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Operating manual

Hydraulic excavator
R 906 Classic

from serial number 31049

Document identification

	ORIGINAL OPERATING MANUAL
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Product identification

Manufacturer:	Liebherr-France SAS
Type:	R 906 Classic
Type no.:	1140 / 1141 / 1283
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1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and descriptions of the components shown.

1.1.1 Machine and construction equipment

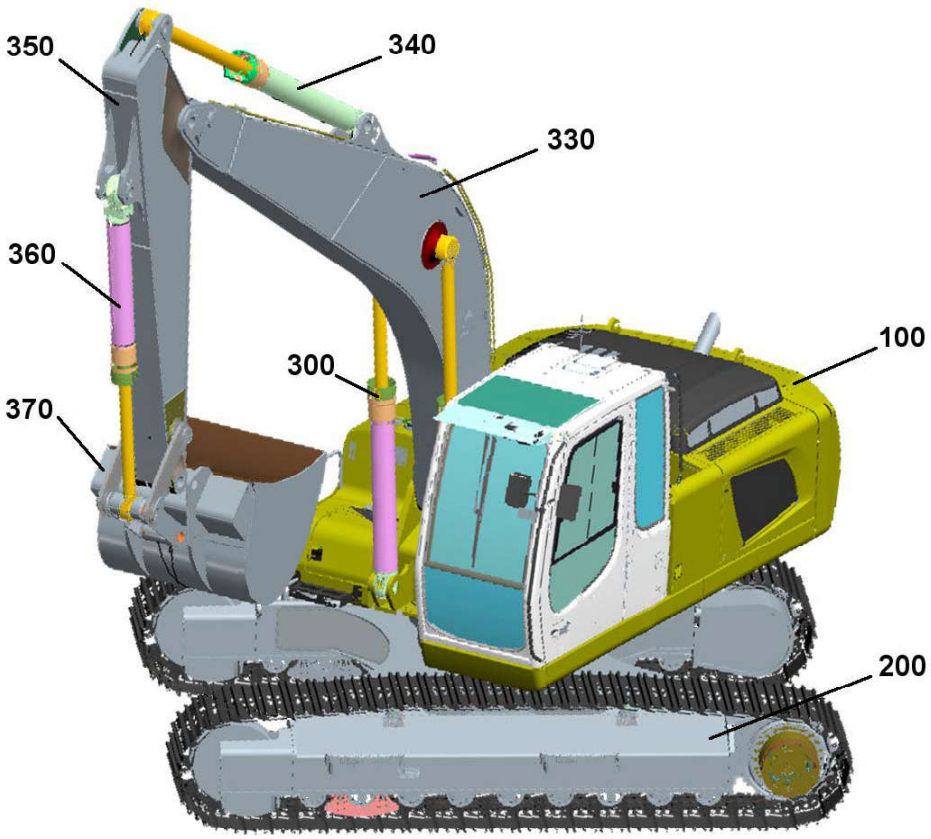

Fig. 1-1 *Machine with construction equipment*

100	Upper carriage	**330**	Boom	**360**	Tilt cylinder
200	Chassis	**340**	Stanchion cylinder	**370**	Bucket
300	Hydraulic jack	**350**	Shovel arm		

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Crawler excavator

R 906
Litronic®

Advanced/Classic

Operating Weight: 22,350 – 25,250 kg
Engine Output: 105 kW / 143 hp
Bucket Capacity: 0.80 – 1.35 m³

Fig. R 906 Advanced

LIEBHERR

Fig. R 906 Advanced

Economical

Crawler excavators from Liebherr guarantee maximum productivity. The optimum interplay of hydraulics and electronics means that individual movements and superimposed movements alike can be carried out particularly efficiently. And, perhaps last but by no means least, the perfect harmonisation of all the components means that energy expenditure during operation can be kept to an absolute minimum.

Economical technology

Costs savings thanks to fuel efficiency

Classic

Tests have shown that the new crawler excavators from Liebherr use even less fuel than the units of the previous generation. The electronic engine speed sensing control creates efficient conversion of engine output into hydraulic performance. The result: Faster and more powerful working while cutting fuel consumption at the same time; which means less stress for the diesel engine, too.

Classic

Advanced

The Advanced crawler excavator is even more economical when it comes to fuel consumption. Fuel savings are achieved thanks to the integrated excavator system technology and the efficient engine and hydraulics management. When at rest, the sensor-controlled function automatically brings the engine revolution speed down to idling, which reduces fuel consumption and emission values, and helps save the environment - as well as costs.

Advanced

Value retention

High resale value

Liebherr excavators are built to last, with top quality materials given top quality workmanship – and that guarantees top value retention.

Environmental protection and recycling

All Liebherr engines meet the exhaust gas directives specified by law, of Stage IIIA/ Tier 3, which means reduced nitrogen oxide and fine dust emissions. This effect is supported even further by the optionally available Liebherr particle filter. With Liebherr, concern for the environment is extended to the whole machine. Up to 95 % of all the components from a Liebherr excavator can be recycled, and only lead-free paints are used.

Advanced / Classic

Innovative tooth system

- Patented tooth system, consisting of tooth holder, tooth, securing bolts, and protective plugs
- Teeth can be replaced rapidly and without the use of force
- Tooth shapes for every operational situation

Advanced / Classic

Modular particle filter (optional)

- Reduction in fine dust emissions
- Consists of intake, filter, outlet, and muffler modules
- Certified in accordance with the VERT filter list

Lift Capacities

with Two-piece Boom 3.50 m

Advanced

Stick 2.20 m

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
9.0	LC											4.4*	4.4*	3.92
	WLC											4.4*	4.4*	
7.5	LC			7.0*	7.0*							3.7*	3.7*	5.96
	WLC			7.0*	7.0*							3.7*	3.7*	
6.0	LC	8.5*	8.5*	7.6	8.6*	4.7	7.0*					3.2	3.5*	7.12
	WLC	8.5*	8.5*	8.0	8.6*	5.0	7.0*					3.5	3.5*	
4.5	LC	13.5*	14.2*	7.3	9.5*	4.7	7.3*	2.9	5.0			2.6	3.5*	7.83
	WLC	14.2*	14.2*	7.7*	9.5*	5.0	7.3*	3.1	5.0			2.8	3.5*	
3.0	LC	12.7*	14.9*	7.1	10.2*	4.6	7.1	2.8	4.9			2.3	3.7*	8.20
	WLC	13.5*	14.9*	7.4	10.2*	4.9	7.1	3.0	4.9			2.5	3.7*	
1.5	LC	12.6	15.5*	7.0	10.3*	4.3	7.0*	2.7	4.8			2.1	3.9	8.28
	WLC	13.4	15.5*	7.4*	10.3*	4.6	7.0*	2.9	4.8			2.3	3.9	
0	LC	12.0	16.3*	6.4	10.3*	3.9	7.0*	2.5	4.6			2.2	4.0	8.08
	WLC	13.1	16.3*	6.9	10.3*	4.2	7.0	2.7	4.6			2.4	4.0	
-1.5	LC	11.4	16.7*	6.0	10.6*	3.6	6.6	2.4	4.1*			2.4	3.8*	7.58
	WLC	12.5	16.7*	6.5	10.6*	3.9	6.6	2.6	4.1*			2.6	3.8*	
-3.0	LC	11.2	16.2*	5.5	9.5*	3.4	5.1*					2.8*	2.8*	6.66
	WLC	12.3	16.2*	6.0	9.5*	3.7	5.1*					2.8*	2.8*	
-4.5	LC													
	WLC													

Stick 2.40 m

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
9.0	LC											4.0*	4.0*	4.32
	WLC											4.0*	4.0*	
7.5	LC			6.6*	6.6*	4.3*	4.3*					3.4*	3.4*	6.22
	WLC			6.6*	6.6*	4.3*	4.3*					3.4*	3.4*	
6.0	LC			7.6	7.8*	4.7	6.9*					3.1	3.2*	7.35
	WLC			7.8*	7.8*	5.0	6.9*					3.2*	3.2*	
4.5	LC	13.6*	13.7*	7.3	9.3*	4.7	7.2*	2.9	5.0			2.5	3.2*	8.03
	WLC	13.7*	13.7*	7.7	9.3*	5.0	7.2*	3.2	5.0			2.7	3.2*	
3.0	LC	12.8	15.0*	7.1*	10.1*	4.6	7.1*	2.9	4.9			2.2	3.4*	8.39
	WLC	13.6*	15.0*	7.5	10.1*	4.9	7.1*	3.1	4.9			2.4	3.4*	
1.5	LC	12.5	15.3*	7.0	10.3*	4.4	7.0*	2.7	4.8			2.1	3.7*	8.47
	WLC	13.4	15.3*	7.4	10.3*	4.7	7.0*	2.9	4.8			2.2	3.7*	
0	LC	12.1	16.2*	6.4	10.3*	4.0	7.0	2.5	4.6			2.1	3.9	8.28
	WLC	13.2	16.2*	6.9	10.3*	4.3	7.0	2.7	4.6			2.2	3.9	
-1.5	LC	11.4	16.5*	6.0	10.5*	3.6	6.6	2.4	4.5			2.2	3.7*	7.78
	WLC	12.5	16.5*	6.5	10.5*	3.9	6.6	2.6	4.5			2.4	3.7*	
-3.0	LC	11.2	16.6*	5.5	9.9*	3.4	5.7*					2.7*	2.7*	6.93
	WLC	12.3	16.6*	6.0	9.9*	3.7	5.7*					2.7*	2.7*	
-4.5	LC	9.4*	9.4*									5.1*	5.1*	4.21
	WLC	9.4*	9.4*									5.1*	5.1*	

Stick 2.70 m

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
9.0	LC			4.4*	4.4*							3.5*	3.5*	4.87
	WLC			4.4*	4.4*							3.5*	3.5*	
7.5	LC			6.0*	6.0*	4.6	4.7*					3.0*	3.0*	6.61
	WLC			6.0*	6.0*	4.7*	4.7*					3.0*	3.0*	
6.0	LC			6.8*	6.8*	4.8	6.3*	3.0	3.6*			2.8*	2.8*	7.68
	WLC			6.8*	6.8*	5.1	6.3*	3.2	3.6*			2.8*	2.8*	
4.5	LC	12.2*	12.2*	7.3	9.0*	4.8	7.0*	3.0	5.1			2.3	2.8*	8.34
	WLC	12.2*	12.2*	7.7	9.0*	5.1*	7.0*	3.2	5.1			2.5	2.8*	
3.0	LC	12.7	15.2*	7.1	9.9*	4.7	7.1*	2.9	5.0			2.0	2.9*	8.69
	WLC	13.6	15.2*	7.5*	9.9*	5.0	7.1*	3.1	5.0			2.2	2.9*	
1.5	LC	12.4	15.2*	6.9	10.2*	4.5	6.9	2.8	4.8			1.9	3.2*	8.76
	WLC	13.3*	15.2*	7.3	10.2*	4.8	7.0	3.0	4.8			2.1	3.2*	
0	LC	12.3	16.1*	6.5	10.2*	4.1	7.0	2.6	4.6			1.9	3.6*	8.57
	WLC	13.4	16.1*	7.0	10.2*	4.4	7.0*	2.8	4.7			2.1	3.6*	
-1.5	LC	11.4	16.4*	6.0	10.4*	3.7	6.7	2.4	4.5			2.1	3.7*	8.10
	WLC	12.5	16.4*	6.5	10.4*	4.0	6.7	2.6	4.5			2.3	3.7*	
-3.0	LC	11.2	16.7*	5.6	10.3*	3.4	6.4					2.5	2.8*	7.28
	WLC	12.3	16.7*	6.1	10.3*	3.7	6.4					2.7	2.8*	
-4.5	LC	10.8	11.5*	5.4	5.9*							3.9*	3.9*	5.17
	WLC	11.5*	11.5*	5.9	5.9*							3.9*	3.9*	

Stick 3.00 m

m	Under-carriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
9.0	LC			4.7*	4.7*							3.0*	3.0*	5.38
	WLC			4.7*	4.7*							3.0*	3.0*	
7.5	LC			5.5*	5.5*	4.7*	4.7*					2.6*	2.6*	6.99
	WLC			5.5*	5.5*	4.7*	4.7*					2.6*	2.6*	
6.0	LC			6.0*	6.0*	4.9*	5.8*	3.1	4.1*			2.5*	2.5*	8.01
	WLC			6.0*	6.0*	5.1	5.8*	3.3	4.1*			2.5*	2.5*	
4.5	LC	8.5*	8.5*	7.4	8.2*	4.8	6.8*	3.1	5.1			2.2	2.5*	8.64
	WLC	8.5*	8.5*	7.8	8.2*	5.1*	6.8*	3.3	5.1*			2.3	2.5*	
3.0	LC	12.9	15.4*	7.0*	9.7*	4.7	7.1	3.0	5.0			1.9	2.6*	8.98
	WLC	13.7*	15.4*	7.5	9.7*	4.9*	7.1	3.2	5.0			2.1	2.6*	
1.5	LC	12.5*	15.1*	6.9	10.2*	4.6	6.9	2.8	4.9	1.8	3.1*	1.8	2.8*	9.05
	WLC	13.2	15.1*	7.2	10.2*	4.8	6.9	3.1	4.9	2.0	3.1*	2.0	2.8*	
0	LC	12.5	15.8*	6.6	10.1*	4.2	6.9	2.6	4.7			1.8	3.1*	8.87
	WLC	13.3	15.8*	7.1	10.1*	4.5	6.9	2.8	4.7			2.0	3.1*	
-1.5	LC	11.5	16.2*	6.1	10.3*	3.8	6.8	2.4	4.5			1.9	3.6*	8.41
	WLC	12.6	16.2*	6.5	10.3*	4.0	6.8	2.6	4.5			2.1	3.6*	
-3.0	LC	11.1	16.7*	5.7	10.5*	3.4	6.4	2.3	3.3*			2.3	2.8*	7.63
	WLC	12.2	16.7*	6.1	10.5*	3.7	6.4	2.5	3.3*			2.5	2.8*	
-4.5	LC	10.8	13.3*	5.4	7.3*							3.2*	3.2*	5.88
	WLC	11.9	13.3*	5.8	7.3*							3.2*	3.2*	

Height | Can be slewed though 360° | In longitudinal position of undercarriage | Max. reach | * Limited by hydr. capacity

The lift capacities on the load hook of the Liebherr quick coupler 48 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Adjacent values are valid for the undercarriage when in the longitudinal position. Capacities are valid for 600 mm wide triple-grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated by *) or are limited through the allowed lift capacity of the load hook on the quick coupler (12 t). Without quick coupler the lift capacities will increase by 250 kg, without bucket cylinder, link and lever they increase by an additional 365 kg. According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.

Lift Capacities

with Two-piece Boom 3.50 m

Stick 2.20 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	NLC[1]											
	LC										4.2* 4.2*	3.92
	WLC										4.2* 4.2*	
7.5	NLC[1]			6.7* 6.7*							3.5* 3.5*	
	LC			6.7* 6.7*							3.5* 3.5*	5.96
	WLC			6.7* 6.7*							3.5* 3.5*	
6.0	NLC[1]	8.1* 8.1*		7.3 8.2*	4.6 6.7*						3.2 3.4*	
	LC	8.1* 8.1*		7.5 8.2*	4.6 6.7*						3.2 3.4*	7.12
	WLC	8.1* 8.1*		7.9 8.2*	4.9 6.7*						3.4* 3.4*	
4.5	NLC[1]	12.8* 13.5*		7.0 9.0*	4.6 6.9*	2.9 5.2*					2.6 3.4*	
	LC	13.2* 13.5*		7.2 9.0*	4.6 6.9*	2.9 4.9					2.6 3.4*	7.83
	WLC	13.5* 13.5*		7.6 9.0*	4.9 6.9*	3.1 4.9					2.8 3.4*	
3.0	NLC[1]	12.1* 14.2*		6.8 9.7*	4.5 7.1*	2.8 5.3					2.3 3.5*	
	LC	12.5 14.2*		7.0 9.7*	4.5 6.9	2.8 4.9					2.3 3.5*	8.20
	WLC	13.1* 14.2*		7.3 9.7*	4.8 6.9	3.0 4.9					2.4 3.5*	
1.5	NLC[1]	11.9 14.7*		6.8 9.7*	4.2 7.1*	2.7 5.2					2.1 3.9*	
	LC	12.3 14.7*		6.9 9.7*	4.3 6.8*	2.7 4.7					2.1 3.9*	8.28
	WLC	13.1 14.7*		7.2 9.7*	4.6 6.8*	2.9 4.7					2.3 3.9*	
0	NLC[1]	11.3 15.4*		6.2 9.8*	3.9 7.1*	2.5 5.1					2.1 4.2*	
	LC	11.9 15.4*		6.3 9.8*	3.9 6.9	2.5 4.6					2.1 4.0	8.08
	WLC	13.0 15.4*		6.8 9.8*	4.2 6.9	2.7 4.6					2.3 4.0	
-1.5	NLC[1]	10.7 15.8*		5.8 10.0*	3.5 7.1*	2.4 3.8*					2.3 3.5*	
	LC	11.3 15.8*		6.0 10.0*	3.6 6.5	2.4 3.8*					2.3 3.5*	7.58
	WLC	12.4 15.8*		6.4 10.0*	3.8 6.5	2.6 3.8*					2.5 3.5*	
-3.0	NLC[1]	10.6 15.4*		5.4 9.0*	3.4 4.8*						2.6* 2.6*	
	LC	11.1 15.4*		5.5 9.0*	3.4 4.8*						2.6* 2.6*	6.66
	WLC	12.2 15.4*		5.9 9.0*	3.7 4.8*						2.6* 2.6*	
-4.5	NLC[1]											
	LC											
	WLC											

Stick 2.40 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	NLC[1]										3.8* 3.8*	
	LC										3.8* 3.8*	4.32
	WLC										3.8* 3.8*	
7.5	NLC[1]			6.3* 6.3*	4.1* 4.1*						3.2* 3.2*	
	LC			6.3* 6.3*	4.1* 4.1*						3.2* 3.2*	6.22
	WLC			6.3* 6.3*	4.1* 4.1*						3.2* 3.2*	
6.0	NLC[1]			7.3* 7.5*	4.6 6.6*						3.0 3.1*	
	LC			7.4* 7.5*	4.7 6.6*						3.0 3.1*	7.35
	WLC			7.5* 7.5*	5.0 6.6*						3.1* 3.1*	
4.5	NLC[1]	12.8 13.1*		7.1* 8.8*	4.7 6.8*	2.9 5.4					2.5 3.1*	
	LC	13.1* 13.1*		7.2 8.8*	4.7 6.8*	2.9 5.0					2.5 3.1*	8.03
	WLC	13.1* 13.1*		7.6 8.8*	5.0 6.8*	3.1 5.0					2.6 3.1*	
3.0	NLC[1]	12.0 14.3*		6.8 9.6*	4.5 7.0*	2.8 5.4					2.2 3.2*	
	LC	12.4 14.3*		7.0 9.6*	4.6 6.9	2.8 4.9					2.2 3.2*	8.39
	WLC	13.2 14.3*		7.3 9.6*	4.9 6.9	3.1 4.9					2.3 3.2*	
1.5	NLC[1]	11.8 14.5*		6.7* 9.7*	4.3 7.1*	2.7 5.2					2.0 3.5*	
	LC	12.2 14.5*		6.9 9.7*	4.3 6.8*	2.7 4.7					2.0 3.5*	8.47
	WLC	13.0* 14.5*		7.2* 9.7*	4.6 6.8*	2.9 4.8					2.2 3.5*	
0	NLC[1]	11.4 15.3*		6.2 9.7*	3.9 7.1*	2.5 5.1					2.0 4.0*	
	LC	12.0 15.3*		6.4 9.7*	4.0 6.9	2.5 4.6					2.0 3.8	8.28
	WLC	13.1 15.3*		6.9 9.7*	4.3 6.9*	2.7 4.6					2.2 3.8	
-1.5	NLC[1]	10.7 15.7*		5.8 9.9*	3.6 7.1*	2.4 4.3*					2.2 3.5*	
	LC	11.3 15.7*		6.0 9.9*	3.6 6.6	2.4 4.3*					2.2 3.5*	7.78
	WLC	12.4 15.7*		6.4 9.9*	3.9 6.6	2.6 4.3*					2.4 3.5*	
-3.0	NLC[1]	10.6 15.7*		5.4 9.4*	3.4 5.4*						2.5* 2.5*	
	LC	11.1 15.7*		5.5 9.4*	3.4 5.4*						2.5* 2.5*	6.93
	WLC	12.2 15.7*		6.0 9.4*	3.7 5.4*						2.5* 2.5*	
-4.5	NLC[1]	8.8* 8.8*									4.8* 4.8*	
	LC	8.8* 8.8*									4.8* 4.8*	4.21
	WLC	8.8* 8.8*									4.8* 4.8*	

Stick 2.70 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	NLC[1]			4.2* 4.2*							3.3* 3.3*	
	LC			4.2* 4.2*							3.3* 3.3*	4.87
	WLC			4.2* 4.2*							3.3* 3.3*	
7.5	NLC[1]			5.8* 5.8*	4.5* 4.5*						2.8* 2.8*	
	LC			5.8* 5.8*	4.5* 4.5*						2.8* 2.8*	6.61
	WLC			5.8* 5.8*	4.5* 4.5*						2.8* 2.8*	
6.0	NLC[1]			6.5* 6.5*	4.7 6.0*	3.0 3.4*					2.7* 2.7*	
	LC			6.5* 6.5*	4.7 6.0*	3.0 3.4*					2.7* 2.7*	7.68
	WLC			6.5* 6.5*	5.0 6.0*	3.2 3.4*					2.7* 2.7*	
4.5	NLC[1]	11.7* 11.7*		7.1* 8.6*	4.7 6.6*	3.0* 5.4*					2.3 2.7*	
	LC	11.7* 11.7*		7.2 8.6*	4.7* 6.6*	3.0 5.0					2.3 2.7*	8.34
	WLC	11.7* 11.7*		7.6 8.6*	5.0 6.6*	3.2 5.0					2.5 2.7*	
3.0	NLC[1]	12.0 14.4*		6.8* 9.4*	4.6 6.9*	2.9 5.4*					2.0 2.8*	
	LC	12.5 14.4*		6.9 9.4*	4.7* 6.9*	2.9 4.9					2.0 2.8*	8.69
	WLC	13.2 14.4*		7.3 9.4*	4.9 6.9	3.1 4.9					2.2 2.8*	
1.5	NLC[1]	11.7 14.4*		6.7 9.7*	4.4 7.0*	2.7 5.3					1.9 3.0*	
	LC	12.3* 14.4*		6.8 9.7*	4.4 6.7*	2.7 4.8					1.9 3.0*	8.76
	WLC	12.9 14.4*		7.2 9.7*	4.7 6.8	3.0 4.8					2.1 3.0*	
0	NLC[1]	11.6 15.2*		6.3 9.6*	4.0 7.0*	2.5 5.1					1.9 3.4*	
	LC	12.2 15.2*		6.4 9.6*	4.1 6.8*	2.5 4.6					1.9 3.4*	8.57
	WLC	13.1* 15.2*		6.9 9.6*	4.4 6.8	2.7 4.6					2.1 3.4*	
-1.5	NLC[1]	10.8 15.5*		5.9 9.8*	3.6 7.2*	2.4 4.8*					2.1 3.4*	
	LC	11.3 15.5*		6.0 9.8*	3.6 6.6	2.4 4.4					2.0 3.4*	8.10
	WLC	12.4 15.5*		6.4 9.8*	3.9 6.6	2.6 4.4					2.2 3.4*	
-3.0	NLC[1]	10.5 15.8*		5.4 9.7*	3.4 6.0*						2.4 2.5*	
	LC	11.1 15.8*		5.5 9.7*	3.4 6.0*						2.4 2.5*	7.28
	WLC	12.1 15.8*		6.0 9.7*	3.7 6.0*						2.5* 2.5*	
-4.5	NLC[1]	10.2 10.9*		5.3 5.6*							3.6* 3.6*	
	LC	10.7 10.9*		5.3 5.6*							3.6* 3.6*	5.17
	WLC	10.9* 10.9*		5.6* 5.6*							3.6* 3.6*	

Stick 3.00 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	NLC[1]			4.5* 4.5*							2.9* 2.9*	
	LC			4.5* 4.5*							2.9* 2.9*	5.38
	WLC			4.5* 4.5*							2.9* 2.9*	
7.5	NLC[1]			5.2* 5.2*	4.5* 4.5*						2.5* 2.5*	
	LC			5.2* 5.2*	4.5* 4.5*						2.5* 2.5*	6.99
	WLC			5.2* 5.2*	4.5* 4.5*						2.5* 2.5*	
6.0	NLC[1]			5.7* 5.7*	4.7 5.5*	3.0 3.9*					2.4* 2.4*	
	LC			5.7* 5.7*	4.8 5.5*	3.0 3.9*					2.4* 2.4*	8.01
	WLC			5.7* 5.7*	5.0* 5.5*	3.2 3.9*					2.4* 2.4*	
4.5	NLC[1]	8.1* 8.1*		7.2* 7.8*	4.7* 6.5*	3.0 5.4*					2.1 2.4*	
	LC	8.1* 8.1*		7.3 7.8*	4.7 6.5*	3.0 5.0					2.1 2.4*	8.64
	WLC	8.1* 8.1*		7.7* 7.8*	5.0 6.5*	3.3 5.0					2.3 2.4*	
3.0	NLC[1]	12.2 14.6*		6.8 9.2*	4.6 6.8*	3.0 5.3					1.9 2.4*	
	LC	12.6 14.6*		6.9 9.2*	4.6 6.8*	3.0 5.0					1.9 2.4*	8.98
	WLC	13.4* 14.6*		7.3 9.2*	4.9 6.8*	3.2 5.0					2.1 2.4*	
1.5	NLC[1]	11.8 14.3*		6.7 9.6*	4.5 7.0*	2.8 5.3	1.8 2.9*				1.8 2.6*	
	LC	12.2* 14.3*		6.8* 9.6*	4.5 6.7	2.8 4.8	1.8 2.9*				1.8 2.6*	9.05
	WLC	12.9 14.3*		7.1 9.6*	4.8 6.7	3.0 4.8	2.0 2.9*				1.9 2.6*	
0	NLC[1]	11.8 14.9*		6.4 9.6*	4.1 6.9*	2.6 5.1					1.8 3.0*	
	LC	12.3 14.9*		6.5 9.6*	4.2 6.7*	2.6 4.6					1.8 3.0*	8.87
	WLC	13.0* 14.9*		7.0 9.6*	4.5 6.7*	2.8 4.6					1.9 3.0*	
-1.5	NLC[1]	10.8 15.4*		5.9 9.7*	3.7 7.1*	2.4 4.9					1.9 3.3*	
	LC	11.4 15.4*		6.0 9.7*	3.7 6.7	2.4 4.4					1.9 3.3*	8.41
	WLC	12.5 15.4*		6.5 9.7*	4.0 6.7	2.6 4.5					2.1 3.3*	
-3.0	NLC[1]	10.5 15.8*		5.5 10.0*	3.4 6.5*	2.3 3.0*					2.2 2.6*	
	LC	11.0 15.8*		5.6 10.0*	3.4 6.4	2.3 3.0*					2.2 2.6*	7.63
	WLC	12.1 15.8*		6.1 10.0*	3.7 6.4	2.5 3.0*					2.4 2.6*	
-4.5	NLC[1]	10.2 12.5*		5.2 6.9*							3.0* 3.0*	
	LC	10.7 12.5*		5.3 6.9*							3.0* 3.0*	5.88
	WLC	11.8 12.5*		5.8 6.9*							3.0* 3.0*	

Height · Can be slewed though 360° · In longitudinal position of undercarriage · Max. reach · * Limited by hydr. capacity

The lift capacities on the load hook of the Liebherr quick coupler 48 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Adjacent values are valid for the undercarriage when in the longitudinal position. Capacities are valid for 600 mm wide triple-grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated by *) or are limited through the allowed lift capacity of the load hook on the quick coupler (12 t). Without quick coupler the lift capacities will increase by 250 kg, without bucket cylinder, link and lever they increase by an additional 365 kg. According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.

[1] Values are calculated with 500 mm wide triple-grouser pads and heavy counterweight for the NLC-Undercarriage

- It is possible to install an extinguisher into the driver's cab.
- Covers and boxes locks have to be unlocked, to facilitate the fight against fire in case of.

Safely starting the machine

- Before starting the machine, carry out a thorough inspection all around the machine.
- Make sure no one is working on or under the machine.
- Make sure no one is in the danger zone of the machine.
- Check the machine for loose bolts, cracks, wear, leakage and damage.
- Never operate a damaged machine.
- Ask qualified maintenance personnel to repair any damage immediately.
- Close all hoods and covers. Leave the locks unlocked to facilitate access in case of emergency.
- Make sure that all warning signs on the machine are present and legible.
- Keep windows, interior and exterior mirrors clean. Secure doors and windows against unintended movement.
- Sound the horn to warn personnel in the vicinity of the machine that it is about to start.

Safely getting up

- Before getting up or down to the cab of the machine, position the machine on even, horizontal ground. Position the upper structure with the undercarriage in such a way that the steps and ladders are aligned with each other.
- Ensure that steps, ladders and hand-rails (grips) are in good condition. In particular, ensure that they are free of dirt, oil, ice and snow.
- To assure that the cab door opens easily in all weather conditions, the door seals must be dusted with talc or silicon at least every two months or more often if required. The door hinges and locks should be greased regularly.
- Face the machine when getting up or down and always adopt three-point support method, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
- As soon as you can reach the door handle with your free hand, unlock the door as necessary and open it, while paying attention to remain out of its swing radius before you climb any higher. External influences, such as wind, can make it more difficult to open doors.
  Because of this, always lead along the door with your hand during the whole opening motion. Ensure that the door locks in place when reaching its open position, so to prevent it can slam open and shut.
- Now continue to climb up, still using the three-point support and sit down in the operator's seat as soon as you enter the cab.
- Close the door and fasten the safety belt, unlock the door using the destined lever,
  Close the door thereafter using the both handholds mounted to the inner face of the door frame. Only after it tilt down the safety lever, and start the machine.
- It is essential to fasten your safety belt if you wish to work with the door open.
- For the excavators mounted on a special support or employed as a component of a larger installation (uppercarriage used on a pontoon, on a gantry crane,...), also consider the safety instructions in to the operator's manual of the complete machine relating to a safe getting up.

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Avoiding accidents

- Avoid any unsafe working method.
- The following modifications to the machine can lead to the maximum permitted total weight certified for the roll-over protective structure being exceeded:
  - Use of excessively heavy tool attachments
  - Exchange of the working attachments
  - Add-ons or conversions to the machine
- Do not operate a machine with a damaged protection system.
- Damage to a protective system can be caused by the following work and incidents:
  - Welding, cutting or drilling of holes
  - Attaching holders
  - Deformations after an accident
  - Falling objects
- Structural changes or repairs of any kind are prohibited.

Avoiding injuries

- The roll-over protective structure of the operator's cab will only protect the operator if the safety belt is fastened.
- Any modifications within the operator's cab, for example installation of accesories, must not interfere with the operator's working area.
- Objects carried in the operators' cab must not protrude into the operator's working area. Loose objects must be stored securely.

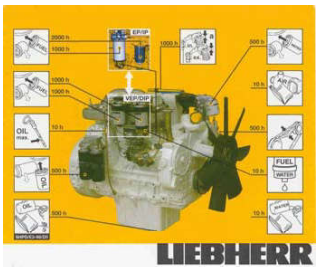
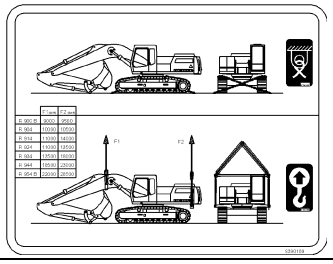
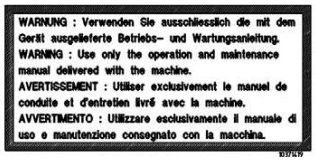
Protective devices (FOPS and Frontguard)

- With certain machine applications, Liebherr offers a range of optional protection systems for the operator in accordance with ISO 10262.
- The systems are either:
  - A cab guard extending over the entire cab roff and front is bolted onto the uppercarriage, representing an independent protection system.
  - A cab guard extending over the entire cab roof and windscreen is bolted onto the operator's cab.
  - Front and upper guards are bolted onto the operator's cab.
- If the protective equipment is bolted to the operator's cab, this is an integral part of the protective system.
- Do not operate a machine with a damaged protection system.
- Damage to a protective system can be caused by the following work and incidents:
  - Welding, cutting or drilling of holes
  - Attaching holders
  - Deformations after an accident
  - Falling objects
- Structural changes or repairs of any kind are prohibited.

2.4 Servicing the machine safely

General safety instructions

- Maintenance and repair work may only be carried out by specially trained personnel.

Signs for all countries (except the USA and Canada)	Signs for the USA and Canada	
		**Plate 30: Lubrication chart (engine)** Indicates the maintenance operations for the Diesel engine.
		**Plate 35: Loading and lashing points** Indicates the positions of the loading and lashing points, as well as the relevant weight of the machine. Indicated values are maximal values. Actual values may be different.
 		**Plate 36: Waxoyl*** Indicates the corrosion protection of the pistons rods.
		**Plate 40: Lashing point** The use of lashing points depends on the transport method. See chapter "Transport".
		**Plate 41 : Operating manual** Use only the operation and maintenance manual delivered with the machine.
		**Plate 42 : Roll-over protection structure (ROPS)** Specifies that modifications or repairs to the roll-over protection structure (ROPS) are prohibited. Refer to the operating manual for further information.

Caution!
On machines destined to the North American market, and which are fitted with a lifting magnet, the functions of the push buttons and switches in the joysticks differ from those described above.
Also with some specific combinations of optional equipments and/or at customer's wish, the functions may be different.
Always check the functions of special equipments before beginning to work with the machine.

Function of push buttons and switches on US version with lifting magnet

For machines destined to the North American market, and which are fitted with a lifting magnet, the functions are as follows:

Left joystick	Right joystick
Push button **S5L**: For optional equipment See in this chapter "Cut off by end switches of attachment movements (option)".	Push button **S6L**: Rotating device left See in this chapter "Turning, rotating, bolting and unbolting the add-on unit" and "Control of the swivel rotator (option)".
Push button **S5M**: Horn	Push button **S6M**: For optional equipment See in this chapter "Float position of the boom with shovel attachment" in the part "Working attachment control"
Push button **S5R**: For optional equipment See in this chapter "Drive warning device (optional extra)"	Push button **S6R**: Rotating device right See in this chapter " Turning, rotating, bolting and unbolting the add-on unit" and "Control of the swivel rotator (option)".
Push switch **S55**: Lifting magnet See in this chapter "Lifting magnet control system (optional equipment)".	Rocker switch **S57**: Reserve

Tab. 3-2 *Functions of push buttons and switches in standard execution for US version with lifting magnet*

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H12 –Indicator light, battery charge

The indicator light illuminates if the ignition key is placed in the contact position.

The indicator light goes out as soon as the engine is started.

When the machine is operating, this indicator light illuminates if the alternator belt or the electrical charging system are defective.

- ▶ Bring the engine to a low idle immediately.
- ▶ Allow the engine to idle for approximately 5 seconds.
- ▶ Switch off the engine.
- ▶ Find and correct the cause of the problem.

H19 – No function

H20 –No function

H23 – No function

H24 – No function

Area D : Menu control buttons

Fig. 3-7 *Menu control buttons*

The screen can be operated using the following 4 buttons:

– **S349**: **Back button**
– **S350**: **Down button**
– **S351**: **Up button**
– **S352**: **Menu* button**

* = Change from main to submenus

These buttons can be used to jump from the main menu to the submenus or to move from page to page.

Area C: LCD Screen

To change the screen contrast:

- ▶ Press button **Menu** and arrow button **Up** (higher contrast) or **Down** (lower contrast) simultaneously.
  ↳ The value set will be saved.

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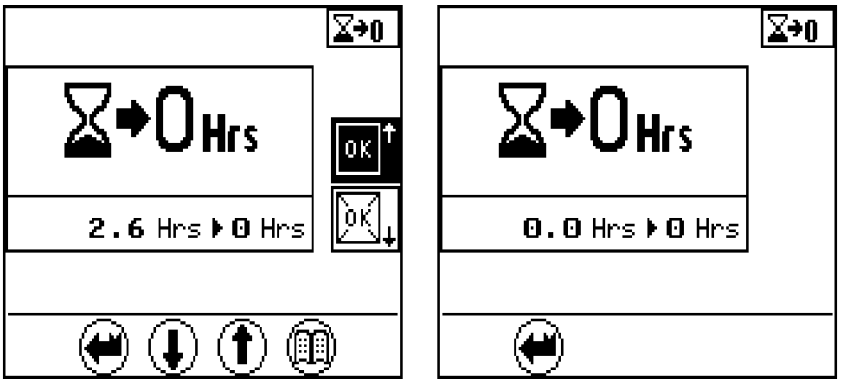


Fig. 3-11 *Resetting the daily operating hours counter*

- ▶ Press the **Up** arrow key.
  - ↳ The OK which is not crossed out will be displayed with a black background.
- ▶ Press the **Menu** key.
  - ↳ The operating hours will be reset to 0.
  - ↳ The arrow key symbols **Up** and **Down** and the **Menu** symbol will no longer be displayed.

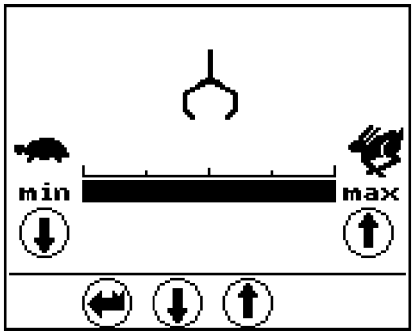
To exit the menu:

- ▶ Press the **Back** key.
  - ↳ The sub-menu will be aborted.

Menu " Set SF" - Rotation speed of the tool

This menu enables to adjust the rotation speed of the tool.

This menu is only available when joyticks with proportional function are mounted on the excavator.



- ▶ Press the **Up** or **Down** key.
  - ↳ The rotation speed of the tool can be adjusted.

Note!
The push button SF **S354** has no function.

Menu "Set Service" - confirmation of the execution of a recurring service work

This menu gives information about the falling due of the next service work and allows to confirm the execution of the service work after it just has been carried out.

"list S-Exxx" : Operating faults in service mode

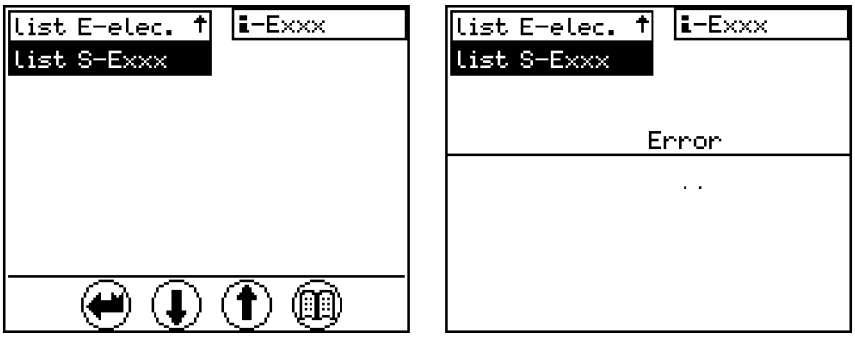


Fig. 3-25 *List of operating faults appeared in service mode*

No information will be displayed in this menu if the service connector is not connected.

❑ When a service connector is pluged in:

The submenu **list S-Exxx** lists all the operating faults, just like the submenu **list Exxx**, but this time only faults appeared in service mode, i. e. when a service connector was connected.

The sub-menu allows to separate the faults occuring during maintenance works,in particular during the troubleshootings.

For each error, an overview is shown and can be paged in just like for the "list Exxx" selection.

When exiting the service mode, the memory "list S-Exxx" is reset, the service mode operating faults are not stored.

Menu "set clock"

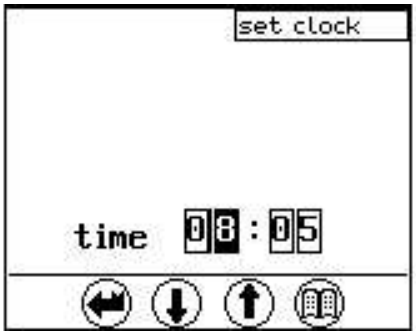


Fig. 3-26 *Clock setting*

▶ After selection of the function the digit completely right is inversely displayed.

▶ Press key **UP** or **DOWN** to adjust the selected digit.

▶ Press **MENU key t**
↳ **the next digit is selected.**

▶ Repeat the operation until the right time is set.

▶ Press the **Enter** key to store the set number.
↳ The message "update xx: xx" appears shortly on screen to confirm the new setting and the display automatically returns to main screen.

3.2.2 Safety lever

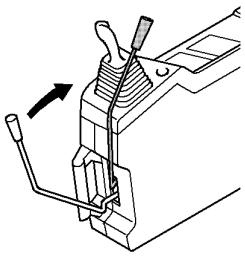


Fig. 3-33 *Safety lever*

The safety lever is mounted to the left control console and is designed to block the way to the cab when moved in lower position.

Caution!
The operator must move this safety lever up before leaving the operator's seat. The operator may only push the lever down when he is again seated in the operator's seat, ready to work.

- ▶ Before your leave the operator's cab, pull the safety lever in upper position so to interrupt the servo control circuit:
  - ↳ no working movements are possible if the joysticks or pedals are accidentally actuated while entering or leaving the cab,
  - ↳ the swing brake applies automatically (the LED in the touch **S17** is lighting),
  - ↳ the swing brake can no longer be released using the touch **S17**.
- ▶ After you are seated again and before you begin operating the machine, push the lever down in lower position:
  - ↳ the swing brake recovers the previous state (applied or released) before the lever had been pulled up,
  - ↳ the pilot control devices (joysticks and pedals) become active again.

3.2.3 Operator seat

Danger!
The adjustment of the operator seat could result in an inadvertent actuation of control elements, moving the machine or the attachment.
This can lead to injury to persons or damage to property.

- ▶ Do not adjust the operator seat while driving the machine.
- ▶ Move the safety lever up.

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❑ Make sure the ignition is on.

▶ Press the switch **S22**.
  ↳ The front roof headlights **3** or headlights on ballast weight **5** are activated.
  ↳ The LED in the switch illuminates.

▶ Press the switch **S22** again.
  ↳ The front roof headlights **3** or headlights on ballast weight **5** are deactivated.
  ↳ The LED in the switch goes out.

Rotating beacon (option)

Pressing the switch **S41** activates the rotating beacon **4**.

❑ Make sure the ignition is on.

▶ Press the switch **S41**.
  ↳ The rotating beacon **4** is activated.
  ↳ The LED in the switch illuminates.

▶ Press the switch **S41** again.
  ↳ The rotating beacon **4** is deactivated.
  ↳ The LED in the switch goes out.

Rear roof headlights (option)

Pressing the switch **S275** on the right control panel activates the rear roof headlights **6**.

❑ Make sure the ignition is on.

▶ Press the switch **S275**.
  ↳ The rear roof headlights **6** are activated.
  ↳ The LED in the switch illuminates.

▶ Press the switch **S275** again.
  ↳ The rear roof headlights **6** are deactivated.
  ↳ The LED in the switch goes out.

3.2.12 The heater and air conditioner

The cab is equipped with a heating and air conditioning system as standard. The heating and air conditioning system is used to heat, cool and ventilate the cab.

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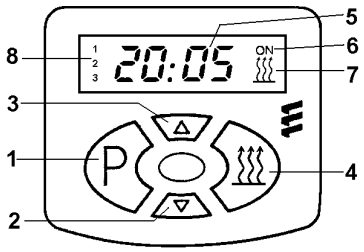
▶ Press the key **1**.
  ↳ The current time is now displayed
  ↳ the colon in the time indication area **5** flashes.

Setting the preset times:

▶ Press the key **1** once, twice or three times to call the preset time "1, 2 or 3".
  ↳ the corresponding preset 5 time is displayed in field **5** of the control module and the number of the preset time is indicated (symbol **8**).

▶ Set the preset time using keys **2** and **3**.

▶ Press the key 4 to activate or to deactivate the selected preset time.
  ↳ when the preset time is activated, the symbol "ON" is displayed.
  ↳ The number "1 , 2 or 3" of the activated preset time is displayed in the symbol field **8**.



1 - Key to activate the setting capabilities
2 - Time setting key backwards
3 - Time setting key forwards
4 - Key ON / OFF
to activate - deactivate the preset time
5 - Current time, preset time and heating time
6 - Symbol for activated preset time
7 - Symbol for heater operation
8 - Symbol for preset time 1, 2 or 3

Operating functions of the Mini-Clock

Switching on the heater:

▶ Press the key **4**.
  ↳ The stanstill heater is on. The symbol 7 and the remaining heating time (in minutes) are displayed on the control module.

Turning off the heater:

▶ Press the key **4**.
  ↳ The heater fan continues running for about 150 seconds (after running).
  ↳ On the control module the symbol 7 disappears and the current time is now displayed.

Continuous operation:

▶ Press the key **3** and keep it depressed, at the same time press the key **4**.
  ↳ the heater will now remain switched on until the key 4 (switching off the heater) is pressed again.

Activating / deactivating the preset time:

▶ Press the key **1** to select the preset time "1, 2 or 3".

▶ Press the key **4** to activate or to deactivate the selected preset time.
  ↳ when the preset time is activated, the symbol "ON" is displayed.
  ↳ The number "1 , 2 or 3" of the activated preset time is displayed.

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Danger!
When actuating the emergency off switch on machines fitted with a lifting magnet, the magnetic plate is demagnetized at the same time, this causing the holded load to fall down.

▶ Never fit out with an emergency off switch an hydraulic excavator that is already equiped with a lifting magnet!
And inversely!

After actuation of the emergency off switch **S2-1** or **S34**, the switch will remain in a locked position. The switch must then be unlocked before attempting to restart the Diesel engine.

▶ Lightly depress the operating knob of the emergency off switch and turn it clockwise.

Diesel engine stop with engine after running (Option)

To save the Diesel engine and its turbocharger, the machine can be fitted out at customer's request with the optional equipment "engine after running X minutes". With this optional equipment, the Diesel engine does not turn off immediately when the ignition key is returned to "**0**" position, but he continues running at low idle for a given lapse of time, allowing the temperature of components to equalize, and is turned off only thereafter.

▶ First set the engine speed to low idle using the arrow key **S229**.
  ↳ Only the furthest left LED on the engine speed gauge **P4** is now lighting.

▶ Turn the ignition key to "**0**" position and remove the key.
  ↳ The engine after running procedure begins, the engine is held running at low idle for some minutes.
  ↳ After that it turns off automatically.

Notice!
Machines fitted with an engine stop after running also have an emergency off switch **S2-1** on the right control desk.

This switch remains operative during the engine after running procedure, it can be actuated in an emergency case in order to immediately stop the engine.

3.3.7 Automatic motorstop after low idle (option)

This system is a complement of the device "low idle automatic". If the operator do not use the machine during a predefined time, the diesel engine stop automatically.

The time begins to be measured when the engine reaches low idle.

The measure stops when the operator acts on a joystick or a pedal.

The time before the automatic stop is ajustable by the customers service Liebherr. By default, it is adjusted to 5 minutes.

20 seconds before the automatic stop, the operator is warned by a symbol shown on the display and with a beep.

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Travelling up

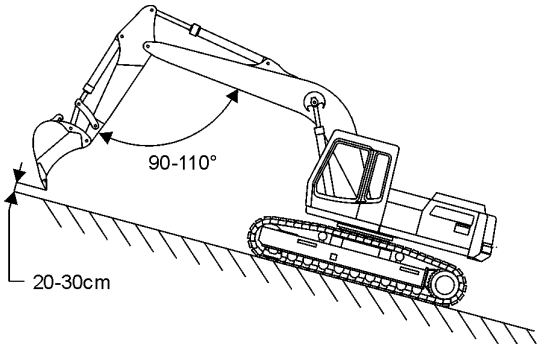

Fig. 3-64 *Travelling up*

▶ Position the attachment as shown on the picture.
- The angle between boom and stick must be between 90° and 110°.
- The tooth ot the bucket must be oriented down at 20-30 cm of the ground.

Travelling down

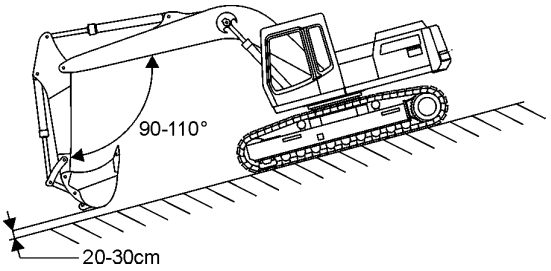

Fig. 3-65 *Travelling down*

▶ Position the attachment as shown on the picture.
- The angle between boom and stick must be between 90° and 110°.
- The tooth ot the bucket must be oriented up with the bottom of the bucket at 20-30 cm of the ground.

▶ Press the touch **S21**.
- ↳ the three LEDs in the touch go out,
- ↳ the normal travel speed is forced.

3.4.3 Travel warning device (option)

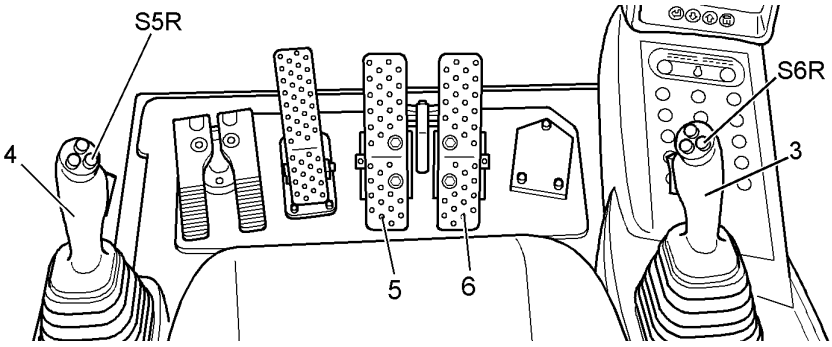

Fig. 3-66 *Travel warning device*

▶ Press push button **S5R**.
  ↳ rotator turns to the right.

Remarque !
To lock and unlock, see chapter "Mechanical quick-change adapter" into the operating instructions.

3.4.10 Lifting magnet control system (optional equipment)

A special circuit comprising an hydrostatic driven generator is installed as an option to supply the lifting magnet with the necessary electrical current.
This special circuit is activated via the switch **S46**.

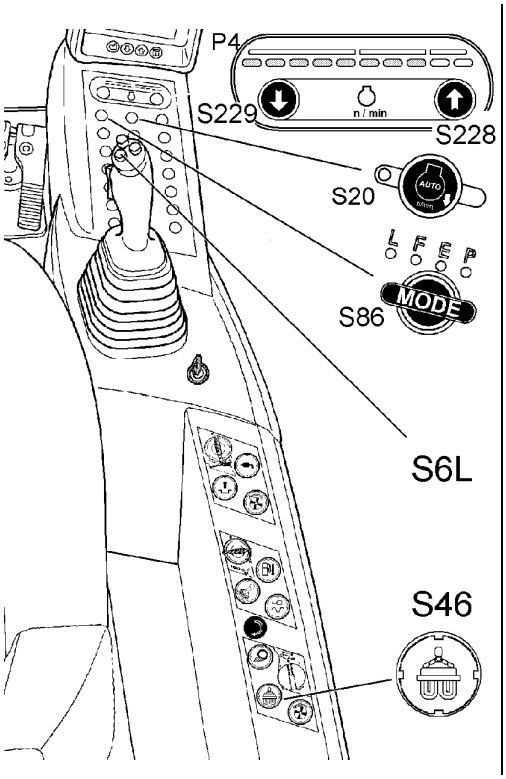

Fig. 3-79 *Lifting magnet control system*

▶ Press the touch **S46 on the right rear control desk**.
  ↳ the control lights inside the button is lighting.
  ↳ the generator is turned on.
  ↳ the engine RPM is automatically set to a fixed value (level 8 on P4).
  ↳ the engine RPM can no longer be changed via the touches **S228**, **S229** and **S86** (this to avoid a possible lost of the load due to a demagnetization of the magnetic plate when the RPM become to low).
  ↳ the engine low idle automatic is deactivated and can no longer be turned on via touch **S20**.
  ↳ The lifting magnet can now be controlled via the button **S6L** at the top of the right joystick handle.

Danger!
The magnet can lose its load in the event of a loss of current.

▶ Always ensure that noone is standing beneath the load.

▶ Do not press pushbutton **S6L** unintentionally.

▶ Press the push button **S6L** at the top of the right joystick handle.
  ↳ The magnetic plate of the magnet is magnetized,
  ↳ the lifting magnet attracts and picks up the iron materials

▶ Press the push button **S6L** again.
  ↳ The magnetic plate of the magnet is demagnetized,
  ↳ the iron materials are released by the magnet and fall down.

Note!
The movement is only cut off to enter into the prohibited zone. The movement to leave it remains possible.

Adjustment of the movement cut-off point

At the time of the cut-off, the attachment can enter into the prohibited zone in case of oscillations of the working tool, variations of its dimensions (open/close position) or attachment inertia.

Danger!
The machine driver is responsible for the adjustments precision!

▶ You must keep a safety margin of **at least 1.5 m** from the prohibited zone.

As soon as the proximity switch detects the reflector, the movement is cut off. The proximity switch or the reflector position is adjustable depending on the configurations.

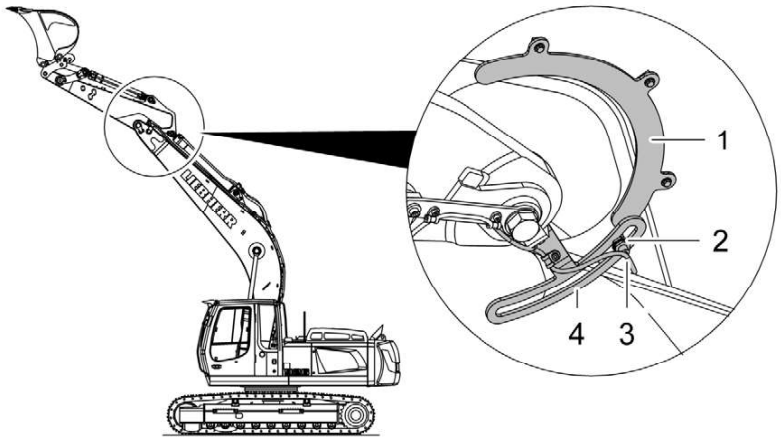

Fig. 3-87 *Example of a cut-off of the stick movement with an adjustable proximity switch*

1	Reflector	**3**	Proximity switch
2	Proximity switch nut	**4**	Rail

▶ Bring the attachment into the desired cut-off position.

▶ Loosen the nut **2** of the proximity switch **3** (or reflector).

▶ Move the proximity switch **3** (or reflector) on the rail **4**. Place it face to face with the reflector **1** (or proximity switch).

▶ If the proximity switch **3** does not detect the reflector **1** when they are face to face, move them closer.

▶ Retighten the nut **2** of the proximity switch **3** (or reflector).

▶ Check the actual cut-off position of the attachement.

▶ If necessary, repeat the adjustment procedure and check the cut-off position again.

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3.7 Installation and removal of attachment parts

3.7.1 Attaching and dismounting the bucket

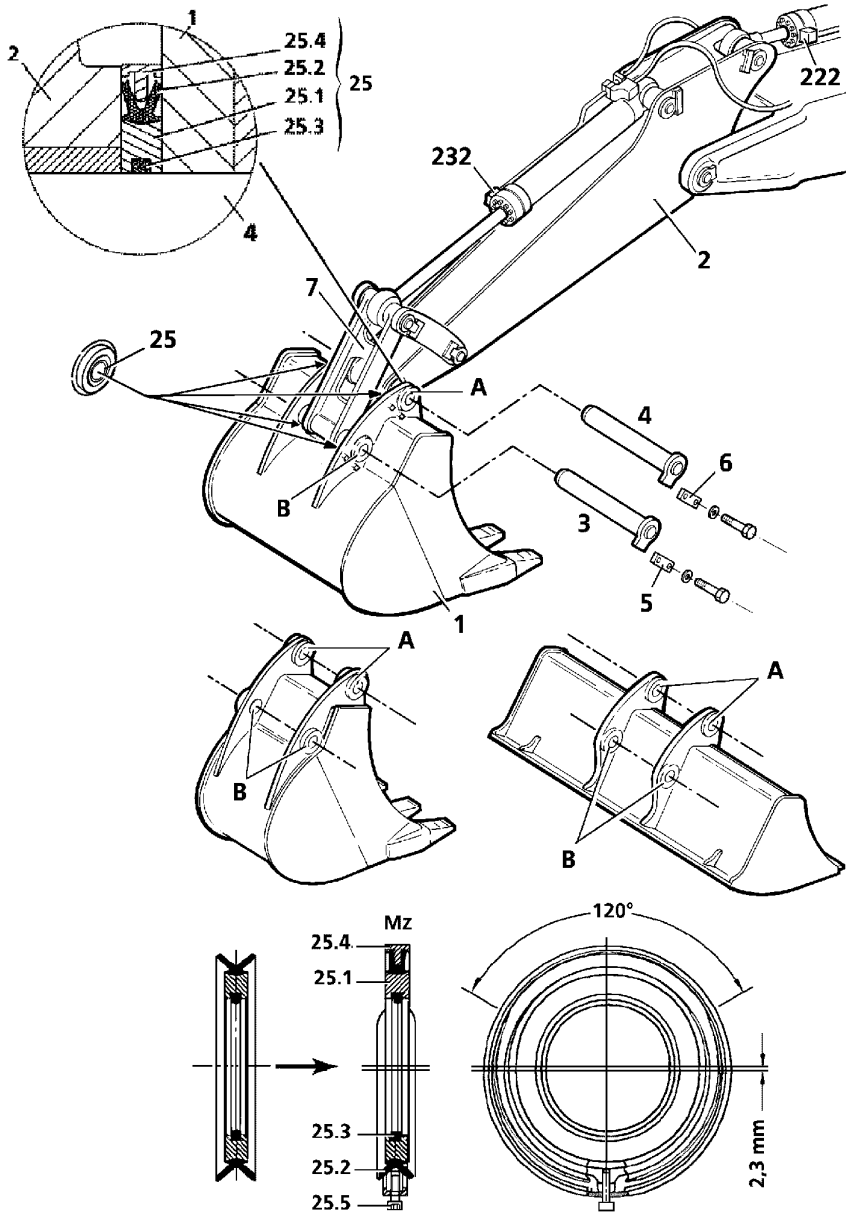

Fig. 3-93 *Attaching and dismounting the bucket*

1	Digging bucket	**25**	Complete pin bearing sealing
2	Stick	**25.1**	Sealing ring
3-4	Pin	**25.2**	Lip seal ring
5-6	Locking plate	**25.3**	O-Ring
7	Connecting link	**25.4**	Protection and installatio ring

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3.7.5 Attaching and dismounting the stick to the boom

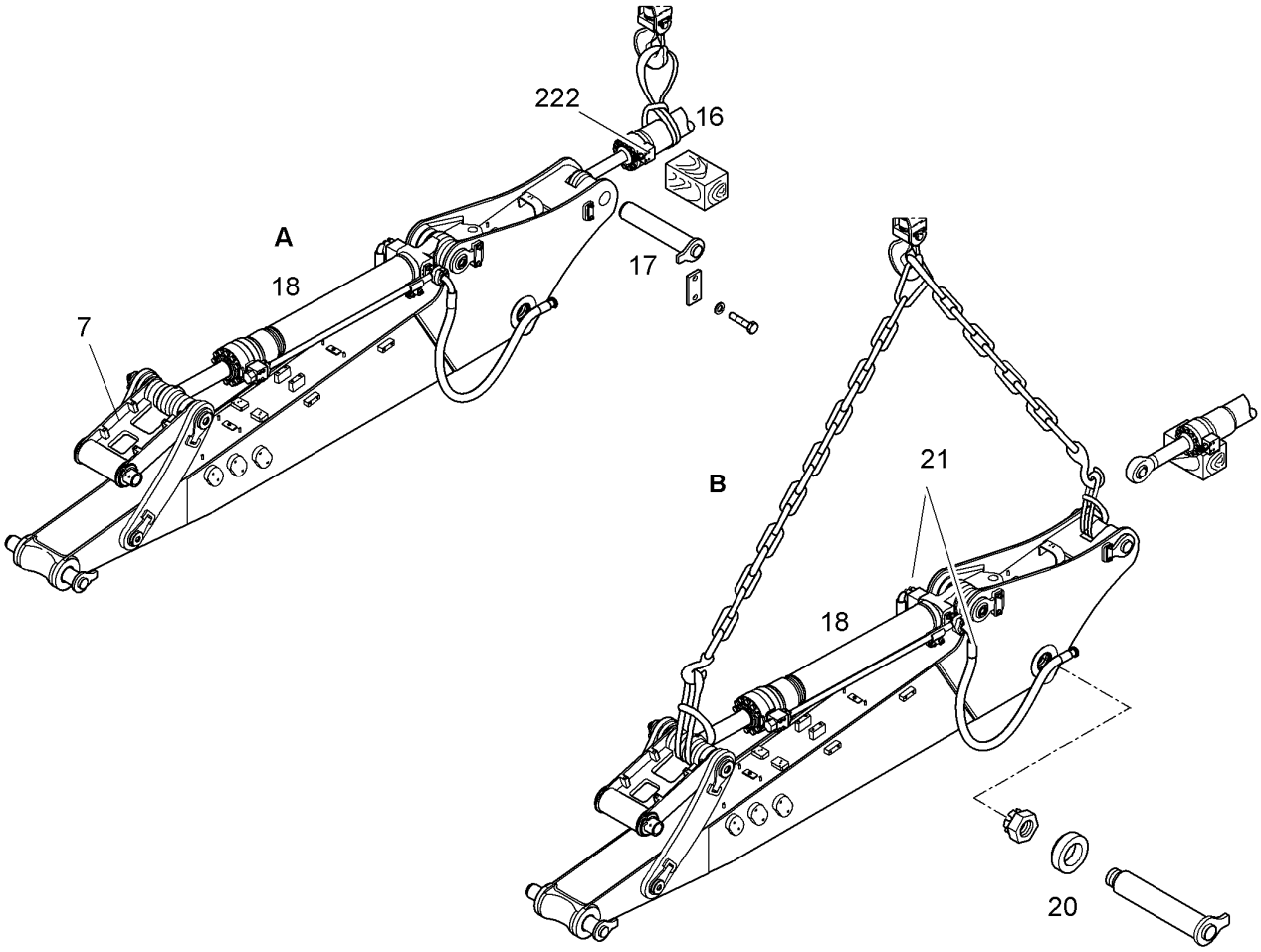

Fig. 3-97 *Attaching and dismounting the stick to the boom*

7	Connecting link	**20**	Pin
16	Stick cylinder	**21**	Hoses
17	Pin	**222**	Restrictor check valve
18	Bucket cylinder		

Dismounting the stick

Figure A

- ▶ If necessary, remove the bucket.
- ▶ Retract the bucket and stick cylinder as far as the stop, position the attachment on the ground.
- ▶ If necessary, tie the connector bracket **7** to the bucket cylinder so it can not slip out.
- ▶ Turn the engine off.
- ▶ Release the pressure in bucket and stick cylinder circuit by turning the ignition key to contact position, tilting the safety lever down, and moving the right joystick to the left and right, the left joystick forward and backward.

Taking up the work tool:

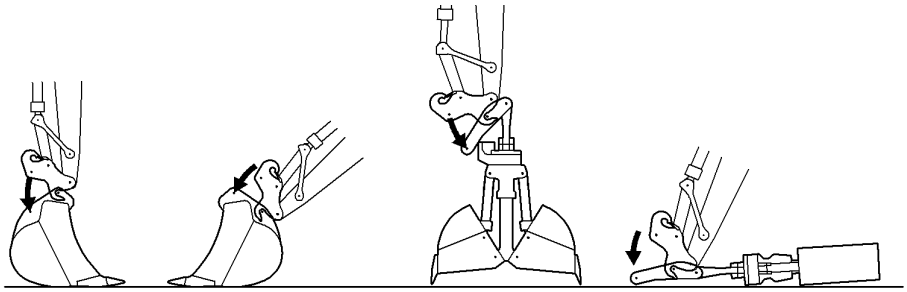

Fig. 3-109 *Taking up the work tool, first step*

▶ Move the quick-change adapter into a position that allows the work tool to be picked up using the take-up hook.

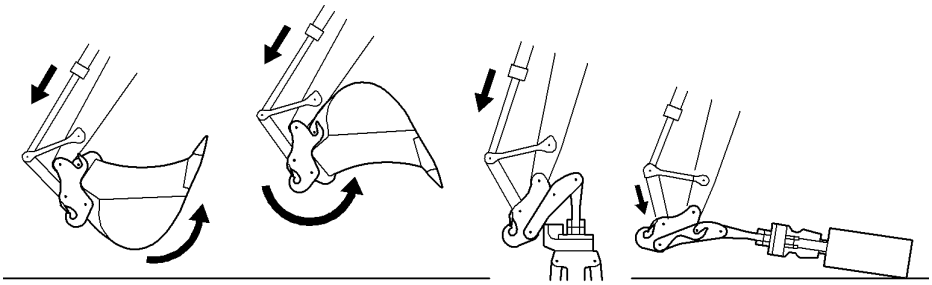

Fig. 3-110 *Taking up the work tool, secondary step*

▶ Raise the work tool from the ground and extend the shovel tilting cylinder fully until the bearing panel for the work tool is laying on the quick-change adapter stop.
  ↳ The bore holes of the work tool and the locking pins of the quick-change adapter must align.

To lock the quick-change adapter:

▶ Press switch **S19**.
  ↳ Quick-change adapter is activated.
  ↳ LED in switch illuminates.

▶ Press and hold button **S47**.
  ↳ Quick-change adapter is activated.

▶ Press and hold pushbutton **L** until the locking pins are fully removed.
  ↳ The buzzer goes off.
  ↳ The symbol “Quick changer” disappears from the screen.
  ↳ The quick-change adapter is locked.
  ↳ The work tool is bolted on when taking up correctly.

▶ Release button **S47**.

▶ Press switch **S19**.
  ↳ Quick-change adapter is deactivated.
  ↳ LED in the switch goes out.

Caution!
Hydraulic lines are pressurized!

▶ Remove the pressure using the joystick before connecting the hydraulic lines (switch off the engine, turn the ignition key into the contact position, operate the joystick).

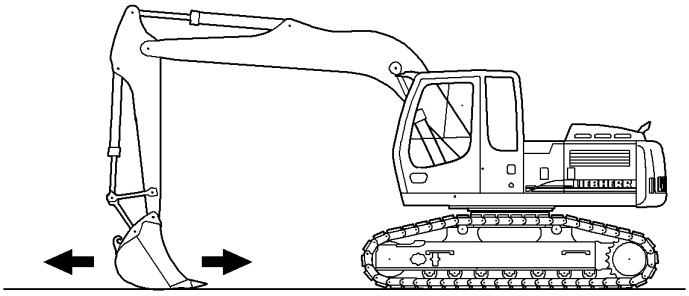

Fig. 3-123 Skimming

- ❑ The machine must be in the working position.
- ❑ The support should be raised.

Danger!
Serious risk of injury when moving the machine.

▶ Ensure that nobody is standing within the working area of the machine.

Caution!
The machine could be damaged.

▶ Never move the machine while the work equipment is touching the ground.

▶ To skim with a backhoestick bucket, lay this on the ground (see Fig. 3-123) and move the stick slowly forwards and backwards. Move the boom steadily up and down while the stick is moving.

▶ If a skimming shield is present (optional extra), lower it to the ground and move slowly forwards and backwards with the machine.

3.8.6 Using a clamshell bucket (earthmoving attachment)

Danger!
Risk of fatal injury and damage to the machine due to a swinging clamshell.

▶ Ensure that the shell type bucket does not swing too close to the cab.
  ↳ The shell type bucket could damage the cab when swinging and injure the machine's operator.

▶ Ensure that the shell type bucket does not swing towards anyone in the working area.
  ↳ The shell type bucket could injure people standing in the vicinity when swinging.

▶ Move the joystick slowly and evenly to prevent the shell type bucket swinging.

▶ Hold the stick in such a way that the shell type bucket cannot swing towards the machine when driving or braking.

▶ Do not lift a load with the boom and stick extended too far and do not slew a heavy load too far to the left or right.
  ↳ The stability of the machine could be affected.

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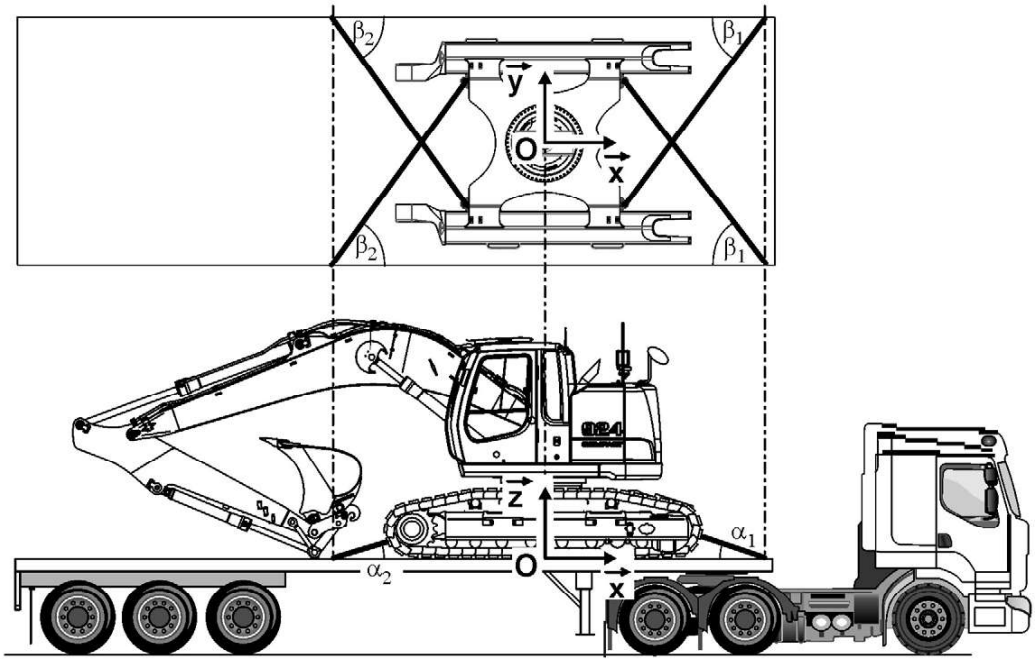

Fig. 3-138 *Secure a machine without blade*

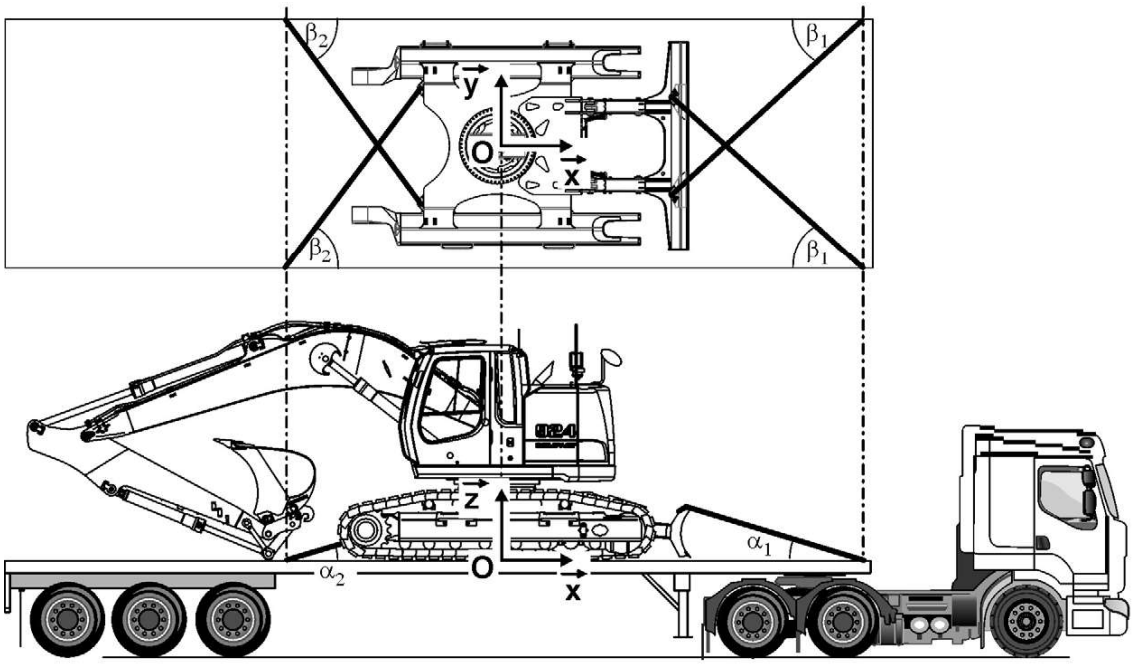

Fig. 3-139 *Secure a machine fitted out with bladel*

$\alpha_{1,2}$ Angle between the chain and the horizontal plan **Oxy**

$\beta_{1,2}$ Angle between the chain and the vertical plan **Oxz**

A tolerance of ±5° on the angle α and β is admited for the position of the chains.

Error code	Effect	Cause	Measure / remedy
E 893		Error on UB3 supply	Consult LIEBHERR customer service.
E 894		Error on UB4 supply	Consult LIEBHERR customer service.

4.2 Faults and remedies

4.2.1 Diesel engine and fuel system

Fault / error	Cause	Solution
Diesel engine does not start	Fuel tank almost or completely empty	Fill tank and vent fuel system
	Low pressure in tank	Remove fuel filler cap
	Fuel filter dirty	Clean or change filter and vent fuel system, drain fuel / clean tank
	Outside temperature below 0°C	For operation under specific climatic conditions, see operating instructions
	Starter motor not drawing through	Check line connections, overhaul starter motor
	Batteries have no power	Charge / replace
Engine starts but stops immediately after or runs irregularly	Fuel tank empty (low pressure in tank)	Fill tank and vent fuel system
	Fuel filter dirty	Clean or change filter and vent fuel system (tank)
	Particularly in winter: too viscous engine oil used	Use engine oil suitable for the outside temperature
	Dry-air filter dirty	Clean or change main filter element
	Air in fuel system	Vent fuel system
	Ventilation in fuel tank obstructed	Clean
	Fuel line bent	Check line and repair if required
Diesel engine emitting grey or black smoke	Dry-air filter dirty	Clean or change filter
Diesel engine continually emitting while smoke (steam)	Water in combustion chamber	Consult customer service
Diesel engine does not reach full speed	Speed adjustment not set to maximum value	Set speed adjustment to maximum value
	Injection system is set incorrectly	Consult customer service
	Dry-air filter dirty	Clean or replace filter
	Bad fuel supply	Clean or change fuel filter, check lines, drain water from tank

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F12	15 A	Power circuit right translation headlight*
F13	15 A	Ignition key, starting circuit (starter), voltage transformer, Radio*, loudspeaker*
F14	15 A	Dome light, cigarette lighter, signal horn
F15	15 A	Reserve - regulating valve for flow distribution (on R934C) pressure cutting on driving (on R964C)
		Relays on printplate A1010
K5		Relay / engine stop (not used)
K6		Relay / horn
K7		Relay / additional headlights on cab roof
K8		Relay / float position of boom
K9		Relay / flow reduction into safety mode

* en option

4.3.3 A1001 Plate

These relays are located in the right control panel of the operator's standing position, behind.

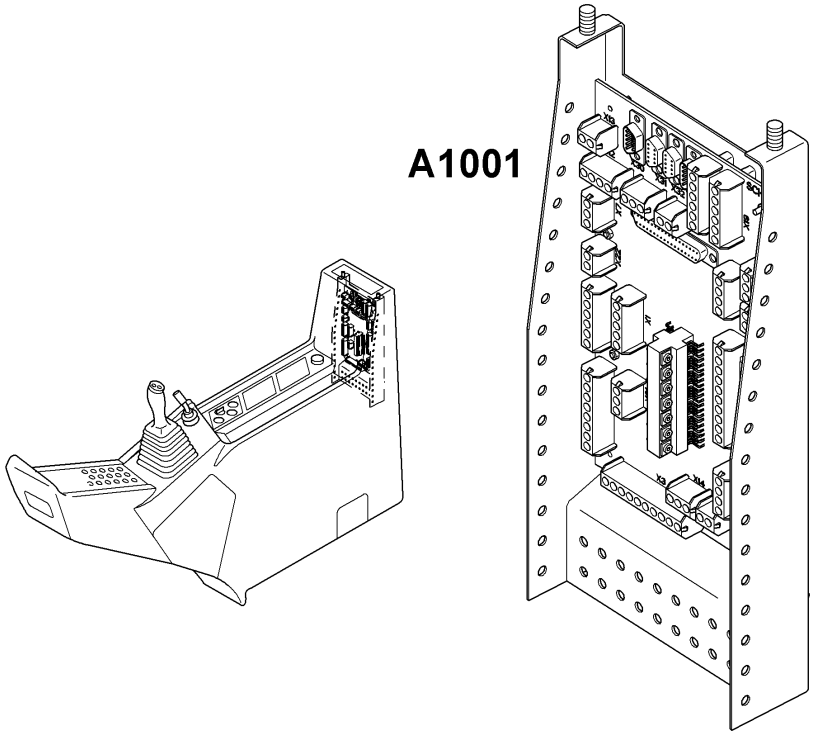

Fig. 4-4 *Relays, A1001 plate*

K1	Relay windscreen
K2	Additional relay
K3	Additional relay
K4	Additional relay
K5 / **A1001**	Relay safety mode

Designation	Specification
ACEA classification (Association des Constructeurs Européens d'Automobiles)	E4, E6, E7 Caution: particle filter only permitted with E6
API classification (American Petroleum Institute)	CH-4, CI-4 Caution: observe shorter oil change intervals

Tab. 5-2 *Lubricating oil specifications*

If LIEBHERR oils are not available locally, use an oil that conforms to the specifications (before choosing an oil, contact our customer service department).

Viscosity

The choice of the lubricating oil viscosity is based on the SAE classification (Society of Automotive Engineers). The SAE classification does not provide any indication as regards the quality of a lubricating oil. The relevant factor for the correct choice of SAE class is the ambient temperature.

Excessively high viscosity might lead to start-up problems. If the viscosity is too low, the oil's lubrication might not be sufficiently efficient.

The temperature ranges shown in the diagram are approximate ranges that might temporarily be exceeded.

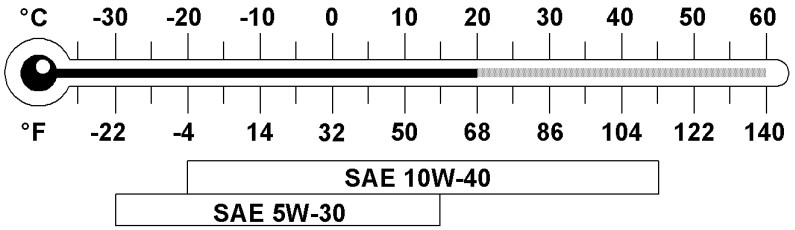

Fig. 5-4 *Temperature-based selection of the SAE class*

For ambient temperatures of -20 °C (-4 °F) to +45 °C (+113 °F), we recommend the following diesel engine oils:

Liebherr Motoroil 10W-40, specification ACEA E4

Liebherr Motoroil 10W-40 low ash, specification ACEA E6

For ambient temperatures of -30 °C (-22 °F) to +15 °C (+59 °F), we recommend the following diesel engine oils:

Liebherr Motoroil 5W-30, specification ACEA E4

Liebherr Motoroil 5W-30 low ash, specification ACEA E6

Adverse operating conditions affecting the oil change intervals

Oil change intervals: see chapter "Inspection and maintenance schedule".

Subsequent oil changes depend on the climate, the sulphur content of the fuel and the oil grade. For details, see the table below.

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Machines delivered with a hydraulic hammer attachment and retrofitted hydraulic hammer kits are already equipped with 10-µm filter cartridges in the return filter. Please take this into account when ordering spare parts.

5.5.5 Lubricants for gearboxes

Quality

Recommended lubricant	Specification
Liebherr Gear Basic 90 LS	API: GL-5 MIL-L: 2105 D ZF: TE-ML 05C, 12C, 16E, 21C
Liebherr Gear Plus 20W-40	API: Niveau von GL4 ZF: TE-ML 05F, 06K, 17E
Liebherr Gear Hypoid 90 EP	API: GL 5 MIL-L: 2105 B, C, D ZF: TE-ML 05A, 12A, 16C, 17B, 19B
Liebherr Hypoid 85W-140 EP	API: GL-5 MIL-L: 2105 D, PRF-2105 E ZF: TE-ML 05A, 07A, 16D, 21A
Liebherr Hydraulic-Gear ATF	GM: Dexron II D ZF: TE-ML 03D, 04D, 11A, 14A, 17C
Liebherr Syntogear Plus 75W-90	API: GL-4, GL-5, MT-1 MIL-L: 2105 D, PRF-2105 E ZF: TE-ML 02B, 05B, 07A, 12B, 16F, 17B, 19C, 21B

Tab. 5-14 *Lubricating oil specifications*

If LIEBHERR oils are not available locally, use an oil that conforms to the specifications (before choosing an oil, contact our customer service department).

Viscosity

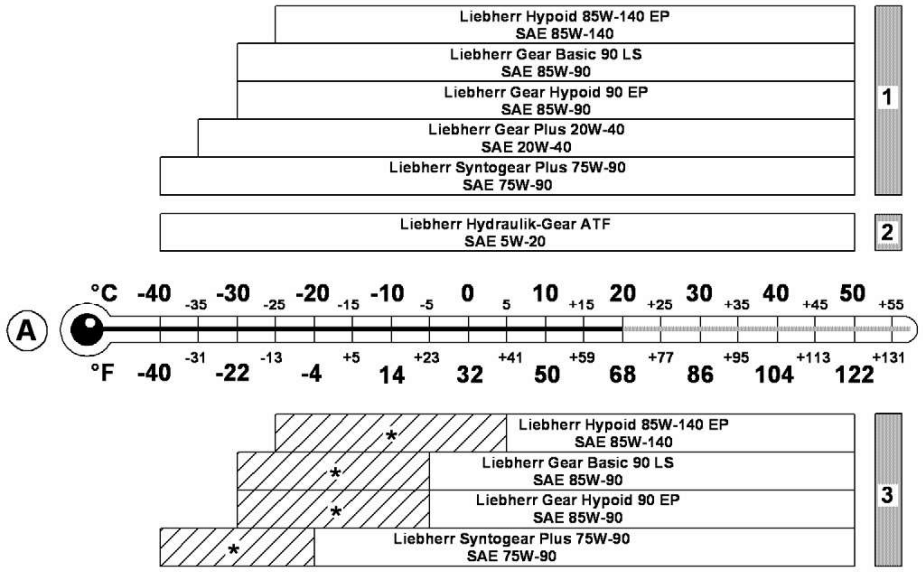

Fig. 5-8 *Temperature-based selection of the SAE class*

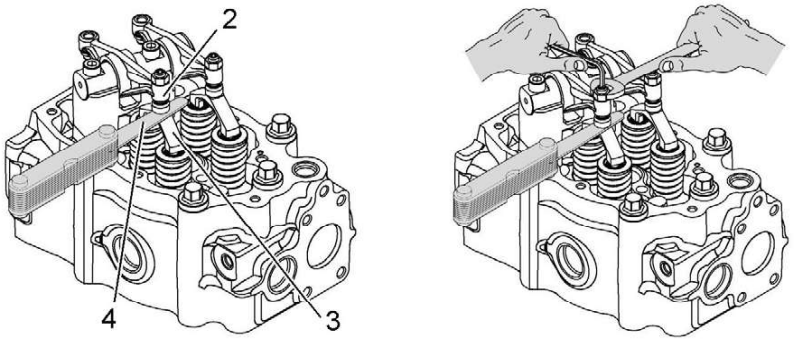

Fig. 5-19 *Check and adjust intake valve clearance - cold*

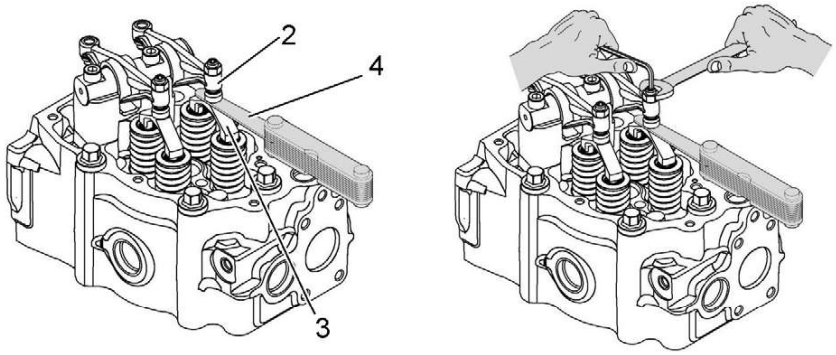

Fig. 5-20 *Check and adjust exhaust valve clearance of 0,40 mm - cold*

2 Rocker arm **3** Crosshead **4** *F*eeler gauge

- ❑ If the measured clearance does not correlate with the recomended adjustment values,
- ▶ Loosen the lock nut on the adjusting screw of the respective rocker arm and adjust the setting.
- ▶ Retighten the lock nut.
- ▶ Check clearance again.
- ▶ After checking or adjusting all valves, mount the cylinder head cover with new seals.
- ▶ Dismount the manual engine barring device.

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5.9 Fuel system

DANGER!
Extremely flammable liquids!
Explosion hazard.

- ▶ Keep sources of ignition or sparks away from the fuel system.
- ▶ Do not smoke.
- ▶ Only work on the fuel system when the diesel engine is shut down.

5.9.1 Refuelling

Fuel filler cap

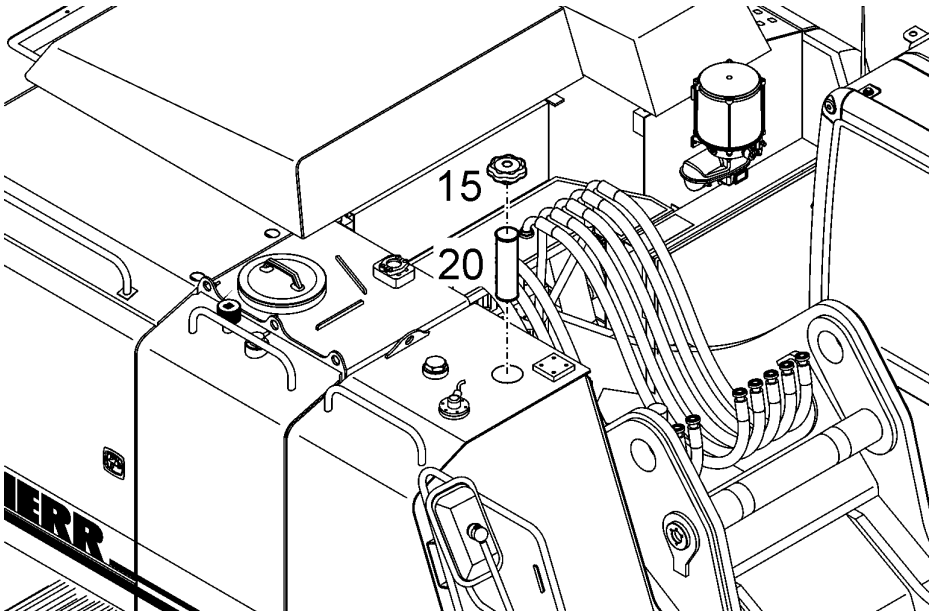

Fig. 5-29 *Fuel filler cap*

Caution!
Humidity admission into fuel filler cap!
Damage.

- ▶ Remove key from fuel filler cap.
- ▶ Put in protective cover of fuel filler cap.

- ▶ Unscrew fuel filler cap **15.**
- ▶ Add fuel via the filler sieve **20**.

Notice !

- ❑ If the engine has still not started after approx. 20 seconds:
- ▶ Wait for 1 minute,
- ▶ Repeat this starting procedure up to three times, waiting for one minute between each.
- ❑ If the starting procedure still remains unsuccessfull:
- ▶ Repeat the complete bleeding procedure of the fuel system.

5.10 Dry air filter

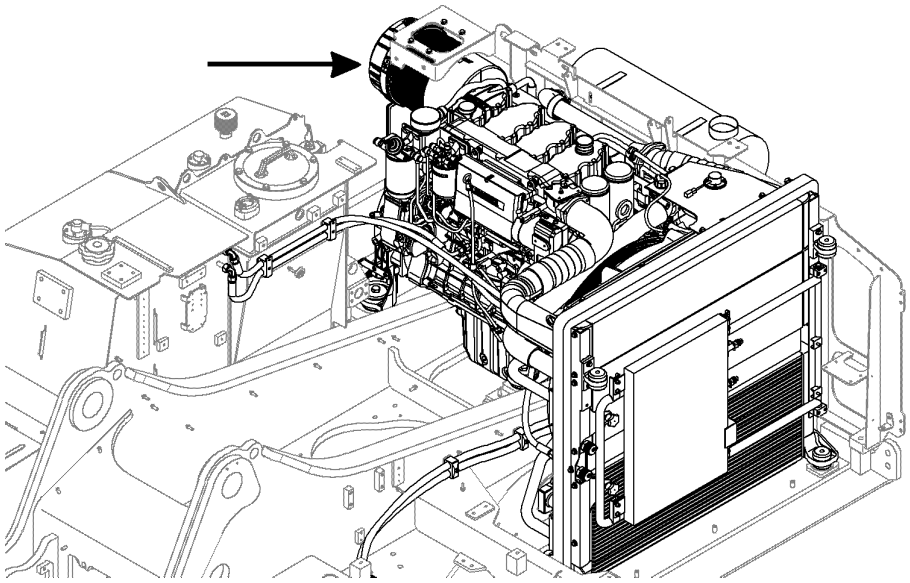

Fig. 5-37 *Dry air filter*

Maximum engine protection against early wear due to dust is only possible if the air filter is serviced at regular intervals.

The dry air filter is designed in such a way that it offers maximum protection and long maintenance intervals.

The maintenance consists in changing the filter elements **3** and **4**. It is not recommended that filter elements be washed out for safety reasons.

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To install the new or cleaned filter element

- ▶ Coat with hydraulic oil the o-rings, the threads and the sealing faces on the filter head and on the housing.
- ▶ Insert with care the new element **7** onto the centring pin.
- ▶ Insert spring **3**.
- ▶ screw and tighten the cover **1** by hand at the bottom.

5.11.5 Control oil filter

The pressure filter **11** is part of the control oil unit **1** which is located on the rear of the hydraulic tank.

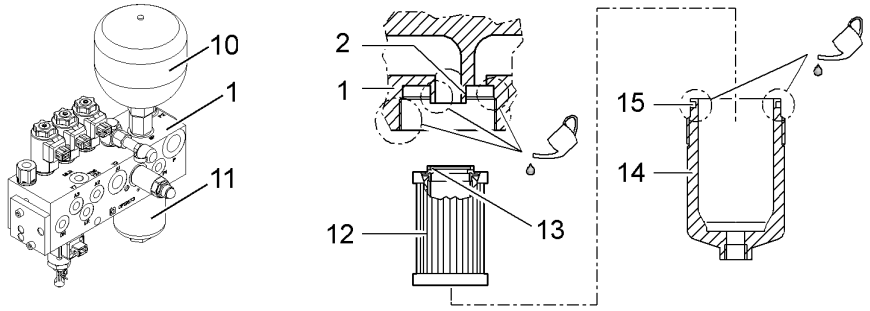

Fig. 5-46 *Control oil unit*

1	Control oil unit	**12**	Filter unit
2	Centering pivot	**13**	Filter unit sealing ring
10	Pressure accumulator	**14**	Filter housing
11	Pressure filter	**15**	Filter housing sealing ring

Note!
It is not permitted to clean the filter unit.

- ▶ Change the filter unit each time you open the filter housing.

To replace the filter element

- ❑ The hydraulic system must be depressurized.
- ▶ Unscrew the filter housing **14** from pressure filter **11** and remove filter element **12**.
- ▶ Clean the filter housing **14**.
- ▶ Oil the thread and sealing surfaces on filter housing **14** and on control oil unit **1** as well as sealing rings **13** and **15** with hydraulic oil.
- ▶ Push the new filter element **12** carefully onto the centering pivot **2**.
- ▶ Screw filter housing **14** as far as the stop and turn it back by hand with a **1/4** turn (approx. 90°).

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Size of screw 4	Torque value in Nm - Quality 8.8
	Half flanges 5a
M10	44
M12	76
M14	122
M16	187

Tab. 5-16 *Tightening torques for SAE fittings - Quality 8.8*

5.12 Oil changes on components

5.12.1 General information

- ❑ The machine must be standing level.
- ▶ Switch off the engine.
- ▶ Wait briefly until the oil has collected in the oil sump.
- ▶ Drain off the oil (preferably when oil is at operating temperature)
- ▶ Add the oil.
- ▶ Check the oil level.

Oil quality and quantity: see lubricant chart.

Change intervals: see lubrication and maintenance chart.

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Danger!
Bent rubber hoses on the central gas outlet increase the risk of explosion!
The hydrogen contained in the batteries should not be allowed to build up in the accumulator box and must be able to escape via the rubber hoses. The central gas outlet hoses must be routed without kinks.

▶ Check the condition of the hoses **B** regularly, particularly after installing a battery (see Fig. 5-66).

The fluid level in the cells should be 10 to 15 mm above the top of the plate. Only distilled water is to be used for any refilling.

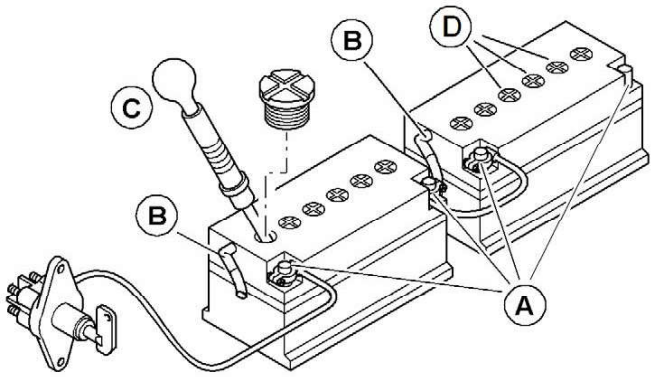

Fig. 5-66 *Battery care*

▶ From time to time, measure the acid concentration **C** using an acid tester.

When the battery is fully charged, the **unit weight is 1.28 kg/l (31.5° Bé)**.

▶ If the acid tester displays a lower value, the batteries is virtually flat and should be charged if necessary.

5.14.4 Slip ring assembly (optional extra)

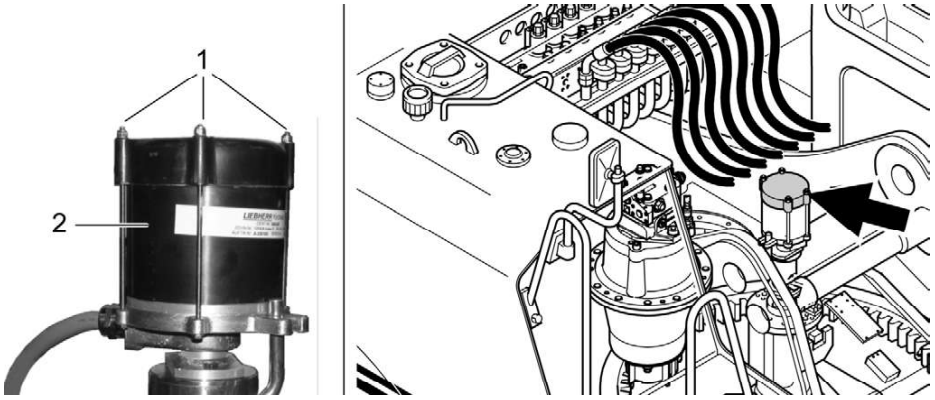

Fig. 5-67 *Slip ring assembly*

Slip ring assemblies are sensitive to moisture. An oxide layer can form on the conductive surfaces, which restricts the flow of current. Electrical consumers in the chassis will no longer be supplied with sufficient current, which can lead to malfunctions.

In case of a failure in the lube circuit (no stroke signal delivered by the proximity switch **B51** about 20 minutes after begin of a lubrication procedure) both LEDs **17** and **18** and the control light inside **S84** will start blinking simultaneously.

The possible causes are:

- a plugged or kinked lubrication line, (in this case the grease will flow out of the relief valve **26**),
- a failure of the switch **B51** or of its connecting wire,
- the use of too viscous grease at very low temperatures,
- not enough grease in the grease tank **13**,
- a problem in the 24 V electrical circuit for the motor **14**.

▶ Immediately locate and remedy the cause of the trouble.

5.16.5 Emergency lubrication with defective lubrication system

In case the lubrication pump **15** does not work, all lubrication points connected to the centralized system may be lubricated via the lube fitting **25** using a lubrication gun. In this case, press daily or per working shift approx. 200 cm^3 grease into the fitting **25**.

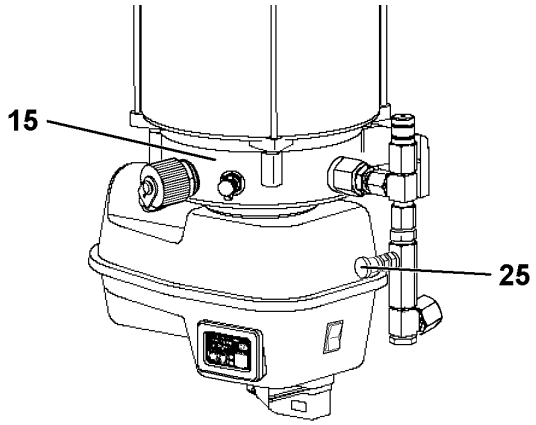

Fig. 5-78 *Emergency lubrication*

15 Grease pump **25** Emergency lube fitting

5.16.6 To refill a grease container

The grease level in the container **13** of the pump must be checked weekly, and if necessary, the container refilled.

See the lubricant chart for grease specification.

The refilling of the grease container should only be done via the special fitting **21**.

Note!
Avoid refilling the container **13** via the upper cover **23**, since it could create an air pocket in the container and cause the pump **15** to run dry.

▶ Insert a grease cartridge in the special filling pump **31** (Id. No. 10009239).