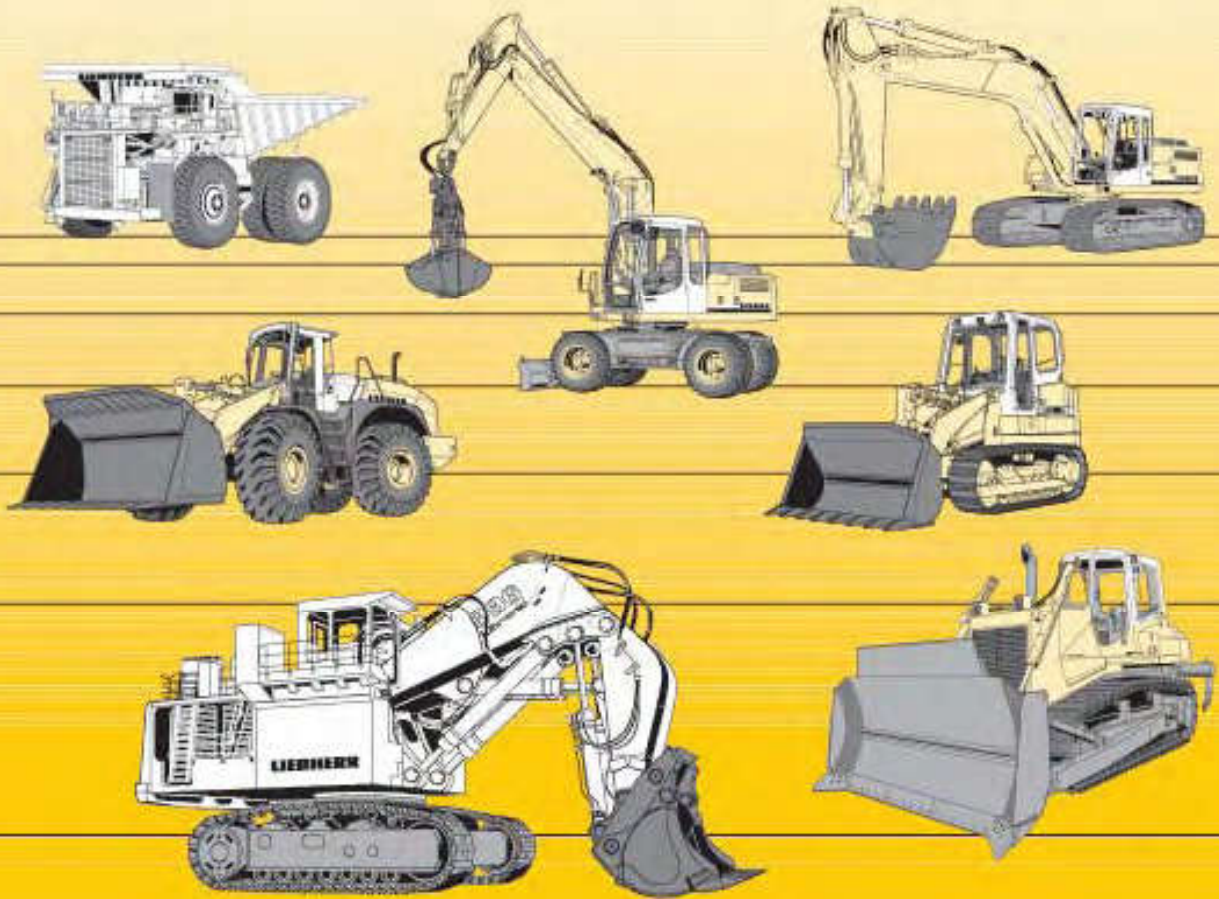


en

Service manual
Wheel loader
L544 - L580 2plus2



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1.1 Safety regulations

Working on the machine poses safety risks to the operator, driver or maintenance technicians. You can considerably reduce the risk of accidents by carefully reading and observing the various safety instructions at regular intervals.




This is especially important for personnel who only occasionally work on the machine, for example, carrying out rigging or maintenance work. The safety regulations listed below, if conscientiously followed, will ensure your own safety and that of others, and will prevent the machine from being damaged.

Whenever tasks which could cause danger to personnel or damage to the machine are described, the necessary safety precautions are explained in this manual.

These are indicated by the headings Danger, Warning or Caution.

1.1.1 Introduction

1. The symbols below have the following meanings:

Danger		Danger Warning that without appropriate precautions, certain operational procedures could result in fatal accidents.
Warning		Warning Warning that without appropriate precautions, certain operational procedures could result in severe physical injuries.
Caution		Caution Warning that without appropriate precautions, certain operational procedures could result in minor physical injuries or damage to the machine.

2. Observance of these instructions does not relieve you of the responsibility to observe other rules and guidelines!

The following should also be observed:

- The safety rules in force at the operating site
- Legally enforced road traffic regulations
- Guidelines issued by trade associations

2.1 Technical data

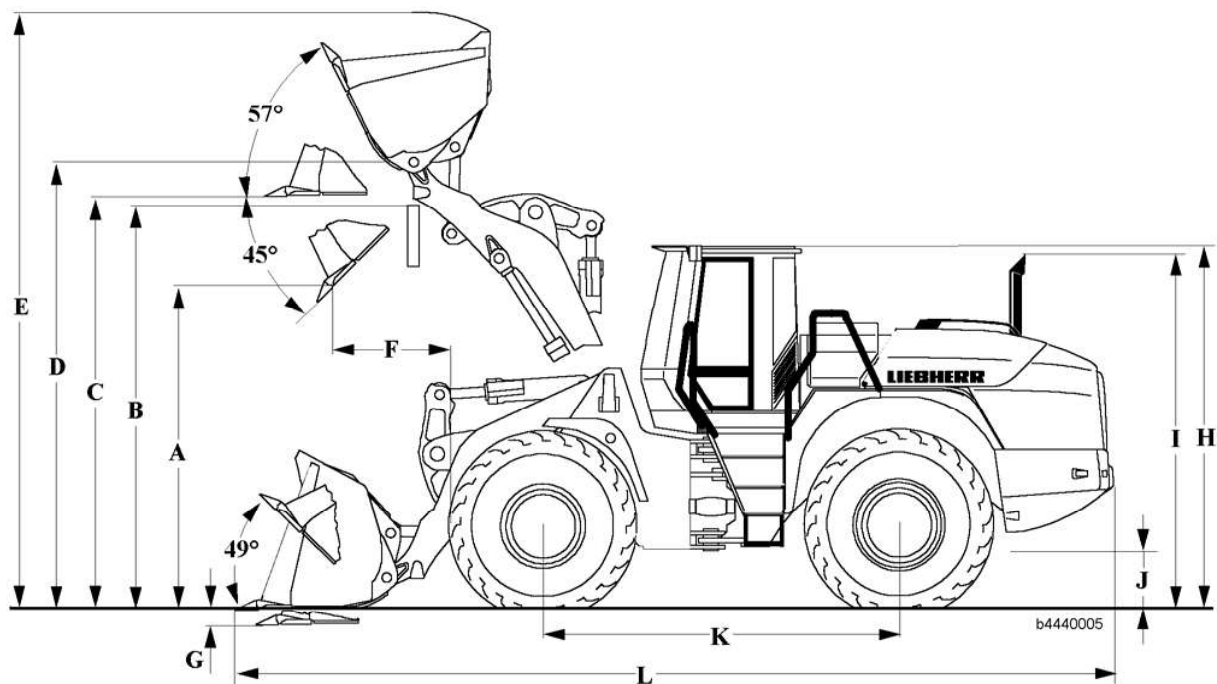
2.1.1 Complete machine

Wheel loader with Z-bar lift arms

Valid for: **L544 - 443 / from 7477**

The values stated refer to the standard version of the machine:

- With Z-bar lift arm (2600 mm) without hydraulic quick-change device.
- With 23.5 R25 Michelin XHA tyres.
- The specified tipping loads and weights include all lubricants, full fuel tank, ROPS/FOPS cab and driver.



Description	Value	Unit
Bucket capacity as per ISO 7546	3.0	m ³
Bucket width	2700	mm
Specific material weight	1.8	t/m ³
A - Dump height at maximum lifting height and 45° tilt-out angle	2920	mm
B - Maximum dumping height	3500	mm
C - Maximum height of bucket base	3645	mm
D - Maximum height of bucket pivot point	3915	mm
E - Maximum height of bucket upper edge	5350	mm
F - Reach at maximum lifting height and 45° tilt-out angle	1040	mm
G - Digging depth	85	mm
H - Height above cab	3355	mm
I - Height above exhaust	3310	mm

LBHVersion 03/07.2003/en/ferrial-look/28.08.2007

Description	Value	Unit
Turbocharger	KKK K29	
Auxiliary output ratio	1 : 1.275	
V-ribbed-belt tension value	30 - 35	
Weight	740	kg
Emission limit values comply with	EU – RL 97/68 EG – level 1	

Valid for: **L554** - 453 / from 7887; ID 9074804

Description	Value	Unit
Engine type	D924TI-E A2	
Number of cylinders	4	
Ignition sequence	1-3-4-2	
Cylinder volume	6640	cm ³
Bore diameter	122	mm
Stroke	142	mm
Rated power according to ISO 9249	145 / 197	kW / hp
Rated speed	2000	min ⁻¹
Max. torque at 1200 min ⁻¹	959	Nm
Lower idling speed	800 ⁺⁵⁰	min ⁻¹
Upper idling speed	2100 ⁺⁸⁰	min ⁻¹
Begin delivery before TDC	See type plate	°
Compression pressure	20 – 28	bar
Injection nozzle jet pressure	217 ⁺⁸	bar
Inlet valve play (cold)	0.25	mm
Outlet valve play (cold)	0.30	mm
Direction of rotation looking towards flywheel	Anti-clockwise	
Number of teeth on flywheel	147	
Coolant thermostat	79	°C
Longitudinal / traverse inclinability	45 / 45	°
Injection pump	Bosch P3000	
Governor	RSV	
Operating voltage of starter	24	V
Power consumption of starter	5.4	kW
Output voltage of alternator	28	V
Power output from alternator	55	A
Turbocharger	KKK K29	
Auxiliary output ratio	1 : 1.275	
V-ribbed-belt tension value	30 - 35	
Weight	740	kg
Emission limit values comply with	EU – RL 97/68 EG – level 2	

LBHVersion 03/07.2003/en/fernal-tack/28.09.2007

Description	Value	Unit
Torque (Δp 400 bar)	653	Nm
Weight	47	kg

Valid for: **L564** - 463 / from 7477; **L574** - 473 / from 7477; **L580** - 458 / from 7477

Description	Value	Unit
Control type	EP	
Max. displacement	140	cm ³
Max. swivel angle	25	°
Min. swivel angle	0	°
Max. speed	4950	min ⁻¹
Torque (Δp 400 bar)	855	Nm
Discharge valve / max. discharge quantity	10	l/min
Discharge valve / orifice diameter	2.0	mm
Weight	60	kg

Gear pump scavenging for variable displacement motors

Description	Value	Unit
Displacement	8	cm ³
RPM at rated engine speed	2550	min ⁻¹

2.1.5 Working hydraulics

Variable displacement pump

Valid for: **L544** - 443 / from 7477; **L554** - 453 / from 7477

Description	Value	Unit
Control type	LRDS	
Maximum displacement	95	cm ³
Flow rate at rated engine speed	234	l/min
RPM at rated engine speed	2542	min ⁻¹
Power output	80	kW
Flow controller (Δp)	22 ^{±2}	bar
Power controller at regulation begin	180 ^{±10}	bar
Weight	53	kg

Valid for: **L564** - 463 / from 7477; **L574** - 473 / from 7477; **L580** - 458 / from 7477

Description	Value	Unit
Control type	LRDS	
Displacement	130	cm ³
Flow rate at rated engine speed	290	l/min
RPM at rated engine speed	2312	min ⁻¹
Power output	100	kW
Flow controller (Δp)	22 ^{±2}	bar

LBHVersion 03/07.2003/en/ferrial-tdck/28.09.2007

Service brake hydro accumulator

Valid for: **L544** - 443 / 7477 - 9981; Id. 5717519

Description	Value	Unit
Number of hydro accumulators	4	units
Hydro accumulator volume	1400	cm ³
Preload pressure (nitrogen filling)	70	bar

Valid for: **L554** - 453 / 7477 - 9255; **L564** - 463 / 7477 - 9981;
L574 - 473 / 7477 - 9981; **L580** - 458 / 7477 - 9981; Id. 5717519

Description	Value	Unit
Number of hydro accumulators	2	units
Hydro accumulator volume	1400	cm ³
Preload pressure (nitrogen filling)	70	bar

Valid for: **L544** - 443 / from 9982; **L554** - 453 / from 9256; **L564** - 463 / from 9982;
L574 - 473 / from 9982; **L580** - 458 / from 9982; Id. 10038487

Description	Value	Unit
Number of hydro accumulators	4	units
Hydro accumulator volume	1400	cm ³
Preload pressure (nitrogen filling)	95	bar

Brake light pressure switch

Description	Value	Unit
Switch type	N/O switch	
Increasing switching point	5 ^{+0.5}	bar
Connecting thread	M 12 x 1.5	mm

Accumulator charge pressure switch

Valid for: **L544** - 443 / 7477 - 9981; **L554** - 453 / 7477 - 9981; **L564** - 463 / 7477 - 9981;
L574 - 473 / 7477 - 9981; **L580** - 458 / 7477 - 9981; Id. 6905533

Description	Value	Unit
Switch type	NC switch	
Switching point decreasing	90 ^{±5}	bar
Connecting thread	M 12 x 1.5	mm

Valid for: **L544** - 443 / from 9982; **L554** - 453 / from 9982; **L564** - 463 / from 9982;
L574 - 473 / from 9982; **L580** - 458 / from 9982; Id. 10036072

Description	Value	Unit
Switch type	NC switch	
Switching point decreasing	120 ^{±5}	bar
Connecting thread	M 12 x 1.5	mm

LBHVersion 03/07.2003/en/serial-look/28.09.2007

Progressive distributor**MX-F**

Description	Value	Unit
Maximum operating pressure at the inlet	300	bar
Temperature range	min. -35 max. +100	°C °C
Transfer medium	Grease up to NLGI Class 2	

MX-F 25

Description	Value	Unit
Pump flow per outlet	25	mm ³
Flow per element	50	mm ³
Piston diameter	3	mm

MX-F 45

Description	Value	Unit
Pump flow per outlet	45	mm ³
Flow per element	90	mm ³
Piston diameter	4	mm

MX-F 75

Description	Value	Unit
Pump flow per outlet	75	mm ³
Flow per element	150	mm ³
Piston diameter	5	mm

MX-F 105

Description	Value	Unit
Pump flow per outlet	105	mm ³
Flow per element	210	mm ³
Piston diameter	6	mm

EP-tronic control device and operation

Description	Value	Unit
Factory-set lubrication time	28	Cycles
Factory set cycle time	0.5	Hours
Adjustable lubrication time	min. 1 max. 48	Cycles Cycles
Adjustable cycle times	min. 0.5 max. 8	Hours Hours
Supply voltage	min. 10 max. 30	V V

LBHVersion 03/07.2003/en/fernal-tack/28.09.2007

- 3.5.57 Checking whether metered quantities (grease collars) are adequate at the bearing points of the central lubrication system.....3.5-36
- 3.5.58 Check the hose lines of the central lubrication system (lubrication points, detached hoses, external leakage).....3.5-36
- 3.5.59 Lubricating the door hinges3.5-36
- 3.5.60 Clean or replace the fresh air and recirculated air filter3.5-37
- 3.5.61 Checking the indicator beads in the dryer-collector unit.....3.5-37
- 3.5.62 Lubricating the lift arms and attachment3.5-38
- 3.5.63 Checking the bucket bearing seals and the bearing bushings on the lift arms.....3.5-38
- 3.5.64 Checking the lift arms and bucket stops.....3.5-40

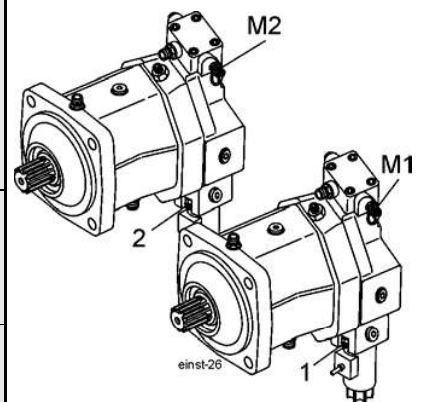
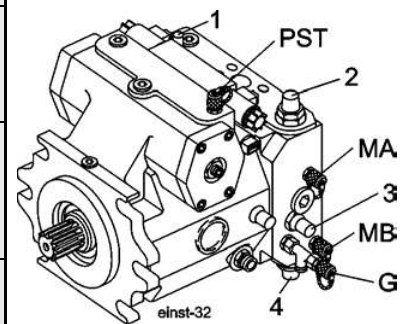
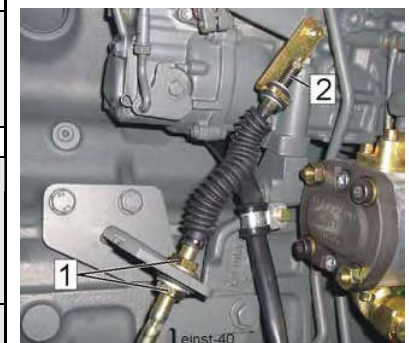
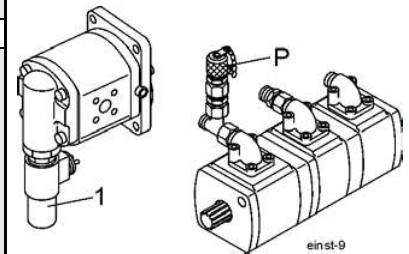
- 3.6 Testing and adjustment tasks3.6-1
 - 3.6.1 Preparatory tasks before testing and adjusting3.6-1
 - 3.6.2 Safety precautions before checking and adjusting.....3.6-1
 - 3.6.3 Warming up the machine to operating temperature3.6-2
 - 3.6.4 Checking the speed on the diesel engine3.6-2
 - 3.6.5 Checking the pressure relief valve of the fan motor and the fan control.....3.6-3
 - 3.6.6 Calibrating the inch pedal angle sensor3.6-5
 - 3.6.7 Calibrating the gas pedal angle sensor3.6-6
 - 3.6.8 Recording the engine characteristics3.6-7
 - 3.6.9 Checking the replenishing pressure of the variable displacement pump3.6-8
 - 3.6.10 Calibrating the block curve3.6-8
 - 3.6.11 Checking the pressure relief and replenishing valves of the variable displacement pump.....3.6-9
 - 3.6.12 Checking the pressure cut-off of the variable displacement pump3.6-10
 - 3.6.13 Checking the maximum VG of the variable displacement motors3.6-11
 - 3.6.14 Checking the minimum VG of the variable displacement motors3.6-12
 - 3.6.15 Check the power of the diesel engine3.6-13
 - 3.6.16 Checking the flow controller (Delta p) on the working hydraulics pump3.6-15
 - 3.6.17 Checking the power controller (regulation begin) of the working hydraulics pump3.6-15
 - 3.6.18 Checking the secondary pressure relief valves on the control valve block3.6-16
 - 3.6.19 Checking the primary pressure relief valve on the control valve block3.6-16
 - 3.6.20 Checking the LS pressure cut-off on the control valve block3.6-17

LBM/Version 02/08.2003/en/lehrling-tip/18.08.2006



Customer:	L 544 S/N: 443 /
Job site:	Operating hours:
	Type of application:
	Checked by:
	Checked on date:

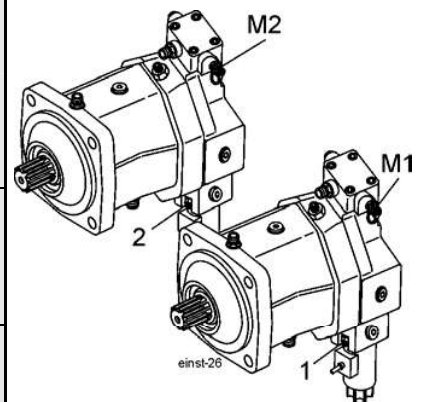
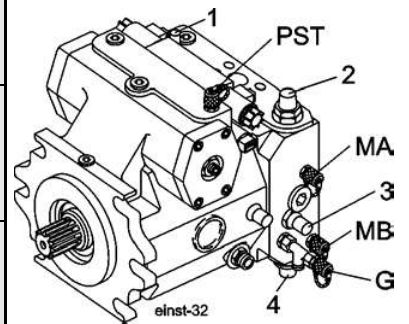
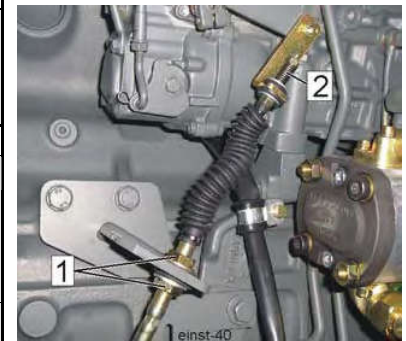
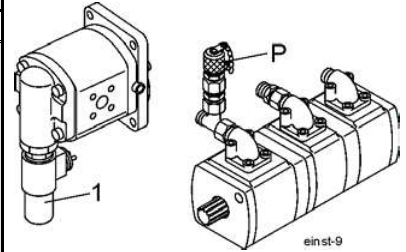
Check / Adjustment	1000 Bh.		Unit	Adjust. values	Value before adjust.	Value after adjust.	Adjust. point	Test point
Cooling system								
Cooling System (fan control)	<input type="checkbox"/>	<input type="checkbox"/>						
Hydraulic oil 31 - 55 °C								
Coolant below 78 °C								
Fan at high idle/ Sensor unplugged			bar	175 ^{±5}			1	P
Fan at high idle			bar	65 ^{±10}				P
Fan at low idle			bar	30 ^{±10}				P
Diesel engine								
Diesel engine RPM	<input type="checkbox"/>	<input type="checkbox"/>						
Low idle RPM			min ⁻¹	800 ⁻⁵⁰			1	Display
High idle RPM			min ⁻¹	2100 ⁺⁸⁰			2	
Travel hydraulic								
Adjustment of sensors	<input type="checkbox"/>	<input type="checkbox"/>	Min.	Max.				B O D E M
Inching pedal – angle sensor			2,9 ^{±0,4}	1,2 ^{±0,4}				
Gas pedal – angle sensor			0,9 ^{±0,3}	4,2 ^{±0,2}				
Check of engine characteristics								
Replenishing pressure	<input type="checkbox"/>	<input type="checkbox"/>						
At high idle RPM			bar	31 ^{±1}			3	G
High pressure relief valves	<input type="checkbox"/>	<input type="checkbox"/>						
Forward			bar	470 ^{±10}			2	MA
Reverse			bar	470 ^{±10}			4	MB
Pressure cut off	<input type="checkbox"/>	<input type="checkbox"/>						
High pressure			bar	430 ^{±5}			1	MA (MB)
Engine speed drop, max. difference to high idle RPM			min ⁻¹	30				Display
Block curve at 950 min⁻¹	<input type="checkbox"/>	<input type="checkbox"/>						
Diesel engine RPM			min ⁻¹	950	950	950		B O D E M
High pressure			bar	350 ^{±10}				
Block curve at 1200 min⁻¹	<input type="checkbox"/>	<input type="checkbox"/>						
Diesel engine RPM			min ⁻¹	1200	1200	1200		B O D E M
High pressure			bar	290 ^{±10}				
Block curve at 1400 min⁻¹	<input type="checkbox"/>	<input type="checkbox"/>						
Diesel engine RPM			min ⁻¹	1400	1400	1400		B O D E M
High pressure			bar	150 ^{±10}				
Variable displ. motor – Q max	<input type="checkbox"/>	<input type="checkbox"/>						
High pressure variable displ. pump			bar	300	300	300		B O D E M
Servo pressure (after adjustment increase current by 10 mA)			bar	285 ^{±5}				
Variable displ. motor – Q min	<input type="checkbox"/>	<input type="checkbox"/>						
At 1000 min ⁻¹ Diesel engine RPM								B O D E M
RPM variable displ. motor 1			min ⁻¹	4180 ^{±50}				
RPM variable displ. motor 2			min ⁻¹	4180 ^{±50}				



■ = Blocked Machine

Customer:	L 564, L 574 Ser. No. 463, 473 /
Job site:	Operating hours: Type of application: Checked by: Checked on date:

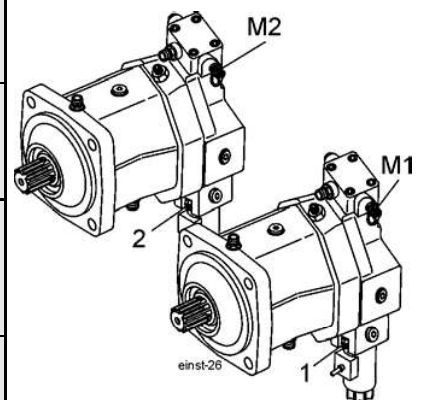
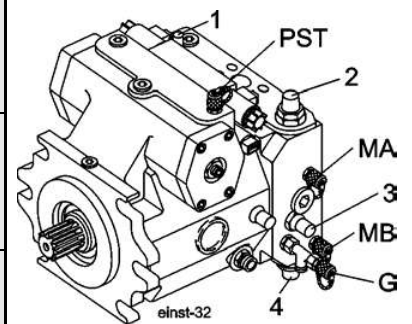
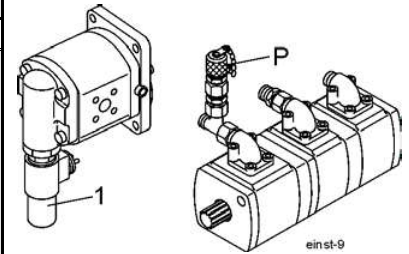
Check / Adjustment	1000 Bh.		Unit	Adjust. values	Value before adjust.	Value after adjust.	Adjust. point	Test point
Cooling system								
Cooling System (fan control)	○	○						
Hydraulic oil 31 - 55 °C Coolant below 78 °C								
Fan at high Diesel engine RPM/ Sensor unplugged			bar	175 ^{±5}			1	P
Fan at high Diesel engine RPM			bar	90 ^{±10}				P
Fan at low Diesel engine RPM			bar	40 ^{±10}				P
Diesel engine								
Diesel engine RPM	○	○						
Low idle RPM			min ⁻¹	750 ^{±50}			1	Display
High idle RPM			min ⁻¹	2100 ⁺⁸⁰			2	
Travel hydraulic								
Adjustment of sensors	○	○	Min.	Max.			B O D E M	
Inching pedal – angle sensor			2,9 ^{+0,4}	1,2 ^{+0,4}				
Gas pedal – angle sensor			0,9 ^{+0,3}	4,2 ^{+0,2}				
Check of engine charac								
Replenishing pressure	○	○						
At high idle RPM			bar	34 ^{±1}			3	G
High pressure relief valves	○	○						
Forward			bar	450 ^{±10}			2	MA
Reverse			bar	450 ^{±10}			4	MB
Pressure cut off	○	○						
High pressure			bar	410 ^{±5}			1	MA (MB)
Engine speed drop, max. difference to high idle RPM			min ⁻¹	30				Display
Block curve at 950 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	950	950	950		MA (MB)
High pressure			bar	330 ^{±10}				
Block curve at 1200 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	1200	1200	1200		MA (MB)
High pressure			bar	230 ^{±10}				
Block curve at 1400 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	1400	1400	1400		MA (MB)
High pressure			bar	100 ^{±10}				
Variable displ. motor – VG max	○	○					B O D E M	
High pressure variable displ. pump			bar	300	300	300		MA
Servo pressure (after adjust increase current by 10 mA)			bar	285 ^{±5}			M1 / M2	
Variable displ. motor – VG min	○	○					B O D E M	
At 1000 min ⁻¹ Diesel engine RPM								
RPM variable displ. motor 1			min ⁻¹	4240 ^{±50}				
RPM variable displ. motor 2			min ⁻¹	3270 ^{±50}				



■ = Blocked Machine

Customer:	L 574 / L580 Ser. No. 473, 458 /
Job site:	Operating hours: Type of application: Checked by: Checked on date:

Check / Adjustment	1000 Bh.		Unit	Adjust. values	Value before adjust.	Value after adjust.	Adjust. point	Test point
Cooling system								
Cooling System (fan control)	○	○						
Hydraulic oil 31 - 55 °C Coolant below 78 °C								
Fan at high Diesel engine RPM/ Sensor unplugged			bar	220 ^{±5}			1	P
Fan at high Diesel engine RPM			bar	90 ^{±10}				P
Fan at low Diesel engine RPM			bar	40 ^{±10}				P
Diesel engine								
Diesel engine RPM	○	○						
Low idle RPM			min ⁻¹	750 ^{±50}			1	Display
High idle RPM			min ⁻¹	2100 ⁺⁸⁰			2	Display
Travel hydraulic								
Adjustment of sensors	○	○	Min.	Max.			B O D E M	
Inching pedal – angle sensor			2,9 ^{±0,4}	1,2 ^{±0,4}				
Gas pedal – angle sensor			0,9 ^{±0,3}	4,2 ^{±0,2}				
Check of engine charac								
Replenishing pressure	○	○						
At high idle RPM			bar	34 ^{±1}			3	G
High pressure relief valves	○	○						
Forward			bar	470 ^{±10}			2	MA
Reverse			bar	470 ^{±10}			4	MB
Pressure cut off	○	○						
High pressure			bar	430 ^{±5}			1	MA (MB)
Engine speed drop, max. difference to high idle RPM			min ⁻¹	30				Display
Block curve at 950 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	950	950	950		
High pressure			bar	330 ^{±10}				MA (MB)
Block curve at 1200 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	1200	1200	1200		
High pressure			bar	230 ^{±10}				MA (MB)
Block curve at 1400 min⁻¹	○	○					B O D E M	
Diesel engine RPM			min ⁻¹	1400	1400	1400		
High pressure			bar	100 ^{±10}				MA (MB)
Variable displ. motor – VG max	○	○					B O D E M	
High pressure variable displ. pump			bar	300	300	300		MA
Servo pressure (after adjust increase current by 10 mA)			bar	285 ^{±5}				M1 / M2
Variable displ. motor – VG min	○	○					B O D E M	
At 1000 min ⁻¹ Diesel engine RPM								
RPM variable displ. motor 1			min ⁻¹	4240 ^{±50}				
RPM variable displ. motor 2			min ⁻¹	3270 ^{±50}				



■ = Blocked Machine

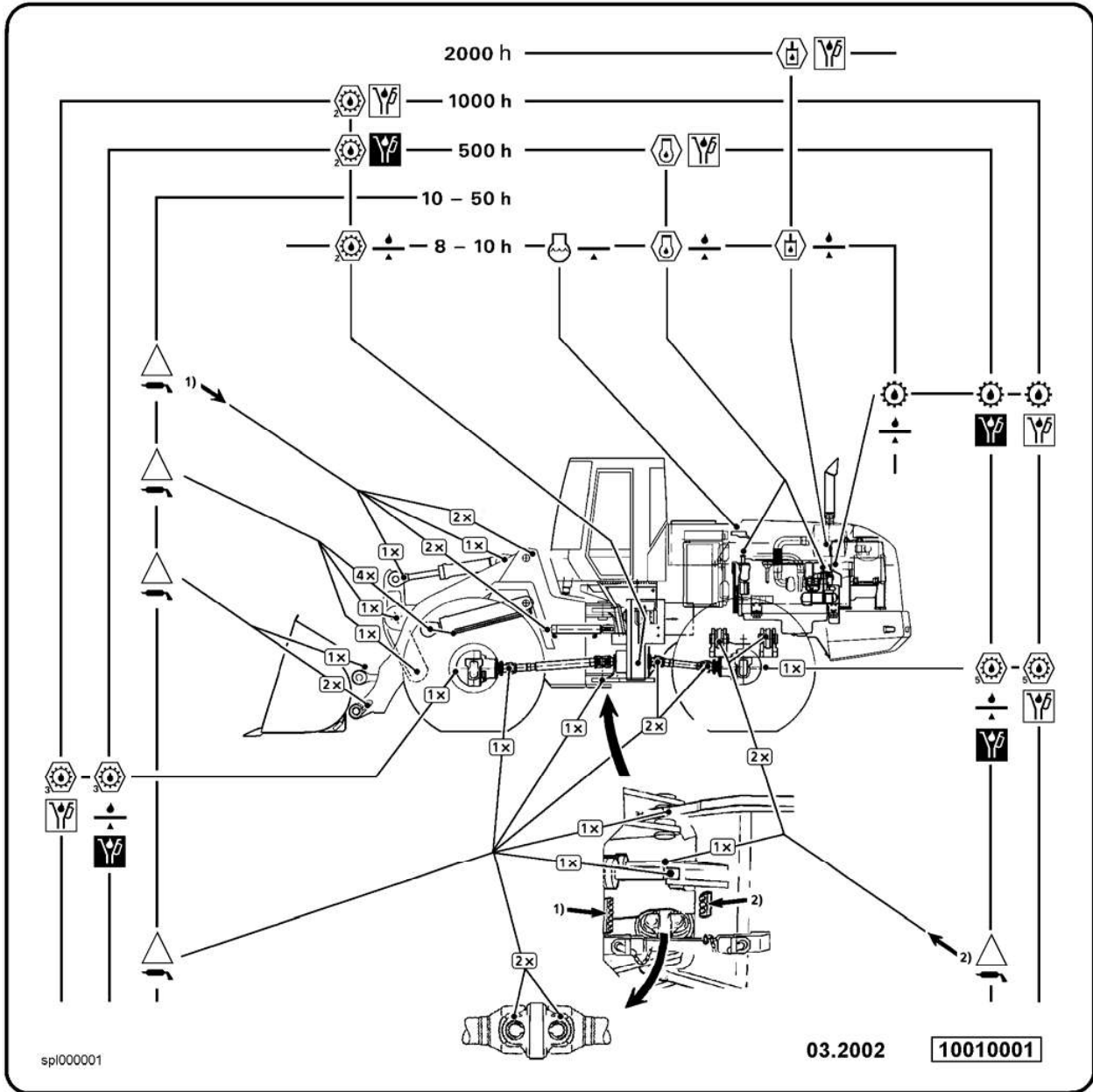
3.4.5 Lubrication chart

The lubrication chart provides an overview of the location of the maintenance points on the machine and of their maintenance intervals.

You will find detailed information in the "Maintenance and inspection schedule", as well as in the individual descriptions of the maintenance tasks, see the section entitled "Maintenance tasks".

For more detailed information about the required lubricants and service fuels, see the section on lubricants and fuels.

For information about the required filling quantities, see the "tables of filling quantities".



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Run the engine for a short time, check the belt tension again and adjust it if necessary.

3.5.9 Check the valve play

Check valve play when the engine is cold.

Make sure that:

- The machine is in maintenance position 1
- The engine compartment hood and door are open
- The special cranking device tool, a feeler gauge and new cylinder head cover seals are all available.

Cylinder numbering, direction of rotation and valve placement specifications:

- Cylinder 1 on the flywheel side
- Anti-clockwise rotation looking towards the flywheel
- Outlet valves on the flywheel side

Valve play	
Inlet valve	0.25 mm
Outlet valve	0.30 mm

D 924 engine		D 926 engine	
Cylinder		Cylinder	
Overlap	Adjust	Overlap	Adjust
4	1	6	1
2	3	2	5
1	4	4	3
3	2	1	6
		5	2
		3	4



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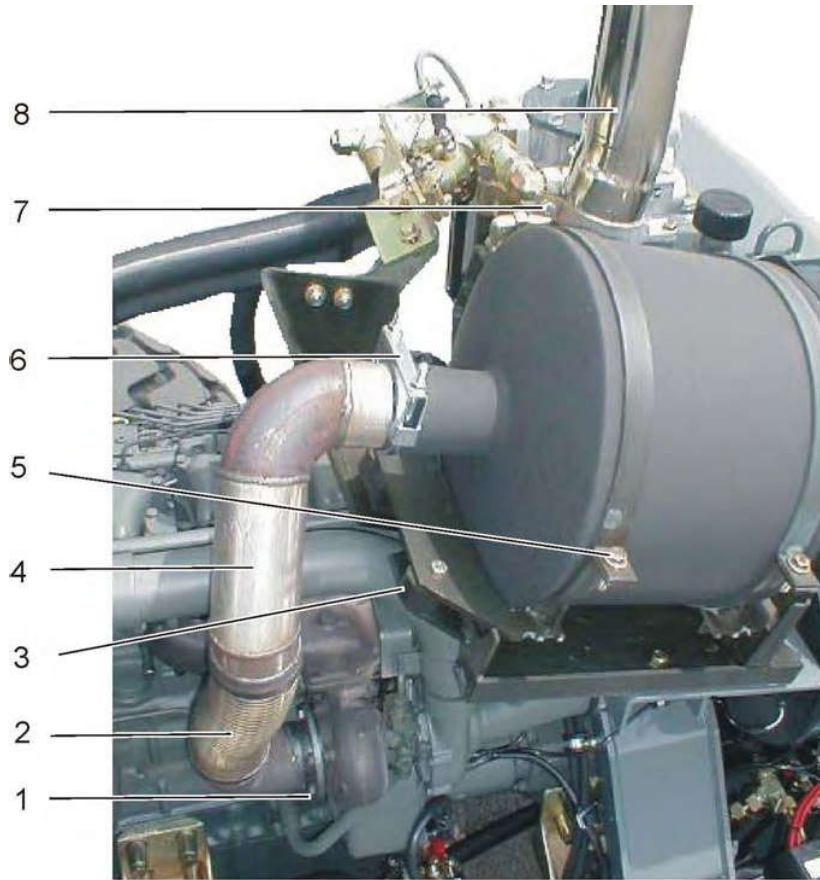
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Procedure

- Dismantle the cylinder head covers.
- Attach the cranking device, special tool identity no. 0524045 to the flywheel housing or insert special tool identity no. 9183785 in the crank shaft.
- Due to space restrictions, use extensions to turn the cranking device and work from the rear side of the ratchet.
- Turn the crankshaft in the direction of rotation until the cylinder to be adjusted and the adjacent valve overlap. See the table for details.
- Push the feeler gauge between the valve and rocker arm and check the valve play.

LBM/Version 02/08.2003/en/lehrling-tip/18.08.2006

Procedure



sdp00056

- Check that the fixing screws 1 and the fixing clip 6 of the exhaust pipe 4 between the turbocharger and the muffler are tight and do not leak.
- Check that the flexible pipe 2 of the exhaust pipe 4 is laid straight.
- Check that the rubber bearing 3 is tight and not cracked.
- Check that the fixing clips 5 are tight.
- Check that the fixing clip 7 on the end pipe 8 is tight.

3.5.25 Check the coolant level

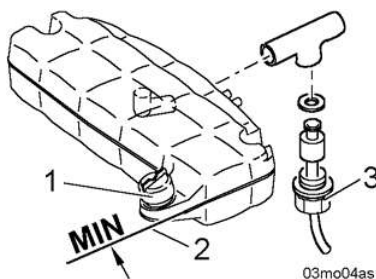
The coolant equalising reservoir with filler neck is located on the top side of the cooling unit. The equalising reservoir can be accessed once the engine hood has been opened. The filler neck can be accessed after the left-hand cooler hood has been opened.

Make sure that:

- The machine is in maintenance position 1
- The engine compartment hood is open

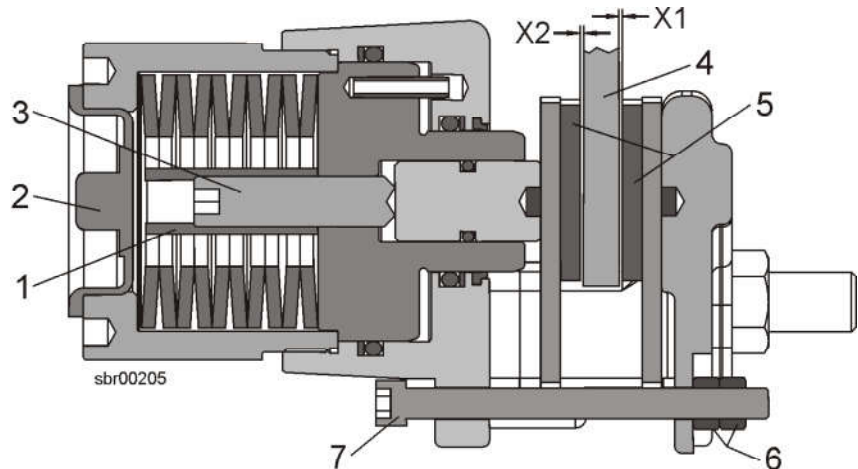
Procedure

The coolant level can be seen on the coolant equalising reservoir from outside. The proper level for a cold engine is slightly below the middle of the equalising reservoir MIN marking. If the level is too far below the MIN marking, coolant must be added. If the coolant level is too low, this is indicated by the coolant level probe 3 and displayed on the engine overheating and coolant level symbol field, along with a simultaneous audible warning.



03mo04as

LBMVersion 02/08.2003/en/lehrling-tip/18.08.2006

Procedure*Disc brake (shown in open position)*

- Stop the machine from rolling away.
- Start the diesel engine and release the parking brake (pushbutton).
- Test the brake lining thickness:

If the lining is less than 1.0 mm thick, replace the brake linings.

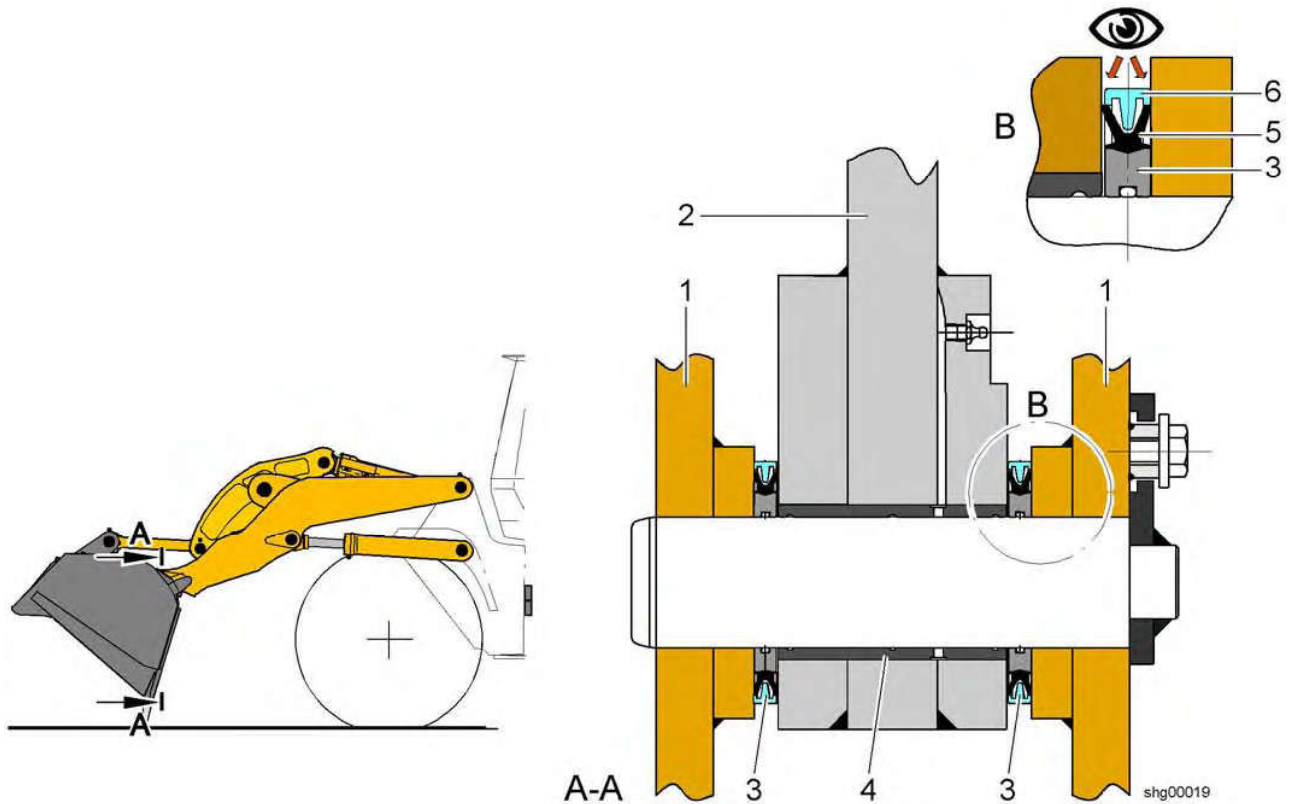
- Check the gap **X1** and **X2**:
If the gap **X1** + **X2** is more than **1.5 mm**, it must be readjusted.
Loosen the counter nut 6 and set the gap **X1** using an allen key 7 to **0.3 mm**.
- Tighten the counter nut 6.
- Unscrew the sealing cap 6 and loosen the lock nut 1.
- Using the adjusting screw 3, set the gap **X2** to **0.3 mm**.
- Tighten the lock nut 1.
- Engage the parking brake several times and test it again.
- Screw on the sealing cap 2 and tighten it.

3.5.41 Check the indicator lamps and lighting

For the layout of the illuminating components and symbol fields on the display unit refer to the section "Operation," in the chapter "Operation, handling" in the "Operator's manual."

Procedure

- Start the diesel engine and check that the illuminating components and symbol fields light up.



- 1 Bucket bearing plate
- 2 Bucket arm

Checking the bucket bearing seal

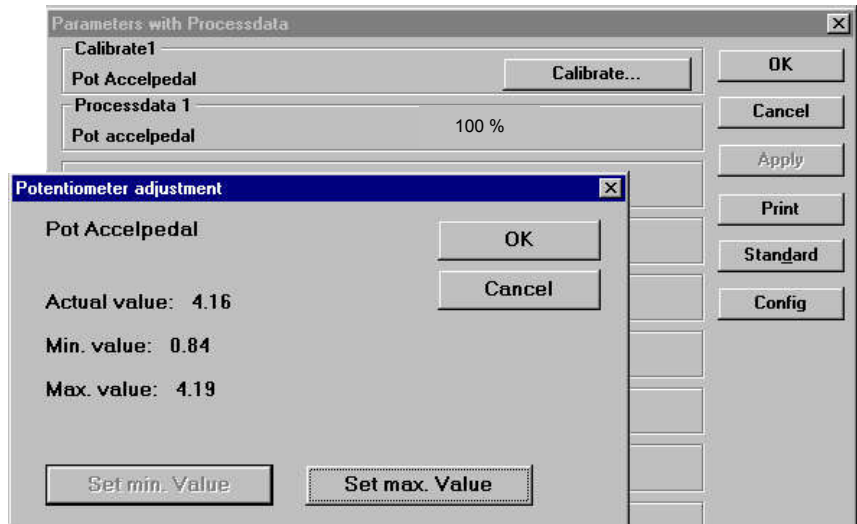
- 3 Bucket bearing seal
 - 4 Bearing bushing
 - 5 Sealing lips
 - 6 Dirt guard
- Move the lift arms and the bucket to the position shown.
 - Clean the bucket bearing seals 3 using a steam jet.
 - Visually check whether the sealing lips 5 touch the sides of the lift arms and the bucket.
 - If there is a gap between the sealing lips 5 and the bucket arm 2 or the bucket bearing plate 1, or if the bucket bearing seal is damaged:
Replace the bucket bearing seal as described in 17.2.5.

Procedure for checking the bearing bushings for wear

Dirt or insufficient lubrication can cause wear on the bearing bushings. The increased play between the pin and bearing bushing causes noises.

Replacing the bearing bushing in time prevents damage.

LBM/Version 02/08.2003/en/lehrling-tip/18.08.2006



Description	Value	Unit
Angle sensor minimum voltage	0.9 ±0.3	V
Angle sensor maximum voltage	4.2 ±0.2	V

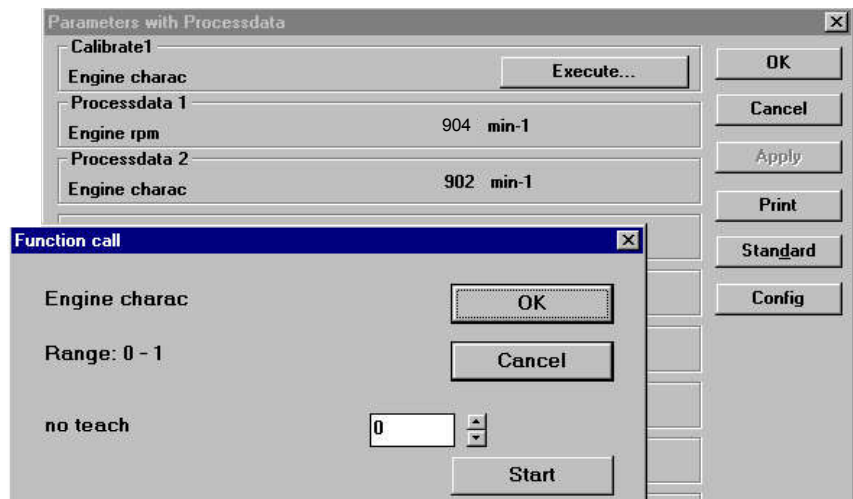
3.6.8 Recording the engine characteristics

The engine characteristics can only be recorded using the BODEM software.

When recording the engine characteristics, the micro controller records the diesel engine speed for every gas pedal position.

Procedure

- Connect the laptop, start the diesel engine and run the BODEM software.
- Select the parameters and process data shown in the illustration in the **Parameters with Processdata** menu and click **OK** to confirm.
- In the **Engine Charac** field, click the **Execute...** button, and in the new window, click the **Start** button.
- With the diesel engine running, slowly and evenly push down the gas pedal to top idle speed.
- After reaching the full throttle position, click **OK** to finish recording the engine characteristics (this is only possible in the 100% gas pedal position).



LBH/Version 02/08.2003/en/lehrling-tip/18.08.2006

- Check whether the pressure corresponds to the required value.
- If the required value is not reached:
Turn the adjusting screw on the primary pressure relief valve 3 until the pressure attains the required value.
- Re-adjust the pressure cut-off 5 to the required value. See the section on testing the pressure cut-off.

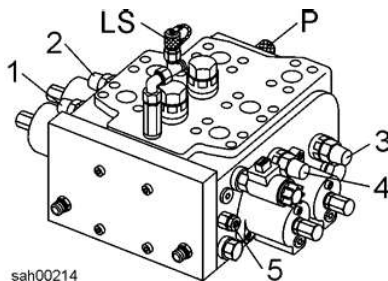
Valid for: **L544** - 443 / from 7477; **L554** - 453 / from 7477

Description	Value	Unit
Primary valve (pos. 3)	360 ^{±5}	bar

Valid for: **L564** - 463 / from 7477; **L574** - 473 / from 7477; **L580** - 458 / from 7477

Description	Value	Unit
Primary valve (pos. 3)	380 ^{±5}	bar

3.6.20 Checking the LS pressure cut-off on the control valve block



sah00214

Procedure

- Attach a pressure gauge (600 bar) to the test connection P.
- Start the diesel engine and let it run at lower idling speed.
- Raise the lift arms until the maximum position is reached.
- Check whether the pressure corresponds to the required value.
- If the required value is not reached:
Turn the adjusting screw on the LS pressure cut-off 5 until the pressure reaches the required level.

Valid for: **L544** - 443 / from 7477

Description	Value	Unit
LS - pressure cut-off (pos. 5)	290 ^{±5}	bar

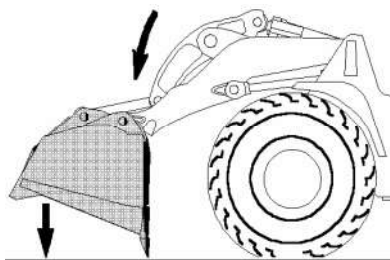
Valid for: **L554** - 453 / from 7477

Description	Value	Unit
LS - pressure cut-off (pos. 5)	330 ^{±5}	bar

Valid for: **L564** - 463 / from 7477; **L574** - 473 / from 7477; **L580** - 458 / from 7477

Description	Value	Unit
LS - pressure cut-off (pos. 5)	350 ^{±5}	bar

3.6.21 Depressurising ride control and hydro accumulator



Before carrying out any adjustment work, checking and filling the hydro accumulator or repairing the ride control system, it is essential that you depressurise the system first.

The steps below describe how to depressurise the ride control system.

LBH/Version 02/08.2003/en/lehrling-tip/18.08.2006

3.7 Lubricants and fuels

Conscientious observance of the regulations for handling lubricants and fuels will increase the reliability and service life of the machine.

It is especially important that the specified lubricant qualities are observed.

You can find the various specifications about the prescribed intervals in the maintenance and inspection schedule and the lubrication chart.

You can find details on lubrication, checking the oil level and changing operating fluids in the maintenance section under maintenance tasks.

Follow the rules on handling lubricants and fuels, especially the environmental regulations.

Filling quantities and specifications:

- The filling quantities listed in the tables are only guidelines. The dipstick and level markings are always mandatory.
- Each time the lubricant or fuel is replaced or topped up, check the level in the unit in question.
- For more detailed information about the required lubricants, fuels and filling quantities, see the filling quantities in the lubrication chart and the section on lubricants and fuels.

Environmental protection

- Always implement and observe environmental protection measures.
- Observe national regulations.
- Ensure that liquids can be properly disposed of before draining them.

Disposing of used materials

This applies to the following types of used materials and hazardous waste:

- Oils, lubricants, brake fluids, etc.
- Coolant
- Fuels
- Filters, oil cartridges etc.
- Rubber, tyres, insulating materials etc.
- Batteries

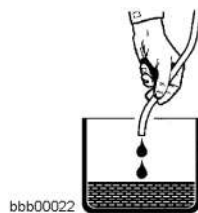
Procedure

Environmental and health hazard!

! Observe the local regulations for protecting the environment when disposing of used materials.

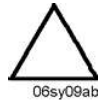
- Always collect and store used materials separately in suitable containers.
- Dispose of used materials properly at the official collection points.

Caution 



Disposal

3.7.6 Grease for general lubrication points



This grease must meet the **KP2k** specification – consistency 2 of the NL GI class according to DIN 51818 and DIN 51825 or EP 2 according to NF-T-60 132.

The grease must be made of a lithium complex with a four ball tester (VKA) value of at least 2300 N according to DIN 51350 or ASTM D 2596.

Application:

- Grease for all lubrication points (according to the lubrication schedule)
- Lubricant grease for bolt fitting
- Lubricant grease for automatic central lubrication systems

Approved greases

LIEBHERR 9610 special grease is a milling-resistant, ageing-resistant lithium grease, providing protection against corrosion with excellent lubricity over a wide temperature range.

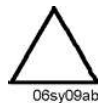
Its molecular composition yields high degrees of shearing and milling stability and good flow properties in long pipes.

Description	ID nor.	Quantity
LH 9610 special grease	861302908	400 g (cartridge)
LH 9610 special grease	861301308	10 kg (drum)
LH 9610 special grease	861304508	25 kg (drum)

Lubricant grease for automatic central lubrication systems

Greases with high-pressure additives (EP greases) are recommended.

Only use greases with the same type of saponification.



Note:

Greases with solid lubricant particles such as graphite may not be used.

4.1.2 Diesel engine speed sensor

Technical data

The speed sensor B24 is mounted on the flywheel housing of the diesel engine and is designed to measure the diesel engine speed.

The speed-dependent frequency of the generated voltage is used for the following:

- Controlling the fan drive
- Starting the emergency steering pump check
- Diesel engine RPM output
- Power limiting control
- Overspeed protection
- Inching control

Design

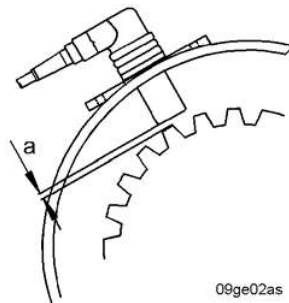
The speed sensor is an electromagnetic component with permanent magnet and coil (magnetic frequency encoder).

The distance between sensor and flywheel ring gear is fixed.

Function description

Basic function

Like all electricity generators (alternators), the speed sensor produces a sinusoidal alternating voltage. The RPM of the diesel engine, number of poles (number of teeth on flywheel ring gear) and the frequency of the generated alternating voltage are directly proportional. The frequency of the voltage generated is proportional to the speed.



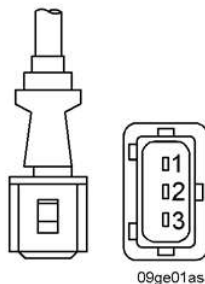
09ge02as

Speed sensor installation

Distance "a" = 2.4±3 mm

Plug pin assignment

- 1 Coil connection A
- 2 Coil connection B
- 3 Shielding

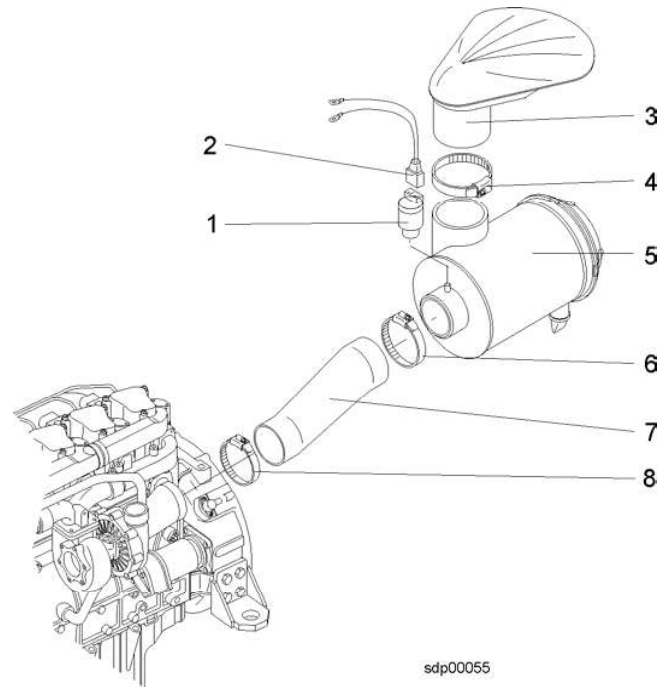


09ge01as

4.3 Air filter system

(ID 9654591, 9654186)

Design



Air filter system

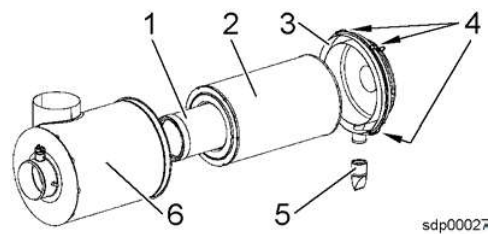
- | | |
|-----------------------|----------------------------|
| 1 Vacuum switch | 5 Air filter |
| 2 Vacuum switch cable | 6 Fixing clips |
| 3 Rain cap | 7 Filtered air intake hose |
| 4 Fixing clips | 8 Fixing clips |

Function description

The diesel engine sucks in fresh air via the rain cap 1 and the air filter 3. The filtered air is provided to the engine via the turbocharger.

4.3.1 Air filter

Design



Air filter

- | | |
|---------------------|-------------------------|
| 1 Safety element | 4 Fixing clips |
| 2 Main element | 5 Dust extraction valve |
| 3 Air cleaner cover | 6 Air filter housing |

L544 - 413 / from 7477
L564 - 463 / from 7477
L574 - 473 / from 7477
L580 - 458 / from 7477

5 Cooling system

5	Cooling system.....	5.0-1
5.1	Gear pump.....	5.1-1
5.2	Gear motor.....	5.2-1
5.3	Temperature sensor	5.3-1

LBHVersion 02/07.2003/en/lehrling-ip/18.08.2006

5.2 Gear motor

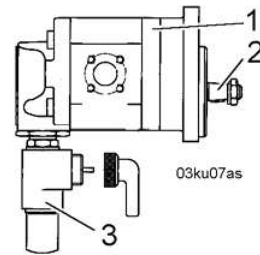
(ID 5716676, 10013344)

Technical data

The gear motor is mounted on the cooler box. The gear motor drives the fan blade via a shaft.

The proportional pressure relief valve mounted on the gear motor controls the fan speed.

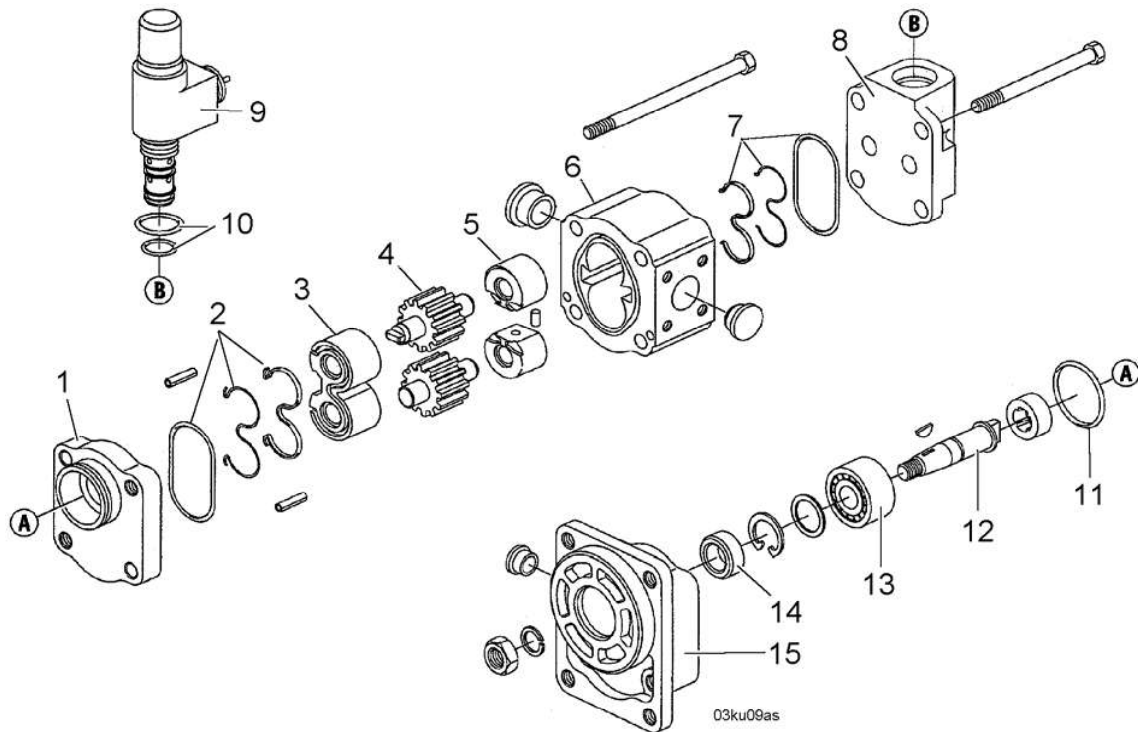
Design



Gear motor with proportional pressure relief valve

- 1 Gear motor
- 2 Fan drive shaft

- 3 Proportional pressure relief valve



Gear motor with proportional pressure relief valve

- 1 Bearing cover
- 2 Gasket set
- 3 Bearing bushing
- 4 Gearwheels
- 5 Bearing bushing
- 6 Motor housing

- 7 Gasket set
- 8 Proportional pressure relief valve connection housing
- 9 Proportional pressure relief valve
- 10 O-ring

- 11 O-ring
- 12 Shaft
- 13 Roller bearing
- 14 Shaft seal ring
- 15 Bearing cover

LBHVversion 02/07.2003/en/lehrling-ipr/18.08.2006

- | | | | | | |
|----|--|----|--|----|---|
| 1 | Hydraulic tank | 21 | Axial piston pump | 40 | Variable displacement motor 2, complete |
| 2 | Return strainer | 22 | Travel direction valve | 41 | Axial piston drive unit |
| 3 | Bleeder filter | 23 | Servo cylinder | 42 | Check valves |
| 4 | Return suction filter | 24 | Restrictor \varnothing 1.8 mm | 43 | Proportional valve and control piston |
| 5 | Replenishing valve with strainer | 25 | Pressure relief and replenishing valve A | 44 | Servo piston |
| 6 | Pre-tension valve | 26 | Pressure relief and replenishing valve B | 45 | Discharge valve |
| 7 | Bypass valve | 27 | Replenishing pressure relief valve | 46 | Pressure relief valve with orifice |
| 8 | Shut-off valve | 28 | Pressure cut-off | 47 | Orifice \varnothing 4.2 mm |
| 9 | Return flow of oil from the working hydraulics | 29 | Control pressure proportional valve | | |
| 10 | Fan gear pump | 30 | Replenishing pump | | |
| 11 | Brake system gear pump | 31 | To working hydraulics pilot control | | |
| 12 | Suction pump for variable displacement motors | 32 | Bypass valve | | |
| 13 | Oil cooler | 35 | Variable displacement motor 1, complete | | |
| 14 | Fan blade | 36 | Axial piston drive unit | | |
| 15 | Fan motor, complete | 37 | Check valves | | |
| 16 | Gear motor | 38 | Proportional valve and control piston | | |
| 17 | Pressure relief and proportional valve | 39 | Servo piston | | |
| 18 | Main piston | | | | |
| 19 | Bypass valve | | | | |
| 20 | Variable displacement pump, complete | | | | |

Test connections:

- PST Control pressure / variable displacement pump
 G Replenishing pressure
 MA High pressure / travel direction, forward
 MB High pressure / travel direction, reverse
 M1 Servo pressure / variable displacement motor 1
 M2 Servo pressure / variable displacement motor 2
 P High pressure / fan

The hydrostatic travel drive operates in a closed circuit. The variable displacement pump 20 pumps oil directly to the variable displacement motors 35 and 40. The oil returning from the variable displacement motors is pumped back to the intake side of the variable displacement pump.

The travel direction valve 22 determines the direction in which the displacement pump operates and thus the travel direction of the machine.

1. Gear: At low speeds or high traction loads the two variable displacement motors swivel to a wider angle. This leads to a low output speed and a high torque at the variable displacement motors. If the speed is increased, both variable displacement motors then control in the direction of the smaller swivel angle.

2. Gear: The variable displacement motor 35 is disengaged (does not move) and set to a swivel angle of 0° . The variable displacement motor 40 controls a particular swivel angle that depends on the speed.

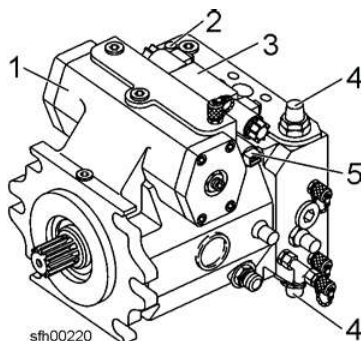
3. Gear: The variable displacement motor 40 is disengaged (does not move) and set to a swivel angle of 0° . The variable displacement motor 35 controls a particular swivel angle that depends on the speed. The highest speed is reached when the variable displacement motor is at a swivel angle of approximately 15° .

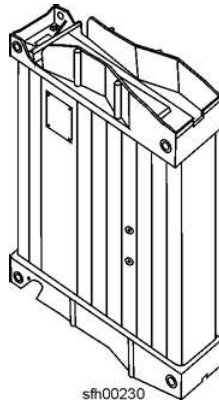
Variable displacement pump

The variable displacement pump operates in a closed circuit. It pumps the oil directly to the variable displacement motors. The oil flowing back from the variable displacement motors is fed back to the suction side of the variable displacement pump.

The variable displacement pumps are controlled by the microcontroller. Depending on the operating condition of the machine, the control pressure proportional valve 5 is regulated by the microcontroller. The proportional valve regulates the control pressure and thus the flow of the variable displacement pump.

The variable displacement pump is adjusted to a lower displacement by the reaction forces from the high pressure.





Controlling the variable displacement motors

The following parameters influence how the variable displacement pumps are controlled:

- Speed
- Gas pedal position
- Variable displacement motor power limiting control (excessive diesel engine throttling)
- Inching function
- Tempomat
- Overspeed or excessive speed

Speed

The proportional valves are energised at the variable displacement motors according to the speed.

The smaller the current is at the proportional valve of the variable displacement motors, the smaller the swivel angle and the displacement are on the variable displacement motor.

Gas pedal position

The gas pedal position determines how fast the variable displacement motors can be adjusted in the direction of the smaller swivel angle. This is what determines the acceleration of the machine.

Variable displacement motor power limiting control

The power limiting control is activated if the diesel engine is throttled due to excessive pressure. This can occur when driving and if the working hydraulics or steering is additionally actuated.

The microcontroller then increases the current on the control pressure proportional valve until the diesel engine speed is once again within the normal speed range. The variable displacement motors then control in the direction of the larger swivel angle.

Inching function

When the inching brake pedal is actuated, the microcontroller increases the current on the proportional valve of the variable displacement motors, and a hydrostatic braking procedure is triggered.

Tempomat

With the Tempomat function the variable displacement motors swivel to a particular displacement that corresponds to the full throttle position of the selected speed. This also causes the speed to be reduced when the diesel engine speed is throttled.

It is activated only in forward travel in the fixed gears 1 or 2.

The current speed when the Tempomat button is pressed is stored. At full throttle the machine will achieve this pre-selected speed.

Overspeed or excessive speed

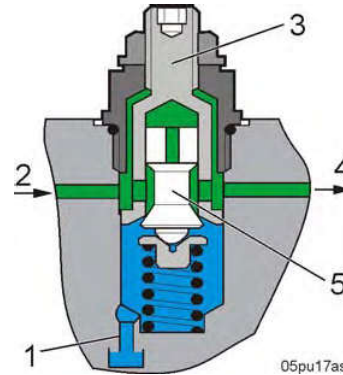
If the diesel engine speed is too high when travelling uphill, the variable displacement motors swing to a smaller swivel angle. If the diesel engine speed passes a critical mark, the rear axle brake is activated.

If the speed of the variable displacement motors is too high, the rear-axle brake is also activated.

The maximum replenishing pressure is limited by the replenishing pressure relief valve.

Replenishing pressure relief valve

This directly actuated pressure relief valve protects the replenishing pump against excess pressure.



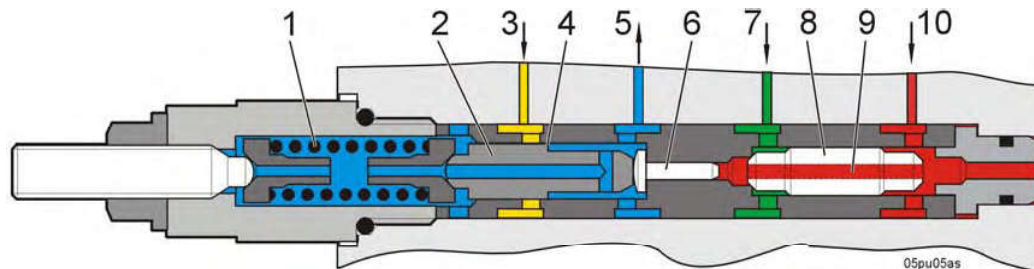
Cross section of the replenishing pressure relief valve

- | | |
|----------------------------------|---|
| 1 Tank outlet | 4 Oil to the pressure relief valve and replenishing valve |
| 2 Oil from the replenishing pump | 5 Valve piston |
| 3 Adjusting screw | |

Excess oil that is not fed into the closed circuit flows via the replenishing pressure relief valve to the pump housing. At the same time, this oil cools the rotary group of the variable displacement pump.

Pressure cut-off

The pressure cut-off valve limits the operating pressure in the closed circuit.



Sectional view of the pressure cut-off

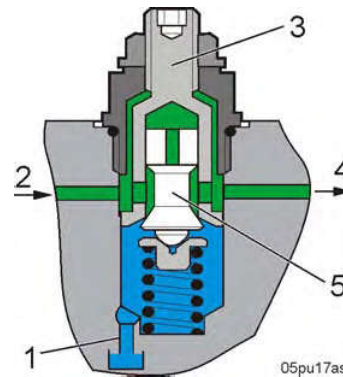
- | | | |
|--------------------|---------------------------------|-----------------------------------|
| 1 Pressure spring | 5 Tank outlet | 8 Check valve |
| 2 Valve piston | 6 Tappet | 9 Bore hole |
| 3 Servo oil supply | 7 Low pressure / closed circuit | 10 High pressure / closed circuit |
| 4 Control edge | | |

The operating pressure controls the valve. When the maximum operating pressure has been reached, the tappet 6 and the valve piston 2 are pushed against the pressure spring 1. The control pressure channel 3 is linked to the tank outlet 5, and servo oil drains off. The control pressure drops and the variable displacement pump swivels to a smaller flow rate. The variable displacement pump then delivers just enough oil to attain the maximum pressure.

LEH-Version 02/07-2003/en/lehing-ip/18.08.2006

Replenishing pressure relief valve

This directly actuated pressure relief valve protects the replenishing pump against excess pressure.



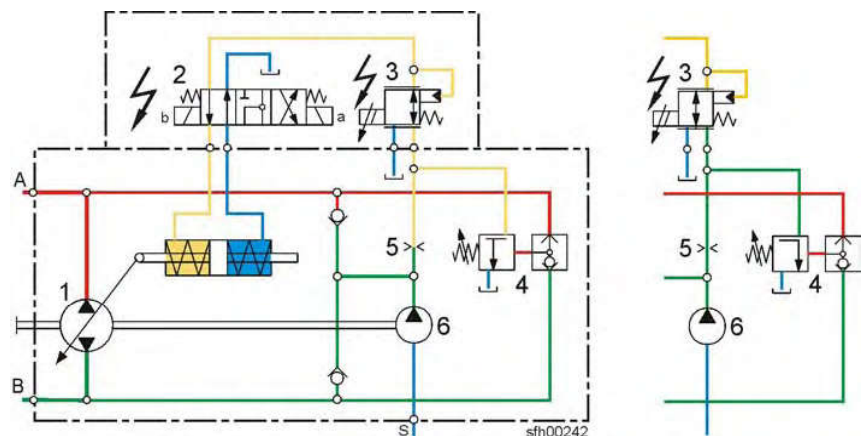
Cross section of the replenishing pressure relief valve

- | | |
|----------------------------------|---|
| 1 Tank outlet | 4 Oil to the pressure relief valve and replenishing valve |
| 2 Oil from the replenishing pump | 5 Valve piston |
| 3 Adjusting screw | |

Excess oil that is not fed into the closed circuit flows via the replenishing pressure relief valve to the pump housing. At the same time, this oil cools the rotary group of the variable displacement pump.

Pressure cut-off

The pressure cut-off valve limits the operating pressure in the closed circuit. When the maximum operating pressure is reached, the variable displacement pump flow is reduced until the maximum operating pressure is just maintained.



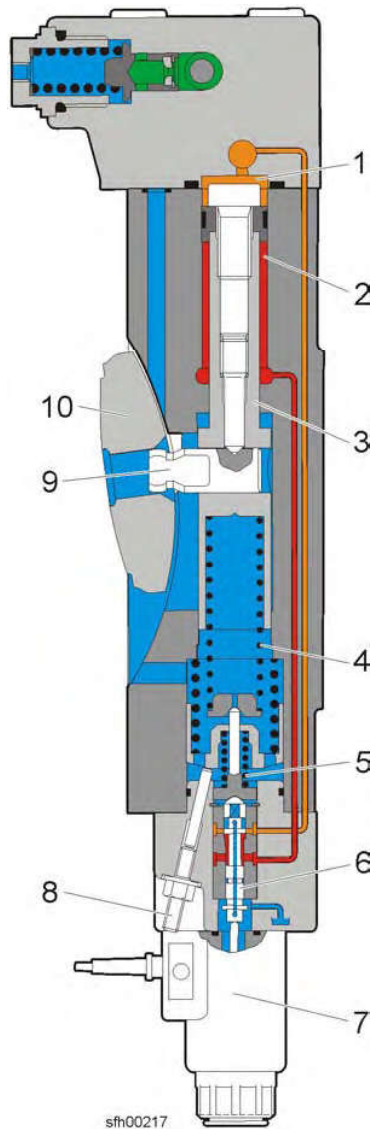
Hydraulic plan of pressure cut-off (active / not active)

- | | |
|---------------------------------------|---------------------|
| 1 Variable displacement pump | 4 Pressure cut-off |
| 2 Travel direction valve | 5 Nozzle |
| 3 Control pressure proportional valve | 6 Replenishing pump |

Pressure cut-off active: The pressure cut-off is activated when the maximum operating pressure in the closed circuit is reached. Oil flows to the tank channel.

Sufficient oil can no longer flow through the nozzle 5 from the replenishing pump 6. The replenishing pressure acts up to the nozzle 5, and after that only the reduced control pressure.

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Electrical-proportional control (EP)

Depending on the amount of energy supplied to the proportional solenoid 7, the variable displacement motor is moved to the swivel angle required.

When the proportional solenoid is in a de-energised condition, the variable displacement motor is kept at a swivel angle of 0° by the high pressure that is applied to the small servo piston surface 2.

If the proportional solenoid is energised, the control piston 6 is pushed against the regulating springs 5 and 4 starting at a particular amount of current. In the process, the high pressure oil flows via the control piston 6 to the large servo piston surface 1, and the variable displacement motor moves in the direction of the larger swivel angle.

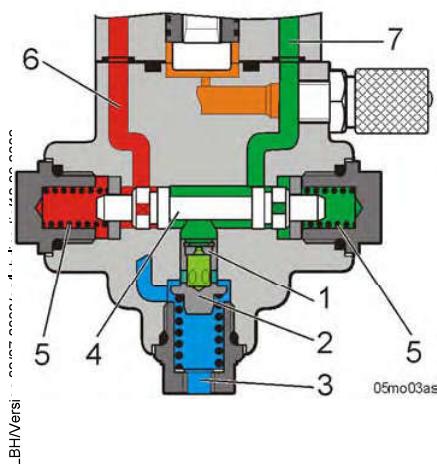
During the movement, servo piston 3 is pushed downward whereby regulating spring 4 is increasingly preloaded. This stops the movement again if the current on the proportional solenoid is not further increased.

If the current is increased further, the spring force of both regulating springs are again exceeded, and the variable displacement motor moves in the direction of the large swivel angle.

The maximum swivel angle is reached at approximately 600 mA of current. The force of the proportional solenoid is so great, that the spring force of the regulating springs is also exceeded for large swivel angles.

The adjusting screw 8 is used to set the regulating spring 5 (normal setting). The regulating spring 5 setting should be selected in such a way that the variable displacement motor moves to a 25° swivel angle when 600 mA of current is applied at the proportional solenoid.

The speed of the variable displacement motor control is determined by the microcontroller. Thus no swivel restrictors are required.



Cooling by the discharge valve

The discharge valve is used in the closed circuit to avoid excessive heat build-up. In the process, oil is discharged from the low pressure side of the closed circuit and fed to the hydraulic tank. The replenishing pump replaces this oil quantity with cooled oil.

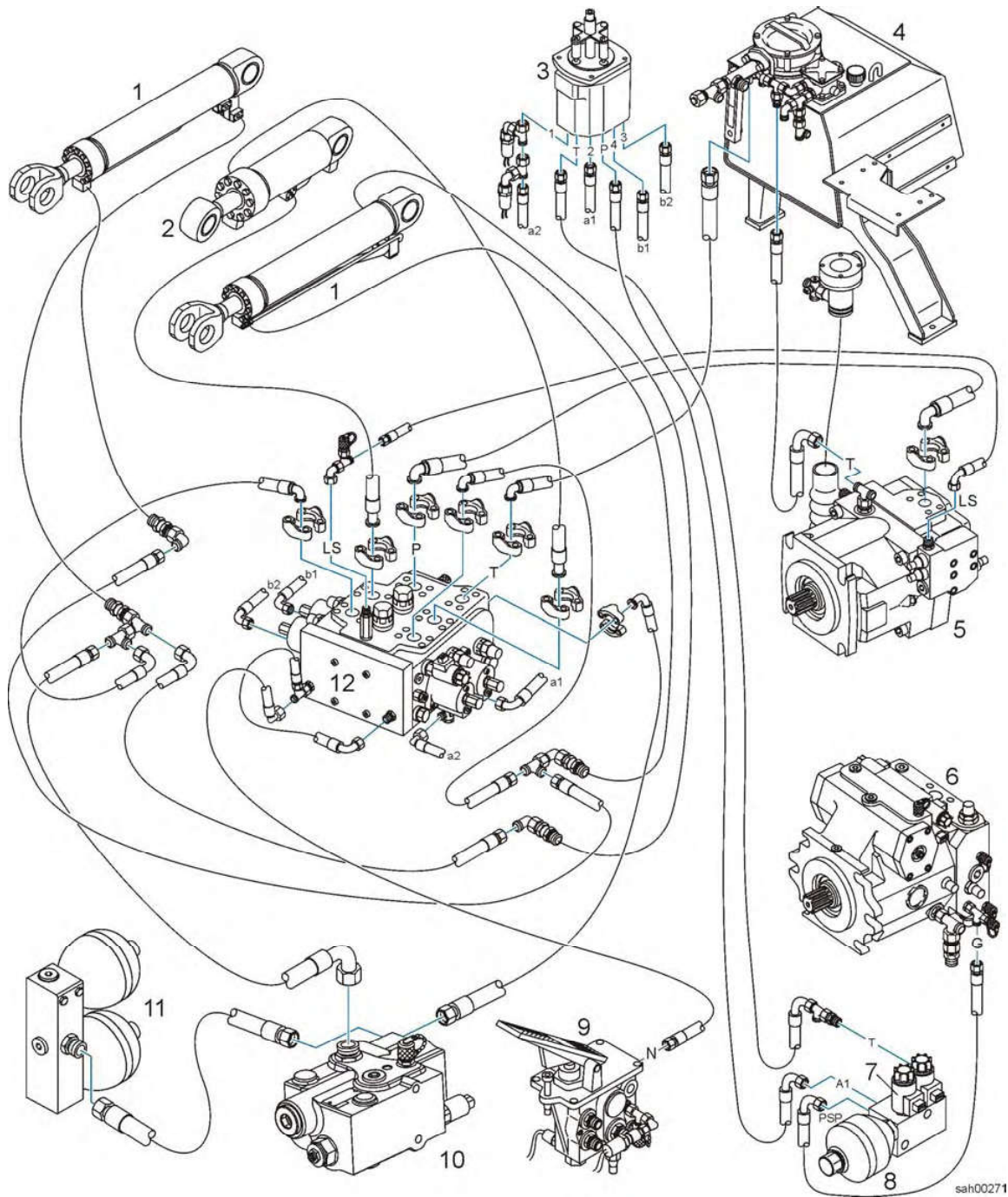
When the machine is at rest, the pressure is the same on both faces of the valve piston 4. Both return springs 5 push the valve piston 4 to the centre position. No oil is discharged in this position.

If the machine is moved, the pressure in the channel 6 or 7 increases and moves the valve piston 4 against one of the return springs 5. In the process, the lower pressure side opens and a fixed oil quantity flows via the orifice 1, and the pressure relief valve 2 to the hydraulic tank.

7.0.2 Working hydraulics L544, L554 from 11598

Valid for: **L544** - 443 / from 11598; **L554** - 453 / from 11598

Design

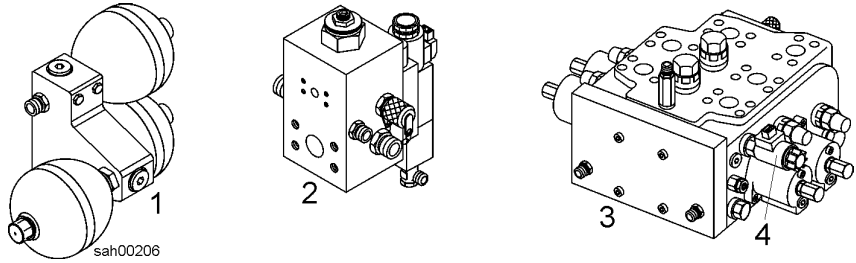


Main components of the working hydraulics

- | | | |
|---------------------------|---|-------------------------|
| 1 Lift cylinder | 6 Travel hydraulics variable displacement pump with replenishing pump | 9 Compact brake valve |
| 2 Tilt cylinder | 7 Pilot control solenoid valve | 10 Stabilisation module |
| 3 Pilot control unit | 8 Pilot control hydro accumulator | 11 Hydro accumulator |
| 4 Hydraulic tank | | 12 Control block |
| 5 Working hydraulics pump | | |

LBHVersion 03.09.2007/en/dtw/17.06.2009

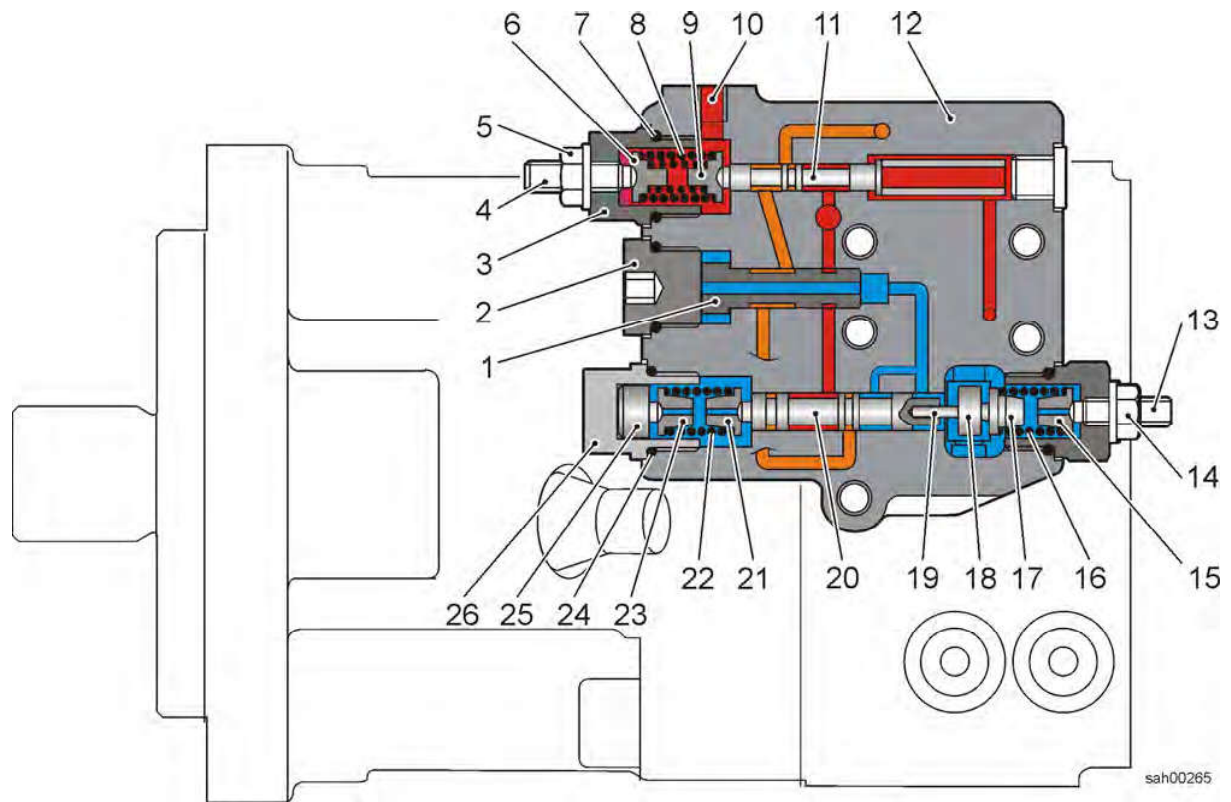
Ride control



The ride control system attenuates the bouncing and pitching vibrations of the machine while it is travelling, thus greatly increasing comfort and safety.

The lift cylinders are connected at the base end via the control valve block 3 and the stabilisation module 2 to the hydro accumulator unit 1. The rod end of the lift cylinders is connected to the hydraulic tank via the float position solenoid valve 4 in the control valve block.

See the detailed description in the section on ride control.



sah00265

Components of the regulator unit

- | | | |
|----------------------|----------------------|--------------------|
| 1 Valve piston | 10 LS connection | 19 Pin |
| 2 Plug | 11 Valve piston | 20 Valve piston |
| 3 Valve insert | 12 Regulator housing | 21 Spring cup |
| 4 Adjusting screw | 13 Adjusting screw | 22 Pressure spring |
| 5 Counter nut | 14 Counter nut | 23 Spring cup |
| 6 Spring cup | 15 Spring cup | 24 O-ring |
| 7 O-ring | 16 Regulating spring | 25 Brace |
| 8 Regulating springs | 17 Spring cup | 26 Valve insert |
| 9 Spring cup | 18 Control lever | |

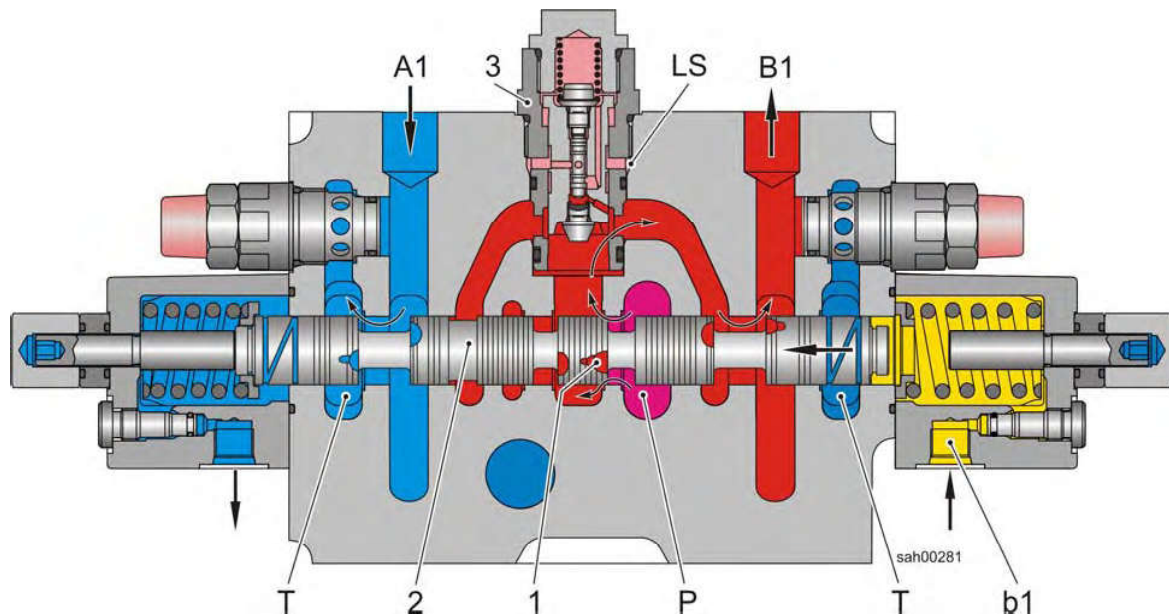
LBHVersion 03.09.2007/en/dw/17.06.2009

Secondary pressure relief valves for each function protect the working attachment, cylinders, hose lines and the control block from overload. At the same time, the secondary pressure relief valves act as replenishing valves.

The LS pressure cut-off 2 protects the working hydraulics pump from excess pressure.

Working hydraulics in active state

The spool valves in the control block are hydraulically actuated by the pilot control unit.



Control block in active state

When the tilt-in function is actuated, oil flows from the pilot control unit to the connection b1. This pushes the spool valve 2 to the left.

The spool valve 2 opens the pump duct P to the pressure balance 3 via the control notches 1. If the pump pressure exceeds the pressure at the tilt cylinder, the pressure balance in the load valve opens and oil flows through the connection B1 to the tilt cylinder.

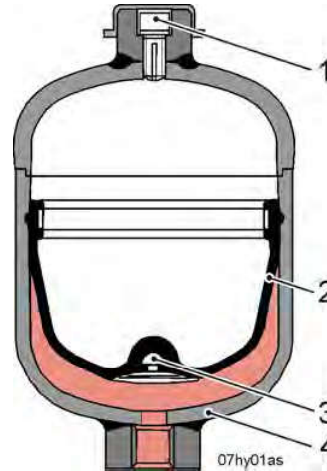
The oil returning from the tilt cylinder flows through the connection A1 and the spool valve to the tank duct T.

7.3.3 Pilot control hydro accumulator

Technical data

See section 2.1

Design



Components of the hydro accumulator

- | | |
|------------|----------------|
| 1 Plug | 3 Closing head |
| 2 Membrane | 4 Accumulator |

The elastic partition between the fluid and the nitrogen is a membrane 2, which is stretched in the accumulator 4. The closing head 3 prevents the membrane from being pressed into the inlet opening when the hydro accumulator is completely empty.

The plug 1 allows the accumulator to be checked and topped up using the filling and testing device.

Function description

Basic function

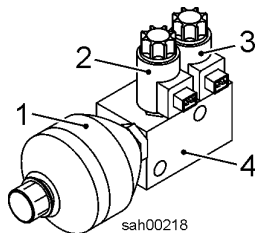
The purpose of the hydro accumulator is to store hydraulic energy and supply it when needed.

It has the following applications:

- To act as an attenuator for pressure peaks, for example for the ride control system or steering attenuation.
- As an energy reserve to supply energy when needed, for example for the brake system.

Storing pressure for the pilot control

The hydro accumulator 1 allows the working hydraulics to be used even when the engine is not running (starter switch in position 1). The lift arms can be lowered and the working attachment tilted out.



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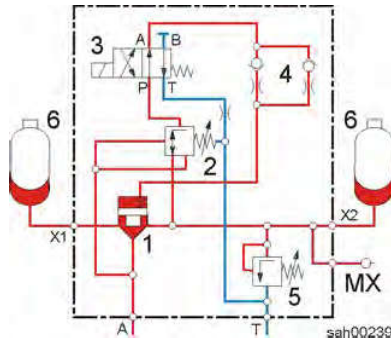
When ride control is deactivated, the logic valve 1 opens and closes very slowly, ensuring that the correct pressure in the hydro accumulators 6 is reached. This means the hydro accumulators 6 no longer have an absorbing effect.

Cut-off valve

The cut-off valve 2 controls the logic valve 1. Oil flows either from the hydro accumulators or the lift cylinder base end through the cut-off valve 2 and the solenoid valve 3 to the spring side of the logic valve 1.

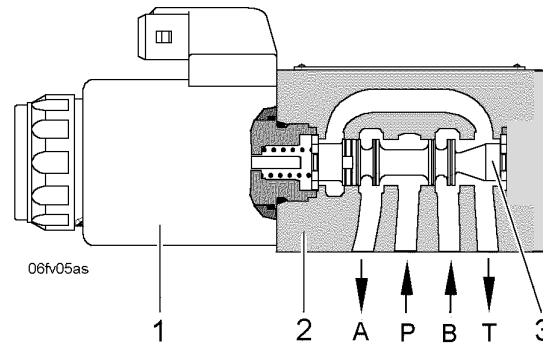
At low pressure, the cut-off valve 2 is in its idle position. Oil flows from the hydro accumulators through the cut-off valve to the spring side of the logic valve 1.

If the pressure increases to the set value, the cut-off valve 2 switches to its second position. Oil flows from the lift cylinder base end through the cut-off valve to the spring side of the logic valve 1.



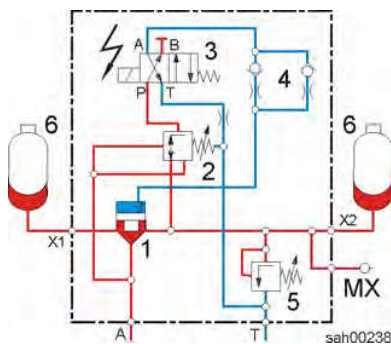
Ride control solenoid valve

The ride control solenoid valve controls the logic valve. The logic valve opens and closes according to the condition of the machine.



Sectional view of the solenoid valve with actuator cylinder

Ride control activated



When ride control is activated, the solenoid valve 3 is energised. The solenoid valve 3 opens the duct A to the hydraulic tank. This opens the spring side of the logic valve 1 to the tank.

The restrictor check valve 4 attenuates the opening and closing of the logic valve 1. The restrictor check valve 4 is installed in a position to ensure that the logic valve 1 opens slowly and closes quickly.

Ride control deactivated

When ride control is deactivated, the solenoid valve 3 is not energised and is in its idle position. Oil can flow from the cut-off valve 2 to the spring side of the logic valve 1.

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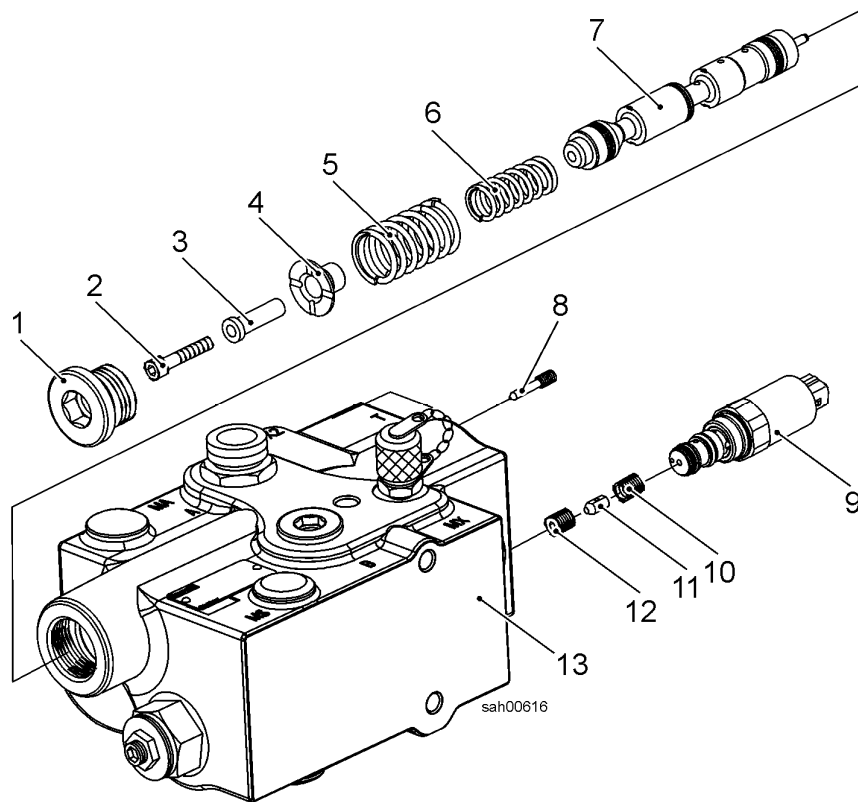
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Components of the stabilisation module

- | | | |
|---------------------|-------------------------------|---------------------------|
| 1 Plug | 6 Regulating spring | 10 Outer restrictor screw |
| 2 Socket-head screw | 7 Ride control spool valve | 11 Restrictor check valve |
| 3 Spacer bushing | 8 Relief valve | 12 Inner restrictor screw |
| 4 Spring cup | 9 Ride control solenoid valve | 13 Housing |
| 5 Regulating spring | | |

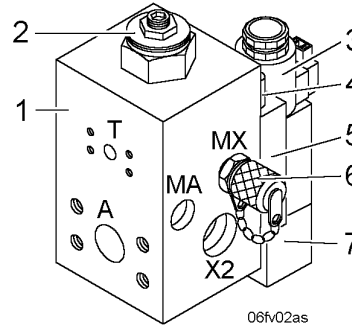
LBHVersion 03.09.2007/en/dtw/17.06.2009

7.6.1 Stabilisation module

Technical data

See section 2.1

Design



Main components of the stabilisation module

- | | |
|-------------------------------|-------------------------|
| 1 Main block | 4 Cut-off valve |
| 2 Safety valve | 5 Cut-off valve housing |
| 3 Ride control solenoid valve | 6 MX test connection |
| | 7 Actuator cylinder |

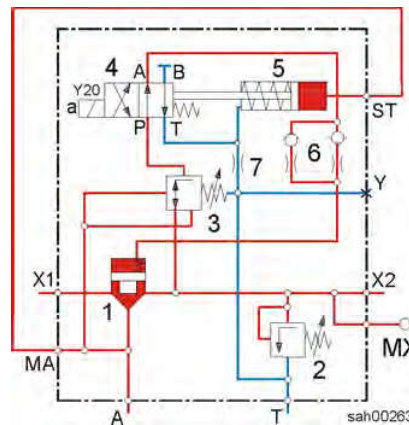
The stabilisation module is installed the front section on the right next to the control valve block.

It consists of the main block 1, which contains the safety valve 2 and the logic valve. The cut-off valve 4 and the solenoid valve 3 with the actuator cylinder 7 are attached to the main block 1.

Function description

Basic function

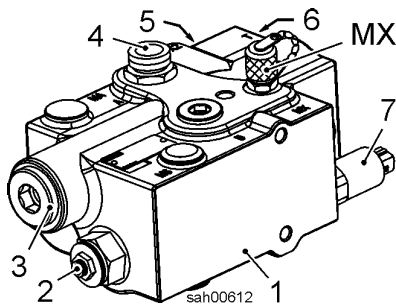
The stabilisation module protects the hydro accumulator from excessive pressure peaks. If the pressure is too high, the stabilisation module stops the oil flow to the hydro accumulators.



Hydraulic diagram of the stabilisation module

- | | |
|------------------|--------------------------|
| 1 Logic valve | 5 Actuator cylinder |
| 2 Safety valve | 6 Restrictor check valve |
| 3 Cut-off valve | 7 Restrictor |
| 4 Solenoid valve | MX Test connection |

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Stabilisation module

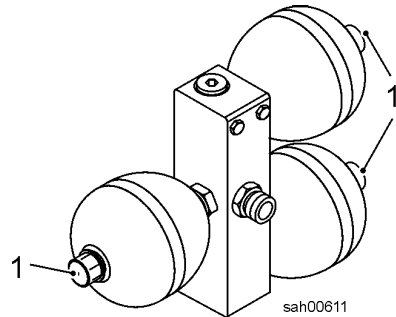
The stabilisation module protects the hydro accumulator from overload.

If the pressure is too high, the stabilisation module stops the oil flow to the hydro accumulators.

The solenoid valve 7 is for activating and deactivating ride control.

The safety valve 2 opens if the pressure to the tank connection is too high. This protects the hydro accumulator from overload.

See the detailed description in the section on the stabilisation module.



Hydro accumulator unit

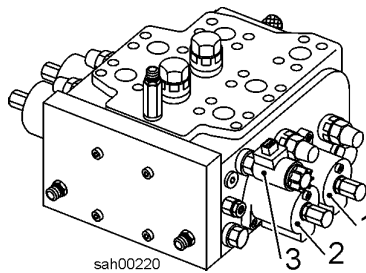
The stabilisation module protects the hydro accumulator 1 from overload.

If the pressure is too high, the stabilisation module stops the oil flow to the hydro accumulators.

The hydro accumulators absorb bouncing and pitching vibrations.

The vibration damping effect is achieved using a nitrogen filling in the hydro accumulators.

See the detailed description in the section on the hydro accumulator unit.



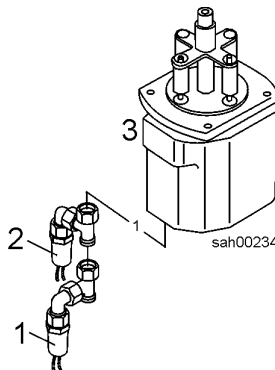
Control block

The control block contains the spool valves for the lift cylinder 2 and the tilt cylinder 1.

The lift cylinder base end is connected to the control valve block and the stabilisation module.

The float position/ride control solenoid valve 3 connects the lift cylinder rod end to the hydraulic tank when it is activated.

See the detailed description in the section on the control block.



Ride control pressure switch

The ride control pressure switch 1 prevents ride control from being activated at the same time as the float position or lift arm lowering function.

When the float position or lift arm lowering function is not activated, the contact in the ride control pressure switch 1 is open. This means that ride control can be activated.

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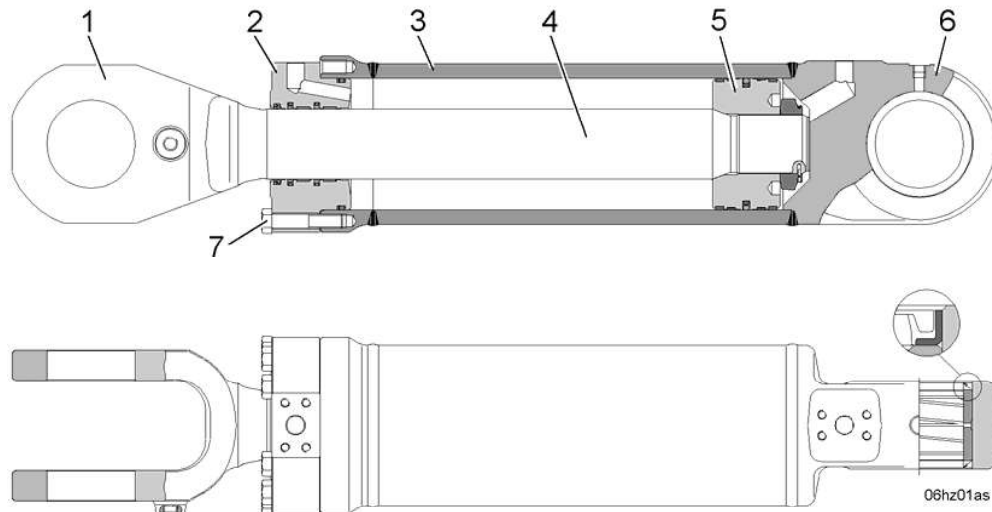
7.8 Lift and tilt cylinders

7.8.1 Lift cylinder

Technical data

See section 2.1

Design



- 1 Rod-end cylinder bearing
- 2 Piston rod bearing
- 3 Cylinder tube

- 4 Piston rod
- 5 Piston
- 6 Base-end cylinder bearing

- 7 Hex Screw

The cylinder base is welded to the cylinder tube 3.

The rod-end cylinder bearing 1 is forked.

The base-end cylinder bearing 6 is a lug with a bearing bushing.

The piston rod bearing 2 is pushed on and screwed to the cylinder tube 3.

The piston 5 and the piston rod bearing 2 are fitted with Glyd Seal, Rimseal and Stepseal sealing rings.

The O rings are equipped with support rings.

Function description

Extension and retraction

The hydraulic cylinder is a double-action cylinder with a piston at one end.

The maximum forces in the cylinder depend on the maximum operating pressure and the active surfaces.

When extending, the piston face is active; when retracting, the smaller ring face is active.

This means the force when extending is greater than when retracting.

The piston speed is inversely proportional to the force. It is faster when retracting than extending.

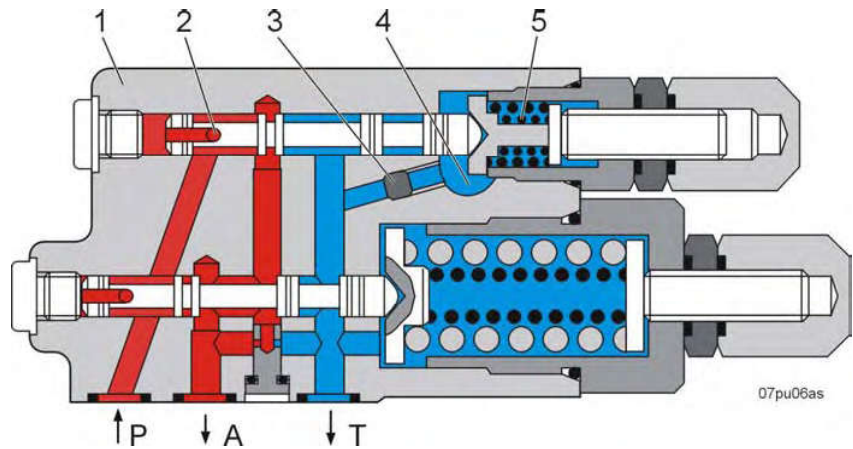
8 Steering system

Chapter contents

8	Steering system	8.0-1
8.1	Steering pump	8.1-1
8.2	Servostat.....	8.2-1
8.3	Steering cylinder	8.3-1
8.3.1	Steering damper hydro accumulator	8.3-3
8.4	Emergency steering.....	8.4-1
8.4.1	Emergency steering pump	8.4-4
8.4.2	Emergency steering pump	8.4-6
8.4.3	Emergency steering pressure switch	8.4-9
8.4.4	Emergency steering pressure switch	8.4-10
8.4.5	Emergency steering check pressure switch.....	8.4-11
8.4.6	Valve block	8.4-12

- | | |
|--------------------|-----------------------------|
| 1 Flow controller | 6 Adjusting screw |
| 2 Valve piston | 7 Pressure cut-off |
| 3 Plug | T Return pump housing |
| 4 Connection X | A To the restoring cylinder |
| 5 Pressure springs | P High pressure |

If the steering is not actuated, the load pressure at the connection 4 falls. The pump pressure pushes the piston 2 against the pressure springs 5. The piston 2 opens the pump pressure channel P to the channel A and the restoring cylinder adjusts the pump to the lowest flow.



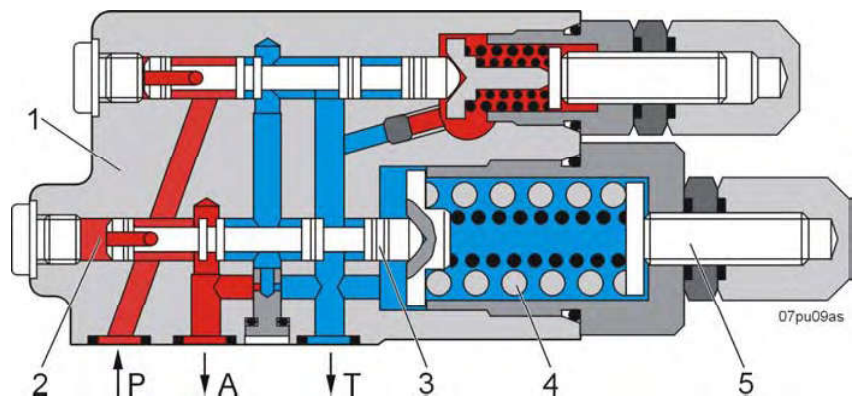
Flow controller without steering movement (pump delivers no oil)

Pressure cut-off

If the maximum system working pressure is reached, the pump swivels back to the lowest swivel angle and only delivers leakage oil. This keeps the maximum working pressure constant.

When the operating pressure of the pump reaches the maximum permissible level, the valve piston 3 in the pressure cut-off 1 pushes against the pressure spring 4. A channel A opens and pressure oil flows to the restoring cylinder.

The restoring cylinder displaces the swash plate and sets the pump to the smallest swivel angle.



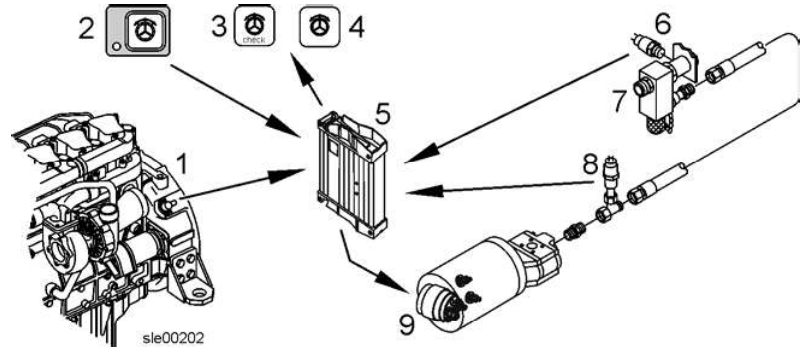
Pressure cut-off at maximum system pressure

- | | |
|--------------------|-----------------------------|
| 1 Pressure cut-off | 5 Adjusting screw |
| 2 Effective area | P High pressure |
| 3 Valve piston | A To the restoring cylinder |
| 4 Pressure spring | T Return pump housing |

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8.4 Emergency steering

Design



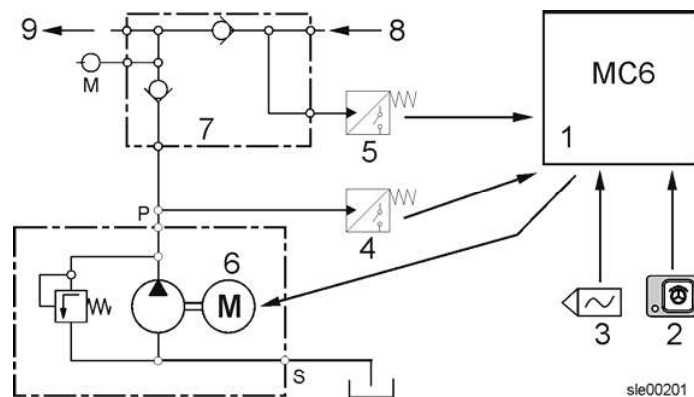
Main components of the emergency steering

- | | |
|---|--|
| 1 Diesel engine speed sensor | 6 Emergency steering pressure switch B3 |
| 2 Emergency steering button | 7 Valve block |
| 3 Emergency steering check symbol field | 8 Emergency steering check pressure switch B3a |
| 4 Emergency steering symbol field | 9 Emergency steering pump |
| 5 MC6 microcontroller | |

The emergency steering pump 9 and the emergency steering check pressure switch 8 are fitted on the right side of the rear section of the machine. The valve block 7 and the emergency steering pressure switch 6 are fitted on the left side of the rear section of the machine. The microcontroller 5 is fitted in the cab behind the driver's seat.

Function description

Basic function



Function diagram of the emergency steering

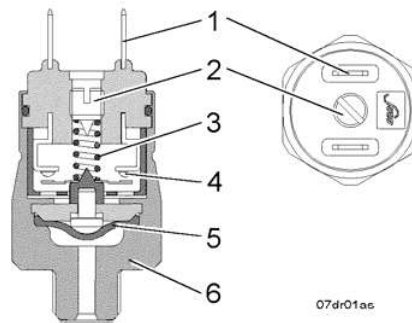
- | | |
|--|---|
| 1 MC6 microcontroller | 6 Electric motor M8 |
| 2 Emergency steering button | 7 Valve block |
| 3 Diesel engine speed sensor | 8 Oil from the variable displacement pump |
| 4 Emergency steering check pressure switch B3a | 9 To the servostat |
| 5 Emergency steering pressure switch B3 | |

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8.4.5 Emergency steering check pressure switch

(ID 6905535)

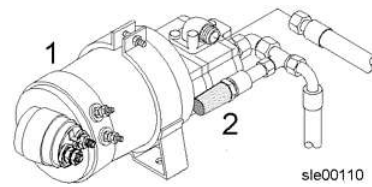
Technical data Design



Components and connections on the valve block

- | | |
|----------------------|------------------|
| 1 Connection contact | 4 Switch contact |
| 2 Adjusting screw | 5 Membranes |
| 3 Pressure spring | 6 Housing |

The emergency steering check pressure switch 2 is mounted on the pressure port of the emergency steering pump 1.



Function description

Basic function

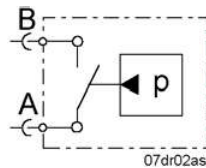
Membrane pressure switches are used to switch an electrical circuit on and off. Hydraulic pressure acts via a membrane on an adjustable spring. When the required value is reached, the electrical contact closes and the circuit is completed.

This membrane switch is an N/O type switch.

Checking the emergency steering system

The job of the emergency steering check pressure switch is to monitor the emergency steering system.

Once the diesel engine is started, the emergency steering pump begins to deliver oil. When the pressure reaches the set value, the pressure switch closes. This sends a positive signal to the microcontroller and the emergency steering check is successfully completed.



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After the motor is started and the parking brake button is pressed, the solenoid valve 2 in the compact brake valve 1 is activated. Oil flows from the hydro accumulator 3 to the parking brake 5, acts on the brake cylinder and opens the brake callipers.

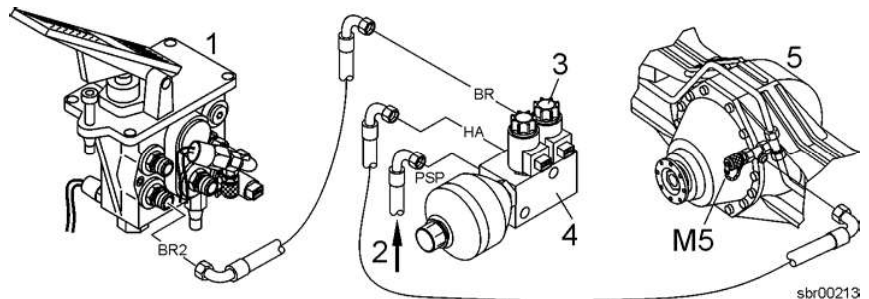
When the parking brake button is pressed again or the diesel engine shut down, the brake is closed by the spring force in the brake cylinder, thus producing the required braking torque at the brake disc.

When the parking brake is closed, the LEDs on the parking brake button and the parking brake symbol field in the display light up.

See the detailed description in the "Parking brake" chapter.

Overspeed protection

The overspeed protection prevents the diesel engine or variable adjustment motors from excess torque, which can happen when travelling downhill.

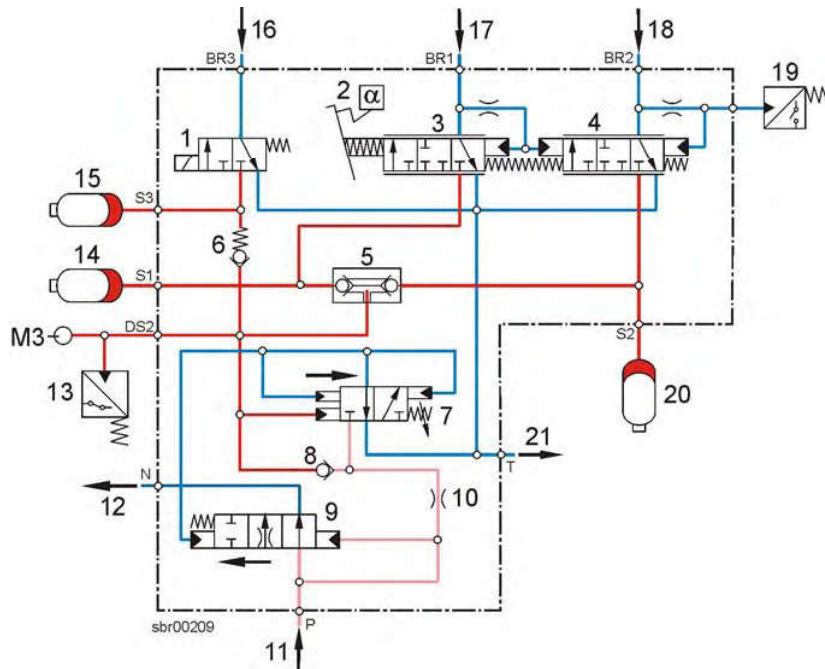


When a certain limit speed is reached, the overspeed protection solenoid valve 3 is activated. Oil flows from the replenishing pump 2 to the disc brake of the rear axle 5, causing the machine to brake.

See the detailed description in the "Overspeed protection" chapter.

Function description

Basic function



Compact brake valve - hydraulic circuit diagram

- | | | |
|---|---|--|
| 1 Parking brake solenoid valve | 9 Accumulator charge valve | 16 Parking brake connection |
| 2 Inching angle sensor | 10 Flow control nozzle | 17 Front axle connection |
| 3 Pressure control piston for 1st circuit | 11 Connection P – gear pump | 18 To overspeed protection solenoid valve |
| 4 Pressure control piston for 2nd circuit | 12 To the control valve block (housing pre-heating) | 19 Brake light pressure switch |
| 5 Inverted shuttle valve | 13 Accumulator charge pressure switch | 20 Rear axle hydro accumulator |
| 6 Check valve | 14 Front axle hydro accumulator | 21 Hydraulic tank connection |
| 7 Pressure balance pilot valve | 15 Parking brake hydro accumulator | M3 Accumulator charge pressure test connection |
| 8 Check valve | | |

The compact braking valve is supplied with oil from a gear pump. The built-in accumulator charge valve 9 and the pilot valve 7 fill the hydro accumulator with hydraulic oil.

Once the cut-off pressure of the accumulator charge function is reached, the accumulator charge valve 9 switches the pump flow to circulation into the connection N.

If the accumulator pressure drops to the cut-in pressure of the accumulator charge function due to actuation of the brakes, the accumulator charge valve 9 switches over to accumulator charging.

The brake circuits of the rear and front axles are mutually isolated by the inverted shuttle valve 5.

The parking brake solenoid valve 1 supplies the disc brake with hydraulic oil.

Service brake

When the pedal is pressed down, the hydraulic inch function is active in the first two thirds of the pedal travel range. This function is activated by the angle sensor on the compact brake valve.

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The parking brake is closed by spring force and opened by brake oil from the hydro accumulator 2.

When the parking brake button is pressed, brake oil flows from the hydro accumulator and releases the parking brake. Safe opening of the parking brake can only be guaranteed when the parking brake symbol field is not lit.

Code	Description	Step	Machine view
Kb	Forward travel direction electronic relay	4/20	2
KL15/1	Terminal connection 15	1/37	
KL24_G	24 Volt terminal connection	1/36	
KL30/1	Positive (+) battery terminal connection	1/6	
KL31	Ground (-) terminal connection	1/13	
M1	Starter	1/11	1
X10	Front windshield wiper motor	10/22	
M3	Rear windshield wiper motor	10/30	
M4	Front windshield washer pump	10/36	3
M5	Blower motor	9/13	
M7	Driver's seat compressor motor	14/19	
M8	Emergency steering pump motor	13/30	2, 3
M9	Rear windshield washer pump	10/40	3
M11	Heater water valve adjustment drive	9/39	3
P1	Mechanical operating hours display	2/27	
R1	Inch/brake pedal angle sensor	5/10	1
R3	Flame glow plug	1/42	
R5	Gas pedal angle sensor	5/14	2
S1	Ignition start switch	2/35	
S2	Control lever for travel direction, kick-down and additional function	4/25	
S2a	Control lever for travel direction, kick-down and additional function	4	
S3	Steering column switch	10/10	
S15	Battery main switch	1/4	1, 3
S26	Fan reverse switch	7/25	
T1	24 V – 12 V voltage converter (radio)	16/24	
V1	Starter extinguishing diode	1/14	
X/MC6a	55-pin Junior Timer connector (MC6 master board)	3, 4, 5, 6	
X/MC6b	55-pin Junior Timer connector (MC6 slave board)	3, 6, 7, 13, 15	
X1	40-pin Deutsch DRC connector (main electronics)	1, 2, 7, 9, 11, 12, 14	2, 3
X2	24-pin Deutsch DRC connector (main electronics)	5, 6, 8, 10, 11, 13, 14, 15	2, 3
X2a	40-pin Deutsch DRC connector (gear wiring harness)	5, 6, 7, 13, 15	
X3	24-pin Deutsch DRC connector (main electronics)	8, 10	2, 3
X3A	10-pin Junior Power Timer connector (control board)	8, 10	
X3B	14-pin Junior Power Timer connector (control board)	8, 10	
X4	15-pin SUB-D pin connector (CPU)	18	
X4a	15-pin SUB-D socket connector (control unit)	18	
X5	6-pin Junior Power Timer connector	11	
X5	9-pin SUB-D pin connector (CPU)	18	
X5a	9-pin SUB-D socket connector (CPU)	18	
X6	6-pin Junior Power Timer connector	11	
X6	9-pin SUB-D pin connector (CPU)	18	
X6a	9-pin SUB-D socket connector (heater/air-conditioning control unit)	18	
X7	24-pin Deutsch DRC connector (main electronics)	2, 9, 10, 14	
X7	6-pin Deutsch connector (rear left lighting)	9	
X7A	6-pin Junior Power Timer connector (CPU)	9, 14	
X7B	10-pin Junior Power Timer connector (control board)	2, 9, 10, 14	
X8	6-pin Deutsch connector (rear left lighting)	11/16	
X8	24-pin Deutsch DRC connector (main electronics)	12, 16, 17	
X8A	6-pin Junior Power Timer connector (control board)	12, 16	
X8B	6-pin Junior Power Timer connector (control board)	16, 17	
X9	40-pin Deutsch DRC connector (main electronics)	3, 4, 7, 13, 15	

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Code	Description	Step
A1, A12	Main electronics	3/8
X/MC6a	55-pin Junior Timer connector (MC6 master board)	3/30
X/MC6b	55-pin Junior Timer connector (MC6 slave board)	3/27
X9	40-pin Deutsch DRC connector (main electronics)	3/9
X9A	10-pin Junior Power Timer connector (control board)	3/9
X 9B	10-pin Junior Power Timer connector (CPU)	3/14
X12	10-pin Junior Power Timer connector (power board)	3/23
X12A	4-pin Junior Power Timer connector (internal wiring harness)	3/22
XBB3	8-pin Bodem connector	3/9

LBH/Version 02/07.2003/lem/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	8/6
B15	Bucket return-to-dig inductive switch	8/7
B17	Stroke end limit inductive switch	8/12
B28	Ride control (LFD) pressure switch	8/30
B32	Bucket float position pressure switch	8/34
X1	40-pin Deutsch DRC connector (main electronics)	8/18
X2	24-pin Deutsch DRC connector (main electronics)	8/7
X3	24-pin Deutsch DRC connector (main electronics)	8/29
X3A	10-pin Junior Power Timer connector (control board)	8/40
X3B	14-pin Junior Power Timer connector (control board)	8/29
X33	6-pin Deutsch connector (Y9, Y17, Y18)	8/33
Y9	Bucket return-to-dig solenoid	8/37
Y14	Working hydraulics lockout SV	8/18
Y17	Stroke end limit solenoid	8/38
Y18	Bucket float position solenoid	8/40
Y20	Ride control (LFD) SV	8/22
Y21	Ride control (LFD) SV	8/26

LBH/Version 02/07.2003/lem/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	13/11
A2	Gear electronics	13/11
B3	Emergency steering pressure switch	13/20
B3a	Emergency steering safety test pressure switch	13/23
K11	Emergency steering pump relay	13/31
M8	Emergency steering pump motor	13/28
X/MC6b	55-pin Junior Timer connector (MC6 slave board)	13/12
X2a	40-pin Deutsch DRC connector (gear wiring harness)	13/18
X9	40-pin Deutsch DRC connector (main electronics)	13/12
X9A	10-pin Junior Power Timer connector (control board)	13/12

LBH/Version 02/07.2003/len/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	18/6
A10	Heating control element	18/33
A11	Control unit (switch button)	18/6
A13	Display unit	18/23
X4	15-pin SUB-D pin connector (CPU)	18/6
X4a	15-pin SUB-D socket connector (control unit)	18/6
X5	9-pin SUB-D pin connector (CPU)	18/24
X5a	9-pin SUB-D socket connector (display unit)	18/24
X6	9-pin SUB-D pin connector (CPU)	18/34
X6a	9-pin SUB-D socket connector (heater/air-conditioning control unit)	18/34

LBHVersion 02/07.2003/en/nd/29.09.2008

Code	Description	Step
A1, A12	Main electronics	1
F00	100 A main fuse (MEGA fuse)	1/18
F01	60 A fuse connected to terminal 15	1/16
F02	20 A starter fuse, terminal 50 for starting excess fuel	1/26
F03	20 A fuse for motor stop solenoid	1/45
F04	30 A fuse for terminal 15 (pin)	1/22
G1	Alternator	1/28
G2	Batteries (2x12 V)	1/8-14
K01	Relay connected to terminal 15	1/12
K02	Start lockout relay	1/34
K03	Motor stop relay (30 A)	1/39
KL15/1	Terminal connection 15	1/43
KL24_G	24 Volt terminal connection	1/10
KL30/1	Positive (+) battery terminal connection	1/20
KL31	Ground (-) terminal connection	1/3
M1	Starter	1/20
MP1	Mass point 1, rear section front / right side under the cab	1
MP2	Mass point 2, rear section left / mid side (clip)	1
MP3	Mass point 3, rear section left / mid side (connecting block)	1
MP4	Mass point 4, rear section left / back side (main switch)	1
MP8	Mass point 8, Casing central electronic top / outside	1
S15	Battery main switch	1/5
V1	Starter extinguishing diode	1/24
X1	40-pin Deutsch DRC connector (main electronics)	1
X10	6-pin Junior Power Timer connector (power)	1
Xa	4-pin screw connections M4 / M5 / M6	1
Y4	Starting excess fuel SV	1/33
Y5	Motor stop solenoid	1/45

LBH/Version 02/07.2003/lem/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	6
A2	Electronic control unit for travel drive (master + slave MC6 E/31)	6
B1	Transfer gear speed sensor (gear output speed)	6/23
B2	Variable displacement motor 1 speed sensor (A6VM 80, 80, 107 EP) (gear input speed)	6/26
B2a	Variable displacement motor 2 speed sensor (A6VM 80, 107, 140 EP) (gear input speed)	6/30
B14	Gear oil temperature thermo switch 120 °C	6/35
B19	Brake system accumulator pressure switch, 90 bar	6/38
B24	Diesel engine speed sensor	6/18
MP1	Mass point 1 rear section right / front side under the cab	6
R1	Inch/brake pedal angle sensor	6/7
R5	Gas pedal angle sensor	6/12
X/MC6A	55-pin Junior Timer connector (MC6 master board)	6
X/MC6B	55-pin Junior Timer connector (MC6 slave board)	6
X2	24-pin Deutsch DRC connector (main electronics)	6
X2a	40-pin Deutsch DRC connector (gear wiring harness)	6
X17	Plug connection, 6 pin AMP MQS	6
Y10	Parking brake SV	6/42

LBH/Version 02/07.2003/lem/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	11
B10	Horn	11/44
MP1	Mass point 1 rear section right / front side under the cab	11
MP6	Mass point 6 cabine right / back side (operating stand)	11
MP9	Mass point 9 casing central electronic inside	11
M2	Front windshield wiper motor	11/22
M3	Rear windshield wiper motor	11/31
M4	Front windshield washer pump	11/36
M9	Rear windshield washer pump	11/40
S3	Steering column switch	11/12
X2	24-pin Deutsch DRC connector (main electronics)	11
X3	24-pin Deutsch DRC connector (main electronics)	11
X3A	10-pin Junior Power Timer connector (power board)	11
X3B	14-pin Junior Power Timer connector (power board)	11
X7	24-pin Deutsch DRC connector (main electronics)	11
X7B	10-pin Junior Power Timer connector (power board)	11

LBH/Version 02/07-2003/lem/hnd/09.06.2005

Code	Description	Step
A1, A12	Main electronics	16
A2	Electronic control unit for travel drive (master + slave MC6 E/31)	16
A200	Joystick steering	16/30
MP1	Mass point 1, rear section, front/right side under the cab	16
MP6	Mass point 6, Cabine, right/back side (operating stand)	16
X/MC6B	55-pin Junior Timer connector (MC6 slave board)	16
X2	24-pin Deutsch DRC connector (main electronics)	16
X2a	40-pin Deutsch DRC connector (gear wiring harness)	16
X9	40-pin Deutsch DRC connector (main electronics)	16
X9A	10-pin Junior Power Timer connector (power board)	16
X50	Joystick steering pressure switch	16/42
X208	Joystick steering connector	16
Y51	Right joystick steering PSV (optional)	16/9
Y52	Left joystick steering PSV (optional)	16/13

10.1 Main electronics

(ID 6906026, 10025241)

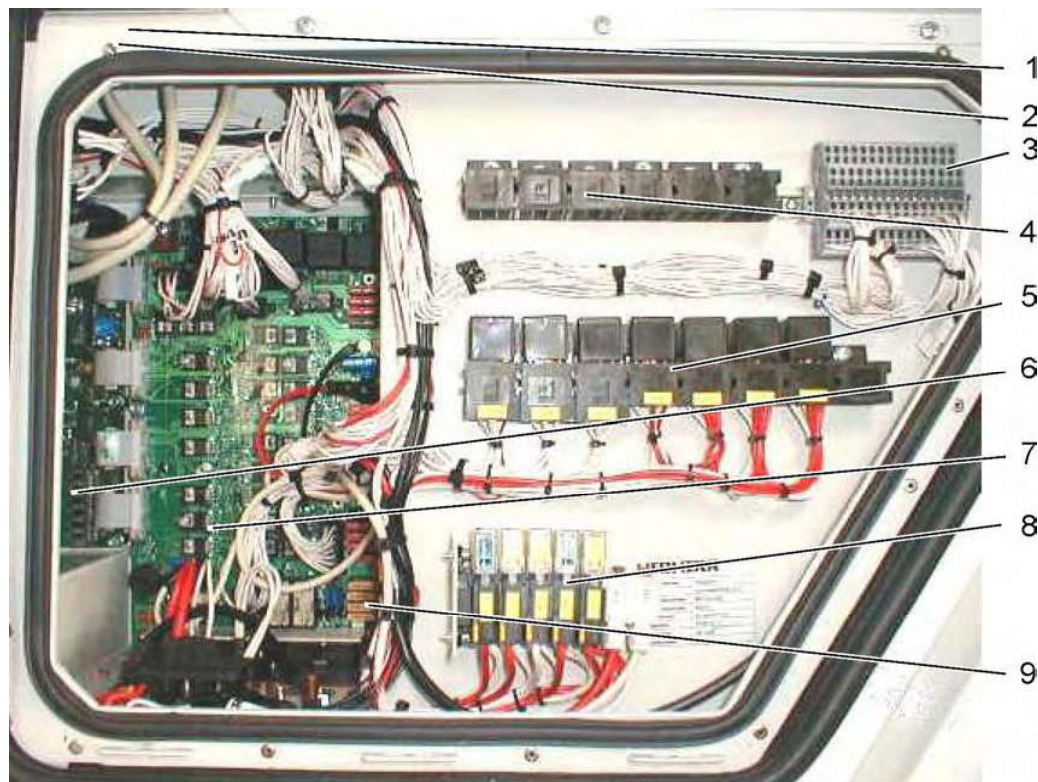
The main electronics are in an enclosed sheet steel housing in the right-hand control panel (protection class IP 65).

Design

The main electronics consist of the following components:

- Fuses
- Relays
- Terminal block
- Control board (CPU) A1
- Power board A12

The electronic components can be accessed via a cover with catches behind the right cab door.



sel00061

Main electronics

- | | | |
|-----------------------------|--------------------------|-------------------|
| 1 Main electronics housing | 4 Cover catches | 7 Power board A12 |
| 2 Schraubverschlüsse Deckel | 5 Relays K01 – K09 | 8 Fuses |
| 3 Terminal block | 6 Control board (CPU) A1 | 9 Fuses A12 |

– Power electronics A12 via analogue interfaces.

The control electronics (CPU) A1 process all commands from the control units A13 and A10 and forward them to the power electronics A12 and the display unit A11.

LED display The following LEDs must light up during operation (ignition on):

Valid for: **L544-L580** / 7477 – 9239

LED	Colour	status
V2	Green	24 V supply from terminal 15 via B4 / 8
V13	Green	Internal 5 V supply
V14	Green	Internal 5 V supply
V15	Green	Internal 8.5 V supply
V16	Green	24 V supply (connected via K01)
V30	Red	CAN line level monitoring
V31	Green	CAN line level monitoring

Valid for: **L544-L580** / ab 9240

LED	Colour	status
V13	Green	Internal 8,5 V supply
V15	Green	Internal 5 V supply
V16	Green	24 V supply (connected via K01)
V23	Red	CAN line level monitoring
V30	Green	CAN line level monitoring

They indicate the power supply status of the control electronics and the monitoring of the CAN lines.

The following LED indicates a malfunction:

LED	Colour	status
V29	Red	Monitoring "RESET" from the controls

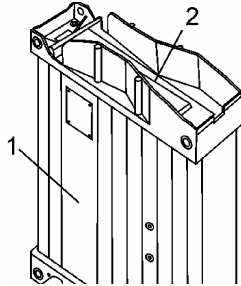
It indicates a malfunction of the processor (EPROM).

If the LED flashes, the EPROM RAM information is missing or incorrect.

10.4 Microcontroller A 2 (MC6)

(ID 6905971)

Design



The microcontroller A2 is mounted behind the driver's seat on the rear wall of the cab. The microcontroller is covered by a panel.

The microcontroller A2 consists of the following components:

- Housing 1
- Master board with connector 2
- Slave board with connector 3

The two boards are connected internally via a data cable.

Function description

Basic function

The control electronics A2 (MC6) control and monitor the following functions:

- Gearbox
- Hydrostatic travel drive
- Fan control
- Emergency steering pump
- Ride control
- Joystick steering

The program parameters for the control electronics A2 (MC6) can be set using a PC and the BODEM software.

The main gearbox control functions are:

- Travel range 1 for fixed gear 1
- Travel range 2 for fixed gear 2
- Automatic range A1-2 for gears 1 and 2
- Automatic range A1-3 for gears 1, 2 and 3
- Automatic range A2-3 for gears 2 and 3
- Manual shifting up independently of speed
- Automatic shifting up dependent on speed and angle sensor
- Kick-down shifting to first gear from any driving situation
- Storing service codes

The main hydrostatic travel drive control functions are:

- Controlling the forward and reverse solenoid valves
- Controlling the variable displacement pump control valve pressure
- Controlling the variable displacement motor proportional solenoid valves
- Reversing from any speed
- Controlling the tempomat function (maintaining the selected speed at full throttle)
- Controlling the tractive force reduction on the control pressure proportional solenoid valve
- Controlling the overspeed protection solenoid valve
- Storing service codes

The main hydrostatic fan drive control functions are:

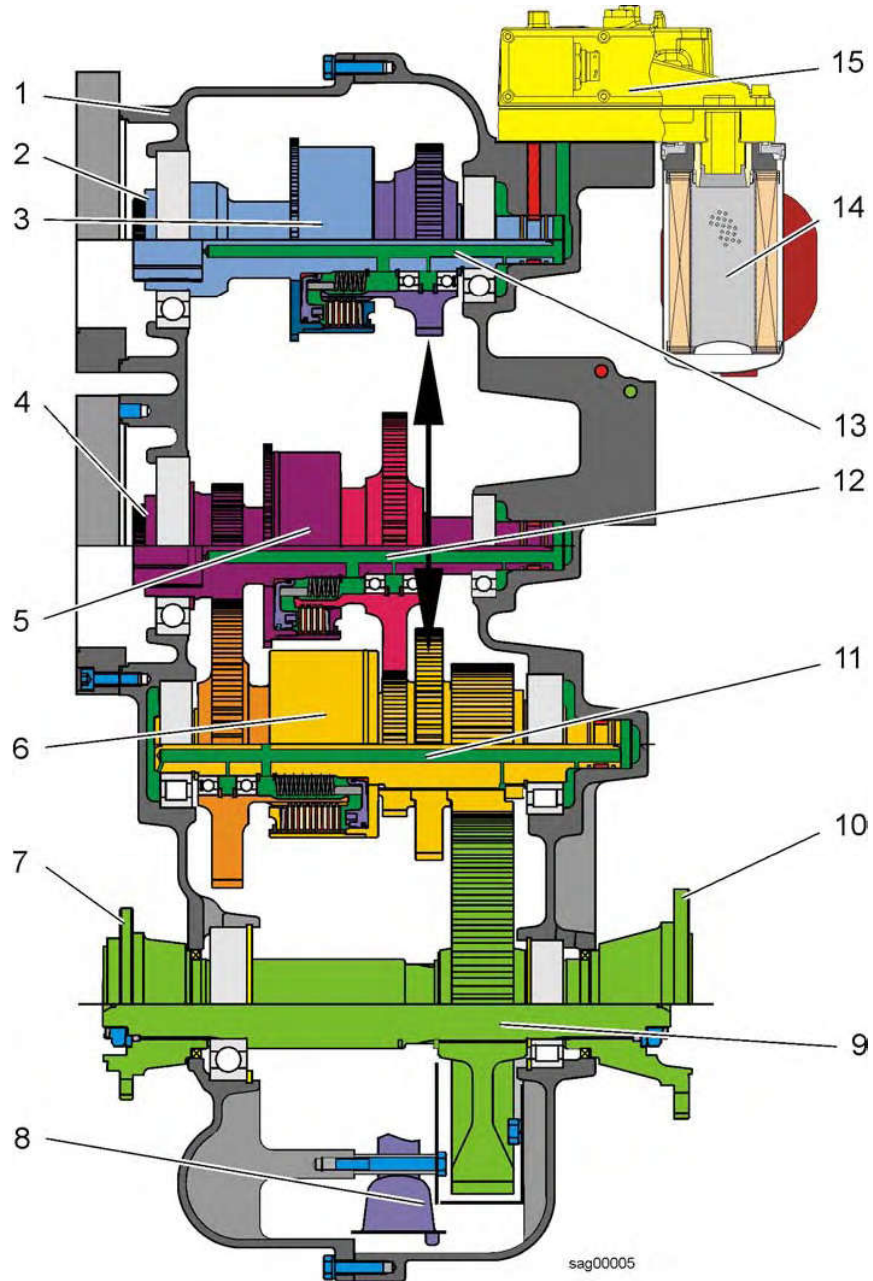
- Controlling the fan motor proportional solenoid valve

11.1 Mechanical transfer gear

(ID 5717268)

Technical data

Design



Sectional view of the transfer gear (Note: The drive shaft 2 with the coupling 2 has been moved upwards so that it can be seen better)

- | | | |
|---|---------------------------------------|---------------------------------------|
| 1 Gearbox housing | 6 Coupling 1 | 12 Coupling 3 lubricating oil channel |
| 2 Variable displacement motor drive shaft 2 | 7 Rear axle drive shaft flange | 13 Coupling 2 lubricating oil channel |
| 3 Coupling 2 | 8 Oil strainer | 14 Oil filter |
| 4 Variable displacement motor drive shaft 1 | 9 Output shaft | 15 Control valve block |
| 5 Coupling 3 | 10 Front axle drive shaft flange | |
| | 11 Coupling 1 lubricating oil channel | |

LBH/Version 02/06.2003/EN/Mechting-tp/18.08.2006

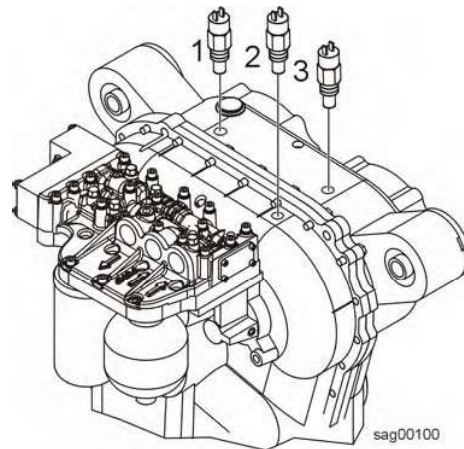
11.2.4 Speed sensor

(ID 7009274)

Technical data

Design

The input and output speeds of the gearbox are recorded by speed sensors and constantly monitored by the MC 6 microcontroller.



RPM sensors on the transmission

- | | |
|---------------------------------|---------------------------------|
| 1 Variable displacement motor 2 | 3 Variable displacement motor 1 |
| speed sensor | speed sensor |
| 2 Output speed sensor | |

Function description

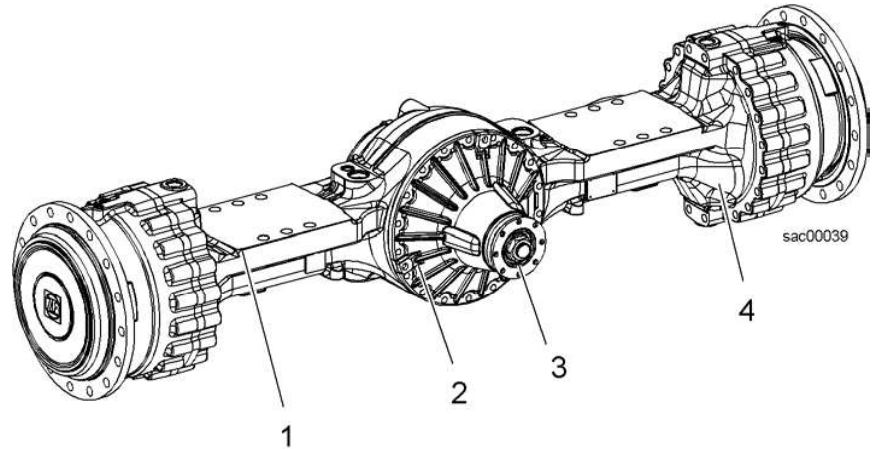
Basic function

The sensors generate an alternating current signal, the frequency of which is proportional to the speed and number of teeth of the corresponding gearwheel. This signal is recorded by the microcontroller and converted into the speed.

12.1 Axles

Valid for: **L544** - 443 / from 7477, ID 5717120, 5717121

Technical data Design



Main components of the axle

- | | |
|-----------------------------|----------------------|
| 1 Axle casing | 3 Drive shaft flange |
| 2 Self-locking differential | 4 Wheel hub |

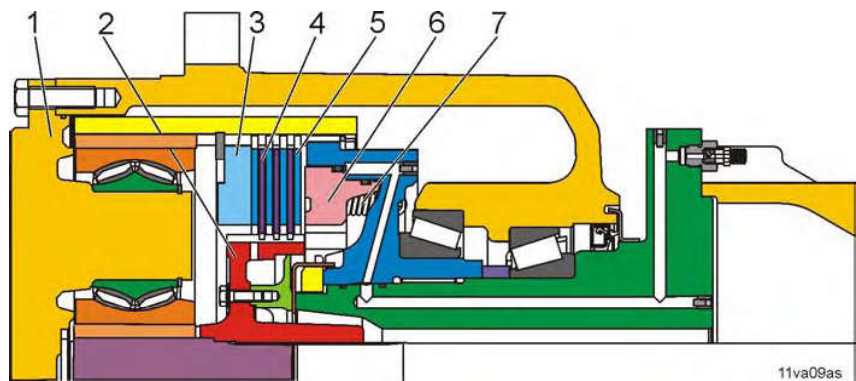
The axle consists of a differential with a tapered gear and self-locking differential 2 and the planetary final drive in the wheel hub 4. The wheel hub also houses the service brake, which is designed as a wet disc brake. The wheel hubs are mounted on the axle casing 1 on tapered roller bearings.

Self-locking function

The disc brakes 9 which are arranged on the left and right of the axle tapered gears 5 counteract the relative movement between the axle tapered gear 5 and the differential housing 3 with a braking effect dependent on the torque. This braking torque has a blocking action and increases the torque on the side with a firm hold on the ground. The braking torque thus compensates for the insufficient support from the side with poor hold.

The disc brake consists of outer discs which are mounted in the differential housing and of non-twisting inner discs linked to the axle taper gears. The spreading force is generated by the transfer of the differential torque from the two pressure rings 6 to the compensation axles 7, which are loosely guided on inclined surfaces. The force generates a load-dependent locking torque in the disc brakes which maintains a constant proportion to the input torque. This ratio stated as a percentage is known as the locking value.

Service brake function



Cross section of the wheel hub

- | | |
|---------------------|------------------|
| 1 Planetary carrier | 5 Outer discs |
| 2 Disc carrier | 6 Brake piston |
| 3 Retainer plate | 7 Return springs |
| 4 Inner discs | |

The service brake is integrated in the wheel hubs of both axles in the form of a wet disc brake. When hydraulic oil is applied to the brake piston 6, it pushes the outer discs 5 and the inner discs 4 against the retainer plate 3. The inner disks mesh with the disc carrier 2 so that they cannot twist when the drive shaft rotates at high speed. The outer discs are linked to the axle housing and cannot turn or twist. As the discs press together, the wheel torque reduced by the ratio of the planetary gear is acts on the axle housing.

When it is not actuated, the return springs 7 push back the brake piston 6. In the process, the brake discs break contact and the drag torque is reduced to a minimum.

Wheel attachment

The wheels are fixed to the wheel flange of the wheel hubs by wheel nuts. The wheels are centred by the spherical collar nuts.

Axle lubrication

The axle has a common oil system. The oil cavities on the differential and the wheel hubs are also linked. Oil filler and drain plugs are respectively attached to the wheel hubs and the differential housing.

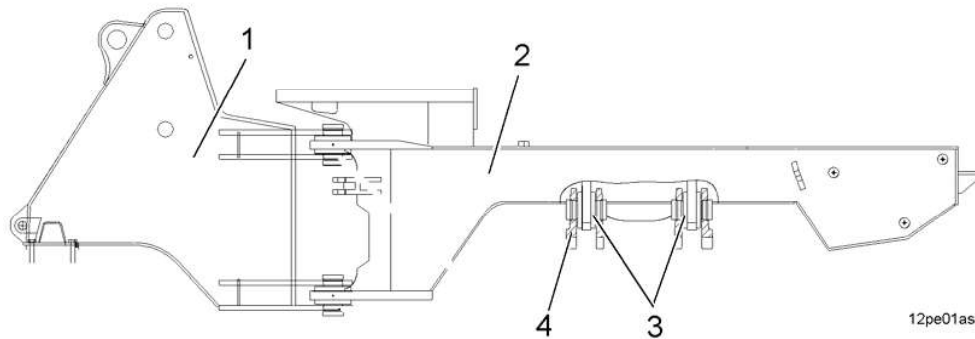
Technical data

13.3 Oscillating axle mount

(ID 9618519, 9519104)

Design

The oscillating axle mount is installed between the rear section and the oscillating axle frame.

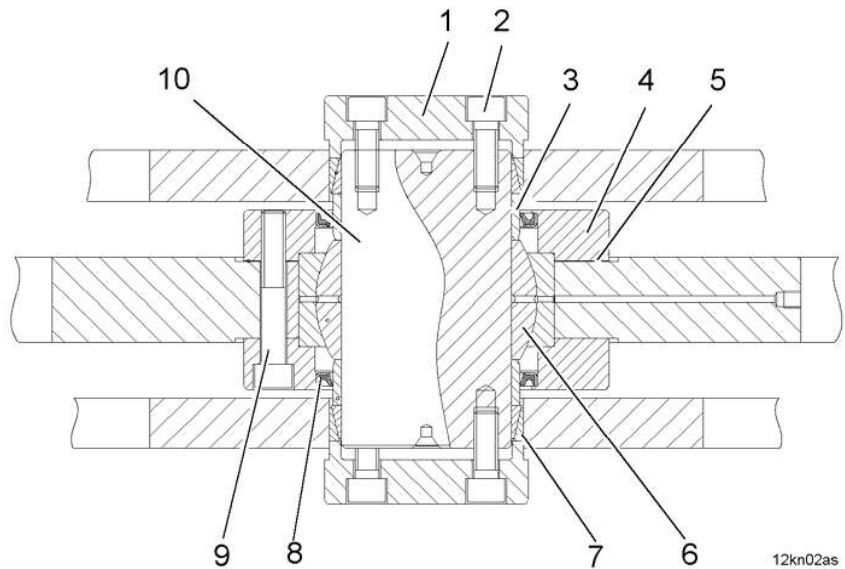


Installation site of the oscillating bearing

- 1 Front section
- 2 Rear section

3 Oscillating axle mount

4 Oscillating axle frame



Main components of the oscillating axle mount

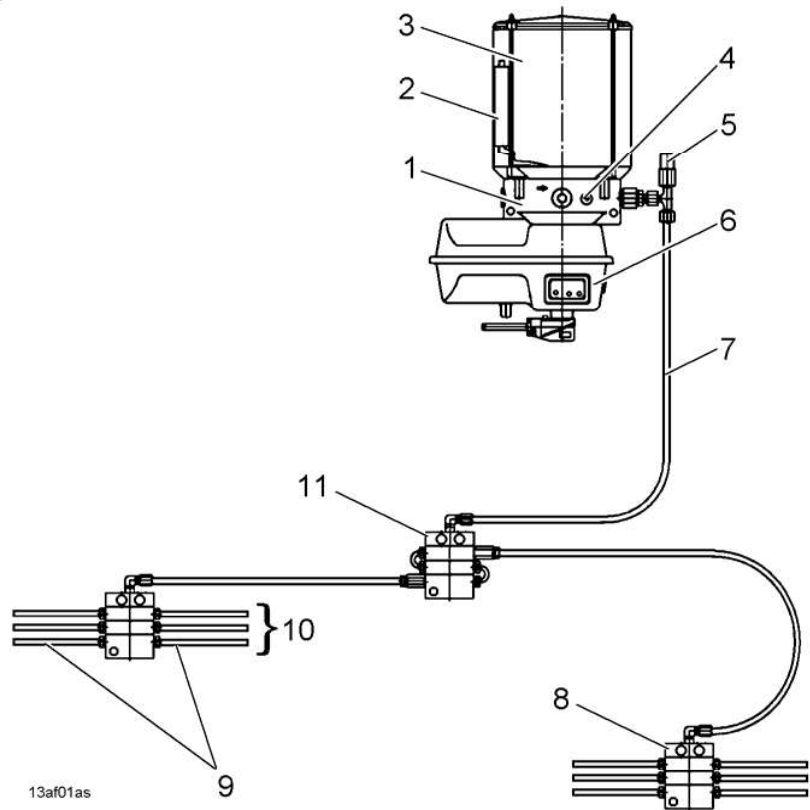
- 1 Pressure flange
- 2 Cheese-head screw
- 3 Bushing
- 4 Bearing cover
- 5 Shims
- 6 Swivel bearing
- 7 Cone tension element
- 8 Shaft seal ring
- 9 Cheese-head screw
- 10 Bearing pin

LEH/Version 02/07.2003/en/fielting-1p/18.08.2006

14.2 Automatic central lubrication system

(ID 9609822, 9609824)

Design



Components of the central lubrication system

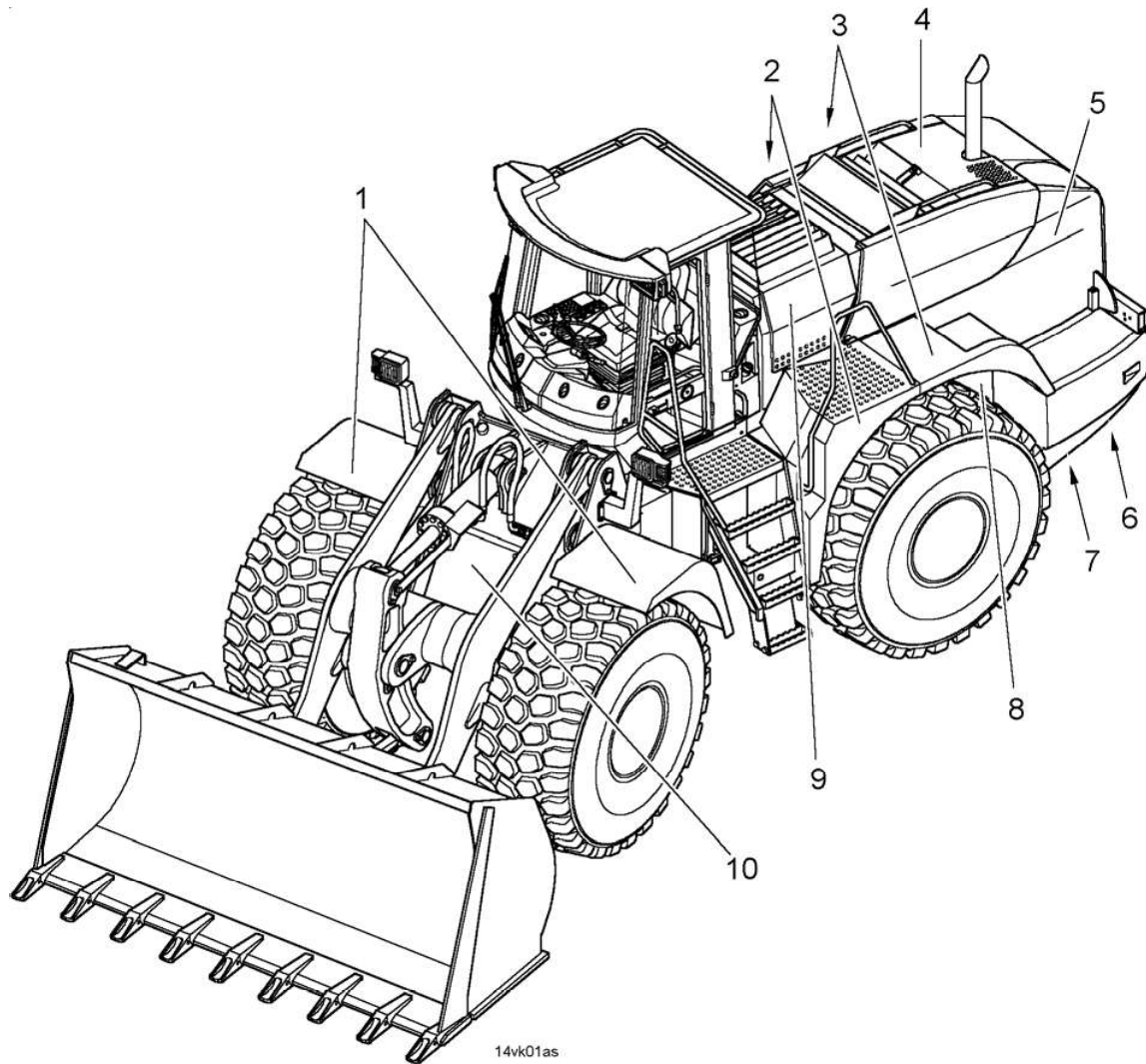
- | | |
|-----------------------------------|--------------------------------------|
| 1 Central lubrication pump EP-1 | 7 Main supply line |
| 2 Agitator | 8 Secondary progressive distributor |
| 3 Transparent container | 9 Lubricant supply lines |
| 4 Grease fitting | 10 Lubrication points |
| 5 Pressure relief valve | 11 Main progressive distributor MX-F |
| 6 Built-in EP-tronic control unit | |

LBHVersion 02/07.2003/en/fehring-ipl/21.08.2006

15.1 Covering

(ID 9654449, 9654104)

Design



14vk01as
Covering sections

- | | | |
|---|------------------------|------------------------------|
| 1 Front mud guard, left and right | 5 Rear cover | 8 Side cover, left and right |
| 2 Wheel box, left and right | 6 Rear lower covering | 9 Cooler hood |
| 3 Rear protective cover, left and right | 7 Front lower covering | 10 Cover |
| 4 Engine cover | | |

LBHV version 02/07, 2003/len/lehling-ipr/18.08.2006

16.0.1 Cab, heating, air-conditioning

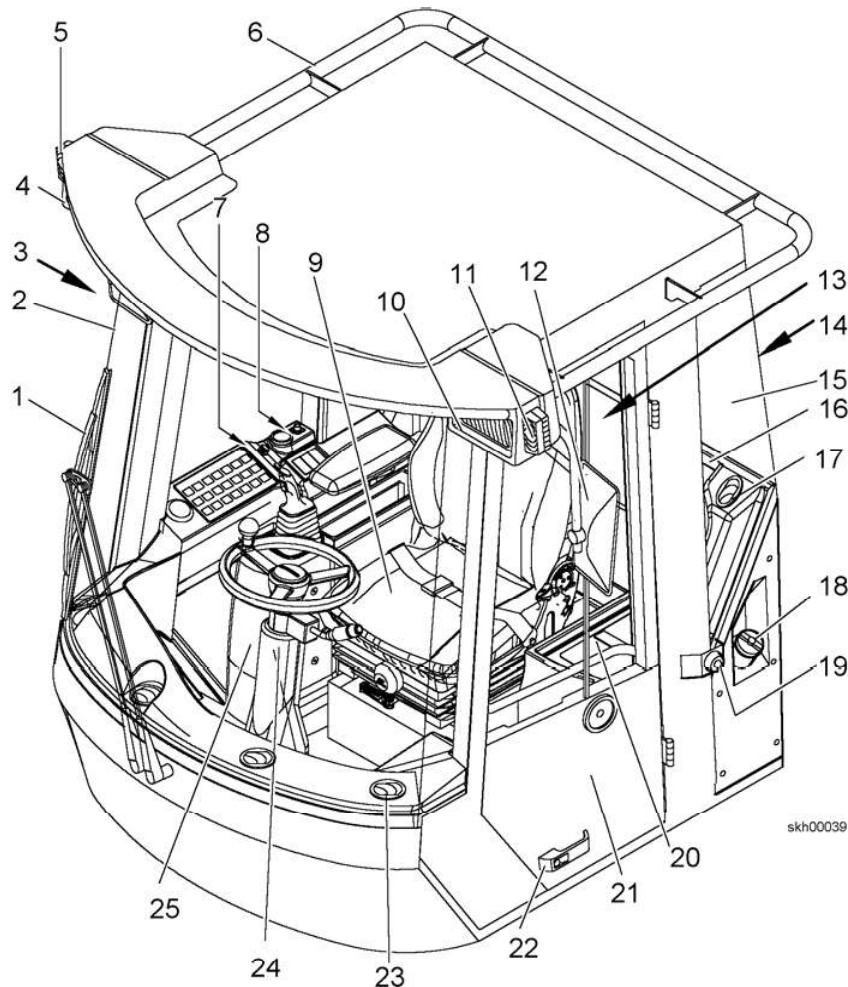
Design

The cab is a safety cab and has been tested and certified according to ROPS/FOPS regulations. It is mounted on cushioned bearings on the rear section.

The cab is equipped with heating, ventilation and air-conditioning.

Access to the cab is from the left-hand side of the machine via the access ladder and the left-hand door.

In emergencies, it is possible to exit through the door on the right hand side.



Full view of the driver's cab

- | | | |
|---|--|--|
| 1 Front windscreen wiper | 9 Seat with safety belt | 18 Filler neck for windscreen washer tank |
| 2 Front windscreen | 10 Left working headlight | 19 Door lock |
| 3 Right cab door | 11 Left profile lights | 20 Glove compartment |
| 4 Right working floodlight | 12 Left exterior mirror | 21 Left cab door |
| 5 Right profile lights | 13 Access to gearbox control unit (MC6) and cab type plate | 22 Door lock |
| 6 Handrail | 14 Rear windscreen wiper | 23 Outlet nozzles |
| 7 Access to fuses, electronics and relays | 15 Rear windscreen | 24 Adjustable steering column with steering wheel |
| 8 Access to fresh and recirculated air filter | 16 Cover for heating/air-conditioning unit | 25 Adjustable pilot control console with control lever |
| | 17 Outlet nozzles | |

Function description

Plug pin assignment

X6 9-pin SUB-D male (communication with the control electronics A1 CPU)

1 Weight	6 Weight
2 +24 V power supply	7 Unassigned
3 CAN_L CAN bus	8 Unassigned
4 CAN_H CAN bus	9 Unassigned
5 +5 V power supply	

Key functions

The buttons with an ON/OFF function are provided with function symbols and LEDs. When they are switched on (activated), the LED (red) lights up.

All functions are stored when the ignition is switched OFF (switching off terminal 15) and re-activated when the ignition is switched ON.

16.1.4 LIEBHERR control lever

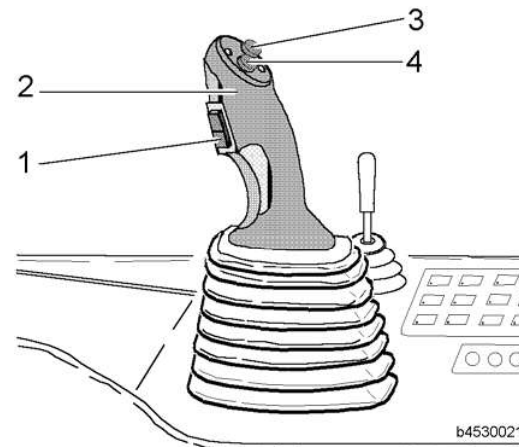
(ID 10011501)

The LIEBHERR (LH) control lever contains the travel direction selection switch 1, the kick-down switch 4 and the additional function switch 3.

Movements of the working equipment (lift and tilt cylinders) can be controlled by the LH control lever.

It is connected to the gearbox control electronics A2 (MC6) via cables and plug connectors.

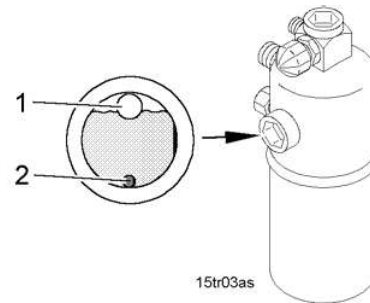
Design



Control lever with button

- | | |
|---------------------------|-------------------------------|
| 1 Travel direction switch | 3 Additional equipment button |
| 2 LH control lever | 4 Kick-down button |

Sight glass



Sight glass

- 1 White filling level indicator bead 2 Blue moisture indicator blue

The sight glass is mounted on the upper third segment of the dryer-collector unit.

The sight glass is provided for:

- Monitoring the filling of the system.
- Monitoring the refrigerant level during operation.
- Monitoring the moisture level of the refrigerant.
- Monitoring the degree of contamination of the refrigeration circuit.

Functions of the sight glass

Monitoring the filling of the system.

- When completely re-filling the system, it is necessary to top up with gaseous refrigerant on the suction-side when the system is switched on. In the process, the filling level bead 1 in the sight glass must be watched. As soon as it floats to the upper edge of the sight glass carried by the liquid refrigerant, the refrigerant feed must be stopped.

Monitoring the refrigerant level during operation:

- After the system has been running for approximately 5 minutes (the refrigerant must be distributed throughout the system), the white filling level indicator bead should float to the upper edge of the sight glass. As the diesel speed increases, the level floats upwards a little. No bubbles may appear in the refrigerant as it flows past the sight glass during operation. If bubbles do appear, it usually means that there is not enough refrigerant in the system.

In addition, it is possible that the refrigerant is not sufficiently condensed due to insufficient heat extraction at the condenser (contamination), resulting in the appearance of bubbles in the sight glass.

Monitoring the moisture level of the refrigerant:

- The sight glass contains a small, dark blue moisture indicator bead 2. If the bead turns red, there is too much moisture in the system.

In this case, the system must be completely drained and evacuated. The oil in the compressor must be replaced too.

The complete dryer-collector unit must also be replaced.

Monitoring the degree of contamination of the cooling circuit:

- If the sight glass suddenly becomes discoloured, this indicates a problem in the system. Usually a discoloration is caused by overheating of the cooling circuit. The cause is usually internal or external contamination.

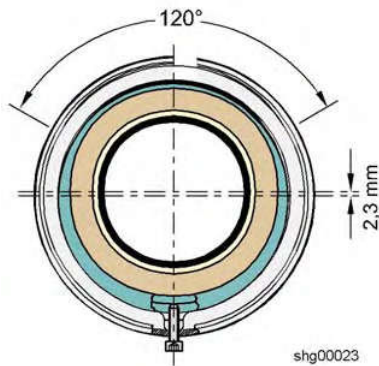
Functional description

Basic function

The bucket pins and bushings are protected from corrosive and abrasive material by a special radial sealing ring. material accelerate wear in the play.

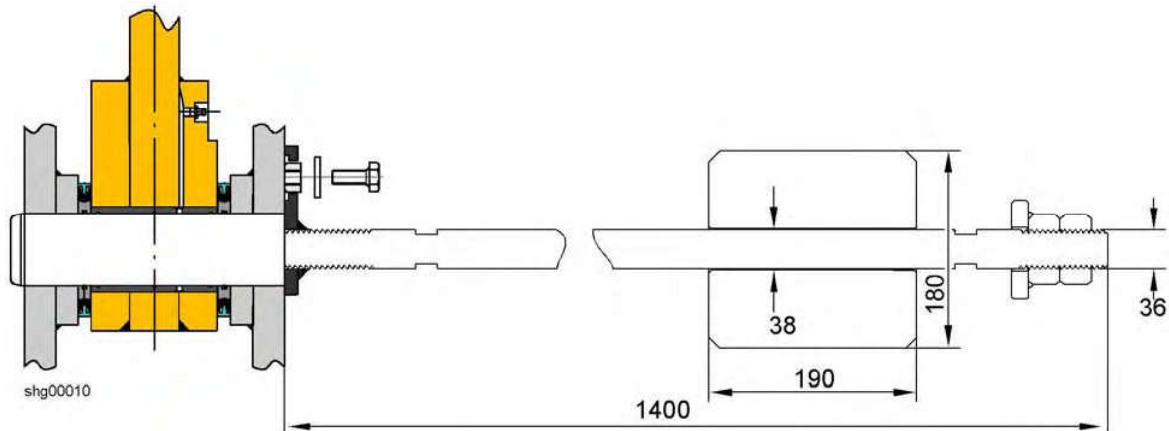
The special radial sealing ring is installed on both sides of the bushing between the lift arms and bucket bearing plates. The special radial sealing ring is held in place by the pin. The steel ring is positioned parallel to the lift arms and the bucket bearing plate surfaces, and prevents the seal from being damaged by the forces acting on the bucket bearing.

A certain axial play between the lift arms and bucket bearing plate ensures that the special radial sealing ring and bearing have an easy action and optimum sealing.



17.2.3 Removing bearing pin

Design



Sliding hammer

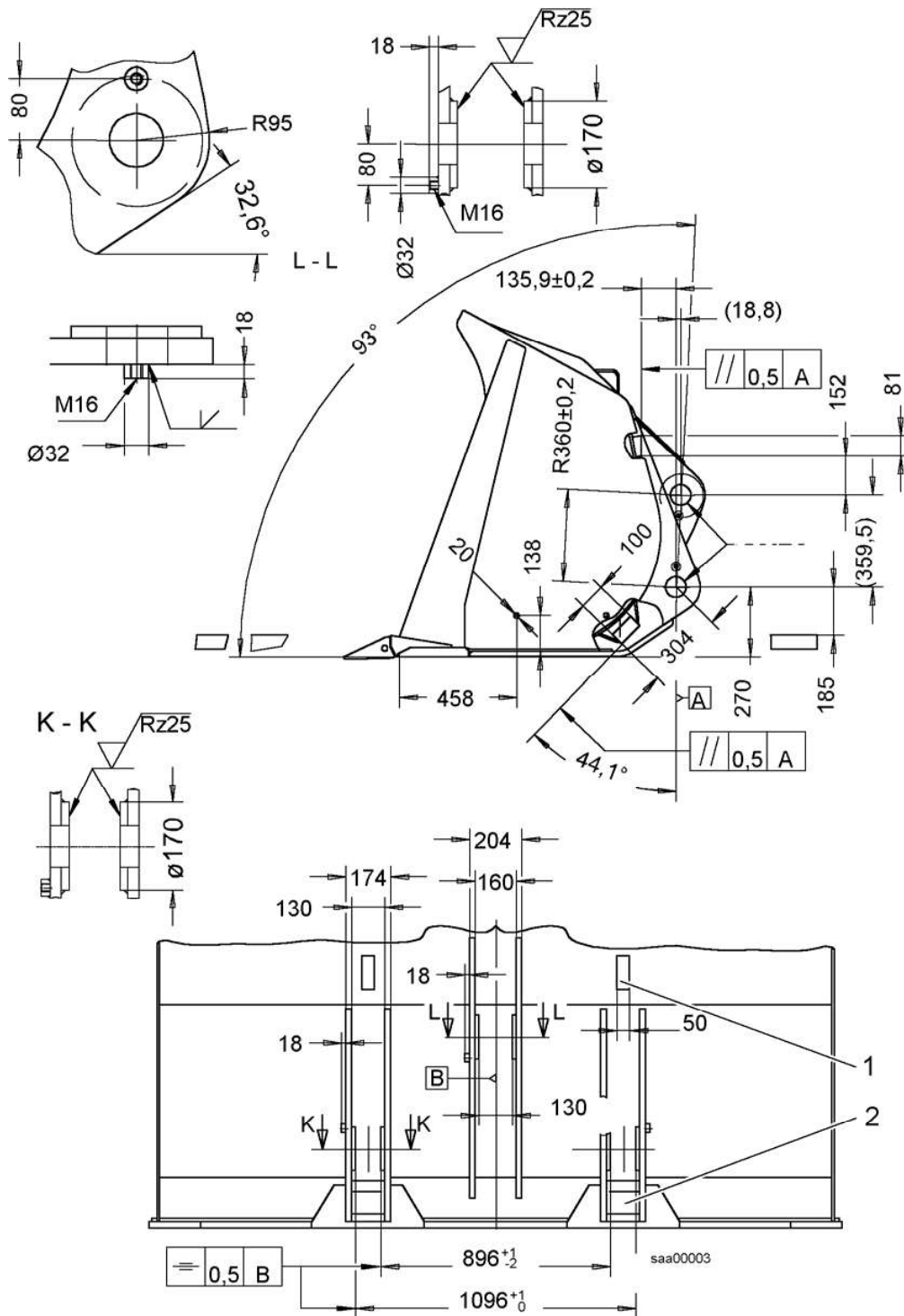
There are many ways to remove the pin. The device is easy to make, and the pin is not damaged when it is removed or ed. The extraction hammer consists of a round rod with an M36 thread on both sides, a hammer head and two nuts.

Procedure

- Bring the machine into maintenance position 1.
- Screw the rod is into the thread of the pin.
- Slide the hammer over the rod and tighten the nuts.
- Remove the retaining screw and disk.
- Drive out the pin.

18.1 Connection dimensions

Valid for: L544 - 443 / from 7477; L554 - 453 / from 7477



Bucket connection dimensions

1 Tilt-in limit

2 Tilt-out limit

LBH/Version 02/06.2003/EN/lehing-1p/18.08.2006

19.1 Malfunctions

Warning and fault messages

- Various faults are indicated by the corresponding symbol fields (optically) or by display instruments on the instrument panel.
- Some warning functions are accompanied by acoustic warning signals.

Identifying and correcting faults and errors

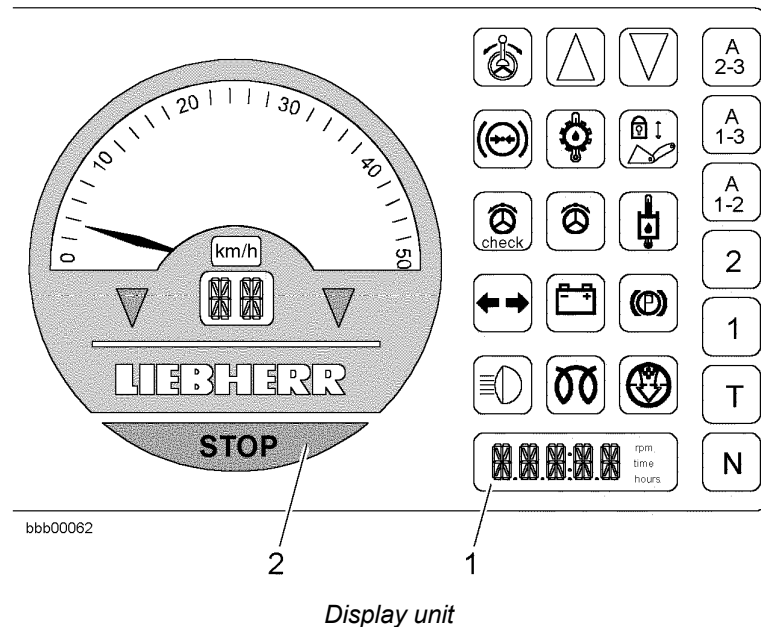
- Faults can often be traced back to incorrect operation or servicing of the machine.

Therefore, carefully read the appropriate section of the operator's manual each time a fault occurs.

- Analyse the cause of the fault and correct it immediately.

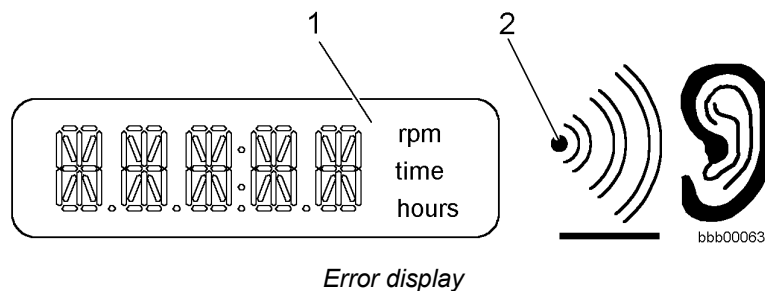
19.1.1 Service code indication on the display

The microcontroller MC6 monitors many of the machine's functions. It monitors for short circuits, cable rupture, external voltage and incorrect input and output signals. In addition, the microcontroller continuously checks the program sequence and communication with the display unit.



- 1 Service code display
- 2 STOP display

If an error arises when the machine is started or when in use, this is indicated in the display unit or stored in the error memory.



Error display

LEHVersion 02/07.2003/en/lfbthae0/14.06.2011

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