a grounding point close to the valve and also check that the resistance is approx. 0 Ω .
 - C. Also check that there is a connection between connection 2 on the ramp generator and ground connection 31C.
 - D. Connect the connector to MA28.

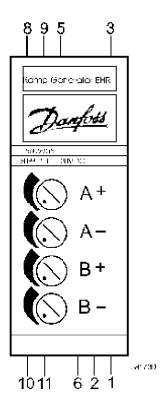


Figure 1 Connections on ramp generator



Service Information

Construction Equipment

Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

The front frame is built as an open box section. It carries the loader unit and the front axle is attached to it.

The rear frame consists of two frame members. Each frame member consists of a closed box section. The rear frame carries the cab, engine and components for the power transmission. The rear axle and the counterweight are also attached to the rear frame.

The engine and the transmission are rubber mounted in the frame.

Vital attaching surfaces between frame and components are machined, thereby obtaining an accurate fit and strong joints.

The frame joint upper bearing consists of a spherical link bearing and the lower bearing consists of two taper roller bearings.



Service Information

Document Title: Specifications, weights	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights L90C

Front frame	1200 kg (2646 lb)
Rear frame	950 kg (2094 lb)



Service Information Construction Equipment

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Belly plate	54 kg (119 lb)



Service Information

	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, tightening torques L90C

Belly plate – frame	60 N m (44 lbf ft)



Service Information Construction Equipment

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Counterweight	1200 kg (2646 lb)



Service Information

Construction Equipment

Document Title: Frame joint, replacing bearings	Function Group: 741	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Frame joint, replacing bearings

Op nbr 74136

999 3651 Draw bolt M30, length 650 mm (25.6 in)

999 3713 Draw bolt M20, length 700 mm (27.6 in)

999 3725 Draw bolt M20, length 160 mm (6.3 in)

999 3715 Intermediate piece

999 3722 Support

999 3739 Support

999 3742 Sleeve

11 666 013 Pump

11 666 014 Jack 12 tonnes

11 666 015 Jack 30 tonnes

11 667 001 Handle

11 667 100 Drift plate

11 667 110 Drift plate

11 667 120 Drift plate

11 667 130 Drift plate

11 667 170 Drift plate

11 667 171 Drift plate

E 985 Hose

Ratchet block, 750 kg (1653 lb), 2 pcs

Bottle-type jack, 1.5 tonnes, 1 pc

Screw stud, M16x260 mm, 2 pcs

NOTICE

The installation of the pivot pins is facilitated if the pins are cooled down to approx. -25 °C (-13 °F) beforehand.

Parting machine

- 1. Position the machine on level ground. Lower the lifting arms and leave any mounted attachment resting on the ground.
- 2. Release any pressure in the brake and hydraulic systems by depressing the brake pedal 30–40 times and by moving the control levers on the control lever carrier to their end positions several times.
- 3. Turn off the battery disconnect switch.
- 4. Drain the hydraulic oil.

Oil capacity: approx. 150 litres (40 US gal)

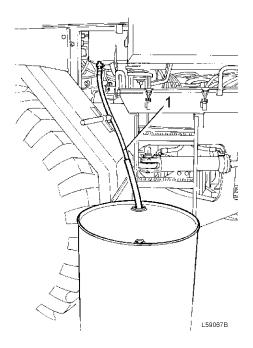


Figure 1

- 1. E 985
- 5. Remove the front propeller shaft.

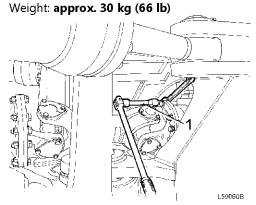


Figure 2

- 1. 999 3742
- 6. Remove the lining over the electrical distribution box and disconnect connector F and when applicable also connector FE from the electrical distribution box and the ground connection.

 Loosen the clamps and detach the cable harness from the rear frame.
- 7. Disconnect the steering cylinder piston rods.

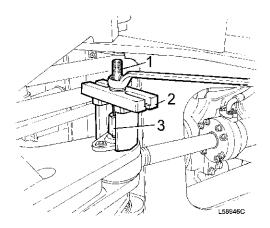


Figure 3

- 1. 999 3725
- 2. 999 3722
- 3. 999 3715
- 8. Disconnect the pressure hose and the return hose from the couplings at the frame joint. Collect the oil which runs out of the hoses in a vessel.
- 9. Block the rear axle from pivoting by placing a block of wood on either side of the machine between frame and rear
- Loosen the steering system shift valve and clamping from the upper frame joint pin.
 Move aside and if required tie up the servo hoses and the brake hose so that the upper the frame joint pin can be pulled out.
- 11. Position two jacks under the rear part of the machine, one under the guard plate and one under the transmission. Position one axle stand under the front frame part in front of the frame joint.

NOTICE

The front frame part is front-heavy at rate of approx. 1600 kg (3527 lb) (standard bucket) depending on bucket size. Without a bucket the front frame part is rear-heavy at a rate of approx. 500 kg (1103 lb).

The rear frame part is rear-heavy at a rate of approx. 1950 kg (4299 lb).

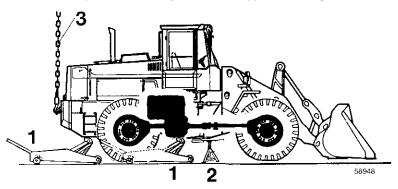


Figure 4
Securing machine

- 1. Jack
- 2. Axle stand
- 3. Securing machine when pulling apart (lifting device)

Removing upper pin

- 12. Fold the floor mat aside and remove the floor plate above the frame joint.
- 13. Install the tools on the upper pin. Pull out the pin.

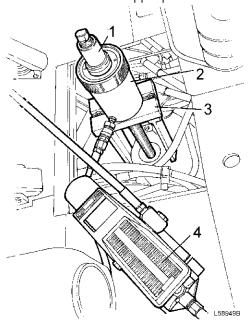


Figure 5

- 1. 999 3651
- 2. 11 666 015
- 3. 11 666 013
- 4. 999 3739

Removing lower pin

14. Remove the cover and the shims under the pin.

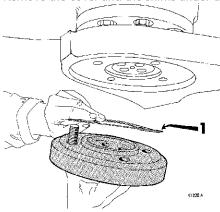


Figure 6

- 1. Shims
- 15. Install the tools on the lower pin and pull it out.

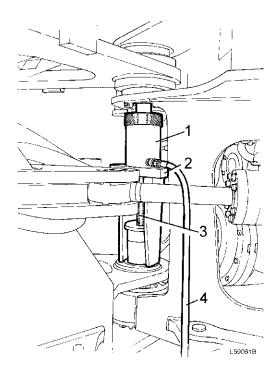


Figure 7

- 1. 11 666 015
- 2. 999 3739
- 3. 999 3651
- 4. 11 666 013

Pulling apart

16. Make sure that any load is taken off the frame joint so that the frame parts are clear of each other when pulled apart.

Secure the rear frame part with the aid of a lifting device (3).

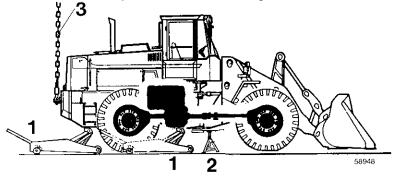


Figure 8
Securing machine

- 1. Jack
- 2. Axle stand
- 3. Securing machine when pulling apart (lifting device)
- 17. Manually release the parking brake.

L90C

Release the parking brake by slackening the lock nut (1) and then turning adjusting screw (2) counter-clockwise until the parking brake has been released.

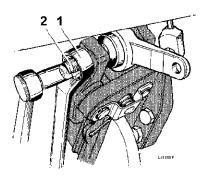


Figure 9 Releasing parking brake, L90C

- 1. Lock nut
- 2. Adjusting screw

L120C

Release the parking brake by removing the three plugs at the front of the transmission and replacing the plugs with $M10 \times 90$ mm bolts together with gaskets. Replace the plugs one at a time and screw in the bolts by hand.

NOTICE

Oil will run out until the plug has been replaced. This is why the plugs should be replaced one at a time.

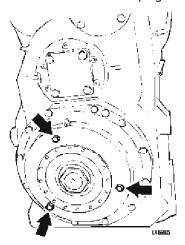


Figure 10 Releasing parking brake, L120C

When all plugs have been replaced, the bolts should be screwed in alternately right to the bottom, until the brake has been released.

18. Press the rear frame part rearward with the aid of a bottle-type jack.



Make sure that the jacks under the rear frame part move with the frame and that the servo hoses are not stretched so much that there is risk of hose rupture.

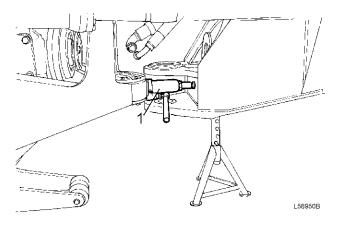


Figure 11 Parting frame parts

- 1. Bottle-type jack, 1.5 tonnes
- 19. Position safety supports under the frame parts.

 Position blocks in front of and behind the rear wheels.

Removing upper bearing

20. Prize away the seal rings. Remove the lock rings and press out the link bearing.

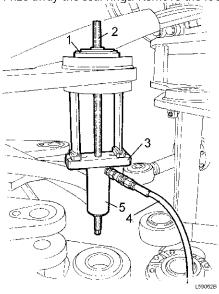


Figure 12

1	11 667 130	4	11 666 013
2	999 3713	5	11 666 014
3	999 3722		

Installing upper bearing

21. Place the lower lock ring in position.
Coat the bearing sliding surfaces with grease.
Press the bearing down against the lock ring.
Place the upper lock ring in position.

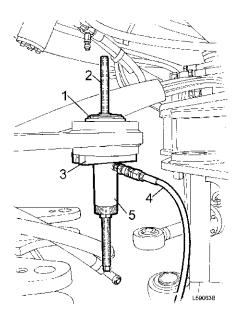


Figure 13

1	11 667 130	4	11 666 013
2	999 3713	5	11 666 014
3	999 3722		

22. Turn the seal rings according to Figure [?].

Press in the upper and lower seal ring according to Figure [?].

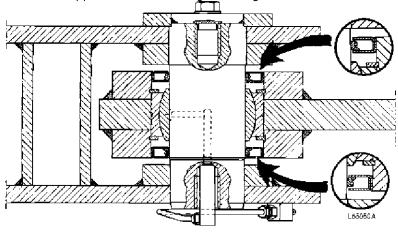


Figure 14

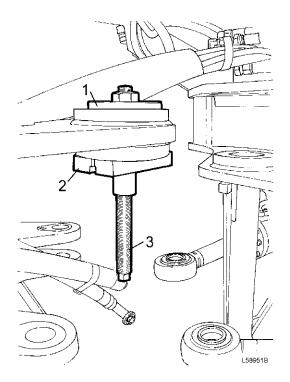


Figure 15 Pressing in seals

- 1. 11 667 171
- 2. 999 3739
- 3. 999 3651

Removing lower bearing

23. Press the bushing out of the front frame part.

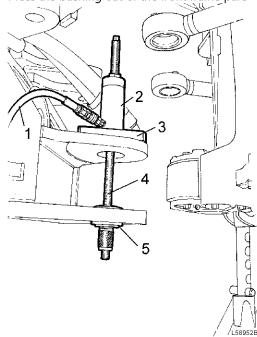


Figure 16

- 1. 11 666 013
- 2. 11 666 014
- 3. 999 3722
- 4. 999 3713

- 5. 11 667 100
- 24. Remove the upper bearing cover and the shim and the lower bearing cover.
- 25. Drive out the lower bearing race together with the bearings by driving on the upper bearing. Drive out the upper bearing race upward with the aid of 11 667 001 and 11 667 170.

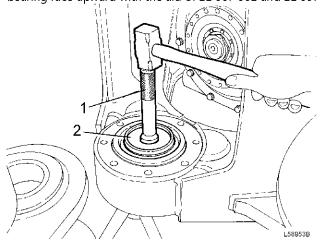


Figure 17
Driving out lower bearing race

- 1. 11 667 001 2. 11 667 110
- 26. Remove the spacer rings and drive the seal rings out of the upper and lower bearing covers.

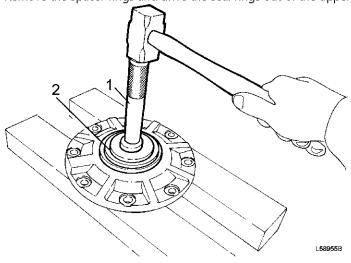


Figure 18

- 1. 11 667 001
- 2. 11 667 110

Installing lower bearing

27. Drive new seal rings into the covers.

In the lower cover (with grease nipple) the seal should be turned so that it seals from the inside. The seal in the upper cover is turned so that it seals from the outside, see Figure [?] and Figure [?].

Position the spacer rings in the bearing covers.

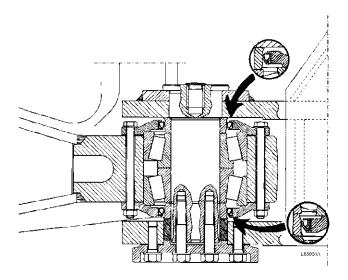


Figure 19

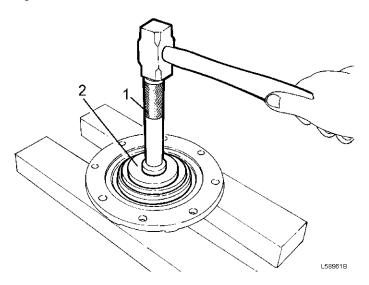


Figure 20 Driving-in seal rings

- 1. 11 667 001
- 2. 11 667 120
- 28. With the aid of a plastic mallet drive in the lower bearing race from underneath until their is approx. 10 mm (0.40 in) left to the face.

Position the lower cover and tighten down the cover with four nuts and bolts. Tighten the bolts alternately until the cover has pressed the bearing race into position.

29. Lubricate the bearings and position them.

Drive in the upper bearing race until there is approx. 10 mm (0.40 in) left.

Position the upper cover and press down the bearing race with the aid of the cover by tightening the bolts alternately.

Adjusting the rolling resistance of the bearings

30. Position the pin and roll in the bearings.

Apply a torque wrench to the pin. Tighten the four bolts alternately and at the same time measure the rolling resistance of the bearings.

Break off the tightening when the torque is 13-17 N m (10-13 lbf ft).

31. Measure the slot with the aid of a feeler gauge.



Make sure that the lower bearing cover fits up.

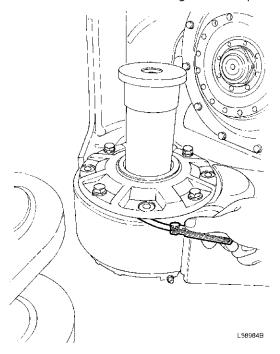


Figure 21 Measuring slot

32. Remove the upper cover and position shims corresponding to the measured slot. Position the cover and tighten the bolts.

Tightening torque: **85 N m (63 lbf ft)**

Again check the rolling resistance of the bearings. Rolling resistance: **13–17 N m (10–13 lbf ft)**

33. Lubricate the bushing with oil and press it into the frame joint lower lug.

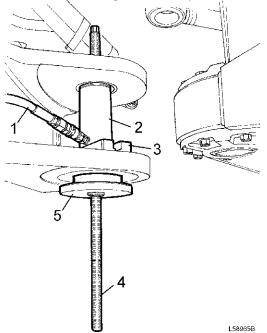


Figure 22

1. 11 666 013

- 2. 11 666 014
- 3. 999 3722
- 4. 999 3713
- 5. 11 667 171
- 34. Install the cover, without shims, from the underside of the frame joint lug and press in the bushing from below with the aid of the cover so that the bushing ends up flush with the upper face.

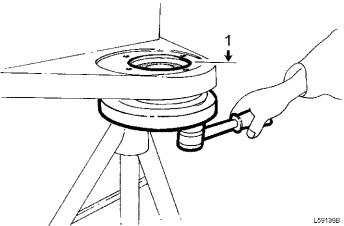


Figure 23 Pressing in bushing

1. Press the bushing until flush with the upper face

Assembling frame joint

35. Connect two ratchet blocks between the frame parts.

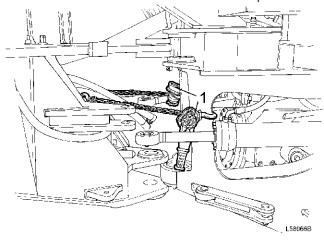


Figure 24

- 1. Ratchet blocks attached on either side of the centre line of the machine
- 36. Secure the rear frame part with the aid of a lifting device.

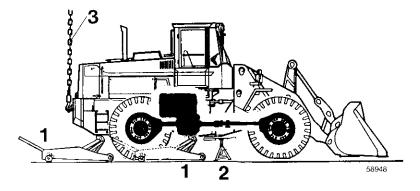


Figure 25 Securing machine

- 1. Jack
- 2. Axle stanc
- 3. Securing machine when pulling apart (lifting device)

37. Manually release the parking brake.

L90C

Release the parking brake by slackening lock nut (1) and then turning adjusting screw (2) counter-clockwise until the parking brake has been released.

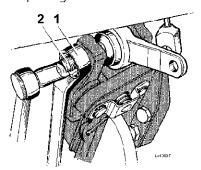


Figure 26 Releasing parking brake, L90C

- 1. Lock nut
- 2. Adjusting screw

L1200

Release the parking brake by removing the three plugs at the front of the transmission and replacing the plugs with $M10 \times 90$ mm bolts together with gaskets. Replace the plugs one at a time and screw in the bolts by hand.

NOTICE

Oil will run out until the plug has been replaced. This is why the plugs should be replaced one at a time.

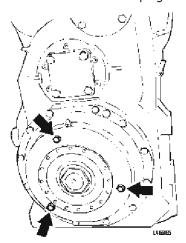


Figure 27

Releasing parking brake, L120C

When all plugs have been replaced, the bolts should be screwed in alternately right to the bottom, until the brake has been released.

38. Pull the rear frame part forward.



Make sure that the jack below the rear frame part also moves forward.

Carefully align the frame parts.



Make sure that the spacer rings in the seal rings do not catch against the front frame, as this may damage the seal rings.

Installing upper pin

39. Carefully align both pin locations relative to each other.

Apply grease to the pin and the bearing locations. Guide the pin with the aid of screw studs and pull down the cooled pin.

Approximately the last 5 mm (0.20 in) the pin is pressed down with the aid of the lock screws. Screw in the grease nipple.

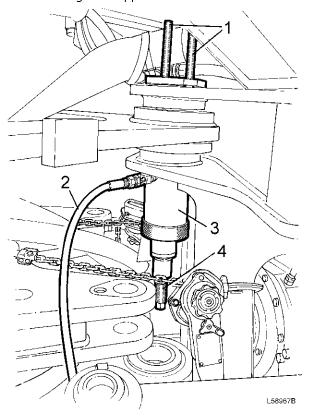


Figure 28

- 1. Screw stud, M16x260 mm
- 2. 11 666 013
- 3. 11 666 015
- 4. 999 3651

Installing lower pin

- 40. Check and when necessary adjust the height and bearing locations of the frame parts relative to each other.
- 41. Tighten down the cover on the lower frame joint lug without shims. Tighten the bolts loosely.

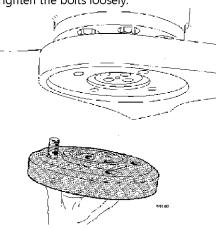


Figure 29 Attaching cover

42. Screw guide pins into the cooled pin. Lubricate the pin and the bearing location.

Position the pin so that the guide pins locate in the cover. Press down the pin.

When possible, replace the guide pins with the ordinary bolts and tighten these at the same time so that they aid the pulling down of the pin into position.

Tightening torque: 220 N m (162 lbf ft)

NOTICE

The bolts will also, with the cover, press up the bushing which tighten up spacers and bearings.

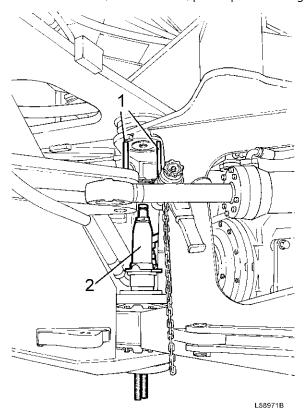


Figure 30

- 1. 999 3722
- 2. Bottle-type jack 1.5 tonnes

- 3. Guide pins M16x260 mm
- 43. Measure the slot between cover and frame in at least four places using a feeler gauge (the bolts between attaching washer and frame removed).

Remove the cover and position shims corresponding to the measured clearance between attaching washer and frame.

Tighten down the attaching washer.

Tightening torque: 220 N m (162 lbf ft)

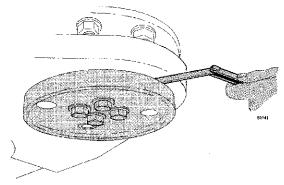


Figure 31
Measuring clearance
Cover accurred to pivot pin only and with

Cover secured to pivot pin only and without shims.

- 44. Remove all jacks and the support from the towing hook of the machine.
- 45. Tighten down the retainer for the servo hoses to the lock screws for the upper pin and secure the shift valve to the frame. Do not forget the spacers between valve and frame.
- 46. Connect the pressure hose and the return hose at the frame joint.
- 47. Connect the front frame cable harness to the electrical distribution box, connector F and when applicable connector FE and the ground connection.

Clamp the cable harness to the rear frame part.

Re-install the lining over the electrical distribution box.

- 48. Bolt down the floor plate and put the rubber mat back in position.
- 49. Bolt on the propeller shaft.

Connect and torque-tighten the front flange first. One of the front wheels should be raised off the ground, so that the propeller shaft can be rotated half a turn.

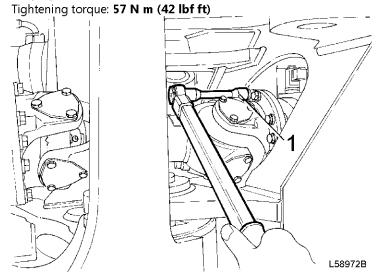


Figure 32 Attaching propeller shaft

1. 999 3742

50. Connect the steering cylinder piston rods.

If the piston has to be pushed in, loosen the hoses from the cylinder to let out the oil and press in the piston rod.

51. Fill with hydraulic oil.

Oil capacity L90C: approx. 130 litres (34.3 US gal)
Oil capacity L120C: approx. 145 litres (38.3 US gal)

- 52. Lubricate frame joint bearings and the steering cylinders piston rod pins.
- 53. Restore the parking brake.
- 54. Start the engine and check that there is no oil leakage.



Service Information

Document Title: Specifications, weights	ļ ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights L90C

Wheel without liquid ballast	340 kg (750 lb)
Wheel with liquid ballast CaCl ₂	750 kg (1653 lb)



Document Title: Cab, installing	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Cab, installing

Op nbr 81002

Sling, 2 m (6 ft), 2 pcs

- 1. Connect the slings to the handholds on the cab.
- 2. Check that the rubber elements are serviceable. Position a washer on each element.
- 3. Lift the cab into position.

Cab weight: approx. 700 kg (1543 lb)

Install the lower rubber elements and the bolts together with washers.



Figure 1 Installing cab

- 4. Remove the lifting device.
- 5. Connect the coolant hoses to the cab radiator.
- 6. Secure the evaporator to the climate control unit.



Do not disconnect the hoses from the evaporator, as it contains refrigerant under pressure.

- 7. Install the servo valve on the bracket and secure it.
- 8. Instal the plastic casing on the side of the control lever carrier.

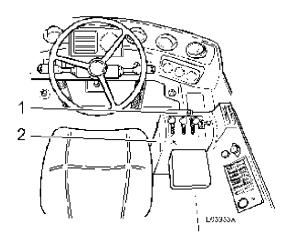


Figure 2

- 1. Casing over control levers
- 2. Casing on side of control lever carrier
- 9. Install the casing over the control levers.
- 10. Connect all cable harnesses to the electrical distribution box according to the markings on the connectors and on the electrical distribution box.
- 11. Install the engine heater and connect the reversing light cable.
- 12. Install the foot brake valve.
- 13. Connect the hoses to the steering valve.
- 14. Connect the control cable to the accelerator pedal.
- 15. Install the centre floor plate.
- 16. Put back the floor mat.
- 17. Install the brake pedal.



Document Title: Cab, removing	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Cab, removing

Op nbr 81001

Sling, 2 m (6 ft), 2 pcs

1. Detach the evaporator (AC) from the cab and lay it in a protected position on the steps.



Do not disconnect the hoses from the evaporator, as it contains refrigerant under pressure.

2. Disconnect the coolant hoses from the cab radiator.

NOTICE

Use pairs of hose pliers or alternatively drain the coolant.

3. Remove the casing over the control levers.

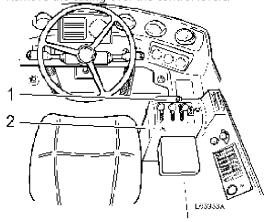


Figure 1

- 1. Casing over control levers
- 2. Casing on side of control lever carrier
- 4. Remove the plastic casing on the side of the control lever carrier.
- 5. Disconnect the cables from the control lever carrier.
- 6. Remove the brake pedal.
- 7. Remove the floor mat.
- 8. Remove the centre floor plate.
- 9. Detach the servo valve (four bolts) and lay down the servo valve together with hoses and levers through the hole in

the floor.

- 10. Detach the foot brake valve from the floor.
- 11. Disconnect the hoses from the steering valve.
- 12. Disconnect the control cable from the accelerator pedal.
- 13. Disconnect the connectors on the cable harnesses from the electrical distribution box and pull them out through the lead-through in the cab wall. Mark the respective holes and cable harnesses, so that they can be installed in the same holes when assembling.

The connectors are moved through the plastic nuts.

- 14. Remove the four attaching bolts, washers and lower rubber spacer securing the cab.
- 15. Disconnect the engine heater connection and the cable for the reversing lights.
- 16. Connect the slings to the handholds on the cab.
- 17. Lifting the cab.

Cab weight: approx. 700 kg (1543 lb)

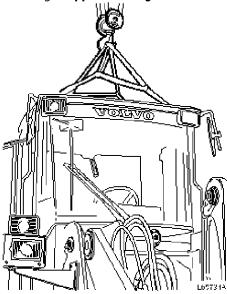


Figure 2 Removing cab



Service Information Construction Equipment

Document Title: Description	Information Type: Service Information	Date: 25.04.2013
Profile:		

Description

The windscreen on the cab is divided into three panes with silicone-sealed joints. To fix the position of the windscreen there are four clips at the upper edge.



Service Information

Construction Equipment

Document Title: Rear window, sealing	Function Group: 843	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Rear window, sealing

Op nbr

1. Inject sealant (part No. 11998258-5) at the upper corners between the rubber moulding and attaching edge, over a distance of approx. 60 + 60 mm (2.4 + 2.4 in).

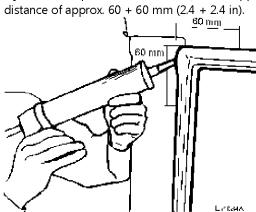


Figure 1

2. Inject sealant, over a distance of approx. 60 mm (2.4 in) at the lower corners.



Document Title: Rear window, replacing	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Rear window, replacing

Op nbr

Removing

- 1. Remove the wall lining at the rear and the rear window wiper motor.
- 2. Push out the window pane and the moulding at one corner and press the rubber moulding over the attaching edge and remove the window pane.

Installing

- 3. Install the rubber moulding on the window pane. Place a pulling cord (for example an electrical lead) in the fold for the attaching edge in the rubber moulding at the lower part of the pane and a little way up past the corner.
- 4. Lubricate the attaching edge in the cab with a soap solution or similar.

 Push up the window pane so that the moulding at the upper part of the pane is placed around the attaching edge of the cab.

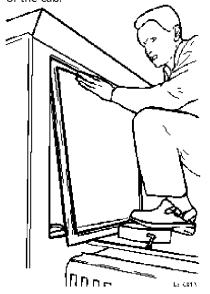


Figure 1

5. Press in the lower part of the pane and pull at the cord so that the moulding grips around the attaching edge, see <u>Figure [?]</u> and <u>Figure [?]</u>.

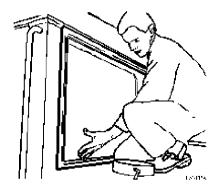


Figure 2

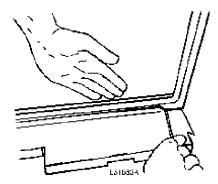


Figure 3

6. Seal the rear window, see ---- not implemented: INTXREF ----: .



Document Title: Windscreen side pane, replacing and sealing	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Windscreen side pane, replacing and sealing

Op nbr

Removing

- 1. Remove the working lights and the overhead panel from the front edge of the cab roof.
- 2. Remove the clips from the upper edge of the window pane.
- 3. Cut off the joints between windscreen and the side panes with a thin knife or similar.

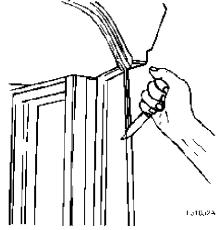


Figure 1

4. Prize out the side pane and the rubber moulding at the rear edge away from the cab post, see Figure [?] and Figure [?]

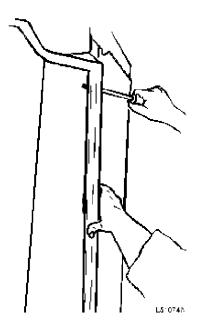


Figure 2

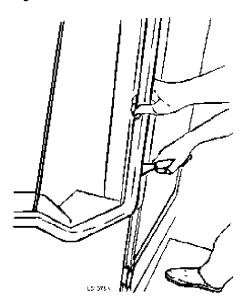


Figure 3

5. Fold the rubber moulding over the edge and remove the side pane.

Installing

- 6. Clean off any silicon sealant residue from the edge of the windscreen. Wash with spirit.
- 7. Lengths of butyl tape should be placed on the side member in the radius (corner) between the plate edge and the member from the upper to the lower corner, see measurement A in Figure [?].

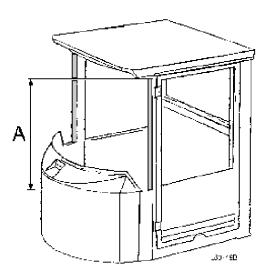


Figure 4

- 8. Install the side pane in the rubber moulding.
- 9. Place a pulling cord \emptyset 3–5 mm (0.12–0.20 in) (for example an electrical lead) in the fold for the attaching edge in the rubber moulding.
- 10. Press the side panes against their location in the cab. Pull at the cord from the inside so that the rubber moulding grips around the attaching edge in the cab, see Figure [?] and Figure [?].

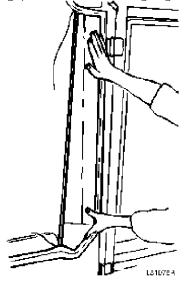


Figure 5

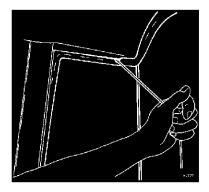


Figure 6

- 11. Tap with a rubber mallet so that the side pane bottoms in the moulding and fits tightly up against the cab post.
- 12. Lock the upper edge of the side pane with clips.
- 13. Seal the joint between windscreen and side pane, see ---- not implemented: INTXREF ----: .

Service Information

Construction Equipment

Document Title: Windscreen, sealing	Function Group: 843	Information Type: Service Information	Date: 25.04.2013	
Profile:				

Windscreen, sealing

Op nbr

1. Fold out gripping edge of the rubber moulding in all places where the sealing is to be improved.

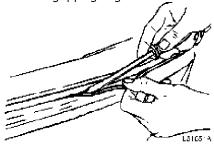


Figure 1

- 2. Inject sealant (part No. 11998258-5):
 - O between the rubber moulding and the attachment edge at both top corners of the windscreen over a distance of (approx. 150 mm (6 in)), see Figure ?.
 - O at the upper and lower rear corners of the side panes as a bead over a distance of approx. 70 mm (2.75 in), see Figure [?].

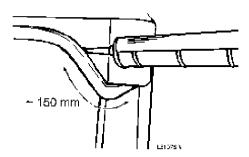


Figure 2

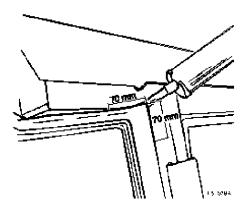


Figure 3

Document Title: Windscreen, replacing and sealing	Function Group: 843	Information Type: Service Information	Date: 25.04.2013
Profile:			

Windscreen, replacing and sealing

Op nbr

Removing

- 1. Remove the working lights and the overhead panel from the front edge of the cab roof.
- 2. Remove the clips from the upper edge of the window pane.
- 3. Cut off the joints between windscreen and the side panes with a thin knife or similar.

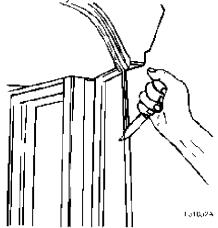


Figure 1

4. Lift the rubber moulding over the upper corner of the windscreen and push out the upper edge of the pane from the rubber moulding, see Figure [?] and Figure [?].

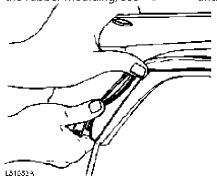


Figure 2

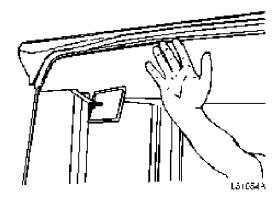


Figure 3

- 5. Lift away the windscreen.
- 6. Prize out the side panes and the rubber moulding from the attachment in the cab.

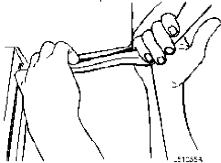


Figure 4

Installing

7. Lay the rubber moulding out on a level surface. Place a pulling cord \emptyset 3–5 mm (0.12–0.20 in) (for example an electrical lead) in the fold for the attaching edge in the rubber moulding, see Figure [?] and Figure [?] . Tape to prevent the cord from falling out.

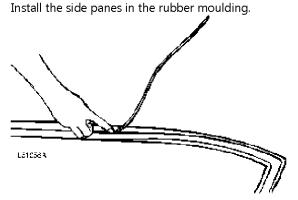


Figure 5

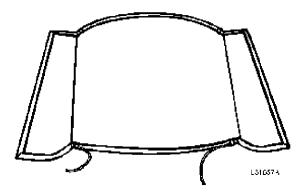


Figure 6

8. Lengths of butyl tape are placed on the side member in the radius (corner) between the plate edge and the member from the upper to the lower corner, see measurement A in Figure [?].

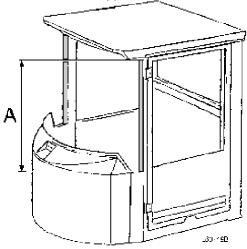


Figure 7

- 9. Lubricate the attaching edge in the cab with a soap solution or similar.
- 10. Place the two panes together with the rubber moulding in the window opening and push the side panes into position on the cab.

Pull at the cord from the inside so that the rubber moulding grips around the attaching edge round both side panes, see Figure [?] and Figure [?].

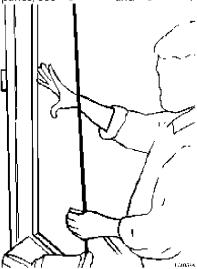


Figure 8

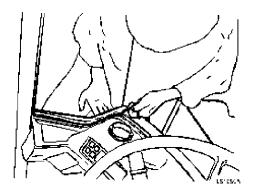


Figure 9

11. Tap with a rubber mallet so that the side panes bottom in the moulding and fit tightly up against the cab posts.

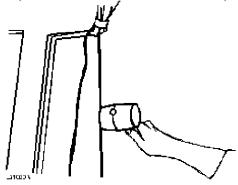


Figure 10

- 12. Lock the side panes with clips at the upper edge.
- 13. Push the rubber moulding onto the lower attaching edge in the cab and secure in position with tape.

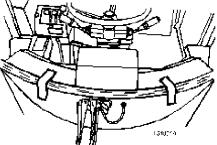


Figure 11

- 14. Lubricate the rubber moulding with a soap solution or similar, where the windscreen is to be placed.
- 15. Push the windscreen down into the rubber moulding and cut off the tape.

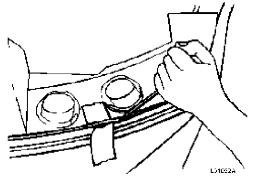


Figure 12

16. Push the rubber moulding onto the upper edge of the windscreen. Place the pulling cord in the fold for the attaching edge in the rubber moulding.

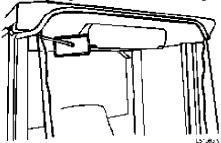


Figure 13

- 17. Make sure that the windscreen is positioned in the middle between the side panes, i.e. the slot between side pane and windscreen should be equally large on both sides.
- 18. Press in the upper edge of the windscreen and pull at the cord from the inside so that the rubber moulding grips around the attaching edge on the cab.

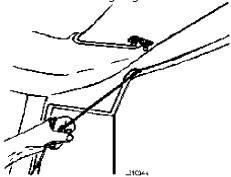


Figure 14

- 19. Seal the windscreen, see ---- not implemented: INTXREF ----: .
- 20. Install clip at the upper edge of the windscreen.
- 21. Adjust the position of the windscreen so that the slot is equally large on both sides.

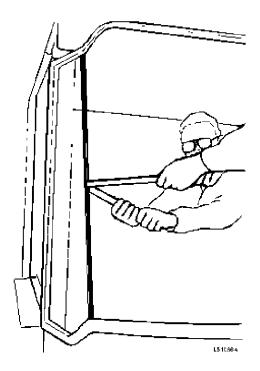
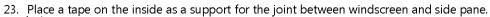


Figure 15

Sealing joint between windscreen and side panes

22. Wash the joints between windscreen and side panes with spirit.



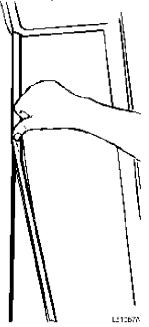


Figure 16

24. Place a tape externally on both sides of the joint, approx. 5 mm (0.20 in) from the edge.

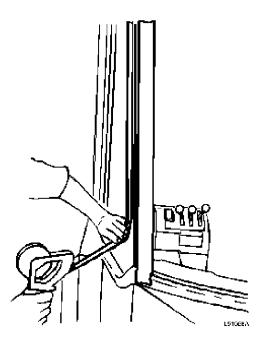


Figure 17

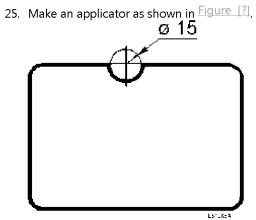


Figure 18 Applicator for silicone joint

26. Squeeze silicone sealant (part No. 11998259-3) into the joint making sure the joint is slightly over-filled.

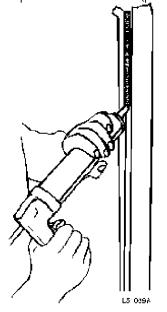


Figure 19

27. Level off the joint with the applicator so that an even joint is obtained.

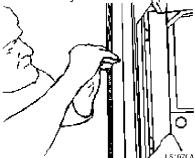


Figure 20

28. Immediately remove the tape before the sealant begins to dry, see Figure [?]. The supporting tape on the inside should be pulled away level with the panes removing as little as possible of the sealant, see Figure [?].

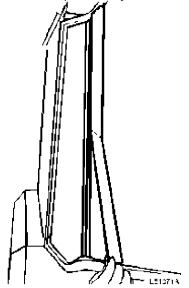


Figure 21

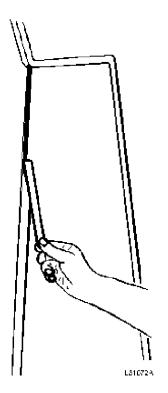


Figure 22



Service Information

Construction Equipment

Document Title: Description	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The machine is provided with a climate control system to which air conditioning (cooling unit) can be added. All controls for the climate control system are positioned by the right instrument panel.

The fan has four speeds and is controlled with the rotary switch on the right instrument panel. The temperature is controlled with a sliding control, which, via a control cable, actuates a valve which in turn controls the coolant flow through the hear unit.

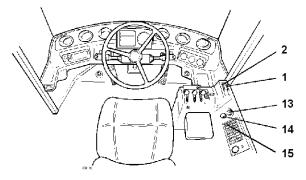


Figure 1 Right instrument panel

1	Recirculation control
2	Temperature control
13	Switch, cab fan
14	Thermostat, air conditioning
15	Switch, air conditioning



Document Title: Description	· · · · · · · · · · · · · · · · · · ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The air, which is blown into the cab, first passes through a washable, (replaceable) pre-filter and then through a replaceable filter, see Figure [?]. The filters are fitted inside the cover door on the right side of the cab. After the air has passed through the filters it is sucked into the fan and is then forced on through the heating unit and distributed throughout the cab.

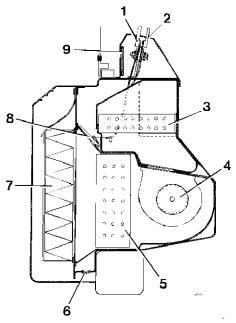


Figure 1 Climate control system, cross section

- 1. Recirculation control
- 2. Temperature control
- 3. Heating unit
- 4. Fan
- 5. Evaporator
- 6. Valve for draining condensation water
- 7. Prefilter / filter
- 8. Recirculation damper
- 9. Recirculation filter

The air is distributed through 14 air outlets. Nine of these outlets are individually adjustable and can also be closed, see Figure [?]. The air in the cab is discharged through a one-way outlet fitted with slats and placed in the cab door. In order to open the slats a certain degree of excess pressure in the cab is required. The higher pressure inside the cab contributes to keeping the cab free of dust.

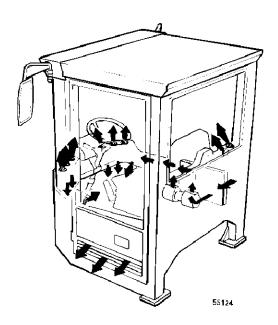


Figure 2 Cab, air outlets



Service Information Construction Equipment

Document Title: AC-safety, description of function	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

AC-safety, description of function

If the pressure in the system becomes too high (above 2.1-2.4 MPa) (305-348 psi) or too low (below 0.1-0.2 MPa) (15-29 psi), pressure monitor (SE22) interrupts the control current to (RE44) which is de-energised and the feed to compressor clutch (MA17) and the AC-safety (RE48 terminal 85) is interrupted.

The coil in relay (RE48 terminal 85) now becomes connected to ground via the thermostat and compressor clutch (SE21 -MA17) and is thus energised. The AC-safety (RE48) will remain energised until the feed is interrupted with switch (SW7).

Even if the pressure should become normal again so that pressure monitor (SE22) closes and restores the feed to (RE44), which then becomes energised, the unit will not start, because AC-safety (RE48) is energised and prevents current feed to relay (RE44 terminal 30).

The operator must first turn off the air conditioning and then turn it on for the system to start again.

This function is built into the system in order to inform the operator that the pressure has been outside the permissible range.

NOTICE

After an interruption, caused by incorrect pressure, the air conditioning should always be checked in order to determine and rectify any faults.





Document Title:		Information Type:	Date:
Air conditioning,	874	Service Information	25.04.2013
performance test			
Profile:			

Air conditioning, performance test

Op nbr 87403



Components such as recirculation filter, evaporator and condenser must be clean.

- 1. Warm up the machine to normal working temperature and place it in the shade.
- 2. Measure the ambient temperature and the relative humidity of the air. The measuring should be done in the shade.
- 3. Close the windows and the door. The ventilation hatches must be closed and all air nozzles in the cab fully open.
- 4. Leave the engine running at 1500 rpm. Turn the knob for the cab fan to position 4, set the recirculation control to the maximum position and the heating control to the minimum position.
- 5. Turn on the air conditioning and set the thermostat control knob to max. cooling (only applicable to machines provided with a thermostat control knob).
- 6. Check the performance of the air conditioning by measuring the temperature of the air coming out of the right-hand air nozzle on the rear wall.
 - Within 30 minutes the temperature should drop to, or fall slightly below, the temperature values given in the table below.

	Ambient temperature Air conditioning temperature values				
Relative humidity of the air	20°	25°	30°	35°	40°
10%	7°	7°	8°	10°	13°
20%	7°	7°	8°	11°	13°
30%	7°	7°	8°	12°	15°
40%	7°	8°	9°	13°	16°
50%	7°	8°	9°	14°	18°
60%	7°	8°	9°	15°	19°
70%	7°	8°	10°	16°	20°
80%	7°	9°	11°	17°	21°
90%	7°	10°	12°	18°	23°

7. If the temperatures stated in the performance test are not reached, see the Service Manual "AIR CONDITIONING, R134a".



Document Title: Description	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

See also Safety when working with refrigerant.

The air conditioning system, Figure [?] is filled with refrigerant (R134a) which is circulated in the system by compressor (5). The compressor, which obtains its drive from the diesel engine via a V-belt, is provided with an electro-magnetic clutch for engaging and disengaging the drive.

The compressor raises the pressure and thereby the temperature and pumps the refrigerant to condenser (6) to be cooled, where it, because of the increased pressure, changes into a liquid.

Receiver drier (7) absorbs any moisture which might be present in the refrigerant and also serves as a storage place (expansion tank) for the refrigerant.

Evaporator (5) is positioned between cab filter (9) and fan (4), see Figure [?].

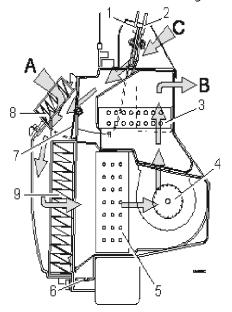
When the AC is started, the evaporator becomes cold and the air which passes through the evaporator core is cooled down. If the air becomes too cold, it can be heated to the required temperature with the aid of heating unit (3).

The amount of refrigerant passing through evaporator (1), Figure [?], is controlled by expansion valve (3), which senses the temperature at the outlet from the evaporator with the aid of capillary tube (8). The restriction in the expansion valve lowers the pressure and thereby also lowers the temperature of the refrigerant considerably. The refrigerant then changes from a liquid to a gas.

When the refrigerant passes through evaporator (1) it is heated by the air which passes into the cab between the evaporator fins. The temperature of the evaporator is controlled with the aid of a thermostat (4), which senses the temperature at the outlet from the evaporator with the aid of capillary tube (2). It is used for preventing ice from forming on the evaporator. When there is a risk of ice formation, the thermostat cuts out the compressor until the temperature has risen again.

The water which condenses on the evaporator is drained through a valve (6) at the bottom of the evaporator, Figure [?]. To achieve maximal cooling of the cab, a recirculation damper (7) can be opened and approx. 90 % of the air flow is then

The recirculated air is filtered through ordinary cab filter (9).



taken from the cab through this damper.

Figure 1
Climate control system, cross section

1	Recirculation control	5	Evaporator	9	Cab filter

2	Heating control	6	Valve	Α	Air from outside the cab
3	Heating unit	7	Recirculation damper	В	Air into the cab
4	Fan motor	8	Prefilter	С	Recirculation air

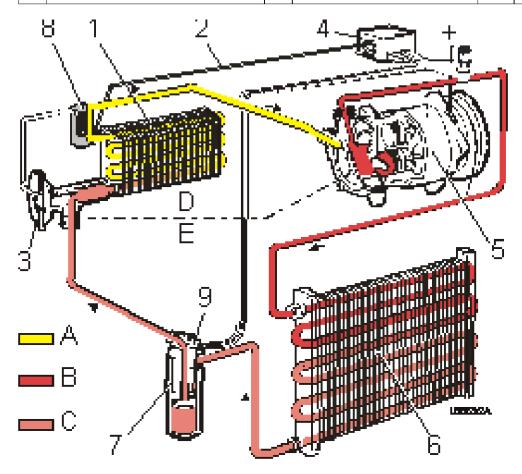


Figure 2 Air conditioning, principle diagram

1	Evaporator	8	Capillary tube to expansion valve
2	Capillary tube to thermostat	9	Pressure switch
3	Expansion valve	Α	Low pressure, gas form
4	Thermostat (always set to maximum position, thus not adjustable by the operator) positioned behind the side panel in the cab	В	High pressure, gas form
5	Compressor	С	High pressure, liquid form
6	Condenser	D	Low-pressure side
7	Receiver drier	Е	High-pressure side

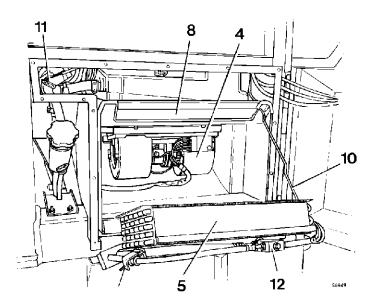


Figure 3 Climate control system from the outside, evaporator is lowered

4	Fan with rheostat for different speeds
5	Evaporator, lowered
8	Recirculation damper
10	Capillary tube
11	Valve for temperature control
12	Expansion valve

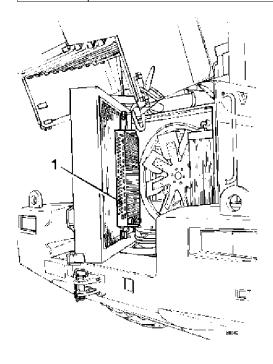


Figure 4

1. Condenser

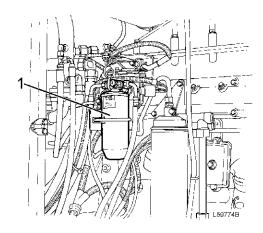


Figure 5
Inside the engine cover on the left side of the machine

1. Receiver drier

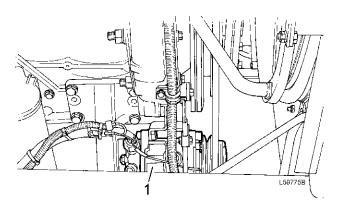


Figure 6
Inside the engine cover on the left side of the machine

1. Compressor

For more detailed descriptions of the component parts and repair instructions, see Service Manual "AIR CONDITIONING, R134a" and any relevant Service Bulletins.



Service Information

Construction Equipment

Document Title: Electrical system, air conditioning, description of function	Information Type: Service Information	Date: 25.04.2013
Profile:		

Electrical system, air conditioning, description of function

Normal operation

When the air conditioning is turned on with switch (SW7), relays (RE44 and RE48) obtain control current (RE44 via pressure monitor SE22), at the same time the motor for the cab fan (MO1) is switched on and is running at the lowest speed. The activation of the AC-safety (RE48) is delayed with the aid of a capacitor "C" connected in parallel. When relay (RE44) is energised, the compressor electro magnet (MA17) receives current from fuse (FU1) via switch (SW7), the contacts in relays (RE44 and RE48) and thermostat (SE21).

When relay (RE44) is energised, also relay (RE48) receives current at terminal 85, which means that the AC-safety (RE48) will not be activated. The activation of the AC-safety (RE48) is delayed with the aid of capacitor "C" which is connected in parallel. The delay of the energising of (RE48) is to safeguard that the supply via (RE44) is prioritised.

Summary

The air conditioning is turned on with switch (SW7) and while it is operating (RE44) is energised and pressure monitor (SE22) is closed. The temperature is controlled with thermostat (SE21). The AC safety (RE48) is not activated (obtains positive feed at both 86 and 85). Diode (DI1.30) is a quenching diode which protects thermostat (SE21) against the formation of sparks when it interrupts the feed to the compressor clutch (MA17).



Document Title: Refrigerant conditioning	in		Information Type: Service Information	Date: 25.04.2013
Profile:				

Refrigerant in air conditioning

See also Section Safety.

The system contains pressurised HFC-refrigerant R134a. It is illegal to purposely release this into the environment. Any service, refilling or emptying of the refrigerant circuit must only be carried out by a trained and accredited person.

This refrigerant has been developed as an alternative to the earlier refrigerant R12, as it has less environmental impact. R134a has, in difference to R12, no potentially depleting properties that will affect the ozone layer of the atmosphere, **but R134a is a so called greenhouse gas and must never intentionally be released into the open air.** If the system has to be serviced or repaired, the refrigerant must be collected in a special pressure vessel for recycling or destruction.

Do not mix different types of refrigerant

Pressure vessels, filling station, hoses etc. which are used for servicing a system filled with **R134a must never come into contact with another type of refrigerant**. Even very small quantities of for instance R12 has a greatly decomposing effect on R134a. This in turn may destroy components in the system.

Service, R134a air conditioning

The service valves are positioned by the evaporator, and are provided with quick-action couplings.

The safety valve is positioned next to the compressor. On L90C serial No. 13257– and L120C serial No. 10149– the safety valve on the compressor is plugged and the safety valve installed on a T-connection on the pressure hose. The same applies to machines with earlier serial numbers which have been updated.

There is no sight glass, which means that the only way of knowing, when the correct amount of refrigerant has been filled, is to use weighing scales.

NOTICE

Special equipment is required for filling or emptying a R134a air conditioning unit, see Service Manual "AIR CONDITIONING, R134a". Equipment intended for R12 air conditioning units must not be used. For filling/emptying R134a units, see Service Manual "AIR CONDITIONING, R134a".

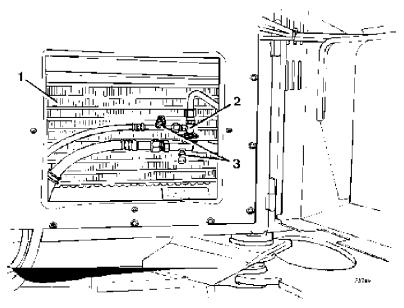


Figure 1
Air conditioning seen from the side

- 1. 2. Evaporator Expansion valve
- 3. Service valves for filling/emptying refrigerant



Service Information

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Amount of refrigerant R134a	2.1 +0.1 kg (4.6 +0.2 lb)
7 inodite of refingerant N134d	2.1 10.1 kg (4.0 10.2 lb)

11 041 167POL 161449a

Construction Equipment

Document Title: Wiring diagram, climate control system and air conditioning	874	 Date: 25.04.2013
Profile:		

Wiring diagram, climate control system and air conditioning

L90C Serial No. –15744 (EU) L120C Serial No. –12903 (EU)

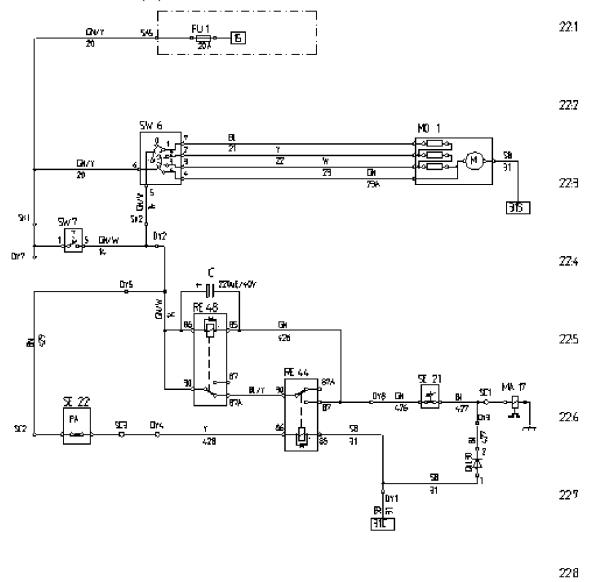


Figure 1
Wiring diagram, climate control system and air conditioning, circuit 22:1–22:7

FU1	Fuse for cab fan / air conditioning
SW6	Switch, cab fan

SW7	Switch, air conditioning
MO1	Motor, cab fan
SE21	Thermostat, air conditioning
SE22	Pressure monitor, air conditioning
RE44	Air conditioning safety
RE48	Air conditioning compressor
MA17	Compressor clutch
DI1.30	Quenching diode for MA17

L90C Serial No. 15745– (EU) L120C Serial No. 12904– (EU)

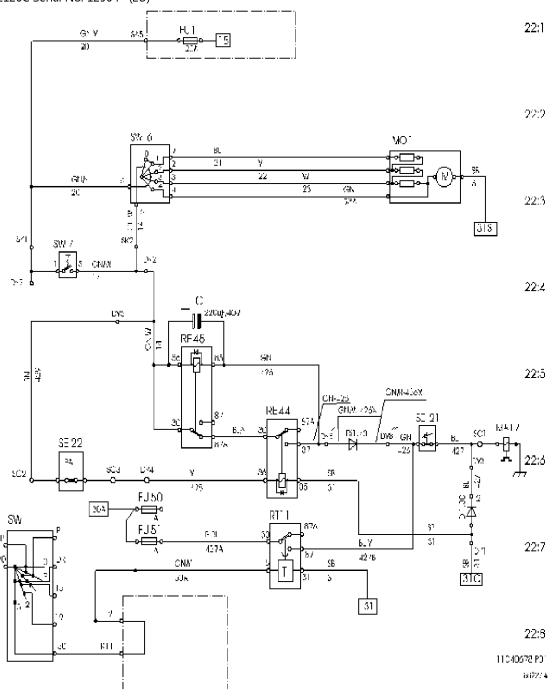
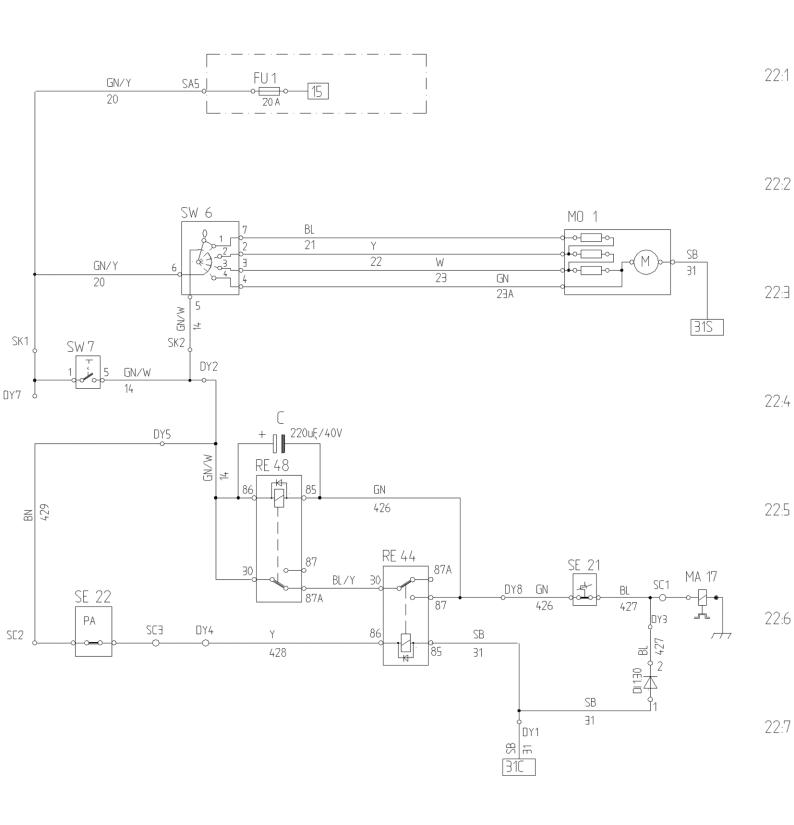
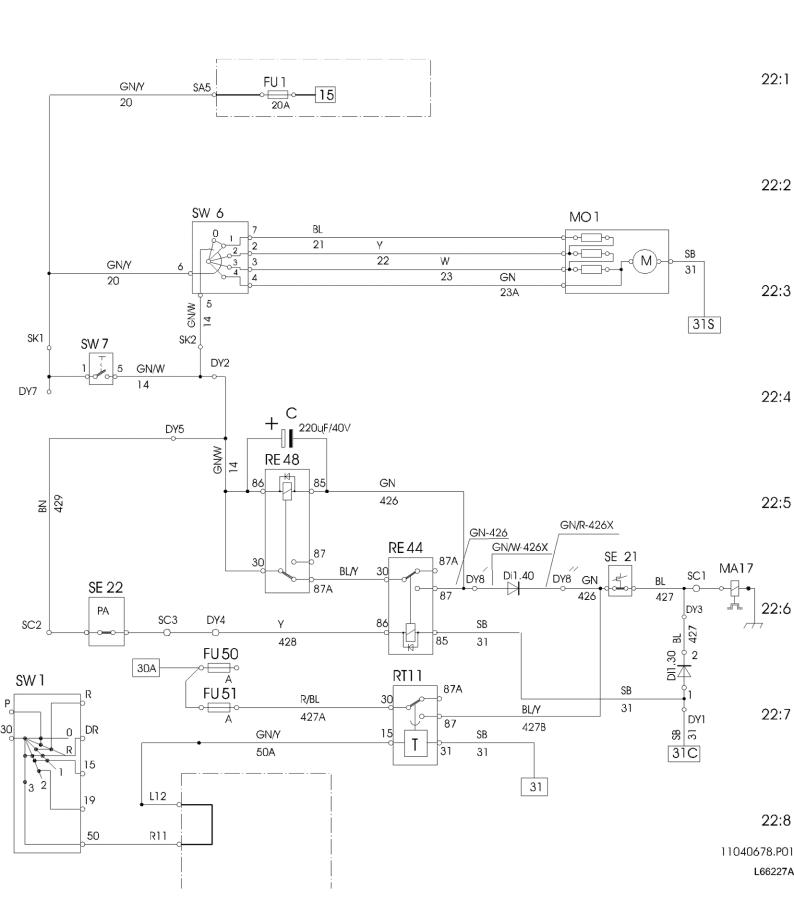


Figure 2 Wiring diagram, climate control system and air conditioning, circuit 22:1–22:7

FU1	Fuse for cab fan / air conditioning	SE21	Thermostat, air conditioning
FU50	Fuse for stop solenoid	SE22	Pressure monitor, air conditioning
FU51	Fuse for loud tone horn compressor	RE44	Air conditioning safety
SW1	Ignition switch	RE48	Air conditioning compressor
SW6	Switch, cab fan	RT11	Smooth start, compressor
SW7	Switch, air conditioning	MA17	Compressor clutch
MO1	Motor, cab fan	DI1.30	Quenching diode for MA17



22:8 11 041 119/P01 L61449a





Document Title: Hydraulic diagrams, working hydraulics	Function Group: 910	Information Type: Service Information	Date: 25.04.2013
Profile:			

Hydraulic diagrams, working hydraulics

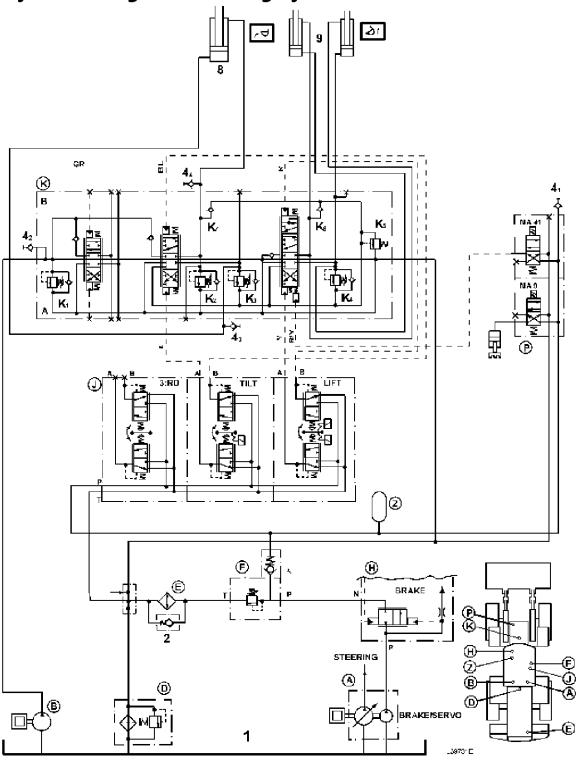


Figure 1 Hydraulic diagram L90C/L120C basic machine

Α	Hydraulic oil pump, steering, brake and servo systems
В	Hydraulic oil pump, working hydraulics
F	
D	Return-oil filter
E	Hydraulic oil cooler
F	Pressure-limiting valve, servo system, 3.0–4.0 MPa (435–580 psi)
Н	Control valve, brake and servo systems (installed in the brake valve)
J	Servo valve
K	Control valve
K ₁	Pressure-limiting valve, working pressure 22.5 MPa (3263 psi)
K ₂	Shock and anti-cavitation valve for piston rod end of tilting cylinder, 17.5 ±0.9 MPa (2538 ±131 psi)
K ₃	Shock and anti-cavitation valve for piston end of tilting cylinder, 24.5 ±0.9 MPa (3553 ±131 psi)
K ₄	Shock and anti-cavitation valve for piston end of lifting cylinders, 32.0 ±0.9 MPa (4641 ±131 psi)
K₅	Back-up valve for return pressure in connection with lowering or tilting forward, 1.0–2.0 MPa (145–290 psi)
K ₆	Anti-cavitation valve for piston rod end of lifting cylinders
K₂	Anti-cavitation valve for piston rod end of tilting cylinder
Р	Solenoid valve block: MA9 Differential lock, MA41 Floating position
Z	Accumulator for pressure back-up in servo circuit
1	Hydraulic oil tank
2	Non-return valve, by-pass for oil cooler
41	Pressure outlet, servo pressure
42	Pressure outlet, working pressure
4 ₃	Pressure outlet, shock pressure (piston end of tilting cylinder)
44	Pressure outlet, shock pressure (piston rod end of tilting cylinder)
8	Tilting cylinder
9	Lifting cylinders
_	

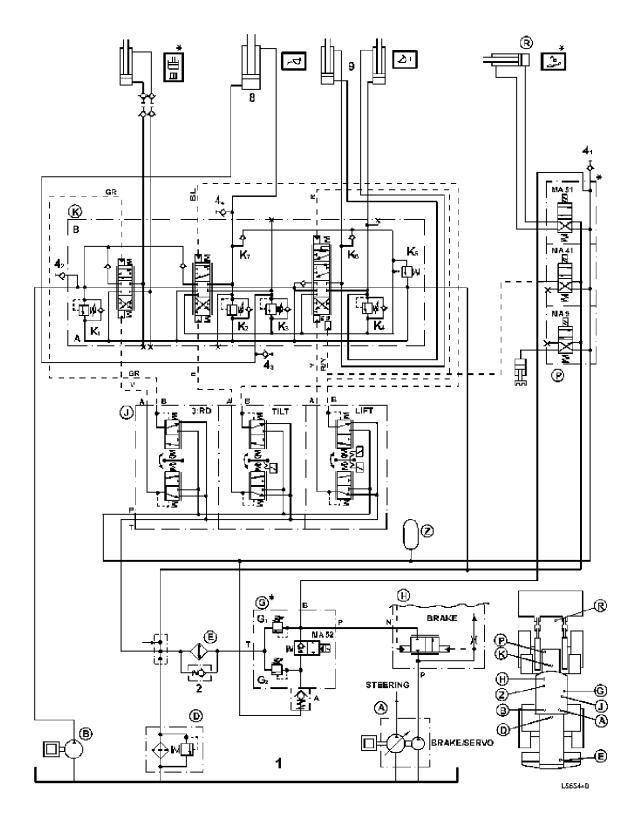


Figure 2 Hydraulic diagram L90C/L120C

The following equipment can be found on the hydraulic diagram:

Basic machine 3rd hydraulic function Pressure draining of quick-action couplings Separate attachment locking

Α	Hydraulic oil pump, steering, brake and servo systems
В	Hydraulic oil pump, working hydraulics

D	Return-oil filter
Е	Hydraulic oil cooler
G	Valve block, separate attachment locking
G ₁	Pressure-limiting valve, 15.0 \pm 0.5 MPa (2176 \pm 73 psi), for raised servo pressure
G ₂	Pressure-limiting valve, 3.0–4.0 MPa (435–580 psi), ordinary servo pressure
Н	Control valve, brake and servo systems (installed in the brake valve)
J	Servo valve
K	Control valve
K ₁	Pressure-limiting valve, working pressure 22.5 MPa (3263 psi)
K ₂	Shock and anti-cavitation valve for piston rod end of tilting cylinder, 17.5 ±0.9 MPa (2538 ±131 psi)
K ₃	Shock and anti-cavitation valve for piston end of tilting cylinder, 24.5 ±0.9 MPa (3553 ±131 psi)
K ₄	Shock and anti-cavitation valve for piston end of lifting cylinders, 32.0 ±0.9 MPa (4641 ±131 psi)
K₅	Back-up valve for return pressure in connection with lowering or tilting forward, 1.0–2.0 MPa (145–290 psi)
K ₆	Anti-cavitation valve for piston rod end of lifting cylinders
K ₂	Anti-cavitation valve for piston rod end of tilting cylinder
Р	Solenoid valve block: MA9 Differential lock, MA41 Floating position, MA51 Attachment locking (Optional equipment), MA52 Raised servo pressure
R	Hydraulic cylinders attachment locking (Optional equipment)
Z	Accumulator for pressure back-up in servo circuit
1	Hydraulic oil tank
2	Non-return valve, by-pass for oil cooler
41	Pressure outlet, servo pressure
42	Pressure outlet, working pressure
43	Pressure outlet, shock pressure (piston end of tilting cylinder)
44	Pressure outlet, shock pressure (piston rod end of tilting cylinder)
8	Tilting cylinder
9	Lifting cylinders

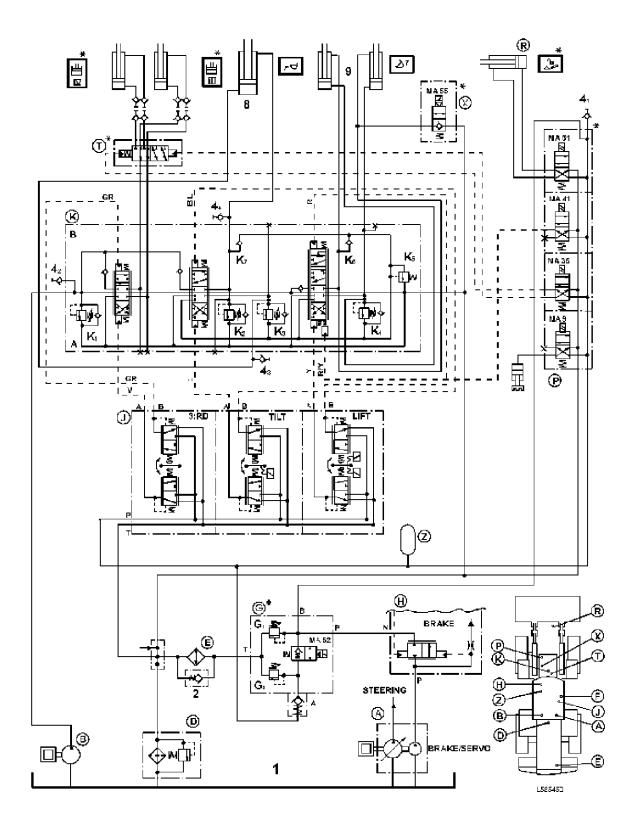


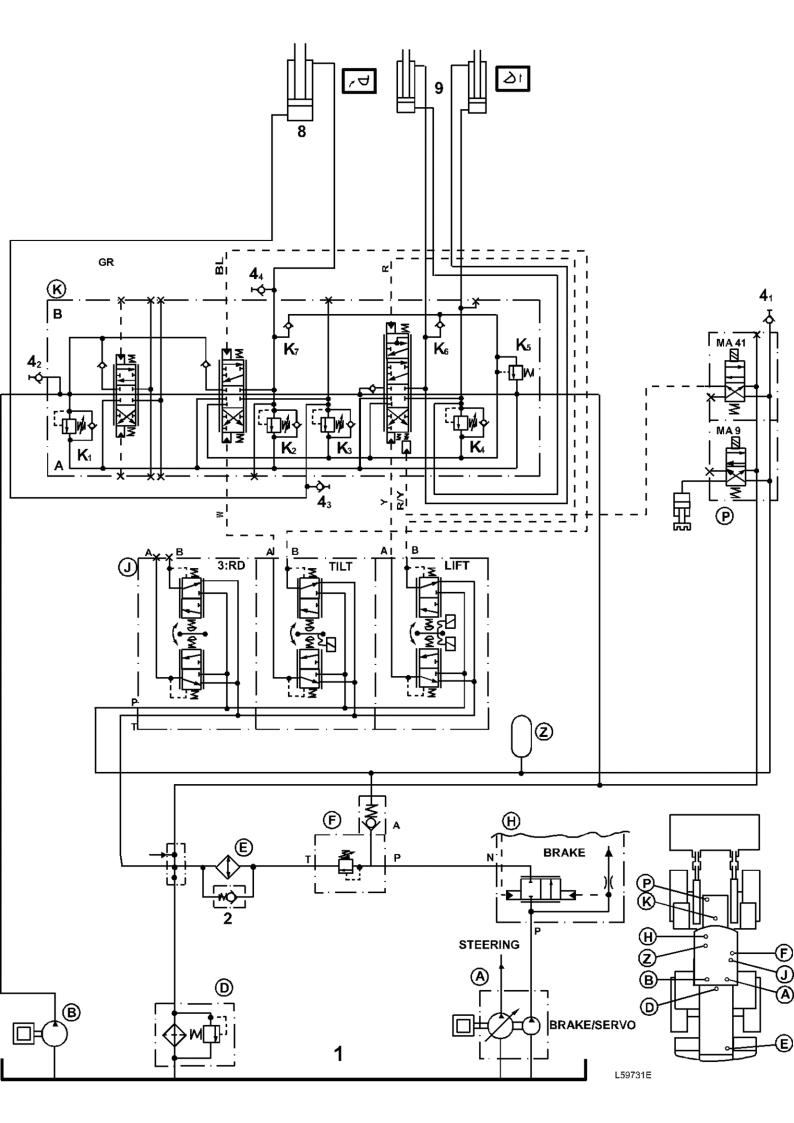
Figure 3 Hydraulic diagram L90C/L120C

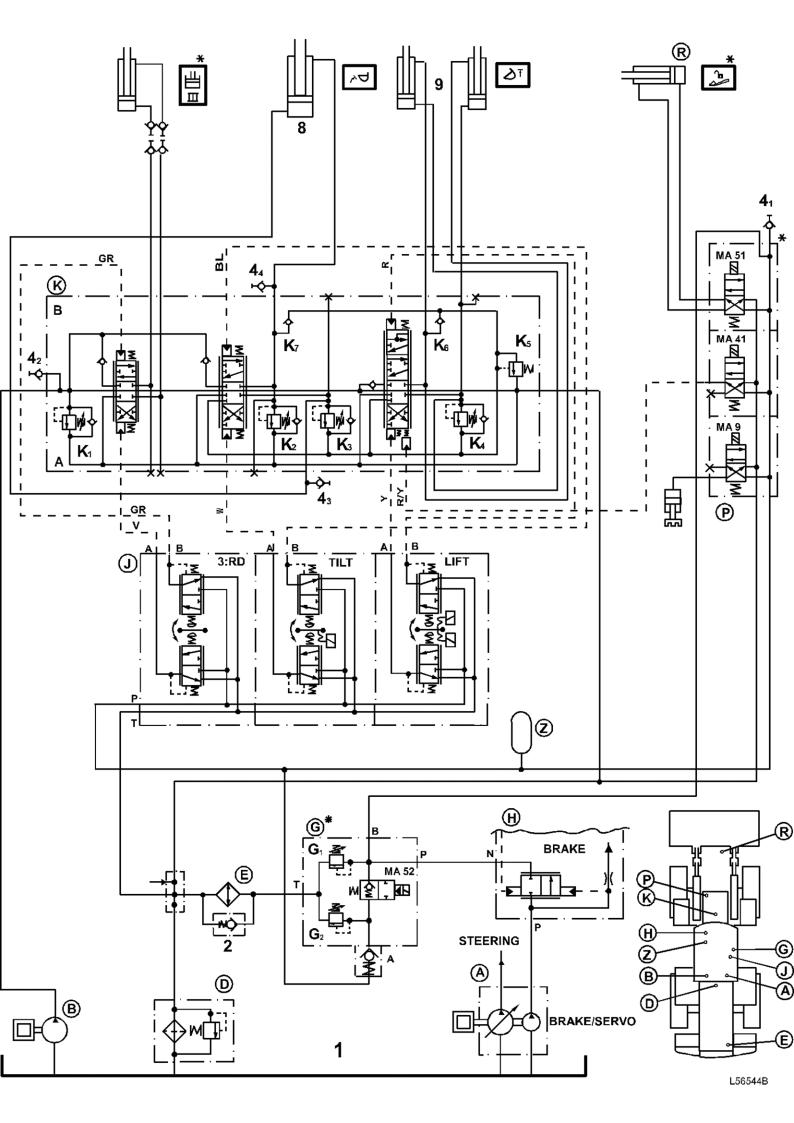
Α

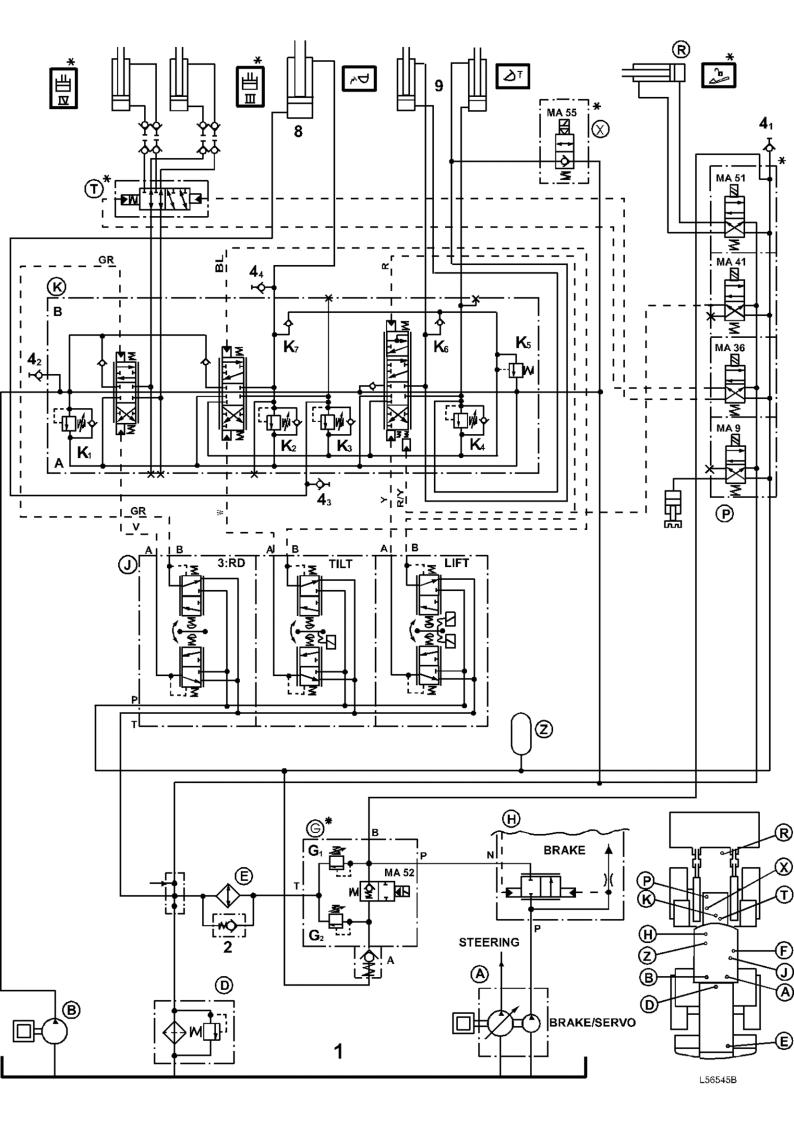
The following equipment can be found on the hydraulic diagram:

Basic Machine 3rd/4th hydraulic function Pressure draining of quick-action couplings Separate attachment locking Single-acting lifting function

В	Hydraulic oil pump, working hydraulics
D	Return-oil filter
E	Hydraulic oil cooler
G	Valve block, separate attachment locking
G ₁	Pressure-limiting valve, 15.0 \pm 0.5 MPa (2176 \pm 73 psi), for raised servo pressure
G ₂	Pressure-limiting valve, 3.0–4.0 MPa (435–580 psi), ordinary servo pressure
Н	Control valve, brake and servo systems (installed in the brake valve)
J	Servo valve
K	Control valve
K ₁	Pressure-limiting valve, working pressure 22.5 MPa (3263 psi)
K ₂	Shock and anti-cavitation valve for piston rod end of tilting cylinder, 17.5 ±0.9 MPa (2538 ±131 psi)
Kз	Shock and anti-cavitation valve for piston end of tilting cylinder, 24.5 ±0.9 MPa (3553 ±131 psi)
K ₄	Shock and anti-cavitation valve for piston end of lifting cylinders, 32.0 ±0.9 MPa (4641 ±131 psi)
K₅	Back-up valve for return pressure in connection with lowering or tilting forward, 1.0–2.0 MPa (145–290 psi)
K ₆	Anti-cavitation valve for piston rod end of lifting cylinders
Κz	Anti-cavitation valve for piston rod end of tilting cylinder
Р	Solenoid valve block: MA9 Differential lock, MA36 3rd/4th hydraulic function, MA41 Floating position, MA51 Attachment locking (Optional equipment), MA52 Raised servo pressure
R	Hydraulic cylinders attachment locking (Optional equipment)
Т	Change-over valve , 3rd/4th hydraulic function
Х	MA55 Single-acting lifting function (Optional equipment)
Z	Accumulator for pressure back-up in servo circuit
1	Hydraulic oil tank
2	Non-return valve, by-pass for oil cooler
41	Pressure outlet, servo pressure
42	Pressure outlet, working pressure
4 ₃	Pressure outlet, shock pressure (piston end of tilting cylinder)
44	Pressure outlet, shock pressure (piston rod end of tilting cylinder)
8	Tilting cylinder
9	Lifting cylinders









Service Information

Document Title: Specifications, capacities	Information Type: Service Information	Date: 25.04.2013
Profile:		

Specifications, capacities

Hydraulic system, total	130 dm³ (litres) (34.3 US gal)
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Service Information

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Hydraulic system	
Туре	Servo-controlled of the "open centre" type



Service Information

Document Title: Working description	hydraulics,	Information Type: Service Information	Date: 25.04.2013
Profile:			

Working hydraulics, description

The working hydraulics consists of among other things oil tank, hydraulic oil pumps, servo controlled control valve, servo valve, solenoid valve(s), hydraulic oil cooler and control cylinders.

The pressure-limiting valve limits the maximum pressure in the hydraulic system.

The oil tank, which is common to the brake system, the steering system and the working hydraulics, is provided with a return oil filter. The tank is ventilated through a separate breather filter.

The servo pump is a vane pump that is common to the servo and brake systems. The pump is mounted together with the steering pump on the right power take-off on the transmission. The servo system has a separate pressure-limiting valve that limits the pressure in the servo circuit.

The servo valve, which receives its oil from the servo pump, has a closed centre. This means that the oil flows via a pressure-limiting valve, without passing the servo valve, directly to the tank in neutral position. The servo valve consists of three sections, one for each hydraulic function. The servo valve is provided with detent solenoids (electro magnets) for the floating position, the bucket positioner and the boom kick-out as well as a microswitch for engaging the floating position on the lifting/lowering function.

The hydraulic oil pump for the working hydraulics is a single vane pump that receives its drive from the left power take-off on the transmission.

The control valve, which receives its oil directly from the working hydraulics pump, has an open centre. This means that the hydraulic oil passes through the control valve and directly to tank, when the control valve spools are in neutral position. The control valve consists of three sections, 3rd hydraulic function, tilting function and lifting/lowering function with floating position.

Floating position means that the piston and piston rod ends of the lifting cylinders are connected through the return line. The piston rod end is directly connected and the piston end has a connection to the return line via the back-up valve. The spool in each section is controlled by a servo valve. Each section is provided with a load-holding valve which ensures the position of the cylinders when a movement has been completed and counteracts undesired movements when starting. Shock valves limit the pressure in the tilting functions and in the lifting function during shock loads.

The tilting and lowering functions have anti-cavitation valves which ensure after-filling in the cylinders.

The back-up valves pressurises the return oil when lowering and tilting forward and contributes to improved filling.

The solenoid valves for control of different functions receive their oil from the hydraulic system servo circuit. The solenoid valves control engagement of floating position and differential lock and the solenoid valves for optional functions.

The hydraulic oil cooler, which is positioned together with the engine coolant radiator, is connected between the servo system pressure-limiting valve and the hydraulic oil tank return oil filter.

The control cylinders consist of one tilting cylinder and two lifting cylinders and one cylinder for the hydraulic locking of the attachment bracket (optional equipment), and any cylinders for other equipment.

The lifting frame is made up of two arms attached to the upper part of the front frame. The arms are joined together to form one rigid construction, which also carries a linkage which transfers the tilting movement. The lifting cylinders are well protected in that they are attached high up in the front frame. The tilting movement is performed by a sturdy cylinder positioned between the lifting arms. Because of the position of the tilting cylinder and the design of the linkage, the attachment is kept parallel to the ground throughout the lifting movement and high break-out torque is maintained throughout the range. These properties have given the arm system its name, TP-linkage.

"T" stands for torque and "P" for parallel. The bucket can be attached via a special attachment bracket or be direct-mounted to the lifting frame.

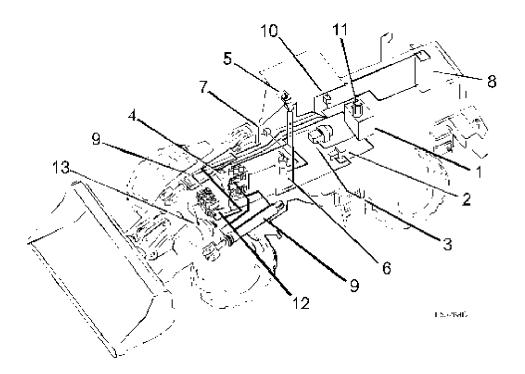
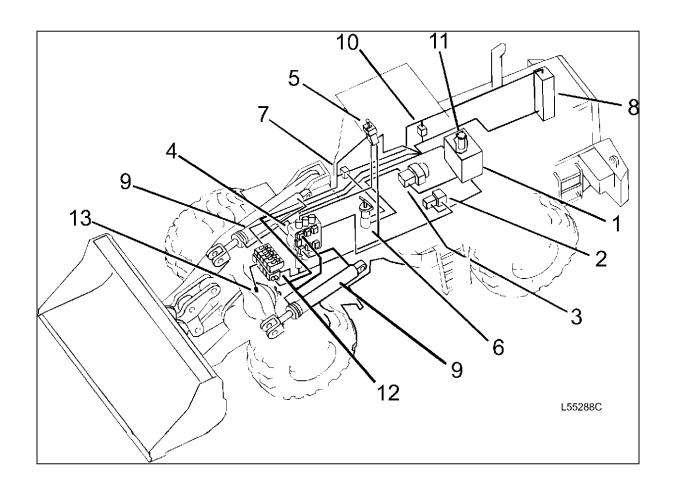


Figure 1 Hydraulic system, working hydraulics

1	Hydraulic oil tank	8	Oil cooler
2	Hydraulic oil pump, working hydraulics	9	Lifting cylinder
3	Hydraulic oil pump, servo and brake systems	10	By-pass valve for oil cooler
4	Control valve	11	Return-oil filter
5	Servo valve	12	Solenoid valves
6	Brake valve	13	Differential lock, engagement
7	Pressure-limiting valve		





Document Title: Control valve	1	Information Type: Service Information	Date: 25.04.2013
Profile:			

Control valve

Control valve functions

- O Control valve
- O Control valve, connections for servo pressure
- O Section of control valve
- O Back-up valve, return pressure
- O Control valve, neutral position
- O Control valve, tilting rearward
- O Back-up valve, return pressure, non-actuated position

A new control valve has been introduced in production w.e.fr. the following serial No.:

	W.e.fr. serial No.	
Machine	EU	US
L90C	13644-	62229–
L120C	10668-	61513-

The return springs for the spools in the new control valve are longer, which means that the casings have been made longer too. Only the new version is available as spare part.

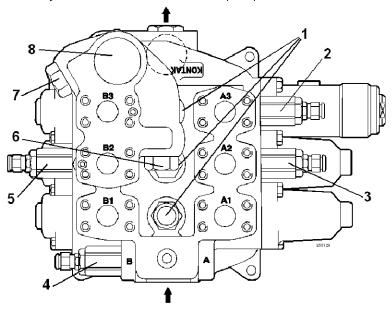


Figure 1 Control valve

- 1. Load-holding valve
- 2. Shock and anti-cavitation valve, lifting (piston end)
- 3. Shock and anti-cavitation valve, tilting rearward (piston end)
- 4. Pressure-limiting valve, working pressure
- 5. Shock and anti-cavitation valve, tilting forward (piston rod end)
- 6. Anti-cavitation valve, tilting forward

- 7. Anti-cavitation valve, lowering
- 8. Back-up valve for return pressure, 1.0–2.0 MPa (145–290 psi)

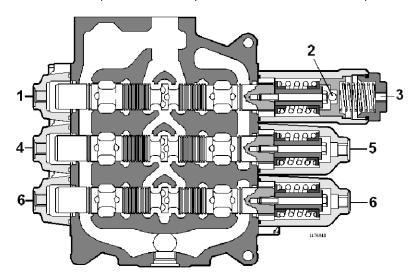


Figure 2 Control valve, connections for servo pressure

- 1. Lowering function
- 2. Lifting function
- 3. Floating position function
- 4. Tilting function, forward
- 5. Tilting function, rearward
- 6. Optional hydraulic function

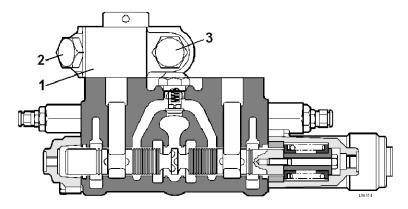


Figure 3
Section of control valve

- 1. Back-up valve, return pressure
- 2. Anti-cavitation valve, lowering (piston rod end of lifting cylinder)
- 3. Anti-cavitation valve, tilting forward (piston rod end of tilting cylinder)

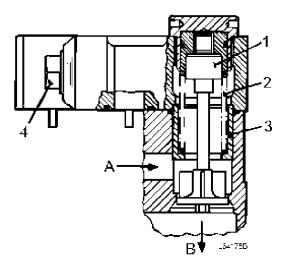


Figure 4 Back-up valve, return pressure

- A. Return from the function tilting forward and lowering (piston end of tilting cylinder and piston end of lifting cylinder)
- B. Return to tank
- 1. Valve poppet
- 2. Spring
- 3. Seat for spring
- 4. Anti-cavitation valve, tilting forward (piston rod end of tilting cylinder)

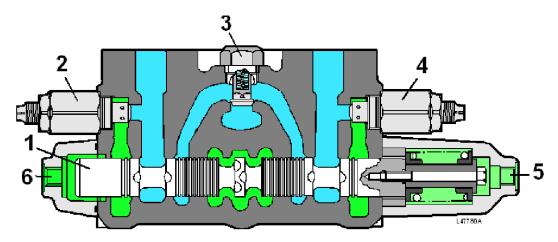


Figure 5 Control valve, neutral position

Valve spool for tilting function with its shock and anti-cavitation valves and load-holding valve in neutral position

- 1. Valve spool for tilting function
- 2. Shock and anti-cavitation valve, tilting forward (piston rod end)
- 3. Load-holding valve
- 4. Shock and anti-cavitation valve, tilting rearward (piston end)
- 5. Connection for servo pressure, tilting rearward
- 6. Connection for servo pressure, tilting forward

Green	Atmospheric pressure
Blue	Raised return pressure

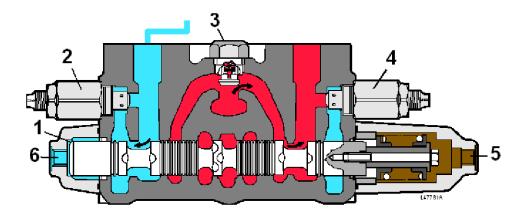


Figure 6
Control valve, tilting rearward

Valve spool for tilting function, in position for tilting rearward with its shock and anti-cavitation valve and load-holding valve

- 1. Valve spool for tilting function
- 2. Shock and anti-cavitation valve, tilting forward (piston rod end)
- 3. Load-holding valve
- 4. Shock and anti-cavitation valve, tilting rearward (piston end)
- 5. Connection for servo pressure, tilting rearward
- 6. Connection for servo pressure, tilting forward

Red	Working pressure
Blue	Raised return pressure
Orange	Servo pressure

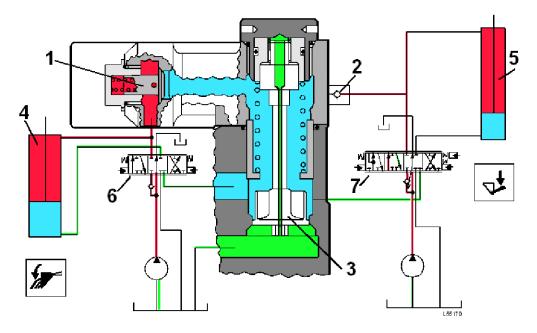


Figure 7
Back-up valve for return pressure, non-actuated position

- 1. Anti-cavitation valve, tilting forward
- 2. Anti-cavitation valve, lowering
- 3. Back-up valve
- 4. Tilting cylinder
- 5. Lifting cylinder
- 6. Control spool, tilting function
- 7. Control spool, lifting function, lowering function

Red	Working pressure
Blue	Raised return pressure
Green	Atmospheric pressure



Document Title: Shock and anti-cavitation valve	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Shock and anti-cavitation valve

Shock and anti-cavitation valve functions:

- O Shock function
- O Anti-cavitation function

Shock function

When the pressure from cylinder (6) increases, pilot valve (1) will open at the preset opening pressure.

When the oil begins to flow past the pilot valve, the pressure in chamber (2) will drop in relation to the pressure from the cylinder. Pipe (3), which works as a movable restriction, will move with the flow and seal against the pilot valve.

This means that the shock pressure now acts on the entire area of the pipe and the valve will close at a pressure comparatively lower than the opening pressure. The oil in the chamber is connected to tank via the open pilot valve. Piston (5) can now open and the shock pressure is drained directly to the tank connection.

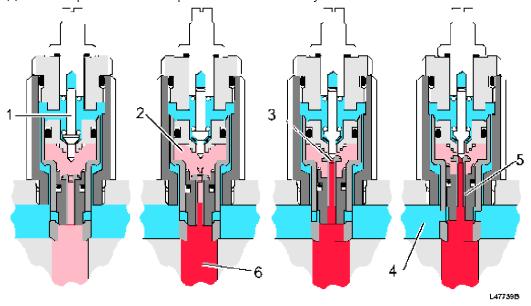


Figure 1
Shock function

The sequence of events is shown from left to right

- 1. Pilot valve
- 2. Chamber
- 3. Pipe
- 4. Tank connection
- 5. Piston
- 6. Connection to cylinder

Blue	Raised return pressure
Pink	Partial working pressure
Red	Working pressure

Anti-cavitation function

When the pressure in the cylinder drops, the pressure in chamber (1) also drops to a level lower than the tank pressure. The tank pressure now acts on piston (4) and lifts the same, causing after-filling to take place.

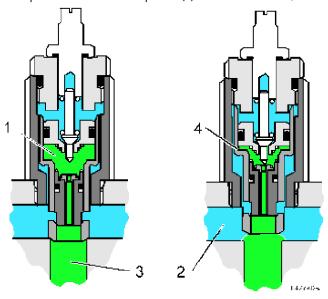


Figure 2 Anti-cavitation function

The sequence of events is shown from left to right

- 1. Chamber
- 2. Tank connection
- 3. Connection to cylinder
- 4. Piston

Blue	Raised return pressure
Green	Atmospheric pressure



Service Information

Document Title: Specifications, capacities	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, capacities

Hydraulic oil tank	95 dm³ (litres) (25.1 US gal)
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Service Information

Document Title: Specifications, general	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Control valve		
Designation	KM302 / 351 9220 126	
Shock valve, tilting rearward (piston end)	24.5 ±0.9 MPa (245 ±9 bar) (3553 ±131 psi)	
Shock valve, tilting forward (piston rod end)	17.5 ± 0.9 MPa (175 ±9 bar) (2538 ±131 psi)	
Shock valve, lifting	32.0 ±0.9 MPa (320 ±9 bar) (4641 ±131 psi)	
Back-up valve, tilting forward and lowering	1.0-2.0 MPa (10-20 bar) (145-290 psi)	

Operating times (approximate times) high idling speed	
Lifting, with SAE operating load	5.5 seconds
Lowering, without load	2.3 seconds
Forward tilting, with SAE operating load	1.6 seconds
Forward tilting, without load	2.5 seconds



Document Title: Description	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Description

The pump consists of one inlet housing, one outlet housing, two side plates, one drive shaft and one pump unit.

The pump unit consists of an elliptical cam ring, a rotor with 12 vanes and thrust pins. The rotor is secured to the drive shaft with splines.

The hydraulic oil flows into the pump unit via the inlet port and is forced out through the side plate and leaves the pump via the outlet port.

A new pump has been introduced in production w.e.fr. the following serial No.

	W.e.fr. serial No.		
Machine	EU	US	Brazil
L90C	14819–	62770-	70149–
L120C	11867–	61930-	70169–

The new pump has thrust plates made from nodular iron and the oil ducts have a new shape. Only the new version is available as spare part.

Function

The rotor is turned inside the cam ring by the drive shaft. When the rotor turns, the centrifugal force and the pressurised thrust pins force out the vanes so that they follow the elliptical inside of the cam ring. The radial movement of the vanes and the rotation of the rotor, cause the spaces between the vanes to increase when they pass the inlet to the cam ring, resulting in a partial vacuum so that oil is sucked into the spaces between the vanes.

When the oil has been moved past the inlet, it is closed in between the vanes, the cam ring, the rotor and the side plates. As the oil gets closer to the outlet the distance between rotor and cam ring reduces and the pressure rises accordingly. When the oil reaches the outlet, the oil is forced out by the increased pressure.

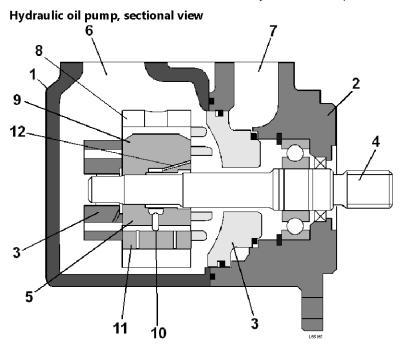


Figure 1 Hydraulic oil pump

1	Inlet housing	7	Outlet port
2	Outlet housing	8	Cam ring
3	Side plates	9	Rotor
4	Drive shaft	10	Thrust pin
5	Pump unit	11	Vane
6	Inlet port	12	Pressure duct



Service Information

Construction Equipment

Document Title: Specifications, general	Information Type: Service Information	Date: 25.04.2013
Profile:		

Specifications, general

Hydraulic oil pump (working hydraulics)		
Designation	T6DM - B31 - 3R00 - C1 - M2 - 63669	
Working pressure, high idling speed	22.5 ±0.4 MPa (225 ±4 bar) (3263 ±58 psi)	
Flow at 36.7 r/s (2200 rpm) and 10 MPa (100 bar) (1450 psi) pressure	212 litres (56 US gal) per minute	



Service Information

Document Title: Specifications, weights	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Hydraulic oil pump, working hydraulics	31 kg (68 lb)	
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Document Title: Working pressure, checking and adjusting	l	Information Type: Service Information	Date: 25.04.2013
Profile:			

Working pressure, checking and adjusting

Op nbr 91324

999 3831 Support 11 666 020 Pressure gauge 0–25 MPa (0–3626 psi) 11 666 037 Hose

The following applies when checking:

Temperature: Normal working temperature

Speed: **High idling speed**

Working pressure: 22.5 MPa (3263 psi)

NOTICE

Always use the support to secure the lifting frame when carrying out work under the lifting frame, see $\frac{\text{Figure }}{?}$.

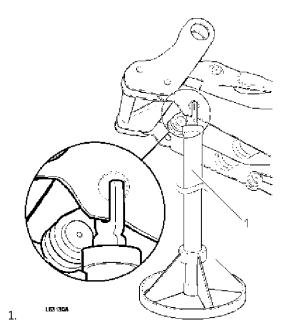


Figure 1 Securing lifting frame

- 1. 999 3831
- 2. Remove the cover plate in the front frame.
- 3. Connect the pressure gauge to the pressure outlet.

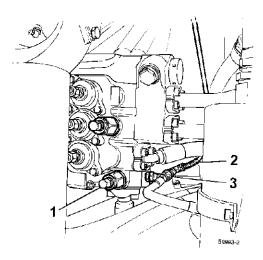


Figure 2
The control valve as seen from the underside of the machine

- 1. Pressure-limiting valve, working pressure
- 2. 11 666 037 and 11 666 020
- 3. Pressure outlet for working pressure

Working pressure, checking

4. Machines provided with 3rd or 3rd/4th hydraulic function:

Disconnect the hydraulic hoses for any attachments connected to the 3rd or 3rd/4th hydraulic function and move the control lever slowly towards its end position and read off the pressure.

Machines not provided with 3rd or 3rd/4th hydraulic function:

Check that the floating position is not engaged and move the control lever slowly toward lowering position and read off the pressure when the cylinders have reached their end position.

Working pressure, adjusting

- 5. Adjustment is carried out on the pressure-limiting valve on the control valve, item 1 in Figure [?]. The pressure is raised when the screw is screwed in. One turn changes the pressure approx. 10 MPa (1450 psi).
- 6. Restore the machine.



Service Information

Construction Equipment

Document Title:	Function Group:	Information Type:	Date:
Pressure back-up for servo	914	Service Information	25.04.2013
circuit			
accumulator checking			
Profile:			

Pressure back-up for servo circuit, accumulator checking

Op nbr

999 3704 Nipple, 2 pcs 11 666 019 Pressure gauge, measuring range 0–6 MPa (0–870 psi), 2 pcs 11 666 037 Hose, 2 pcs

- If the machine is equipped with separate attachment locking:
 First carry out points 1, 2 and 3; Servo pressure, checking at spool in control valve.
 If the machine is not equipped with separate attachment locking:
 First carry out points 1 and 2; Servo pressure, checking and adjusting (machine without separate attachment locking).
- 2. Stop the engine, operate the lifting lever from neutral position to max. lifting position. One of the pressure gauges should now show the servo pressure. It should now be possible to repeat the lever movement from neutral position to max. lifting position 10–15 times without the pressure falling below the accumulator precharging pressure, (the pressure drops slowly), thereafter the pressure drops quickly down to 0.
- 3. Restore the machine.



Document Title: Servo pressure, checking at spool in control valve	Function Group: 914	Information Type: Service Information	Date: 25.04.2013
Profile:			

Servo pressure, checking at spool in control valve

Op nbr 91463

999 3831 Support 999 3704 Nipple, 2 pcs 11 666 019 Pressure gauge, measuring range 0–6 MPa (0–870 psi), 2 pcs 11 666 037 Hose, 2 pcs

The following applies when checking:

Temperature: Normal working temperature

Speed: Entire speed range

Servo pressure: 0.6-4.0 MPa (87-580 psi), depending on the lever deflection

In case of operating problems in any section, check that there are no leaks and that the output servo pressure is correct.



Always use the support, to secure the lifting frame when carrying out work under the lifting frame, see Figure [?].

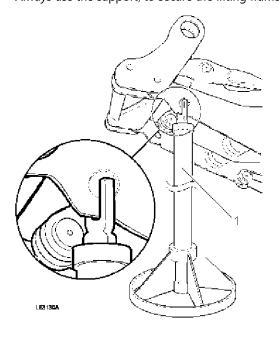


Figure 1 Securing lifting frame

- 1. 999 3831
 - 1. Remove the cover plate in the front frame.

Servo pressure, checking at spool

2. Install 3704 (2 pcs) one on either side of the valve spool for the function that is to be checked and connect hoses and pressure gauge.

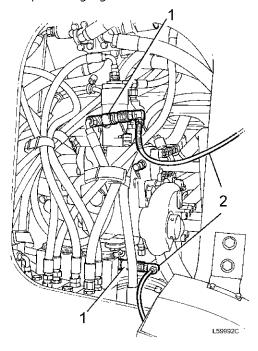


Figure 2 Checking servo pressure at valve spool

- 1. 3704 (connected one on either side of the valve spool)
- 2. 11 666 037 and 11 666 019 (two of each)
- 3. Start the engine and run it at low idling speed. With the servo valve in neutral position, check that there is no output pressure from the servo valve to the control valve. Measure the output pressure from the servo valve. The pressure must, depending on the lever deflection, be approx. 0.6–4.0 MPa (87–580 psi) and no pressure at the opposite side.
- 4. Restore the machine.



Document Title: Servo pressure, checking and adjusting < br /> (machine without separate attachment locking)	914	Information Type: Service Information	Date: 25.04.2013
Profile:			

Servo pressure, checking and adjusting

Op nbr 91455

999 3831 Support 11 666 019 Pressure gauge 0–6 MPa (0–870 psi) 11 666 037 Hose

The following applies when checking:

Temperature: Normal working temperature

Speed: Entire speed range

Servo pressure: 3.0-4.0 MPa (435-580 psi)

NOTICE

Always use the support, to secure the lifting frame when carrying out work under the lifting frame, see Figure [?].

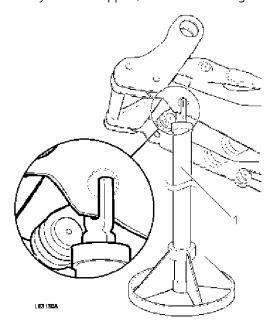


Figure 1 Securing lifting frame

- 1. 999 3831
 - 1. Remove the cover plate from the front frame.

Servo pressure checking

2. Connect the pressure gauge to the pressure outlet on the solenoid valve block, positioned in the front frame above

the differential carrier assembly. Start the engine and read off the servo pressure.

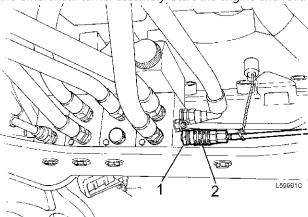


Figure 2 Checking servo pressure

- 1. Pressure outlet for servo pressure
- 2. 11 666 037 and 11 666 019

Servo pressure, adjusting

3. Remove the cover plate on the right side under the cab. Adjust the servo pressure on the right screw on the valve block.

The pressure is raised when the screw is screwed in. Remove the pressure gauge.

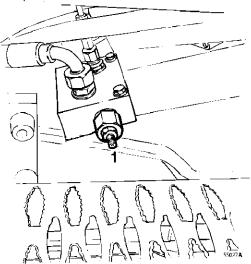


Figure 3 Valve block, servo pressure

- 1. Adjusting screw, servo pressure
- 4. Restore the machine.



Document Title: Servo pressure, checking and adjusting < br /> (machine with separate attachment locking)	914	Information Type: Service Information	Date: 25.04.2013
Profile:			

Servo pressure, checking and adjusting

Op nbr 91455

999 3831 Support 11 666 019 Pressure gauge 0–6 MPa (0–870 psi) 11 666 020 Pressure gauge 0–25 MPa (0–3626 psi) 11 666 037 Hose

The following applies when checking:

Temperature: Normal working temperature

Speed: **Entire speed range**

Servo pressure: 3.0-4.0 MPa (435-580 psi)

Raised servo pressure: 15 MPa ±0.5 MPa (2176 psi ±73 psi)

NOTICE

Always use the support, to secure the lifting frame when carrying out work under the lifting frame, see Figure [?].

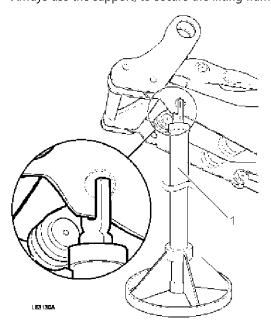


Figure 1 Securing lifting frame

- 1. 999 3831
 - 1. Remove the cover plate from the front frame.

Servo pressure checking

2. Connect pressure gauge 11 666 019 to the pressure outlet on the solenoid valve block, positioned in the front frame above the differential carrier assembly. Start the engine and read off the servo pressure.

NOTICE

The switch for raised servo pressure on the instrument panel must not be touched, as the pressure then increases to 15.5 MPa (2248 psi) at the pressure outlet.

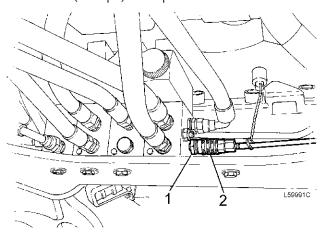


Figure 2
Checking servo pressure and raised servo pressure

- 1. Pressure outlet for servo pressure and raised servo pressure, separate attachment locking
- 2. 11 666 037 and 11 666 019 (checking servo pressure) or 11 666 020 (checking raised servo pressure)

Servo pressure, adjusting

3. Remove the cover plate on the right side under the cab. Adjust the servo pressure on the right screw on the valve block, see Figure [?]. The pressure is raised if the screw is screwed in.

Raised servo pressure, checking

4. Connect pressure gauge 11 666 020 to the pressure outlet on the solenoid valve block, positioned in the front frame above the differential carrier assembly, see Figure [?]. Start the engine, operate switch SW91 for raised servo pressure and read off the pressure.



Figure 3
SW91 raised servo pressure on front left instrument panel

Raised servo pressure, adjusting

5. Remove the cover plate on the right side under the cab. Adjust the pressure on the left adjusting screw on the valve block. The pressure is raised when the screw is screwed in. Remove the pressure gauge.

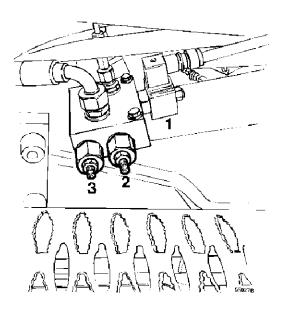


Figure 4
Valve block, separate attachment locking

- 1. Solenoid valve MA52, raised servo pressure
- 2. Adjusting screw, servo pressure
- 3. Adjusting screw, raised servo pressure
- 6. Restore the machine.



Document Title: Servo valve, description of function	Function Group: 914	Information Type: Service Information	Date: 25.04.2013
Profile:			

Servo valve, description of function

The servo valve consists of six valve spools, one for each hydraulic function.

The servo valve works in principle as a pressure-reducing valve. In neutral position the valve spool closes off the servo pressure, while the connection from the control valve is connected to tank. When the thrust pin is actuated via the lever (function engaged) the valve spool will be pressed down via the spring and first close the connection to the tank. When the movement continues, the valve spool will open for the servo pressure out to the control valve. The output servo pressure also actuates the valve spool which is pressed up against the spring. When the output pressure reaches a value corresponding to the lever deflection and thereby the spring force, the valve closes. This means that a controlled oil pressure actuates the spool in the control valve.

When the valve spool in the servo valve opens, an immediate so called starting pressure is obtained. This is the lowest pressure which is able to move the valve spool to the closed position. The starting pressure causes the respective spools in the control valve to move to a position very close to where the connection to the hydraulic cylinder opens.

Between the starting position and the so called forced opening in the servo valve, the output pressure is controlled in proportion to the lever deflection. The forced opening means a mechanical contact between thrust pin and valve spool.

The output servo pressure just before the forced opening is the pressure required to press the spool in the control valve to its end position. When the forced opening has been reached, the output servo pressure rises to the same level as the input servo pressure. For the functions, which are equipped with detent solenoids, forced opening should be reached at the so called sensing position. The servo valve is in sensing position when an additional resistance is felt in the lever.

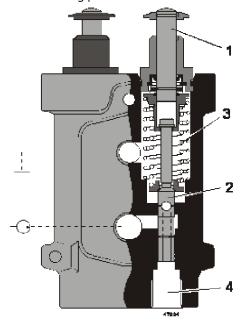


Figure 1 Servo valve

- 1. Thrust pin
- 2. Valve spool
- 3. Spring
- 4. Connection to control valve

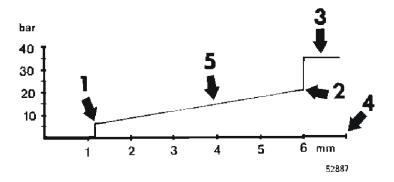


Figure 2
Pressure diagram, output pressure from servo valve

- 1. Starting pressure, 0.6 and 0.7 MPa (87 and 102 psi) respectively (see the table)
- 2. Forced opening
- 3. Maximum servo pressure
- 4. Stroke
- Controlled servo pressure

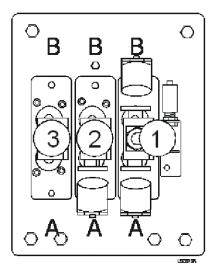


Figure 3 Servo valve

Table for Figure [?] and Figure [?].

Servo valve Output servo pressure		Valve spool A	Valve spool B
1	Lifting function		
	Starting pressure	0.7 MPa (102 psi)	0.6 MPa (87 psi)
	Final pressure at forced opening	2.1 MPa (305 psi)	2.1 MPa (305 psi)
2	Tilting function		
	Starting pressure	0.7 MPa (102 psi)	0.6 MPa (87 psi)
	Final pressure at forced opening	2.1 MPa (305 psi)	2.1 MPa (305 psi)
3	3rd/4th hydraulic function		
	Starting pressure	0.60 MPa (87 psi)	0.6 MPa (87 psi)
	Final pressure at forced opening	2.1 MPa (305 psi)	2.1 MPa (305 psi)



2.1 MPa (305 psi) is the highest controlled output servo pressure before forced opening is reached.

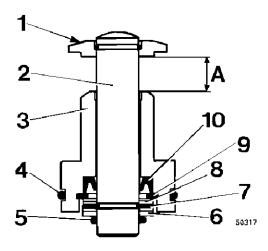


Figure 4
Thrust pin and guide

- A. Thrust pin stroke
- 1. Washer
- 2. Thrust pin
- 3. Guide
- 4. O-ring
- 5. O-ring
- 6. Spacer washers for adjusting starting position (1.2 mm (0.05 in) stroke) of the thrust pin before the valve spool opens and the so called starting pressure is obtained.
- 7. Lock ring
- 8. Spacer washers
- 9. Lock ring
- 10. Seal

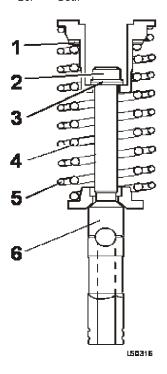


Figure 5 Spring pack with valve spool

- 1. Spacer washers for adjusting starting pressure
- 2. Screw

- Spacer washers, forced opening 3.
- 4. Spring
- 5. 6. Spring Valve spool



Document Title: Servo valve, operating controls, adjusting	Function Group: 914	Information Type: Service Information	Date: 25.04.2013
Profile:			

Servo valve, operating controls, adjusting

Op nbr 91454

Removing

1. Remove the casing and the switch.

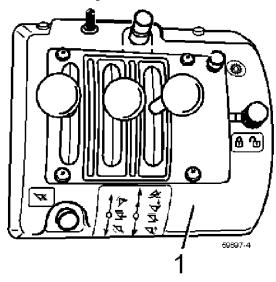


Figure 1

1. Casing with switch

Control levers

2. Adjust the distance between the adjusting screw on the lever and the thrust pin.

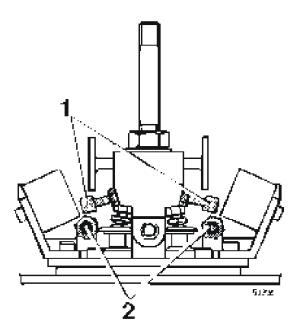


Figure 2 Sensing position

- Adjusting screw
- 2. Thrust pin

NOTICE

The sensing position is the position which the lever has to pass before the detent solenoid pulls (detent position), and the transition between lowering and floating position.

Sensing position at 2.1 MPa (305 psi)

3. Adjusting sensing position is carried out with adjusting screws (1) Figure [?] .

NOTICE

The adjusting screw must only be turned full turns.

4. The force required to pass the sensing position is adjusted with thrust pin (2) Figure [?] (2 mm hexagon key).

Alternative 1: The sensing position should be reached at a distance of 2–3 mm (0.08–0.12 in) between solenoid and striking plate washer, see item A Figure [?]

Alternative 2: Connect a pressure gauge according to Figure [?] and adjust so that the sensing position is reached at 2.1 MPa (305 psi).

NOTICE

Alternative 1 assumes that the detent solenoid is correctly adjusted.

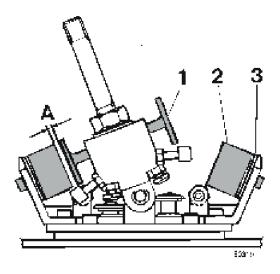


Figure 3

- A. 2-3 mm (0.08-0.12 in)
- 1. Striking plate
- 2. Detent solenoid
- 3. Spacer washers

Detent solenoid, bucket positioner, boom kick-out and floating position

5. Move the lever to the sensing position. After adjusting the sensing position according to alternative 2 point 4, adjust the clearance between detent solenoid and striking plate to 2–3 mm (0.08–0.12 in), see Figure [?]. Adjust with shims behind the detent solenoids.

Microswitch

6. The microswitch must be actuated when the detent solenoid is pulling (detent position), i.e. the floating position is engaged, but not actuated in the sensing position. Adjust by loosening and moving the microswitch, see Figure [?]. NOTE: Check that switch SW60, right instrument panel, see Figure [?], is switched on.

NOTICE

The floating position should never be engaged until the sensing position has been passed.

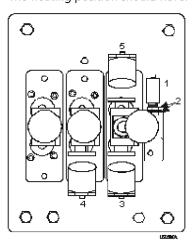


Figure 4

- 1. Microswitch
- 2. Lock nut

- 3. Detent solenoid, lifting (MA20)
- 4. Detent solenoid, tilting rearward (MA19)
- 5. Detent solenoid, floating position (MA21)

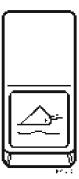


Figure 5 SW60 Switch floating position (right instrument panel)

Installing

7. Install casing and switch.



Service Information

Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Servo pump (in common with brake system)			
Туре	Vane pump		
Designation	V10 - 1B5B - 41B - 20R- 090 / 02 - 318820BR		
Flow at 35 r/s, (2100 rpm) and 10 MPa (100 bar) (1450 psi) pressure	31 litres (8.2 US gal) per minute		
Servo pressure (across the entire speed range)	3.5 ±0.5 MPa (35 ±5 bar) (508 ±73 psi)		
Raised pressure, separate attachment locking (optional equipment)	15 ±0.5 MPa (150 ±5 bar) (2176 ±73 psi)		
Accumulator 0.5 litre (30 in3) in servo circuit, precharging pressure	1.5 MPa (15 bar) (218 psi)		

Servo valve	
Designation	PCL - 402 - 6 - H2



Service Information

Document Title: Specifications, weights	<u>'</u>	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

|--|



Service Information Construction Equipment

Document Title: 4th hydraulic function, description	Information Type: Service Information	Date: 25.04.2013
Profile:		

4th hydraulic function, description

In addition to the ordinary control valve the machine may be equipped with an electrically controlled solenoid valve (MA36A) for operating the 4th hydraulic function, the quick-action couplings of which are installed furthest out on the lifting arms. With the aid of oil from the servo system solenoid valve MA36 actuates a change-over valve, which controls the flow to the 3rd and 4th hydraulic functions respectively.



Service Information

Construction Equipment

Document Title: Accumulator for Boom Suspension System, releasing pressure	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Accumulator for Boom Suspension System, releasing pressure

Op nbr



Before any work is carried out on the hydraulic system of the Boom Suspension System, the hydraulic oil pressure in the accumulator must first be released as follows.



Oil under high pressure!



Lower end of SW142 pressed in.

- 1. Start the engine.
- 2. The forward/reverse control should be in neutral.
- 3. Activate the Boom Suspension System (SW106).
- 4. Lower the lifting frame to the ground.
- 5. Switch on the floating position switch and move the control lever toward the floating position until the solenoid retains the lever.
 - The pressure in the accumulator will be drained.
- 6. Keep the control lever in the floating position and stop the engine.



Service Information

Construction Equipment

Document Title: Accumulator, Boom Suspension System, reconditioning	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Accumulator, Boom Suspension System, reconditioning

Op nbr 91603

999 3734 Installation sleeve

Dismantling

- 1. Release the hydraulic oil pressure in the accumulator, according to "Accumulator for Boom Suspension System, releasing pressure".
- 2. Remove the accumulator.
- 3. Remove the protective cap for the accumulator and the protective clamp for the gas valve.
- 4. Drain the gas pressure in the accumulator:

Up to and incl. serial No. FW187

Depress the valve needle in the gas valve, so that all gas escapes from the accumulator.

With effect from serial No. FW188

Screw the gas valve hexagon nut (19 mm) counter-clockwise, so that all gas escapes from the accumulator.

- 5. Remove the gas valve and the attaching bolts for the end plates.
- 6. Press end plate (3) against piston (4) until lock ring (7) becomes visible and remove the lock ring and pull out end plate (3) from the cylinder tube.
- 7. Press end plate (2) against piston (4) until lock ring (7) becomes visible and remove the lock ring and pull out end plate (3) from the cylinder tube.



There may be oil under a certain pressure between the seals in the piston.

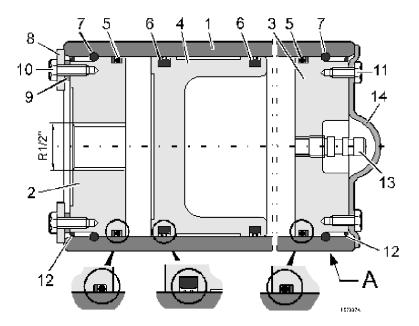


Figure 1 Accumulator

A. Stamped-in serial No.

1	Cylinder tube	8	Washer
2	End plate, oil side	9	Washer
3	End plate, gas side	10	Screw
4	Piston	11	Screw
5	Seal ring	12	O-ring
6	Seal ring	13	Gas valve
7	Lock ring	14	Protective clamp

- 8. Carefully press out the piston from the cylinder tube with the aid of a wooden rod.
- 9. Clean and inspect all parts as regards damage and wear.

Assembling

- 10. Install new seals. Liberally lubricate the piston seals.
- 11. Push the installation sleeve into the cylinder as far as it can go.
- 12. Install the piston and end plate (3), see Figure [?].
- 13. Remove the installation sleeve and install the lock ring.

 Pull the end plate against the lock ring and install the O-ring.
- 14. Install end plate (2), the lock ring and the O-ring. See Figure [?].
- 15. Install the washers and tighten down the end plate.
- Install a new gas valve in the end plate.
 Up to and incl. serial No. FW187 is sealed with hydraulic seal.
 Tightening torque: 0.3 N m (0.2 lbf ft)
- 17. Precharge the accumulator according specifications.
- 18. Check for any gas leaks with the aid of leak-detecting fluid or soapy water or oil.

- 19. Install the protective cap for the gas valve and the protective clamp for the accumulator.
- 20. Install the accumulator on the machine.





Document Title: Accumulator, precharging pressure, checking and adjusting	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Accumulator, precharging pressure, checking and adjusting

Op nbr 91602

11 666 008 Gas filling set 11 666 018 Pressure gauge, 0-2.5 MPa (0-25 bar) (0-363 psi)



Before any work is carried out on the hydraulic system of the suspension system, the hydraulic oil pressure in the accumulator must first be unloaded as follows.



Lower end of SW142 pressed in.

- 1. Start the engine.
- 2. The forward/reverse control should be in neutral.
- 3. Activate the suspension system (SW106).
- 4. Lower the lifting frame to the ground.
- 5. Operate the floating position switch and move the control lever toward the floating position until the solenoid retains the lever.
 - The pressure in the accumulator will be drained.
- 6. Keep the control lever in the floating position and stop the engine.

Checking

- 7. Remove the protective clamp for the accumulator and the protective cap on the gas valve.
- 8. Connect the gas filling set and a pressure gauge 0–2.5 MPa (0–363 psi).

 Open the gas valve on the accumulator by screwing the gas valve hexagon nut counter-clockwise.

 Read off the accumulator precharging pressure on the pressure gauge.



The swivel nut should be screwed onto the accumulator by hand only far enough to prevent a gas leak.

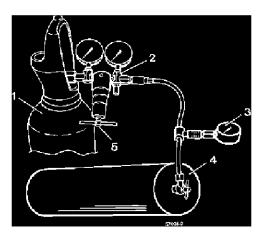


Figure 1
Checking precharging pressure

1	Gas cylinder	4	Accumulator
2	Air vent valve	5	T-handle on gas pressure regulator
3	Pressure gauges		

- 9. Close the accumulator gas valve and remove the gas filling set.
- Check for any gas leakage both at the threads and at the gas valve with the aid of leak-detecting fluid or soapy water.
- 11. Re-fit the protective cap for the gas valve and the protective clamp for the accumulator.

Adjusting

- 12. First check the precharging pressure, points 1–11 above.
- 13. Unscrew the gas pressure regulator T-handle until the lowest pressure is reached.

 Carefully open the gas cylinder valve. Increase the pressure by screwing in the T-handle on the gas regulator. Fill the accumulator to the precharging pressure according to the Specifications.



Take into consideration that the pressure in the accumulator drops when the compressed gas cools.

Precharge to 20 % above the required pressure.

- 14. Close the valve on the gas cylinder and wait five minutes.

 Then read off the pressure. If the pressure is too high, release gas through the air vent valve on the gas pressure regulator.
- 15. Close the accumulator gas valve by screwing the gas valve hexagon nut clockwise.
- 16. Remove the gas filling set.
- 17. Check for any gas leakage both at the threads and at the gas valve with the aid of leak-detecting fluid or soapy water.
- 18. Re-fit the protective cap for the gas valve and the protective clamp for the accumulator.



Document Title: Boom Suspension System	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Boom Suspension System

To increase the operator comfort and to reduced the mechanical stresses on the frame, the drive line, the lifting frame etc., a suspension system is available as optional equipment. The equipment is called Boom Suspension System (BSS for short), and it makes the operation with or without a load even and smooth at all speeds and minimises the bouncing tendencies of the machine.

The system consists of one (L90C) or two (L120C) accumulators which, via a valve system, is or are connected to the lifting cylinders on the machine.

The accumulators are positioned inside the front frame. They are of the piston type and precharged with nitrogen gas. The precharging pressure can be adapted according to the customer's requirements.



When replacing an accumulator, the new unit must be precharged to the correct pressure.

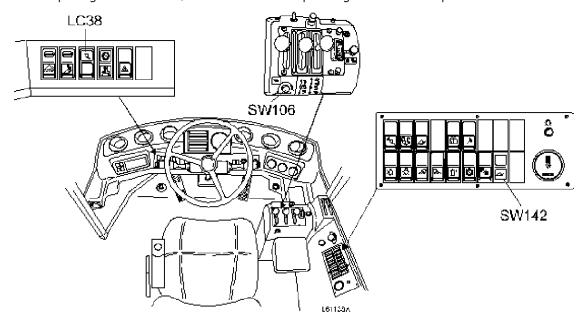


Figure 1

Right instrument panel

SW142 switch for selecting between gear-dependent disengagement of the Boom Suspension System or speed-dependent disengagement (below approx. 5 km/h (3.1 mph)).

Activated Boom Suspension System

The system is activated via switch SW106 and control lamp LC38 indicates that the system is activated.

When the system is activated, and if certain conditions are met, a connection is opened between the piston end of the lifting cylinders and the accumulator(s) and also between the piston rod end of the lifting cylinders and the tank, which means that the oil can pass freely in both directions.

If the system is to operate efficiently, it is important that the lifting frame can move up and down freely. The attachment must not rest against any mechanical stop.

Gear dependent disengagement of Boom Suspension System

If the system is activated and the upper end of switch SW142 is pressed in, the system will be engaged when either of the gears 2, 3 or 4 are engaged and the system will be automatically disengaged when 1st gear is engaged. This means that the system is activated but disengaged during the bucket filling stage when the machine is operating in 1st gear. The system will be automatically engaged when upshifting takes place.

Speed dependent disengagement of the Boom Suspension System

If the system is activated and the lower end of SW142 is pressed in, the system will be engaged if the speed exceeds approx. 5 km/h (3.1 mph). At speeds below approx. 5 km/h (3.1 mph) the system will be disengaged regardless of which gear is used. This is advantageous for example during timber handling when 2nd gear is normally used.

- O If the accumulator is charged and the ignition key is turned on, the lifting frame will rise a few inches when the system is activated.
- O An involuntary lifting movement may also occur, when the system is activated and engaged and for example the bucket is emptied. This is because the weight in the bucket is reduced and because the oil in the accumulator is connected to the piston end of the lifting cylinders the result will be that the lifting frame will slowly rise a few inches without any actuation of the lifting lever.

Deactivated Boom Suspension System

A deactivated system means that the connection between the lifting cylinders and the accumulator is blocked and does not open when operating in either of gears 2, 3 or 4 or at speeds above 5 km/h (3.1 mph).

Electrical system, description of function Activate the Boom Suspension System Gear dependent disengagement (SW142 upper end pressed in)

Switch on SW106 and then release it.

- O When SW106 is actuated, terminal EB15 on the ECU receives a current pulse. From terminal EA15 on the ECU terminal 86 in relay RE22 is supplied with "holding current".
- O Relay RE22 is energised and current is now supplied via fuse FU31 and relay RE22 (30-87), solenoid valves MA59 and MA55B and the system is activated.
- O Control lamp LC38 receives current from terminal EA16 on the ECU. The lamp lights up and lights with a fixed light.
- O If 1st gear is selected, the ECU interrupts the feed to 86 on relay RE22 and thereby the current to the solenoid valves MA59 and MA55B is interrupted.
- O The system is disengaged.
- O Control lamp LC38 will now be flashing because the ECU temporarily interrupts the feed. The system will be automatically engaged again when either of gears 2, 3 or 4 are selected.

Speed-dependent disengagement (SW142 lower end pressed in)

When the lower end of switch SW142 is pressed in, the ECU receives a voltage signal at terminal EB21 via fuse FU10. This signal tells the ECU that the system is to be disengaged if the travelling speed drops below approx. 5 km/h (3.1 mph). While the speed is below 5 km/h (3.1 mph), control lamp LC38 will be flashing. When the speed exceeds approx. 5 km/h (3.1 mph), the system will be automatically engaged again and control lamp LC38 will light with a fixed light.

Deactivating Boom Suspension System

Press in switch SW106 and then release it.

O Via the ECU the current is interrupted to terminal 86 on RE22, which is energised, and the current to control lamp LC38 and the solenoid valves MA59 and MA55B is interrupted.

Hydraulic system, description of function

When the engine is running and the lifting function is being used, the accumulator is charged via valve R2. The accumulator can only be charged when lifting, as it is only then that sensor SE88 is closed by the servo pressure for the lifting function. When SE88 is closed, solenoid valve MA129 is energised and causes a connection to be opened from the piston end of the lifting cylinders to the accumulator.

When the working pressure rises to 12 MPa (1740 psi), R2 closes the connection to the accumulator. 12 MPa (1740 psi)

approximately corresponds to the pressure in the lifting cylinders with a full load in the bucket.

Activated Boom Suspension System

When MA59 and MA55B receive current, the Boom Suspension System is activated.

- O The piston rod end of the lifting cylinders become connected to tank via MA55B and the piston end of the cylinders become connected to the accumulator via MA59 and valve poppet D. The pressure shocks, arising in the hydraulic circuit for the lifting cylinders, are taken up and dampened via the accumulator.
- O If the pressure exceeds 20 MPa (2900 psi), R1 closes the draining from valve poppet D, which is pressed down against its seat and the accumulator.
- O After-filling of the lifting cylinders is prevented in that MA55A is energised. The servo pressure is constantly exerted on the stem piston, which thereby locks the valve poppet in its position.

Deactivated Boom Suspension System

Solenoid valves MA55B and MA59 close, via the built-in non-return valves, the connection between the piston rod end of the lifting cylinders and the tank and between the piston end of the cylinders and the accumulator.

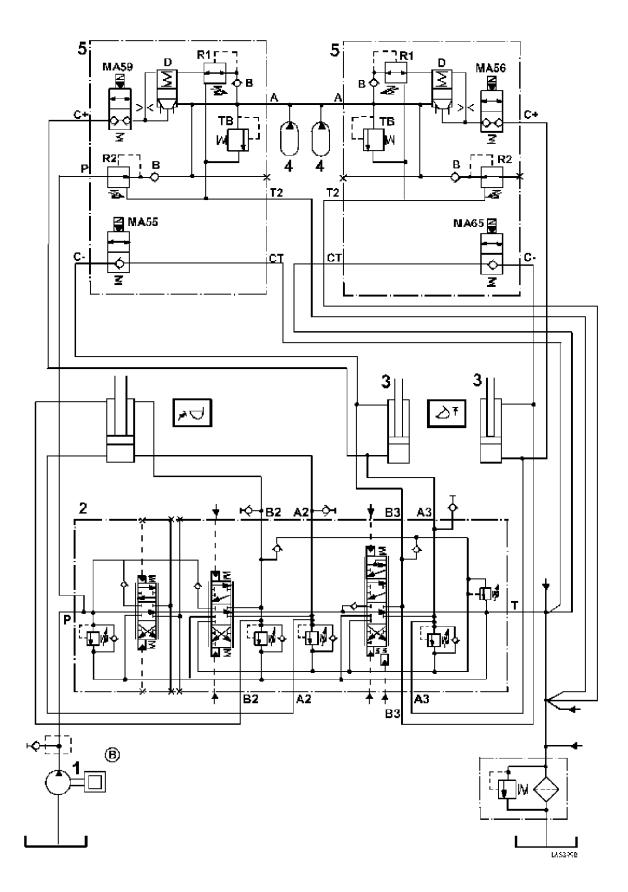


Figure 2 Hydraulic diagram, Boom Suspension System, earlier type

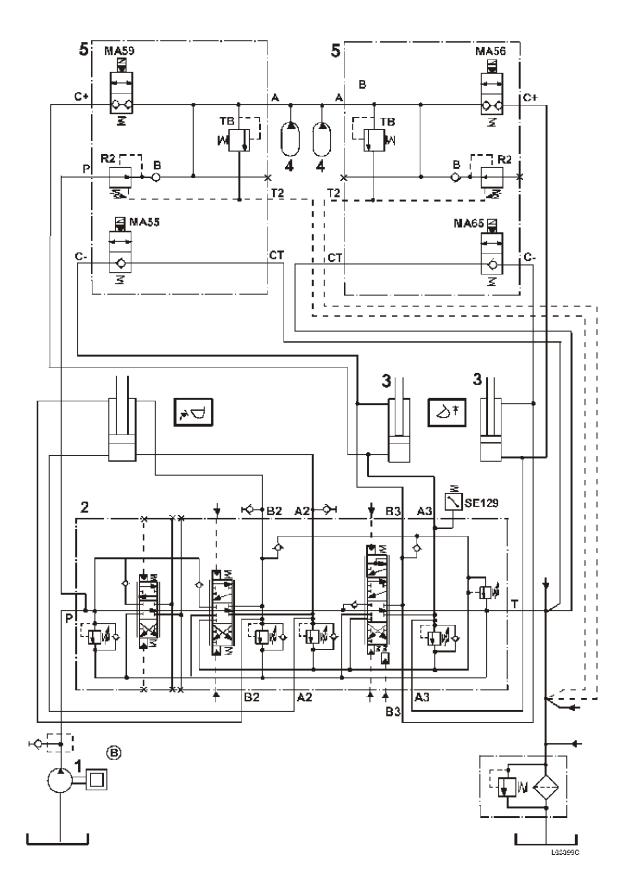


Figure 3 Hydraulic diagram, Boom Suspension System, later type

Valve block, Boom Suspension System Pressure-reducing valve R1

The valve functions as a pilot valve for valve poppet D and functions together with the valve poppet as a pressure-reducing valve and limits the pressure in the accumulator to 20 MPa (2900 psi).

If the closing pressure is too high, more than 21 MPa (3046 psi), the lifting arms may lower a little because safety valve TB opens.

If the closing pressure too low, the damping function is impaired because the valve poppet D closes the connection between the piston end of the lifting cylinders and the accumulator.

In the later type Boom Suspension System, the pressure-reducing valve R1 has been omitted and replaced by a sensor, SE129, with a corresponding function.

Pressure-reducing valve R2

If the engine is started and the lifting function is used, the accumulator will automatically be precharged to the pressure that corresponds to the load, however, at the most 12 MPa (1740 psi).

Safety valve TB

If the opening pressure of TB is too low, the lifting frame may lower when the Boom Suspension System is activated.

If TB is leaking, the lifting arms will sink when the Boom Suspension System is activated.

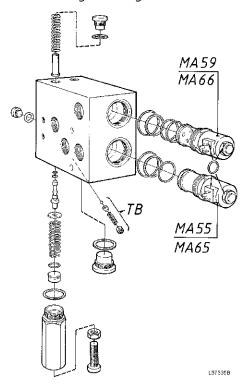


Figure 4
Valve block for Boom Suspension System

MA55	Solenoid valve, draining piston rod end of lifting cylinder	
MA59	Solenoid valve Boom Suspension System	

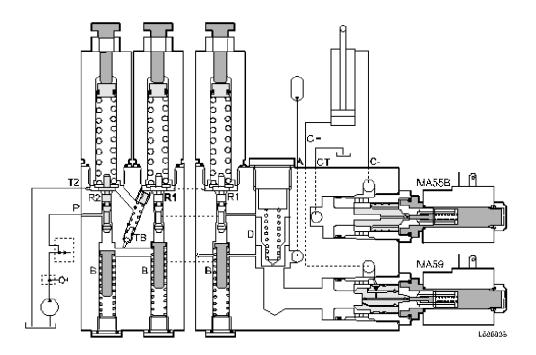
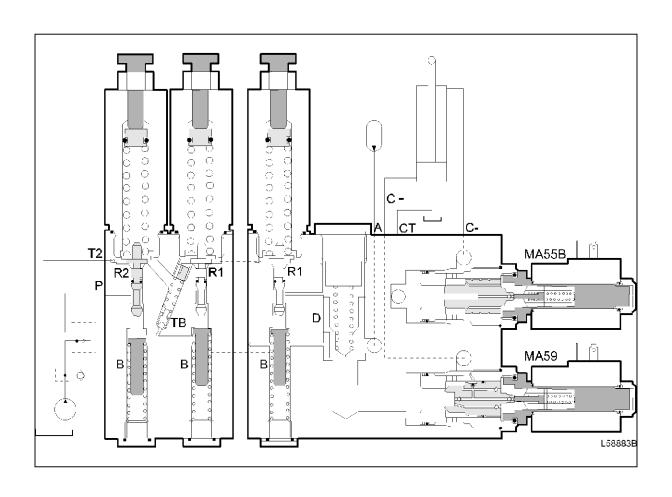
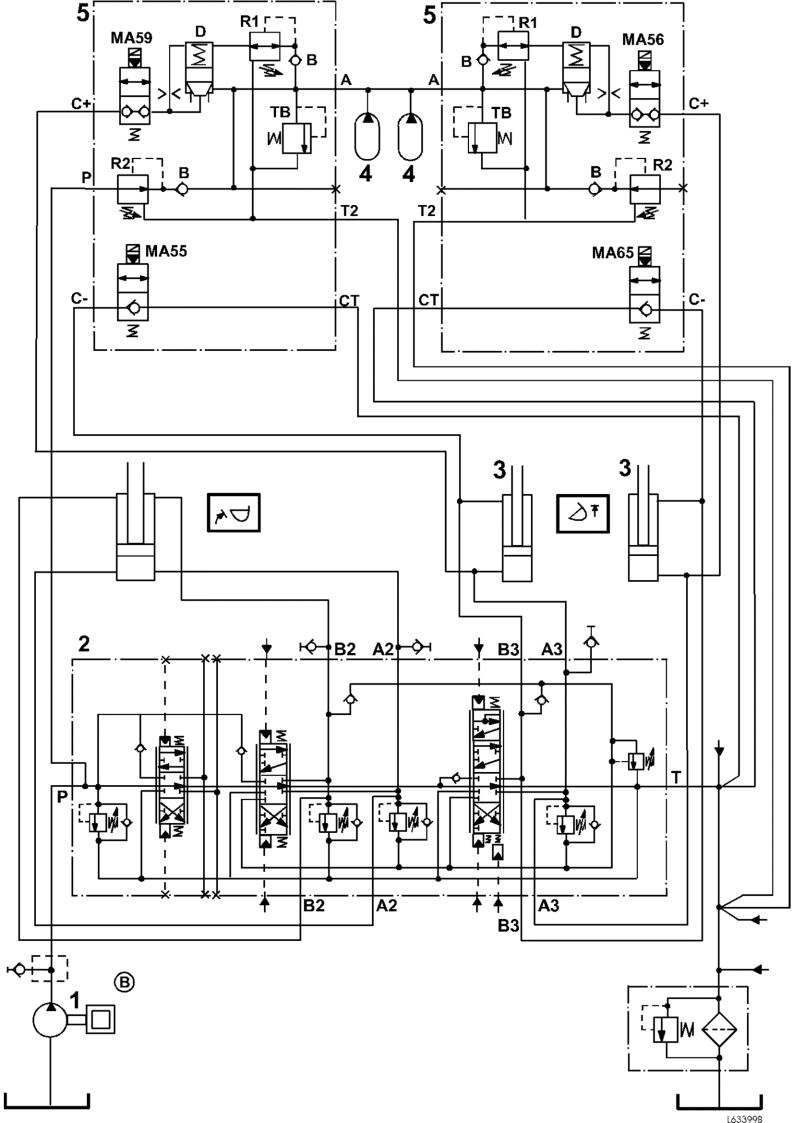
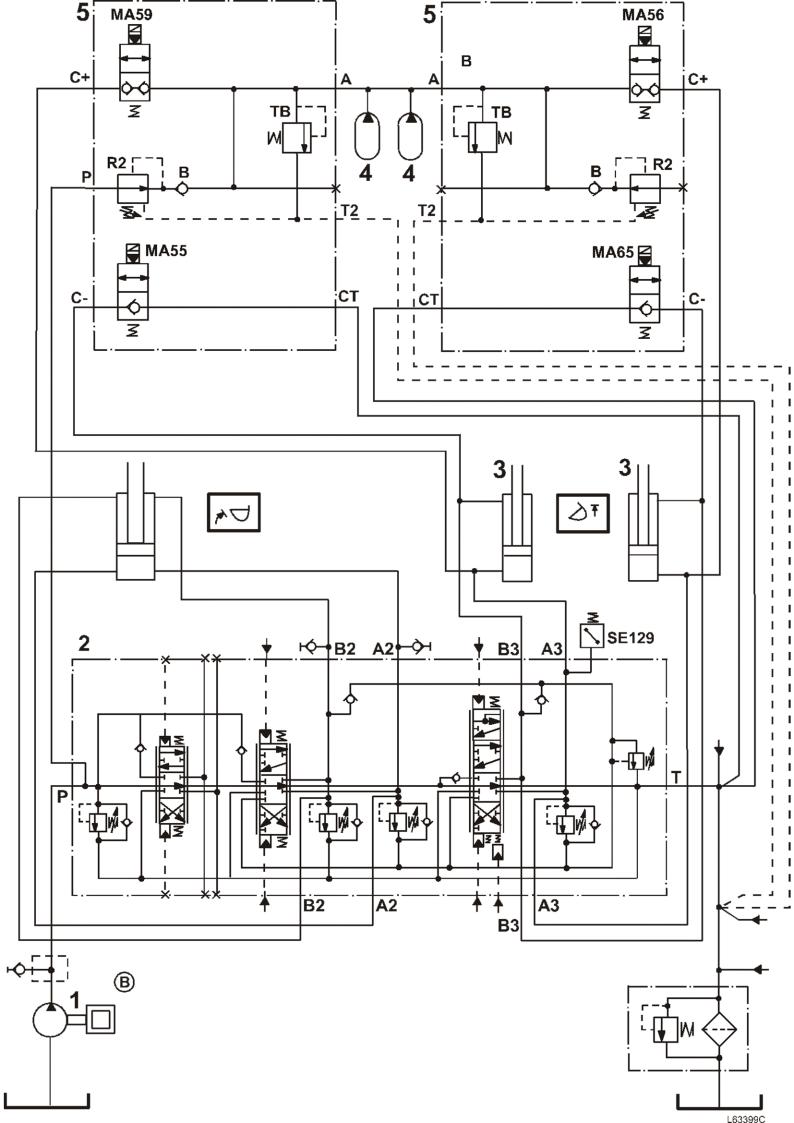


Figure 5 Valve block, Boom Suspension System

Α	Accumulator
В	Non-return valve
D	Valve poppet
MA59B	Solenoid valve Boom Suspension System
MA59A	Solenoid valve Boom Suspension System
R1	Pressure-reducing valve for the accumulator (not installed on later type machines)
R2	Pressure-reducing valve for the accumulator
ТВ	Safety valve for the accumulator
L	Lifting cylinder











,	· ·	Information Type: Service Information	Date: 25.04.2013
checking			
Profile:			

Boom Suspension System, checking

Op nbr 91601

Checking flow path from hydraulic pump to lifting cylinder and accumulator (Boom Suspension System not activated).

- 1. Start the engine and raise the lifting arms until they are horizontal.
- 2. Charge the accumulator by raising the lifting arms up against stop for four seconds. Then lower the lifting arms to the horizontal position.
- Activate the Boom Suspension System with switch SW106.If the lifting arms jump up, the flow path is correct.



The upper end of switch SW142 should be pressed in.

Checking flow path between lifting cylinder and accumulator

- 4. Attach a bucket and position it with its bottom parallel to the ground and at an height of approx. 100 mm (4 in) above the ground.
- 5. Tilt the bucket forward so that the front wheels begin to be lifted off the ground.
- 6. Engage the floating position which should cause the machine to "drop" to the ground.
- 7. Activate the Boom Suspension System with SW106 and disengage the floating position. (The engine should be running at idling speed).
- 8. Tilt the bucket rearward until it is level. The lifting arms should now give way so that the bucket drops to the ground. If it happens this way, the flow path is correct.

Checking setting of pressure-reducing valve R2 in the valve block (12 MPa (1740 psi) at delivery).

- 9. Attach the standard load weight or alternatively take a full load in a standard bucket.
- 10. Run the engine at approx. 2000 rpm and tilt the bucket rearward against stop and retain the control lever in that position. The lifting arms should now begin to rise and just about manage to lift the load. If this is achieved, the pressure-reducing valve R2 is correctly adjusted.
- The pressure is adjusted at pressure-reducing valve R2 in the valve block.
 Upper end of switch SW142 pressed in, gear-dependent disengagement of Boom Suspension System.

Checking electrical functions

12. Activate the Boom Suspension System with switch SW106 and tilt rearward against stop and hold the lever in that position. The lifting arms should now rise slowly and control lamp LC38 light with a fixed light.

- 13. Engage 1st gear. The lifting movement should now stop and LC38 begin to flash.
- 14. Release the lever and deactivate the Boom Suspension System with SW106 which should cause LC38 to be extinguished.
- 15. Deselect 1st gear and activate the Boom Suspension System with SW106 and LC38 should light up and light with a fixed light. Stop the engine and check that the Boom Suspension System has been deactivated when the ignition key is turned to position 1 again. LC38 should now be extinguished.
- 16. Start the engine and press the lower end of SW142, (speed-dependent disengagement of Boom Suspension System).
- 17. Activate the Boom Suspension System with SW106. LC38 should now flash.
- 18. Operate the machine forward and tilt the bucket rearward against stop and hold the lever in that position. When the speed exceeds 6 km/h (3.7 mph), the lifting arms should rise slowly and LC38 light with a fixed light.
- 19. Lower the speed to below 5 km/h (3.1 mph). The lifting movement should be interrupted and the LC38 should begin to flash.
- 20. Operate the machine in reverse and tilt the bucket rearward against stop and hold the lever in that position. When the speed exceeds 6 km/h (3.7 mph), the lifting arms should rise slowly and LC38 light with a fixed light.
- 21. Lower the speed to below 2 km/h (1.2 mph). The lifting movement should be interrupted and the LC38 should begin to flash.





Document Title: Pressure-reducing valves R1 and R2, < br / > closing pressure, checking	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Pressure-reducing valves R1 and R2,

Op nbr 91604

11 666 022 Pressure gauge 0–60 MPa (0–600 bar) (0–8700 psi) 11 666 037 Hose

963804 Reducing nipple

930032 Quick-action coupling

- 1. Check the working pressure of the working hydraulics and note the value. The engine speed should be as indicated in point 4.
- 2. Release the hydraulic oil pressure in the accumulator, according to "Accumulator for Boom Suspension System, releasing pressure".
- 3. Install reducing nipple 963804 and quick-action coupling 930032 in the valve block of the suspension system, see Figure [?]. Then connect hose and pressure gauge.

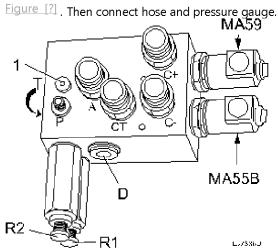


Figure 1
Valve block, Boom Suspension System

1	Connection of hose and pressure gauge, (port marked X in the hydraulic diagram)		
R1	Pressure-reducing valve, adjusting screw		
R2	Pressure-reducing valve, adjusting screw		

- 4. Start the engine and run it at approx. 1000 rpm.
- 5. Activate the suspension system (SW106).
- 6. The closing pressure of the pressure-reducing valve R2 is checked by raising the lifting arms against their top position. When the arms have reached the top position, the pressure should quickly rise to 12 MPa (120 bar) (1740

psi).

7. The closing pressure of R1 is checked by slowly tilting the bucket rearward against its end position. The pressure should then quickly rise to the value given in the Specifications. After that the pressure should rise slowly because of a leakage across R1.

Any adjustment is done with the adjusting screw, see Figure [?].

8. Release the hydraulic oil pressure in the accumulator and remove the tools.

NOTICE

If it is not possible to release the pressure, a residual pressure of approx. 12 MPa (120 bar) (1740 psi) will show up on the pressure gauge.

If it is not possible to release the hydraulic oil pressure, solenoid valve MA59A is faulty and this means that the accumulator does not become connected to the tank when the control lever is moved to lowering position.



Document Title:	Function Group:	Information Type:	Date:
Releasing the hydraulic oil	916	Service Information	25.04.2013
pressure			
in the accumulator			
Profile:			

Releasing the hydraulic oil pressure in the accumulator

Op nbr

- 1. Start the engine.
- 2. Move the forward/reverse control to neutral.
- 3. Activate the Boom Suspension System
- 4. Lower the lifting frame.
- 5. Engage the floating position and move the control lever to the lowering position.
- 6. (The pressure in the accumulator will be drained).
- 7. Hold the control lever in the lowering position and stop the engine.
- 8. If the accumulator precharging pressure is to be checked, the pressure must be drained according to points 1–6.
- 9. Then slacken the hydraulic oil connection on the accumulator so that any remaining pressure in the accumulator is drained.

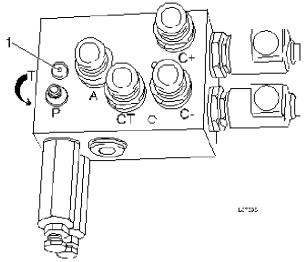


Figure 1
Valve block, Boom Suspension System

Α	Connection to accumulator	
C+	Connection to piston end of the lifting cylinders	
C-	Connection to piston rod end of lifting cylinders	
СТ	Connection to hydraulic system return pipe	
Р	Connection to control valve inlet (pressure side)	
T2	Connection to hydraulic system return pipe	



Document Title: Safety valve TB, checking opening pressure	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Safety valve TB, checking opening pressure

Op nbr 91605

11 666 003 Pressure gauge 0–40 MPa (0–400 bar) (0–5800 psi) 11 666 030 Hand pump 11 666 037 Hose 999 3723 Nipple 999 3758 Quick-action coupling

4821970 Blind nut (hole drilled in the nut \varnothing 12 mm, tapped to 1/4" BSP)

4821886 Elbow nipple

1. Release the hydraulic oil pressure in the accumulator, according to "Accumulator for Boom Suspension System, releasing pressure".

2. Disconnect the accumulator from the valve block and connect a pressure gauge and a pump.

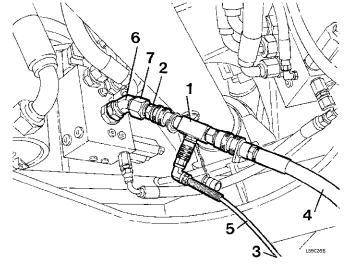


Figure 1 Checking opening pressure, TB

- 1. 999 3723
- 2. 999 3758
- 3. 11 666 003
- 4. 11 666 030
- 5. 11 666 037
- 6. Elbow nipple
- 7. Blind nut
- 3. Pump up the pressure and read off the opening pressure. Opening pressure: **21 MPa (3046 psi)**

Any adjustment is made with the hexagon socket plug on the TB, see Figure [?].

After adjusting, lock the plug with a punch mark.

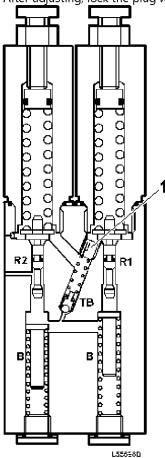


Figure 2

- 1. Hexagon socket plug on TB
- 4. Release the pressure by opening the valve on the pump, remove the tools and re-fit the accumulator connection.



Service Information

Document Title: Specifications, general	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Boom Suspension System	
Accumulator, precharging pressure (Serial No. –13238, if the machine has not been recharged)	0.8 MPa (8 bar) (116 psi)
Accumulator, precharging pressure (Serial No. 13239–)	3.0 MPa (30 bar) (435 psi)



Document Title: Back-up valve, opening pressure, checking	•	Information Type: Service Information	Date: 25.04.2013
Profile:			

Back-up valve, opening pressure, checking

Op nbr

<u>11 666 018 Pressure gauge, measuring range 0–2.5 MPa (0–363 psi)</u> 11 666 037 Hose

The following applies when checking:

Temperature: Normal working temperature

Speed: Low idling speed

Opening pressure: 1.0-2.0 MPa (145-290 psi)

NOTICE

The bucket should be tilted forward. If the bucket is tilted rearward, the pressure may rise to max. working pressure, which means that the pressure gauge may be damaged

- 1. Lower the lifting arms so that the bucket lies flat against the ground.
- 2. Connect a pressure gauge to the pressure outlet, see Figure [?].

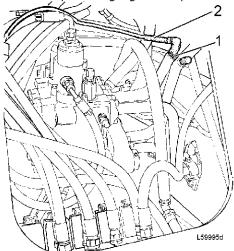


Figure 1
Checking opening pressure

- 1. Pressure outlet
- 2. 11 666 037 and 11 666 018
- 3. Start the engine and run it at low idling speed. Slowly tilt forward so that the machine is lifted off the ground and read off the pressure.

Opening pressure: 1.0-2.0 MPa (145-290 psi)



The valve is not adjustable.



Document Title: Bearing points linkage	in	·	Information Type: Service Information	Date: 25.04.2013
Profile:				

Bearing points in TP-linkage

In order to simplify and co-ordinate the description of the bearing points and links occurring in the TP-linkage, these have been named individually with a letter designation.

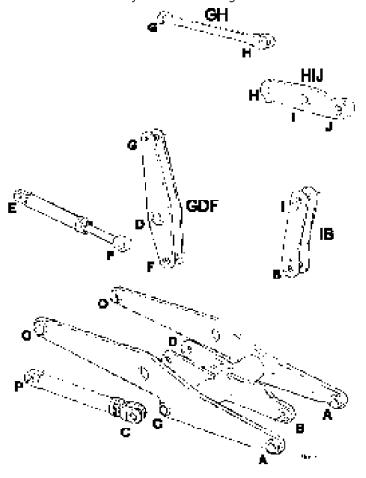
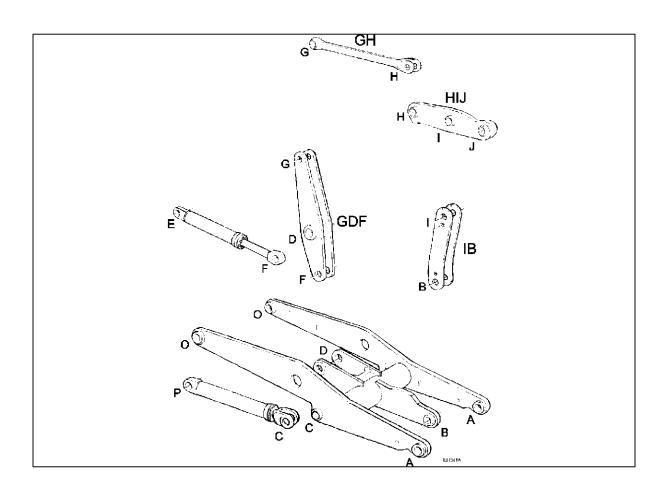


Figure 1

The letter designation is to be used for identifying a specific bearing point, and as a combination make up the name of the respective links, e.g. the GDF-link and the HIJ-link respectively.





Document Title: Boom kick-out and bucket positioner, adjusting	·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Boom kick-out and bucket positioner, adjusting

Op nbr

Adjusting height position

- 1. Raise the lifting frame to the required position, stop the engine and turn the ignition key to position 1.
- 2. Slacken nut (A) and displace sensor (B) to its rear position.

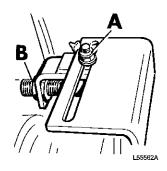


Figure 1

- 3. Switch on the switch for the boom kick-out and move the lifting lever to the rear detent position.
- 4. Displace sensor (B) forward toward the lifting arm until the lifting lever returns to neutral. Tighten nut (A).

Adjusting rearward tilting (roll back)

- 5. Place the bucket in the required position, stop the engine and turn the ignition key to position 1.
- 6. Slacken bolt (F) and displace bracket (G) to its rear position.

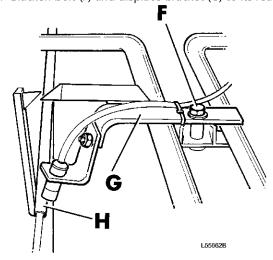


Figure 2

- 7. Switch on the switch for the bucket positioner and move the tilting lever to the rear detent position.
- 8. Displace bracket (G) with the sensor toward rod (H) until the tilting lever returns to neutral position. Tighten bolt (F).



The distance between the sensors and the actuating part on the machine should be 3-5 mm (0.12–0.20 in).

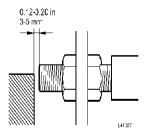


Figure 3

Document Title: Lifting arm, replacing bearings at lower bucket or attachment mounting	945	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lifting arm, replacing bearings at lower bucket or attachment mounting

Op nbr 94502

999 3652 Draw bolt 999 3739 Support 11 667 100 Drift plate 11 666 013 Pump 11 666 015 Jack 30 tonnes

Removing pin

- 1. Lower the bucket / attachment bracket until level on the ground so that the load is taken off the pin.
- 2. Remove the lock screw and grease nipple from the pin.

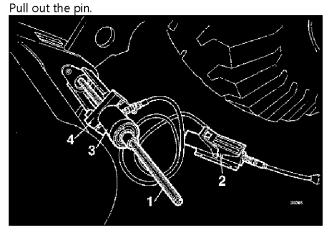


Figure 1 Removing pin

- 1. 999 3652
- 2. 11 666 013
- 3. 11 666 015
- 4. 999 3739
- 3. Remove the pin on the other side.
- 4. Remove the stop lug from the top of the centre tilting arm joint.
- 5. Reverse the machine and at the same time tilt forward, so that the bucket / attachment bracket is left standing.
- 6. Remove the dust seals.

Replacing bushing

- 7. Remove the seal rings from both sides of the bushings in the lifting frame.
- 8. Pull out the bushings.

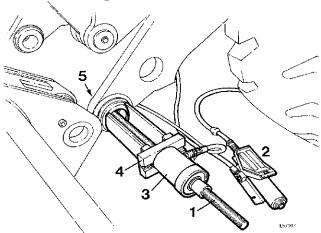


Figure 2 Removing bushing

- 1. 999 3652
- 2. 11 666 013
- 3. 11 666 015
- 4. 999 3739
- 5. 11 667 100
- 9. Remove the bushing on the other side.
- 10. Apply grease to the new bushing and press it into position until it lies at the centre of the location in the lifting arm.

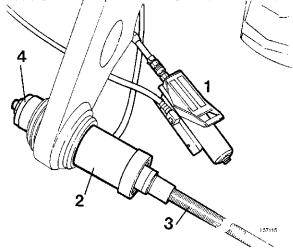


Figure 3
Pressing in bushing

- 1. 11 666 013
- 2. 11 666 015
- 3. 999 3652
- 4. 11 667 100
- 11. Install the seal rings on both sides of the bushing in the lifting frame.
- 12. Install the bushing and the seal rings on the other side.

Installing pin

13. Install the dust seals by forcing them across the bushing attachment on the lifting frame. The lip is turned toward the attaching lugs on the bucket / attachment bracket.

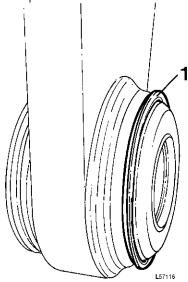


Figure 4 Installing seals

- 1. Seal
- 14. Align the lifting frame with the attaching lugs on the bucket / attachment bracket and centre the holes in the attaching lugs with the hole in the bushing so that the pin can be positioned.
- 15. Install the cleaned and greased pin.

 Drive in the pin with a soft mallet and lock the pin.
- 16. Poke down the dust seals into their location against the bucket / attachment bracket attaching lugs.
- 17. Install the grease nipple.
- 18. Install the pin on the other side.
- 19. Lubricate the pivot pins and install the stop lug on the centre tilting arm joint.





Document Title: Lifting cylinder, changing seals in machine	Information Type: Service Information	Date: 25.04.2013
Profile:		

Lifting cylinder, changing seals in machine

Op nbr 94505

999 3651 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack

Ratchet block, 750 kg (1653 lb), 2 pcs

Lifting sling, 2 m (6.5 ft), 4 pcs

Axle stand, 15 tonnes, 2 pcs

1. Raise the lifting frame until it is possible to remove the piston rod pivot pin. Secure the lifting frame in this position with axle stands.

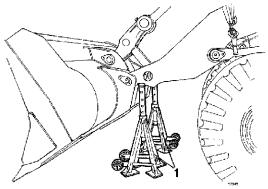


Figure 1
Supporting lifting frame

1. Axle stand, 15 tonne

AWARNING

Risk of pressurised oil.

Disconnect the hydraulic hoses and the clamp from the hydraulic pipes below the lifting cylinder. Drain the oil from the cylinder.

Use protective plugs.

- 3. Remove the piston rod pin grease nipple and lock screw.
- 4. Connect a ratchet block to the piston rod end. Pull out the piston rod pin.

Pin weight: approx. 13 kg (29 lb)

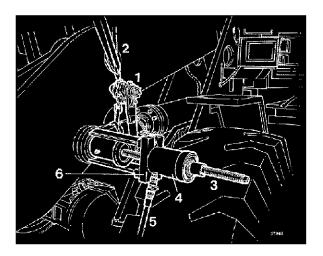


Figure 2 Removing piston rod pin

- 1. Ratchet block, 750 kg (1653 lb)
- 2. Lifting sling, 2 m (6.5 ft), 2 pcs
- 3. 999 3651
- 4. 11 666 015
- 5. 11 666 013
- 6. 999 3739
- 5. Position a block of wood as support for the lifting cylinder in the frame.

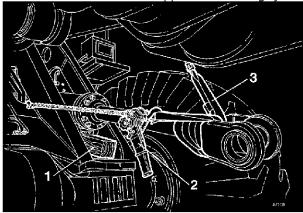


Figure 3
Supporting lifting cylinder

- 1. Block of wood
- 2. Ratchet block, 750 kg (1653 lb)
- 3. Lifting sling, 2 m (6.5 ft)
- 6. Connect a ratchet block to the piston rod lug and press in the piston rod so that the oil at the piston end is pressed out, see Figure [?].

Put a piece of cardboard or similar below the cylinder connecting pipe and conduct the oil down into a vessel.

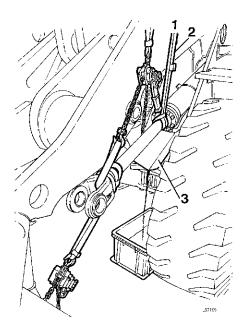


Figure 4 Draining lifting cylinder

- 1. Lifting device
- 2. Lifting sling, 5 m (16 ft)
- 3. Corrugated cardboard or similar
- 7. Move the ratchet block, which was used for pressing in the piston rod, so that the piston rod can be pulled out, see Figure [?]. Pull out the piston rod until stop.

Connect a lifting device to the piston rod at the piston end, see Figure [?].

- 8. Remove the piston rod guide attaching bolts.
- 9. Carefully pull out the piston rod.

The piston rod weight: approx. 110 kg (243 lb)

Figure 5 Removing piston rod

10. Remove the piston rod.

11. Remove the lock screw and the lock pin.

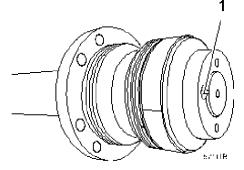


Figure 6

- 1. Lock screw
- 12. Remove the piston from the piston rod.

 Secure the pin end of the piston rod so that the rod cannot turn.
- 13. Remove the piston rod guide.
- 14. Replace the piston rod guide internal and external seals. Regarding the positioning of and location for the seals, see Figure [?].

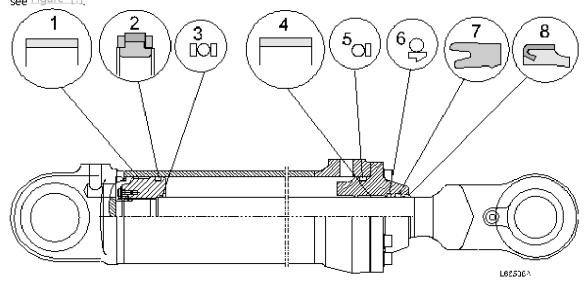


Figure 7 Lifting cylinder

- 1. Guide
- 2. Piston seal
- 3. Support rings and O-ring
- 4. Bushing
- 5. O-ring and support ring
- 6. Piston rod seal
- 7. Piston rod seal
- 8. Scraper seal
- 15. Check that the bushings in the piston rod guide are undamaged. Replace damaged bushings.

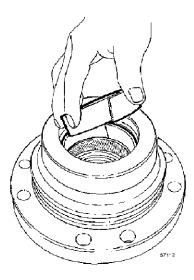


Figure 8
Installing bushings in piston rod guide

16. Replace the seals on the piston.

NOTICE

The chamfered side of the support rings must be turned toward the edges in the location on the piston, see Figure [?]

17. Check that the bushing on the piston is undamaged. Replace the bushing if it is damaged.

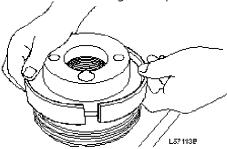


Figure 9
Installing bushing in piston

Assembling

- 18. Replace the O-ring at the piston rod piston end.Lubricate the threads with oil and install the piston rod guide and the piston.Tighten down the piston so that one of the three grooves on the rod aligns with with the hole for the lock screw.
- 19. Lock the piston with the lock pin and lock screw. Tightening torque: **25 N m (18 lbf ft)**

Installing

20. Connect a lifting device and ratchet block to the piston rod. Lubricate the piston with oil. Also connect a ratchet block between the piston rod lug and the cylinder and pull the piston into the cylinder.

Install and tighten the piston rod guide bolts.

Tightening torque L90C: **79 N m (58 lbf ft)**Tightening torque L120C: **310 N m (229 lbf ft)**

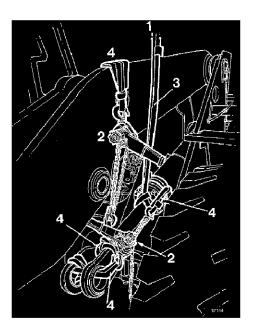


Figure 10

- 1. Lifting device
- 2. Ratchet block, 750 kg (1653 lb)
- 3. Lifting sling, 5 m (16 ft)
- 4. Lifting sling, 2 m (6.5 ft), 4 pcs
- 21. Install dust seals for the piston rod pin. Force (roll) them over the bushing attachment in the lifting frame. Check that the seal rings by the bushing are undamaged.

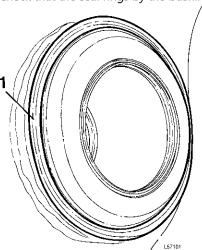


Figure 11 Pre-assembling dust seal

- 1. Dust seal (force (roll) over edge)
- 22. Lift and align the piston rod lug in the lifting frame.
- 23. Install the pin and knock it in with a soft mallet.
- 24. Poke down the dust seals in their location, so that they seal against the piston rod lug.
- 25. Install the lock screw and the grease nipple.
- 26. Lubricate the pin.

- 27. Connect the hydraulic hoses to the pipes below the lifting cylinder and replace the O-rings. Install the hose clamp against the cylinder.
- 28. Adjust the oil level in the hydraulic oil tank.
- 29. Start the engine. Run the lifting frame up and down a few times to remove any air from the cylinder. Check that there are no leaks.



Document Title: Lifting cylinder, replacing	ļ ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lifting cylinder, replacing

Op nbr 94504

999 3651 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack

Axle stand, 15 tonnes, 2 pcs

Ratchet block, 750 kg (1653 lb)

Lifting sling, 2 m (6.5 ft), 2 pcs

Lifting sling, 5 m (16 ft)

1. Raise the lifting frame until it is possible to remove the piston rod pivot pin. Secure the lifting frame in this position with axle stands.

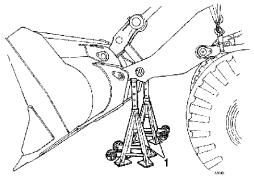


Figure 1
Supporting lifting frame

1. Axle stand, 15 tonne

A WARNING

Risk of pressurised oil.

Disconnect the hydraulic hoses and the clamp from the hydraulic pipes below the lifting cylinder. Drain the oil from the cylinder. Use protective plugs.

- 3. Remove the piston rod pin grease nipple and lock screw.
- Connect a ratchet block to the piston rod end.
 Pull out the piston rod pin.

Pin weight: approx. 13 kg (29 lb)

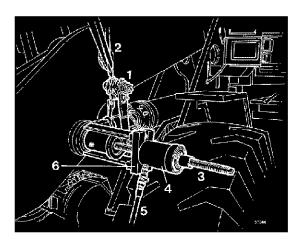


Figure 2 Removing piston rod pin

- 1. Ratchet block, 750 kg (1653 lb)
- 2. Lifting sling, 2 m (6.5 ft), 2 pcs
- 3. 999 3651
- 4. 11 666 015
- 5. 11 666 013
- 6. 999 3739
- 5. Connect a lifting device to the middle of the hydraulic cylinder. Cylinder weight: **approx. 215 kg (474 lb)**

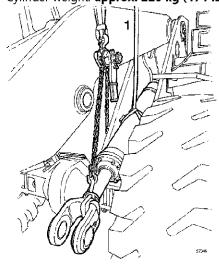


Figure 3 Removing lifting cylinder

- 1. Lifting sling, 5 m (16 ft)
- 6. Remove the grease nipple and the lock screw from the lifting cylinder pivot pin.
- 7. Pull out the lifting cylinder pivot pin. Pin weight: **approx. 19 kg (42 lb)**

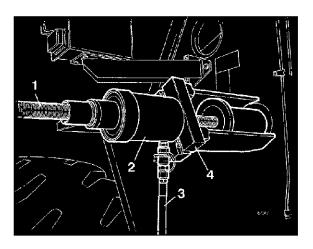


Figure 4
Removing cylinder attaching pin

- 1. 999 3561
- 2. 11 666 015
- 3. 11 666 013
- 4. 999 3739
- 8. Lift the lifting cylinder forward and lower it. At the same time lower the piston rod end with the ratchet block.

Installing lifting cylinder

9. Connect a lifting device to the middle of the lifting cylinder.

Cylinder weight L90C: approx. 125 kg (276 lb)

Cylinder weight L90C: approx. 135 kg (298 lb)

Connect a ratchet block between the lifting frame and the piston rod end.

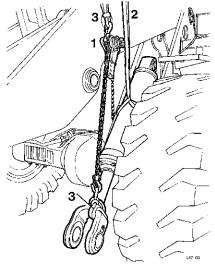


Figure 5 Installing lifting cylinder

- 1. Ratchet block, 750 kg (1653 lb)
- 2. Lifting sling, 5 m (16 ft)
- 3. Lifting sling, 2 m (6.5 ft)
- 10. Align the lifting cylinder with the location in the frame so that the bushing lies in the centre of the location for the pin.
- 11. Install the cleaned and greased pin. Knock in the pin with a soft mallet.
- 12. Install the lock screw and the grease nipple.

13. Install the dust seals for the piston rod pin. Force (roll) them over the bushing attachment in the lifting frame. Check that the scraper rings by the bushing are undamaged.

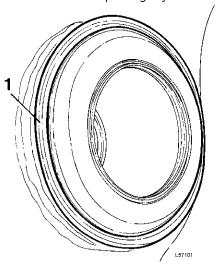


Figure 6 Pre-assembling dust seal

- 1. Dust seal forced (rolled) over edge
- 14. Lift and align the piston rod lug in the lifting frame.
- 15. Install the pin by knocking with a soft mallet. Poke down the dust seals in their location, so that they seal against the piston rod lug.
- 16. Install the lock screw and the grease nipple.
- 17. Lubricate the pin.
- 18. Connect the hydraulic hoses to the pipes below the lifting cylinder and replace the O-rings. Install the hose clamp against the cylinder.
- 19. Adjust the oil level in the hydraulic oil tank.
- 20. Start the engine.

Run the lifting arms up and down a few times to remove any air from the cylinder. Check that there are no leaks.



Document Title: Lifting cylinder, replacing bushings (removed)	Information Type: Service Information	Date: 25.04.2013
Profile:		

Lifting cylinder, replacing bushings (removed)

Op nbr 94512

999 3652 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack 11 667 100 Drift plate 11 667 120 Drift plate

Replacing bushings for cylinder pin

- 1. Remove the scraper rings.
- 2. Press in the new bushing (greased) and at the same time press out the worn bushing, see Figure [?]. Make sure that the lubrication grooves in the bushing are positioned as shown in Figure [?]. Position the new bushing at the centre so that the scraper rings can be installed on either side.

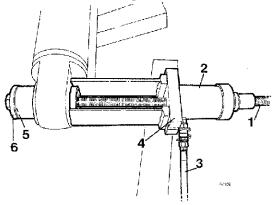


Figure 1
Pressing out/in bushing for piston rod pin

- 1. 999 3652
- 2. 11 666 015
- 3. 11 666 013
- 4. 999 3739
- 5. 11 667 100
- 6. 11 667 120

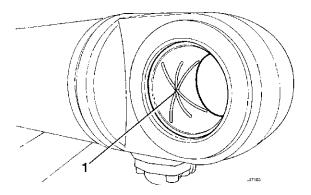


Figure 2
Position of bushing in lifting cylinder

- 1. Lubrication grooves
- 3. Knock the worn bushing out of the location where the scraper ring is to be installed.
- 4. Install the scraper rings on both sides of the bushing.

Replacing bushings for piston rod pin

- 5. Remove one of the scraper rings.
- 6. Press in the new bushing (greased) and at the same time press out the worn bushing, see Figure [?] Make sure that the lubrication groove is positioned as shown in Figure [?]. Position the new bushing at the centre so that the scraper rings can be installed on either side.

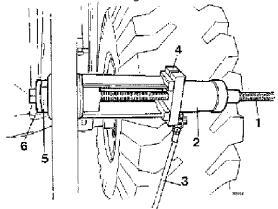


Figure 3
Pressing out/in bushing for piston rod pin

- 1. 999 3652
- 2. 11 666 015
- 3. 11 666 013
- 4. 999 3739
- 5. 11 667 100
- 6. 11 667 120

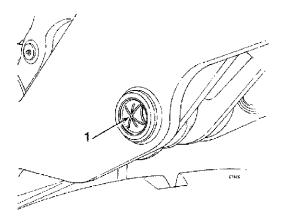


Figure 4 Position of bushing in lifting arm

- 1. Lubrication grooves
- 7. Knock the worn bushing out of the location where the scraper ring is to be installed.
- 8. Install the scraper rings on both sides of the bushing.

Document Title: Lifting/tilting cylinder, (principle diagram)	945	Information Type: Service Information	Date: 25.04.2013
Profile:			

Lifting/tilting cylinder, (principle diagram)

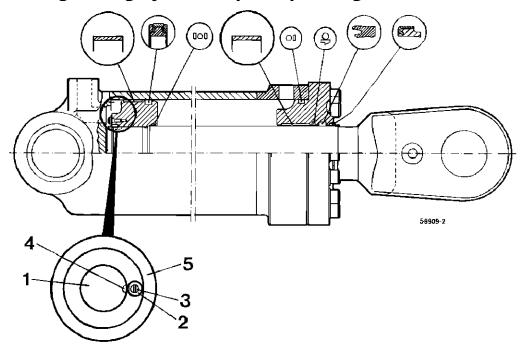


Figure 1 Lifting/tilting cylinder, (principle diagram)

- 1. Piston rod
- 2. Washer
- 3. Screw
- 4. Pin
- 5. Piston

Service Information

Construction Equipment

Document Title: Shock valve, function, checking and adjusting	lifting	·	Information Type: Service Information	Date: 25.04.2013
Profile:				

Shock valve, lifting function, checking and adjusting

Op nbr 94523

999 3831 Support 999 3723 Nipple 999 3749 Nipple 11 666 003 Pressure gauge 11 666 030 Pump 11 666 037 Hose 14 360 000 Vacuum pump

NOTICE

Always use the support to secure the lifting frame when carrying out work under the lifting frame.

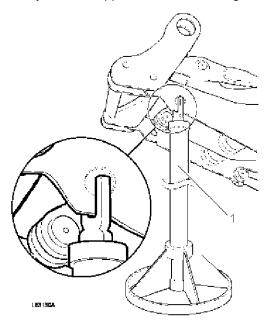


Figure 1 Securing lifting frame

- 1. 999 3831
 - 1. Raise the lifting arms and position the support, see Figure [?], and lower the lifting arms onto the support. Tilt the bucket forward against end position.
 - 2. Connect the an ejector to the hydraulic tank.



The precondition for using 14 360 000 is that the compressed air is continuously connected and is not turned off. Never leave the machine unattended. The partial vacuum in the hydraulic oil tank must not exceed 0.7 MPa (102 psi).

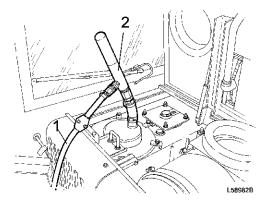


Figure 2 Shutting off hydraulic oil

- 1. Compressed-air line
- 2. 14 360 000
- 3. Remove the shock valve for the lifting function.

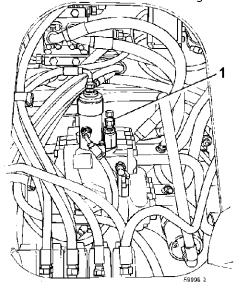


Figure 3

- 1. Shock valve, lifting function
- 4. Connect the shock valve according to Figure [?], check and if required adjust the opening pressure. Opening pressure: 32 ±0.9 MPa (4641 ±131 psi)

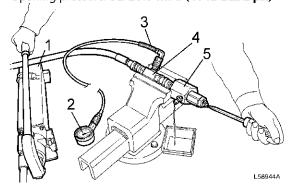


Figure 4

Adjusting shock valve

- 1. 11 666 030
- 2. 11 666 003
- 3. 11 666 037
- 4. 999 3723
- 5. 999 3749
- 5. Re-install the shock valve to the control valve, remove the ejector and lower the lifting frame.





Document Title: Shock valve, tilting function, checking and adjusting	945	Information Type: Service Information	Date: 25.04.2013
Profile:			

Shock valve, tilting function, checking and adjusting

Op nbr 94519

999 3831 Support 11 666 003 Pressure gauge 0–40 MPa (0–5800 psi) 11 666 037 Hose

The following applies when checking:

Temperature: **Normal working temperature** Speed: **Low idling speed**

NOTICE

Always use the support to secure the lifting frame when carrying out work under the lifting frame, see Figure [?].

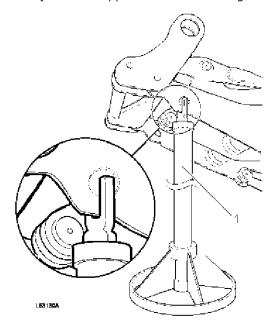


Figure 1 Securing lifting frame

- 1. 999 3831
 - 1. Remove the cover plate on the front frame and connect the pressure gauge to the pressure outlet.

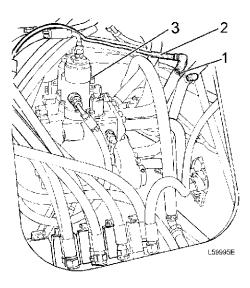


Figure 2 Checking shock pressure, tilting rearward

- 1. Pressure outlet
- 2. 11 666 037 and 11 666 003
- 3. Pressure-limiting valve, shock pressure (tilting rearward)

Shock pressure, checking, tilting rearward

2. Raise the lifting frame approx. 1 m (3 ft) and tilt the bucket rearward against end position. Lower the lifting frame. Read off the pressure when the stop lugs touch each other and the tilting cylinder is forced inward. Shock pressure: 24.5 ±0.9 MPa (3553±131 psi)

Shock pressure, adjusting

3. The pressure is adjusted at item 3, Figure [?]. The pressure is raised when the screw is screwed in. One turn changes the pressure approx. 10 MPa (1450 psi).

Shock pressure, checking, tilting forward

4. Connect the pressure gauge to the pressure outlet.

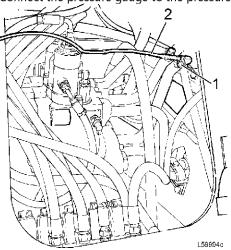


Figure 3
Checking shock pressure (tilting forward)

- 1. Pressure outlet
- 2. 11 666 037 and 11 666 003

5. Raise the lifting frame approx. 2 m (7 ft) and tilt the bucket forward against end position. Raise the lifting frame. Read off the pressure when the stop lugs touch each other and the tilting cylinder is forced outward. Shock pressure: 17.5 ±0.9 MPa (2538 ±131 psi)

Shock pressure, adjusting

6. The pressure is adjusted at item 1, see Figure [?]. The pressure is raised when the screw is screwed in. One turn changes the pressure approx. 10 MPa (1450 psi).

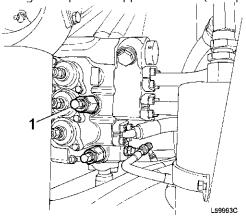


Figure 4
Control valve as seen from the underside of the machine

- 1. Pressure-limiting valve, shock pressure (tilting forward)
- 7. Restore the machine.



Service Information

Construction Equipment

Document Title: Specifications, general	ļ ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, general

Lifting cylinder		
Туре	Double-acting	
Piston rod diameter	70 mm (2.76 in)	
Inside diameter / stroke	130 / 710 mm (5.12 / 27.95 in)	

Tilting cylinder		
Type Double-acting		
Piston rod diameter	90 mm (3.54 in)	
Inside diameter / stroke	190 / 430 mm (7.48 / 16.93 in)	



Service Information

Construction Equipment

Document Title: Specifications, weights	Function Group: 945	Information Type: Service Information	Date: 25.04.2013
Profile:			

Specifications, weights

Lifting frame, incl. links, pivot pins and cylinders	1800 kg (3968 lb)
Lifting cylinder	125 kg (276 lb)
Tilting cylinder	170 kg (374 lb)

L90C/L120C Long Boom

Lifting frame, incl. links, pivot pins and cylinders	2560 kg (5644 lb)
Lifting cylinder	190 kg (419 lb)
Tilting cylinder	245 kg (540 lb)



Document Title: Tilting cylinder, changing seals in machine	· ·	Information Type: Service Information	Date: 25.04.2013
Profile:			

Tilting cylinder, changing seals in machine

Op nbr 94509

999 3651 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack 30 tonnes

Ratchet block, 750 kg (1653 lb), 2 pcs

Lifting sling, 5 m (16 ft)

Lifting sling, 3 m (10 ft)

Lifting sling, 2 m (6.5 ft), 2 pcs

1. Raise the lifting frame and secure the lifting frame with axle stands. Tilt the bucket down against the ground.

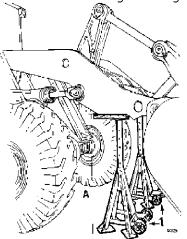


Figure 1
Supporting lifting frame

- 1. Axle stand, 15 tonne
- A. 145–150 cm (5.71–5.91 in)
- 2. Connect a lifting device to the tilting cylinder

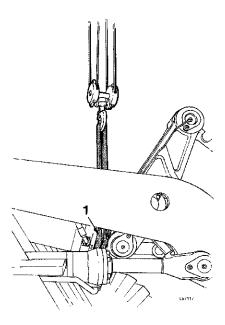


Figure 2

- 1. Lifting sling, 5 m (16 ft)
- 3. Remove the lubrication pipe, the lock screw and the position indicator from the pin. Remove the tilting cylinder piston rod pin.

Pin weight: approx. 26 kg (57 lb)

NOTICE

protect the piston rod.

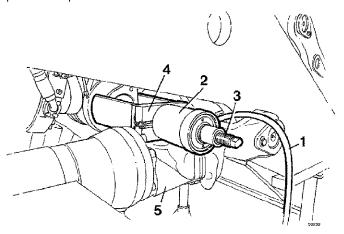


Figure 3
Removing the tilting cylinder piston rod pin.

- 1. 11 666 013
- 2. 11 666 015
- 3. 999 3651
- 4. 999 3739
- 5. Protection for piston rod
- 4. Empty the oil from the tilting cylinder by disconnecting the hydraulic hoses from piston and piston rod ends in a suitable place. Pull the piston rod to the end position with the aid of a ratchet block and sling.

 Oil capacity: approx. 20 litres (5.3 US gal)

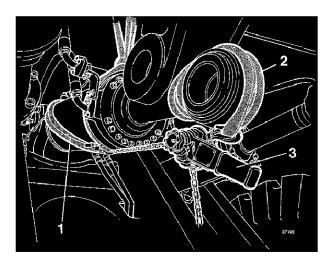


Figure 4 Draining tilting cylinder

- 1. Lifting sling, 3 m (10 ft)
- 2. Lifting sling, 2 m (6.5 ft)
- 3. Ratchet block, 750 kg (1653 lb)
- 5. Detach the hoses and the brackets from the piston rod guide. Support the cylinder against the frame.
- 6. Connect a lifting device to the piston rod. Remove the piston rod guide bolts. Pull out the piston rod. Piston rod weight: **approx. 165 kg (364 lb)** incl. piston and guide.

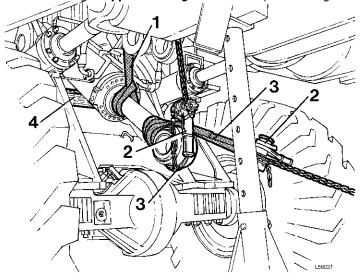


Figure 5 Removing piston rod

- 1. Lifting device and lifting sling, 5 m (16 ft)
- 2. Ratchet block, 750 kg (1653 lb)
- 3. Lifting sling, 2 m (6.5 ft), 2 pcs
- 4. Block of wood
- 7. Remove the lock screw and the lock pin.

Remove the piston and the piston rod guide from the piston rod.

Piston weight: approx. 27 kg (60 lb)

Piston rod guide weight: approx. 44 kg (97 lb)

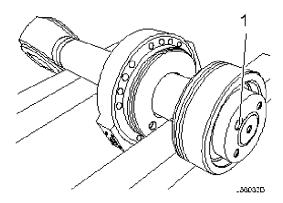


Figure 6

- 1. Lock screws
- 8. Replace the seals on the piston and the piston rod guide. Regarding the position of the seals, see Figure [?].

NOTICE

The chamfered side of the piston seal support rings must be turned toward the edges in the location on the piston. Check that the bushings in the piston rod guide and on the piston are undamaged.

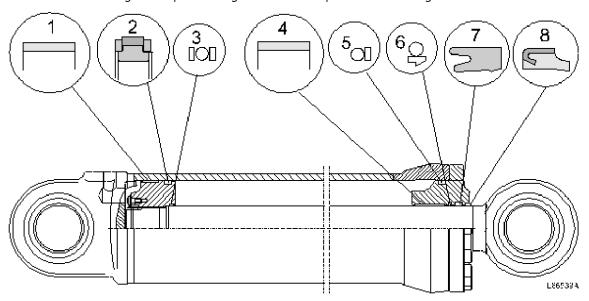


Figure 7
Tilting cylinder, position of seals

- 1. Guide
- 2. Piston seal
- 3. Support rings and O-ring
- 4. Bushing
- 5. O-ring and support ring
- 6. Piston rod seal
- 7. Piston rod seal
- 8. Scraper seal
- Replace the O-ring and the support rings on the piston rod piston end.
 Lubricate the threads with oil and install the piston rod guide and the piston.
 Tighten down the piston so that one of the three grooves on the rod aligns with with the hole for the lock screw.
- 10. Lock the piston with the lock pin and lock screw. Tightening torque: **25 N m (18 lbf ft)**
- 11. Lift the piston rod into position and pull it into the tilting cylinder.

Install the piston rod guide bolts.

Tightening torque L90C: **310 N m (229 lbf ft)**Tightening torque L120C: **650 N m (479 lbf ft)**

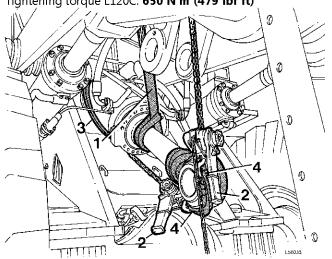


Figure 8 Installing piston rod

- 1. Lifting device and sling, 5 m (16 ft)
- 2. Ratchet block, 750 kg (1653 lb)
- 3. Lifting sling, 3 m (10 ft)
- 4. Lifting sling, 2 m (6.5 ft), 2 pcs
- 12. Lift and align the piston rod end in the "3-hole link". At the same time install the dust seals and allow them to slide with into their locations when the piston is positioned.

Check that the parts of the scraper rings are not damaged. Replace when necessary.

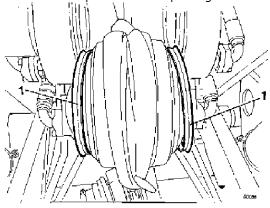


Figure 9 Installing dust seals

- 1. Dust seals
- 13. Install the cleaned and greased pin.
- 14. Install the lock screw, the lubrication pipe and the position indicator.
- 15. Connect the hoses for the piston and piston rod ends on the tilting cylinder.
- 16. Adjust the oil level in the hydraulic oil tank.
- 17. Test the tilting function and check that there are no leaks.



Document Title: Tilting cylinder, replacing	'	Information Type: Service Information	Date: 25.04.2013
Profile:			

Tilting cylinder, replacing

Op nbr 94508

999 3651 Draw bolt 999 3652 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack 30 tonnes

Removing

1. Raise the lifting frame and secure the lifting frame with axle stands. Tilt the bucket down against the ground.

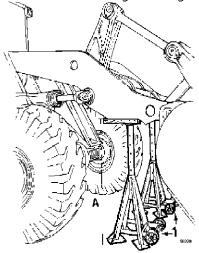


Figure 1
Supporting lifting frame

- 1. Axle stands, 15 tonnes
- A. 145–150 cm (5.71–5.91 in)
- Disconnect the hydraulic hoses from the piston rod guide and the hydraulic pipes from the top of the cylinder jacket.
 Use protective plugs.
- 3. Connect a lifting device to the tilting cylinder

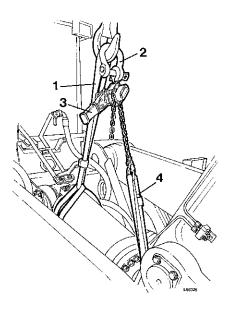


Figure 2 Removing tilting cylinder

- 1. Lifting sling, 4 m (13 ft)
- 2. Shackle
- 3. Ratchet block, 750 kg (1653 lb)
- 4. Lifting sling, 2 m (6.5 ft)
- 4. Remove the lubrication pipe, the lock screw and the position indicator from the pin. Remove the tilting cylinder piston rod pin.

Pin weight: approx. 26 kg (57 lb)



protect the piston rod.

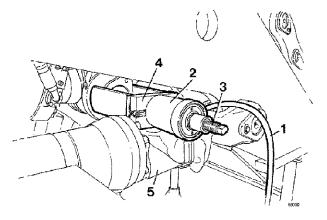


Figure 3
Removing the tilting cylinder piston rod pin.

- 1. 11 666 013
- 2. 11 666 015
- 3. 999 3651
- 4. 999 3739
- 5. Protection for piston rod
- 5. Remove the lubrication pipe and the lock washer from the pivot pin in the cylinder attachment.
- 6. Remove the headlamps together with the cables. Disconnect the hose for attachment locking, if applicable.
- 7. Remove the pivot pin.

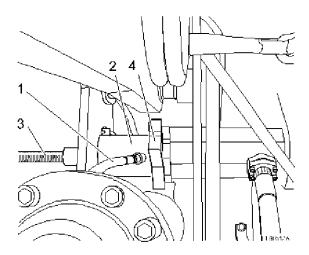


Figure 4
Removing pivot pin, tilting cylinder attachment

- 1. 11 666 013
- 2. 11 666 015
- 3. 999 3652
- 4. 999 3739
- 8. Lift away the tilting cylinder.

Cylinder weight L90C: **approx. 170 kg (375 lb)**Cylinder weight L120C: **approx. 269 kg (593 lb)**

9. Remove the pivot pin from the cylinder attachment in the front frame. Clean, apply grease to the pin and the location.

Pin weight: approx. 30 kg (66 lb)

Installing

- 10. Connect a lifting device to the tilting cylinder and lift it.
- 11. Install the dust seals and align the cylinder with the attachment in the frame. Centre the bushing in the pin location in the frame.

Check that the scraper rings by the bushing are undamaged. Replace when necessary.

- 12. Install the pivot pin. The lock pin with the lock washer. Connect the lubrication pipe to the pin.
- 13. Align the piston rod lug with the "3-hole link". At the same time install the dust seals and allow them to slide with into their locations when the piston rod is positioned.

Check that the scraper rings by the bushing are undamaged.

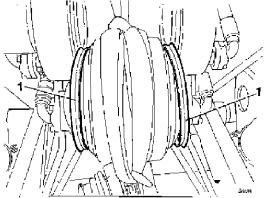


Figure 5 Installing dust seals

1. Dust seals

- 14. Install the cleaned and greased pivot pin. Install the lock screw and connect the lubrication pipe and.
- 15. Connect the hoses and the pipes for the piston and piston rod ends on the tilting cylinder. Re-install the position indicator.
- 16. Lubricate the tilting cylinder pivot pins.
- 17. Adjust the oil level in the hydraulic oil tank.
- 18. Test the tilting function and check that there are no leaks.



Document Title: Tilting cylinder, replacing bearings (removed)	Information Type: Service Information	Date: 25.04.2013
Profile:		

Tilting cylinder, replacing bearings (removed)

Op nbr 94507

999 3652 Draw bolt 999 3739 Support 11 666 013 Pump 11 666 015 Jack 11 667 130 Drift plate

Prize away one of the scraper rings.
 Press out the bushing from the cylinder lug and at the same time press in the new bushing.
 Knock away the old bushing from the location for the scraper ring. Install new scraper rings.

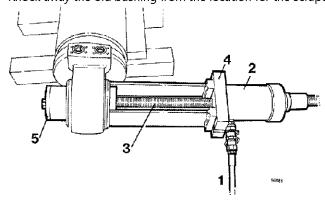


Figure 1 Pressing out/in bushing in cylinder lug

- 1. 11 666 013
- 2. 11 666 015
- 3. 999 3652
- 4. 999 3739
- 5. 11 667 130

2. Replace the bushing in the piston rod lug in the same way as for the cylinder lug.

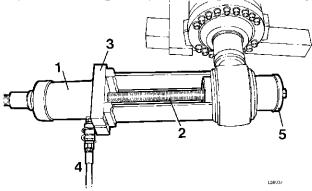


Figure 2
Pressing out/in bushing in piston rod lug

- 1. 11 666 015
- 2. 999 3652
- 3. 999 3739
- 4. 11 666 013
- 5. 11 667 130