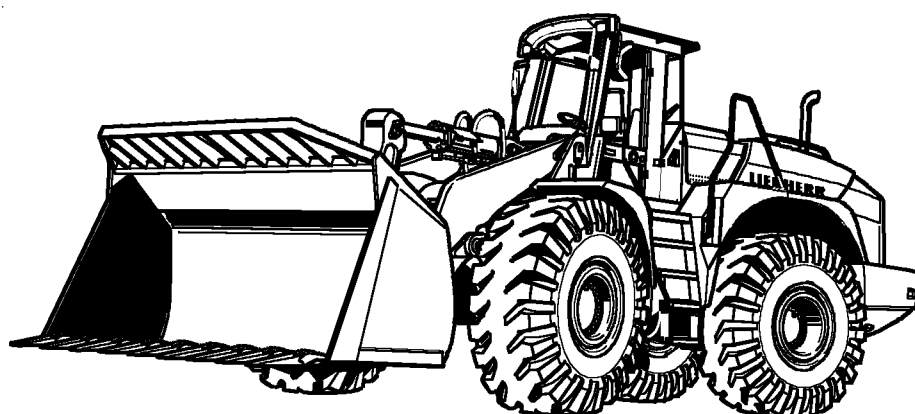


L564

valid from serial No.: - 462 0384
464 0384



Please enter the following details on receipt of your machine:
*You will find these details on the machine type plate, on the front right-hand side. They will be of assistance when ordering spare parts.

* **Vehicle identity No.**

- . - . - . - . - .

* **Year of construction**

- . - . - . - . - .

Date of commissioning

. . / . . / . .

Address

Address: LIEBHERR-WERK BISCHOFSHOFEN GMBH

Dr. Hans Liebherr – Straße 4
A – 5500 BISCHOFSHOFEN

Product identification

Manufacturer: LIEBHERR-WERK BISCHOFSHOFEN GMBH

Product group: Wheel loader

Type: L564 L564 T

Construction number: 462 464

Serial number: 0384 0384

Conformity:



Document identification

Order number: 8450650

Author: LBH/Dept. - TIP

Document version: 02

LBH/02/003801/0003/4_0/en

This Operator's manual is intended for the **driver** and for the **maintenance personnel** of the machine.

It contains descriptions of:

- technical data
- safety provisions
- control and operation
- maintenance

This Operator's Manual should be carefully read before commissioning and should be read later at regular intervals and used by everyone with responsibility for work on/with the machine.

Work with or on the machine includes, for example:

- **Operation** including rigging work, trouble-shooting during operation, removal of operational waste, service, disposal of operating and auxiliary materials
- **Servicing** including maintenance, inspection and repair work
- **Transport** or loading of the machine

This manual makes it easier for the driver to become acquainted with his machine and avoids malfunctions due to improper operation.

Observance of the operating instructions by the maintenance personnel:

- improves operational reliability
- extends the service life of your machine
- reduces repair costs and downtimes

This manual belongs with the machine. Place a copy within easy reach in the glove compartment in the driver's cab.

The Operator's Manual is to be supplemented by instructions based on existing national accident prevention and environmental protection regulations.

In addition to the Operator's Manual and the applicable national and local legal requirements for accident prevention, the recognised technical regulations for safe and professional operation should be observed.

This Operator's Manual contains all necessary information for the operation and maintenance of your machine.

If you should, however, require more detailed explanations or information, our technical information and production quality (TIP), technical documentation and customer service departments will be only too glad to be of assistance.

You will readily understand that we cannot accept guarantee claims in the event of improper operation, insufficient maintenance, the use of unauthorised operating materials or non-observance of safety regulations.

LIEBHERR will cancel all obligations such as guarantee agreements, service contracts entered into by **LIEBHERR** and/or its agents when spare parts other than original **LIEBHERR** parts or those purchased from **LIEBHERR** are used for maintenance and repairs.

Under extreme conditions, shorter maintenance intervals than provided for in the inspection schedule may be necessary.

Modifications, conditions, copyright:

- We reserve the right to alter the technical specifications of the machine in respect of the specifications and illustrations in the documents provided.
- The guarantee and liability conditions of the general conditions of business of **LIEBHERR** are not affected by the information in the manual.
- The specifications and illustrations in this manual may neither be reproduced, distributed nor used for commercial purposes. All rights in accordance with the laws of copyright are expressly reserved.

Contents

1	Product description	1 - 1
1.1	Technical data	1 - 2
1.1.1	Complete machine	1 - 2
1.1.2	Diesel engine, Pump distributor gear	1 - 7
1.1.3	Travel hydraulics	1 - 8
1.1.4	Working hydraulics	1 - 9
1.1.5	Steering system	1 - 10
1.1.6	Brake system	1 - 10
1.1.7	Electrical system	1 - 10
1.1.8	Transfer gear	1 - 10
1.1.9	Axles	1 - 11
1.1.10	Tyres	1 - 11
1.1.11	Central lubrication system	1 - 13
1.1.12	Cab, Heating, Air conditioning system	1 - 13
1.1.13	Lift arm, Quick-change device	1 - 14
1.1.14	Attachments, Accessories	1 - 15
1.2	Technical description	1 - 18
1.2.1	Complete machine	1 - 18
1.2.2	Diesel engine, Pump distributor gear	1 - 18
1.2.3	Cooling system	1 - 19
1.2.4	Travel hydraulics	1 - 20
1.2.5	Working hydraulics	1 - 20
1.2.6	Steering system	1 - 22
1.2.7	Brake system	1 - 22
1.2.8	Electrical system	1 - 23
1.2.9	Transfer gear	1 - 23
1.2.10	Axles, Tyres	1 - 23
1.2.11	Vehicle frame, Ballast weight	1 - 24
1.2.12	Central lubrication system	1 - 24

1.2.13	Cab, Heating, Air-conditioning system	1 - 25
1.2.14	Lift arm, Quick-change device	1 - 26
1.2.15	Attachments, Accessories	1 - 26
2	Safety regulations	2 - 1
2.1	Introduction	2 - 1
2.2	General safety precautions	2 - 1
2.3	Proper use	2 - 3
2.4	Signs on the machine	2 - 3
2.4.1	Arrangement of signs	2 - 4
2.4.2	Safety signs	2 - 4
2.4.3	Information signs	2 - 6
2.4.4	Type plates	2 - 9
2.5	Instructions for avoiding crushing injuries and burns	2 - 9
2.6	Instructions for avoiding fires and explosions	2 - 10
2.7	Instructions for starting up safely	2 - 10
2.8	Safety precautions at start-up	2 - 11
2.9	Instructions for working safely	2 - 11
2.10	Safety instructions for driving on slopes	2 - 12
2.11	Parking safely	2 - 13
2.12	Transporting the machine safely	2 - 13
2.13	Towing the machine safely	2 - 14
2.14	Measures for ensuring safe maintenance	2 - 14
2.15	Safety instructions for welding work on the machine	2 - 17
2.16	Instructions for working safely on machine attachments	2 - 17
2.17	Safety regulations when transporting the machine by crane	2 - 18
2.18	Safe maintenance of hydraulic hoses and hose lines	2 - 18
2.19	Attachments and accessories	2 - 19
3	Operation, Handling	3 - 1
3.1	Layout of controls and instruments	3 - 1
3.2	Operation	3 - 3

3.2.1	Cab access	3 - 3
3.2.2	Emergency exit	3 - 3
3.2.3	Driver's seat with pneumatic suspension	3 - 4
3.2.4	Driver's seat with gas-filled spring suspension	3 - 7
3.2.5	Safety belt	3 - 11
3.2.6	Starter switch	3 - 13
3.2.7	Steering column and steering wheel	3 - 14
3.2.8	Steering column switch	3 - 14
3.2.9	Display unit	3 - 17
3.2.10	Control unit	3 - 23
3.2.11	Control element	3 - 27
3.2.12	LIEBHERR control lever	3 - 28
3.2.13	Control lever for optional working functions	3 - 31
3.2.14	Heating, Ventilation	3 - 32
3.2.15	Air-conditioning system	3 - 33
3.2.16	Internal cab illumination	3 - 34
3.2.17	Inside and outside mirrors	3 - 34
3.2.18	Sun visor	3 - 35
3.2.19	Electric windshield wiper and washer system	3 - 35
3.2.20	Reservoir for windshield washer fluid	3 - 37
3.2.21	Automatic central lubrication system	3 - 38
3.2.22	Acoustic reverse warning device	3 - 38
3.2.23	Optical reverse warning device	3 - 39
3.3	Handling	3 - 41
3.3.1	Daily start-up routine	3 - 41
3.3.2	Operation with diesel particle filter	3 - 44
3.3.3	Starting the diesel engine	3 - 45
3.3.4	Driving mode	3 - 49
3.3.5	Shutting down the machine	3 - 63
3.3.6	Operating the lift arm	3 - 66
3.3.7	Operating the hydraulic quick-change device	3 - 76

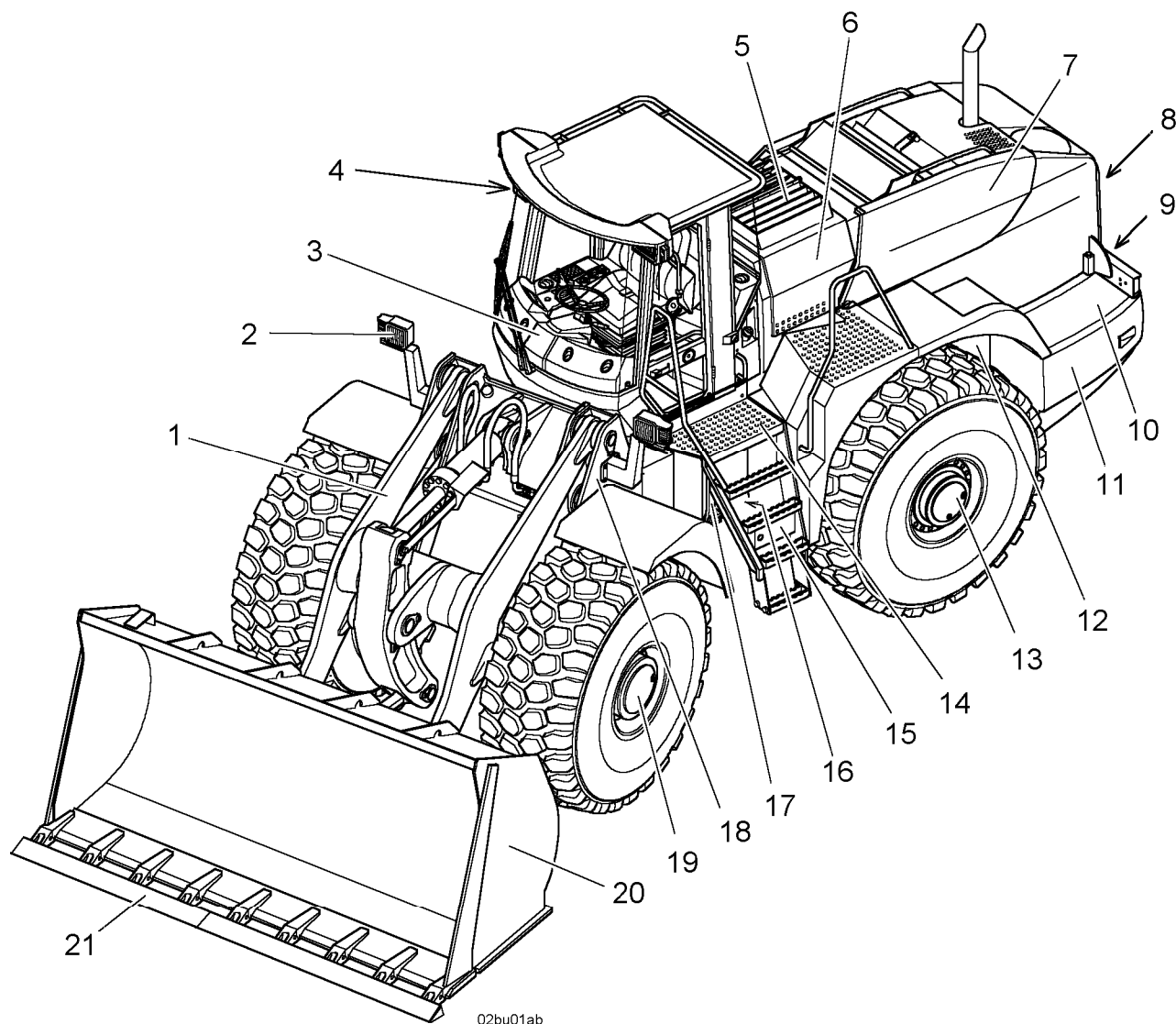
3.3.8	Operation of the hydraulic quick-change equipment (electro-hydraulic actuation with comfort control)	3 - 82
3.3.9	Operation of the hydraulic quick-change equipment (electro-hydraulic actuation without comfort control)	3 - 85
3.3.10	Working with optional equipment	3 - 90
3.3.11	General working methods	3 - 93
3.3.12	Transporting the machine	3 - 106
3.4	Emergency operation	3 - 113
3.4.1	Towing the machine	3 - 113
3.4.2	Procedure for jump starting	3 - 117
4	Malfunctions	4 - 1
4.1	Error code tables	4 - 1
4.1.1	Error code – indication on the display	4 - 1
4.1.2	Acoustic warning signals	4 - 5
4.2	Malfunction rectification	4 - 7
4.2.1	Changing fuses	4 - 7
5	Maintenance	5 - 1
5.1	Maintenance and inspection schedule	5 - 1
5.2	Lubricant chart, Filling quantities	5 - 5
5.2.1	Table of filling quantities	5 - 5
5.2.2	Lubricant chart	5 - 6
5.3	Maintenance tasks	5 - 9
5.3.1	Preparatory tasks for maintenance	5 - 9
5.3.2	Maintenance tasks (daily) every 10 service hours	5 - 14
5.3.3	Maintenance tasks (weekly) every 50 service hours	5 - 18
5.3.4	Unscheduled maintenance tasks	5 - 30
5.3.5	Cleaning the machine	5 - 33
5.3.6	Corrosion protection work	5 - 34
5.4	Lubricants and fuels	5 - 36
5.4.1	Handling lubricants and fuels	5 - 36
5.4.2	Lubricant and fuel specifications	5 - 37

1 Product description

Overview of design

Standard version

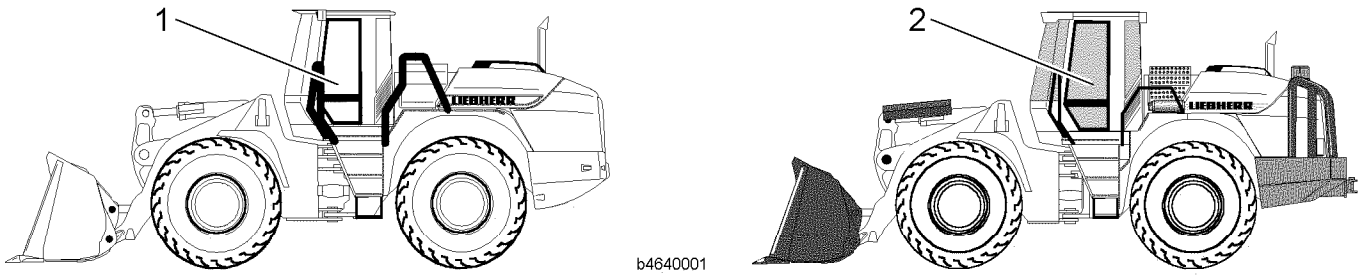
This section contains an overview of the machine with annotations of the illustrated components.



02bu01ab

Basic machine – View from left

- | | | |
|-----------------------------|--------------------------------|-----------------------|
| 1 lift arm | 8 door – engine compartment | 15 tool box |
| 2 lighting | 9 hitching device | 16 steering cylinder |
| 3 driver's cab | 10 cover – battery compartment | 17 articulation lock |
| 4 working floodlights | 11 ballast weights | 18 front section |
| 5 cooling system | 12 rear section | 19 front axle |
| 6 hood – cooling system | 13 rear axle | 20 loading bucket |
| 7 hood – engine compartment | 14 cab access | 21 bucket tooth guard |



b4640001

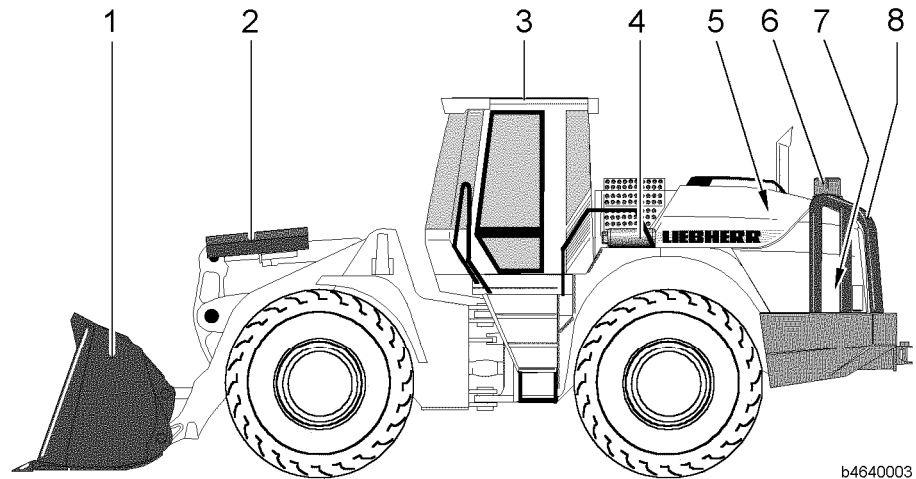
Design variants of the machine

1 Standard version

2 Tunnel version

Tunnel version L564 T

This section provides a brief overview of the distinguishing features of the machine, while naming the illustrated parts.



b4640003

Tunnel version

- 1 HD bucket
- 2 tilt cylinder guard
- 3 roof plate
- 4 fire extinguisher

- 5 diesel particle filter
- 6 top air pre-fractionator
- 7 reverse warning device
- 8 tail ram protection

1.1 Technical data

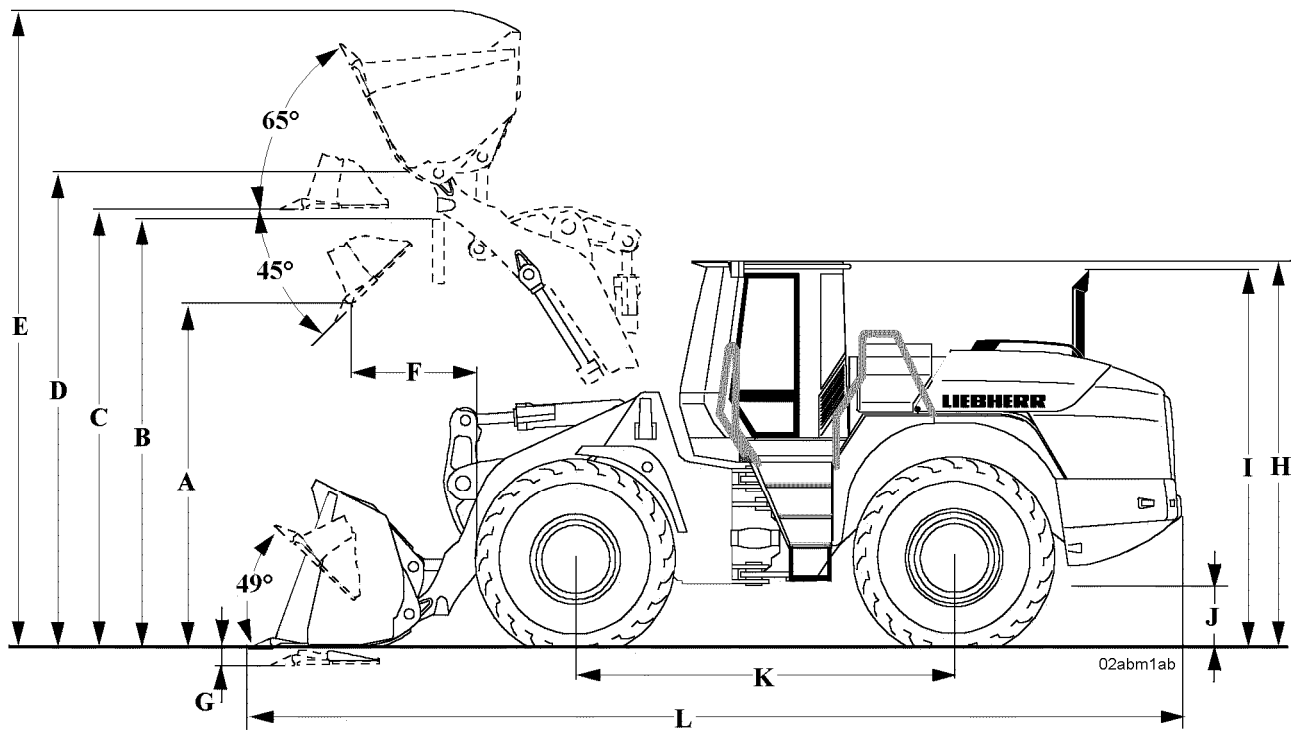
1.1.1 Complete machine

Wheel loader with Z-bar lift arm

The values specified apply to:

- the machine with Z-bar lift arm (2920 mm) without hydraulic quick-change device
- a machine with a toothed loading bucket – 4.0 m³ and with 26.5 R25 Michelin XHA tyres

LBH/02/003801/0003/4_0/en



Dimensions

Name	Value	Units
Bucket capacity	4.0	m ³
Bucket width	3000	mm
Specific material weight	1.8	t/m ³
A – dump height at max. extension and 45° tilting out angle	3220	mm
B Max. dump height	3900	mm
C Max. height bucket base	4025	mm
D Max. height of bucket pivot point	4355	mm
E Max. height of bucket upper edge	5870	mm
A – dump height at max. extension and 45° tilt out angle	1180	mm
G Digging depth	100	mm
H Height above cab	3540	mm
I Height above exhaust	3450	mm
J Ground clearance	550	mm
K Wheel base	3450	mm
L Overall length	8630	mm
Turning radius at bucket outer edge	6930	mm
Lifting force (SAE)	245	kN
Breakout force (SAE)	185	kN
Tipping load when straight *	17410	kg
Tipping load, articulated 35° *	15770	kg

LBH/02/003801/0003/4.0/en

Name	Value	Units
Tipping load, articulated 40° *	15285	kg
Articulation angle	40	°
Operating weight	22450	kg
Travel speed – travel range 1 forward and reverse	0–8.0	km/h
Travel speed – travel range 2 forward and reverse	0–18.0	km/h
Travel speed – travel range A2 (Automatic), forward and reverse	0–18.0	km/h
Travel speed – travel range A2 (automatic), forward and reverse	0–38.0	km/h

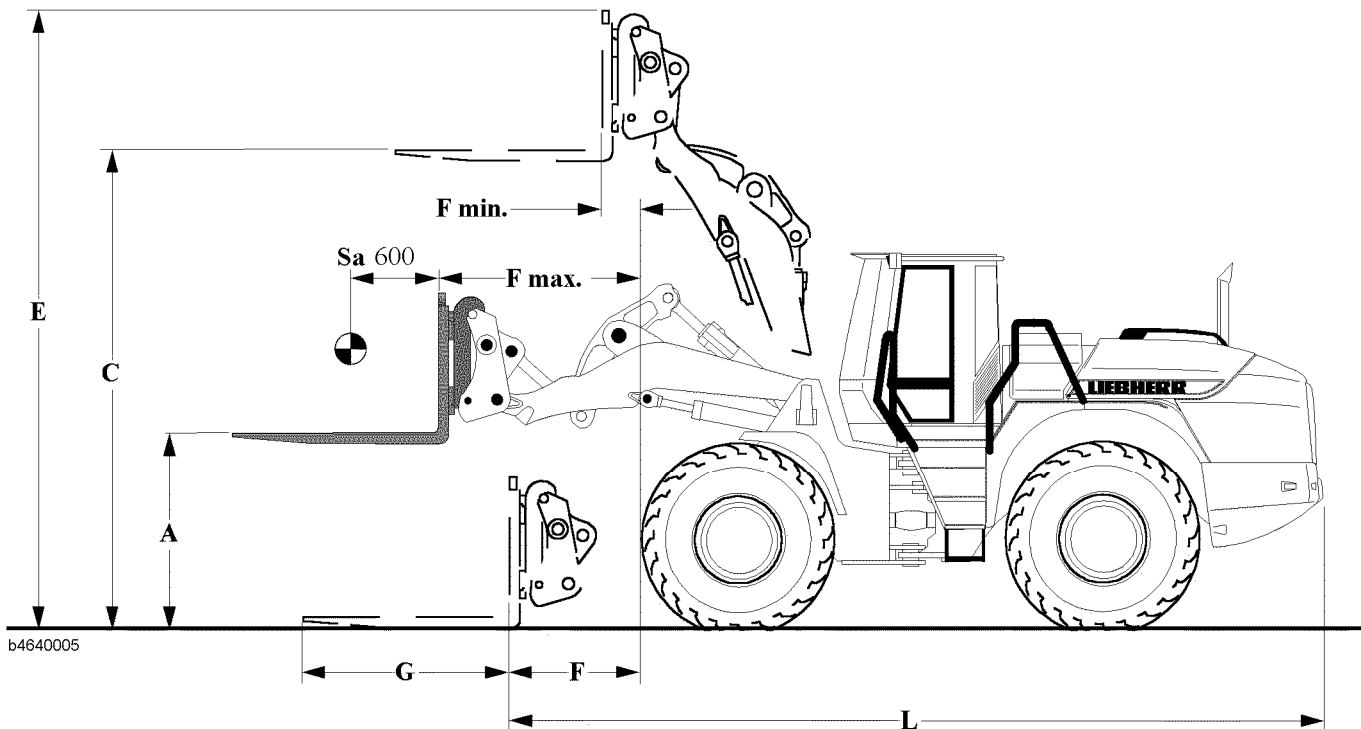
* The specified values refer to Michelin 26.5 R25 XHA tyres, inclusive of all lubricants, full fuel tank, ROPS/FOPS cab and driver.

Wheel loader with forklift

This equipment is optional.

The values specified apply to:

- the machine with Z-bar lift arm (2920 mm) with hydraulic quick change device
- for the machine with a FEM IV forklift and 26.5 R25 Michelin XHA tyres



Dimensions – Machine with Z-bar lift arm and forklift

Loading geometry		Z-bar kinematics		Z-bar kinematics	
Forklift equipment for quick change device		FEM IV 1500 mm forklift		FEM IV 1800 mm forklift	
Name		Value	Units	Value	Units
A	Lifting limit at max. reach	1985	mm	1985	mm

LBH/02/003801/0003/4_0/en

Loading geometry		Z-bar kinematics		Z-bar kinematics	
Forklift equipment for quick change device		FEM IV 1500 mm forklift		FEM IV 1800 mm forklift	
Name		Value	Units	Value	Units
C	Max. lifting limit	4120	mm	4120	mm
E	Max. height above fork carrier	5300	mm	5300	mm
F	Loading position reach	1250	mm	1250	mm
F max.	greatest possible reach	1960	mm	1960	mm
F min.	Reach at max. lift limit	1030	mm	1030	mm
G	Fork prong length	1500	mm	1800	mm
L	Total length of the basic machine	7640	mm	7640	mm
	Tipping load when straight *	11170	kg	11170	kg
	Tipping load, articulated **	9805	kg	9805	kg
	Operational weight *	22410	kg	22410	kg

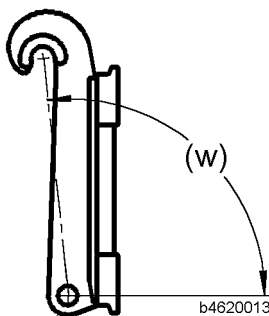
* The specified values refer to Michelin 26.5 R25 XHA tyres, inclusive of all lubricants, full fuel tank, ROPS/FOPS cab and driver.

The operational weight and the tipping load are affected by the tyre dimensions and the accessories.

** permitted payload (ISO 8313):

- on even terrain = 80% of the tipping load when arm not straight
- on uneven terrain = 60% of the tipping load when arm not straight

Load bearing tables for forklift operation



The Safety Norm EN 474-3 serves as the basis for determining the loads (nominal working loads).

The permitted load is stated as a % of the tipping load.

The following values may not be exceeded:

- even and firm terrain = 80% of the tipping load with forklift
- uneven terrain = 60% of the tipping load with forklift

The permitted loads on various bases, angles (w) and various centre of gravity offsets Sa are specified in the table below.

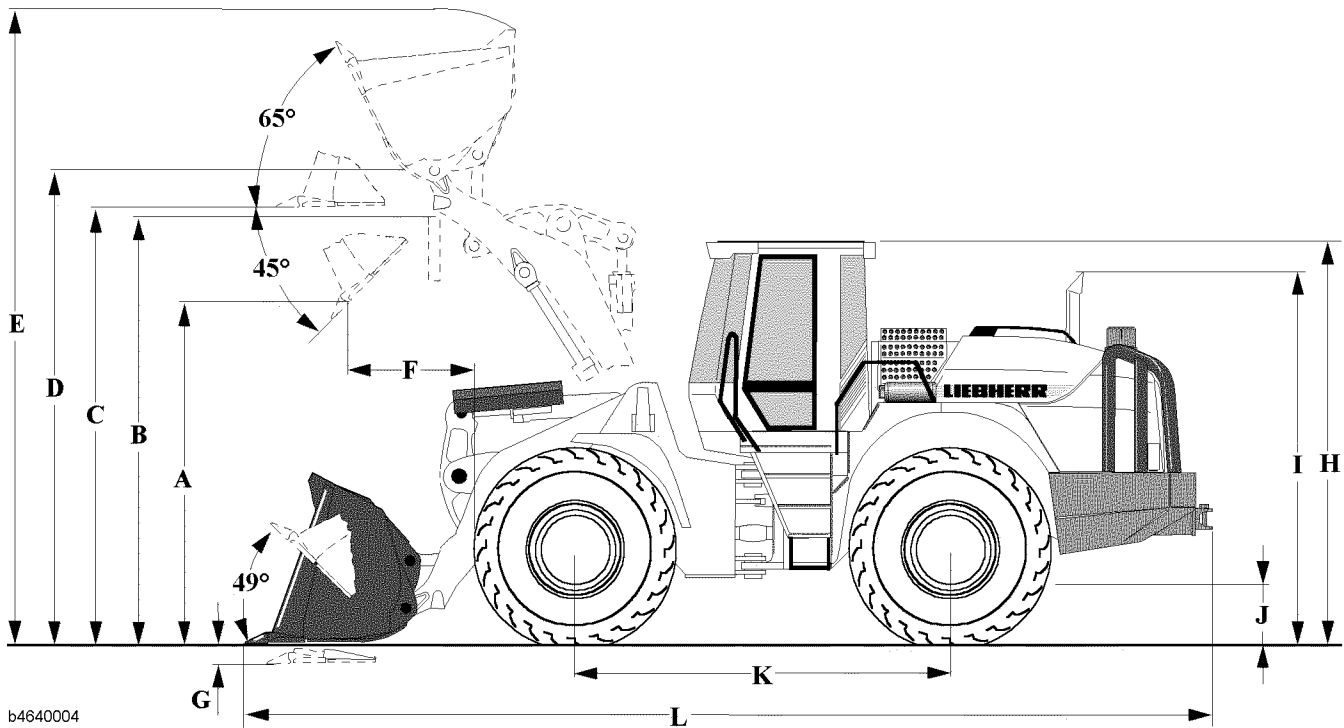
Terrain - even and firm Load = 80% of the tipping load		Lift arm with Z-bar kinematics: Loads in kg with different centres of gravity - CG in mm					
Tyres	Tyre filling	500	600	700	800	1000	1200
26.5-25	--	8117	7880	7656	7445	7056	6705
26.5-25	1500 kg	8117	7880	7656	7445	7056	6705
23.5-25	--	7777	7550	7336	7133	6760	6425
23.5-25	1140 kg	8117	7880	7656	7445	7056	6705

Terrain - uneven Load = 60% of the tipping load		Lift arm with Z-bar kinematics: Loads in kg with different centres of gravity - CG in mm					
Tyres	Tyre filling	500	600	700	800	1000	1200
26.5-25	--	6088	5910	5742	5584	5292	5029
26.5-25	1500 kg	6912	6710	6520	6340	6008	5710
23.5-25	--	5830	5660	5499	5348	5068	4816
23.5-25	1140 kg	6459	6270	6092	5924	5614	5335

LBH/02/003801/0003/4.0/en

**Wheel loader in tunnel version
L564 T**

The specified values apply to a machine with a 3.5 m³ HD toothed loading bucket and with Michelin 26.5 R25 XHA tyres.



b4640004

Dimensions – Tunnel version

Name	Value	Units
Bucket capacity	3.5	m ³
Bucket width	3000	mm
Specific material weight	1.8	t/m ³
F – dump height at max. extension and 45° tilting out angle	3220	mm
B Max. dump height	3900	mm
C Max. height bucket base	4025	mm
D Max. height of bucket pivot point	4355	mm
E Max. height of bucket upper edge	5855	mm
A – dump height at max. extension and 45° tilt out angle	1180	mm
G Digging depth	100	mm
H Height above cab	3540	mm
I Height above exhaust	3450	mm
J Ground clearance	550	mm
K Wheel base	3450	mm
L Overall length	8880	mm
Turning radius at bucket outer edge	6930	mm
Lifting force (SAE)	245	kN
Breakout force (SAE)	185	kN
Tipping load when straight *	17410	kg

LBH/02/003801/0003/4_0/en

Name	Value	Units
Tipping load, articulated 35° *	15770	kg
Tipping load, articulated 40° *	15285	kg
Articulation angle	40	°
Operating weight	22450	kg
Travel speed – travel range 1 forward and reverse	0–8.0	km/h
Travel speed – travel range 2 forward and reverse	0–18.0	km/h
Travel speed – travel range A2 (automatic), forward and reverse	0–18.0	km/h
Travel speed – travel range A2 (automatic), forward and reverse	0–38.0	km/h

* The specified values refer to Michelin 26.5 R25 XHA tyres, inclusive of all lubricants, full fuel tank, ROPS/FOPS cab and driver.

1.1.2 Diesel engine, Pump distributor gear

Diesel engine

Name	Value	Units
Engine type	D926TI-E A2	
Combustion process	Diesel, four stroke, direct injection	
Number of cylinders	6	
Cylinder volume	9960	cm ³
Rated power according to ISO 9249	183 / 249	kW / hp
Rated speed	2000	min ⁻¹
Max. torque at 1200 min ⁻¹	1072	Nm
Lower idling speed	750 ±50	min ⁻¹
Upper idling speed	2100 ±50	min ⁻¹
Inclinability /longitudinal, tranverse	45	°
Operating voltage of the ignition	24	V
Power consumption of the ignition	5.4	kW
Output voltage of alternator	28	V
Current output from alternator	55	A
Emission limit values in accordance with	ISO 8178 EUROMOT 1	

Fuel system

Name	Value	Units
Tank capacity	310	l
Tank RESERVE	70	l

Diesel particle filter

This equipment comes as standard with the tunnel version of the machine.

Name	Value	Units
Type	PF - 19 S	
Candles (radial)	6	pieces
Filter medium	Ceramic micro-fibres	
Max. permissible exhaust gas counterpressure	0.2	bar
Regeneration	Additive supported	
Additive blending ratio in litres (after first-time operation)	1:1000	

Refuelling pump

This equipment is optional.

Name	Value	Units
Flowrate	50	l/min
Duty cycle max.	15	minutes
Suction height max.	4	m

Coupling – torsion absorber

Name	Value	Units
Coupling type	Torsion absorber	

Pump distributor gear

Name	Value	Units
Transmission type	PVG 350 B 384	

1.1.3 Travel hydraulics**Variable displacement pump**

Name	Value	Units
Type	A4VG 125 DA	
Displacement max.	125	cm ³
Flow at rated engine speed	300	l/min
Pressure cut-off	400 ±5	bar

Variable displacement motor

Name	Value	Units
Type	A6VM 200 DA	
Displacement max.	200	cm ³

1.1.4 Working hydraulics**Variable displacement pump**

Name	Value	Units
Type	A11VO 130 LRDS	
Displacement max.	130	cm ³
Flow at rated engine speed	290	l/min
Pressure cut-off	320 ^{±5}	bar

Control valve block

Name	Value	Units
Type	M7-3005	
Primary pressure relief valve	380 ^{±5}	bar

Pilot control unit

Name	Value	Units
Type	5 THF 6	

Stabilization module

Name	Value	Units
Type	MH RSM 25 D2X	
Cut-off valve	170 ^{±20}	bar

Hydro accumulator unit

Name	Value	Units
Number of hydro accumulators	7	
Hydro accumulator volume	750	cm ³

Hydraulic tank

Name	Value	Units
Hydraulic tank	Steel container	

1.1.5 Steering system**Steering pump**

Name	Value	Units
Type	A10VO 71 DFR	
Displacement max.	71	cm ³
Flow at rated engine speed	160	l/min
Pressure cut-off	210 ±5	bar

Servostat

Name	Value	Units
Type	Eaton 233 - 3073	
Displacement	588	cm ³

1.1.6 Brake system**Compact brake valve**

Name	Value	Units
Max. brake pressure at pedal stop	65 ±5	bar

Parking brake

Name	Value	Units
Nominal gap	1.0	mm
Gap	min.0.5 max.1.5	mm mm

1.1.7 Electrical system

Name	Value	Units
System voltage	24	V
Battery voltage	12	V
Battery capacity	143	Ah

1.1.8 Transfer gear**Mechanical transfer gear**

Name	Value	Units
Type	3 AVG 310	
Number of gears	3	

1.1.9 Axles

Front axle	Name	Value	Units
	Type	AP 417 LK	
	Locking value of the self-locking differential	45	%
	Track width	2230	mm
	Wheel lug tightening torque	650	Nm
	Wheel lug spanner size	30	mm

Rear axle	Name	Value	Units
	Type	AP 415 LK	
	Locking value of the self-locking differential	45	%
	Angle of swing	13	°
	Track width	2230	mm
	Wheel lug tightening torque	650	Nm
	Wheel lug spanner size	30	mm

1.1.10 Tyres

For information concerning “wheel lug tightening torque” and “wheel lug spanner size”, refer to the Section “Axles”.

Tyre sizes and air pressures

The recommended tyre sizes with the corresponding tyre pressures are listed in the following tables.

The tyre pressure specifications are:

- the value set on delivery ex-works
- basic air pressure recommendations

They relate to cold tyres and to a machine which is ready for operation – the basic machine with standard equipment and permitted load.

Note: For special applications, such as stockyard operations with timber, where higher loading may be expected, a higher tyre pressure is recommended, depending on the specific load.

The tyre pressure may not however be greater than the max. permitted according to the tyre manufacturer’s specifications!

DUNLOP – tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permitted air pressure (bar)
23.5 R25 T7LD L3	4.50	2.50	4.50
23.5 R25 PG120SD L5	4.50	2.50	4.50
26.5 R25 T7LD L3	3.80	2.50	4.50

MICHELIN – tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permitted air pressure (bar)
23.5 R25 XHA L3	4.30	2.50	4.50
625/70.225 R25 70-1 L3	4.30	2.50	4.50
23.5 R25 XLD D2A L5	4.30	2.50	4.50
23.5 R25 XMine D2 L5	4.30	2.50	4.50
26.5 R25 XHA L3	3.80	2.50	5.50
26.5 R25 XLD D1A L4	3.80	2.50	5.50
26.5 R25 XLD D2A L5	3.80	2.50	5.50
26.5 R25 XMine D2 L5	3.80	2.50	5.50

GOODYEAR – tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permitted air pressure (bar)
23.5 R25 GP-2P L2	5.00	3.50	5.00
23.5 R25 RL-2 + L2	5.00	3.50	5.00
23.5 R25 RL 5K L5	5.00	3.50	5.00
26.5 R25 GP-2P L2	3.80	2.50	5.00
26.5 R25 RL-2 + L2	3.80	2.50	5.00
26.5 R25 RL 5K L5	3.80	2.50	5.00

Special tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permitted air pressure (bar)
1)			
2)			
2)			

The specifications should be entered as follows in the table:

¹⁾ from the manufacturer: If the machine is delivered ex-works with special tyres.

²⁾ from the machine operator: If the machine is retrofitted by the machine operator.

Tyres for machines with special equipment

Particulars	Type of special equipment
1)	

Particulars	Type of special equipment
2)	
2)	

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permitted air pressure (bar)
1)			
2)			
2)			

The specifications should be entered as follows in the table:

¹⁾ from the manufacturer: If the machine is delivered ex-works with special tyres.

²⁾ from the machine operator: If the machine is retrofitted by the machine operator.

1.1.11 Central lubrication system

Automatic central lubrication system

This equipment is optional.

Name	Value	Units
Type - central lubrication pump	EP-1	
Container size	4	kg
Supply voltage	24	V
Type of protection	IP 65	
Type – electronic control device	S-EP4	
Lubrication time - factory setting	7	min
Dead time - factory setting	0.5	hours

1.1.12 Cab, Heating, Air conditioning system

Driver's seat with pneumatic suspension

Name	Value	Units
Seat compressor (comfort model)	ISRI – 6500KM/575	
Voltage	24	V
Type of suspension	pneumatic	

Driver's seat with gas-filled spring suspension

This equipment is optional.

Name	Value	Units
Type	ISRI – 6000/575	
Type of suspension	Gas-filled spring suspension	

Heating, Ventilation

Name	Value	Units
Number of blower speeds	3	
Heat output	12	kW

Air-conditioning system

Name	Value	Units
Type	Heating / air conditioning unit	
Refrigerant	R134a	
Cooling output	4,8 ±10%	kW

1.1.13 Lift arm, Quick-change device**Z-bar lift arm**

Name	Value	Units
L – length	2920	mm

Quick-change device, hydraulic actuation

This equipment is optional.

Name	Value	Units
Control	Additional control lever	
Shut-off	Changeover valve	
Locking indicator	Mechanical	
Mass	440	kg

Quick-change device, electro-hydraulic actuation (with comfort control)

This equipment is optional.

Name	Value	Units
Control	Comfort control	
Shut-off	Changeover valve	
Locking indicator	Mechanical	
Mass	440	kg

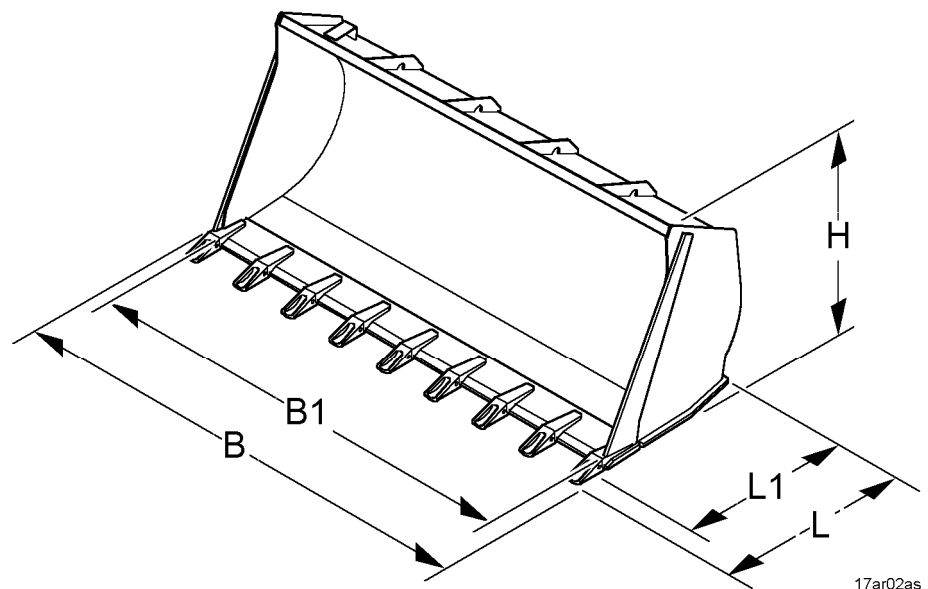
**Quick change device,
electro-hydraulic actuation
(without comfort control)**

This equipment is optional.

Name	Value	Units
Control	LH control lever	
Shut-off	–	
Locking indicator	Mechanical	
Mass	830	kg

1.1.14 Attachments, Accessories

Loading bucket

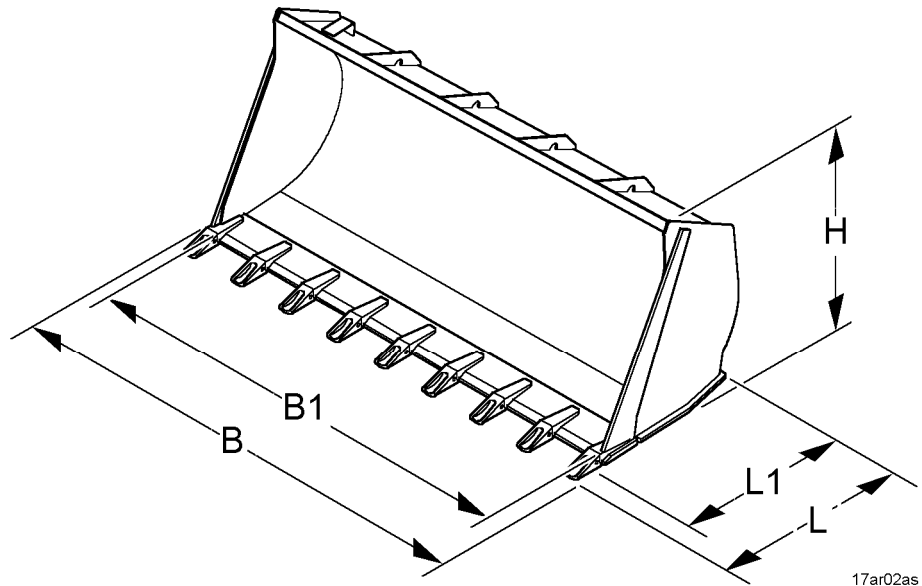


Main dimensions

Name	Value	Units
B - Bucket width	3000	mm
B1 - Loading dimension	2910	mm
H - Height	1555	mm
L - Length with teeth	1695	mm
L1 - Length without teeth	1440	mm
Specific material weight	1.8	t/m ³
Heaped bucket capacity (ISO 7546)	4.0	m ³
Mass	2080	kg
Toothing - UNI-Z-2000 IV	9	pieces

LBH/02/003801/0003/4.0/en

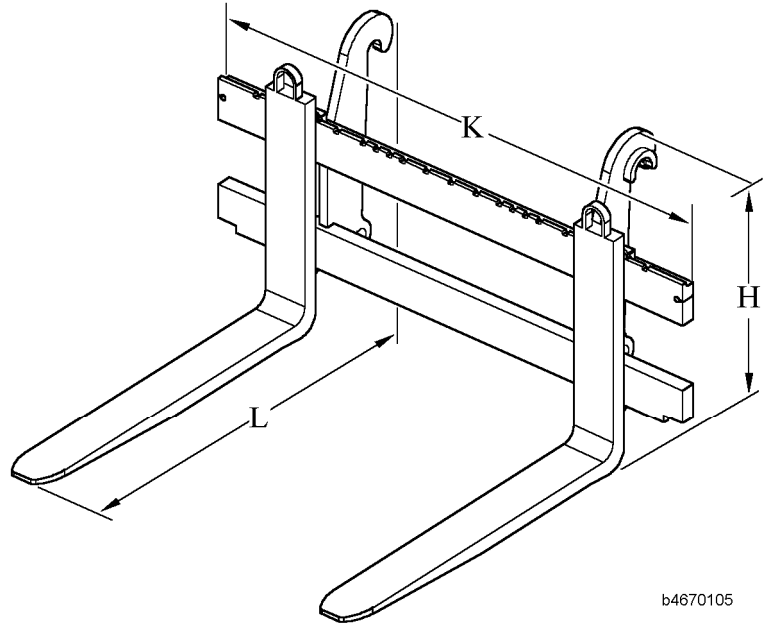
HD loading bucket This equipment is optional.



Main dimensions

Name	Value	Units
B - Bucket width	3000	mm
B1 - Loading dimension	2910	mm
H - Height	1500	mm
L - Length with teeth	1585	mm
L1 - Length without teeth	1390	mm
Specific material weight	2.0	t/m ³
Heaped bucket capacity (ISO 7546)	3.5	m ³
Mass	2030	kg
Toothing - Bofors C3T1C	9	pieces

Forklift This equipment is optional.



Main dimensions

Name	Value	Units
Prong length	1800	mm
L – Length (fork carrier + prongs)	2220	mm
K – Fork carrier width	2050	mm
H – Height (fork carrier + prongs)	1270	mm
Mass (fork carrier + prongs)	1160	kg

LBH/02/003801/0003/4.0/en

1.2 Technical description

1.2.1 Complete machine

Wheel loader

The **L564** is a fully hydraulic wheel loader with hydrostatic travel drive system.

The machine has an articulated design.

Design variants of the machine:

- Z-bar lift arm with Z-bar kinematics
- tunnel version **L564 T**

Distinguishing features of the tunnel version **L564 T**:

- HD bucket – reinforced bucket with wear-protection
- stone impact protection for tilt cylinder
- additional roof plate over the driver's cab
- fire extinguisher outside/left on the machine
- diesel particle filter
- top air pre-fractionator
- reverse warning device
- tail ram protection

1.2.2 Diesel engine, Pump distributor gear

Diesel engine

The installed diesel engine is a water-cooled, four stroke in-line engine with direct injection, turbocharger and intercooling.

The diesel engine is installed longitudinally on the rear section and elastically mounted on rubber bearings. The flywheel faces backwards.

The power from the engine is transmitted via a torsion absorber to the pump distributor gear.

The gear pumps for the auxiliary drives are flange-mounted at the engine-side.

Fuel system

The fuel tank is located behind the right-hand cab access.

The lockable tank seal can be reached from the right-hand cab access.

The fuel is drawn up by the fuel supply pump via the suction line and the fuel separator (water and contaminant precipitator) and is fed to the injection pump via a fine filter.

Diesel particle filter

This equipment comes as standard with the tunnel version of the machine.

The diesel particle filter is installed on the left-hand side of the engine compartment.

It reduces the emission of soot particles.

Refuelling pump

This equipment is optional.

The refuelling pump is installed at the back of the rear section.

The refuelling pump is only suitable for diesel fuel.

The refuelling system is designed to facilitate filling of the fuel tank with diesel fuel from a container (for example, a drum).

Air filter system

The air filter unit of the diesel engine is designed to prevent the penetration of dust and various other impurities with the suction air into the engine.

The degree of wear on the engine depends to a large degree on how clean the inlet air is. It is therefore important that the air filtering unit is regularly inspected and serviced.

The dry air filter with safety cartridge is designed to provide maximum engine protection during extended maintenance intervals.

Coupling – torsion absorber

The torsion absorber acts as an elastic coupling and oscillation damper between the flywheel of the diesel engine and the pump distributor gear.

It transmits the diesel engine torque to the pump distributor gear.

Pump distributor gear

The pump distributor gear is a single stage spur wheel-type transmission and is attached to the flywheel housing on the diesel engine.

It distributes the power from the diesel engine to the hydraulic pumps of the hydrostatic travel drive, the working hydraulics and the steering hydraulics.

1.2.3 Cooling system

Cooling system

The cooling system is mounted between the diesel engine and the driver's cab on the rear section.

The cooling system cools the diesel engine coolant, the hydraulic oil, the charge air for the diesel engine and the air conditioning condenser.

The hydrostatically driven fan draws up cool air through the cooler units and blows it over the diesel engine.

The speed of the hydrostatically-driven fan depends on the diesel engine RPM and the temperature of the coolant and hydraulic oil.

1.2.4 Travel hydraulics

Travel hydraulics

The drive from the diesel engine is transmitted to the transfer gear via the continuous hydrostatic drive in a closed circuit.

This drive enables:

- automatic adaption of the travel speed to the tractive force in each travel range
- rapid changeover from forward travel to reverse by means of the LIEBHERR control lever
- adjustment of the tractive force or speed by means of the gas pedal and the combined inch- brake pedal

Variable displacement pump

The variable displacement pump is an axial piston pump with a bent axis design. The displacement is adjusted in relation to the engine speed and load.

The delivery direction of the pump is determined by the driving direction valve.

Variable displacement motor

The variable displacement motor with a bent axis design drives the transfer gear. The hydraulic setting of the displacement makes a wide adjustment range possible.

A large tractive force is achieved at the maximum pivoting angle and the possible speed in this case is low.

The highest speed and the lowest possible tractive force obtain at the minimum pivoting angle.

1.2.5 Working hydraulics

Working hydraulics

The working hydraulics systems operates in an open circuit. The variable displacement pump draws oil from the hydraulic tank and delivers it to the control valve block.

The control valve block is hydraulically controlled by the pilot control device and directs the oil volume to the lift or tilt cylinders. A spool valve for floating position / fast lowering function and the LFD system are integrated in the control block.

Variable displacement pump

The variable displacement pump is an axial piston pump with a bent axis design. The controllers attached to the variable displacement pump determine the swivel angle of the pump and its flowrate.

The flow controller ensures that the variable displacement pump only delivers that volume of oil from the hydraulic tank, which is currently required by the working hydraulics.

The pressure limits the maximum operating pressure of the working hydraulics.

The power controller ensures that the pump does not draw off too much power from the diesel engine.

Control valve block

The control valve block is installed in the front section of the vehicle. The spool valves for the lift and tilt cylinders, as well as an additional spool valve for float position, quick drop function and ride control are all integrated in the control valve block.

Pressure relief valves protect the system from pressure peaks.

Pilot control

The working hydraulics are controlled by the LIEBHERR control lever. The control valve block is thereby hydraulically controlled via the pilot control valve.

The pilot control valve is supplied with oil from the replenishing pump via the pilot control - solenoid valve. The presence of a hydro accumulator means that even when the diesel engine is at rest, the working attachments can be operated in emergencies, for example the lift arm can be lowered and/or the bucket can be tilted out.

The functions 'bucket return-to-dig', 'lift kick-out' and 'float position' are all controlled via retaining magnets in the pilot control unit and via proximity switches.

Ride control (LFD system)

The LFD system absorbs the bouncing and pitching motion by the machine when driving, considerably improving driver comfort and safety.

The lift cylinders are linked at their base-ends with the hydraulic accumulator unit via the control block and the stabilising module. The rod-end of the lift cylinders is linked to the hydraulic tank.

Stabilization module

The stabilization module protects the hydro accumulators from pressure peaks.

When the pressure is too high, the stabilization module interrupts the oil flow to the hydro accumulator unit.

Hydro accumulator unit

The hydro accumulator unit of the LFD system consists of a steel block with 7 hydraulic accumulators.

The hydro accumulators absorb the pressure peaks from the lift cylinder bottom-end and thus absorb the bouncing and pitching vibrations by the vehicle when travelling.

Hydraulic tank

The hydraulic tank supplies the travel hydraulics, working hydraulics, brake system and steering system with hydraulic oil.

The variable displacement pumps move the oil via control units to the individual consumers and back to the hydraulic tank via the oil cooler. The oil passes through the return-suction filter as it flows back.

In addition, the fixing brackets for the exhaust gas system and for the air filter are integrated on the steel section of the hydraulic tank.

Return-suction filter

The return-suction filter cleans the oil as it flows back from the working and travel hydraulics. The oil flows from the inside outwards through the filter.

The filter acts simultaneously as a suction filter for the replenishing pump of the hydrostatic travel drive

Return strainer

The return strainer filters a fraction of the return-flow oil from the entire hydraulic system. The filtered oil then flows back to the hydraulic tank.

1.2.6 Steering system

Steering system

The vehicle has articulated steering. Two steering cylinders push the front and rear sections together via the articulated joint.

The hydraulic steering system is supplied with oil from the variable displacement pump. When the steering wheel is turned, the oil is directed by the servostat to the steering cylinders.

An absorption system in each steering cylinder prevents an abrupt impact at the limit of the articulated steering movement in both directions. Two hydro accumulators damp the steering movements during steering.

An emergency steering system makes steering possible, even in the event that the variable displacement pump breaks down.

Steering pump

The steering pump is an axial piston pump with a bent axis design and is flange-mounted on the variable displacement pump of the working hydraulics.

The pressure and flow controllers - mounted on the pump housing - determine the flowrate of the pump.

Emergency steering pump

The emergency steering pump, is a gear pump driven by an electric motor. The pump supplies oil as required to the steering system.

The electric motor is controlled by an electronic system. If the variable displacement pump breaks down, the emergency steering pump is automatically activated. Each time the diesel engine is started, the emergency steering pump executes a short test run.

Servostat

The servostat is actuated by the steering wheel via the steering column. The metering pump in the servostat directs the oil flow from the variable displacement pump to the steering cylinders. In the process, the oil volume is precisely metered to enhance the responsiveness of the steering.

1.2.7 Brake system

Brake system

The service brake is a hydraulic dual-circuit pump accumulator brake system. It acts on the wet disc brakes in the wheel hubs of the front and rear axles.

The service brake in conjunction with the hydrostatic braking is operated by the combined inch/brake pedal.

Compact brake valve

The compact brake valve is mounted outside on the cab floor. It is actuated by the inch/brake pedal.

The compact braking valve is supplied with hydraulic oil from a gear pump.

Parking brake

The parking brake is a spring-accumulator - gliding caliper brake and acts on the external brake disc mounted on the output shaft of the transfer gear.

The parking brake is opened by oil pressure and closed by spring force.

1.2.8 Electrical system

Electrical system

The batteries are connected in series, one is located in each counterweight (left- and right-side).

The battery main switch is located on the left-hand side of the engine compartment at the rear.

When the main switch is turned off, the whole electrical system is shut down. If the main switch is turned on and the starter switch on the instrument panel is turned off, the batteries are still connected to the electrical system.

The battery main switch may not be turned off when the diesel engine is running. The electrical system could be damaged as a result.

1.2.9 Transfer gear

Transfer gear system

The transfer gear is a 3-gear power shift gearbox with a planetary design.

The gearbox is controlled and monitored by an electronic control system.

The multi-disc couplings of the gearbox are pressure modulated.

The gearbox lubrication and circuit are supplied by a separate hydraulic system driven by a gear pump. A pressure filter is integrated in the supply line.

1.2.10 Axles, Tyres

Front axle

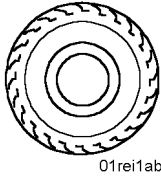
The front axle is a fixed axle and is rigidly bolted to the front section.

The axle is equipped with a central tapered gear with an integrated disc-type self-locking differential. The planetary drives and wet disc brakes are located in the wheel hubs.

Rear axle

The rear axle is a fixed axle and is rigidly bolted to the oscillating axle frame. The oscillating axle frame is mounted on a rotating bearing on the rear section.

The axle is equipped with a central tapered gear with an integrated disc-type self-locking differential. The planetary drives and wet disc brakes are located in the wheel hubs.



Tyres

The driving performance of the machine depends among other things on the tyres.

It is essential that all four tyres are of the same size.

The correct tyre pressure is a decisive factor for perfect machine performance in operation and for high tyre mileage.

Snow chains or guard chains

When snow chains or guard chains are used, then they must be to all four wheels!

Note: Non-observance can result in damage to the drive system!

1.2.11 Vehicle frame, Ballast weight

Vehicle frame

The vehicle frame is divided between the front and rear sections. These are linked by the articulation bearing.

For steering, the vehicle frame is pivoted to the left or right via the articulation bearing.

The vehicle frame transmits the forces from the lift arm to the axles. The frame bears all the key components of the machine such as the diesel engine, driver's cab, transfer gear, etc.

Articulation lock

The front and rear sections must be mechanically locked together in close proximity to the articulated joint when the machine is slung from a crane and during transport by truck or rail, as well as for maintenance and repair work.

The joint is locked by means of a safety bar.

This is attached to the rear section on the left next to the cab access ladder.

1.2.12 Central lubrication system

Manual central lubrication

The "manual central lubrication" consisting of two central lubrication rails is mounted on the left-hand side of the machine in the articulation zone.

Otherwise inaccessible lubrication points are manually lubricated via the two central lubricating rails.

Automatic central lubrication system

This equipment is optional.

The automatic central lubrication system is a progressive system. It lubricates progressively; that is to say, all the lubrication points are served one after the other.

An electrically driven central lubrication pump EP-1, delivers the grease to the primary progressive distributor and distributes it amongst the secondary progressive distributors. The secondary progressive distributors pump the grease to the individual lubrication points. An integrated, electronic control device controls the lubrication and dead time of the piston pump.

An overpressure valve monitors lubrication of the individual lubrication points.

1.2.13 Cab, Heating, Air-conditioning system

Cab

The cab is a safety cab and has been tested and certified according to ROPS/FOPS regulations. It is mounted on sprung 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, exiting through the right-hand door is also possible.

Driver's seat with pneumatic suspension

The driver's seat is equipped with pneumatic suspension (compressor operated).

An electrically driven compressor supplies a pneumatic spring in the seat section and two pneumatic chambers in the back rest.

For information on seating comfort, adjustability and vibration damping: Refer to the Section "Driver's seat with pneumatic spring suspension"

Driver's seat with gas-filled spring suspension

This equipment is optional.

The driver's seat is equipped with gas-filled spring suspension.

The ergonomically designed driver's seat offers a high degree of comfort.

The adjustable seat surface, back rest, suspension and arm rest mean that the driver can adjust the seat for maximum individual comfort.

Vibration damping

The seat installed in the machine corresponds to ISO 7096.

When the machine is used correctly, the values of the vibrations transmitted by the driver's seat are smaller or equal to the simulated vibrations for the corresponding machine class in accordance with ISO 7096.

The values of the evaluated vibration accelerations " a_{ZW} ", measured according to ISO 2631, Part 1, thus fulfil the requirements for protection against whole body vibrations according to EN 474-1.

Heating, Ventilation

The driver's cab is equipped with a warm water heating system.

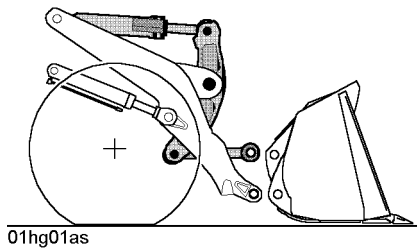
The inlet air is filtered via two serviceable dry filter cartridges and directed to the cab via the heating/air-conditioning unit and the adjustable air flow nozzles.

Air-conditioning system

An air-conditioning system is installed as standard in the driver's cab.

The drawn-in air is filtered via two serviceable dry filter cartridges and directed into the cab via a vaporiser and heat exchanger and the adjustable outlet nozzles.

1.2.14 Lift arm, Quick-change device



Z-bar kinematics

Z-bar lift arm

The lift arm is attached to the front section of the machine.

The lift arm has a Z-kinematic design. That is to say, the tilt cylinder, reversing lever and connecting strap form a “Z”. The “Z-Form” can be seen from the right-hand side.

With the lift arm with Z-bar kinematics, no parallel movement is possible.

The arm can be equipped with a hydraulic quick change device (option).

Two lift cylinders and a tilt cylinder are attached to the lift arm.

The lift arm is bolted to the front section via the bucket arm bearings and the cylinder bearings on the cylinder base side.

The bearing points on the lift arm are sealed and protected against wear caused by contamination and corrosion.

Quick-change device

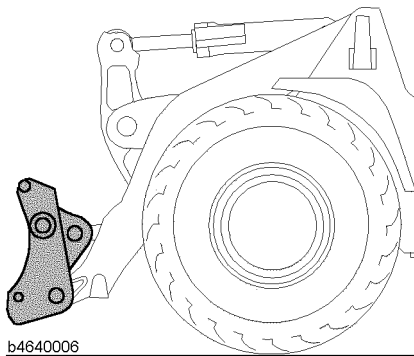
This equipment is optional.

The quick-change device is or will be attached to the lift arm of the machine.

It is designed to facilitate the fast changeover of various attachments on the lift arm.

Design variants of the quick change device:

- version: hydraulic actuation by an additional controller
- version: combined, electro-hydraulic actuation with comfort control
- version: combined, electro-hydraulic actuation with switch



1.2.15 Attachments, Accessories

Loading bucket

The loading bucket is one of a variety of implements which can be mounted on the lift arm.

The loading bucket is part of the standard equipment of the machine. The bottom cutting edge is supplied in a variety of designs, depending on the deployment conditions.

The loading bucket is attached directly to the lift arm as standard.

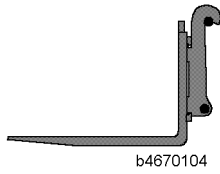
Where the optional quick-change device is provided, the loading bucket is attached to this.

HD loading bucket

This equipment is optional.

The HD bucket is a reinforced bucket with wear-protection. It is employed when the machine is deployed under difficult conditions (e.g. for tunnel work).

Forklift



This equipment is optional.

The forklift is one of a variety of attachments which can be mounted on the lift arm.

The forklift is either attached directly to the lift arm or via the optional quick-change device.

The forklift is intended for picking up, carrying and transferring pallets and for stacking jobs.

2 Safety regulations

Working on the machine involves possible risk to life and limb of the operator, driver or maintenance technicians. You can considerably reduce the risk of accidents by always reading and observing the various safety instructions carefully.

This is especially important for specialists 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 for specialists or damage to the machine are described in this manual, the necessary safety precautions are explained.

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

2.1 Introduction

1. The symbols below have the following significance:



“Danger”

Warning that without appropriate precautions, certain operational procedures could result in fatal accidents.



“Warning”

Warning that without appropriate precautions, certain operational procedures could result in severe physical injuries.



“Caution”

Warning that without appropriate precautions, certain operational procedures could result in less severe physical injuries or damage to the machine.

2. **Observance of these instructions does not relieve you of the responsibility for following any additional rules and guidelines that may apply!**

The following should also be observed:

- the safety rules in force at the operating site
- legally enforceable “traffic regulations”,
- guidelines issued by the employees trade associations

2.2 General safety precautions

1. Familiarise yourself with the **“Operator's manual”** before starting up the machine.
Make sure that you are in possession of and have read and understood additional instructions applicable for any accessory equipment installed on your machine.
2. Only expressly authorised personnel may operate, service or repair the machine.
Observe the legally enforceable minimum ages!
3. Only deploy trained or instructed personnel, clearly assign responsibility for operation, rigging, maintenance and repair work.

4. Clearly establish the driver's responsibilities (also in respect of traffic regulations) and empower him to refuse to carry out unsafe instructions from third parties.
5. Personnel undergoing training, instruction or who are not yet fully qualified may only be allowed to work on/with the machine under constant supervision.
6. Now and again check that your personnel are working safely and are aware of possible dangers in observance of the "**Operator's manual**".
7. Wear safe working overalls when working on or with the machine. Avoid wearing rings, wrist watches, ties, scarves, open jackets, loose clothing and so on. There is a risk of injuries due for example, to being caught or being drawn in.
For certain kinds of work the following are prescribed: safety goggles, safety boots, hard hats, gloves, reflective vests, ear protection. . .
8. Obtain information about any special safety regulations in force on-site from the site manager.
9. Do not hold onto the steering column, the control panel or the control levers when getting on or off.
This can result in unforeseen movements by the machine which could in turn lead to accidents.
10. Never jump down from the machine. Use the steps, ladders and gangways provided for getting on and off.
11. Familiarise yourself with the emergency exit through the right-hand cab door and/or rear window.
12. If no other instructions are in effect, proceed as follows with maintenance and repair work:
. . .
 - park the machine on firm, level ground and set the working attachment down on the ground
 - move all control levers to neutral
 - shut down the engine and take out the ignition key
13. Before commencing any work on the hydraulic circuit, you must also actuate all servo control devices (joystick and pedals) in both directions, in order to reduce the control pressure and banded up pressure in the operating circuits. You must then reduce the internal tank pressure.
14. Lock the working hydraulics to prevent unforeseen actuation before leaving the driver's cab.
Block the working hydraulics in accordance with the instructions in the "**Operator's manual**".
15. Secure all loose components on the machine.
16. Never start up a machine without first making a thorough tour of inspection and check if any warning signs are missing or illegible.
17. Observe all signs bearing danger or safety instructions.
18. The machine must be provided with specific safety devices for special applications. In this case, only operate the machine when these have been installed and are fully functional.
19. Do not make any modifications, extensions or conversions to the machine with possible safety implications, without the approval of the supplier. This also applies for the installation and adjustment of safety installations and valves as well as for welding work on load bearing components.

2.3 Proper use

1. When equipped with standard loading bucket, forklift or grab, the wheel loader is designed exclusively for loosening, picking up, transferring, loading and dumping earth, stone, rock fragments or other materials and loading the same onto trucks, ships, conveyor belts or crushing installations.
2. Any other use or a use going beyond this, such as breaking up rock, driving in posts, transporting personnel etc., counts as improper use.
The manufacturer/supplier accepts no liability for any injury or damage resulting from the above.
The risk is borne by the user alone.
3. Machines used for lifting purposes are subject to special conditions and must, among other things, be equipped with the prescribed safety equipment.
4. Proper use also includes observance of the **“Operator's manual”** and adherence to the inspection and maintenance conditions.

2.4 Signs on the machine

1. Your machine has several types of signs.

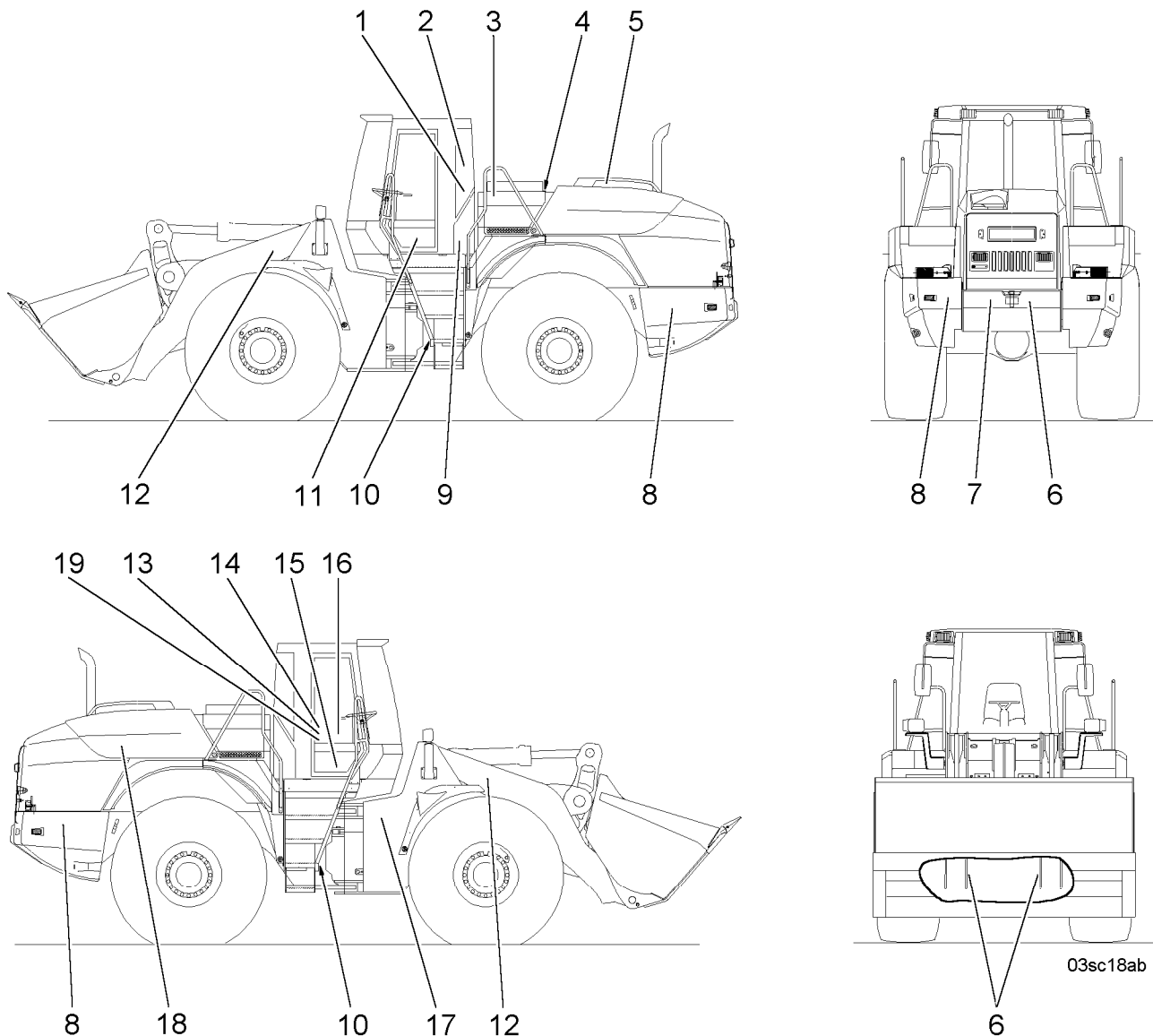
Types of signs:

- safety signs
- information signs
- type plates

Their contents and locations are described below.

The order numbers are included in the spare parts list.

2.4.1 Arrangement of signs

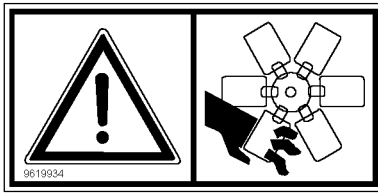


Arrangement of signs

- | | | |
|--|-------------------------------|--------------------------------|
| 1 Noise pressure decal – L _{pA} | 8 Speed limit sign 40 | 15 ROPS decal |
| 2 Noise output decal – L _{WA} | 9 Sign for windscreen water | 16 Sign for working hydraulics |
| 3 Cooler unit sign | 10 Pivoting area warning sign | 17 Type plate – machine |
| 4 Minimum level sign | 11 Lubricant chart | 18 OIL LEVEL sign |
| 5 Engine standstill sign | 12 Loiter warning sign | 19 Wheel lugs sign |
| 6 Sign for slinging - lifting point | 13 Accident prevention sign | |
| 7 Sign for lashing point | 14 Steering sign | |

2.4.2 Safety signs

1. Non-observance of the safety signs can result in serious or even fatal injuries.
The safety signs should be continuously checked for completeness and legibility.
Missing or illegible safety signs should be replaced immediately.



03sc04ab

Engine standstill sign

Sign 5 is affixed on top of the engine compartment – hood.
Warns of risk of accidents, possibly resulting in severe injuries.
Meaning: **Only open when the engine is shut down!**



03sc02ab

Pivoting area warning sign

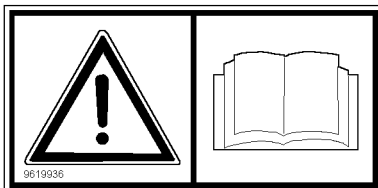
Sign 10 is affixed outside on the left and right in the pivoting area.
Warns of risk of accidents, possibly resulting in severe or even fatal injuries.
Meaning: **Remaining in the pivoting area is prohibited, when this is unlocked!**



03sc01ab

Loiter warning sign

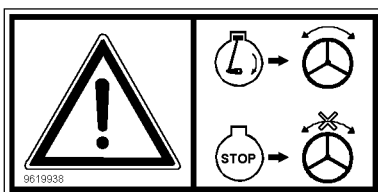
Sign 12 is affixed to the outside of the lift arm on the left and right.
Warns of risk of accidents, possibly resulting in severe or even fatal injuries.
Meaning: **Remaining in the danger area is prohibited!**



03sc03ab

Accident prevention sign

Sign 13 is affixed to the right-hand side of the driver's cab.
Refers to regulations in the operating manual for accident prevention.
Meaning: **When operating the machine, the regulations in the operating manual for accident prevention must be followed precisely!**



03sc05ab

Steering sign

Sign 14 is affixed to the right-hand side of the driver's cab.
Warns of risk of accidents, possibly resulting in severe or even fatal injuries.
Meaning: **The steering is only operational when the engine is running!**

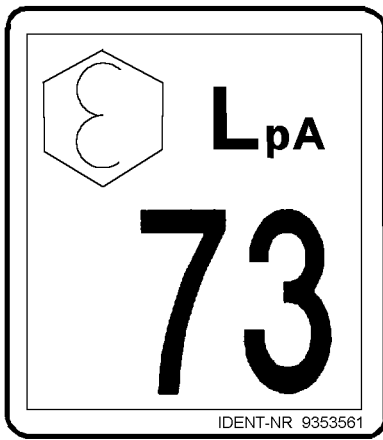
2.4.3 Information signs

1. The information signs refer to certain facts in respect of the operation, maintenance and properties of the machine.

Noise pressure decal – L_{pA}

Decal 1 is affixed inside the left-hand window of the driver's cab.

Specifies the L_{pA} – sound pressure of the machine in decibels.

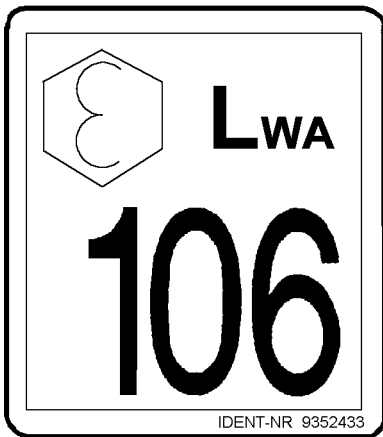


03sc15ab

Noise output decal – L_{WA}

Decal 2 is affixed inside the left-hand window of the driver's cab.

Specifies the L_{WA} – sound pressure level of the machine in decibels.

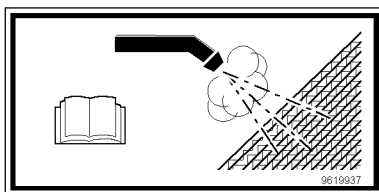


03sc14ab

Cooler unit sign

Decal 3 is affixed externally to the cooling system – hood on the left.

Refers to cleaning the cooling system.

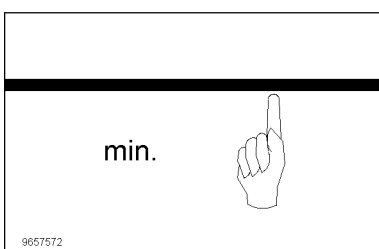


03sc07ab

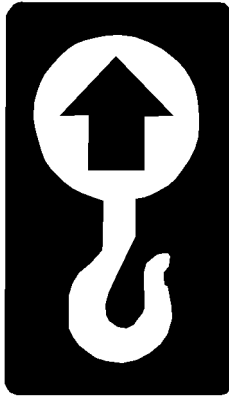
Minimum level sign

Decal 4 is attached in the engine compartment to the coolant reservoir.

Indicates the coolant level in the coolant reservoir.



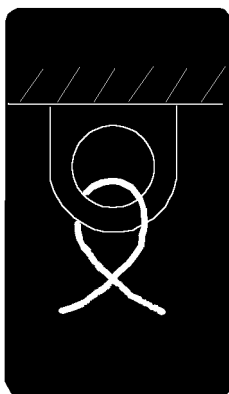
03sc12ab



03sc17ab

Sign for slinging - lifting point

Decal 6 is affixed to the slinging-lifting points on the machine.
 Refer to the Section “Slinging the machine from a crane”.
 Refers to the slinging- lifting points on the machine.



03sc16ab

Sign for lashing point

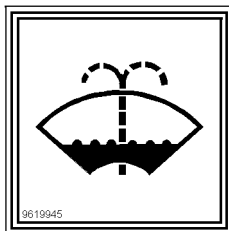
Decal 7 is affixed to the lashing points on the machine.
 Refer to the Section “Transporting the machine by truck or rail”.
 Refers to the lashing points on the machine.



03sc08ab

Speed limit sign 40

Decal 8 is affixed to the rear of the machine and on the sides to the left- and right-hand ballast weights.
 Refers to the permitted speed limit for the machine.



9619945

03sc13ab

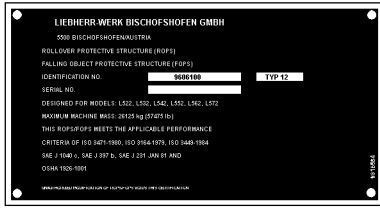
Sign for windshield water

Decal 9 is affixed outside on the left side of the driver's cab.
 Indicates the container for the windscreen washing agent.

Lubricant chart

The decal is affixed to the left-hand door of the driver's cab.
 Figure – refer to the Section “Maintenance”.
 Indicates the maintenance points and intervals in relation to lubricants and operating materials for the machine.

LBH/02/003801/0003/4.0/en

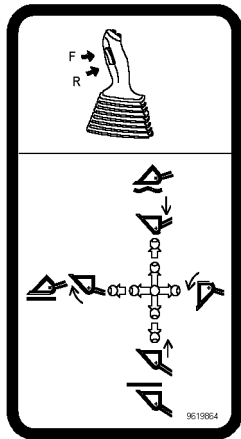


03sc09ab

ROPS sign

Decal 15 is affixed to the floor of the driver's cab on the right-hand side of the driver's seat.

Indicates the maximum loading of the rollbar structure.

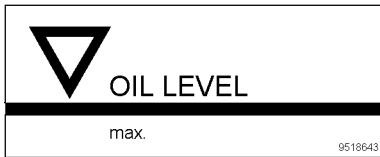


03sc06ak

Sign for working hydraulics

Decal 16 is attached to the right-hand side of the driver's cab.

Indicates the directions in which the LH control lever can be moved.

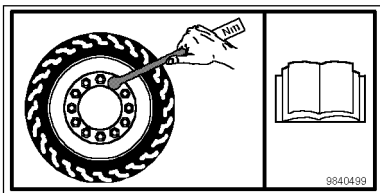


03sc11ab

OIL LEVEL sign

Decal 18 is attached to the hydraulic tank on the right-hand side of the engine compartment.

Indicates the oil level in the hydraulic tank.



bsch0001

Wheel lugs sign

Decal 19 is attached to the right-hand side of the driver's cab.

Indicates the service interval for checking the secureness of the wheel lugs specified in the Operating Manual.

2.4.4 Type plates

1. A type plate is attached to the machine and individual components such as, the diesel engine, gearbox, axles etc.

Type plate – machine

Decal 17 is affixed to the right-hand side of the front section.

Details on the type plate:

- type
- vehicle identity No.
- permitted total weight
- year of construction
- permitted front axle load
- permitted rear axle load
- engine output
- speed limit



03sc10ab

2.5 Instructions for avoiding crushing injuries and burns

1. Do not work below the working attachment until it has been securely set down on the ground or is supported.
2. Do not use any ropes or chains, which are damaged or with insufficient load bearing capacity.
Wear protective gloves when handling wire hawsers.
3. When working with the attachment, never align the boreholes with your fingers, instead use a suitable mandrel for this purpose.
4. Make sure that when the engine is running, no objects come into contact with the fan.
Objects which fall or project into the fan will be catapulted out or destroyed and could damage the fan.
5. At operating temperature, the engine cooling system is hot and under pressure.
Avoid contact with parts carrying cooling water.
There is a risk of burns.
6. Do not attempt to check the cooling water level until the screw cover of the expansion container is cool enough to touch.
Open the cover carefully to release the excess pressure.
7. At around operating temperature, the engine and hydraulic oil are hot.
Do not let hot oil or parts conducting oil come into direct contact with your skin.
8. Wear safety goggles and protective gloves when working on the battery.
Avoid sparks and naked flames.
9. Never let the loading bucket or other working attachments be moved into position by hand.
10. Before reaching into the engine compartment, secure the engine compartment hatches against unforeseen dropping or closing with the struts provided for this purpose.
11. Before starting up the vehicle, the engine compartment hatches and the battery container covers should be closed and locked.

12. Never get under the machine when this is propped up on the working attachment, without first securely supporting the undercarriage on wooden billets.

2.6 Instructions for avoiding fires and explosions

1. When refuelling, the engine must be shut down. Shut down any auxiliary heating systems.
2. Do not smoke and avoid naked flames when refuelling or when near batteries while they are being recharged.
3. Always follow the instructions in the “**Operator's manual**” when starting the engine.
4. Check the electrical system.
Immediately rectify all faults, such as loose connections, worn cables or burnt-out fuses and bulbs.
5. Do not transport any flammable liquids on the machine except in the tanks designed for this purpose.
6. Regularly check all leads, hoses and couplings for leaks and damage.
7. Immediately repair the leaks and replace the defective components.
Oil escaping under pressure from leaks can easily lead to fires.
8. Ensure that all supports and protective plates are properly installed so as to avoid vibrations, abrasion and heat damming.
9. Starting pilot (ether) is a special fire hazard!
Never employ volatile gas-based cold starting aids in the proximity of heat sources, naked flames (e.g. cigarettes) or in poorly ventilated spaces.
10. Familiarise yourself with the operation and location of fire extinguishers and obtain information on the fire alarm and fire fighting options available on site.

2.7 Instructions for starting up safely

1. Each time before starting up, walk around the machine, carrying out a thorough inspection.
2. Check the machine for loose bolts, cracks, wear, leaks and malicious damage.
3. Never attempt to start up a defective machine.
4. Ensure that any defects are rectified immediately.
5. Ensure that all hoods and covers are closed and locked. Check that all warning and information signs are present.
6. Make sure that the cab windows and inside and outside mirrors are clean and secure the doors and windows against unforeseen movements.
7. Make sure that nobody is working on or under the machine. Warn persons in the vicinity that the machine is being started up.
8. After getting into the driver's cab, adjust the seat, the inside and outside mirrors, the control lever and the safety belt so that you can work comfortably.
9. Acoustic protection equipment on the machine must be activated during operation.

2.8 Safety precautions at start-up

1. Before starting, check that all pilot lamps and instruments are working perfectly.
Move all control levers to neutral.
2. Before starting the engine, briefly sound the horn, to warn other persons in the vicinity of the machine.
3. Only ever start the machine from the driver's seat.
4. Unless otherwise instructed, start the engine in accordance with the instructions in the "**Operator's manual**".
5. Start the engine and then check all display and monitoring devices.
6. Never run the engine in an enclosed space, unless it is sufficiently ventilated.
If necessary, open doors and windows to guarantee an adequate supply of fresh air.
7. Run the engine until both it and the hydraulic oil are at operating temperature; low oil temperatures lead to a sluggish performance.
8. Check that the control for the working attachment is functioning perfectly.
9. Drive the machine carefully to an open space and then check that the service brake, the steering and the signal and lighting equipment are all functioning properly.

2.9 Instructions for working safely

1. Before commencing work, acquaint yourself with the special features of the building site as well as special regulations and warning signals.
The working environment includes for example, any obstacles in the working area and on access roads, the load bearing capacity of the ground and any cordoning off to secure the site from the public roads.
2. Always maintain sufficient safety clearance from overhangs, edges, slopes and unstable ground.
3. Be especially careful when the ground conditions are variable, when your field of vision is restricted or when the weather conditions are changeable.
4. Familiarise yourself with the position of the utility lines on the site and be especially carefully when working in proximity to them. If necessary, inform the responsible authorities.
5. Maintain a sufficient safety clearance from overhead power lines.
When working in close proximity to overhead power lines, be especially careful not to let the working attachment get close to the lines.
 - There is a risk of "**FATAL INJURIES**!"
 - Obtain information about the safety clearances to be observed.

If you do come into contact with live power lines:

 - Do not attempt to leave the machine!
 - If possible, drive the machine a sufficient distance away from the danger area.
 - Warn others not to come close or to touch the machine.
 - Arrange for lines to be de-energized.
 - Do not get out of the machine until you are certain that the contacted/damaged power line is voltage free!
6. Before driving or working with the machine, always make sure that the accessories have been stowed away so as to prevent accidents.

7. When driving on public roads, paths and spaces, observe the applicable traffic regulations and if necessary, make sure that the machine is roadworthy.
8. Always turn on the lights when visibility is poor or in darkness.
9. Do not allow anybody to ride on the machine.
10. Only work when seated and with your seat belt fastened.
11. Report all malfunctions and ensure that all necessary repairs are carried out immediately.
12. Personally ensure that nobody could possibly be endangered when you set the machine in motion.
13. Before starting work, check the brake system in accordance with the regulations in the **“Operator’s manual”**.
14. Never leave the driver’s seat when the machine is still in motion.
15. Never leave the machine unmonitored when the engine is running.
16. When in motion, lower the working attachment into the transport position and keep the load as close to the ground as possible.
17. Avoid movements which could cause the machine to tip over.
If the machine should start to tilt or slide to one side, set down the working attachment immediately and turn the machine so that it is facing downhill.
Wherever possible work up- or downhill and not perpendicular to the slope.
18. Drive carefully on rocky or swampy ground or on slopes.
19. Only drive downhill within the permitted speed limit, otherwise you could lose control over the machine.
The engine must be running at the rated speed and the travel speed may only be reduced by means of the gas pedals.
Shift down to the lowest gear before reaching the slope, don’t wait until you are actually on it.
20. When loading a truck, insist that the driver leaves his cab, even when stone impact protection is provided.
21. With demolition work, clearance, crane operation etc., always use the protective equipment provided for these specific deployments.
22. Where vision is restricted and whenever it is necessary, get an assistant to give you directions from outside.
Only let one person give you directions.
23. Only assign experienced personnel with responsibility for slinging loads and directing crane operators.
The banksman should remain in visual contact with the operator or at the very least be in audio contact with him.

2.10 Safety instructions for driving on slopes

1. On downward slopes, always drive carefully and never at top speed, as otherwise you could lose control over the machine.
Travel speeds:
 - The travel speed limits specified in the **“Operator’s manual”** must never be exceeded!
 - Exceeding the max. speed limit causes the permitted limits to be exceeded for all rotating parts, such as the drive engine, the cardan shaft, all gears inclusive of axles and ultimately the diesel engine itself.

2. Therefore, before driving onto a slope, a travel range (gear) should be previously selected, in which the machine can comfortably manage the whole slope without endangering other traffic, the driver or the machine itself.
3. When driving on slopes, you should also ease off the gas pedal.

2.11 Parking safely

1. If possible, only park the machine on firm, level ground.
If it must be parked on a slope, then the machine should be secured against rolling away with wedges.
2. If the machine has an articulated design, the articulation lock must be installed.
With wheel loaders, this applies to machines with articulated steering.
3. Lower the working attachment and lightly anchor the digging attachment in the ground.
4. Move all control levers into neutral position and engage the parking brake.
5. Shut down the engine in accordance with the instructions in the **“Operator’s manual”**.
6. Lock the working hydraulics before leaving the driver’s cab.
The working hydraulics should be locked in accordance with the instructions in the **“Operator’s manual”**.
7. Secure all locks on the machine, take out all keys and secure it against unauthorised use and vandalism.

2.12 Transporting the machine safely

1. Only use suitable means of transport and lifting devices with sufficient lifting capacity.
2. Park the machine on a flat surface and wedge the tracks or wheels securely.
3. If necessary, dismantle part of the working attachment for the duration of transport.
4. The ramp for driving onto a low loader should have an inclination no more than 30° and should be covered with wooden boards to prevent slipping.
5. Clean the machine tracks / wheels of snow, ice and mud before driving onto the ramp.
6. Before driving on, lock the superstructure to the undercarriage with the locking pin.
Procedure: not applicable with wheel loader.
7. Align the machine precisely with the loading lamp.
8. Attach the hand levers to the gas pedals for more responsive control.
Procedure: not applicable with wheel loader.
9. A banksman must give the machine driver the required signs.
Drive carefully onto the ramp and then onto the transport vehicle itself.
10. Have wedges ready in case the machine starts to roll back while on the ramp.
11. Retract the working attachment and drive onto the loading ramp.
Always keep the working attachment as close as possible to the loading bed.
12. After loading, set down the working attachment on the loading bed.
Install the articulation lock (this is only applies to wheel loaders with articulated steering)

13. Secure the machine and the remaining individual components with chains and wedges against sliding .
14. Depressurise the pressure lines, take out the ignition key, lock the driver's cab - and side panels and leave the machine.
15. Acquaint yourself with the route before transport, especially in relation to width, height and weight limits.
16. Make special note of any overhead power lines, bridges and tunnels en route.
17. Proceed with the same care when unloading as with loading.
Procedure:
 - remove all chains and wedges
 - start the engine in accordance with the instructions in the “**Operator's manual**”
 - drive carefully off the loading bed down a ramp
 - keep the working attachment as close as possible to the ground
 - get someone to give you hand signals

2.13 Towing the machine safely

1. Always observe the correct procedure in accordance with the instructions in the “**Operator's manual**”, see the section “Towing the machine”.
2. The machine may only be towed in exceptional circumstances, in order, for example to move the machine away from a dangerously exposed position for repairs.
3. When towing, check that all attachment and towing devices are safe and secure.
4. The rope or tow bar used for towing must have a sufficient tensile strength and be fed through the boreholes provided for this purpose in the front section.

In no event can damage or accidents resulting from towing be covered by the manufacturer's guarantee.

Instructions for towing by rope:

- make sure that nobody remains in the vicinity of the taut rope
 - keep the rope taut and avoid kinks
 - carefully draw the rope until it becomes taut
 - sudden jerks can cause a slack rope to rupture
5. When towing, maintain the prescribed transport position, observe speed limits and permitted routes.
 6. When starting the machine up again, proceed in accordance with the instructions in the “**Operator's manual**”.

2.14 Measures for ensuring safe maintenance

1. Never attempt maintenance or repair work unless you are fully competent.
2. Observe the prescribed periods or those specified in the “**Operator's manual**” for regular checks/inspections.

An appropriately equipped workshop is an absolute necessity for the proper execution of maintenance work.

3. Who must or may carry out what jobs is precisely defined in the table at the end of this “**Operator’s manual**”.
The jobs listed under “**daily/weekly**” in the maintenance schedule can be carried out by the driver or by service personnel.
The remaining jobs may only be carried out by specialist technicians with appropriate training.
4. Spare parts must meet the technical requirements set by the manufacturer. This is always guaranteed by the use of original spare parts.
5. Wear safety overalls for maintenance work. For certain jobs, in addition to a hard hat and safety boots, safety goggles and protective gloves are required.
6. Keep unauthorised persons away from the machine during maintenance work.
7. Set up an extended cordon around the maintenance area, when necessary.
8. Inform operating personnel in advance of specialist and maintenance work. Designate supervisory staff.
9. Unless otherwise specified in the “**Operator’s manual**”, carry out all maintenance work on the machine on firm level ground with the engine shut down.
10. Afterwards always re-tighten threaded couplings loosened during maintenance and repair work.
11. If safety installations have to be dismantled for rigging, maintenance and repair work, then as soon as the respective job is finished, the safety installations must be re-installed and checked.
12. When undertaking maintenance jobs, especially work under the machine, attach a warning sign “**DO NOT SWITCH ON**” to the ignition where it is clearly visible. Take out the ignition key.
13. Clean the machine of oil, fuel or service fluids, especially from couplings and threaded connections. Do not use reactive cleaning agents. Use fibre-free cloths.
14. Before starting any welding, burning or grinding work on the machine, remove all dust and flammable materials from the machine and ensure that there is sufficient ventilation.
Otherwise there is a risk of “**EXPLOSIONS**”!
15. Before cleaning the machine with water, steam jets (high pressure cleaners) or other cleaning agents, cover/tape down all openings into which no water/steam/cleaning agent may penetrate for reasons of safety/operational considerations.
It is especially important to protect electric motors, control cabinets and battery casings.
Further procedure:
 - make sure that during cleaning work on the machine housings, the temperature sensors for the fire alarm and extinguisher systems do not come into contact with hot cleaning agent otherwise the fire extinguishing system could be activated
 - after cleaning, completely remove the covers/tapes
 - after cleaning, check all fuel, engine oil and hydraulic oil lines for leaks, loose connections, abrasion and damage
 - rectify any defects as soon as they are established
16. Note the safety regulations which apply to the respective product, when handling oils, greases and other chemical substances.
17. Make sure that operating and auxiliary materials as well as replaced parts are disposed of safely in an environmentally friendly manner.
18. Take care when handling hot operating and auxiliary materials (danger of burns and scalding).

19. Only operate internal combustion engines and fuel burning heating systems in spaces with sufficient ventilation. Before starting up in an enclosed space, make sure that the ventilation is sufficient. Observe the locally applicable regulations.
20. Only carry out welding, burning and grinding work on the machine, if this has been expressly approved. There is, for example a risk of fire and/or explosions.
21. Avoid lifting heavy components by yourself. Always use suitable lifting equipment with sufficient load bearing capacity for this purpose.

Procedure:

- carefully fix and secure individual components and larger assemblies to the lifting aids when they are being replaced, so that the risk of accidents is precluded
- only use suitable and lifting aids and slinging gear in a technically perfect condition with sufficient load bearing capacity

It is prohibited to remain or work under suspended loads.

22. Do not use ropes, which are damaged or with insufficient load bearing capacity. Wear protective gloves when handling wire hawsers.
23. Only assign experienced personnel with responsibility for slinging loads and directing crane drivers. The banksman should be in visual contact with the operator or at the very least in audio contact with him.
24. When carrying out fitting work over head height, use the safety climbing aids and working platforms provided or similar. Do not use machine parts as climbing aids. When working at greater heights, wear a safety harness. Keep all handles, steps, rails, gangways, platforms and ladders free from soiling, snow and ice.
25. Make sure when working on the attachment (e.g. when changing the teeth on the bucket) that sufficient support is provided. Avoid direct metal on metal contact when doing this.
26. Never get under the machine when this is propped up on the working attachment, without first securely supporting the undercarriage on wooden billets.
27. Always jack up the machine so that any shifts in its centre of gravity do not jeopardise its stability, while at the same time avoiding any direct metal on metal contact.
28. Work on the chassis, the braking and steering systems may only be carried out by personnel with specialist training.
29. If the machine has to be repaired on a slope, then the wheels must be secured with wedges. Move the working attachment into the maintenance position and insert the articulation lock.
30. Only personnel with specialist knowledge and experience may work on the hydraulics.
31. When searching for leaks, wear protective gloves. A fine fluid jet, under pressure, can penetrate the skin.
32. Never release hydraulic lines or threaded couplings before setting down the working attachment and shutting down the engine.
All servo control devices (joystick and pedals) must then be moved in both directions – with the ignition key in the contact position – in order to relieve control pressure and ram pressure in the working circuits; in addition release internal tank pressure by loosening the air bleeder screw.
33. Regularly check all hydraulic lines, hoses and screw for leaks and externally recognisable damage. Rectify all damage immediately. Oil escaping under pressure can result in injuries and fires.
34. Before beginning repair work, depressurise the system sections and pressure lines (hydraulics, compressed air) in accordance with the component descriptions.

35. Lay and install hydraulic and pneumatic lines properly. Do not cross over couplings. Fittings as well as the length and quality of the hose lines must match the manufacturer's requirements.
Only use LIEBHERR spare parts.
36. Hydraulic hose lines should be replaced at the specified or appropriate time intervals, even where no safety-related deficiencies are apparent.
37. Work on the machine's electrical equipment may only be carried out by a qualified electrician or by instructed persons under the direction and supervision of a qualified electrician, in accordance with the recognised electrical engineering rules.
38. Only use original fuses with the prescribed ratings. If disruptions occur in the electrical power supply, switch off the machine immediately.
39. Inspect/check the machine's electrical equipment regularly. Immediately rectify all faults, such as loose connections, scorched/worn cables or burnt out fuses and bulbs.
40. If it is necessary to carry out work on electrically live components, then obtain the assistance of a second person, who can in an emergency throw the emergency stop or main switch with voltage trip-out. Cordon off the working area with a red/white safety tape and a warning sign. Only use insulated tools.
41. When working on high voltage assemblies after they have been isolated from the power supply, short the supply cable and the components, such as capacitors with an earthing rod.
42. First of all check that the isolated parts are voltage free, connect to earth and then briefly short them. Isolate adjacent components which are still live.

2.15 Safety instructions for welding work on the machine

1. Welding jobs may only be carried out on force transmitting main components (e.g. chassis, attachments,) by the manufacturer or by an authorised contractor.

Disconnect the battery when working on the electrical system or when carrying out electric arc welding on the machine.

Always disconnect the minus terminal first and reconnect it last.

With machines with an electronic gearbox control unit:

- In addition, before starting any welding work on the machine, disconnect the multi-pin plug on the electronic gearbox control unit.

The earth cable of the welding device should be brought as close as possible to the actual welding location, so that it is not possible for the welding current to flow through components or sealing elements (e.g. slewing ring, joints, bearings, bushes, rubber components, seals, . . .).

2.16 Instructions for working safely on machine attachments

1. Do not work below the attachment, unless it is resting safely on the ground or is properly supported.

2. Avoid direct metal on metal contact when propping up the attachment in order to replace parts (signs, cutting edges, teeth ...).
3. Never attempt to lift heavy components by yourself. Always use suitable lifting equipment with sufficient load bearing capacity for this purpose.
4. Always wear gloves when working with wire hawsers!
5. Never release hydraulic lines or threaded couplings before setting down the working attachment and shutting down the engine.
All servo control devices (joystick and pedals) must then be moved in both directions – with the ignition key in the contact position – in order to relieve control pressure and ram pressure in the working circuits; in addition release internal tank pressure by unscrewing the breather screw.
6. Ensure that all lines and threaded couplings are reconnected and re-tightened on completion of the job(s).
7. Use extreme caution when removing or inserting bolts and pins made of hardened steel, as they can splinter causing serious injury.
Always wear protective gloves and safety goggles.
Whenever possible use special tools (such as mandrels, extractors ...).

2.17 Safety regulations when transporting the machine by crane

1. Lower the attachment and tilt back the loading attachment to the stop.
2. Install the articulation lock (this is only applies to wheel loaders with articulated steering)
3. Move all control levers into neutral position and engage the parking brake.
4. Shut down the engine in accordance with the instructions in the “**Operator's manual**”.
5. Lock the working hydraulics before leaving the driver's cab.
The working hydraulics should be locked in accordance with the instructions in the “**Operator's manual**”.
6. Close all doors, covers and hoods securely.
7. Only assign experienced personnel with responsibility for slinging loads and directing crane operators. The banksman should remain in visual contact with the operator or at the very least be in audio contact with him.
8. Attach the lifting tackle to the lugs/bore holes provided on the machine.
9. Ensure that the lifting tackle is of sufficient length.
10. Raise the machine carefully.
11. **NOTE! Remaining under the machine when it is suspended is strictly prohibited.**
12. When restarting the machine, proceed strictly according to the “**Operator's manual**”.

2.18 Safe maintenance of hydraulic hoses and hose lines

1. Repairing hydraulic lines and hydraulic hoses is prohibited!
2. All hoses, hose lines and threaded couplings must be checked regularly, at the very least once a year for leaks and visible signs of damage!

Replace damaged parts immediately! Oil escaping under pressure can result in injuries and fires.

3. Even when properly stored and subjected to normal loading, hoses and hose lines are subject to natural ageing. This limits their service life.
4. Improper storage, mechanical damage and loads in excess of permitted limits are the most common causes of malfunctions.
5. The service life of a hose line should not exceed six years, including a storage period of no more than 2 years (note the date of manufacture on the hoses).
6. The service life may be reduced if the hoses are frequently subject to the maximum permissible loading (e.g. due to high temperatures, frequent movement cycles, extremely high pulse frequencies, multiple-shift operation).
7. Hoses and hose lines should be replaced if any of the following criteria are met during inspection.

Criteria:

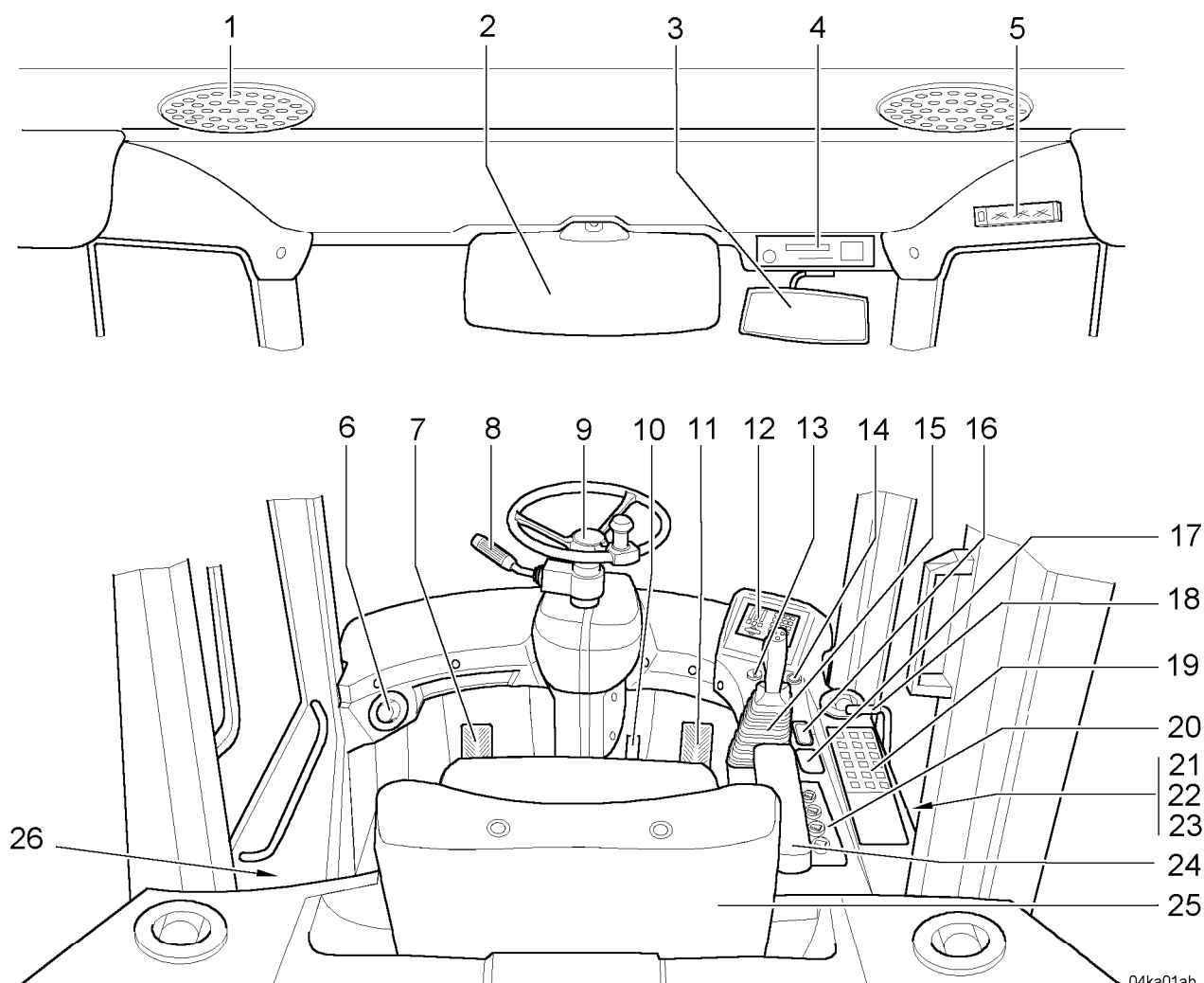
- Damage to the outer layer penetrating through to the inner layer (e.g. abrasion, cuts and tears);
 - Brittle outer layer (cracks in the hose material);
 - Deformation not conforming to the natural shape of the hose or the hose line, both when pressurised and depressurised or at bends, e.g. layer separation, blistering;
 - Leaks;
 - Non-observance of the installation requirements;
 - Damage or deformation of the hose fittings, which reduce the strength of the fittings or the hose/fitting coupling;
 - Slippage of the hose out of the fitting;
 - Corrosion of the fittings, which impair their functioning and strength;
 - Exceeding the prescribed storage period or service life.
8. Only use original spare parts when replacing hoses and hose lines.
 9. Lay and install hoses and hose lines properly. Do not mix up hoses at couplings.

2.19 Attachments and accessories

1. Attachments and accessories produced by other manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting, may not be installed or fitted on the machine without the previous written agreement of LIEBHERR.
2. The appropriate technical documentation should be made available to LIEBHERR for this purpose.

3 Operation, Handling

3.1 Layout of controls and instruments



Driver's cab — inside view

- | | | |
|--|--|---|
| 1 radio loudspeaker | 10 lever – adjustment – steering column | 18 door handle (right-hand door) – emergency exit |
| 2 sun visor | 11 gas pedal | 19 control unit |
| 3 interior mirror | 12 instrument panel – display unit (display) | 20 control element |
| 4 radio unit | 13 starting switch | 21 fuses |
| 5 interior illumination with switch | 14 socket / cigarette lighter | 22 control electronics |
| 6 outlet nozzles – heating/ventilation/air-conditioning (9 in total) | 15 LIEBHERR control lever | 23 control relay |
| 7 inch/brake pedal | 16 ashtray | 24 adjustable arm rest |
| 8 steering column switch | 17 mounting – control lever for optional working functions | 25 driver's seat |
| 9 adjustable steering column with steering wheel | | 26 glove compartment |

LBH/02/003801/0003/4.0/en

3.2 Operation

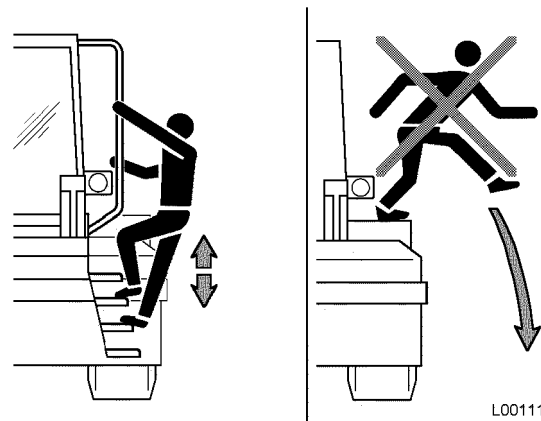
3.2.1 Cab access

Personnel may only get on and off the machine using the access aids provided.

Normally, the driver's cab must be entered and exited through the left-hand driver's cab door.

Entering and leaving the driver's cab

Familiarise yourself with the emergency exit through the right-hand cab door. Refer to the Section "Emergency exit".



Warning



Danger of injuries as a result of jumping or falling off the machine!

! Use the steps, ladders and handles provided for getting on and off.

! Never jump down from the machine.

Warning



Risk of injuries due to unforeseen movement by the machine!

! Do not hold onto the steering column, the control panel or the control levers when getting on or off.

- Get on the machine via the left-hand cab access.

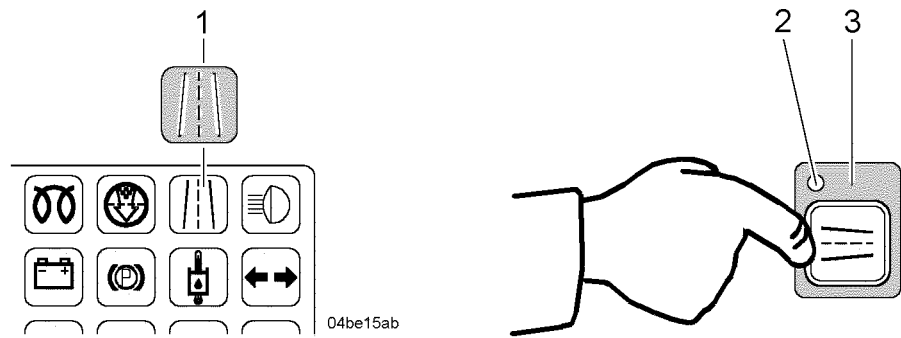
3.2.2 Emergency exit

Leaving the driver's cab by the emergency exit

Normally, the driver's cab must be entered and exited through the left-hand driver's cab door.

The right-hand driver's cab door is provided as an emergency exit and therefore should only be used in this event.

- Before starting up the machine, make sure that it is possible to leave the driver's cab through the right-hand driver's cab door from inside without hindrance.



button – working hydraulics lock

- 1 symbol field – working hydraulics lock
- 2 LED

- 3 button – working hydraulics lock

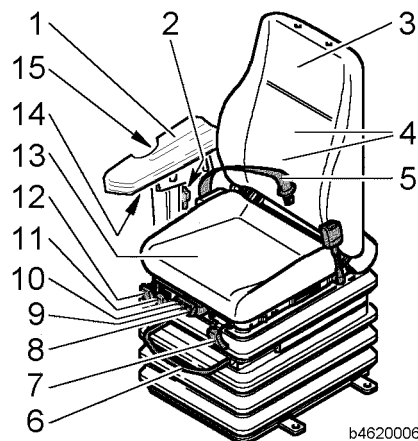
- Before leaving the driver's cab, press button 3 for the working hydraulics lock.

An LED 2 on the button indicates that the function is active.
 The symbol field 1 for the working hydraulics lock must light up.
 The working hydraulics are no longer operational.

- Open the emergency exit door and leave the cab by stepping over the side control console.

3.2.3 Driver's seat with pneumatic suspension

Design



Driver's seat – main components and adjustable elements

- | | |
|--|--|
| 1 arm rest | 9 button – bottom lumbar support chamber |
| 2 star-grip – height adjustment – arm-rest | 10 button – weight adjustment |
| 3 back rest | 11 lever – setting – seat forward inclination |
| 4 lumbar support chambers | 12 lever – setting – seat backward inclination |
| 5 safety belt | 13 seat surface |
| 6 lever – horizontal adjustment | 14 clamp screw – horizontal adjustment – armrest |
| 7 lever – adjustment – backrest | |
| 8 button – top lumbar support chamber | |

LBH/02/003801/0003/4_0/en

15 clamp screw – inclination
adjustment – armrest

Individual adjustment for ergonomic seating

The seat can be adjusted to the driver's individual requirements to provide the highest possible degree of comfort.

Adjusting the driver's seat for use on public roads

Warning



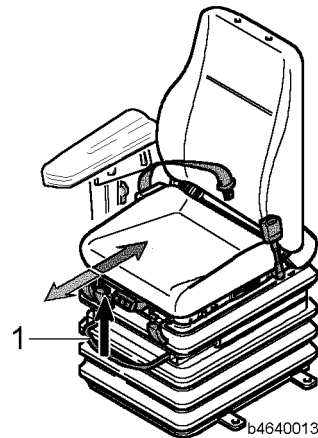
Risk of injuries due to improper adjustment of the driver's seat!

! When driving on public roads, the driver's seat may only be set when the vehicle is at rest.

- Adjust the driver's seat before starting the machine.

Horizontal setting

Backward or forward adjustment is by means of the lever 1 at the front of the driver's seat.



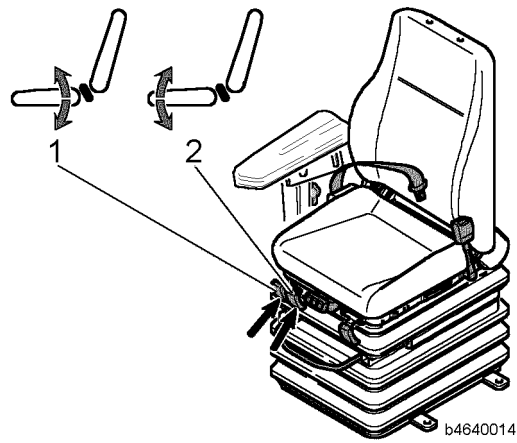
Adjustment – horizontal

1 lever – horizontal adjustment

- Pull lever 1 in the direction of the arrow.
- Horizontally adjust the driver's seat and release lever.

Inclination of the seat surface

Adjustment is made with the lever 1 and lever 2 at the front right of the driver's seat.



Adjustment – seating surface, seat height

- | | |
|---|--|
| 1 lever – adjustment – seat
backward inclination | 2 lever – adjustment – seat
forward inclination |
|---|--|

- Adjustment – seat inclination rear: pull lever 1 the direction of arrow, adjust inclination and release lever.
- Adjustment – seat inclination front: pull lever 2 in the direction of arrow, adjust inclination and release lever.

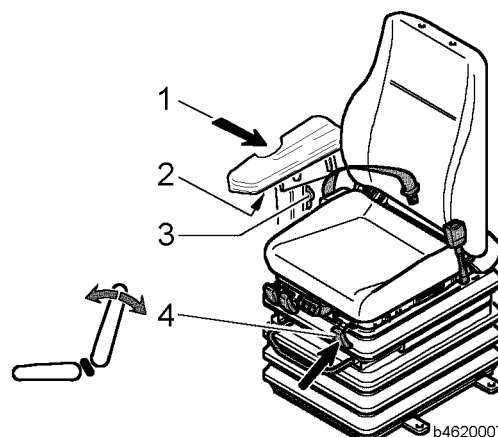
Adjustment of the seat height

Adjustment is made with the lever 1 and lever 2 at the front right of the driver's seat.

- Raise lever 1 and lever 2 simultaneously.
- Move the seat to the required height and release both levers.

Adjustment of back rest

The inclination of the seat back is adjusted with the lever 4 on the left-hand side of the driver's seat.



Adjustment – back rest, arm rest

- | | |
|--|---|
| 1 clamp screw – inclination
adjustment – arm rest | 3 star-grip – height adjustment –
arm rest |
| 2 clamp screw – horizontal
adjustment – arm rest | 4 lever – adjustment – backrest |

LBH/02/003801/0003/4_0/en

- Raise lever 4.
- Move the back rest to the required inclination and release both levers.

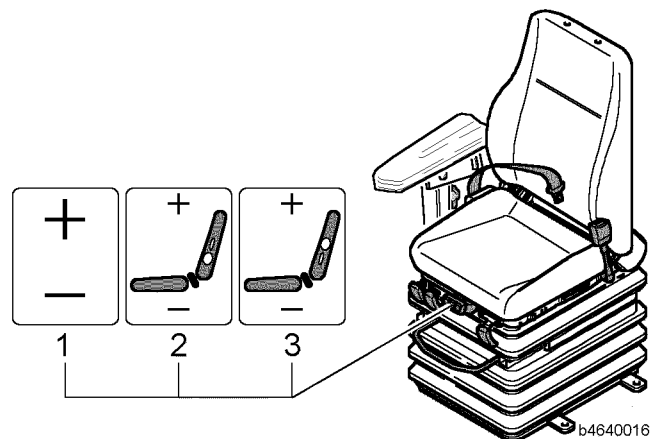
Adjustment of the arm rest

The height, inclination and horizontal position of the arm rests can be separately adjusted.

- Height adjustment: release star-grip 3, adjust height and fix in place.
- Adjustment of inclination: release clamp screw 1, adjust inclination and fix in place.
- Horizontal adjustment: release clamp screw 2, adjust arm rest horizontally and fix in place.

Adjustment of seat suspension

The seat suspension can be adjusted to the driver's individual body weight. Adjustment is by means of the button 1 at the front of the driver's seat.



Adjustment – seat suspension, lumbar support

- | | |
|--|---------------------------------------|
| 1 button – weight adjustment | 3 button – top lumbar support chamber |
| 2 button – bottom lumbar support chamber | |

- Press button 1 and set the oscillatory system according to the body weight into the central position.

The height is not adjusted in this process!

Adjustment of the lumbar support

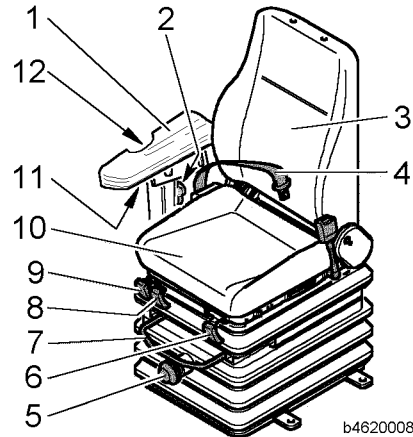
The contours of the back rest can be adapted to the driver's body.

- Press button 2 to fill bottom lumbar chamber with air or to release the air.
- Press button 3 to fill top lumbar chamber with air or to release the air.

3.2.4 Driver's seat with gas-filled spring suspension

This equipment is optional.

Design



b4620008

Driver's seat – main components and adjustable elements

- | | |
|--|--|
| 1 arm rest | 8 lever – adjustment – seat inclination front |
| 2 star-grip – height adjustment – arm rest | 9 lever – adjustment – seat inclination rear |
| 3 back rest | 10 seat surface |
| 4 safety belt | 11 clamp screw – horizontal adjustment – arm rest |
| 5 rotary knob – weight adjustment | 12 clamp screw – inclination adjustment – arm rest |
| 6 lever – adjustment – backrest | |
| 7 lever – horizontal adjustment | |

Individual adjustment for ergonomic seating position

The seat can be adjusted to the driver's individual requirements to provide the highest possible degree of comfort.

Adjusting the driver's seat for use on public roads

Warning



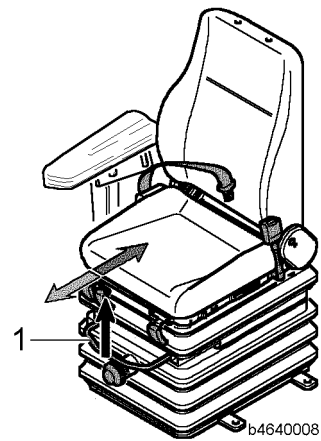
Risk of injuries if the driver's seat is improperly adjusted!

! When driving on public roads, the driver's seat may only be adjusted when the vehicle is at rest.

- Adjust the driver's seat before starting the machine.

Horizontal setting

Backward or forward adjustment is by means of the lever 1 at the front of the driver's seat.



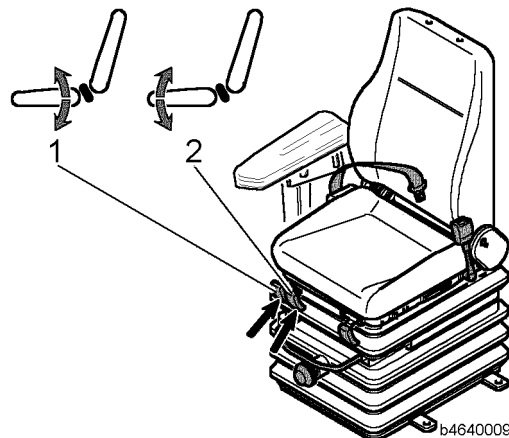
Adjustment – horizontal

1 lever – horizontal adjustment

- Pull lever 1 in the direction of the arrow.
- Horizontally adjust the driver's seat and release lever.

Inclination of the seat surface

Adjustment is made with the lever 1 and lever 2 at the front right of the driver's seat.



Adjustment – seating surface, seat height

1 lever – adjustment – seat
inclination rear

2 lever – adjustment – seat
inclination front

- Adjustment – seat inclination rear: pull lever 1 in the direction of arrow, adjust inclination and release lever.
- Adjustment – seat inclination front: pull lever 2 in the direction of arrow, adjust inclination and release lever.

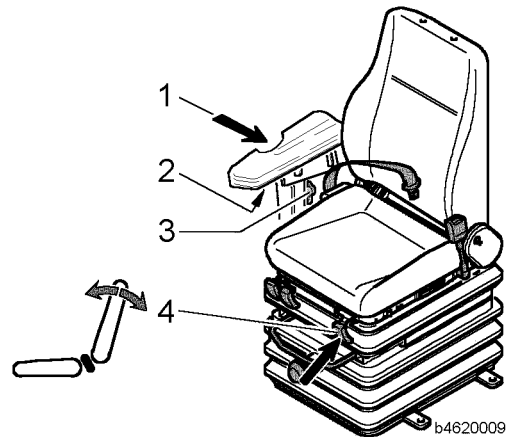
Adjustment of the seat height

Adjustment is made with the lever 1 and lever 2 at the front right of the driver's seat.

- Raise lever 1 and lever 2 simultaneously.
- Move the seat to the required height and release both levers.

Adjustment of back rest

The inclination of the seat back is adjusted with the lever 4 on the left-hand side of the driver's seat.



Adjustment – back rest, arm rest

- | | |
|---|--|
| 1 clamp screw – inclination adjustment – arm rest | 3 star-grip – height adjustment – arm rest |
| 2 clamp screw – horizontal adjustment – arm rest | 4 lever – adjustment – backrest |

- Raise lever 4.
- Move the seat to the required inclination and release both levers.

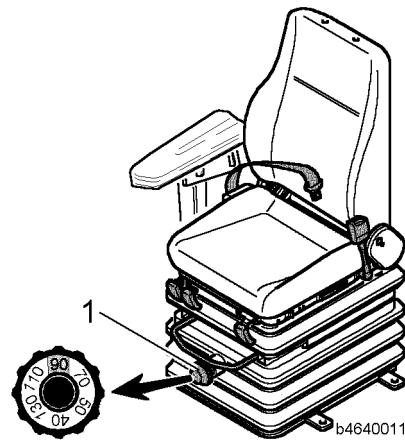
Adjustment of the arm rest

The height, inclination and horizontal position of the arm rests can be adjusted separately.

- Height adjustment: release star-grip 3, adjust height and fix in place.
- Adjustment of inclination: release clamp screw 1, adjust inclination and fix in place.
- Horizontal adjustment: release clamp screw 2, adjust arm rest horizontally and fix in place.

Adjustment of seat suspension

The seat suspension can be adapted to the driver's individual body weight. Adjustment is by means of a rotary knob 1 at the front of the driver's seat. The figures on the rotary knob indicate the set body weight in kg.



Adjustment – seat suspension

1 rotary knob – weight adjustment

- Set the appropriate body weight with the rotary knob 1.

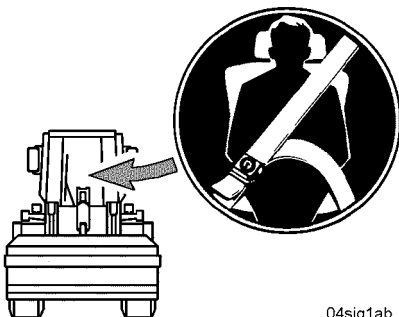
3.2.5 Safety belt

Observance of safety factors

The driver's cab is equipped with rollover protection – **ROPS**.

The roll over protection system – ROPS only affords the driver protection when the safety belt has been fastened.

In this section, the safety features of wearing the safety belt are described.



04sig1ab

Compulsory wearing of seat belts

Warning



Risk of injuries when the safety belt is not fastened!

If the machine is braked or stops abruptly, the driver could suffer severe injuries!

! It is essential that you fasten your safety belt before starting up the machine.

Danger



Risk of injuries when the safety belt is not fastened!

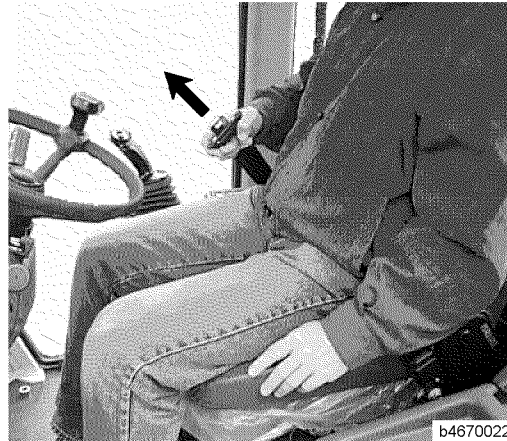
If the machine tips or rolls over, the driver could suffer fatal injuries!

! It is essential that you fasten your safety belt before starting up the machine.

- To guarantee your safety: regularly check the condition, proper functioning and anchorage of the seat belt and have defective parts replaced without delay.
- The safety belt may not be twisted when in use.

Putting on the safety belt

The safety belt is an automatic belt. No adjustment of the belt length is required.



b4670022

Putting on the belt

- Hold the buckle with the right hand and pull the belt slowly out of the roller.

NOTE: When the belt is pulled out too quickly, it can be blocked by the roller.



b4670019

Locking the belt

- Hold the snap lock with the left hand and pull the belt over the body at hip level.
- Insert the buckle into the snap lock and check by pulling the buckle whether the snap lock has 'snapped into place'.

Releasing the seatbelt



Releasing the seatbelt

- Release the seat belt: push the catch on the snap lock downward with your thumb.

3.2.6 Starter switch

The starter switch is equipped with a repeat start lock. The ignition key can be pulled out when in 0 – 0-position/engine shutdown.

When the ignition key is in the 0 position or parking position, the following consumer units can be switched on from the instrument panel:

- parking and driving headlight
- hazard warning system
- working floodlights
- rotating beacon

Design

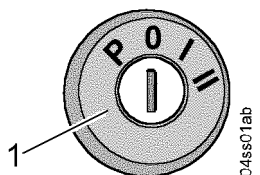
Switching positions:

P – parking position

0 – 0 position / engine shutdown

I – contact, operating preglow position

II – starting position



Starter switch

Switching electrical system on or off

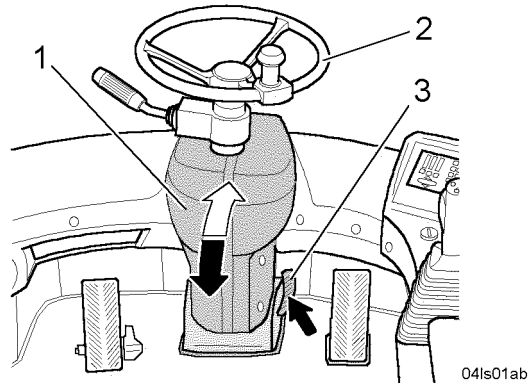
- Switch the machine electrical system on or off with the ignition key.

3.2.7 Steering column and steering wheel

Adjustment of steering column

The steering wheel can be adjusted to meet the driver's requirements by adjusting the steering column.

The column can be set to one of three snap-in settings.



Adjustment – steering column

- 1 steering column
- 2 steering wheel
- 3 pedal

- Press down pedal 3 with your foot in the direction of the arrow.
- By pulling or pushing the steering wheel 2, adjust the steering column 1 as required.
- Lock the selected position of the steering column 1 by releasing the pedal 3.

3.2.8 Steering column switch

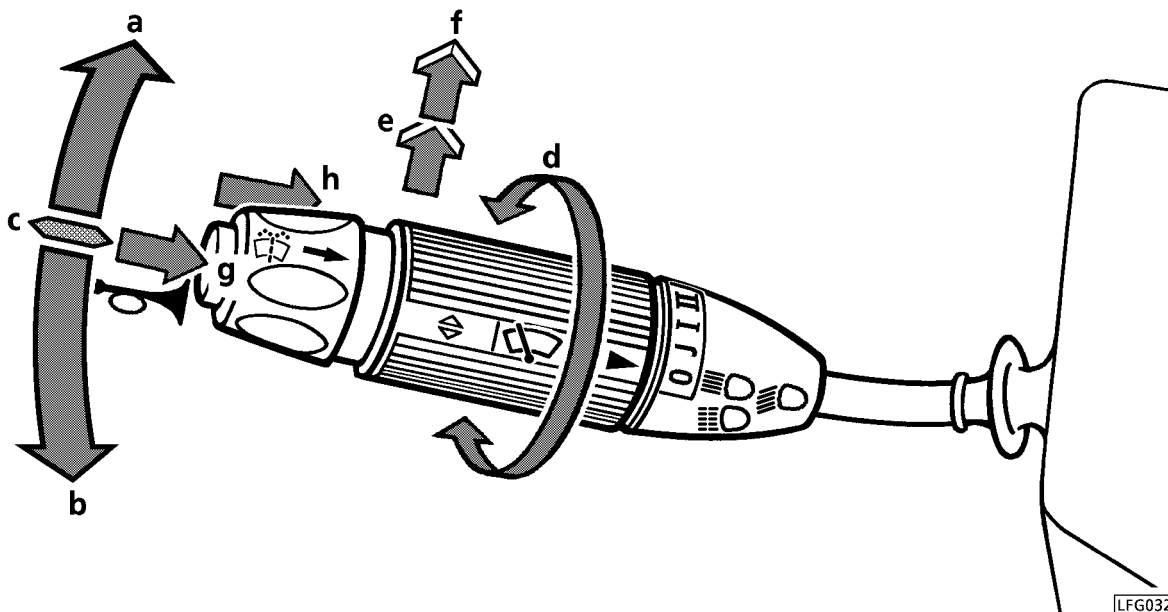
The steering column switch is mounted on the left-hand side of the steering column.

Design

The steering column switch contains controls for the following:

- direction indicators
- high beam
- acoustic and optical horn
- windshield wiper for the front windscreen
- windshield wiper and washer system for the front windscreen

Function description



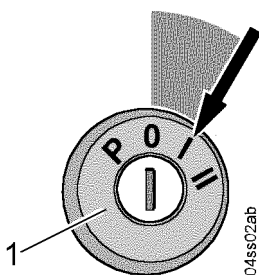
Steering column switch

Functions of the steering column switch when activated in direction:

- a – drive direction display: right-hand flashing lights
- b – drive direction display: left-hand flashing lights
- c – center position: neutral position
- d – windshield wiper: front windscreen
 - 0 – level-0
 - J – interval
 - I – level-I
 - II – level-II
- e – optical horn: light horn
- f – high beam: high beam
- g – acoustic horn: horn tone
- h – windshield wiper / washer system: front windscreen

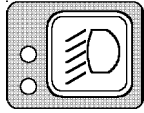
Operation of driving light or high beam

Make sure that the machine's electrical system is switched on.



Starter switch – contact position

LBH/02/003801/0003/4.0/en



04ta13ab

Switching on driving light – dipped beam

- Press the button once.

The parking light lights up.

- Press the button again.

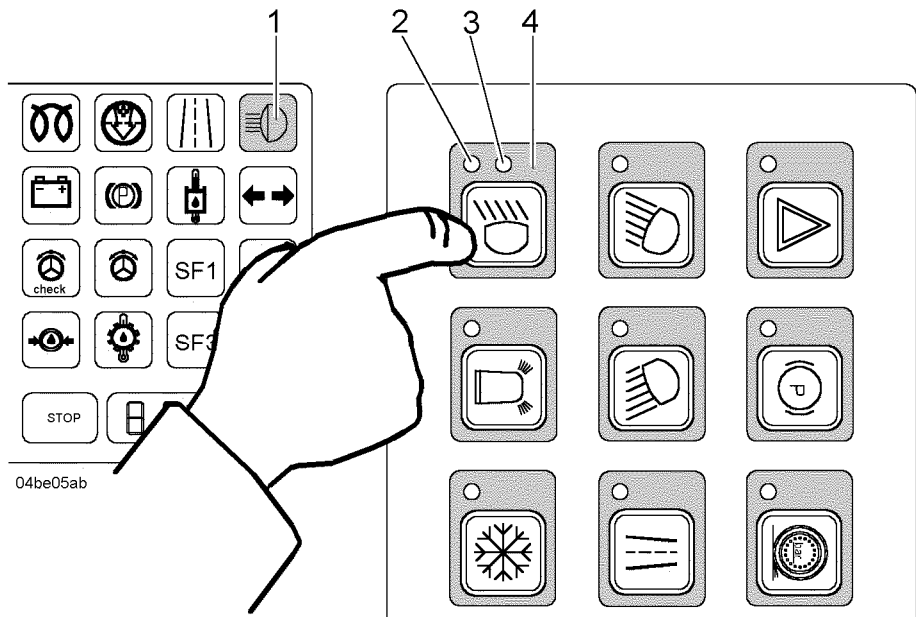
The driving light illuminates.

- To switch off the parking light and driving light: press the button a third time.

All functions are switched off.

Switching on the driving light – high beam

Make sure that the button 4 for the parking/driving light has been pressed twice.



04be05ab

Control unit

- 1 symbol field – headlamp
- 2 LED – parking light
- 3 LED – driving light
- 4 button – parking light/driving light

- Press the button 4 for parking light/driving light twice.

LED 2 and LED 3 light up.

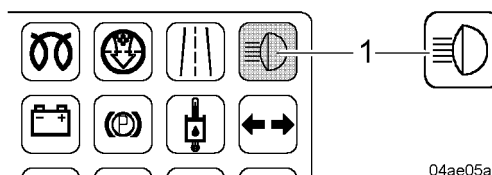
- Push the steering column switch in direction - f-.

The symbol field 1 for the driving light must light up.

The high beam lights up.

Switching back to driving light – dipped beam

Make sure that the button 4 for the parking/driving light is switched off.



04ae05ab

Display unit

- Press button 4 for the parking light/driving light once.
LED 2 and LED 3 light up.
- Switching over to dipped beam: Push the steering column switch in direction - f-.

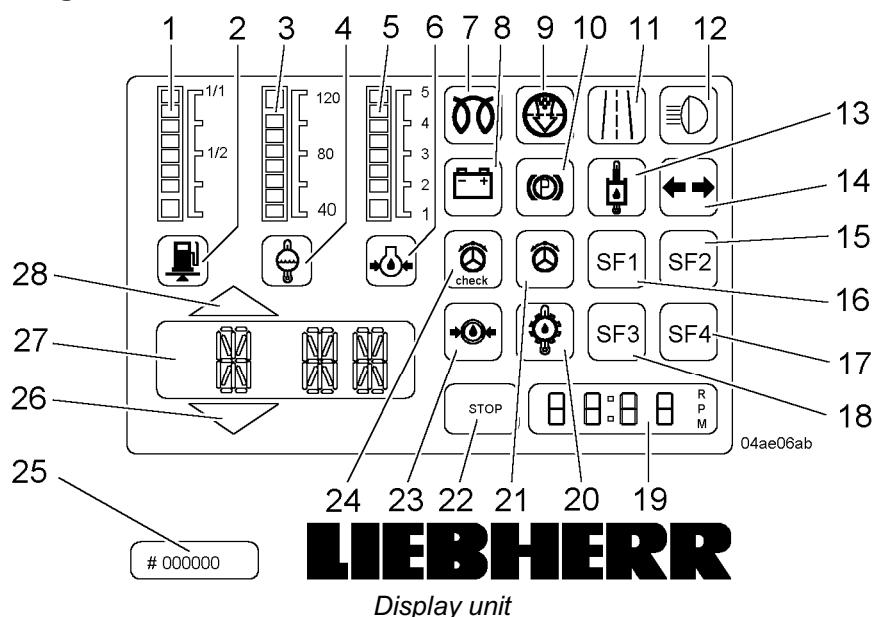
The symbol field 1 for the headlight must go out.

The driving light – dipped beam lights up.

3.2.9 Display unit

The layout and function of the control unit is described in this section.

Design



- | | |
|---|--|
| 1 segment field – fuel supply | 15 symbol field – special function |
| 2 symbol field – fuel supply | 16 symbol field – special function |
| 3 segment field – coolant temperature | 17 symbol field – special function |
| 4 symbol field – engine overheating and coolant level | 18 symbol field – special function |
| 5 segment field – engine oil pressure | 19 segment display – speed or clock |
| 6 symbol field – engine oil pressure | 20 symbol field – gear oil overheating |
| 7 symbol field – preglow monitor | 21 symbol field – emergency steering |
| 8 symbol field – battery charging (charge control) | 22 symbol field – stop |
| 9 symbol field – air filter contamination | 23 symbol field – braking system accumulator pressure |
| 10 symbol field – parking brake | 24 symbol field – “check” emergency steering |
| 11 symbol field – working hydraulics lock | 25 operating hours counter |
| 12 symbol field – headlight | 26 symbol field – travel direction “reverse” |
| 13 symbol field – hydraulic oil overheating | 27 segment display – travel range, travel speed or error codes |
| 14 symbol field – direction indicator system | 28 symbol field – travel direction “forwards” |

LBH/02/003801/0003/4.0/en

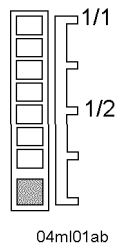
The display unit is integrated at the front on the right-hand side of the instrument panel.

It consists of the display (symbol LCD) and the operating hours counter.

Each symbol field is assigned the appropriate colour (red, yellow, green or blue).

Function description

Fuel supply – tank contents display



1 segment field – fuel supply

Segment field colour – green (limit range with reserve – red)

Indicates the level of the diesel fuel tank.

Fuel supply – reserve display/message



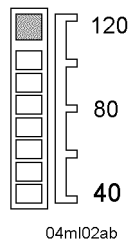
04ml23ab

2 symbol field – fuel supply

Symbol field colour – yellow

Flashes when diesel fuel reserve is reached.

Coolant temperature display



3 segment field – coolant temperature

Segment field colour – green (limit range when temperature too high – red)

Displays the coolant temperature in °C.



Acoustic warning message:

- issued with a coolant temperature of 95°C
- 5 time interval tone with 5 sec pauses.

Engine overheating and coolant level display/message



04ml24ab

4 symbol field – engine overheating and coolant level

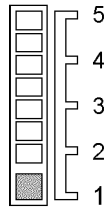
symbol field colour – red

Warning functions:

- flashes when the coolant temperature is too high
- flashes when the coolant temperature is too low
- flashes when the cool blower drive breaks down

Warning message sequence:

- when a warning message is issued, initially the symbol field flashes
- the warning function of the symbol field is supplemented acoustically after 10 seconds by a “continuous tone”



04ml03ab

Engine oil pressure display

5 segment field – engine oil pressure

Segment field colour – green (limit range when pressure too low – red)

Displays the engine oil pressure in bar.



04ml25ab

Engine oil pressure display/message

6 symbol field – engine oil pressure

Symbol field colour – red

Warning functions:

- flashes when the ignition key is at the ignition position - I-
When the diesel engine has started, the symbol field goes out.
- flashes when the engine oil pressure drops – **Condition:** when the diesel engine is running

Warning message sequence:

- when a warning message is issued, first of all the symbol field flashes
- the warning function of the symbol field is supplemented acoustically after 10 seconds by a “continuous tone”



04ml05ab

Preglow monitoring

7 symbol field – preglow monitor

Symbol field colour – yellow

Lights up when ignition key turned to ignition, run, preglow position - I- and in starting position - II-.

At the end of the preglow time and when the diesel engine is started, the symbol field goes out.



04ml09ab

Battery charging – charging control display

8 symbol field – battery charging (charge control)

symbol field colour – red

Warning functions:

- illuminates when the ignition key is at the ignition position - I-
when the diesel engine has started, the symbol field goes out
- lights up when, for example the V-ribbed belt of the alternator drive tears



04ml06ab

Air contamination display

9 symbol field – air filter contamination

Symbol field colour – yellow

Lights up when the air filter is heavily contaminated.



04ml10ab

Parking brake – activation display

10 symbol field – parking brake

Symbol field colour – red

Warning functions:

- lights up when ignition key turned to ignition, run, preglow position - I-
- lights up when the parking brake is engaged
When the parking brake is released, the symbol field goes out.



04ml07ab

Working hydraulics lock – activation display

11 symbol field – working hydraulics lock
 Symbol field colour – yellow
 Lights up when the working hydraulics lock is activated.



04ml08ab

Headlight – activation display

12 symbol field – headlight
 Symbol field colour – blue
 Lights up when the headlight is switched on.



04ml11ab

Hydraulic oil overheating display/message

13 symbol field – hydraulic oil overheating
 Symbol field colour – red
 Lights up when the hydraulic oil temperature is too high.

Warning message sequence:

- when a warning message is issued, initially the symbol field flashes when the hydraulic oil temperature exceeds 100 °C
- the warning function of the symbol field is supplemented acoustically after 10 seconds by a “continuous tone”

Acoustic warning message:

- issued when hydraulic oil temperature reaches 95°C
- 5 time interval tone with 5 sec pause.



bpik0007

Direction indicator system – activation display



04ml12ab

14 symbol field – direction indicator system

Symbol field colour – green

Warning functions:

- flashes when the steering column switch is actuated to display the travel direction
- flashes when the hazard warning system is activated

Special function



04ml16ab

15 symbol field – special function

Not assigned. Symbol field colour – green

Reserved for special function.

Special function



04ml15ab

16 symbol field – special function

Not assigned. Symbol field colour – red

Reserved for special function.

Special function



04ml20ab

17 symbol field – special function

Not assigned. Symbol field colour – green

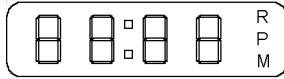
Reserved for special function.



04ml19ab

Special function

18 symbol field – special function
 Not assigned. Symbol field colour – red
 Reserved for special function.



04ml22ab

Engine speed or time display

19 segment display – speed or clock
 Field colour – green

Condition: the required function must be selected at the “control unit”.

Display functions:

- displays the time
- displays the rotary speed of the diesel engine



04ml18ab

Gear oil overheating display/message

20 symbol field – gear oil overheating
 Symbol field colour – red

Lights up when the gear oil temperature is too high.

Warning message sequence:

- when a warning message is issued, initially the symbol field flashes
- the warning function of the symbol field is supplemented acoustically after 10 seconds by a “continuous tone”



04ml14ab

Emergency steering display/message

21 symbol field – emergency steering
 Symbol field colour – red

Warning functions:

- lights up when ignition key turned to ignition, run, preglow position - I-
- lights up: if the diesel engine shuts down or if the steering pump breaks down when underway

In this case, the emergency steering pump is activated for approx. 30 seconds.

Also refer to the Sections “Control unit” and “Emergency operation”.

Acoustic warning message:

- when the emergency steering function (emergency steering pump) is switched on, an interval tone also sounds



bpik0008



04ml21ab

Stop message/display

22 symbol field – stop
 Symbol field colour – red

Lights up: with an error code message, which means that the machine must be brought to a stand still.



04ml17ab

Braking system – accumulator pressure display/message

23 symbol field – braking system accumulator pressure
 Symbol field colour – red

Lights up when the brake accumulator pressure is too low.

Warning message sequence:

- when a warning message is issued, initially the symbol field flashes
- the warning function of the symbol field is supplemented acoustically after 10 seconds by a “continuous tone”



Emergency steering “Check” display/message

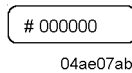
24 Symbol field emergency steering “check”

Symbol field colour – red

Lights up briefly when the engine starts (approx. 2 seconds).

The symbol field goes out after a successfully executed “check”.

The symbol field does not go out if the emergency steering pump does not start during the check.

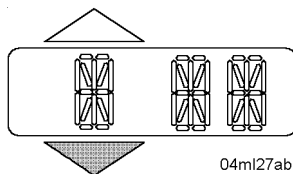


Operating hours of the machine display

25 operating hours counter

shows the time in operating hours that the machine was in service.

The operating hours are the basis for the observance of the maintenance intervals.

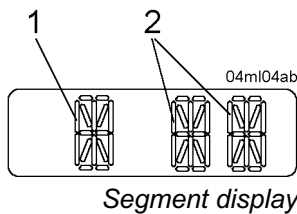


Travel direction “reverse” display

26 symbol field – travel direction “reverse”

Symbol field colour – green

displays the machine’s preselected travel direction “reverse”



Travel range, travel speed or error codes display/message

27 segment display – travel range, travel speed or error codes

1 LCD field – travel range or Error

2 LCD field – travel speed or error code No.

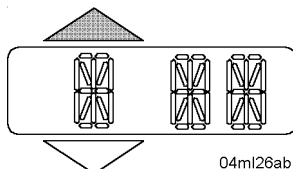
Field colour – green

Display functions:

- displays the activated travel range - **1-** to - **A3-**
In automatic mode, the display in the LCD field changes regularly between the output - **A-** (automatic) and the respective automatic range - **2-** or - **3-**
- displays the machine’s travel speed
- displays the error code in the event of malfunction
Error code composition: Field 1 = **E** plus Field 2 = error code No.
The error code display is supplemented acoustically by a “continuous tone”.

When an error code is displayed, which results in the machine being stopped, the symbol field for “STOP” also lights up.

The segment display goes out when the ignition is switched off. If appropriate, first note the displayed error code.



Travel direction “forward” display

28 symbol field – travel direction “forward”

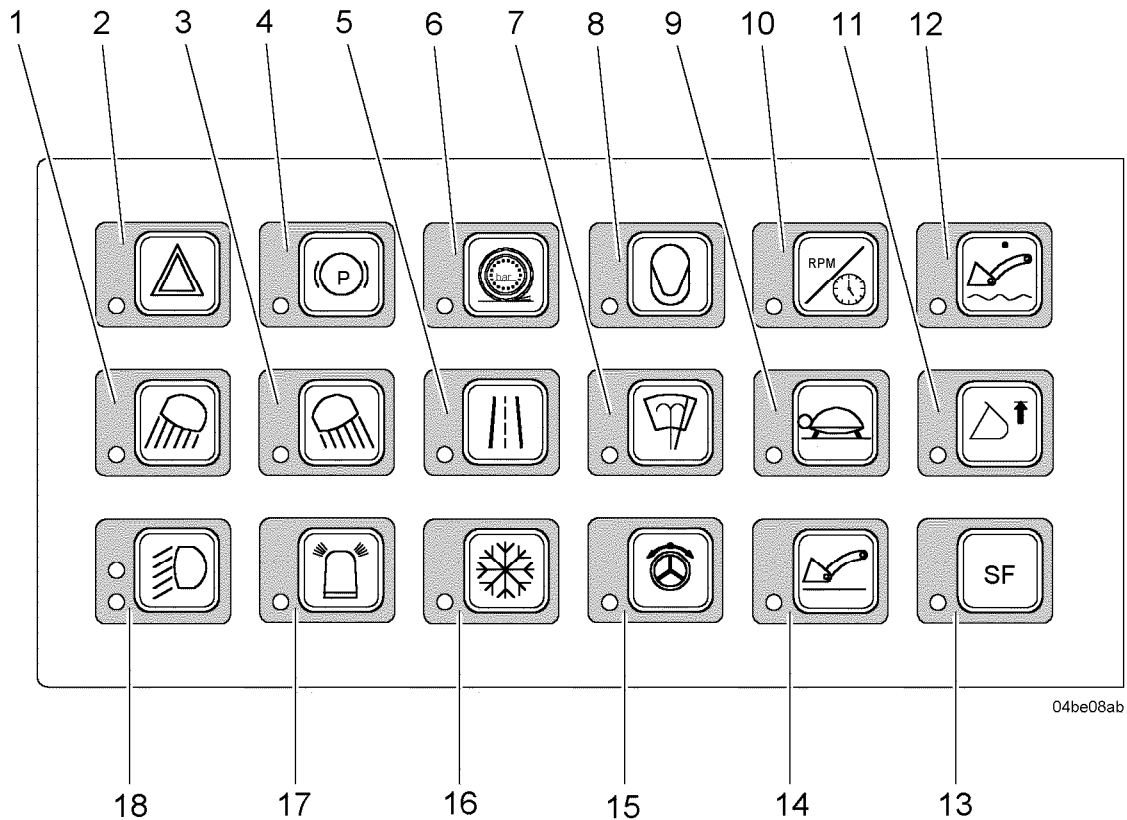
Symbol field colour – green

Displays the machine’s preselected travel direction “forward”

3.2.10 Control unit

The design and function of the control unit is described in this section.

Design



04be08ab

Control unit (view rotated by 90°)

- | | | |
|--|---|---|
| 1 button – working floodlights – front | 6 button – tractive force reduction | 13 button – special function |
| 2 button – hazard warning system | 7 button – window wiping and washing system – rear window | 14 button – bucket return-to-dig |
| 3 button – working floodlights – rear | 8 button – ride control (LFD system) | 15 button – emergency steering |
| 4 button – parking brake | 9 button – creeper (slow drive) | 16 button – air conditioning system |
| 5 button – working hydraulics lock | 10 button – speed or clock | 17 button – flashing beacon |
| | 11 button – lifting limit switch | 18 button – parking light/driving light |
| | 12 button – float position | |

The control unit is integrated in the instrument panel at the right of the driver's seat.

All pushbuttons in the control unit are equipped with LEDs.

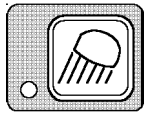
When the pushbutton is switched ON, the LED glows red.

When the pushbutton is switched OFF, the LED goes out.

LBH/02/003801/0003/4.0/en

Function description

Working floodlights – front



04ta07ab

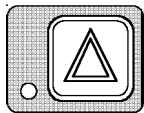
1 button – working floodlights – front

For turning the working floodlights – front on or off.

When the button is pressed, the working floodlights – front go off.

The pushbutton is also functional when the ignition key is in the 0 position or parking position.

Hazard warning system



04ta01ab

2 button – hazard warning system

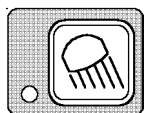
For switching the hazard warning system ON or OFF.

When the button is pressed:

- if the symbol field – hazard warning system is flashing, all four flashing lights on the machine are on
- if the symbol field – hazard warning system goes out, all four flashing lights on the machine go out

The pushbutton is also functional when the ignition key is in the 0 position or parking position.

Working floodlights – rear



04ta08ab

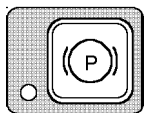
3 button – working floodlights – rear

For turning the working floodlights – rear ON or OFF.

When the button is pressed, the working floodlights – rear go off.

The pushbutton is also functional when the ignition key is in the 0 position or parking position.

Parking brake



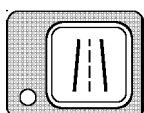
04ta02ab

4 button – parking brake

For engaging or releasing the parking brake.

When the pushbutton is pressed, the parking brake is engaged or released.

Working hydraulics lock



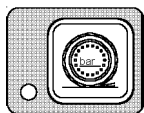
04ta09ab

5 button – working hydraulics lock

For locking or releasing the working hydraulics functions.

When the pushbutton is pressed, the parking brake is engaged or released.

Tractive force adjustment



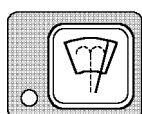
04ta03ab

6 pushbutton – tractive force adjustment

For preparing the tractive force adjustment function.

The function is retained after the ignition is switched OFF and hence is still active when the ignition is switched ON again.

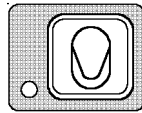
Windshield wiper and washer system – rear window



04ta10ab

7 button – windshield wiper and washer system – rear window

For switching ON or OFF the windshield wiper and washer system for the rear window.



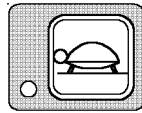
04ta04ab

Ride control (LFD system)

8 button – ride control (LFD system)

For switching the drive vibration absorption function ON or OFF.

The function is retained after the ignition is switched OFF and hence is still active when the ignition is switched ON again.



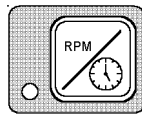
04ta11ab

Creeper (slow drive)

9 button – crawl speed (slow drive)

For switching the machine's travel drive between normal and slow travel.

The function is retained after the ignition is switched OFF and is thus still active when the ignition is switched ON again.

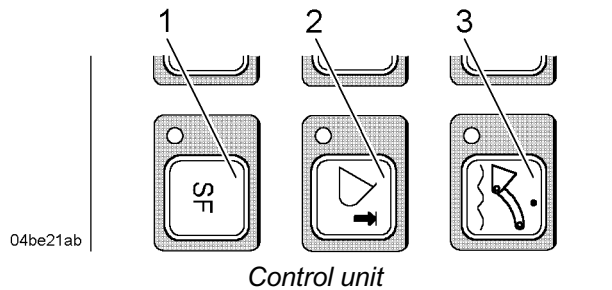


04ta05ab

Engine speed or clock

10 button – speed or clock

For switching over the display between time and engine speed.



04be21ab

- 1 button – special function
- 2 button – lifting limit switch

3 button – float position

Adjustment of the clock:

- press the button 1, 2 and button 3 simultaneously and switch off the machine electrical system with the ignition key
- with button 3, you can switch from hours to minutes
- with button 2, the hours or minutes are counted forwards
- with button 1, the hours or minutes are counted backwards
- to save the setting: switch off the machine electrical system with the ignition key

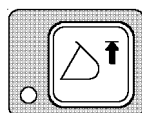
Lift kick-out

11 button – lift kick-out

For switching the automatic lift kick-out function ON or OFF.

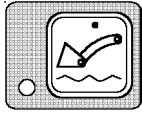
When the pushbutton is pressed, a solenoid on the servo control device is activated.

The "LIEBHERR control lever" is kept in the position – "Raise lift arm" by magnetic force.



04ta12ab

LBH/02/003801/0003/4.0/en



04ta06ab

Float position

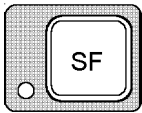
12 button – float position

For switching the float position function ON or OFF.

When the button is pressed, a solenoid on the servo control device is activated.

The “LIEBHERR control lever” is held in the position – “Raise lift arm” by magnetic force.

The function is retained after the ignition is switched OFF and hence is still active when the ignition is switched ON again.

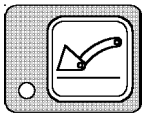


04ta18ab

Special function

13 button – special function

Button is not assigned: reserved for special functions.



04ta17ab

Bucket return-to-dig

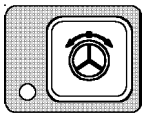
14 button – bucket return-to-dig

For switching the automatic bucket return-to-dig function ON or OFF.

When the button is pressed, a solenoid on the servo control device is activated.

The “LIEBHERR control lever” is held in the position – “Tip bucket up” by magnetic force.

The function is retained after the ignition is switched OFF and hence is still active when the ignition is switched ON again.



04ta16ab

Emergency steering

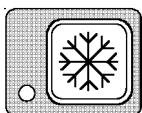
15 button – emergency steering

For repeat start of the emergency control pump for emergency steering functions.

When ignition is switched on, the emergency steering pump can be repeat started by keeping the button pressed down for approx. 30 seconds.

Continuous operation of the emergency steering pump results in overheating of the pump motor! The thermostat switch integrated in the pump motor, automatically switches the emergency steering pump off in the event of overheating.

Also refer to the Section “Towing the machine when the steering system has broken down”.



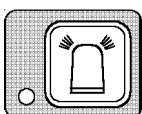
04ta15ab

Air conditioning system

16 button – air conditioning system

Before pressing the button, switch on the rotary knob for the blower (refer to the Section “Control element”).

For switching the air conditioning system ON or OFF.



04ta14ab

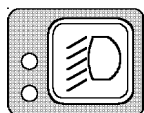
Rotating beacon

This equipment is optional.

17 button – flashing beacon

For switching the rotating beacon ON or OFF.

The button is also functional when the ignition key is in the 0 position or parking position.



04ta13ab

Parking light/driving light

18 button – parking light/driving light

Function for parking light:

- for switching the parking light ON or OFF

When the pushbutton is pressed once, the parking light illuminates.

Function for driving light:

- to turn the driving light ON or OFF

When the button is pressed again, the driving light illuminates.

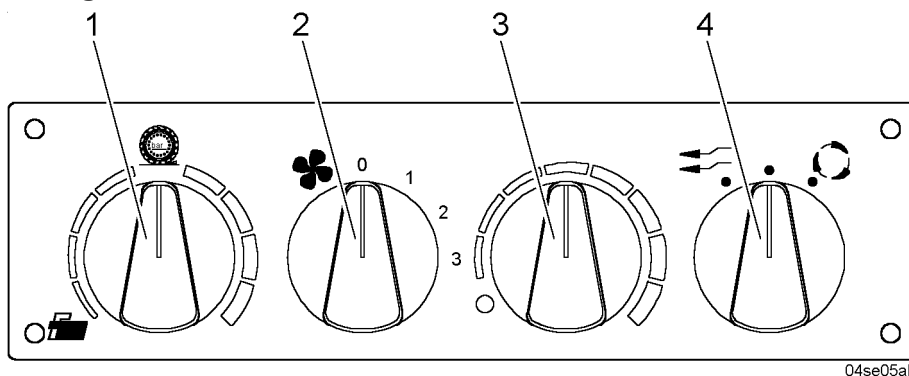
When the button is pressed a third time, all functions are switched off.

The button is also functional when the ignition key is in the 0 position or parking position.

3.2.11 Control element

The design and function of the control element is described in this section.

Design



04se05ab

Control element (view rotated by 90°)

- | | |
|---|--------------------------|
| 1 rotary switch – tractive force adjustment | 3 rotary switch – heater |
| 2 rotary switch – blower | 4 rotary switch – heater |

The controls are integrated in the instrument panel to the right of the driver's seat.

They consist of controls for tractive force adjustment, heating, ventilation and the blower.

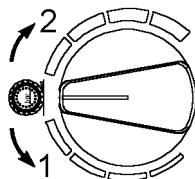
Function description

Regulation of tractive force adjustment

1 rotary switch – tractive force adjustment

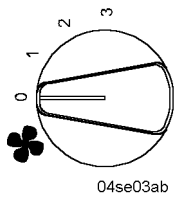
For adjusting the tractive force.

- 1 reduced tractive force
- 2 more tractive force



04se04ab

LBH/02/003801/0003/4.0/en



04se03ab

Blower adjustment

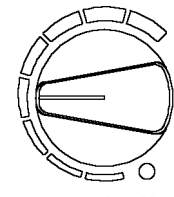
2 rotary switch – blower

Functions:

- for switching the blower ON or OFF
- for regulating the blower levels for heating, ventilation and air conditioning systems

Blower levels:

- Level 1 – gentle air flow
- Level 2 – medium air flow
- Level 3 – strong air flow

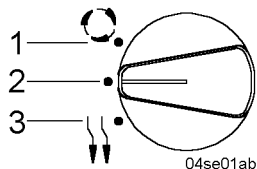


04se02ab

Heating adjustment

3 rotary switch – heater

For infinite adjustment of the temperature.



04se01ab

Rotary switch

Ventilation adjustment

4 rotary switch – ventilation

Switch settings:

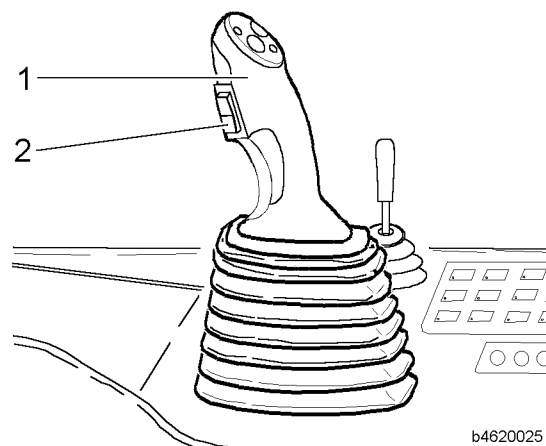
- 1 position – recirculated air
- 2 position – recirculated and fresh air
- 3 position – fresh air

For switching between recirculated air and fresh air

3.2.12 LIEBHERR control lever

The travel ranges, travel directions and movements of the working attachment are controlled by the “LIEBHERR control lever” (LH control lever).

Design



b4620025

LH control lever

1 switch for travel range

2 switch for travel direction

The LH control lever consists the controls for selecting the travel range, the travel direction and operating the working attachment.

Switches for travel range and travel direction

Function description

Basic function

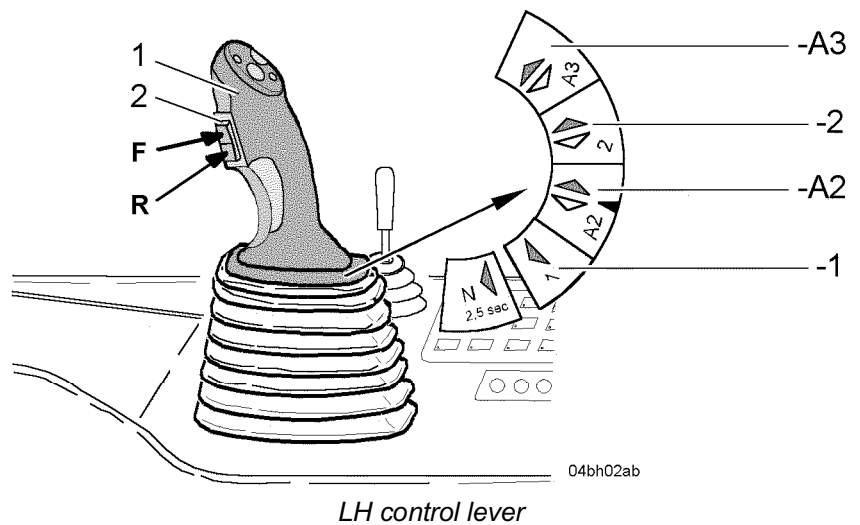
After the electrical system is turned on, travel range - **A2**- (automatic) is automatically selected.

It is not possible to select to another travel range until the travel direction has been selected.

Selecting travel ranges

The drive ranges are selected by jogging the LH control lever to the left or right as appropriate.

Also refer to the Section "Driving mode".



- | | |
|-------------------------------|------------------------------|
| 1 switch for travel range | F Forward (F orward) |
| 2 switch for travel direction | R Reverse (R everse) |

Functions of the travel range switch:

- by jogging in direction - **A3**-, the travel range is shifted up to - **A3**-
- by jogging in direction - **A3**-, the travel range is shifted up to - **A3**-
- by jogging in direction - **1**-, the travel range is shifted down to - **1**-
- neutral selection - **N** - of the travel direction

Function – neutral selection:

- when the switch 1 is held in the direction - **N** -, the drive direction is switched to the neutral position - **N** -, after approx. 2.5 seconds

Function – shifting the automatic travel ranges:

- in the automatic travel ranges - **A2** - and - **A3** -, the gears are automatically shifted up and down, according to the the gas pedal position, the travel speed and the rate of change of speed

Functions of the travel direction switch:

- F travel direction is – forward (**F**orward)
- R travel direction is – reverse (**R**everse)

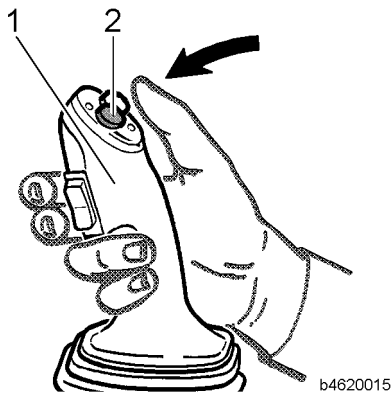
The preselected travel direction as well as the selected travel range are displayed on the instrument panel in the display unit by means of symbol fields.

LBH/02/003801/0003/4.0/en

Kick-down shifting

Kick-down shifting is possible in forwards and reverse travel in the travel ranges - **A2** - and - **A3** - and from every travel speed.

Use: see section "Driving mode" under "Driving with kick-down shift".



- 1 LH control lever
- 2 button – kick-down

Selection procedures for kick-down shift:

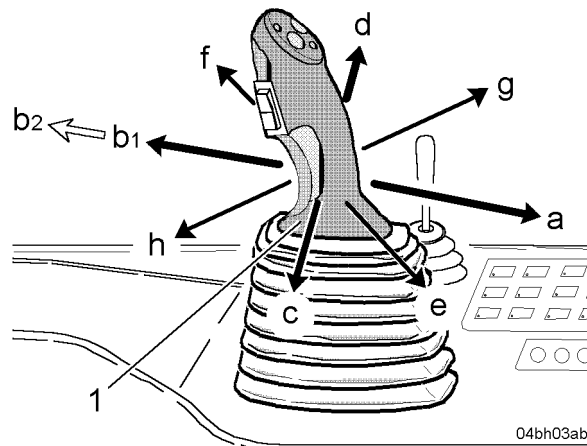
- when the button 2 is pressed, the machine is automatically hydrostatically braked
You then automatically shift into "1st gear" (gear 1).
- when you drive without resistance, the "1st gear" (gear 1) is active for approx. 4 secs.
The machine then switches into "2nd gear" (gear 2) when the speed increases.
- when driving into a pile, the "1st gear" remains active as long as a resistance is present

LH control lever for controlling the working attachment

Design

The grip of the LH control lever is linked mechanically to the pilot control device directly underneath it.

Function description



Movement directions of the LH control lever

- | | |
|-------------------------------|----------------|
| a backwards | c to the left |
| b1 forward up to action point | d to the right |
| b2 forward up to the stop | e-h diagonal |

The working attachment is controlled by moving the LH control lever 1.

The movement directions of the LH control lever and the resulting functions:

- a – lift arm is raised
- b1 – “normal lowering function” – lift arm is lowered slowly
- b2 – “rapid lowering function” – lift arm is lowered rapidly
- c – bucket is tilted in
- d – bucket is tilted out
- e – lift arm is raised and the bucket is simultaneously tilted in
- f – lift arm is lowered and the bucket is simultaneously tilted out
- g – lift arm is raised and the bucket is simultaneously tilted out
- h – lift arm is lowered and the bucket is simultaneously tilted in

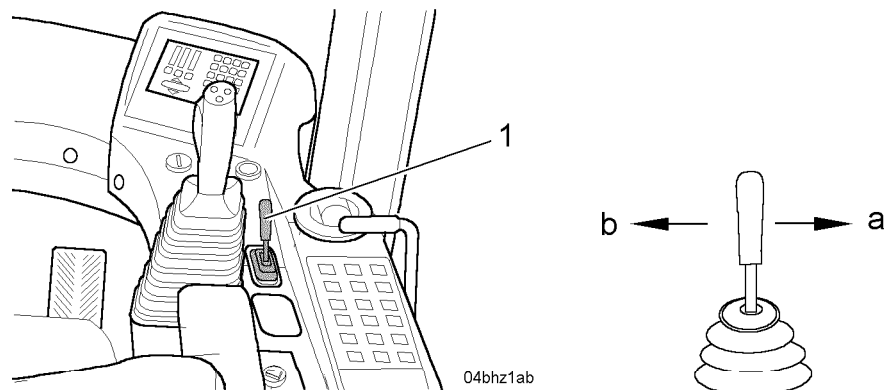
3.2.13 Control lever for optional working functions

This equipment is optional.

The control lever for additional working functions (additional control lever) is installed to the right of the LH control lever, in the instrument panel.

Function description

If an optional attachment with independent control circuit is attached to the lift arm, then this will be controlled by the additional control lever.



Movement directions of the additional control lever

a – backwards

b – forwards

The working attachment is controlled by moving the additional control lever 1.

The movement directions of the additional control lever and the resulting functions:

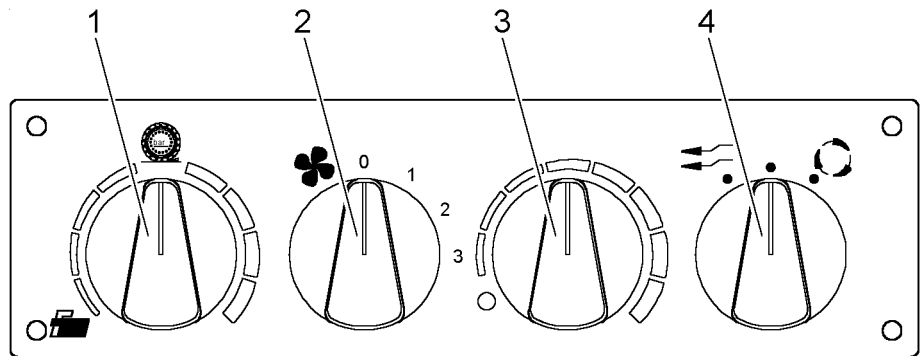
- a – (function depends on the type of optional attachment mounted)
- b – (function depends on the type of optional attachment mounted)

Familiarise yourself with the operation of the built-on optional attachment!

Refer to the Sections “Operation”, “Working with optional equipment”, or in the Operator’s manual for the additional equipment.

3.2.14 Heating, Ventilation

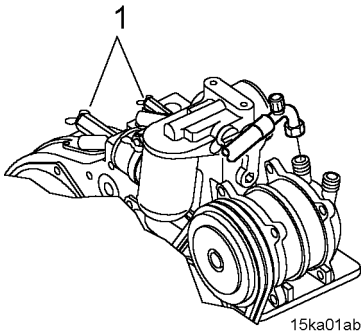
Switching the heater on/off



04se05ab

control element (view rotated by 90°)

- | | |
|---|--------------------------|
| 1 rotary switch – tractive force adjustment | 3 rotary switch – heater |
| 2 rotary switch – blower | 4 rotary switch – heater |



15ka01ab

The shut-off valves 1 on the thermostat housing of the diesel engine must be open so that the cab can be heated.

- Switch on the heater: to do this, turn the rotary switch – heater 3 to the right.
- To speed up the warming process: turn the rotary switch – heater 3 all the way clockwise to the stop. Simultaneously turn the rotary switch – ventilation 4 to the position recirculated air 1 and the rotary switch – blower 2 to level - 3 -.
- Switch off the heater: to do this, turn the rotary switch – heater 3 all the way anti-clockwise to the stop.

Adjusting ventilation

The rotary switches for adjusting the ventilation and the blower are integrated in the control element.

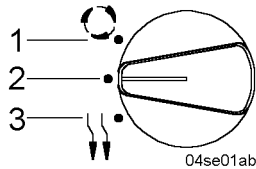
To ensure proper ventilation, the filters in the heater/air-conditioning device have to be serviced regularly. A contaminated filter hinders air throughflow (refer to the Chapter “Maintenance”)

The air – outlet nozzles in the driver's cab must also be open.

Caution 

Danger of damage to the evaporator if recirculated air filter not present!
 If the recirculated air and/or fresh air filter are missing, the close-meshed, deep evaporator fins soon become contaminated.
 It is then necessary to replace the evaporator as cleaning is no longer possible.

! Never operate the heater/air-conditioning unit without filters!



Switch settings:

- 1 position – recirculated air
- 2 position – recirculated and fresh air
- 3 position – fresh air

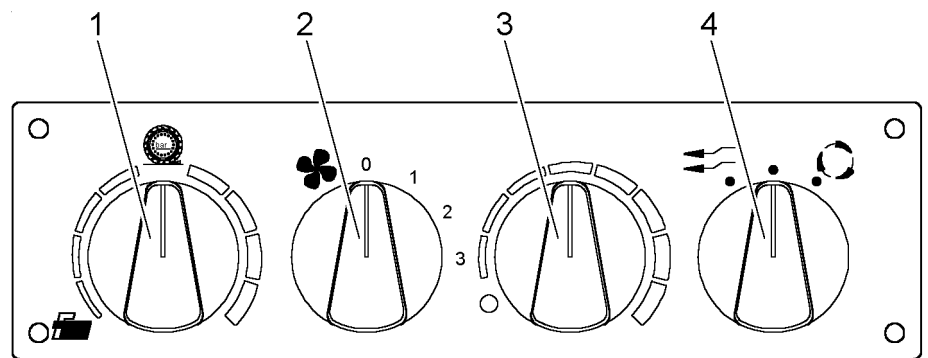
- For optional ventilation of the cab: Set rotary switch – ventilation 4 to fresh air 3 (left-hand stop) and turn the rotary switch – blower 2 to level - 3 - (right-hand stop).
- In order to circulate the cab air just within the cab: Set the rotary switch – ventilation 4 to recirculated air 1 (right-hand stop). Particles (dust, etc.) are filtered out of the recirculated air by the recirculated air filter.
- Mixing filtered external with the circulating cab air: Move rotary switch – ventilation 4 in position 2 for recirculated air and fresh air.

3.2.15 Air-conditioning system

Operating the air-conditioning system

In order to guarantee the long-term reliability of the air-conditioning system, we recommend that it is switched on at least every 14 days.

When the air-conditioning system is running, the shaft seal ring in the air-conditioning compressor is also lubricated. This prevents refrigerant escaping from the air-conditioning compressor.

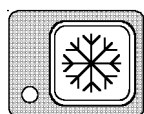


Control element (view rotated by 90°)

Before the air-conditioning system can be switched on, the diesel engine must be running and the rotary switch 2 for the blower must be set at least to level - 1 -.

- Switching on the air-conditioning system: to do this press the button – air-conditioning system

An LED on the button indicates that the function is active.



Button – air-conditioning system

LBH/02/003801/0003/4.0/en

- The required cab temperature can be set by the the rotary switch – heating 3 :

Turn rotary switch clockwise = warmer

Turn rotary switch anticlockwise = colder

In order to achieve a still greater degree of cooling in the cab, take the following steps:

- set the highest blower level
- turn rotary switch - heating 3 all the way anti-clockwise
- close cab windows and doors
- set fresh air / recirculated air flap to recirculated air
- if dammed heat is present in cab, thoroughly ventilate the cab first

Re-heat mode

The air-conditioning system can be used to de-humidify the cab air when the weather is cool and damp.

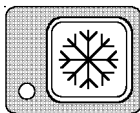
- For de-humidifying the cab air: switch on the air-conditioning system in addition to the heater.

The formation of a layer of condensation on the windows is thus prevented, as the humidity in the air condenses on the cooler evaporator and is collected as water in the drip tray and drains away outside.

Switching off the air-conditioning system

- Switching off the air-conditioning system: to do this press the button – air-conditioning system

When the function is switched off, the LED on the button goes out.



04ta15ab

Button – air-conditioning system

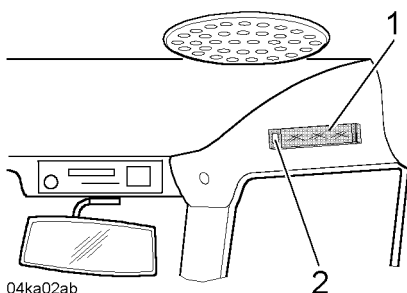
3.2.16 Internal cab illumination

The internal lighting 1 is mounted on the top right-hand side of the cab.

Switching the internal illumination on/off

- 1 internal illumination
- 2 switch

- Switch internal illumination 1 on or off: Turn switch 2 .



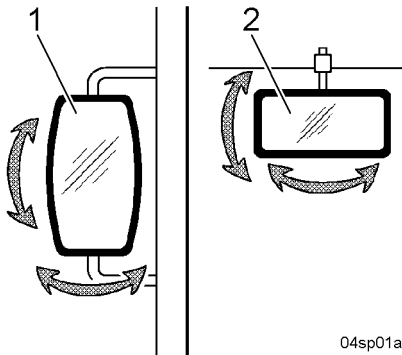
04ka02ab

Internal illumination

3.2.17 Inside and outside mirrors

The driver's cab is equipped with one inside and two outside mirrors.

Adjusting the mirrors



- 1 exterior mirror
- 2 interior mirror

- Individually adjust all mirrors by turning them.

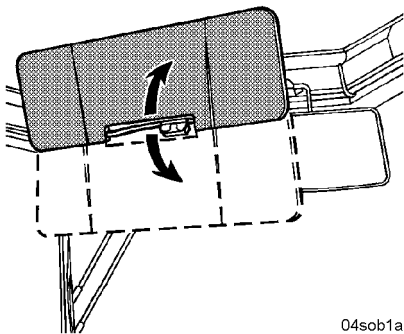
04sp01ab
Adjustment — mirror

3.2.18 Sun visor

The driver's cab is equipped with a sun visor.

Adjustment of sun visor

- Adjust the sun visor according to your individual requirements by pulling it down or up.



04sob1ab
Adjustment — sun visor

3.2.19 Electric windshield wiper and washer system

Design

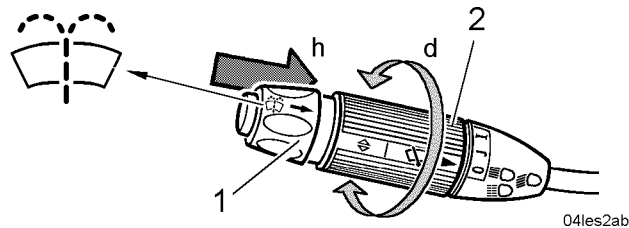
The machine is equipped with an electric windshield wiper and washer system for the front and rear windows.

Essentially it consists of the controls, the windshield wipers, the reservoir and the outlet nozzles for the washing agent.

Switching on the windshield wiper and washer system

Before switching on the windshield wiper and washer system, make sure that the machine's electrical system is switched on.

Operating the windshield wiper and washer system – front window



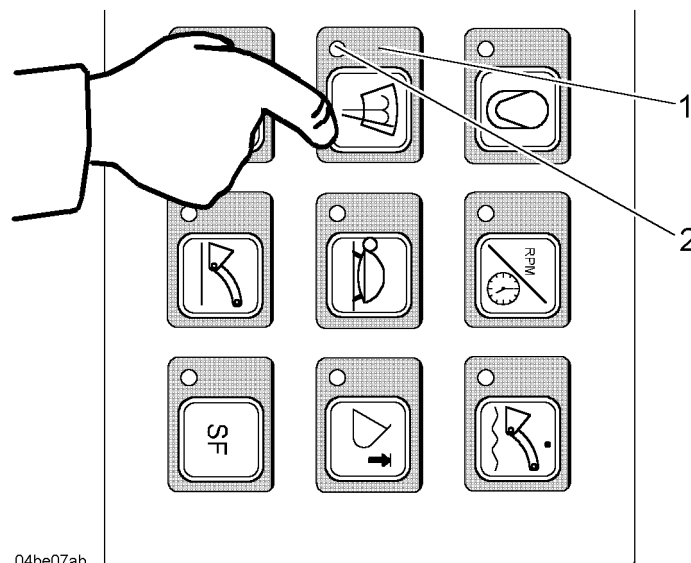
Steering column switch

- 1 pushbutton
- 2 handle
- h switching on the windshield wiper and washer system
- d activation - windshield wiper

- Wipe window: turn handle 2 to the required level J – I – II
 - Wash window: press the button 1 on the steering column switch
- Washing solution is sprayed onto the front windscreen through each outlet nozzle.

Switching on the windshield wiper and washer system – rear window

The windshield wiper and washer system is switched on by pressing the button 1 .



Control unit

- 1 button – windshield wiper and washer system – rear window
- 2 LED

- Wipe window: press switch 1 first time.
- An LED 2 on the button indicates that the function is active.
- Wipe and wash window: press the switch 1 a second time and keep it pressed down.

LBH/02/003801/0003/4_0/en

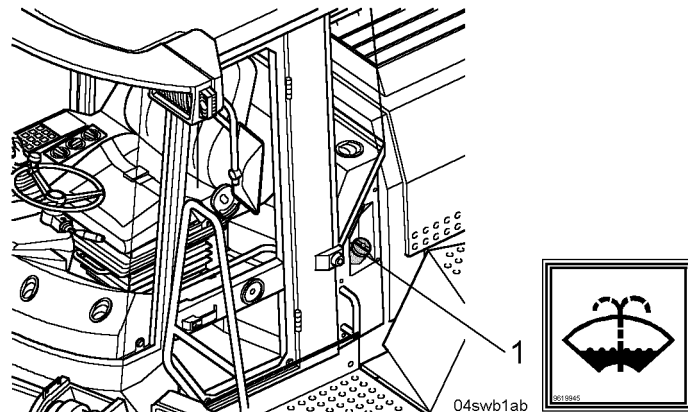
Washing solution is sprayed onto the rear windscreen through each outlet nozzle.

- Switch off the windshield wiper and washer system: press a button 1 a third time.

The LED 2 on the button goes out.

3.2.20 Reservoir for windshield washer fluid

Design



container - windshield washer fluid

1 Reservoir - filling inlet

The reservoir is located on the left-hand side of the driver's cab. The inlet opening 1 is mounted outside on the left-hand side of the driver's cab.

Topping up with windshield washer fluid

Filling quantity approx. 3.5 litres.

- When necessary, refill with commercially available window cleaning agent.

Caution



Risk of damage to the windshield wiper and washer system from ice! Icing up can result in the breakdown or damage to the windshield wiper and washer system. An opaque front or rear windscreen is a safety hazard!
! It is essential to protect the windshield wiper and washer system from ice build-up!

- Use commercially available windscreen frost protection.
- Before the start of the cold season, top up with an appropriate quantity of anti-freeze.



04sy02ab

3.2.21 Automatic central lubrication system

This equipment is optional.

The central lubrication pump with a see-through reservoir and integrated control unit is installed on the left-hand side of the machine.

The central lubrication pump delivers the lubricant via supply lines and via a primary and several sub-progressive distributors to the individual lubrication points. An overpressure valve monitors lubrication of the individual lubrication points.

Function description

Lubrication and dead times

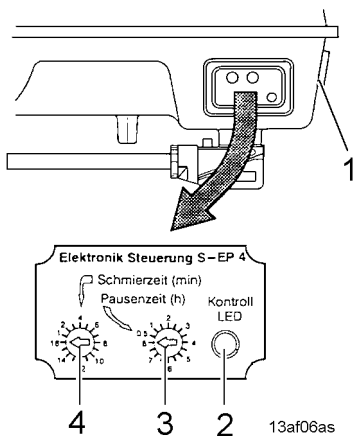
The S-EP4 control unit electronically controls the central lubrication system.

- 1 pushbutton
- 2 LED - yellow
- 3 display and adjustment of the dead time
- 4 display and adjustment of the lubrication time

The yellow LED (light emitting diode) 2 illuminates for about 3 secs after the ignition is switched on and hence signals standby condition.

The pump can also be switched on manually by pressing the pushbutton 1. The pump motor switches off after the set lubrication time 4 has elapsed and the dead time 4 begins. All further lubrication cycles follow automatically in a pattern determined by the set dead time.

If the ignition is switched off during the lubrication or dead time, the control unit stops the clock and logs the time. After the ignition has been switched on again, the control unit scans the data from the memory and continues the function sequence from the point where it was interrupted.



Control unit S-EP4

Switching on for non-scheduled lubrication

Non-scheduled lubrication can be triggered at any time when the ignition is switched on, via the pushbutton 1 on the motor housing.

For the default settings of the lubrication and dead times, see the Chapter "Product description", Section "Technical data".

Refilling the reservoir

The reservoir is filled via the conical grease fitting.

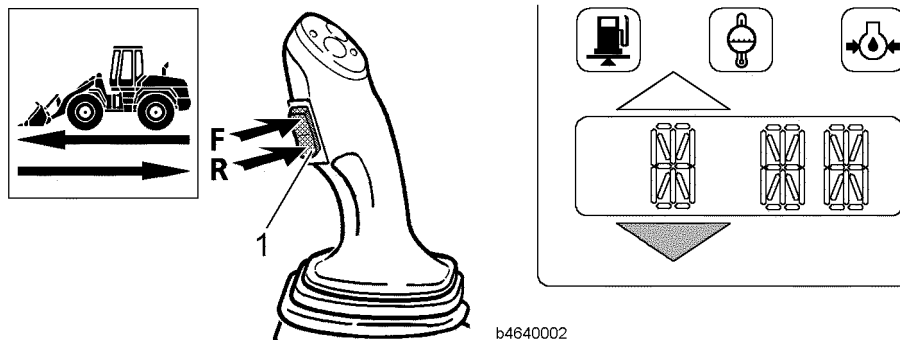
Grease specification: See the Chapter "Maintenance" under "Lubricants and fuels"

3.2.22 Acoustic reverse warning device

This equipment is optional.

This equipment comes as standard with the tunnel version of the machine.

Switching on reverse warning device



b4640002

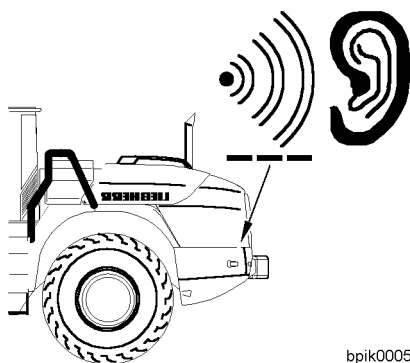
Rocker switch and display unit

When the rocker switch 1 is moved to position R 1 for reverse travel, an audible alarm is issued.

- Press rocker switch 1 for drive direction **R = REVERSE**.

The reverse warning device installed at the rear left of the machine in the engine compartment, sounds an alarm signal with about 60 impulses per minute.

The alarm signal is approx. 5 dB louder than the ambient noise.



bpik0005

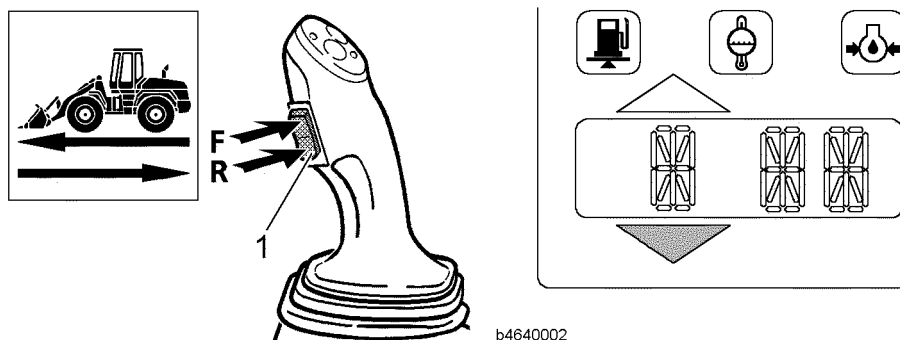
3.2.23 Optical reverse warning device

This equipment is optional.

The machine can also be equipped with an optical reverse warning device – in addition to the acoustic one.

Two red warning lights are built into the tail of the machine.

Switching on reverse warning device

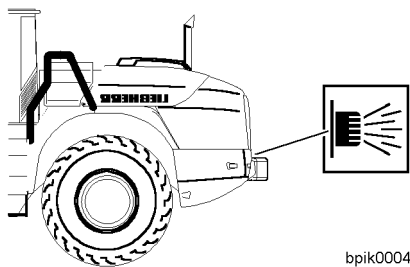


b4640002

Rocker switch and display unit

LBH/02/003801/0003/4.0/en

- Press rocker switch 1 for travel direction **R = REVERSE**.
The two warning lights flash.



bpik0004

3.3 Handling

3.3.1 Daily start-up routine

Make sure that:

- before starting up the machine each day, the “(daily) maintenance tasks should be carried out every 10 operating hours”. See “Maintenance” chapter.

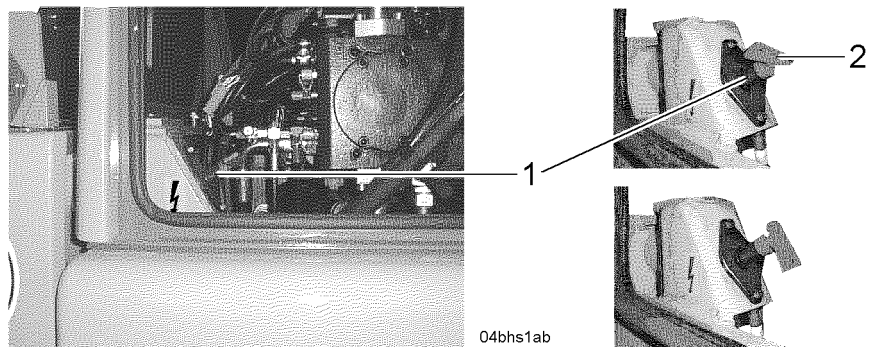
After the “maintenance jobs (daily) every 10 operating hours” have been completed, the machine should be moved into the operating position. See “Operating position” section.

- enough diesel fuel should be available for the foreseen daily workload. See “Refuelling with diesel fuel” section .

Operating position

This is how to bring the machine into the operating position.

Turning on the main battery switch



Main battery switch

1 main battery switch

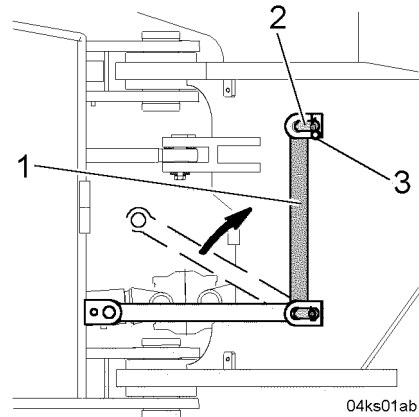
2 main switch - key

Closing service hatches and hoods

- Turn on the main battery switch.
- Close all service hatches and hoods and where possible lock them.

Releasing the articulation lock

When the articulation lock is installed, no steering functions are possible.



Articulation lock

1 safety bar
2 pin

3 spring clip

Warning

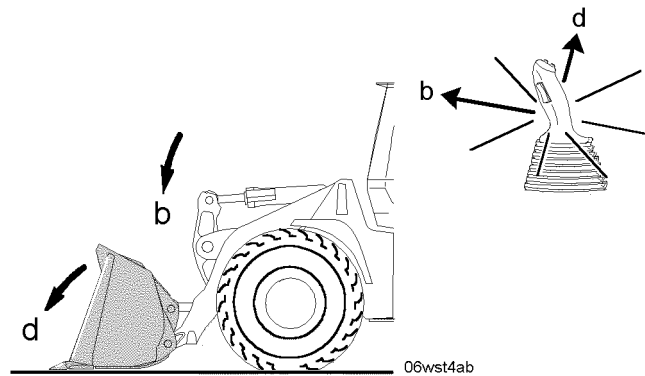
Risk of accidents when steering is blocked!

When the articulation lock is installed, no steering functions are possible.

! Release the articulation lock

- Pin locking bar 1 in the upper position.
- Secure pin 2 against dropping out with a split pin 3.

Moving the working attachment to the starting position

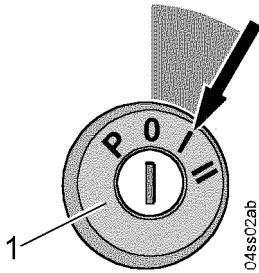


Starting position

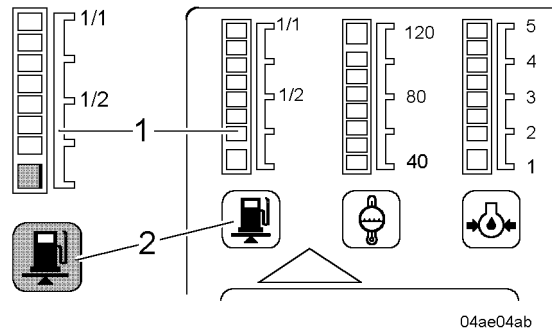
- Set the bucket down flat on the ground.

Refuelling with diesel fuel

Make sure that the machine's electrical system is switched on.



Starter switch – contact position

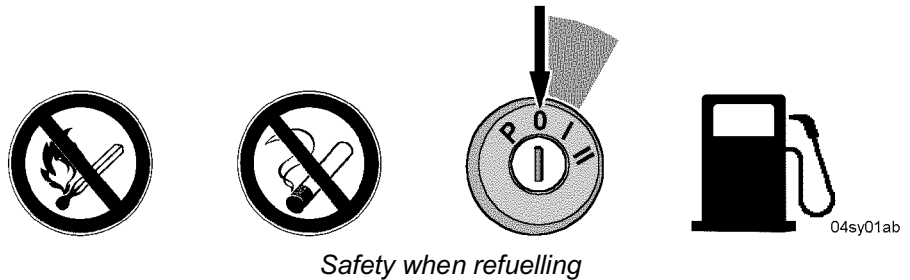


Display unit

1 segment field – fuel supply

2 symbol field – fuel supply

- Read the display in the segment field – fuel supply 1 to see if there is enough diesel fuel in the tank.
- If there is too little diesel fuel, the symbol field - fuel supply 2 starts flashing. Also refer to the Section “Display unit”.
There will still be a residual volume of approx. 20 l left over in tank.



Safety when refuelling

Danger

There is a risk of fires and explosions!

- ! Do not smoke and avoid naked flames when refuelling.
- ! Only refuel when the engine is switched off.

- It is essential to observe the safety regulations for refuelling. Also refer to the Chapter “Safety regulations”.
- Only use clean fuel.
- Carefully clean around the tank cap, before taking it off.
- If required, refuel with diesel fuel.
- Refuel if possible at the end of the working day, to prevent condensation build-up in the tank.

The machine is now ready for operation.

LBH/02/003801/0003/4.0/en

3.3.2 Operation with diesel particle filter

The diesel particle filter is fitted as standard with the tunnel version. The particle filter system is maintenance-free and self-regenerates independently during normal operation when a fuel additive is used.

Daily machine start-up with particle filter system

It is the responsibility of the machine operator to ensure that the following requirements are met.

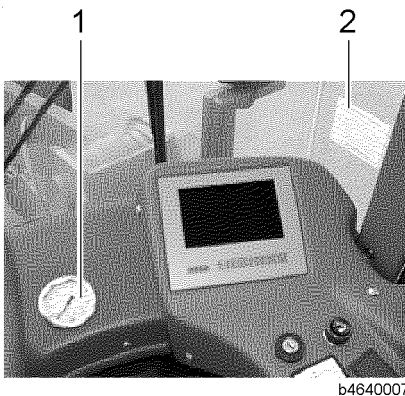
The particle filter system may only be operated in conjunction with diesel fuel with additive.

Additive for diesel particle filter:

- approved additive – Refer to the Section “Lubricant and fuel specifications” under “Diesel fuels”
- additive blending ratio – Refer to the Seciton “Technical data” under “Diesel particle filters”

In addition, the additional information affixed to the machine should be observed:

- see the decal on the fuel tank referring to the “Additive blending ratio” for the diesel fuel
- see the decal in the driver's cab, on the right-hand side of the front windscreen regarding “counter-pressure”



- 1 Exhaust gas counter-pressure display
- 2 Information sign - counter-pressure

The exhaust gas counter-pressure display indicates the loading condition of the filter particle system.

With turbo-engines, the counter-pressure of max. 0.2 bar may not be exceeded.

Caution

Risk of damage to the diesel particle filter!

If the machine idles or is run in the bottom load range for prolonged periods, the max. counter-pressure may be exceeded.

! Avoid letting the machine idle or run in the bottom load range for prolonged periods.

- If it is established that the counter-pressure is too high: counter measures must be taken.

Steps to reduce the counter-pressure:

Run the travel or working hydraulics of the machine at a higher load for 10-15 minutes, until the counter-pressure drops.

When the engine is at running temperature, the counter-pressure must drop within 15 minutes.

- If the counter-pressure is over 0.2 bar: do not suddenly move the gas pedal!

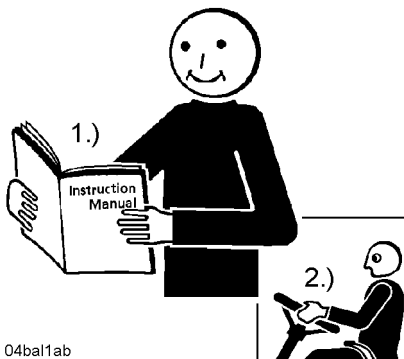
Trouble shooting

If the counter-pressure cannot be reduced by these measures:

- shut down the machine immediately!
 - consult LIEBHERR CUSTOMER SERVICE!
-

- If a fault in the injection system arises in the machine during operation: Immediately make considerable reduction in the loading of the machine and consult the LIEBHERR CUSTOMER SERVICE!

3.3.3 Starting the diesel engine



04ba11ab

Operator's manual

- 1.) first read and understand
- 2.) only then drive and work

Only operate the machine, when you have read and understood the operator's manual.

Information about the machine's travel drive:

- the machine is equipped with a hydrostatic travel drive
- the engine cannot be bump-started or tow-started

Precautions before start-up

The following precautions should be taken before starting the machine. First make sure that the machine is in its operating position. See "Operating position" section.

Start-up procedure

Preheating the engine

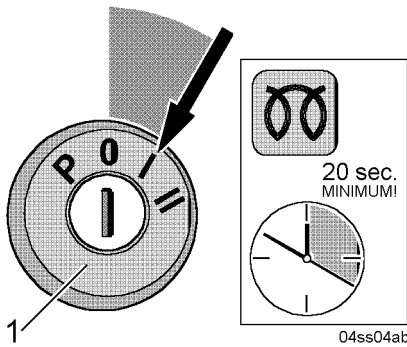
The preglow time depends on the current ambient temperature and the electrical starting conditions.

It lasts at least 20 seconds and when ambient temperatures are extremely low it can last over 120 seconds.

When the engine is warm and the ambient temperature high, it is not necessary to wait until the preglow time is over.

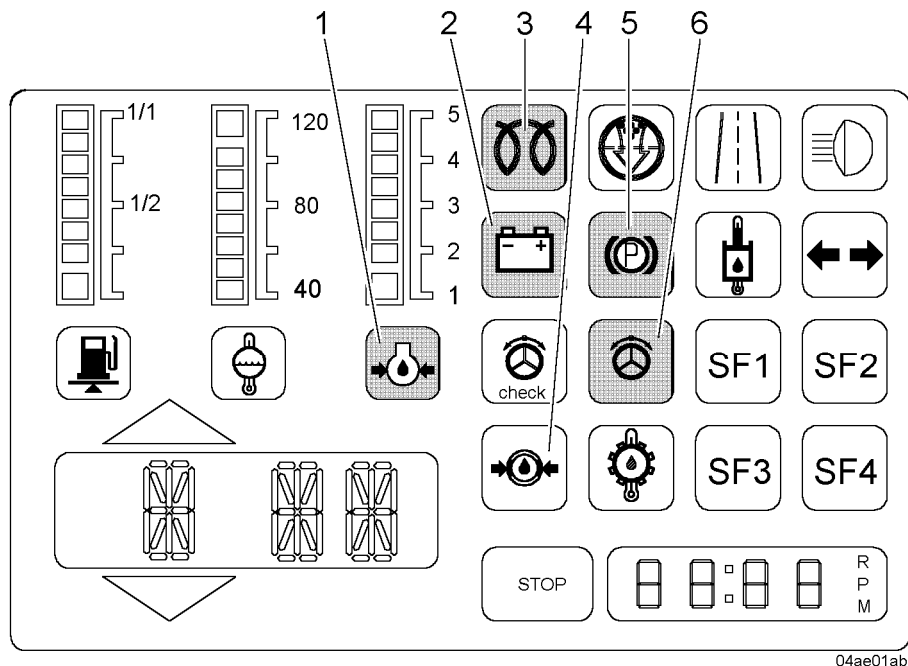
Note: Do not preheat engines which are already at operating temperature.

- Turn electrical system with the ignition key to position - I-.



1
Starter switch – contact- preglow position

As a “Check”, all the segment and symbol fields light up for approx. 3 secs.



Display unit

- | | |
|--|--|
| 1 symbol field – engine oil pressure | 4 symbol field – braking system accumulator pressure |
| 2 symbol field – battery charging (charge control) | 5 symbol field – parking brake |
| 3 symbol field – preglow monitor | 6 symbol field – emergency steering |

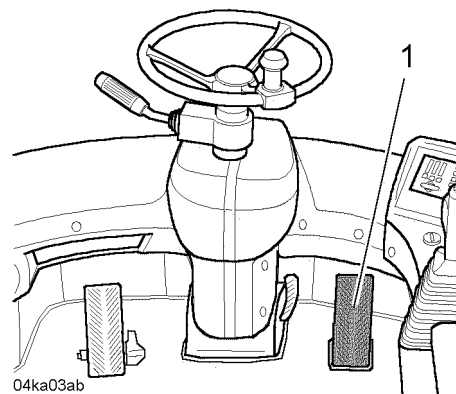
LBH/02/003801/0003/4_0/en

After the "Check" is completed, the following symbol fields must still flash or illuminate with the key at position - I-:

- 1 engine oil pressure (red) – flashes
- 2 battery charging (red) – lights up
- 3 preglow monitor (yellow) – lights up
- 4 braking system accumulator pressure (red):
lights up when the brake accumulator pressure is too low.
- 5 parking brake (red) – lights up
- 6 emergency steering (red) – lights up

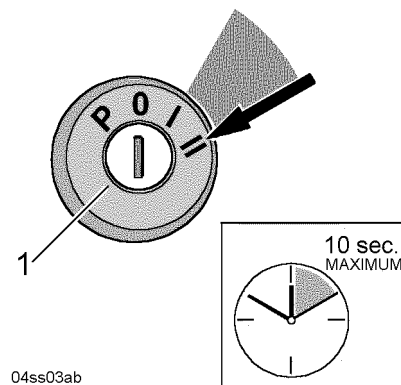
Starting the engine

- Wait until the symbol field 3 for the preglow monitor goes out. When the symbol field goes out, the preglow time is over. The engine can now be started.



Gas pedal

- Press gas pedal 1 approx. $\frac{1}{4}$ of the way down to adjust the diesel engine speed.



04ss03ab

Starter switch – starting position

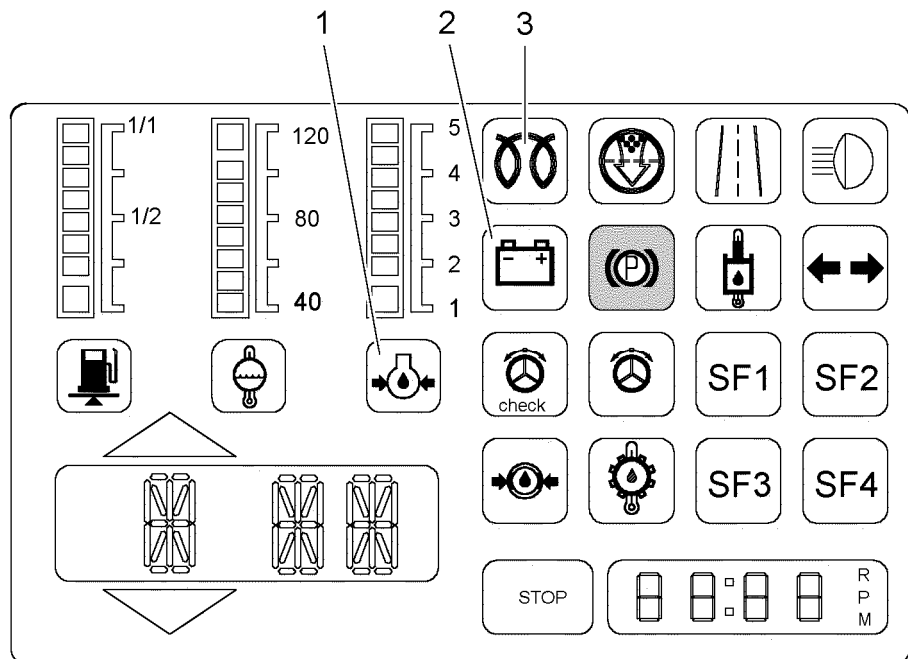
- Turn ignition key to starting position - II - and keep it in this position until the engine cuts in.
- **Do not attempt to start the engine for longer than 10 seconds without interruption.**
- If the engine does not cut in:
turn the ignition key back to the 0-position

Trouble shooting

Will the engine not start?

- Repeat the starting procedure after a break of 120 seconds.
- If the engine does not cut in after two start attempts, find the cause in accordance with the malfunction chart (refer to the Section “Malfunctions”) and rectify it.

- As soon as the engine starts running, release the ignition key. The ignition key returns automatically to the operating position.



04ae02ab

Display unit

- | | |
|--------------------------------------|--|
| 1 symbol field – engine oil pressure | 2 symbol field – battery charging (charge control) |
| | 3 symbol field – preglow monitor |

When the engine cuts in, the following symbol fields must go out:

- 1 engine oil pressure (red)
- 2 battery charging (red)
- 3 preglow monitor (yellow)

Note: when the engine is being preheated, the symbol field 3 goes out when the preglow time has elapsed, i.e. when the engine is ready. It lasts at least 20 seconds and when ambient temperatures are extremely low it can last over 120 seconds.

Trouble shooting

Will the symbol fields 1 not go out?

- Shut down the engine and rectify the problem in accordance with the Section “Malfunctions”.

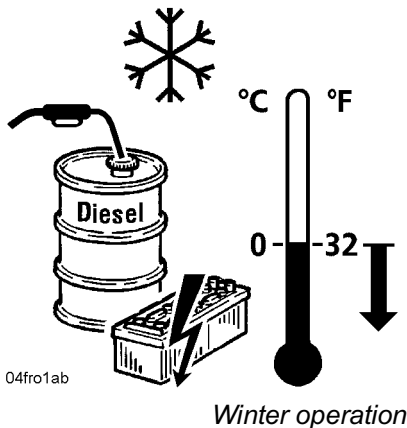
- Adjust the engine speed with gas pedal.

Precautions when starting at temperatures below freezing

The following measures improve the starting performance at low temperatures.

Precautions:

- check battery charging
if necessary recharge the battery
- use winter-grade fuel
See “Lubricants and fuels” Section under Winter operation.
- use additional heating – engine preheating system (cooling water):
if required, the machine can be equipped with an additional heating –
engine prewarming system (cooling water)
The additional heating – engine prewarming system is optionally
available from your LIEBHERR dealer.



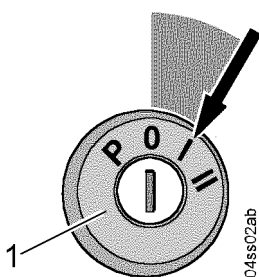
Risk of explosion with the diesel engine!

There is a risk of explosions, when using volatile fluids to start diesel engines with preglow systems!

! Do not use volatile starting aids.

- Carry out the precautions listed for starting at temperatures below freezing.

3.3.4 Driving mode



Situation after the electrical system is switched on:

- the parking brake is automatically activated
- when the parking brake is engaged, the travel lockout is active
- preselection of the travel direction is not possible

Preparations for driving mode

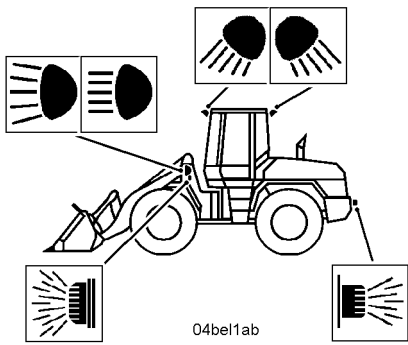
The preparations for driving mode should be carried out in the following sequence.

First make sure that the machine is in its operating position.

See “Operating position” section .

Checking the lighting equipment

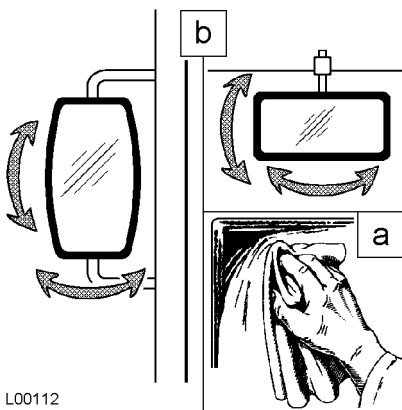
- Check the lighting equipment.
- If required, adjust the setting of the headlamps.



Headlamp adjustment

Checking inside and outside mirrors

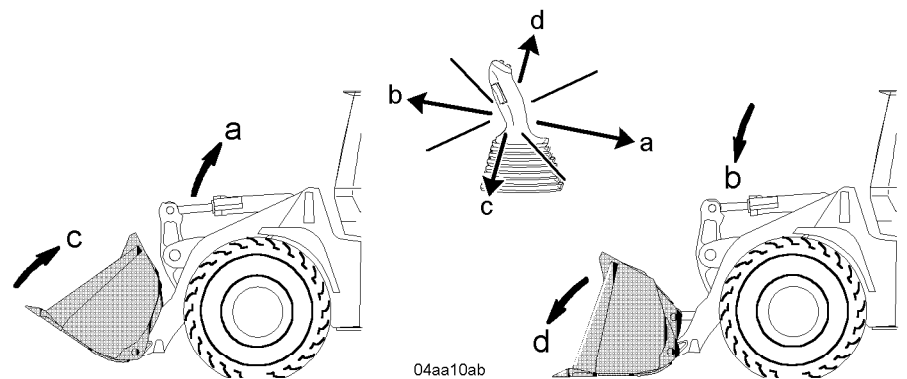
- Clean the inside and outside mirrors.
- Adjust the inside and outside mirrors.



Inside and outside mirrors

Moving the working attachment into position

You will find detailed information on this in the Sections “LIEBHERR control lever” or “Working with the attachment”.

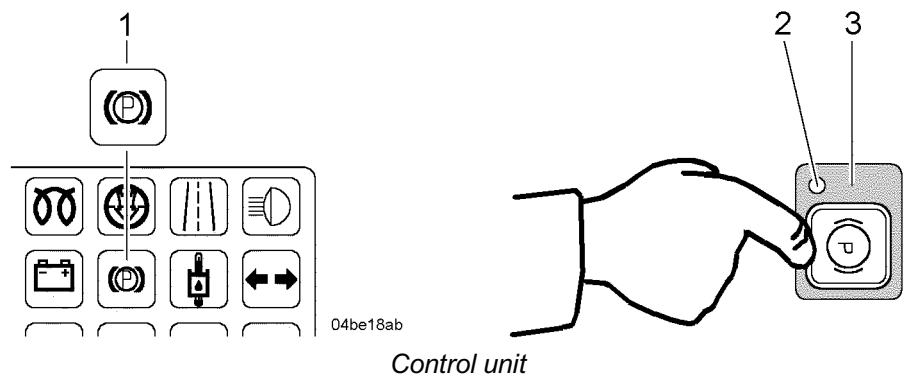


Bucket position

Releasing the parking brake

- Depending on the starting position, the lift arm should be raised or lowered.
- Move the loading bucket to the required position.

When the parking brake is engaged, the travel lockout is active. Preselection of the travel direction is not possible!



- 1 symbol field – parking brake
- 2 LED
- 3 button – parking brake

- Release the parking brake by pressing button 3.

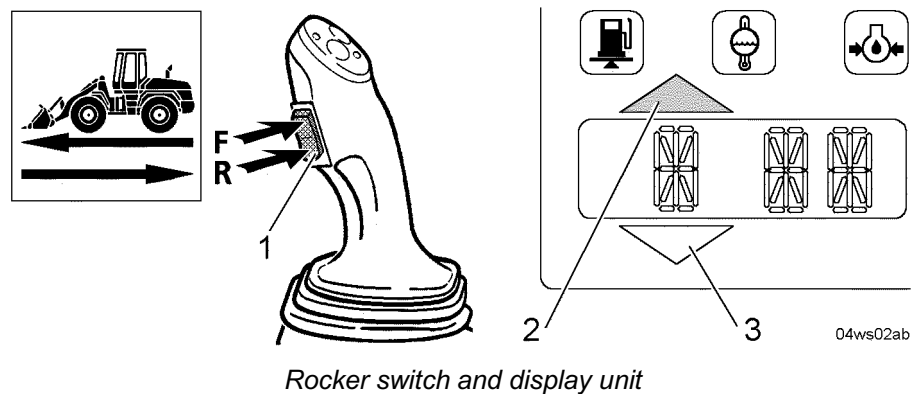
The LED 2 on button 3 goes out.

Symbol field 1 for the parking brake goes out.

Preselection of travel direction

When the electrical system is switched on, the travel direction is automatically switched to neutral.

The travel direction forward or reverse is preselected by pressing the rocker switch in the appropriate direction.



- 1 rocker switch for travel direction
- 2 symbol field – travel direction “forwards”
- 3 symbol field – travel direction “reverse”

- Press rocker switch 1 for travel direction **F = FORWARD**.

or

- Press rocker switch 1 for travel direction **R = REVERSE**.

Depending on the switch position, the symbol field for forward drive 2 or for reverse drive 3 lights up.

LBH/02/003801/0003/4.0/en

Selection of travel ranges

After the electrical system is turned on, travel range - **A2**- (automatic) is automatically selected. It is not possible to select another travel range until the travel direction has been selected.

The travel ranges are selected with the drive switches for travel range and travel direction. Also refer to the Section “LIEBHERR control lever”.

The selected driving range is shown on the instrument panel in the display unit. See also “Display unit” section .

Selecting another travel range is possible at any travel speed. If the driving speed is too high when shifting down, the machine is first hydrostatically braked. The driving range is then automatically shifted down.

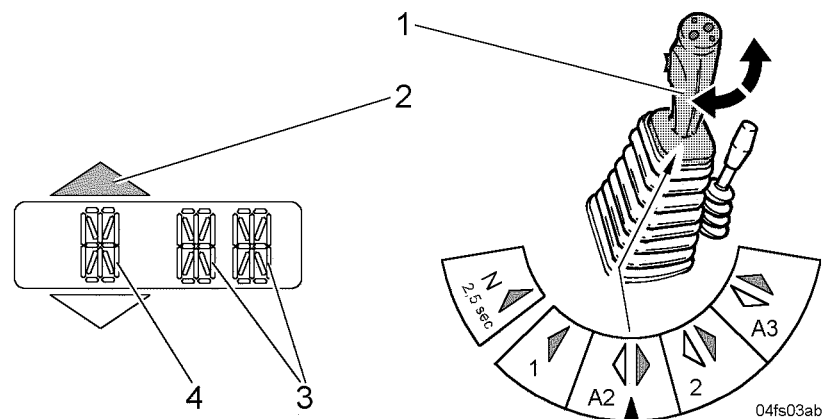
The following travel ranges can be selected:

- travel range - **1** - for slow drive (on steep slopes)
the gearbox is thereby shifted to gear level - **1** -
- travel range - **A2**- (automatic) for normal working operation
the gearbox is thereby shifted to gear level - **1** - or - **2** -
- travel range - **2**- for normal working operation
the gearbox is thereby shifted to gear level - **2** -
- travel range - **A3** -(automatic) for driving on public roads or transport
the gearbox is thereby shifted to gear level - **1** -, - **2** - or - **3** -

Gear shifts in the automatic travel ranges:

- In the automatic travel ranges - **1** -, - **2** - and - **3** -, the gears are automatically shifted up and down, according to the the gas pedal position, the driving speed and the rate of change of speed.

Travel speeds: see “Technical data” section .



Switch for travel range

- | | |
|-----------------------------------|----------------------------|
| 1 switch - travel range | 3 LCD field – travel speed |
| 2 symbol field - travel direction | 4 LCD field – travel range |

- Push the switch 1 according to conditions, in travel range - **1** -, - **A2** -, - **2** - or - **A3** -.

The selected driving range is displayed in the LCD field 4.

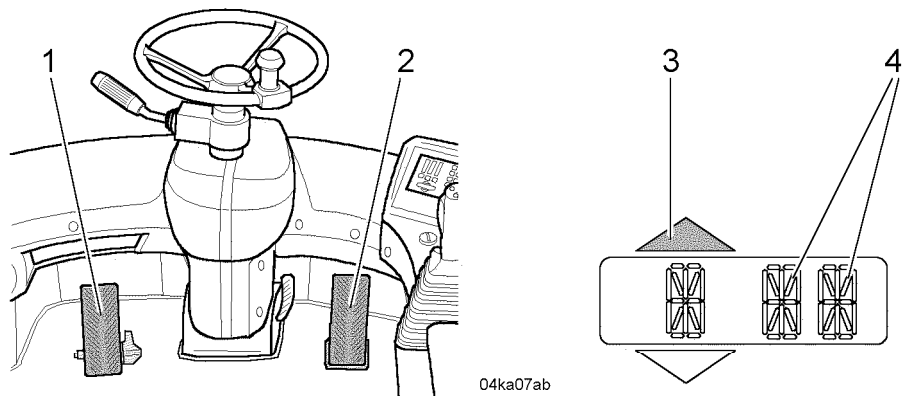
In automatic mode, the display in the LCD field changes regularly between the output - **A**- (automatic) and the respective automatic range - **2**- or - **3**-.

Moving off

After the electrical system is turned on, travel range - **A2**- (automatic) is automatically selected.

Make sure that the preparations for driving mode have been carried out.

LBH/02/003801/0003/4_0/en



Gas pedal and travel speed indicator

- 1 inch/brake pedal
- 2 gas pedal
- 3 symbol field - travel direction
- 4 LCD field – travel speed

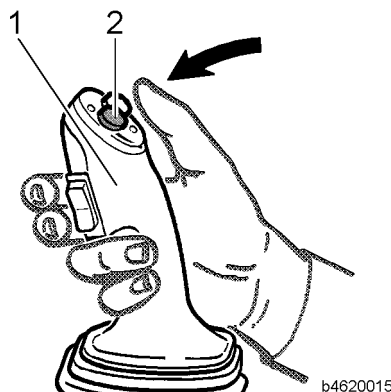
- Push down the gas pedal 2.
The machine moves off.
- Adjust the travel speed with the gas pedal.
The driving speed will be displayed in the LCD field 4.

Driving

You will find appropriate descriptions of work operations, driving, transport and transferring bulk material in the section “General working methods”. Shortly after moving off with the machine, make sure that the steering and brakes are functioning properly. Refer to the Section “Maintenance”.

Driving with kick-down shift

The use of the kick-down shift makes it easier to load bulk materials. When loading bulk materials, it is advantageous to shift to “1st gear” (gear level 1) shortly before penetrating the material. This is made possible by the kick-down shift. Kick-down shifting is possible in forwards and reverse travel in the travel ranges - **A2** - and - **A3** - and from every travel speed.



- 1 LH control lever
- 2 button – kick-down

- Press the button 2 for the kick-down shift.

Selection procedures for kick-down shift:

- when the button 2 is pressed, the machine is automatically braked hydrostatically
You then automatically shift into “1st gear” (gear 1).
- when you drive without resistance, the “1st gear” (gear 1) is active for approx. 4 secs.
The machine then automatically shifts to “2nd gear” (gear 2) when the speed increases.
- when driving into a pile, “1st gear” remains selected as long as a resistance is present

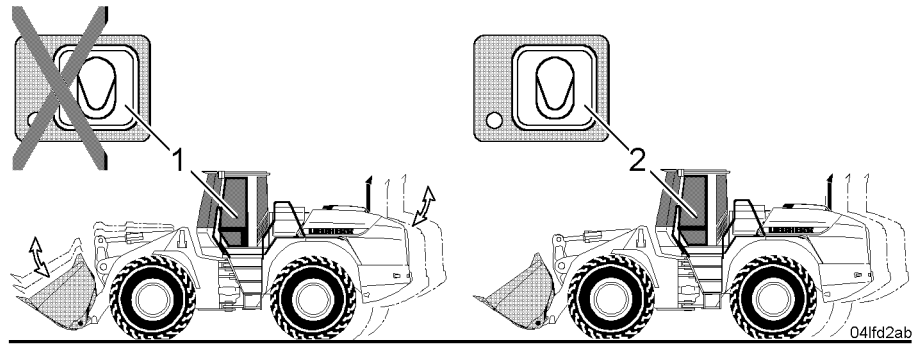
Driving without LFD

When driving over extended distances without LFD, vibrations may be produced. Therefore the LFD system should be switched on for all deployments which require significant distances to be covered.

- Improve driver comfort: by activating the LFD system.

LBH/02/003801/0003/4.0/en

Driving with LFD



Driving with or without LFD

1 Driving without LFD

2 Driving with LFD

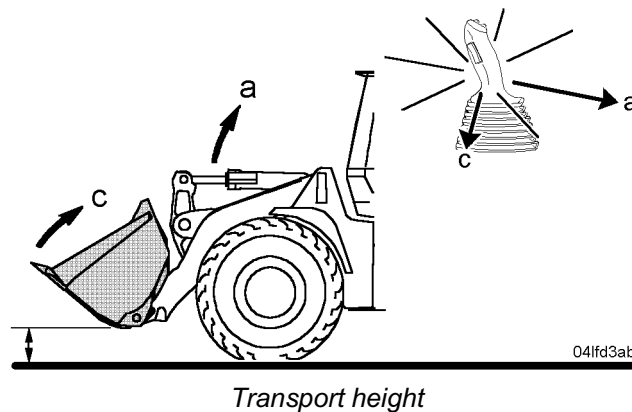
In virtually all driving modes, the LFD system improves driver comfort by reducing vehicle vibrations.

Therefore the LFD system should be switched on for all deployments which require significant distances to be covered.

Activating the LFD system

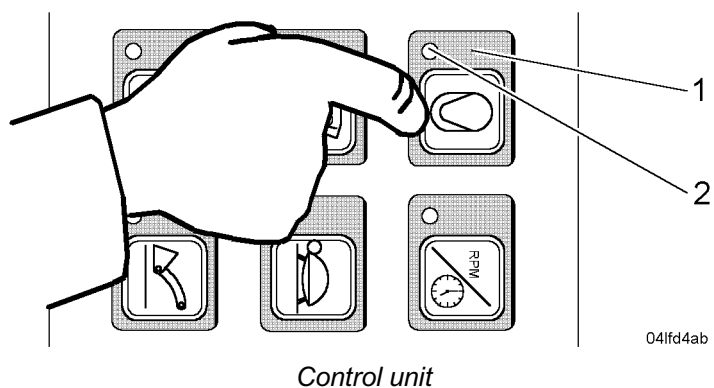
The LFD system is switched on automatically:

- when the bucket is tilted in
In this condition, the proximity switch - ride control is selected.
- when the bucket is tipped out, when the travel speed of the machine is more than 10 km/h



Make sure that:

- the loading bucket is in the transport position
The transport position means: The bucket pivot point must be approx. 40 cm above the ground.



Control unit

LBH/02/003801/0003/4_0/en

1 button - ride control

2 LED

The function is made ready by pressing the button 1 for ride control (LFD system).

- Press the button 1 for ride control (LFD system).

An LED 2 on the button indicates that the function is active.

The LFD system function is now active.

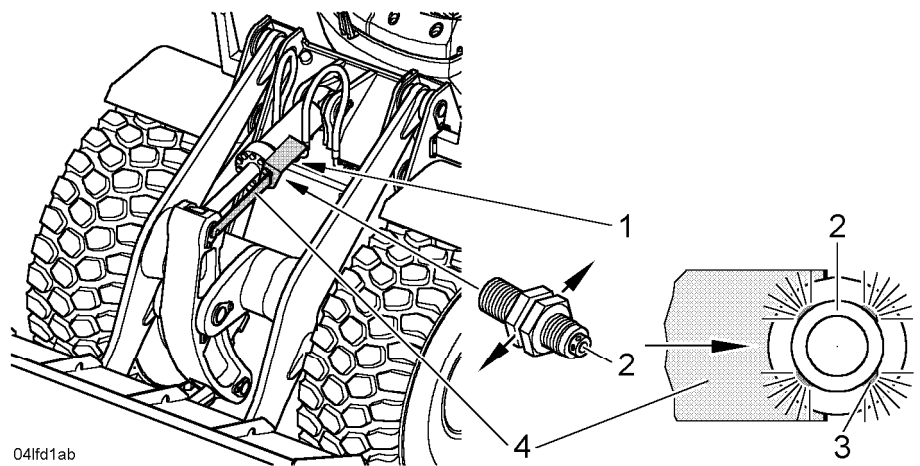
Adjustment of the proximity switch

The proximity switch 2 for the LFD system is set ex-works.

If necessary, the proximity switch can be re-adjusted.

This is the procedure for re-adjusting the proximity switch.

- Raise the lift arm to the required transport height and tilt in the loading bucket approx. 10 cm before the stop.



04lfd1ab

Proximity switch

- | | |
|--|---------------------|
| 1 proximity switch – autom. bucket return-to-dig | 3 LED |
| 2 proximity switch – LFD system | 4 positioning curve |

- Release the fixing nuts on the proximity switch 2.

Horizontally adjust the proximity switch 2 until the positioning curve 4 covers up to half the contact surface of the proximity switch.

When the positioning curve enters the contact area of the proximity switch, the four LEDs 3 on the proximity switch light up.

- Retighten the fixing nuts on the proximity switch 2.

The proximity switch has been reset and the LFD system is once more ready for operation.

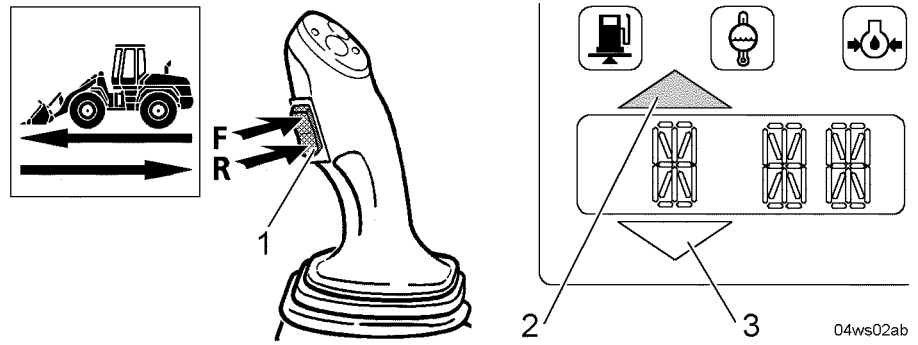
Reverse travel

The machine can be reversed in all travel ranges and at all speeds.

Selection process when reversing:

- when reversing in the travel ranges - **A2** - (automatic) or - **A2** - (automatic), there is no automatic shift back into gear level - **1** -
- the system only shifts to gear level - **1** - when it is not possible to drive off in gear level - **2** -

LBH/02/003801/0003/4.0/en

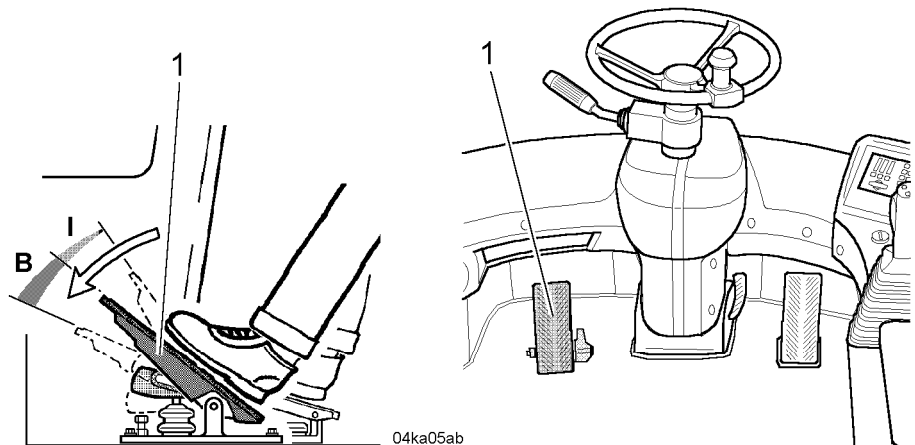


Switch for travel direction and display unit

- 1 switch for travel direction
- 2 symbol field – travel direction “forwards”
- 3 symbol field – travel direction “reverse”

- Changing travel direction: press switch 1.

Depending on the switch position, the symbol field for Forward travel 2 or for Reverse travel 2 lights up.

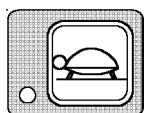


Inch/brake pedal

- If a gentle reverse action is required: support the reversing procedure by easing off the gas pedal or by gently pressing the brake- inching pedal

This produces a smoother reversing performance.

Selecting creeper



04ta11ab

When slow drive is necessary, the creeper function can be activated.

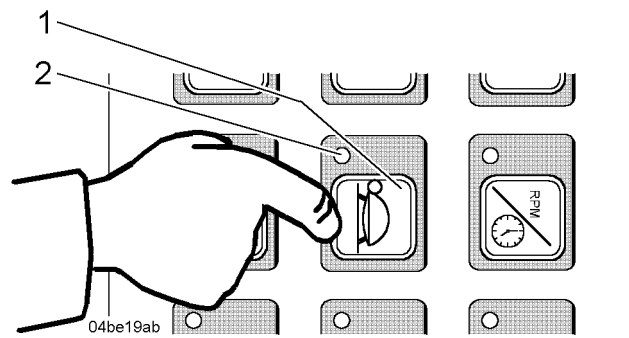
The creeper function is effective in travel directions forwards and reverse.

Creeper limits the travel speed when the vehicle is in travel range - 1 -.

Creeper is activated automatically in travel ranges - 1 -, - A2 - and - A3 -, as soon as the following conditions are fulfilled.

Preconditions for automatic activation:

- the creeper button has been pressed
- the gearbox has automatically selected gear level - 1 -

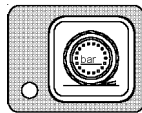


Control unit

1 button – creeper (slow drive) 2 LED

- Press the button 1 for creeper (slow travel).
An LED 2 on the button indicates that the function is active.
The creeper (slow drive) function is now active.
The travel speed is limited to approx. 4 km/h in gear level - 1 -.

Tractive force adjustment

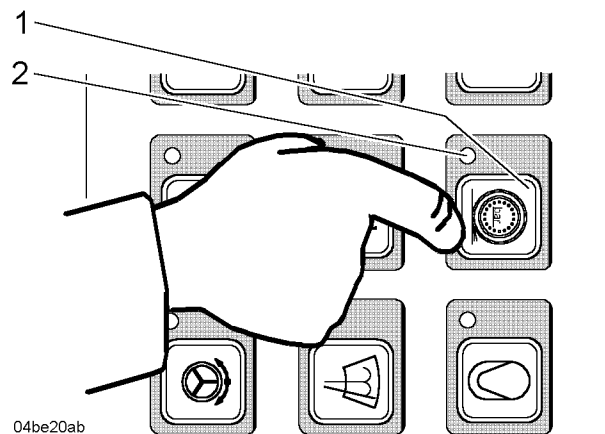


04ta03ab

For special deployments (e.g. on loose sand), the maximum tractive force of the machine can be adjusted in 9 levels. This prevents the wheels from spinning.

See also the sections “Control unit” and “Control element”.
The tractive force is adjusted:

- when the button for tractive force adjustment has been pressed
- only in the travel direction forward
- when the travel speed of the machine is under 3 km/h
- only in gear level - 1 -, in the travel ranges - 1 -, - A2 - and - A3 -

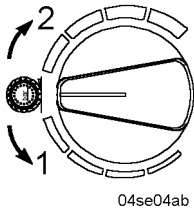


Control unit

1 pushbutton – tractive force adjustment 2 LED

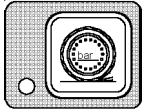
- Press button 1 for tractive force adjustment.
An LED 2 on the button indicates that the function is active.

LBH/02/003801/0003/4.0/en



04se04ab

Rotary switch – tractive force adjustment



04ta03ab

The tractive force adjustment function is now active.

- Adjust tractive force: Turn rotary switch to the required level.
 - 1 reduced tractive force
 - 2 more tractive force

- **When the tractive force adjustment is no longer required: Switch it off again!**

Otherwise the maximum tractive force cannot be achieved.

Driving on public roads

Before driving on public roads, acquaint yourself with the route (roads, bridges, tunnels, subways, narrow places etc.) in respect of the prescribed weight limits, bridge load bearing limits, width and height limits.

With wheel loaders with a design-limited maximum speed of 20 km/h, which do not have a licence plate, a company name (operating base) should be displayed, as well as certification of the operational liability assurance.

The wheel loader may only be driven on public roads when unloaded.

Before driving on public roads, find out:

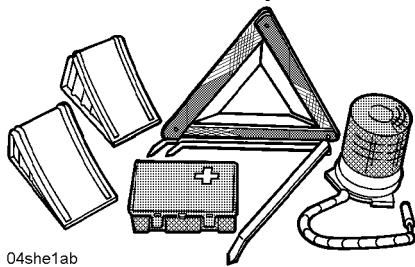
- from the vehicle owner, whether the required conditions for licensing for public roads have been met
 - “Operating permit”
 - “Special licence”
- about the appropriate safety regulations

Refer to the Sections:

- “Safety regulations”
- “Safety instructions for driving on slopes”
- “Instructions for safe working”

Make sure that the preparations for driving mode have been implemented.

Preparations for driving on public roads

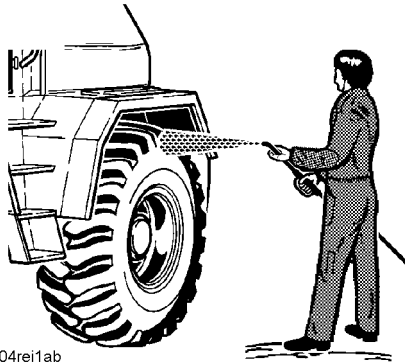


04she1ab

Make sure that the safety equipment listed below is on board, in accordance with the provisions of the **STVZO** (i.e. highway code):

- warning triangle
- rotating beacon
- first aid box
- wheel wedge(s)

In addition, make sure that the jobs listed below have been carried out.

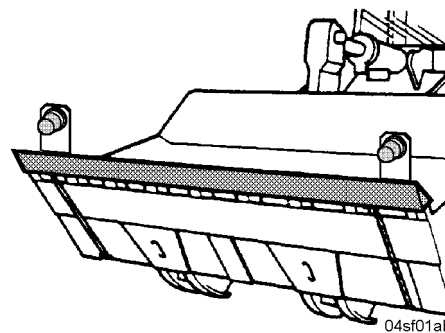


04rei1ab

Wet cleaning

- Remove coarse dirt from the machine and clean the tyre treads.
- See also the chapter "Maintenance", section "Cleaning the machine"

- Close all service hatches and hoods and where possible lock them.



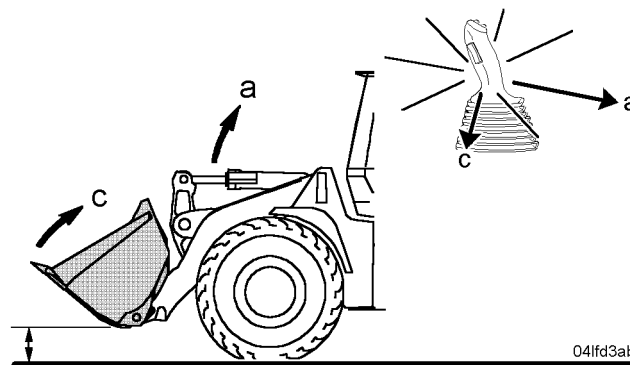
04sf01ab

Bucket teeth guard and profile lamps

- Attach the teeth guard to the bucket.
- Attach the profile lamps.
- Plug in the cables for the profile lamps.

Driving

You will find appropriate descriptions of work operations, driving, transport and transferring bulk material in the Section "General working methods".



04lfd3ab

Transport height

LBH/02/003801/0003/4.0/en

Make sure that:

- the loading bucket is in the transport position when “driving”
The transport position means: the bucket pivot point must be approx. 40 cm above the ground.
- the loading bucket is tipped up as far as it will go
- Always drive with due care.
- Observe traffic regulations.

Braking

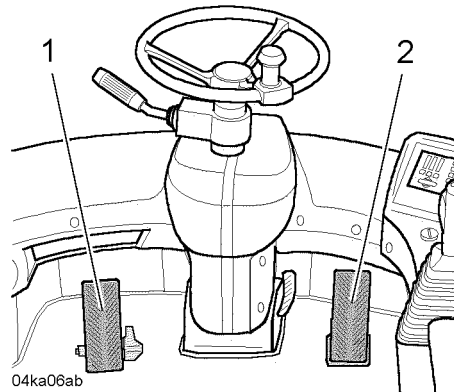
There are two ways in which the machine can be braked:

- with the hydrostatic circuit only
- with the hydrostatic circuit and the disc brake

Hydrostatic braking

The machine is hydrostatically braked by reducing the speed of the diesel engine.

The hydrostatic travel drive system of the machine also acts in the delay phase as a service brake.



Inch-brake pedal and gas pedal

1 inch-brake pedal

2 gas pedal

- Reduce the speed of the diesel engine with the gas pedal 2.

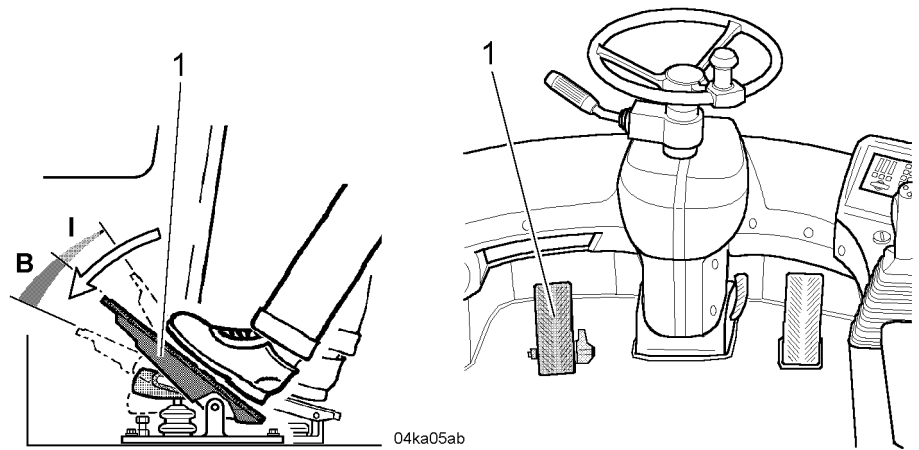
Service brake

If hydrostatic braking is not sufficient, the machine must also be braked with the brake- inching pedal 1.

Braking with the inch-brake pedal

During braking, there are two ranges for activating the inch-brake pedal:

- range - **I** - for hydrostatic braking only.
- range - **B** - for braking with hydrostatic circuit and with wet disc brakes in the wheel hubs



inch-brake pedal

1 inch-brake pedal
I actuation range - I

B actuation range - B

Warning



Risk of accidents when the machine is braked without due care!
If the machine is braked without due care, the driver could suffer severe injuries if the safety belt is not properly fastened!
! It is essential that you fasten your safety belt before starting up the machine.

- Braking with the hydrostatic circuit only: Activate inch-brake pedal 1 in range - I- of the pedal travel.

or

- Braking with the hydrostatic circuit and the disc brake. Activate inch-brake pedal 1 in range - B- of the pedal travel.

The machine will be braked quite strongly.

Trouble shooting

Little or no braking effect?

- Shut the machine down immediately.
 - Consult LIEBHERR CUSTOMER SERVICE!
-

Braking in potentially dangerous situations

Danger



Risk of accidents due to inappropriate braking in dangerous situations!
! For full braking in dangerous situations, the inch-brake pedal must be pressed all the way down!

- Press down inch-brake pedal 1 in range - B- of the pedal travel to the stop.

The machine is heavily braked.

LBH/02/003801/0003/4.0/en

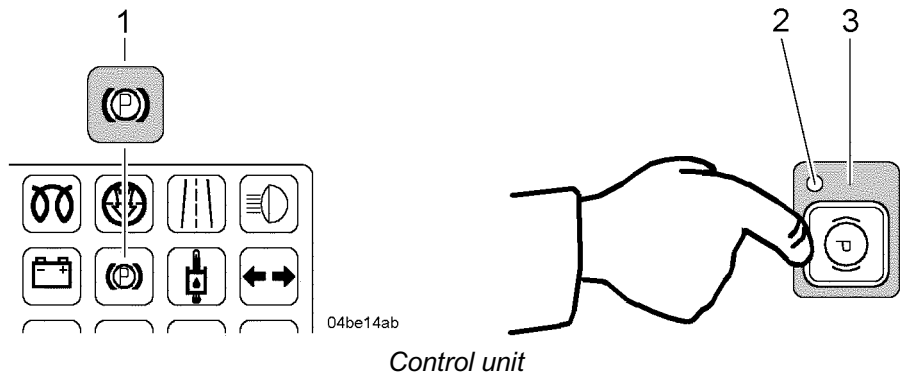
After the machine comes to rest

If you leave the stationary machine while the engine is still running, the following precautions should be taken.

Engage the parking brake

When the parking brake is engaged, the gearbox is automatically switched to neutral.

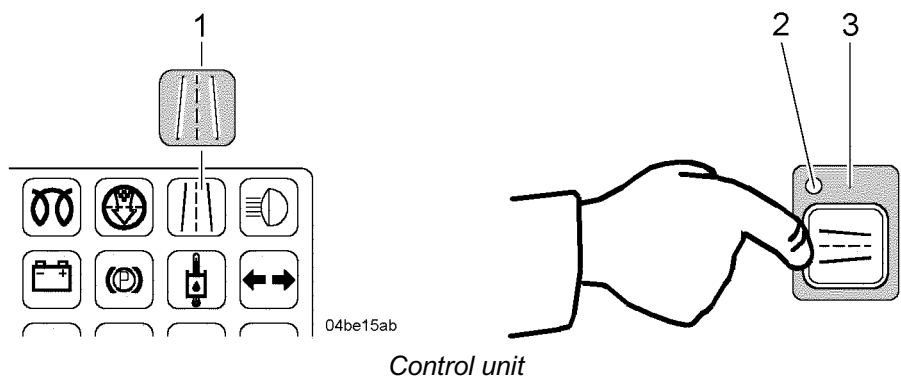
The parking brake may not be engaged until the machine is absolutely stationary!



- 1 symbol field – parking brake
- 2 LED
- 3 button – parking brake

- Activate the parking brake with the button 3.
- An LED 2 on the button indicates that the function is active.
 The symbol field 1 for the parking brake lights up.
 The parking brake is engaged and the travel direction is in neutral.

Blocking working hydraulics



- 1 symbol field – working hydraulics lock
- 2 LED
- 3 button – working hydraulics lock

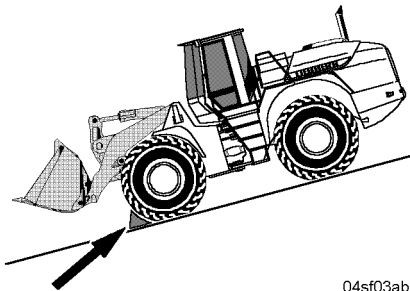
- Press the button 3 to prevent unforeseen actuation of the working hydraulics lock.
- An LED 2 on the button indicates that the function is active.
 The symbol field 1 for the working hydraulics lights up.
 The working hydraulics are no longer operational.

Locking up the machine

The following precautions should be effected when the machine is to be parked for a prolonged period on a slope.

Danger

Risk of accidents due to the unforeseen rolling away by the machine!
! Secure the machine against rolling away.



04sf03ab

On downhill slopes

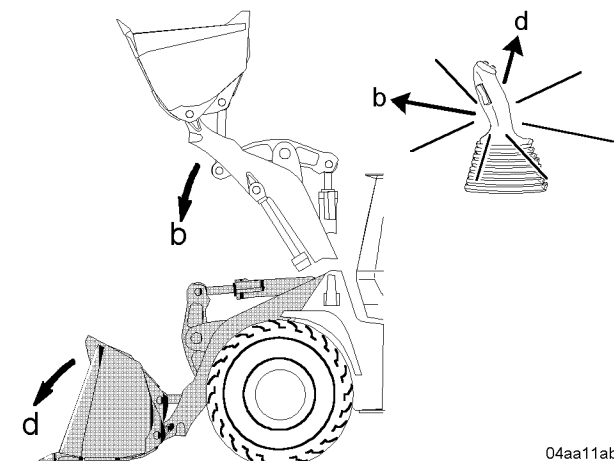
- Take the wedges out of their holders.
- Secure the machine against rolling away with the wedges.

3.3.5 Shutting down the machine

Before you shut down the engine and leave the machine, the following precautions should be taken.

Lower the working attachment

Make sure that the loading bucket is empty.



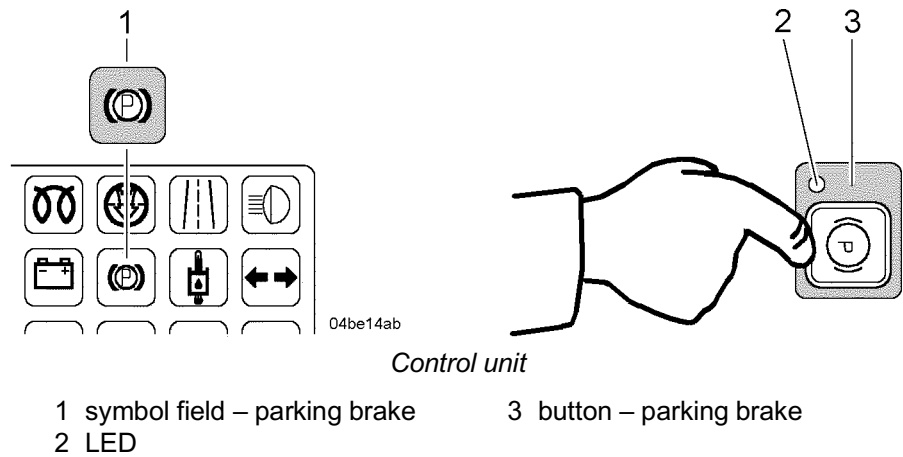
04aa11ab

Bucket arm movement

- Lower the lift arm: Move control lever in direction - **b**-.
- Set down the bucket flat on the ground: Move control lever in direction - **d**-.

Engaging the parking brake

When the ignition is switched off, the parking brake is automatically engaged. If you wish to engage the parking brake before switching off the ignition, proceed as follows.

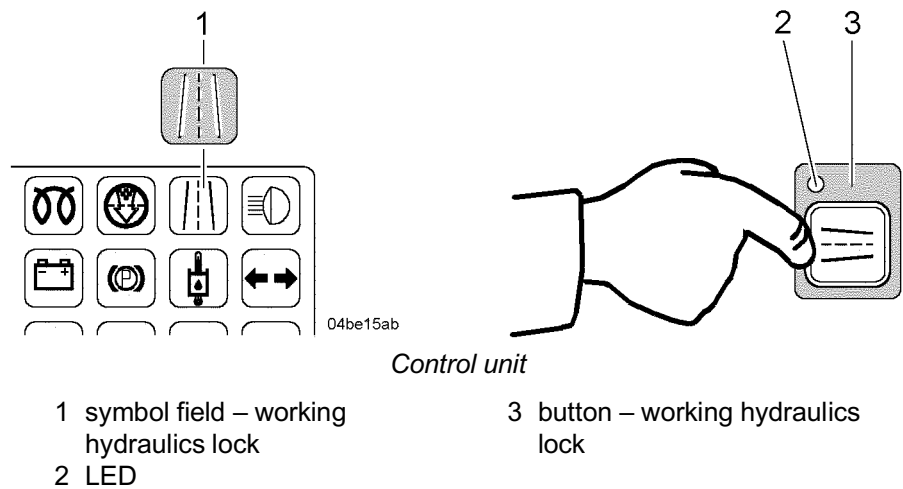


- **If necessary:** Activate the parking brake with the button 3. An LED 2 on the button indicates that the function is active. The symbol field 1 for the parking brake lights up.

Locking working hydraulics

When the ignition is switched off, the working-hydraulics lock is automatically activated.

If you wish to engage the working hydraulics lock before switching off the ignition, proceed as follows.



- **If necessary:** Press the button 3 for working hydraulics lock to prevent unforeseen activation of the working attachment. An LED 2 on the button indicates that the function is active. The symbol field 1 for the working hydraulics lights up. The working hydraulics are no longer operational.

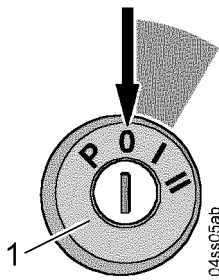
Shutting down the engine

Do not attempt to suddenly shut down the engine when it is running at full load speed. This is especially important with turbo engines.

If the engine is suddenly switched off, the turbo charger continues running for a time without an oil supply.

- Reduce the engine speed to idle running speed: take your foot off the gas pedal.
- Let the engine continue idling briefly - for approx. 10 to 15 seconds -.
- Turn the ignition key to position - 0 - and take it out.

All symbol fields go out.



Starter switch - 0-position

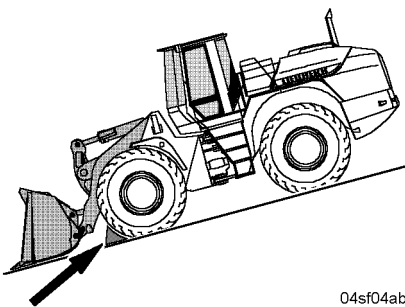
Locking up the machine

The following precautions should be taken when the machine is to be parked for a prolonged period on a slope.

Danger 

Risk of accidents due to the unforeseen rolling away by the machine!
! Secure the machine against rolling away.

- Take the wedges out of their holders.
- Secure the machine against rolling away with the wedges.



04sf04ab

On downhill slopes

Parking position

The ignition key cannot be taken out when in the parking position - P-.

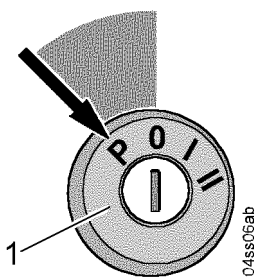
- Turn the ignition key to parking position - P-.

The consumer units listed below are ready for operation.

- parking and driving headlight
- internal illumination
- hazard warning system
- socket/cigarette lighter
- working floodlights

If they have also been installed, the following items are also ready:

- rotating beacon
- radio



Starter switch - parking position

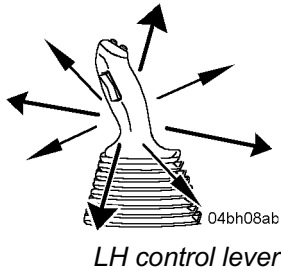
LBH/02/003801/0003/4.0/en

Danger 

Unforeseen operation of the machine by an unauthorised person can place the maintenance personnel in extreme danger!
! Secure the machine against unforeseen operation by unauthorised persons!

- When you leave the machine:
Turn the ignition key to position - 0 - and take it out.

3.3.6 Operating the lift arm

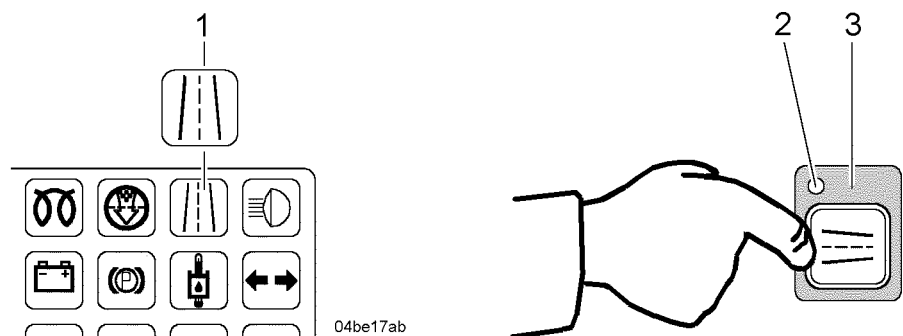


The working movements of the lift arm and the working attachment (bucket) are controlled by the LH control lever.
See also the “LIEBHERR control lever” section.

Enabling operation of the working hydraulics

When the ignition is switched off, the working hydraulics are automatically enabled.

- In the event that the working hydraulics lock is already engaged: operate the working hydraulics to enable them for further use.



Control unit

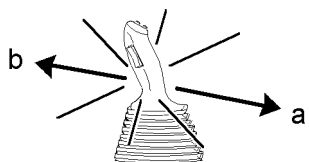
- 1 symbol field – working hydraulics lock
- 2 LED

- 3 button – working hydraulics lock

- Deactivate the working hydraulics lock: by pressing the button 3.
The LED 2 on the button goes out.
The symbol field 1 for the working hydraulics lock goes out.
The working hydraulics are now ready for operation.
The working attachment can now be operated.

Operating the lift cylinder

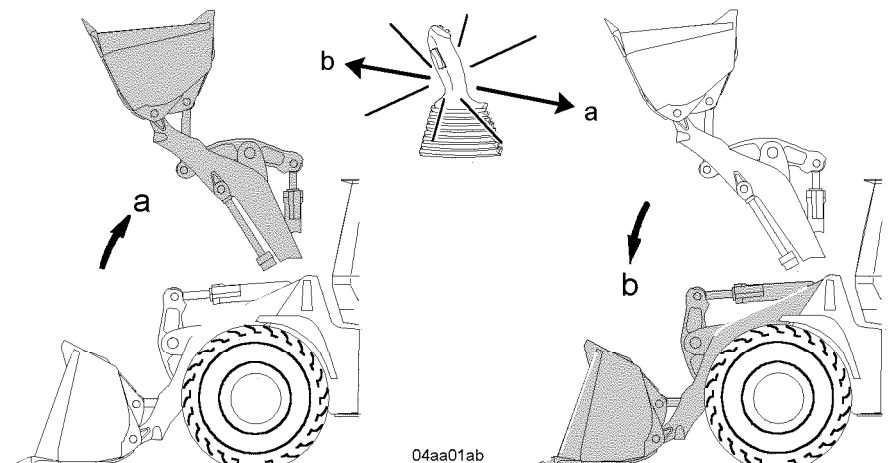
The lift cylinders raise and lower the lift arm.



04bh04ab

LH control lever

Raising the lift arm

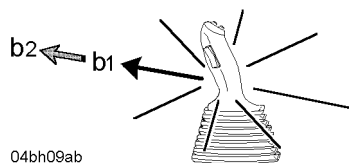


04aa01ab

Bucket arm movement

- Move the LH control lever in direction - a-.
The lift arm is raised.

Lowering the lift arm



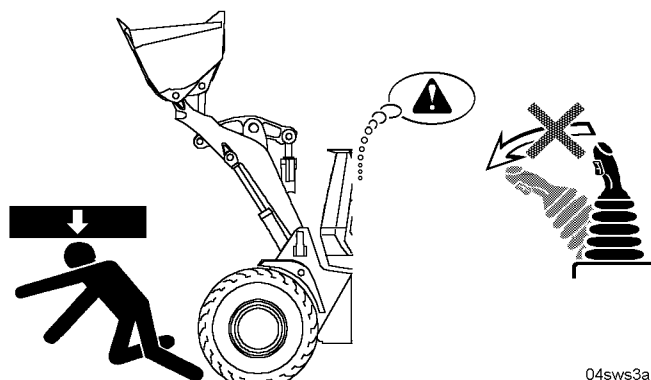
04bh09ab

LH control lever

There are two ways to lower the lift arm:

- slowly with "normal lower function"
- rapidly with "quick drop function"
- Actuate the "normal drop function": to do this move the LH control lever in the direction - b1- as far as the action point.

The lift arm is lowered slowly.



04sws3ab

Potentially dangerous situation

LBH/02/003801/0003/4.0/en

Danger

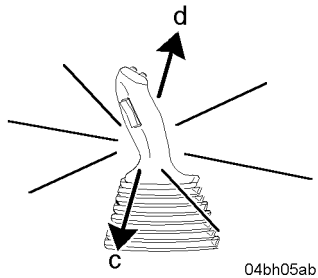


Risk of accidents due to rapid lowering of the working attachment!
The raised working attachment is lowered rapidly when the "Quick-drop function" is activated!
Persons standing under the raised working attachment risk severe crushing injuries!
! Remaining in the danger area is strictly prohibited!

- Actuate the "quick-drop function": move the LH control lever in direction - **b2**- through the action point to its limit.
The lift arm is lowered rapidly.

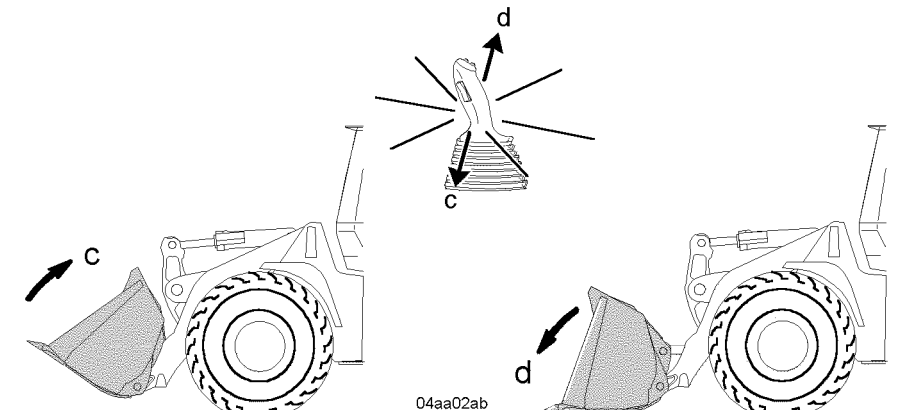
Operating the tilt cylinder

The tilt cylinder makes it possible to tilt the bucket in or out.



LH control lever

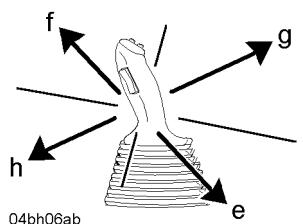
Tilting the bucket in



Bucket movement

Tilting the bucket out

- Move the LH control lever in direction - **c**-.
The bucket is tilted in.
- Move the LH control lever in direction - **d**-.
The bucket is tilted out.



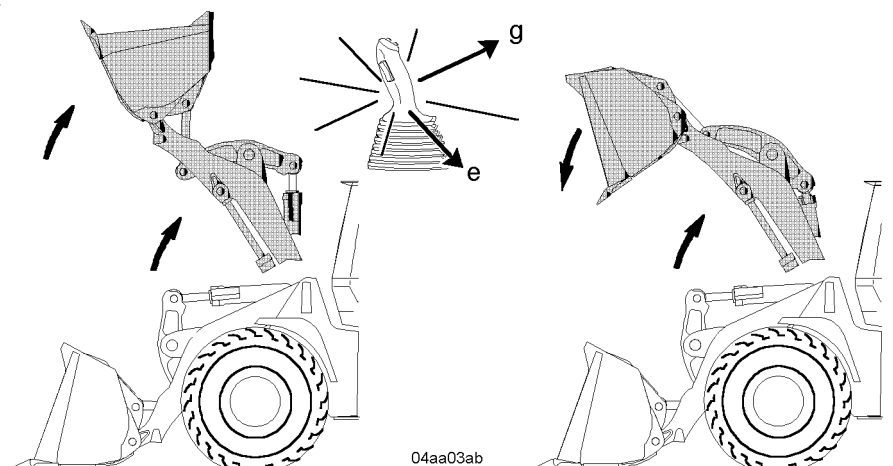
LH control lever

Simultaneous operation of lift and tilt cylinders

The lift and tilt cylinders can be simultaneously retracted or extended by moving the LH control lever diagonally.

LBH/02/003801/0003/4_0/en

Raising the lift arm and simultaneously tilting the bucket in



04aa03ab

Working movements

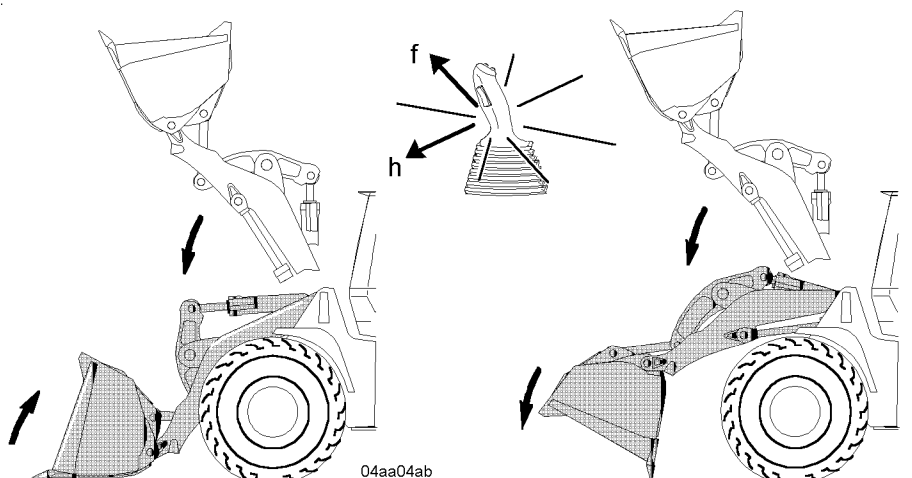
- Move the LH control lever in direction - **e**-.
The lift arm is raised and the bucket is simultaneously tilted in.

- Move the LH control lever in direction - **g**-.

The lift arm is raised and the bucket is simultaneously tilted out.

Raising the lift arm and simultaneously tilting the bucket out

Lowering the lift arm and simultaneously tilting the bucket in



04aa04ab

Working movements

- Move the LH control lever in direction - **h**-.
The lift arm is lowered and the bucket is simultaneously tilted in.

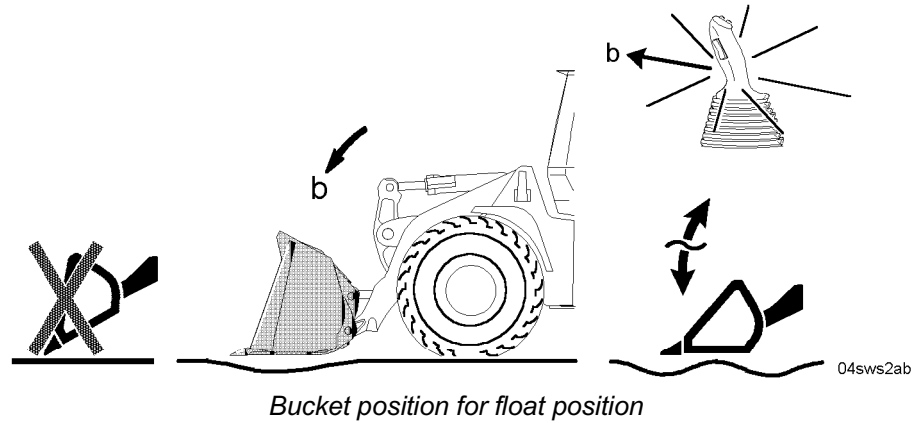
- Move the LH control lever in direction - **f**-.

The lift arm is lowered and the bucket is simultaneously tilted out.

Lowering the lift arm and simultaneously tilting the bucket out

LBH/02/003801/0003/4.0/en

Activating the float position

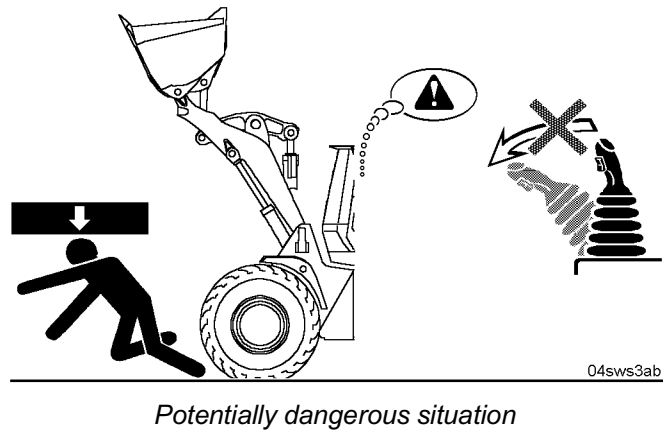


In the float position, the working attachment is kept just above the ground by its own weight and can adapt its position to uneven surfaces.

Activating the float position

The procedure for activating the float position is as follows:

Make sure that the lift arm is lowered and that the bucket is lying flat on the ground.



Danger

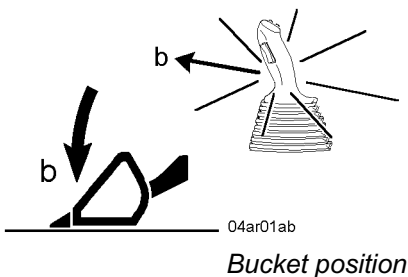
Risk of accidents due to rapid lowering of the working attachment!

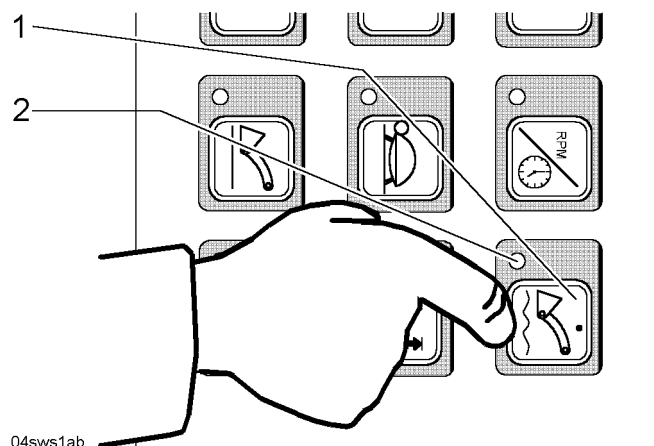
The raised working attachment is lowered rapidly when the float position is activated!

Persons standing under the raised working attachment risk severe crushing injuries!

! Remaining in the danger area is strictly prohibited!

- Do not activate the float position function when the working attachment is raised!
- Lower the lift arm and lay the bucket down flat on the ground.





04sws1ab

Control unit

1 button – float position 2 LED

When the button 1 for float position is turned on, the function is made ready.

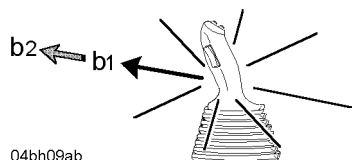
- Press the button 1 for float position.

An LED 2 on the button indicates that the function is active.

- Move the LH control lever in direction - **b2**- through the action point to the stop and then let it go.

The LH control lever is held in this position by magnetic force.

The float position function now remains active.



04bh09ab

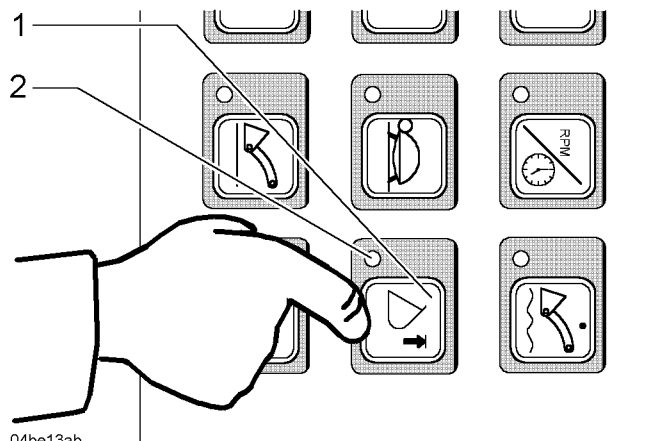
LH control lever

Activating the automatic lifting limit switch

The automatic lifting limit switch prevents the lift arm coming to an abrupt halt at the upper “lift limit”. This protects both the machine and the driver from jolting.

Activation of the automatic lifting limit switch

The procedure for activating the automatic lifting limit switch is as follows:

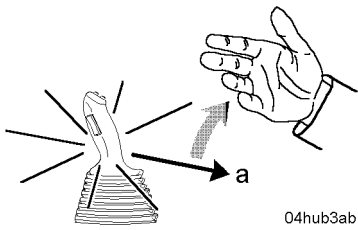


04be13ab

Control unit

1 button – lifting limit switch 2 LED

LBH/02/003801/0003/4.0/en



LH control lever

Lifting limit switch for reduced dumping height



- Press button 1 for lifting limit switch.

An LED 2 on the button indicates that the function is active.

The lifting limit switch function is now active.

- Move the LH control lever in direction - a- through the action point to the stop and then let it go.

The LH control lever is kept in this position by magnetic force.

This means that the lift arm is only raised as far as the switching point for the lifting limit switch.

The lifting process is automatically interrupted at this point.

A reduced dumping height can also be set with the aid of the proximity switch.

Risk of accidents when working close to a height limit!

When working close to a height limit, there is a risk of accidents due to the lifting limit switch being overrun!

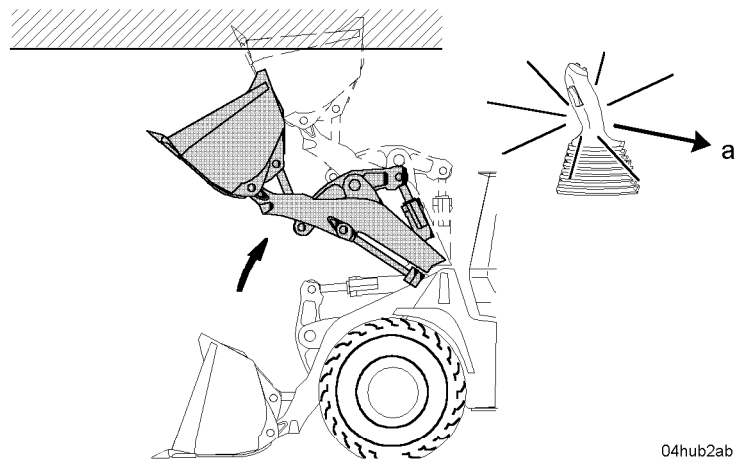
! When working near to a height limit, proceed with extreme caution!

- Set the lifting limit switch for a reduced dumping height.

The proximity switch for the automatic lifting limit switch is adjusted ex-works.

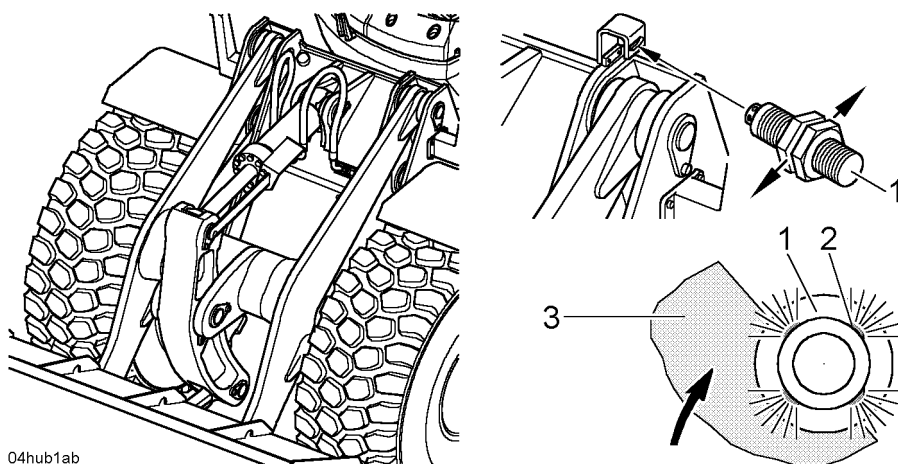
If necessary, the proximity switch can be re-adjusted.

This is the procedure for re-adjusting the proximity switch.



Reduced dumping height

- Raise the lift arms to the required dumping height.



04hub1ab

Proximity switch

- 1 proximity switch – autom. lifting limit switch
- 2 LED
- 3 bucket arm

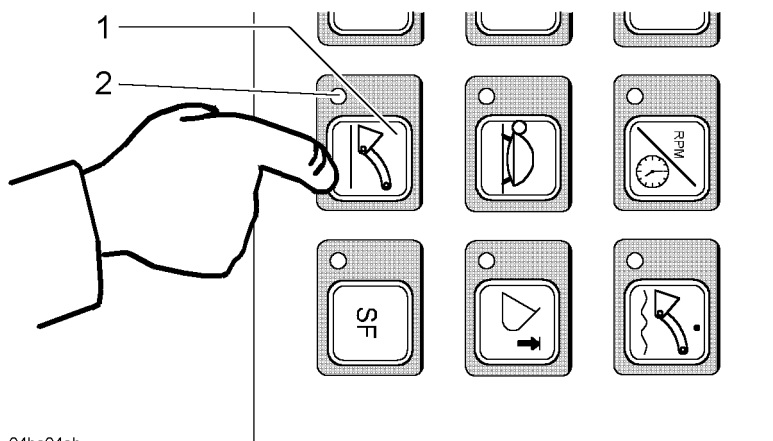
- Release the fixing nuts on the proximity switch.
Horizontally adjust the proximity switch 1 until the bucket arm 3 covers up to half the contact surface of the proximity switch.
When the bucket arm enters the switching area of the proximity switch, the four LEDs 2 on the proximity switch light up.
- Retighten the fixing nuts on the proximity switch.
The proximity switch has been reset and the automatic lifting limit switch is once more ready for operation.
- Test the setting and re-adjust if necessary.

Activating of the automatic bucket return-to-dig

With loading jobs, for which a certain digging position is required again and again, the automatic bucket return-to-dig can be operated.

The procedure for activating the automatic bucket return-to-dig is as follows:

Activating the automatic bucket return-to-dig



04be04ab

Control unit

- 1 button – bucket return-to-dig
- 2 LED

LBH/02/003801/0003/4.0/en

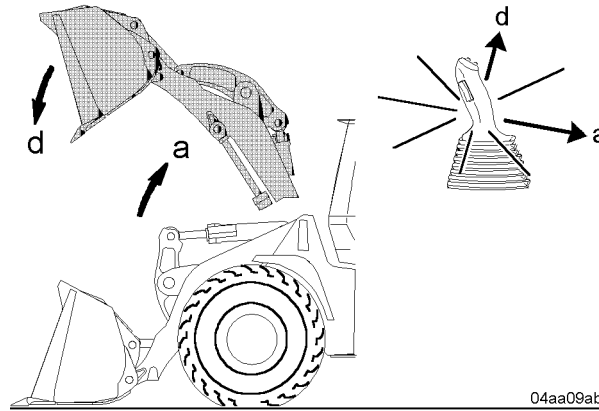
- Press the button 1 for bucket return-to-dig.

An LED 2 on the button indicates that the function is active.

The automatic bucket return-to-dig function is now active.

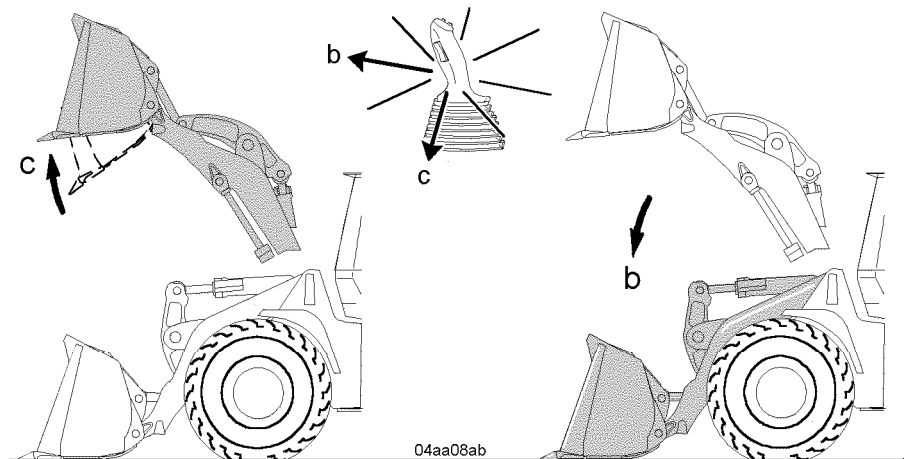
Working with the automatic bucket return-to-dig

Make sure that the automatic bucket return-to-dig function is active.



Working movements

- Raise the lift arm: move the LH control lever in direction - a-.
- Tilt the loading bucket out in the raised position: move the LH control lever in direction - d-.



Working movements

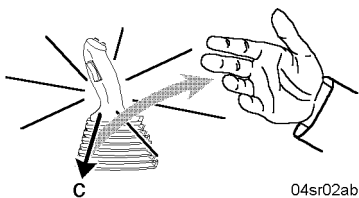
- Tilt in the loading bucket in the raised position: move the LH control lever in direction - c- through the action point to the stop and then let it go.

The LH control lever is kept in this position by magnetic force.

The loading bucket is thus moved into the preliminary position for the digging position.

As soon as the loading bucket is in the preliminary position, the LH control lever is released by the solenoid.

- Lower the lift arm: move the LH control lever in direction - b-.
- The loading bucket is thus moved into the digging position on the ground.



04sr02ab

LH control lever

LBH/02/003801/0003/4_0/en

Adjusting the digging position

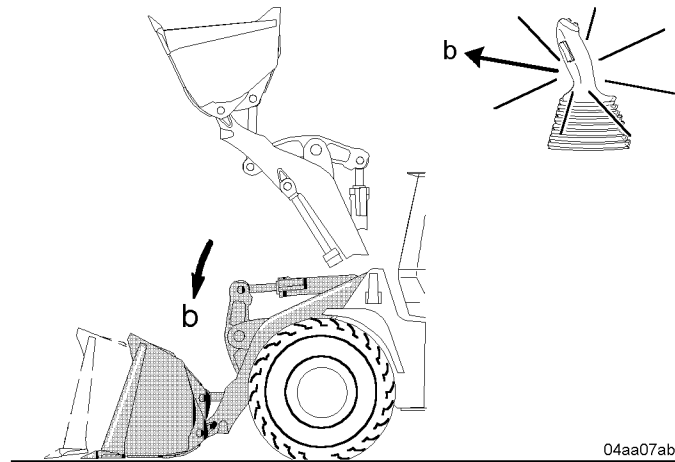
The proximity switch for the automatic bucket return-to-dig is adjusted ex-works.

If necessary, the proximity switch can be re-adjusted.

This is the procedure for re-adjusting the proximity switch.

Coarse adjustment

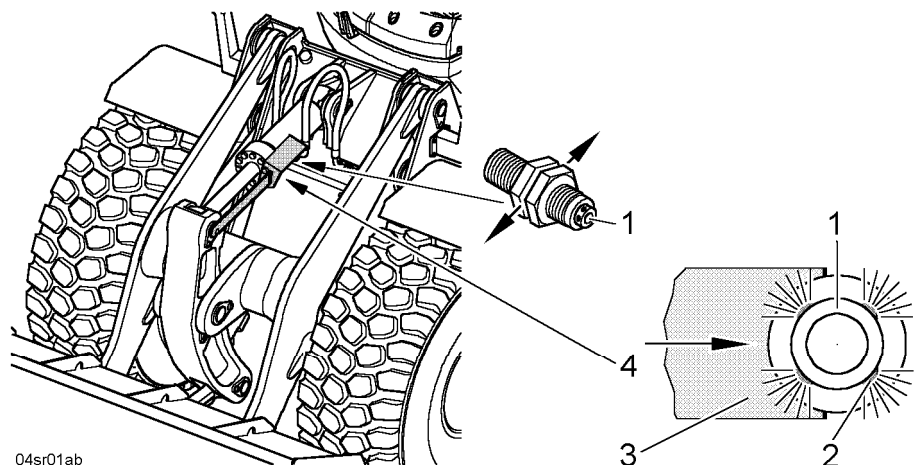
Make sure that the lift arm is lowered and that the loading bucket is empty.



04aa07ab

Digging position - coarse

- Move the loading bucket with the LH control lever into the required digging position.



04sr01ab

Setting up - bucket return-to-dig

- | | |
|---|---------------------------------|
| 1 proximity switch – autom.
bucket return-to-dig | 3 positioning curve |
| 2 LED | 4 proximity switch – LFD system |

- Release the fixing nuts on the proximity switch 1.
Horizontally adjust the proximity switch 1 until the positioning curve 3 covers up to half the contact surface of the proximity switch.

When the positioning curve enters the contact area of the proximity switch, the four LEDs 2 on the proximity switch light up.

- Retighten the fixing nuts on the proximity switch 1.

The coarse adjustment of the required digging position is now complete.

LBH/02/003801/0003/4.0/en

- Testing the “coarse adjustment”: See the “Working with the automatic bucket return-to-dig” section .
- If required, carry out the “fine adjustment”.

Fine adjustment

The required fine adjustment is obtained after several attempts.

- Move the loading bucket with the LH control lever to the precise digging position.
- Readjust the proximity switch: See the “Coarse adjustment” section .
- Testing the “coarse adjustment”: See the “Working with the automatic bucket return-to-dig” section .

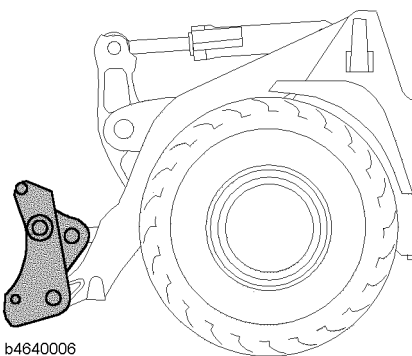
3.3.7 Operating the hydraulic quick-change device

This equipment is optional.

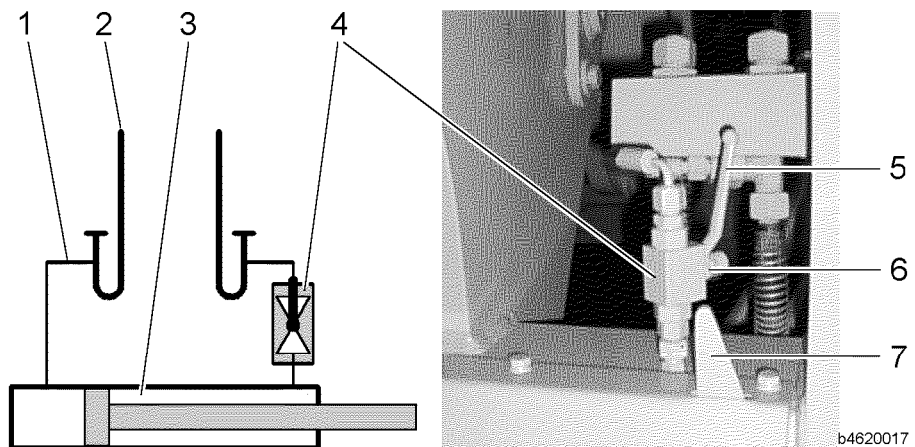
Version: Hydraulic actuation by an additional controller.

Information on attachment and accessories:

- **Attachments and accessories produced by other manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting, may not be installed or fitted on the machine without the previous written agreement of LIEBHERR.**
- **The appropriate technical documentation should be made available to LIEBHERR for this purpose.**



Operating the hydraulic quick-change device



Hydraulic quick-change device

- | | |
|---|------------------------|
| 1 supply line for quick-change device | 4 changeover valve |
| 2 supply line for build-on accessory set: | 5 changeover lever |
| 3 hydr. cylinder | 6 anti-twist lock |
| | 7 display - mechanical |

LBH/02/003801/0003/4_0/en

The hydraulic quick-change device is activated (enabled) or deactivated (blocked) with the changeover valve 4.

The changeover lever 5 is secured with an anti-twist lock 6 to prevent unforeseen operation!

Make sure that:

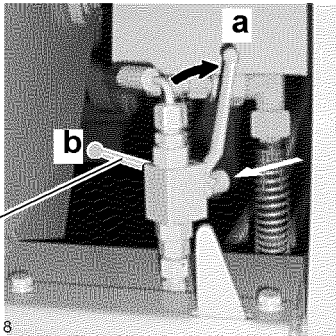
- the lift arm is lowered just above the ground
- where a working attachment with an independent hydraulic supply is mounted, make sure that any cylinders, valves and so on are in the initial position or closed
- where a working attachment is mounted, make sure that it is tilted in

Danger



Risk of accidents due to the working attachment dropping!

! Do not activate (enable) the quick change device when the working attachment is raised!



b4620018

- If you want to activate (enable) the quick change device: move the changeover lever 1 to position a and engage the anti-twist lock. Two lever positions are shown in the Figure on the left.

The changeover valve is thereby opened.

The flow direction of the hydraulic oil is indicated by the lever position.

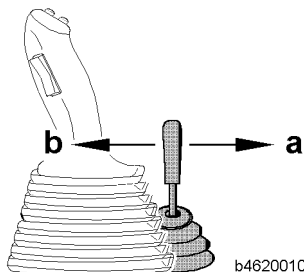
The function for unlocking the hydraulic quick-change device is thus prepared.

Unlocking the hydraulic quick-change device

The procedure for unlocking the hydraulic quick-change device is as follows:

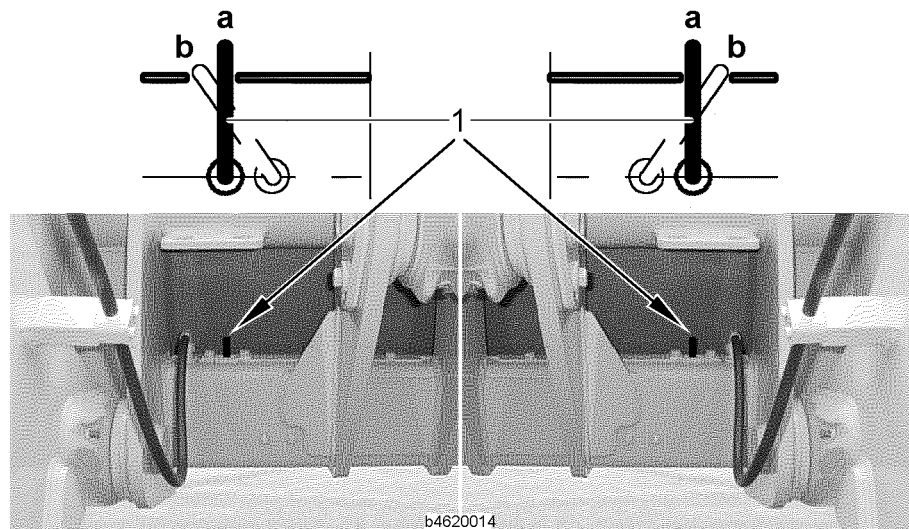
Make sure that the quick change device has been activated (enabled) by means of the changeover valve 4

- Completely retract the locking pins: mMove the LH control lever in direction b to the stop and keep it in this position.



b4620010

The locking pins for the hydraulic quick-change device retract.



Quick-change device - view from the driver's cab

1 indicator - mechanical
a position - locked
b position - unlocked

The position (retracted) of the locking pins is indicated mechanically by the indicator 1.

Decoupling the working attachment

This is the procedure for decoupling the working attachment.

Make sure when a working attachment with an independent hydraulic circuit is mounted, that the coupling to the hydraulic lines is released.

Warning



Risk of accidents due to incorrectly set down working attachment!

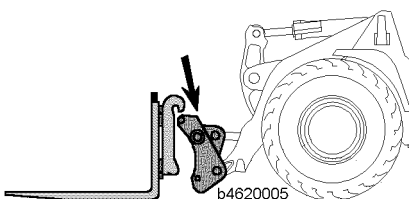
! The working attachment may in no event be set down in unsecured areas (roadways etc.).

- Set down the working attachment down flat on firm, even ground.

Where the working attachment has an independent hydraulic supply: set down the working attachment in such a way that the hydraulic lines are not subjected to any strain!

- Secure the working attachment against tipping over!
- Carefully remove the quick change device from the adapter-holder at the top of the working attachment.

The working attachment is now decoupled.



Disconnecting the hydraulic lines for hydraulically actuated working attachments

Where the working attachment has its own hydraulic circuit, the hydraulic supply lines must be disconnected.

The procedure for disconnecting the hydraulic lines is as follows:

Warning

Risk of accidents from hydraulic lines under pressure!

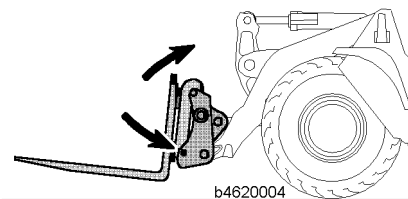
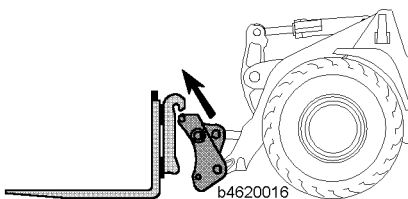
! Depressurise the hydraulic circuits before connecting or disconnecting hydraulic lines/couplings!

- Shut down the diesel engine.
- Actuate all servo devices (control levers) in both directions.
- Release the hydraulic lines/quick action couplings from the machine.
- Make sure that no hydraulic oil leaks onto the ground!
Contaminated soil must be removed for proper disposal as the hydraulic oil can pollute the ground water.
- Close the hose line couplings with protective covers.
- Lay the hydraulic hoses in the hose retainers.

Attaching and coupling the working attachment

This is the procedure for attaching and coupling the working attachment. Make sure that the hydraulic quick-change device is completely unlocked.

- Carefully move the quick-change device into the adapter-holder at the top of the working attachment.



- Slightly raise the working attachment and tilt it in.

In the process, the working attachment must completely engage with the quick-change device.

Locking the hydraulic quick-change device

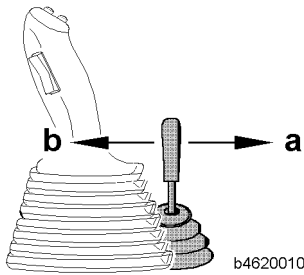
The procedure for locking the hydraulic quick-change device is as follows:

Make sure that:

- the working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins
- the quick change device has been activated (enabled) by means of the changeover valve 4

Danger 

Risk of accidents due to the working attachment dropping!
! Check whether the working attachment is fully engaged in the quick-change device.



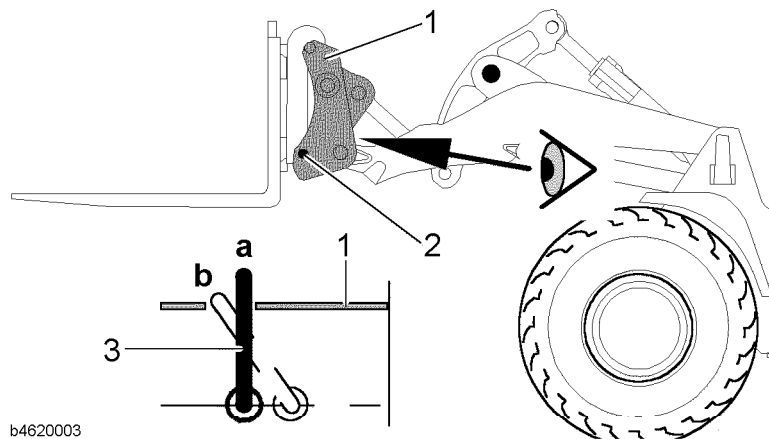
- Completely extend the locking pins: move the LH control lever in direction a to the stop and keep it in this position
- The locking pins for the hydraulic quick-change device extend.
The working attachment is now coupled.

Check after locking procedure

This is the procedure for checking after locking.
Make sure that the quick-change device has been moved to a suitable position for inspection.

Danger 

Risk of accidents due to the working attachment dropping!
! Do not move the working attachment until you have checked the lock.
! Check whether the working attachment is securely locked in place with the quick-change device.



Quick-change device - visual inspection

- | | |
|--------------------------|-----------------------|
| 1 quick-change device | a position - locked |
| 2 locking pin | b position - unlocked |
| 3 indicator - mechanical | |

- Move up with the lift arm until it is possible to view the indicator 3.
- Get out of the machine and visually check that the locking pins 2 have actually locked the working attachment.
- Carry out the inspection on both sides of the machine.

You can see that the pins are properly locked when the indicator 3 is upright.

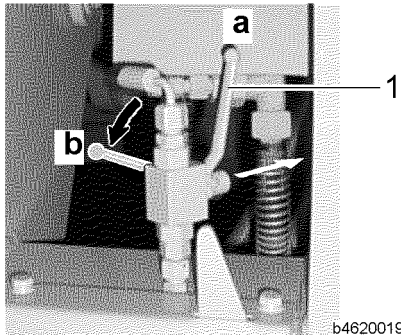
In addition, locking pins 2 must be introduced into outer borehole of the quick-change device 1.

Danger

Risk of accidents due to the working attachment dropping!

If the quick-change device is unintentionally locked, both personnel and the working attachment will be endangered!

! It is essential that the changeover valve is locked again after the locking procedure is finished!



Deactivate the hydraulic quick-change device with the changeover valve (block).

- Close the changeover valve: take the changeover valve 1 out of the anti-twist lock and set to position b. The two lever positions are shown in the Fig. on the left.

The changeover valve is thereby closed.

The function for unlocking the hydraulic quick-change device is thus blocked.

- Further working movements with the working attachment can only be carried out after the quick-change device has been inspected and deactivated (blocked).
- When a working attachment is being operated with an independent control circuit: see the description in the Sections "Control lever for additional working functions (Option)" and "Working with optional equipment".

Connecting the hydraulic lines for hydraulically operated working attachments

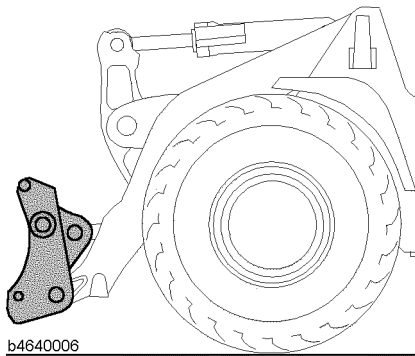
Where the working attachment has an independent hydraulic circuit, the hydraulic supply lines must be connected.

- Remove the protective caps from the hydraulic line couplings.
- Connect the hydraulic lines properly.

The following points should be observed with the connections:

- clean the line couplings before connection
- do not cross over the hydraulic lines
- lay the hydraulic lines so that there is no risk of them being pinched by the operation of the working attachment
- make use of any hose retaining clips when laying the hose
- Check the hydraulic lines for any leakage after connection.

3.3.8 Operation of the hydraulic quick-change equipment (electro-hydraulic actuation with comfort control)



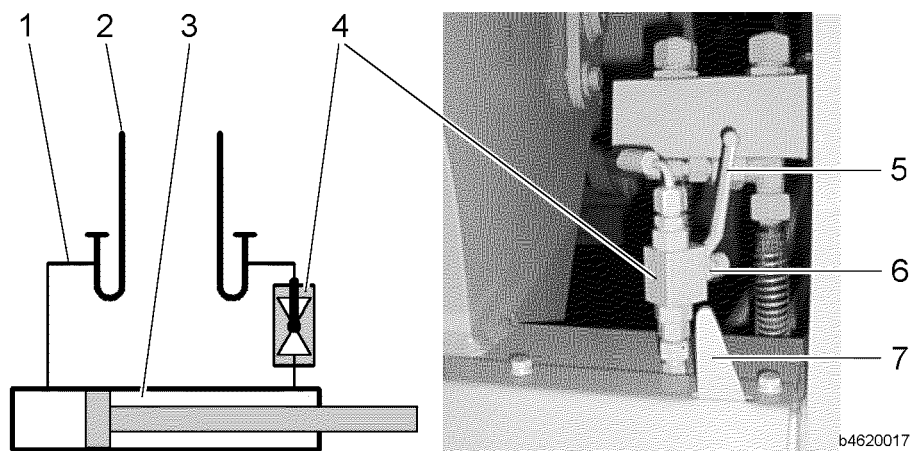
This equipment is optional.

Version: combined, electro-hydraulic actuation with comfort control.

Information on attachment and accessories:

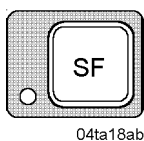
- Attachments and accessories produced by other manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting, may not be installed or fitted on the machine without the previous written agreement of LIEBHERR.
- The appropriate technical documentation should be made available to LIEBHERR for this purpose.

Activation of the combined, electro-hydraulically operated quick-change device



Hydraulic quick-change device

- | | |
|--|--------------------------|
| 1 supply line for quick-change device | 4 changeover valve |
| 2 supply line for build-on accessory set | 5 changeover lever |
| 3 hydr. cylinder | 6 anti-twist lock |
| | 7 indicator - mechanical |



The combined, electro-hydraulically operated quick-change device is activated/de-activated with the special functions button.

Make sure that:

- the lift arm is lowered to just above the ground
- where a working attachment with an independent hydraulic supply is mounted, make sure that any cylinders, valves and so on are in the initial position or closed
- where a working attachment is mounted, make sure that this is tilted in
- the changeover valve 4 is open

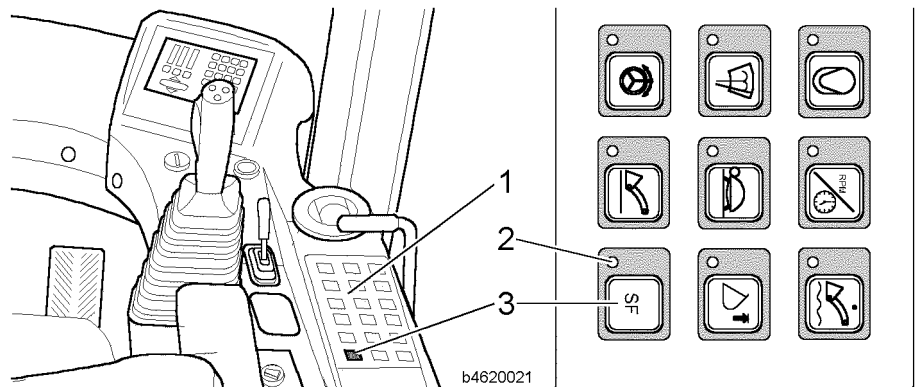
See the “Activation of the hydraulically operated quick-change device” section (Description of Version 1).



Danger

Risk of accidents due to the working attachment dropping!

! Do not activate button when working attachment is raised!



Control unit

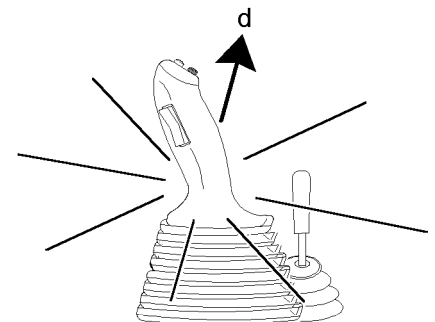
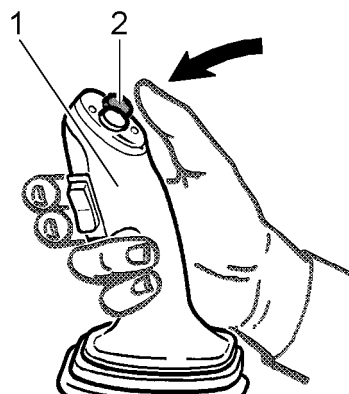
- 1 control unit
- 2 LED

- 3 button – special function

- Press the button 3 for special functions.
An LED 2 on the button indicates that the function is active.
The quick-change device is now operational.

Unlocking the hydraulic quick-change device

The procedure for unlocking the hydraulic quick-change device is as follows: Make sure that the quick-change device has been activated (enabled) by means of the button 3 for special functions.



LH control lever

- 1 LH control lever
- 2 button - comfort control

- d direction of movement

- Press the button 2 and hold it down.
By pressing the button 2, the function operation of the lift and tilt cylinders is switched off.
- Completely retract the locking pins: move the LH control lever 1 in direction d- (to tilt out working attachment) to the stop and keep it in this position.

The locking pins for the hydraulic quick-change device retract.

- When the locking pins are completely retracted:
release the button 2 and the LH control lever 1 again.
By releasing the button 2, the function operation of the lift and tilt cylinders is switched on again.

LBH/02/003801/0003/4.0/en

Decoupling the working attachment

Procedure: as described in the section "Operation of the hydraulic quick-change equipment"

Disconnecting the hydraulic lines for hydraulically operated working attachments

Procedure: as described in the section "Operation of the hydraulic quick change equipmen".

Attaching and coupling the working attachment

Procedure: as described in the section "Operation of the hydraulic quick-change equipment".

Locking the hydraulic quick-change device

The procedure for locking the hydraulic quick-change device is as follows:

Make sure that:

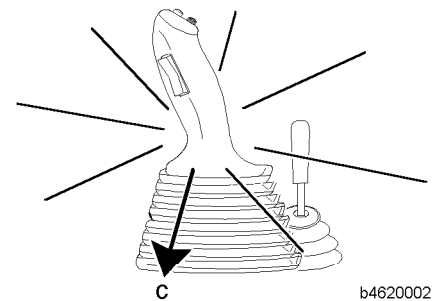
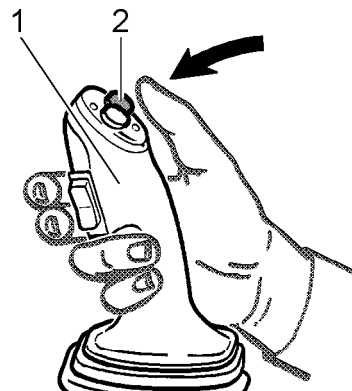
- the working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
- the quick-change device has been activated (enabled) by means of the button 3 for special functions.

Danger



Risk of accidents due to the working attachment dropping!

! Check whether the working attachment is fully engaged in the quick-change device.



LH control lever

- 1 LH control lever
- 2 button - comfort control

c direction of movement

- Press the button 2 and hold it down.

By pressing the button 2, the function operation of the lift and tilt cylinders is switched off.

- Completely extend the locking pins: Move the LH control lever 1 in direction c- (to tilt in working attachment) to the stop and keep it in this position.

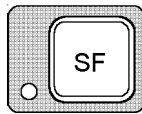
The locking pins for the hydraulic quick-change device are extended.

- When the locking pins are completely extended: release the button 2 and the LH control lever 1 again.

By releasing the button 2, the function operation of the lift and tilt cylinders is switched on again.

The working attachment is now coupled.

After the locking procedure: deactivate the hydraulic quick-change device with the button for special functions.



04ta18ab

- Press the button for special functions.

The LED goes out.

The function for unlocking the hydraulic quick-change device is thereby deactivated.

Check after locking procedure

Procedure: as described in the section “Operation of the hydraulic quick-change equipment”.

Connecting the hydraulic lines for hydraulically operated working attachments

Procedure: as described in the section “Operation of the hydraulic quick-change equipment”.

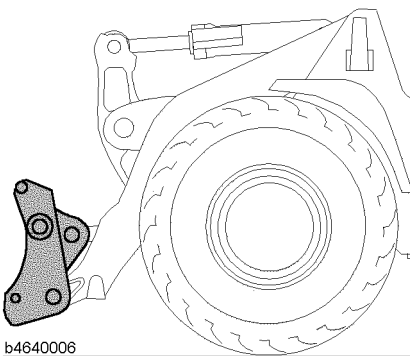
3.3.9 Operation of the hydraulic quick-change equipment (electro-hydraulic actuation without comfort control)

This equipment is optional.

Version: combined, electro-hydraulic actuation with switch.

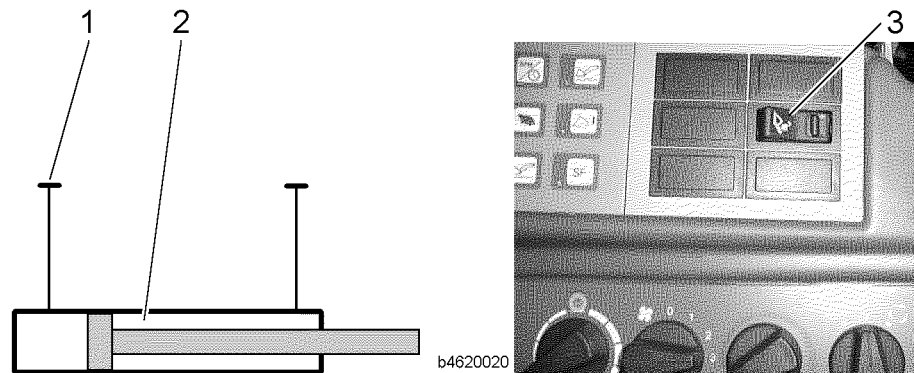
Information on attachment and accessories:

- **Attachments and accessories produced by other manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting, may not be installed or fitted on the machine without the previous written agreement of LIEBHERR.**
- **The appropriate technical documentation should be made available to LIEBHERR for this purpose.**



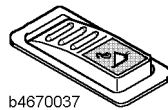
b4640006

Activation of the combined, electro-hydraulically actuated quick-change device



Hydraulic quick-change device

- | | |
|---------------------------------------|---|
| 1 supply line for quick-change device | 3 switch - hydr. quick-change device (option) |
| 2 hydr. cylinder | |



The combined, electro-hydraulically operated quick-change device is activated/de-activated with switch 3 for the hydraulic quick-change device.

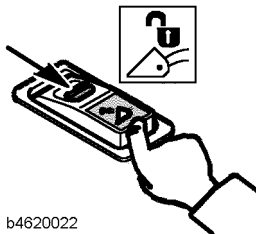
The procedure for activating the hydraulic quick-change device is as follows:

Make sure that:

- the lift arm is lowered to just above the ground
- where a working attachment with an independent hydraulic supply is mounted, make sure that any cylinders, valves and so on are in the initial position or closed
- where a working attachment is mounted, make sure that this is tilted in

Danger 

Risk of accidents due to the working attachment dropping!
 ! Do not activate lockable switch when working attachment is raised!



b4620022



bpik0006

- Release the activation block in the direction of the arrow and simultaneously push the switch forwards.

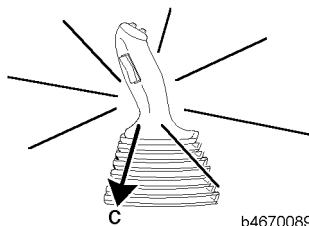
When the switch is pressed, a warning signal sounds from the instrument panel.

The function for unlocking the hydraulic quick-change device is thereby made ready.

Unlocking the hydraulic quick-change device

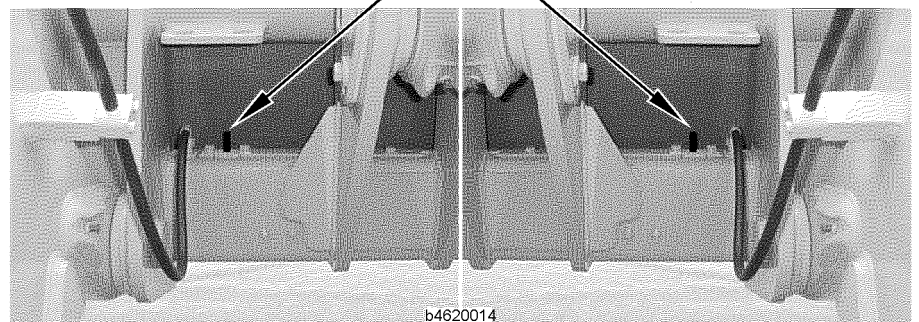
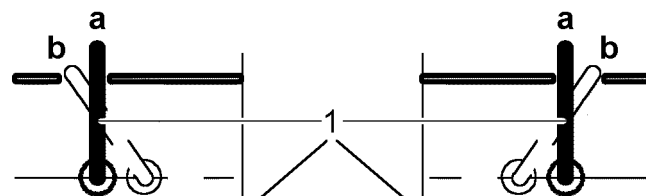
The procedure for unlocking the hydraulic quick-change device is as follows: Make sure that the switch – hydraulic quick-change device has been pressed.

- Completely retract the locking pins: move the **LH control lever** in direction - c- (to tilt in working attachment) to the stop and keep it in this position.



b4670089

The locking pins for the hydraulic quick-change device are retracted.



b4620014

Quick-change device - view from the driver's cab

1 indicator - mechanical
 a position - locked


b position - unlocked

The position (retracted) of the locking pins is indicated mechanically by the display 1.

LBH/02/003801/0003/4.0/en

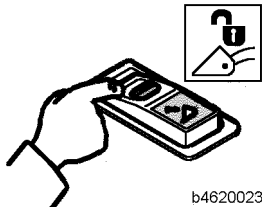
Decoupling the working attachment

This is the procedure for decoupling the working attachment. Make sure when a working attachment is mounted with an independent hydraulic supply, that the coupling to the hydraulic lines is released.

Warning 

Risk of accidents due to incorrectly set down working attachment!

! The working attachment may in no event be set down in unsecured areas (roadways etc.).



- Deactivate the hydraulic quick-change device: push back the switch – hydraulic quick-change device

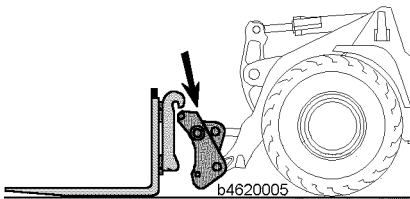
When the switch is pressed, the warning signal from the instrument panel goes out.

- Set down the working attachment down flat on firm, even ground.

Where the working attachment has an independent hydraulic supply: set down the working attachment in such a way that the hydraulic lines are not subjected to any strain!

- Secure the working attachment against tipping over!
- Carefully remove the quick-change device from the adapter-holder at the top of the working attachment.

The working attachment is now decoupled.



Disconnecting the hydraulic lines for hydraulically actuated working attachments

Procedure: as described in the section “Operation of the hydraulic quick-change equipment”.

Attaching and coupling the working attachment

Procedure: as described in the section “Operation of the hydraulic quick change equipment”.

Locking the hydraulic quick-change device

The procedure for locking the hydraulic-quick change device is as follows:

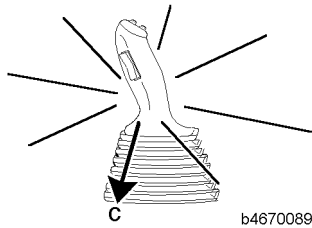
Make sure that:

- the working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins
- hydraulic quick-change device the switch is turned off

Danger



Risk of accidents due to the working attachment dropping!
 ! Check whether the working attachment is fully engaged with the quick-change device.



- Completely extend the locking pins: move the LH control lever in direction - c- (to tilt in working attachment) to the stop and keep it in this position.

The locking pins for the hydraulic quick-change device extend.
 The working attachment is now coupled.

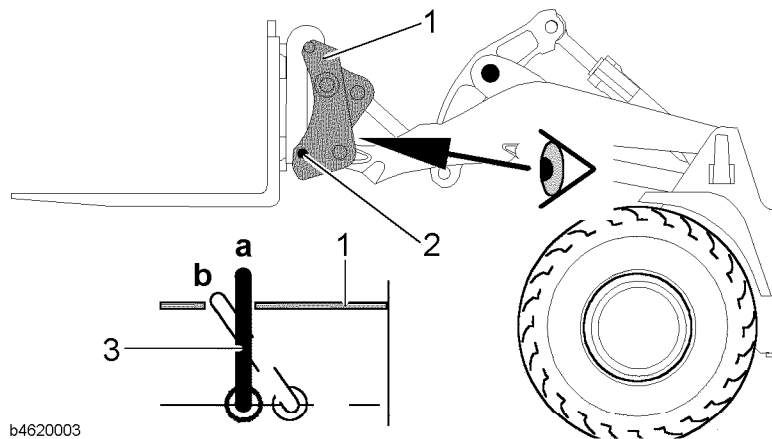
Check after locking procedure

This is the procedure for checking after locking.
 Make sure that the quick-change device has been moved to a suitable position for inspection.

Danger



Risk of accidents due to the working attachment dropping!
 ! Do not move the working attachment until you have checked the lock.
 ! Check whether the working attachment is securely locked to the quick-change device.



Quick-change device - visual inspection

- | | |
|-------------------------|-----------------------|
| 1 quick-change device | a position - locked |
| 2 locking pin | b position - unlocked |
| 3 indicator- mechanical | |

- Move the lift arm up until it is possible to view the display 3.
- Get out of the machine and visually check that the locking pins 2 have actually locked the working attachment.
- Carry out the inspection on both sides of the machine.

You can see that the pins are properly locked when the indicator 3 is upright.

LBH/02/003801/0003/4.0/en

In addition, locking pins 2 must be introduced into outer borehole of the quick-change device 1.

- Do not carry out any other movements with the working attachment until the check is complete.
- For operating a working attachment with an independent control circuit: see the description in the sections “Control lever for additional working functions” and “Working with optional equipment”.

Connecting the hydraulic lines for hydraulically actuated working attachments

Procedure: as described in the “Operation of the hydraulic quick-change equipment” section .

3.3.10 Working with optional equipment

The operation and working with various items of optional equipment is described in this section.

Optional equipment:

- forklift
- refuelling pump

Forklift operation

For forklift operation with lift arm with P-kinematics:

- this only applies for machines with attached P lift arm
The parallel kinematics enables parallel guidance of the load over the entire lifting range during lifting or sinking.

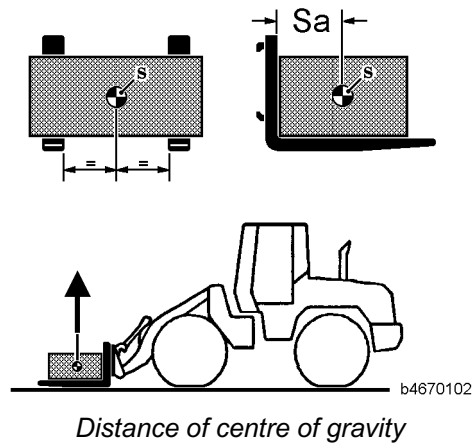
For forklift operation with lift arms with Z-bar kinematics:

- with the lift arm with Z-bar kinematics, no parallel movement is possible
This means, that the attachment tilts in during the lift movement up to 2/3 of the max. lift height and with further upward lift movement it tilts out again, but it does not tilt down forwards.
- due to the less favourable lever ratio of the Z-bar kinematics in the topmost lifting range, restrictions in load bearing capacity may result
See also “Load bearing tables for forklift operation” section .

This is the procedure for forklift operation.

Make sure that the working attachment is securely locked to the quick-change device.

See the description in the sections “Operation of the hydraulic quick-change device”, “Check after locking procedure”.



S Centre of gravity

Sa Distance of centre of gravity

Caution 

Risk of damage to load and machine!

When using forklifts, only use forks with prongs of suitable length and make sure that these do not project beyond the load. Otherwise goods or pallets lying in front of the forks could be damaged.

! Make sure that forklifts are operated correctly!

- When you lift the load: make sure that the load is resting as close as possible to the vertical limb of the fork prong.
Pick up the load: make sure that the centre of gravity S_a of the load is correctly positioned.

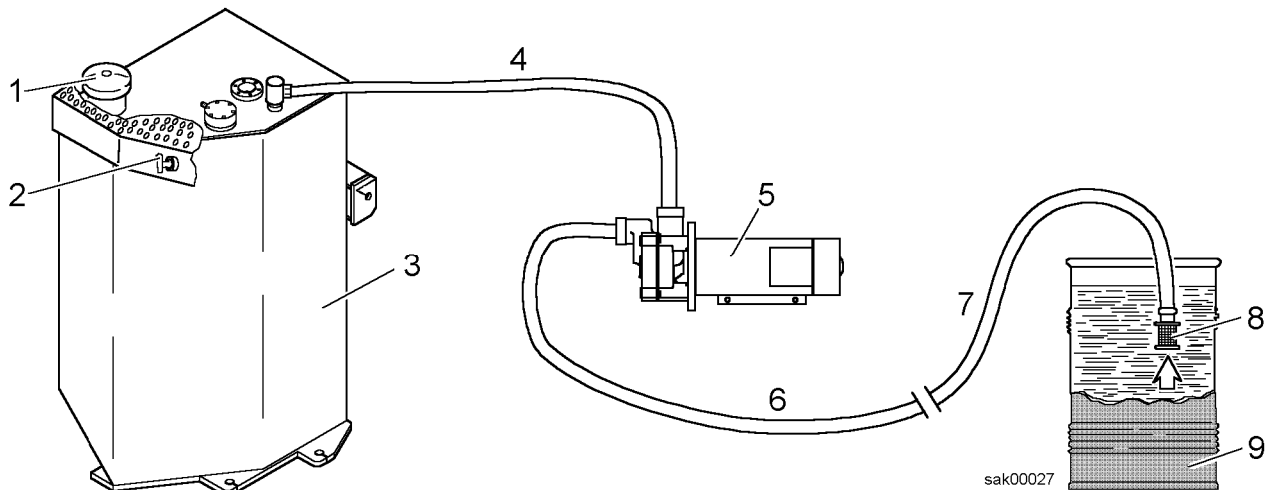
Warning 

Risk of accidents due to the machine tipping over!

! Make sure that forklifts are operated correctly!

- Raise the lift arm to the transport position (approx. 30—40 cm above the ground).
- When the forklift is empty, tilt it in slightly and keep it low.
- When carrying a load, tip the forklift up slightly and keep the load low.
- When on slopes or inclines, always keep the load at the uphill end!
- Never traverse slopes or inclines!
- Never turn on slopes or inclines!
- When a high unloading position is unavoidable:
do not raise the lift arms until you have reached the unloading point.
- When a low unloading position is required:
do not lower the lift arm until you have reached the unloading point.

Refuelling procedure with refuelling pump

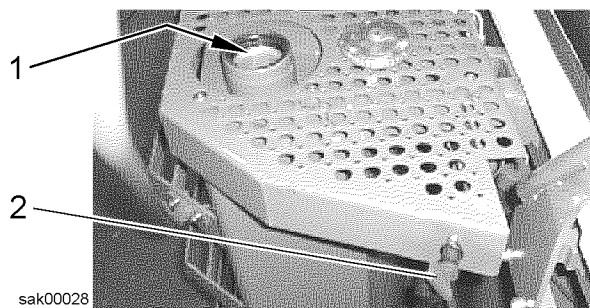


Refuelling pump

Make sure that:

- the machine is in maintenance position 1.
- the suction line extension 7 (with suction strainer) is connected to the suction line 6 behind the engine compartment – door. Make sure that the suction strainer 8 is not damaged, otherwise the refuelling pump 5 is not protected against the ingress of foreign bodies
- the suction line extension 7 with suction strainer 8 can reach to the bottom of the tank 9 (so that the tank can be completely drained)
- the battery main switch is turned on
- the sealing cap 1 on the filler neck - fuel tank is open
- the key for the refuelling pump switch 2 (next to tank filler cap) is inserted

Starting up the refuelling pump



Fuel tank

Warning



Risk of burns and explosions!

! In no event are naked flames or lighted cigarettes allowed in the vicinity during the refuelling procedure.

- Turn the key of the switch 2 to "ON". The refuelling procedure starts.

Caution 

Danger due to the fuel overflowing from the filler neck!
 The refuelling pump does not switch off automatically which could lead to fuel overflowing from the filler neck!
 ! Observe the refuelling procedure via the fuel tank - filler neck 1.

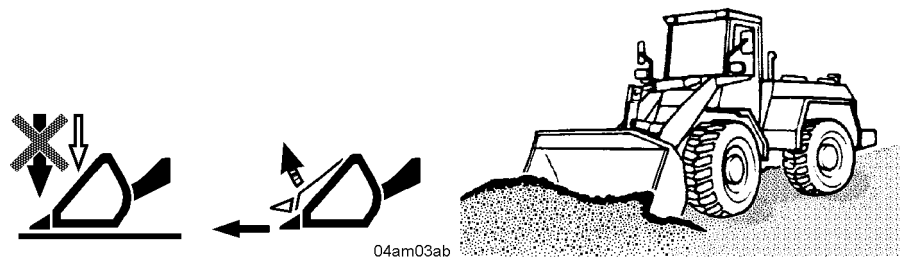
- When the refuelling process is complete, turn the key in the switch 2 to “OFF” and take out the key. Close the fuel tank - sealing cap 1.
- Disconnect suction line extension 7 (with suction strainer) from the suction line 6 and seal lines with dummy plugs.

3.3.11 General working methods

In this section, the routine working methods are described.

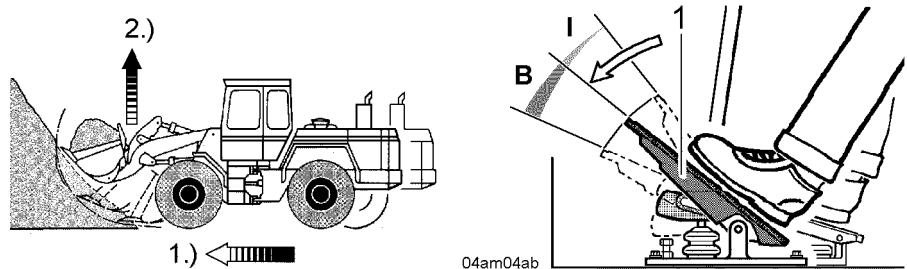
Picking up and transferring bulk materials

The following procedure is recommended to avoid any possible loss of traction.



- Do not work with a strong downwards pressure on the bucket.
- If you do have to promote the flow of the bulk material into the bucket when driving the bucket into the material: gently tilt it in and out.

When the brake- INCHING PEDAL is activated, the advance force (tractive force) is reduced, thus making loading easier.



Power distribution by INCHING

1 brake- INCHING PEDAL
 I range - INCHING

B range - BRAKING

LBH/02/003801/0003/4.0/en

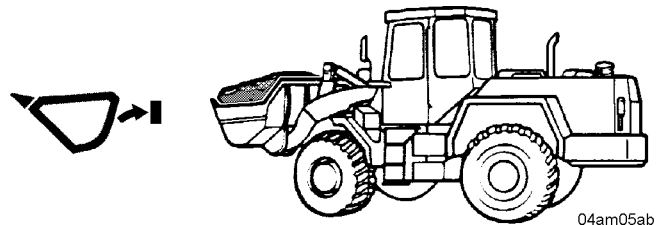
- In addition, push down the brake- INCHING PEDAL 1 in range - I- of the pedal travel with the required force.

The engine power is adjusted:

- 1.) the power going to the travel hydraulics is reduced
- 2.) the power going to the working attachment is increased

The advantages of power adjustment:

- the wheels do not turn over unnecessarily
- fuel consumption is reduced



04am05ab

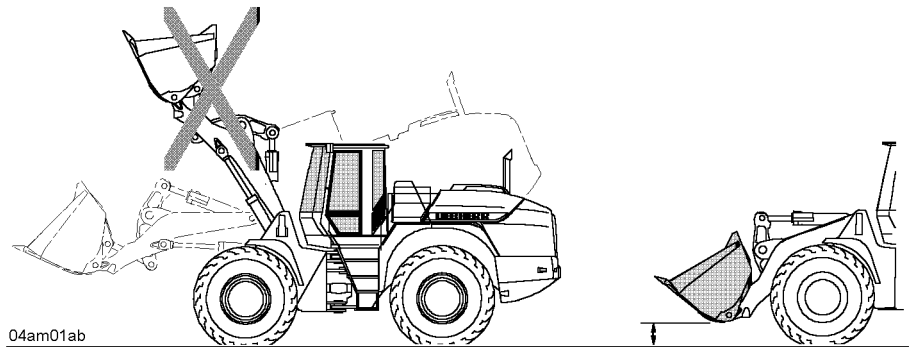
- The loaded bucket is tilted in to its limit and the lift arm is raised.

Transporting and transferring bulk materials

The bucket should be moved into the transport position to improve the machine's stability and to ensure good viewing conditions when transporting and transferring bulk materials.

The transport position means that the bucket pivot point is approx. 40 cm above the ground.

Transport position



04am01ab

Danger of the machine tipping over

Warning

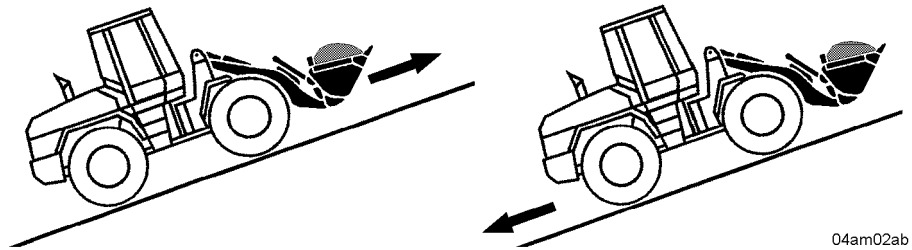


Risk of accidents due to the machine tipping over!

There is a risk that the machine might tip over when the lift arm is raised due to a shift in the centre of gravity!

! Observe the max. permissible bulk material weight and the specified tipping loads.

- Move the loaded bucket into the transport position.

Transporting a load on a slope

04am02ab

*Travel directions when transporting loads***Warning**

Risk of accidents due to the machine tipping over!

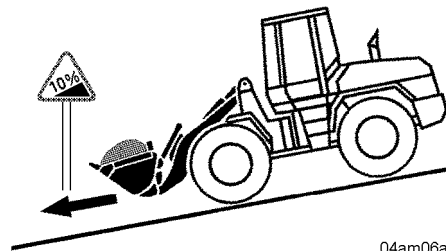
! When transporting a load on a steep slope, keep the loaded bucket low.

- When transporting uphill, drive forwards.
- When transporting downhill, drive in reverse.

Driving on slopes

It is essential that the safety instructions are observed when driving on sloping ground!

Refer to the Section "Safety instructions for driving on slopes".



04am06ab

*Slopes***Warning**

Risk of accidents due to the machine tipping over!

The load at which the machine can tip over is reduced when driving on sloping ground!

! Always keep the loaded bucket low during transport!

! Do not suddenly change direction or brake abruptly!

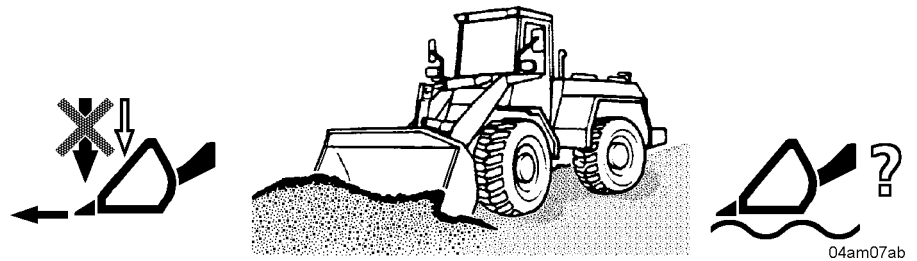
- Select the lowest possible travel range.
- Ease off the gas pedal.
- Drive downhill carefully.

Grading work

Keep the bucket base horizontal when grading.

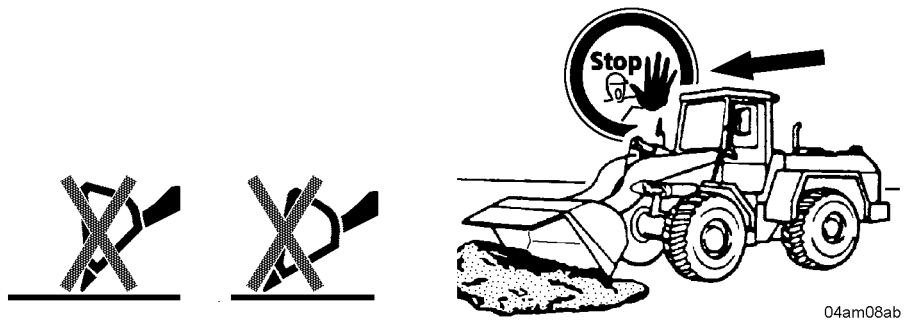
Grading

The following procedure is recommended to avoid any possible loss of traction.



Grading procedure

- Do not work with a strong downwards pressure on the bucket.
- or
- Use the function – float position: Refer to the sections “Operating the lift arm”, “Activating the float position”.



Impermissible bucket positions

Caution

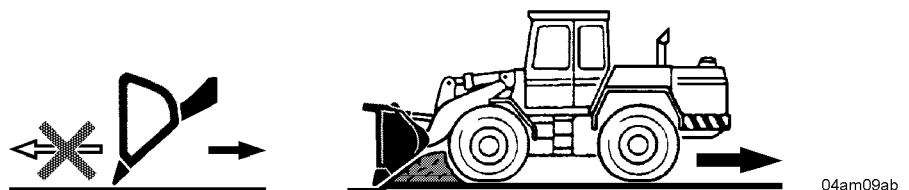
Risk of damage to the machine!

The machine may be damaged during grading work, if the bucket hits a hard object when it is tilted out while the machine is moving “forward”!

! Do not grade in travel direction “forward” when the bucket is tilted out!

- Position the bucket base parallel to the ground.
- or
- Gently set the bucket base down.

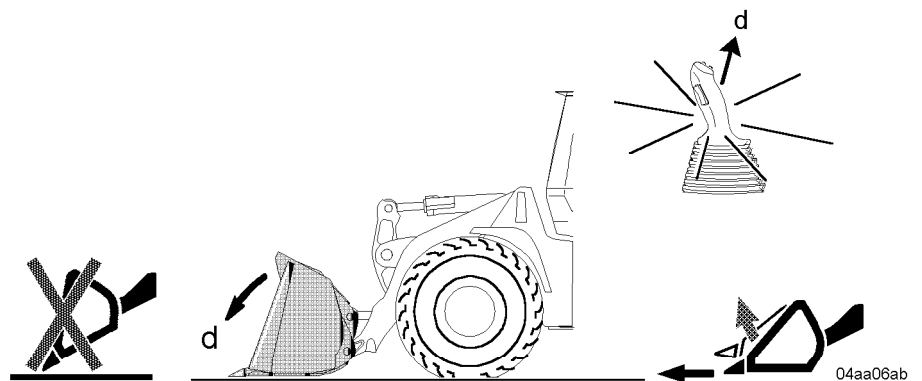
Bulldozing



- Tilt the bucket downwards and reverse the machine.

Loading from a tip

Picking up bulk material



Bucket position

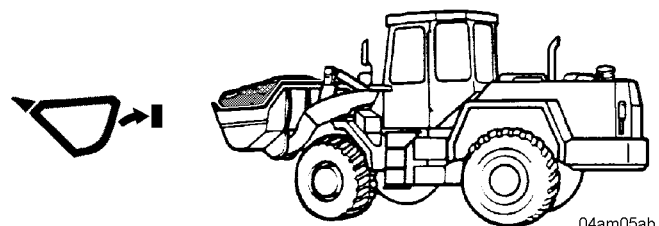


Risk of damage to the machine!

The lift arm may be damaged, if when clearing away bulk material in travel direction "Forward" with a tilted out bucket, you drive into a hard obstacle at speed!

! When clearing away bulk material, do not drive into the pile with the bucket tilted out!

- Set down the loading bucket horizontally on the ground.
- Drive the bucket into the material, slightly tipping up the bucket in the process.
- If you do have to promote the flow of the bulk material into the bucket: When driving the bucket into the material, gently tilt it in and out.
- In addition, press down the brake - INCHING PEDAL: see the "Picking up and transferring bulk materials" section .



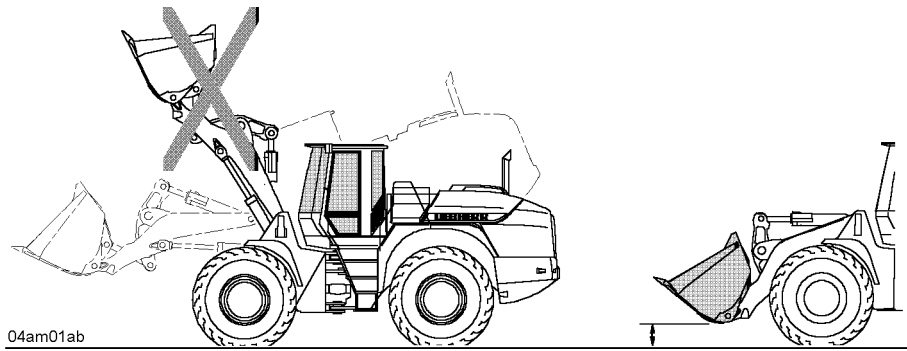
Bucket position

- The loaded bucket is tilted in to its limit and the lift arm is raised.

Bulk material transport

Keep the loaded bucket low during transport, in order to improve the machine's stability and to ensure good viewing conditions.

LBH/02/003801/0003/4.0/en



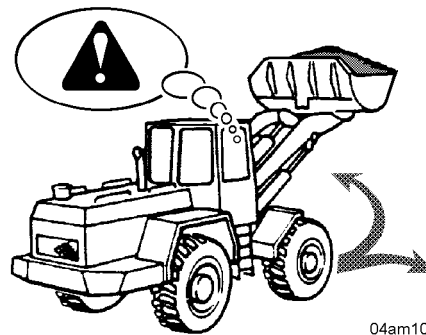
04am01ab

Bucket position

Make sure that the bucket is in the transport position.

The transport position means that the bucket pivot point is approx. 40 cm above the ground.

- Move the bucket into the transport position.



04am10ab

Danger of the machine tipping over

Warning 

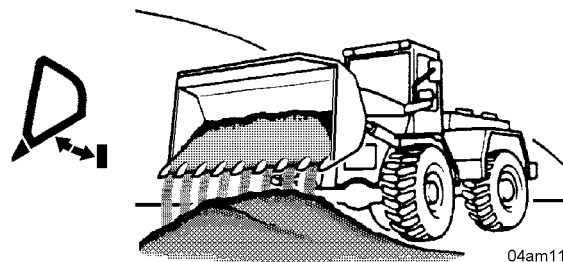
Risk of accidents due to the machine tipping over!

There is a risk that the machine might tip over when the lift arm is raised due to a shift in the centre of gravity!

! Do not suddenly change direction or brake abruptly when the bucket is raised!

- Do not raise the lift arm until just before reaching the unloading point.

Dumping



04am11ab

Dumping

- Tilt the bucket out.
- Loosen material adhering to the bucket: Quickly tilt the bucket in and out, briefly jolting against the bucket arm stops in the process.

Loading from slopes or banks

Material removal from a slope

This is the procedure for removing normal loading material such as sand or gravel.



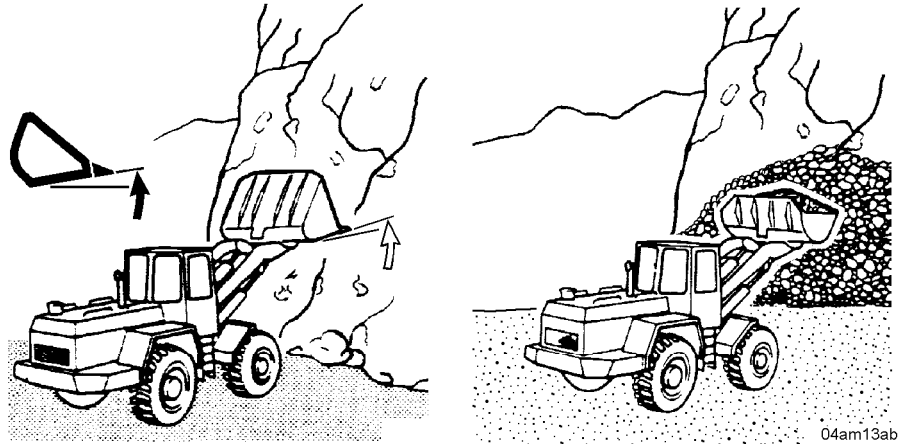
04am12ab

Bulk material removal 1

- Start removing the material at the foot of the slope, working your way upwards.

Material removal from a bank

This is procedure for removing atypical hard materials such as rock.



04am13ab

Bulk material removal 2

- Gently tilt the bucket base upwards.
- Start removing material at the top and work your way downwards.

Warning



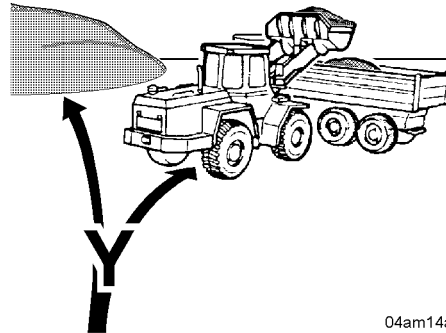
Risk of accidents due to falling material!

! Do not work under overhangs!

- Remove overhangs first and look out for after-slippage.

Loading bulk transport vehicles

Loading paths



04am14ab

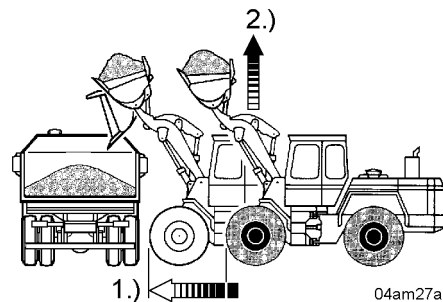
Y-movements

The vehicle to be loaded should be parked so that the transport distance for the machine are as short as possible.

If possible make a “**Y-movement**”. Also refer to the section “Driving mode” under “Reversing”.

Loading procedure

In order to speed up the loading procedure, the machine should be braked in front of the truck with the brake - INCHING PEDAL.



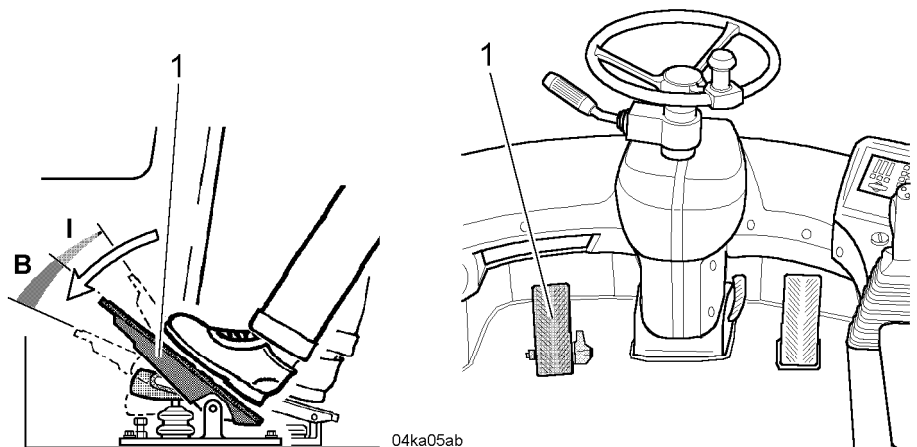
04am27ab

Unloading position

This yields the following benefits:

- 1.) responsive adjustment of the speed
 - 2.) optimum performance adaption for the working attachment
- See aalso the “Picking up and transferring bulk materials” section .

- Adopt the unloading position: do not raise the lift arm until just before reaching the unloading point.



inch/bake pedal

- 1 brake/ INCHING PEDAL
- I range - INCHING
- B range - BRAKING

- Brake the machine: push down the brake - INCHING PEDAL 1 in range - I- of the pedal travel with the required force.

Warning

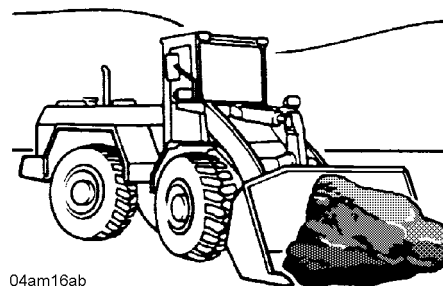
Risk of accidents due to falling material!

- ! The machine driver may only swing the working attachments over occupied driver -operating- and working stations of other vehicles when these are protected by reinforced roofs (FOPS).
- ! If the driver's cab is not equipped to provide the necessary degree of protection, then the driver of the vehicle in question must leave his cab during overhead operations.

- Load the truck with the machine so that the bulk material is dumped in the middle of the skip.
- With longer vehicles, load from the front backwards.

Loading large rocks

Make sure that the skip floor of the transport vehicle is buffered against the impact of large rocks.



Bucket loading

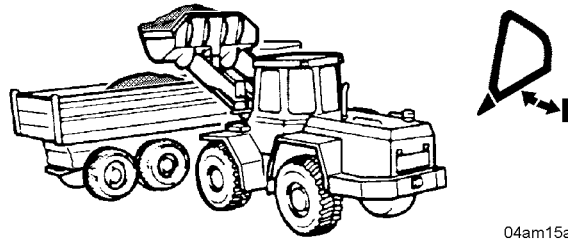
- First place a load of smaller pieces of rock in the vehicle.
- Proceed to load the transportation vehicle.

LBH/02/003801/0003/4.0/en

Off-loading material lodged in the bucket

With loading jobs, for which a certain digging position is required again and again, the automatic bucket return-to-dig can be operated.

Refer to the sections “Operating the lift arm”, “Activating the automatic bucket return-to-dig”.



04am15ab

Dumping

- Tilt the bucket out.

Caution 

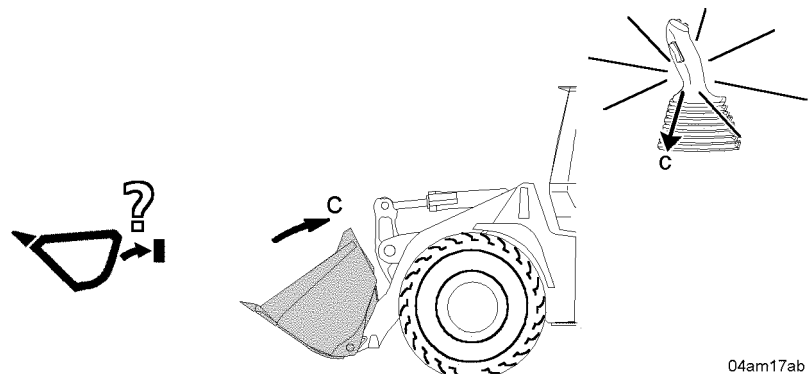
Risk of damage to the machine!

Unnecessary jolting against the bucket arm stops when tilting in and out can lead to accelerated wear to the bolts and bushes on the kinematics!

! Avoid unnecessary impacts against the stops!

- Loosen material adhering to the bucket: Quickly tilt the bucket in and out, briefly jolting against the bucket arm stops in the process.

Moving the machine back



04am17ab

Bucket position

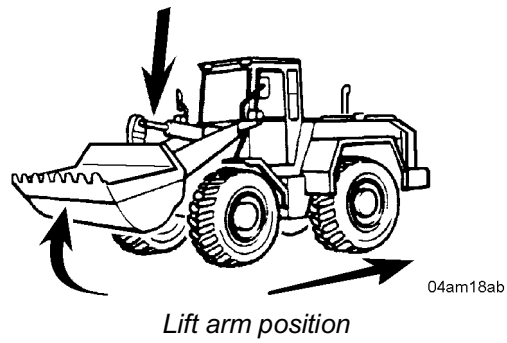
Caution 

Risk of damage to the machine!

Unnecessary jolting against the bucket arm stops when tilting in and out can lead to accelerated wear to the bolts and bushes on the kinematics!

! Avoid unnecessary impacts against the stops!

- Tilt the bucket in.

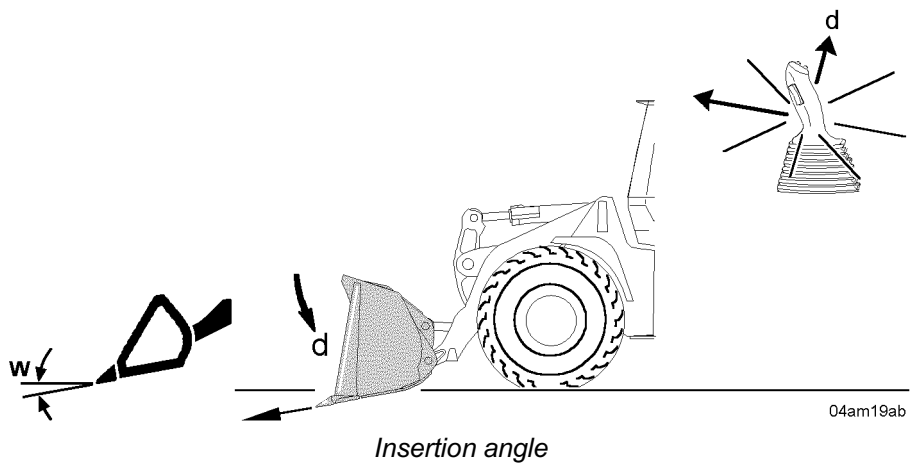


- When moving backwards, lower the lift arm.

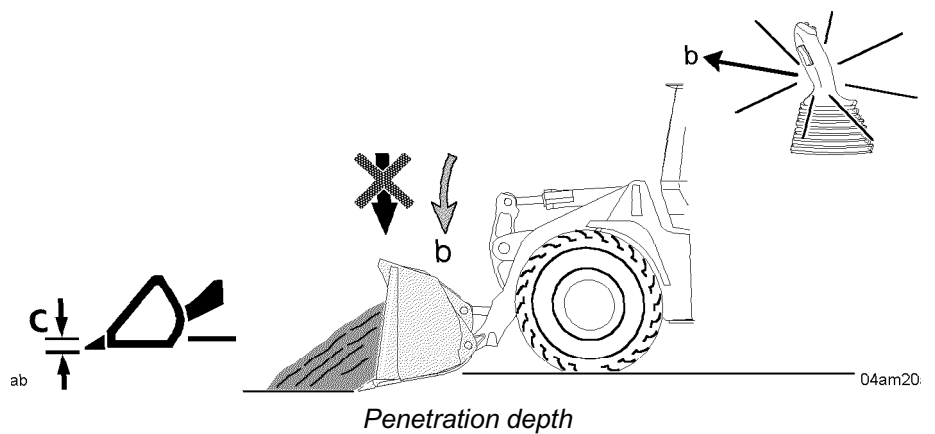
Excavation

Excavating soft material

This is the procedure for excavating soft material.

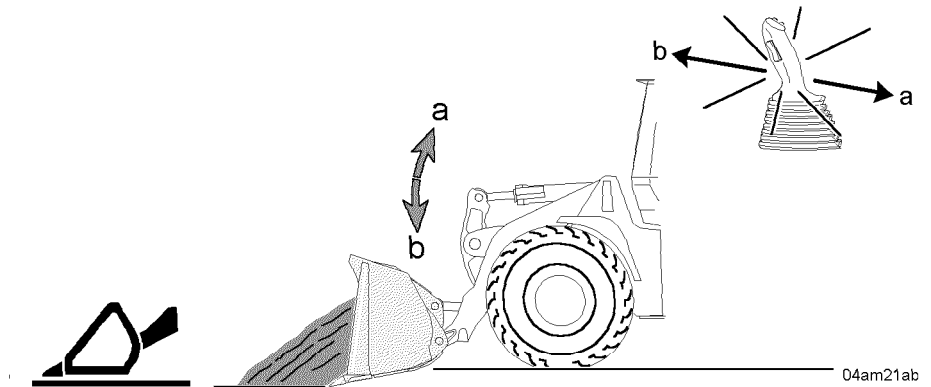


- Lower the loading bucket onto the ground.
- Set a small insertion angle - **W** within a max. of 10°.



- When approaching with the machine, simultaneously press the lift arm down, until a sufficient penetration depth – **C** has been reached.
- The following procedure is recommended to avoid any possible loss of traction: Do not work with a strong downwards pressure on the bucket.

LBH/02/003801/0003/4.0/en



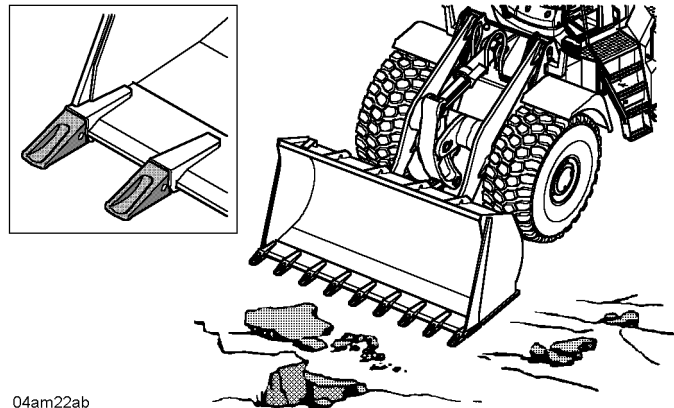
04am21ab

Lift arm movement

- Make horizontal cuts while driving forwards.
- The work is made easier by raising or lowering the lift arm as appropriate.

Excavating hard material

When excavating hard material, a bucket with teeth should be used.



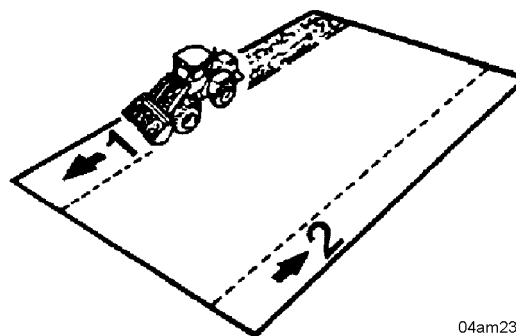
04am22ab

Working attachment

- Additional procedure: See the “Excavating soft material” section .

Example of foundation excavation

This is the procedure for excavating foundations.

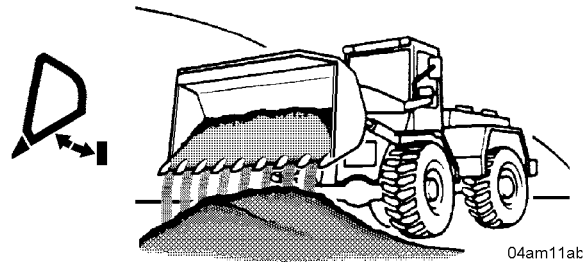


04am23ab

Longitudinal cuts

- Cut an initial trench with the bucket along the outer edge of the excavation.
- When the first cut is down to a depth of approx. 1 metre: start a second trench along the opposite side.
- Work the area between down to the same depth as the side trenches.

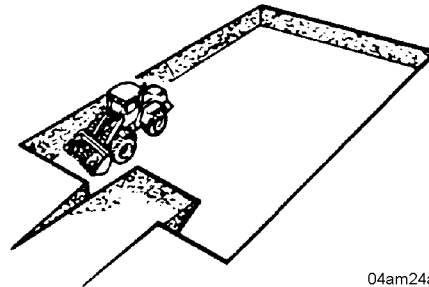
LBH/02/003801/0003/4_0/en



04am11ab

Heaping material

- Pile up the bulk material in a corner, leaving the foundation banks exposed.



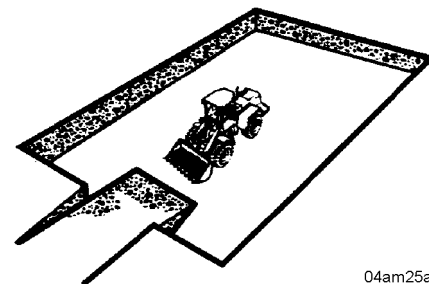
04am24ab

Corners of the foundations

- When the foundations have been excavated to the required depth: dig out the corners and transport the material out of the excavation.

Driving out of the excavation

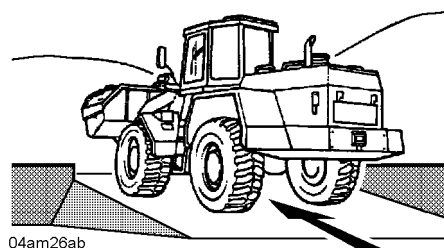
A ramp must be made so that the machine can drive out of the excavated area.



04am25ab

Exit ramp

- To make an exit for the machine: cut a ramp in the middle of a side bank.



04am26ab

Direction of transportation

- Keep the loaded bucket low during transport.
- Drive out of the excavated area forwards.

LBH/02/003801/0003/4.0/en

3.3.12 Transporting the machine

Slinging the machine from a crane

It is essential when the machine is slung from a crane, that the accident prevention regulations are observed!

Refer to the section "Safety regulations" when slinging the machine from a crane.

The following precautions should be taken before slinging the machine from a crane.

Precautions:

- lower the working attachment and tilt back the loading equipment to its limit
- install articulation lock
- move all control levers to neutral
- engage the parking brake
- lock the working hydraulics
- shut down the engine,
- close and lock all doors and hoods on the machine

For more detailed descriptions, refer to the section "Operation, handling".

Obtain information about:

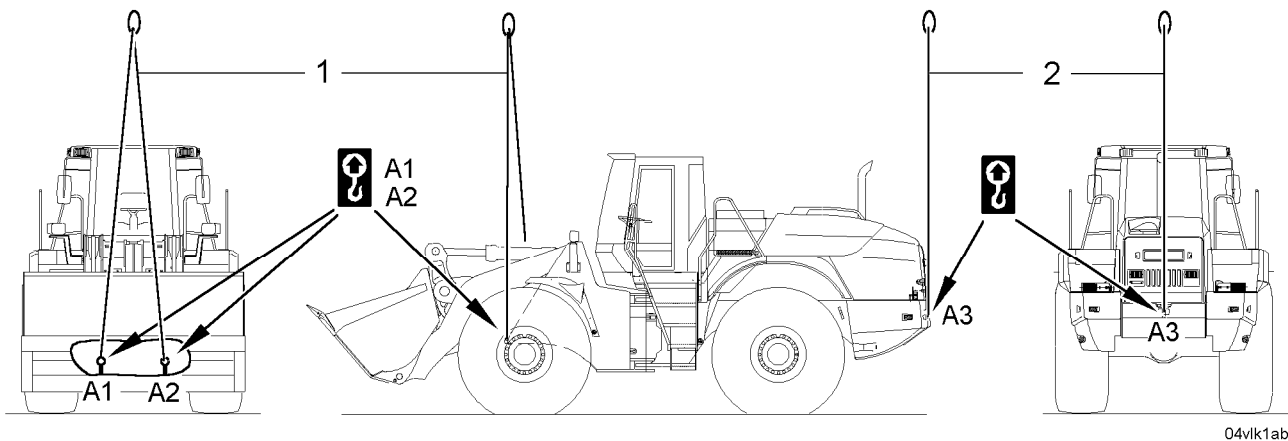
- weight and collision masses of the machine: see the "Technical data" section
- the required load bearing capacity and lengths of the lifting tackle

Execution: when necessary, sling the machine from a crane.

Loading for truck or rail transport

Required equipment:

- lifting tackle 1: rope length - Min. length = 5.0 m.
- lifting tackle 2: rope length - Min. length = 4.5 m.



Sketch 1 of slung machine

- 1 lifting tackle – 2-strand rope
- 2 lifting tackle – 1-strand rope

- A1 slinging and lifting point right-hand, front

- A2 slinging and lifting point left-hand, front

- A3 slinging and lifting point, rear

04vk1ab

LBH/02/003801/0003/4.0/en

Danger 

Risk of accidents due to suspended/falling load!
 ! Standing under the machine when it is suspended is strictly prohibited.

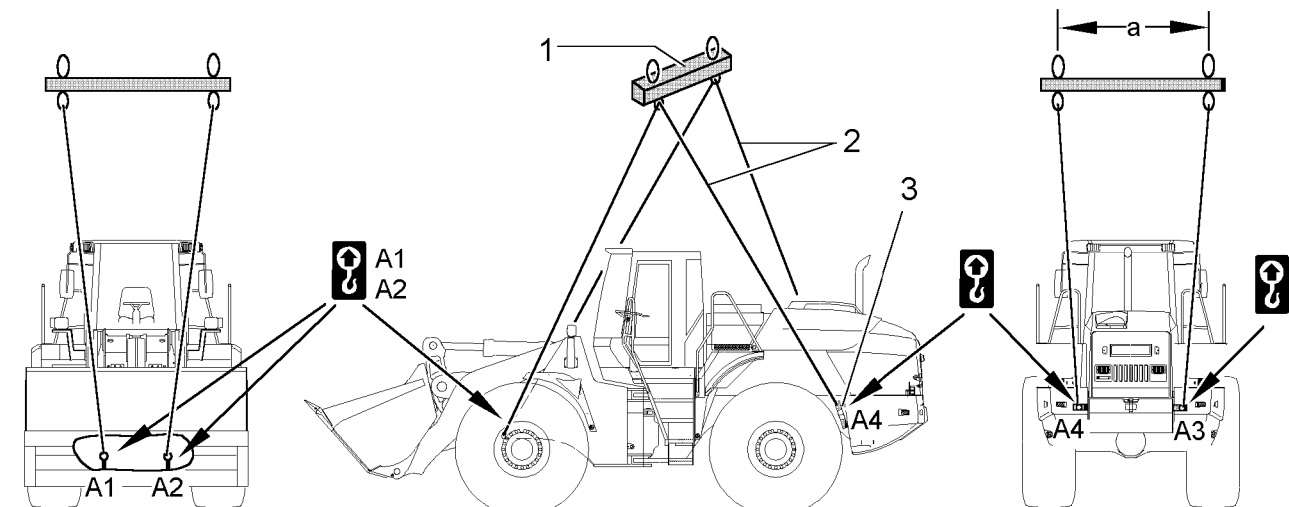
- Fix/attach the lifting tackle to the slinging and lifting points A1, A2, A3 provided on the machine.
- Raise and load the machine with due care.

Loading for transport by ship

Execution: when necessary, sling the machine from a crane.

Required equipment:

- slinging lug 3: is available as optional equipment – LIEBHERR order No. 9840127
- slinging attachment/yoke 1 of the shipping company: minimum dimension a = 2.5 m
- lifting tackle 2: rope length - Min. length = 5-6 m



04vlk2ab

Sketch 2 of slung machine

- 1 slinging device/-bar
- 2 lifting tackle – 2-strand rope
- 3 loading lug

- A1 slinging and lifting point right-hand, front
- A2 slinging and lifting point left-hand, front

- A3 slinging and lifting point right-hand, rear
- A4 slinging and lifting point left-hand, rear

Danger 

Risk of accidents due to suspended/falling load!
 ! Standing under the machine when it is suspended is strictly prohibited.

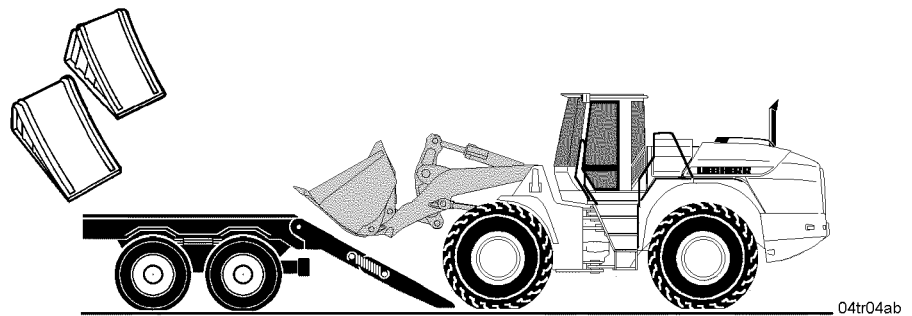
- Remove the mudguards at the rear left- and right-hand side of the machine.
- Attach the slinging lugs 3 to the rear left- and right-hand side of the machine.
- Fix/attach the lifting tackle to the slinging and lifting points A1, A2, A3, A4 provided on the machine.
- Raise and load the machine with due care.

Transport the machine by truck or rail

Before driving onto the loading bed

The following precautions should be undertaken before driving onto the loading bed.

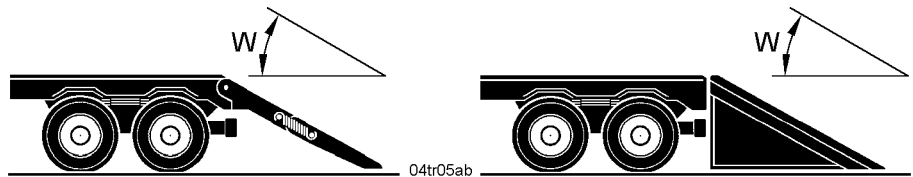
LBH/02/003801/0003/4.0/en



Loading the machine onto the transporter

Precautions:

- have wheel wedges ready
- have suitable tensioning ropes or chains ready to lash the machine down

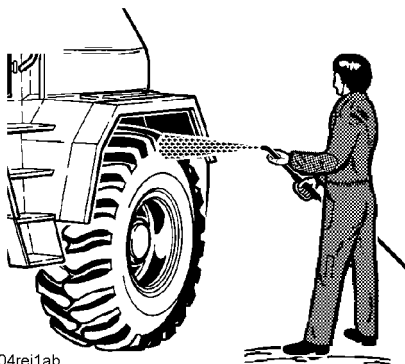


Ramp inclination

A ramp should be provided up which the machine can be driven onto the loading bed.

The inclination of the ramp - **W** - may be no more than 30°.

Any snow, ice or mud on the tyres should be cleaned off before the machine is driven up the ramp.



Wet cleaning

Driving onto the loading bed

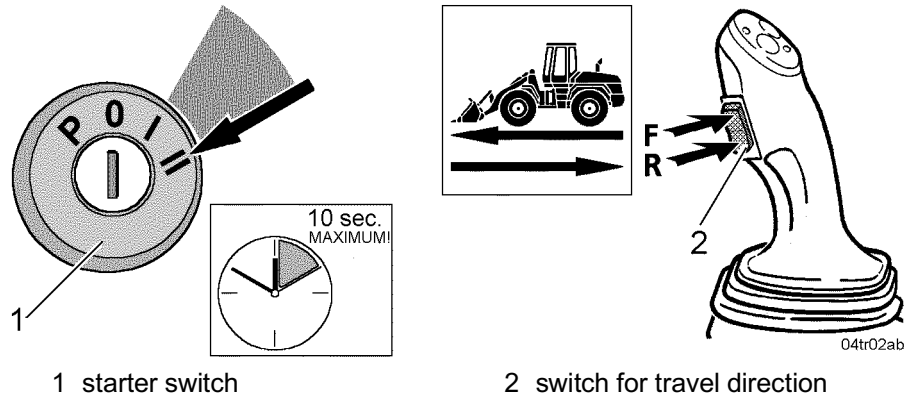


For more detailed descriptions, refer to the section "Operation, handling". When driving onto the loading bed get a second person to give you signals!

Make sure that someone is posted who can give the machine driver the required signals.

Persons giving directions must always take up a position to one side of the machine!

This is the procedure for driving onto the transporter bed:



1 starter switch

2 switch for travel direction

- Start up the engine.

Situation once the engine is started:

- travel range - **A2**-(automatic) is automatically selected
- parking brake is automatically activated

Also refer to the Sections “Starting the diesel engine” and “Driving mode”.

- Release the parking brake.
- Select the travel direction.

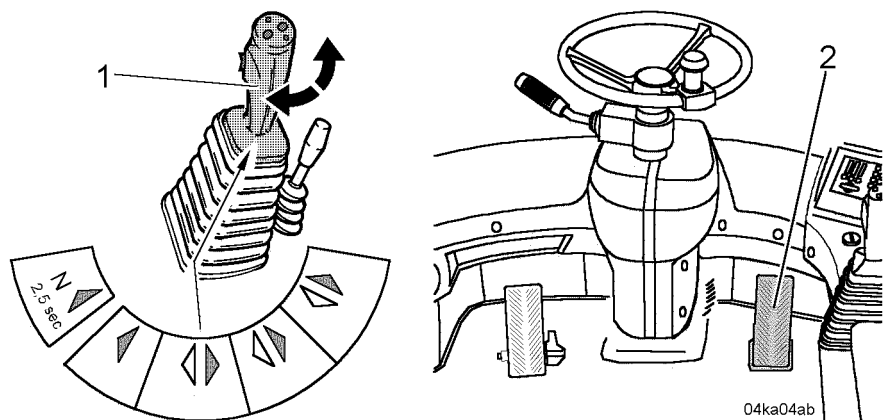
Warning

Risk of accidents if machine is driven without due care!
 If the machine is driven without due care, the loading personnel, the person giving directions and the driver himself may be endangered.
 ! Always drive with due care when loading the machine!

Caution

Risk of accidents if machine is not driven with due care!
 If the machine is not driven with due care, the transporter and the machine being loaded could be damaged.
 ! Always drive with due care when loading the machine!

- Only ever drive onto the ramp in a low travel range!



Moving off procedure

1 switch for travel range

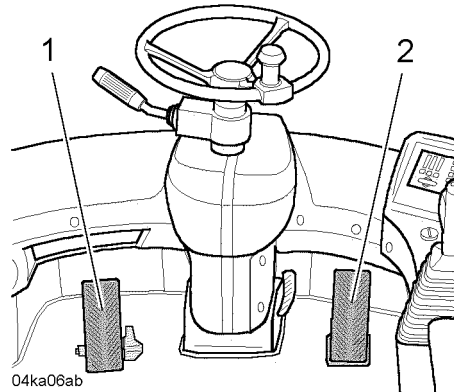
2 gas pedal

LBH/02/003801/0003/4.0/en

- Select a low travel range: turn switch 1.
- Push down the gas pedal 2 carefully.
- Carefully set the machine in motion.

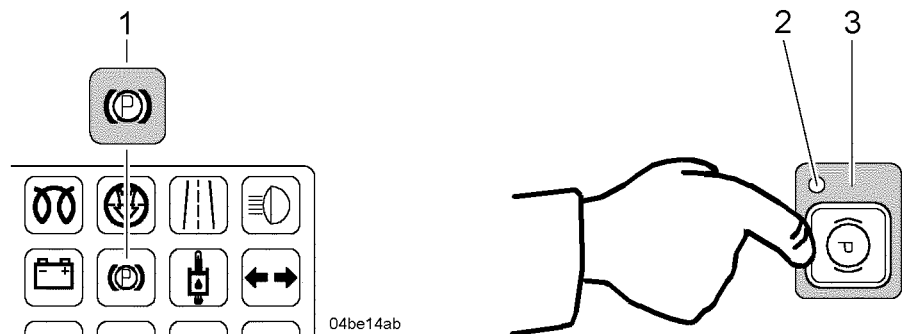
After driving onto the loading bed

For more detailed descriptions, see the “Operation, handling” section .
Make sure that the air stream cannot penetrate the exhaust pipe opening.
This is particularly important with rail transport, as the direction of travel cannot be foreseen!



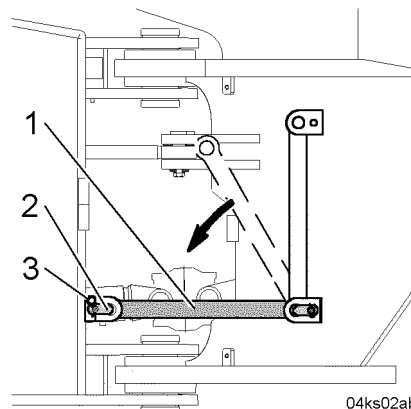
04ka06ab
BRAKE- inching pedal – gas pedal

- Stop the machine



04be14ab
Parking brake

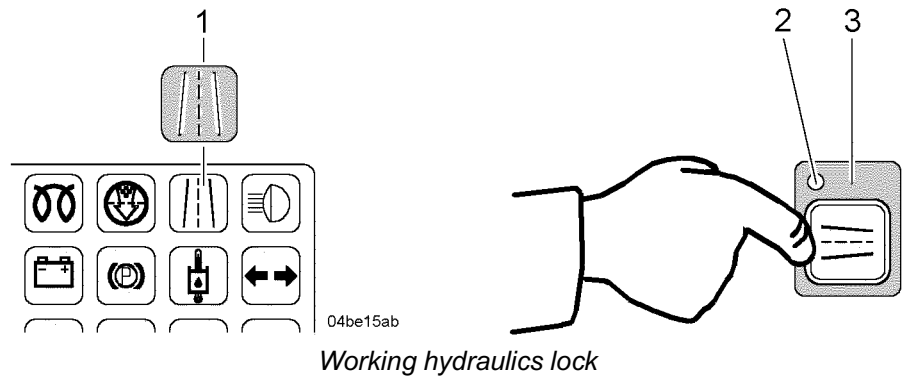
- Engage the parking brake.



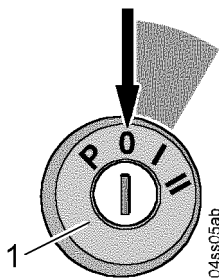
04ks02ab
Articulation lock

LBH/02/003801/0003/4_0/en

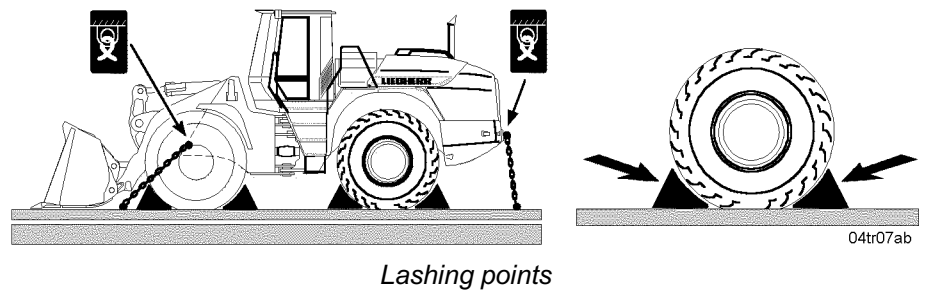
- Install the articulation lock.
- Lower the lift arm and set the loading bucket down flat on the transporter bed.



- Lock the working hydraulics.
- Shut down the engine.

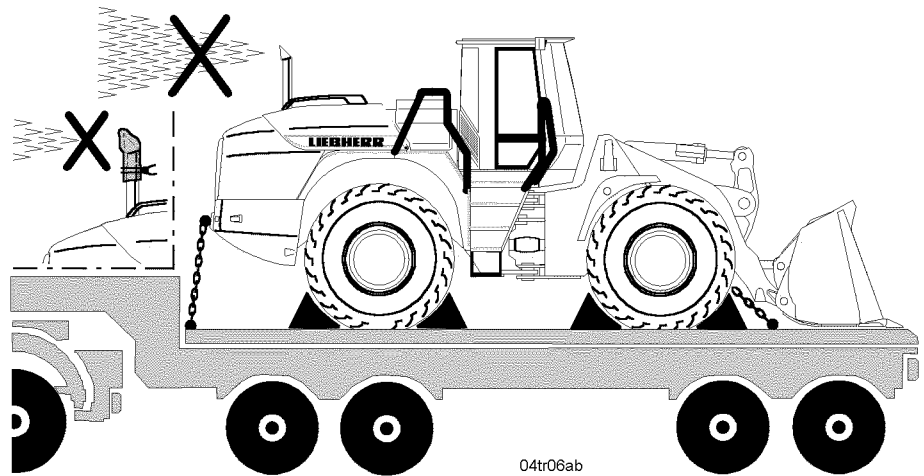


- Close and lock all doors and hoods on the machine.



- Secure the machine against sliding: use wheel wedges and tensioning ropes or chains for this purpose.
- Securely attach the tensioning ropes or chains to the indicated lashing points on the machine.

LBH/02/003801/0003/4.0/en



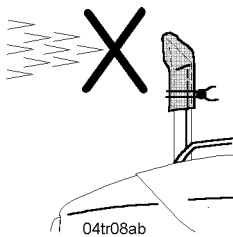
Exhaust pipe cover

If the machine is facing towards the direction of motion during transport, then the air stream can penetrate the exhaust opening. The following precaution should be taken to prevent damage to the turbo during transport.

Caution

Risk of damage to the turbo charger from foreign bodies!
 Penetration of the air stream produced during transport into the exhaust pipe opening drives the diesel engine turbo.
 The turbocharger is not lubricated when the engine is not running.
 Without lubrication, the turbocharger will be damaged.
! Prevent the air stream produced during transport, entering the exhaust!

- To block off the exhaust pipe opening: climb onto the machine via the cab access only and make sure that you have a secure footing.
- Securely block off the exhaust pipe opening so that it cannot slip with windproof material.



Blocking off the exhaust pipe opening

3.4 Emergency operation

In this section, the various emergency operation modes of the machine are described.

Emergency operation modes:

- towing the machine
- procedure for jump starting

3.4.1 Towing the machine

It may be necessary if the machine is damaged to tow it away from an exposed position.

The following towing instructions only apply for exceptional situations, in order to move a machine incapable of independent movement to a place, where it can be repaired or put on a transporter.

Towing speed and towing distance:

- max. towing speed 2 km/h
- only short distances are permitted, in order to move the machine away from a danger area

The machine must always be put on a transporter for longer distances!

Safety when towing

Towing the machine is problematic and is always undertaken under the sole responsibility of the operator.

In no event can damage or accidents resulting from towing be covered by the manufacturer's guarantee.

See also the "Towing the machine safely" Section .

Danger



Risk of accidents when towing not properly carried out!

When a machine incapable of independent movement is not properly towed, the result could be severe or even fatal injuries!

! Always secure the machine against rolling away before releasing the brakes for towing!

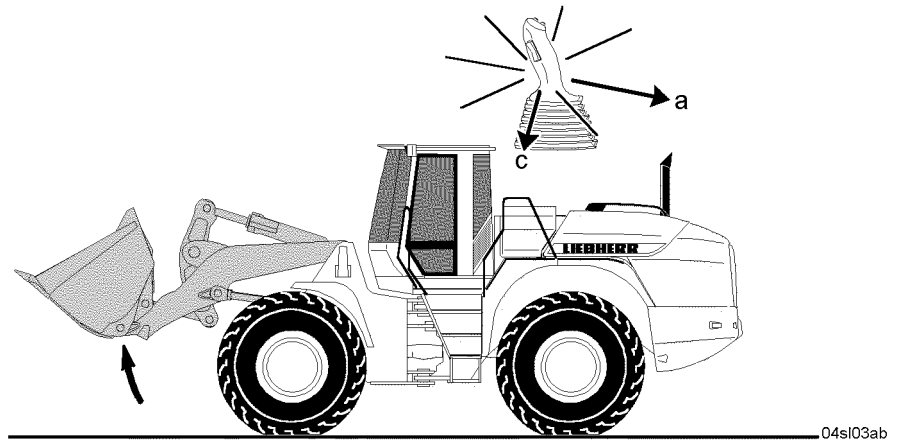
- Observe all prescribed safety regulations and the following recommendations when towing.

Towing when the diesel engine is running

The following precautions should be taken before towing the machine.

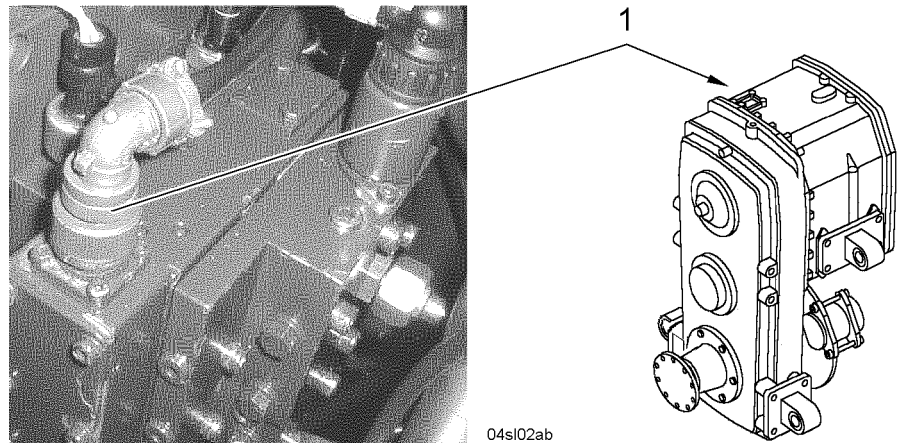
Precautions:

- adopt the transport position
- make all drive functions inoperational
- release the parking brake



Transport position during towing

- Adopt the transport position: raise the lift arm.
- If it is possible to hydraulically actuate the working attachment, tilt in the bucket to the limit.



CANON plug connection

1 CANON plug

- Make all travel functions inoperational: release CANON plug 1 from the transfer gear (gear shift section).

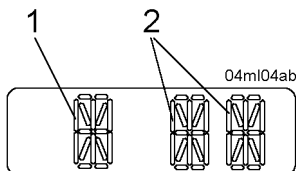
The electrical connection between the solenoid valve on the gearbox and the electronics is thereby broken.

Malfunction message:

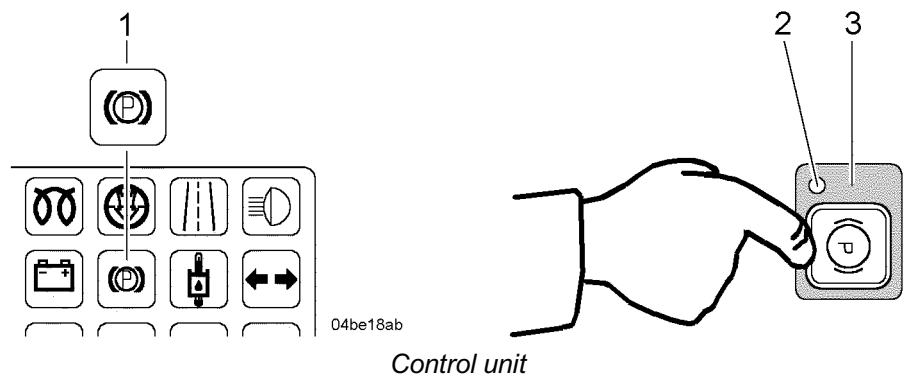
- error code **E 81** is displayed
- in addition, this warning function is acoustically supported by a "continuous tone"

See also the "Display unit" section .

The machine's drive functions are now inoperational.

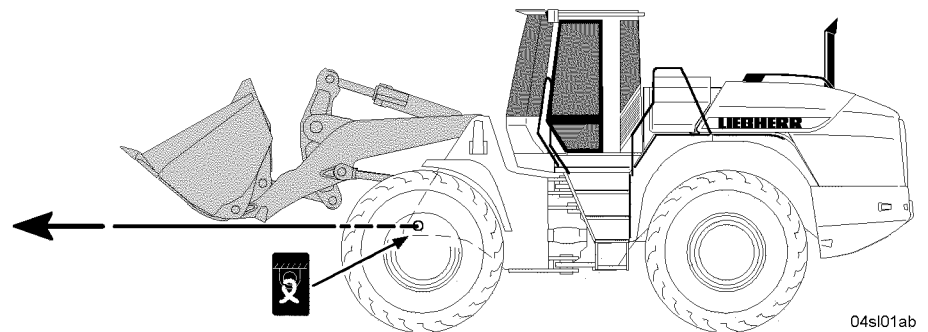


segment display – travel range, travel speed or error codes



- 1 symbol field – parking brake
- 2 LED
- 3 button – parking brake

- Release the parking brake by pressing button 3. The LED 2 on the button 3 goes out. Symbol field 1 for the parking brake goes out. The parking brake is released. The machine is now ready for towing.



- Feed the two towing ropes through the bore holes provided in the front section and secure them.

Towing when the diesel engine is switched off

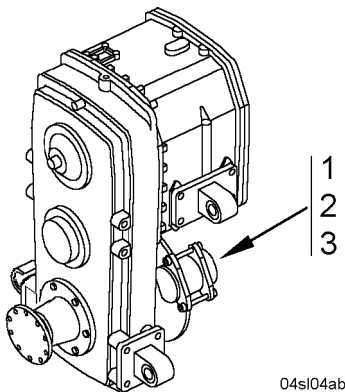
In the event of serious damage to the machine, with breakdown of the diesel engine, the braking and steering functions will be impaired.

Since the brake accumulator is not filled when the diesel engine is not running, the service brake becomes ineffective after it is used a few times.

Make sure that the parking brake has been mechanically released, before the machine is towed away.

Danger

Risk of accidents due to the unforeseen rolling away of the machine!
! Secure the machine against rolling away.



Parking brake

- Mechanically release the parking brake.

- 1 cover
- 2 lock nut
- 3 adjusting screw

- Screw cover 1 off.
- Release counter nut 2.
- Unscrew adjusting screw 3 until the brake lining carrier can be separated from the brake disc.

The parking brake is thereby released.

Warning

Risk of accidents when the machine is under tow!

Since the steering function is restricted, there is a risk of accidents when the machine is being towed!

! When the machine is under tow, use the emergency steering function!

- Refer to the section "Towing the machine when the steering system has broken down".
- Only tow the machine with a tow bar.

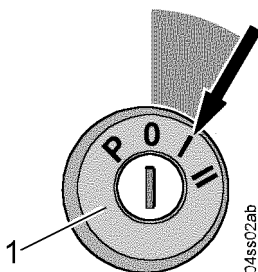
Towing the machine when the steering system has broken down

If the diesel engine or the steering pump break down during a journey, the emergency steering pump starts automatically for a period of approx. 30 seconds. Then the emergency steering pump switches off automatically – steering is no longer possible.

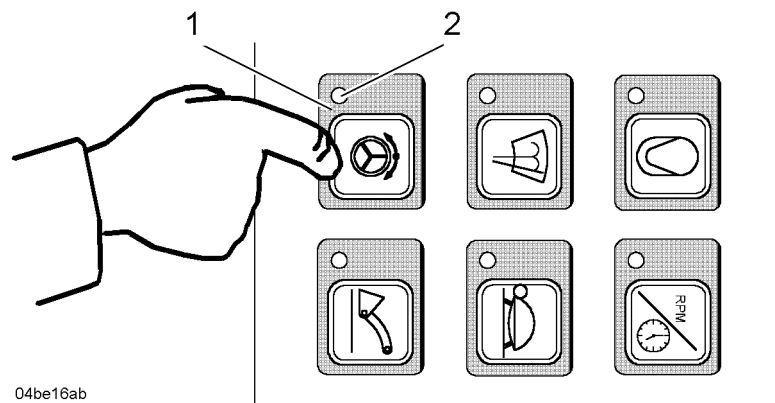
When the ignition is activated steering is possible via the function – Repeat start of the emergency steering pump – .

Continuous operation of the emergency steering pump results in overheating of the pump motor! The thermostat switch integrated in the pump motor automatically switches the emergency steering pump off in the event of overheating.

Make sure that the machine's electrical system is switched on.



This is how to activate the repeat start of the emergency steering pump.



04be16ab

Control unit

1 button – emergency steering 2 LED

- Press the button 1 for emergency steering and keep it pushed down. An LED 2 on the button indicates that the function is active. The symbol field – emergency steering lights up when the emergency steering function is activated. Also refer to the action “Operation” under “Display unit”.
- The emergency steering pump can be operated until it is switched off automatically by the integrated thermostat in the pump motor.
- If it is not possible to tow the machine out of the danger area during this time period: let the pump motor cool down until the thermostat cuts in again.
- Press button 1 again for repeat start of the emergency steering pump and keep it pressed down.

3.4.2 Procedure for jump starting

When it is difficult to start due to flat batteries, the machine can be jump started with an external battery.

Make sure that the precautions detailed below have been met.

Connecting the external battery

This is the procedure for jump starting.

Danger



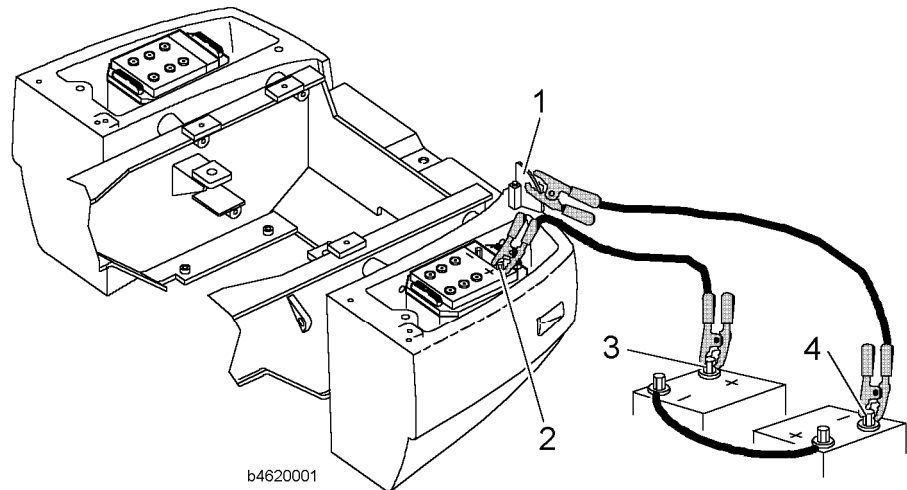
Risk of accidents due to incorrect or careless jump starting!

When external batteries are connected, with old batteries a large amount of gas can form. There is a “RISK OF EXPLOSIONS”!

! Therefore you should avoid naked flame and any sparks in the vicinity of the batteries.

! Protective goggles and gloves should be worn when jump starting.

! Only use jump starting cables with sufficient diameter.



b4620001

Procedure for jump starting

- | | |
|---|---|
| 1 earth point – vehicle frame | 3 positive terminal of the external battery(-ies) |
| 2 positive terminal of the discharged battery | 4 earth point of the external battery(-ies) |

- Connect a jump start cable first to the plus terminal of the discharged battery 2 and then to the plus terminal of the external battery 3.
- Connect the second jump start cable first to the earth point of the external battery (-ies) 4 and then to the earth point – vehicle frame 1.
- Start up the diesel engine. See the “Starting the diesel engine” section .

Disconnecting the external battery

Before the jump start cables are removed, it is essential that the diesel engine of the machine is moved to lower idle speed.

Excess voltage can be avoided by switching on big consumers such as floodlights.

- First remove the jump start cable from the earth point – vehicle frame 1 and then from the earth point of the external battery(-ies) 4.
- Then remove the second jump start cable first from the positive terminal of the external battery(-ies) 3 and then from the positive terminal of the discharged battery 3.

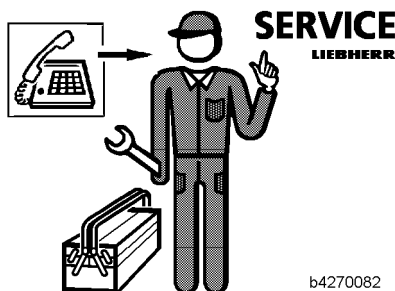
4 Malfunctions

Warning and fault messages

- Various faults are indicated by the corresponding indicator lamps (optically) or by display instruments on the instrument panel. In this regard see chapter “Operation, handling”, section “Display unit”.
- Warning functions are in some cases provided with additional acoustic support.

Identification and rectification of faults and errors

- Faults can often be traced back to the fact that the machine was incorrectly operated or serviced.
Therefore, carefully read the appropriate section of the operating and maintenance instructions each time a fault occurs.
- **Analyse the cause of the fault and rectify it without delay!**
- Describe the fault and all related circumstances as accurately as possible if you call on the services of the **LIEBHERR CUSTOMER SERVICE**. Precise descriptions will facilitate us in the rapid isolation of the fault and its rectification. For this purpose, precise details about the machine type and serial number are required.
- Do not attempt any jobs for which you are not trained or instructed.



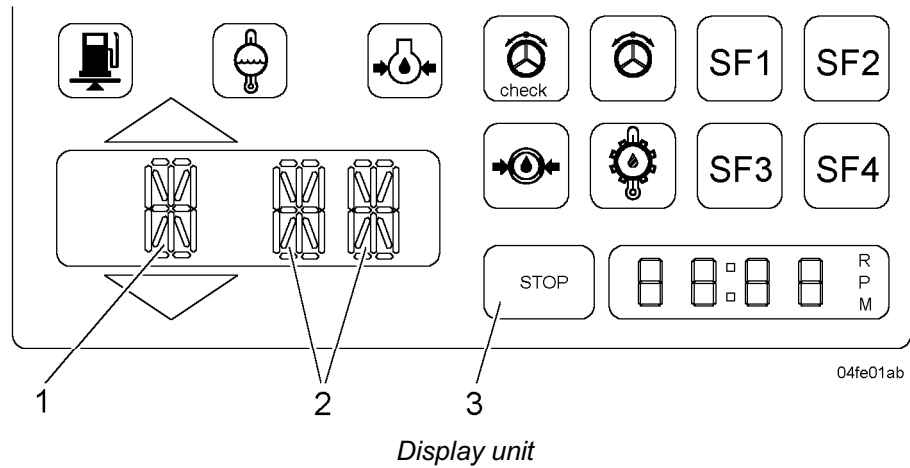
b4270082

If you are not able to identify the cause of the fault with the “Error code tables”, or are not able to remedy the fault, contact the **LIEBHERR CUSTOMER SERVICE**.

4.1 Error code tables

4.1.1 Error code – indication on the display

The hydrostatic travel drive and the travel gear are monitored by the gearbox electronics. The system is monitored for short circuits, cable rupture, external voltage and incorrect input and output signals. In addition, the gearbox electronics continuously checks program sequence and communication with the display unit.



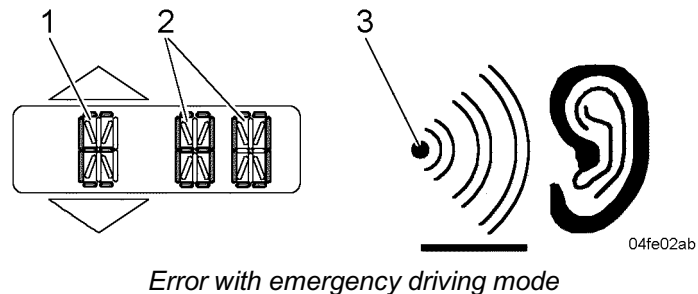
- | | |
|---|---|
| <p>1 display for travel range or error message – Error</p> | <p>2 display for travel speed or error code</p> |
| | <p>3 display “STOP”</p> |

If an error arises when the machine is being started up or when in use, this is indicated in the display unit. A distinction is made in the process between two types of errors.

- Error with emergency driving mode
- Error - machine is shut down

Error with emergency driving mode

With errors which cannot result, however, in damage to the machine, only the affected function is shut down. The machine can only be temporarily driven in emergency driving mode.



If one of these errors occurs, an “**E**” for Error appears in display 1 and in addition an acoustic signal is issued from the buzzer 3 as a “continuous tone”.

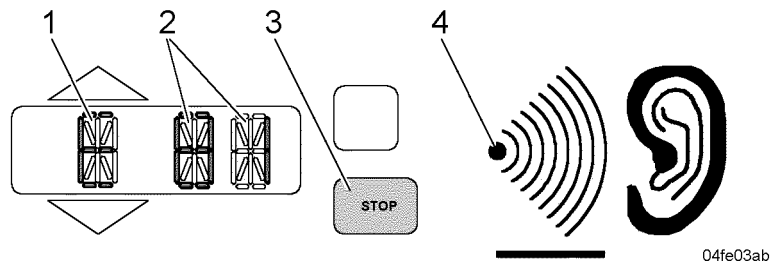
The error code is not shown on the display until the parking brake 2 is engaged. Make a note of the error code, as it will be cancelled when the ignition is switched off.

In emergency driving mode, only manual selection without automatic are possible. Only the driving ranges- **1** -, - **2** - or - **3** - can be selected when the machine is at standstill.

Have the error rectified by LIEBHERR CUSTOMER SERVICE.

Error - machine is shut down

With errors which can result in damage to the machine, the whole machine is shut down. In the process, the neutral travel direction is automatically selected and the machine coasts to halt.



Error display - machine is shut down

If this error arises, the system reacts as follows:

- an “E” for Error appears in the display 1
- the display 2 shows the error code (when the parking brake is active)
- the symbol field 3 for “STOP” lights up
- the buzzer 4 issues an acoustic signal in the form of a “continuous tone”
- the machine is brought to a standstill by selecting the neutral travel direction

The error code is not shown on the display 2 until the parking brake is engaged or until the neutral travel direction - N - is selected.

Make a note of the error code, as it will be cancelled when the ignition is switched off.

Have the error rectified by LIEBHERR CUSTOMER SERVICE.

Error code	Effect	Cause	Solution
E EE	Machine stops	Display unit power supply connected, but no communication with the electronics	Consult LIEBHERR CUSTOMER SERVICE
E 61	Emergency driving mode	Short circuit on M1 - M9 which was already present when on-board circuit switched on.	Consult LIEBHERR CUSTOMER SERVICE
E 62	Machine stops	Break at an output, already present when on-board circuit switched on.	Consult LIEBHERR CUSTOMER SERVICE
E 64	Machine stops	Impermissible input combination (LH control lever V/R rocker or jog +/-)	Consult LIEBHERR CUSTOMER SERVICE
E 65	Machine stops	On-board circuit over- / under-voltage (>39 V or >13 V)	Consult LIEBHERR CUSTOMER SERVICE
E 66	Machine stops	Incorrect RAM information (memory comparison failed)	Consult LIEBHERR CUSTOMER SERVICE
E 67	Machine stops	Incorrect drive program (data comparison failed)	Consult LIEBHERR CUSTOMER SERVICE
E 68	Machine stops	Incorrect program run (software test for all program sections)	Consult LIEBHERR CUSTOMER SERVICE
E 69	Emergency driving mode	Outage of output speed sensor	Consult LIEBHERR CUSTOMER SERVICE
E 70	Emergency driving mode	Outage of drive detector	Consult LIEBHERR CUSTOMER SERVICE

LBH/02/003801/0003/4.0/en

Error code	Effect	Cause	Solution
E 71	Emergency driving mode	Display interface error	Consult LIEBHERR CUSTOMER SERVICE
E 72	Machine stops	Outage of drive and power output detector	Consult LIEBHERR CUSTOMER SERVICE
E 73	Machine stops	Slippage in travel gear	Consult LIEBHERR CUSTOMER SERVICE
E 74	Emergency driving mode	Short circuit M1	Consult LIEBHERR CUSTOMER SERVICE
E 75	Emergency driving mode	Circuit break at M1	Consult LIEBHERR CUSTOMER SERVICE
E 76	Machine stops	External voltage at M1	Consult LIEBHERR CUSTOMER SERVICE
E 77	Emergency driving mode	Short circuit M2	Consult LIEBHERR CUSTOMER SERVICE
E 78	Machine stops	Circuit break or external voltage at M2	Consult LIEBHERR CUSTOMER SERVICE
E 80	Emergency driving mode	Short circuit M3	Consult LIEBHERR CUSTOMER SERVICE
E 81	Machine stops	Circuit break or external voltage at M3	Consult LIEBHERR CUSTOMER SERVICE
E 83	Emergency driving mode	Short circuit M4	Consult LIEBHERR CUSTOMER SERVICE
E 84	Machine stops	Circuit break or external voltage at M4	Consult LIEBHERR CUSTOMER SERVICE
E 85	Emergency driving mode	Short circuit M5	Consult LIEBHERR CUSTOMER SERVICE
E 86	Machine stops	Circuit break or external voltage at M5	Consult LIEBHERR CUSTOMER SERVICE
E 87	Emergency driving mode	Short circuit M6	Consult LIEBHERR CUSTOMER SERVICE
E 88	Machine stops	Circuit break or external voltage at M6	Consult LIEBHERR CUSTOMER SERVICE
E 89	Emergency driving mode	Short circuit M7	Consult LIEBHERR CUSTOMER SERVICE
E 90	Emergency driving mode	Circuit break or external voltage at M7	Consult LIEBHERR CUSTOMER SERVICE

Error code	Effect	Cause	Solution
E 91	Emergency driving mode	Maximum system pressure exceeded (K1 >22 bar)	Consult LIEBHERR CUSTOMER SERVICE
E 92	Machine stops	Block K1 (K1 >1 bar)	Consult LIEBHERR CUSTOMER SERVICE
E 93	Emergency driving mode	Short circuit M9	Consult LIEBHERR CUSTOMER SERVICE
E 95	Machine stops	Pressure in the selected coupling K1 too low (<11 bar)	Consult LIEBHERR CUSTOMER SERVICE
E 98	Emergency driving mode	Pressure sensor K1 error (>4.5 V or <0.25 V)	Consult LIEBHERR CUSTOMER SERVICE
E 99	Emergency driving mode	Pressure sensor inching error (>4.5 V or <0.25 V)	Consult LIEBHERR CUSTOMER SERVICE
E 9A	Emergency driving mode	Load sensor error (>4.5 V or <0.25 V)	Consult LIEBHERR CUSTOMER SERVICE
E 9C	Emergency driving mode	Circuit break or external voltage at M9	Consult LIEBHERR CUSTOMER SERVICE
E 9E	Emergency driving mode	Short circuit or external voltage with supply voltage 5 V	Consult LIEBHERR CUSTOMER SERVICE
E 9F	–	Short circuit at output for tractive force limitation	Consult LIEBHERR CUSTOMER SERVICE
E A0	Emergency driving mode	Error on button – Kick-Down	Consult LIEBHERR CUSTOMER SERVICE

4.1.2 Acoustic warning signals

Those warning messages which are acoustically supported, their causes and remedies are listed in the table below.

There are three different “acoustic warning signals”:

- interval tone (tone sequence is 5 x tones followed by 5 sec pause)
- interval tone (without pause)
- continuous tone

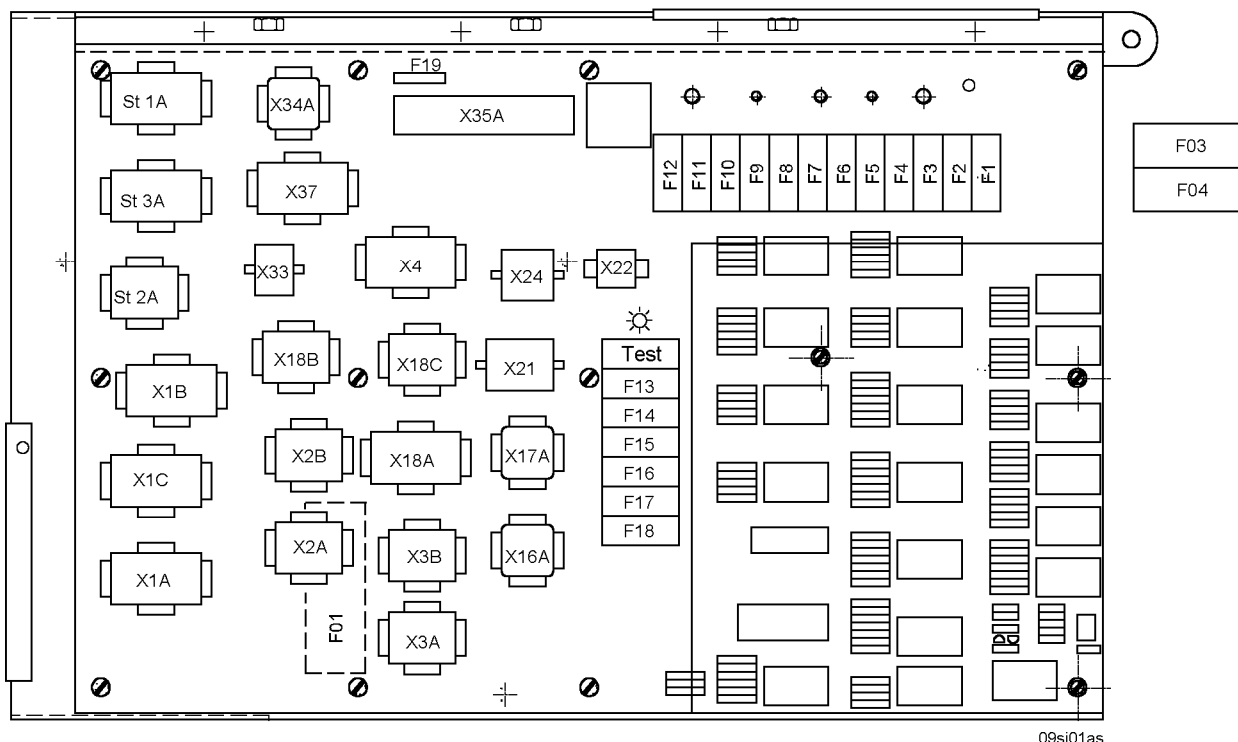
Error signal	Cause	Solution
Segment field - coolant temperature indicates high temperature and interval tone sounds. Tone sequence: 5 x tones followed by 5 secs pause	Coolant temperature over 95 °C	Clean the cooling system

Error signal	Cause	Solution
	Fault in the cooling or electrical system	Consult LIEBHERR CUSTOMER SERVICE
Interval tone sounds tone sequence: 5 x tones followed by 5 secs pause	Hydraulic oil temperature over 95°C	Clean the cooling system
	Fault in the cooling, hydraulic or electrical system	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - emergency steering lights up and interval tone (without pause) sounds.	Activation of the emergency steering function when the steering pump breaks down	Drive or tow machine out of the danger area and consult the LIEBHERR CUSTOMER SERVICE.
	Fault in the electrical system	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - engine overheating and coolant level flashes and continuous tone after 10 secs.	Coolant temperature over 100 °C	Clean the cooling system
	Coolant level too low	Top up with coolant
	Fault in the electrical system	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - engine oil pressure flashes and continuous tone after 10 secs.	Too little engine oil	Check the oil level and top up with engine oil if necessary
	Fault in the diesel engine lubricant supply	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - hydraulic oil overheating flashes and continuous tone after 10 secs.	Hydraulic oil temperature over 100 °C	Clean the cooling system
	Fault in the cooling or hydraulic systems	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - hydraulic oil overheating lights up and continuous tone after 10 secs.	Gear oil temperature over 120 °C: due to fault in gearbox	Consult LIEBHERR CUSTOMER SERVICE
Symbol field - brake system accumulator pressure flashes and continuous tone after 10 secs.	Brake accumulator pressure too low: due to prolonged standstill of machine	Start the engine: when the diesel engine runs, the brake accumulators will be filled
	Fault in brake accumulator or brake system	Consult LIEBHERR CUSTOMER SERVICE
Error code - segment display shows error code and continuous tone is sounded.	Refer to the section error code tables.	Refer to the section error code tables.

4.2 Malfunction rectification

4.2.1 Changing fuses

The control circuit board, electronics, relays, main fusing and the plug-in fuses are located behind the right-hand door and panel covering. The 150 A fuse (mega fuse) for the emergency steering pump is mounted on the left-hand side of the hydraulic tank frame.



Control circuit board A12 with plug-in fuses F1-F19

09si01as

F1 -15A windscreen wiper-/washer system front, horn
- F2 –10A lifting limit switch, working hydraulics lock, bucket return-to-dig, float position
F3-15A blower motor, air-conditioning compressor, air-conditioning system
F4 -15A windscreen wiper, rear washing pump, central lubrication system
F5-7.5A supply control unit KL 15
F6 -7.5A relay motor stop / preglow
F7 -15A cab light, socket, radio, compressor seat
F8 - free
F9 -10A electronics A1, emergency steering pressure switch supply
F10-10A gearbox control electronics A2, parking brake
F11-10A flashing warning system / control unit KL30
F12-15A KL30 steering column switch (light horn)
F13-7.5A tail lamps, sidemarker lamp, profile lights right
- F14 – 7.5A tail lamps, sidemarker lamp, profile lights left
F15 – 7.5A driving headlight, right (dipped beam)
F16 – 7.5A driving headlight, left (dipped beam)
F17 – 7.5A driving headlight, left (high beam)
F18 – 7.5A driving headlight, right (high beam)
F19 – cable bridge

- Open the right-hand cab door and remove side panel.
- Identify the fuse associated with the failure with the aid of the fuse chart above.
- Take out the identified fuse and replace with a new one (the same rating).
- Check that the plug-in fuses (F1 - F19) are functioning at the fuse base "TEST", before replacement. If the fuse is intact, the LED lights up.

5 Maintenance

5.1 Maintenance and inspection schedule

The following abbreviations are used in this Chapter:

- h = service hours
- OM = Operator's manual
- SM = Service manual
- AST = Authorised specialist technicians
- MP = Maintenance personnel

The two types of maintenance work are distinguished by their markings (circle, box, star – filled or circle, box, star – empty).

The markings have the following significance:

- circle, box, star –filled, means that the responsibility for carrying out the maintenance work rests with the machine operator or his maintenance personnel
This affects the maintenance intervals: every 10 and 50 service hours (h) and non-scheduled intervals.
- circle, box, star – empty means that the maintenance and inspection work must be performed or directed by authorised specialist technicians from LIEBHERR or its authorised dealers
This affects the maintenance intervals: on delivery, every 500, 1000, 2000 service hours (h), and at unscheduled times.

You will find a list of the spare parts needed for maintenance and inspection work in the "SERVICE PACKAGE" of the spare parts list.

Customer: Machine type: Serial No.: Oper. hours: Date:

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED		Note on execution
on hand-over	every 10	every 50	every 500	every 1000	every 2000	Special intervals	by maintenance personnel ■ one-off activity ● repetition interval † if necessary * annually at the start of the cold season OM - operating manual SM -service manual	by authorised qualified personnel □ one-off activity ○ repetition interval ‡ if necessary h – operating hours	OM Page
Complete machine									
<input type="checkbox"/>								The driver should lubricate the machine in accordance with the lubrication chart and indicate proper maintenance	
<input type="checkbox"/>								Instruct the driver in the operation of all functions	
		●	●	○	○			Check the machine for external damage	
						†		Check that all screwed connections are tight	
<input type="checkbox"/>						†		Seal any external leaks as necessary	
			□	○	○			Check the hydraulic pressures initially after 500 h, and thereafter every 1000 h	
				○	○			Check the hydraulic pressure every 1000 h	
					○			Check the hydraulic pressure every 2000 h	
Diesel engine, Pump distributor gear									
<input type="checkbox"/>	●	●	○	○	○			Check oil level - diesel engine	
<input type="checkbox"/>		●	○	○	○			Check the oil level in the pump distributor gear	
<input type="checkbox"/>		●	○	○	○			Drain off water and sediment from the fuel tank	
		■	○	○	○			Replace engine oil (normal interval is every 250 h or 500 h, depending on oil specifications)	
		■	○	○	○			Replace the oil filters	
			○	○	○			Check engine speed	
			○	○	○			Check and, if necessary replace V-ribbed belt	
			○	○	○			Check turbo hose	
				○	○			Make sure that the air inlet and exhaust lines are securely attached	
				○	○			Check valve play	
			□	○	○			Replace the gear oil in the pump distributor gear	
					○			Lightly grease the ring gear on the flywheel	
					○	*		Check the flame glow system	
					○	‡		Replace filter insert in the fuel separator	
					○	‡		Replace fuel fine filter	
					3000H			Replace oil separator (minimum of every 2 years)	
						‡		Check injection valves (in case of a drop in power)	
		■	○	○	○	†		Drain off condensate from the fuel-separator	
			○	○	○	‡		Drain off condensate from the fuel filter	

LBH/02/003801/0003/4_0/en

Customer: Machine type: Serial No.: Oper. hours: Date:

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED		Note on execution
on hand-over	every 10	every 50	every 500	every 1000	every 2000	Special intervals	by maintenance personnel ■ one-off activity ● repetition interval † if necessary * annually at the start of the cold season OM - operating manual SM -service manual	by authorised qualified personnel □ one-off activity ○ repetition interval † if necessary h – operating hours	OM Page
				○	○	†			Clean or replace the air filter - main element (replace safety element after having replaced the main element 3 times)
		●	○	○	○	†			Clean service cap and dust extraction valve on the air filter
Cooling system									
□	●	○	○	○					Check coolant level
			○	○	○				Replace the coolant filter
			○	○	○	*			Check anti-freeze protection and DCA-4 concentration in the coolant
						†			Clean the cooling system
						3000H			Replace coolant with anti-freeze protection and DCA-4 (at least every 2 years)
Working hydraulics									
□	●	●	○	○	○				Check oil level in the hydraulic tank
□		■	○	○	○	250H			Check and clean the magnetic rod on the hydraulic tank
			○	○	○				Drain water and sediment from the hydraulic tank
				○	○				Replace return-suction filter
			□	○	○				Clean the return strainer on the hydraulic tank
						10000H			Replace the return strainer on the hydraulic tank
				○	○				Lubricate pilot control unit, clean magnets and lubricate universal joints
				○	○				Replace breather filter on the hydraulic tank
				○					Replace hydraulic oil
Steering system									
□	●	●	○	○	○				Check the steering for proper functioning
□		●	○	○	○				Lubricate the bearing points on the steering cylinders
Brake system									
□	●	●	○	○	○				Check that the service and parking brakes are functioning properly
				○	○				Check the play and wear on the parking brakes
Electrical system									
□	●	●	○	○	○				Check indicator lamps and lighting
			○	○	○				Check batteries, fluid level and terminals
Transfer gear									
□		●	○	○	○				Check the oil level(s)

LBH/02/003801/0003/4.0/en

Customer: Machine type: Serial No.: Oper. hours: Date

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED		Note on execution
on hand-over every 10	every 50	every 500	every 1000	every 2000	Special intervals	by maintenance personnel ■ one-off activity ● repetition interval † if necessary * annually at the start of the cold season	by authorised qualified personnel □ one-off activity ○ repetition interval † if necessary	OM Page	
			○	○	○			Replace filter insert in the in-line filter	
			□	○	○			Replace gear oil(s)	
Axles, Tyres									
□	●	○	○	○				Lubricate the drive shafts	
□	■	○	○	○				Check the tightness of the wheel lugs (once after 50, 100 and 250 h)	
□		○	○	○				Check the oil levels	
		□	○	○				Change gear oils	
□					†			Check and if necessary, adjust tyre inflation pressure on attachments and accessories	
Vehicle frame, Ballast weight									
□	●	○	○	○				Lubricate oscillating axle frame and articulation bearing	
Central lubrication system									
□	●	○	○	○				Check whether metered quantities are adequate at the bearing points (grease collars)	
□	●	○	○	○				Check the hose lines (lubrication points, detached hoses, external leakage)	
Cab, Heating, Air conditioning system									
			○	○	○			Check the indicator beads in the dryer-collector unit	
				○	○	†		Lubricate the door hinges	
						†		Clean or replace the fresh air and recirculated air filter as required	
Lift arm, Quick-change device									
□	●	○	○	○				Lubricate bearings and lubrication points	
□	●	○	○	○	†			Lubricate bucket bearings (the lower bucket bearings - if necessary - daily)	
	●	○	○	○				Check the bucket bearing seals	
		○	○	○				Check the lift arm and bucket stops	

LBH/02/003801/0003/4.0/en










5.2 Lubricant chart, Filling quantities

5.2.1 Table of filling quantities

The values stated for the filling quantities in the table are only guidelines:

- In each case, the dipstick or level markings are definitive.
- Each time the oil is replaced or topped up, the level in the unit in question must be checked.

For more detailed information about the required lubricants and service fuels, see the Chapter "Lubricants and fuels".

	Name	Medium	Dosage	Units
 1 06sy14ab	Transfer gear, powershift section	Lubricating oil	15	l
 2 06sy15ab	Transfer gear, final drive section	Lubricating oil	6	l
 06sy04ab	Cooling system – diesel engine	Coolant	38	l
 06sy05ab	Diesel engine (with filter change)	Lubricating oil	18	l
 06sy08ab	Pump distributor gear	Lubricating oil	2,5	l
 3 06sy16ab	Front axle	Lubricating oil	53	l
 5 06sy18ab	Rear axle	Lubricating oil	32	l
 06sy03ab	Hydraulic tank	Hydraulic oil	125	l
 06sy03ab	Total contents of hydraulic system	Hydraulic oil	240	l
	Air-conditioning system	Refrigerant	1800	g

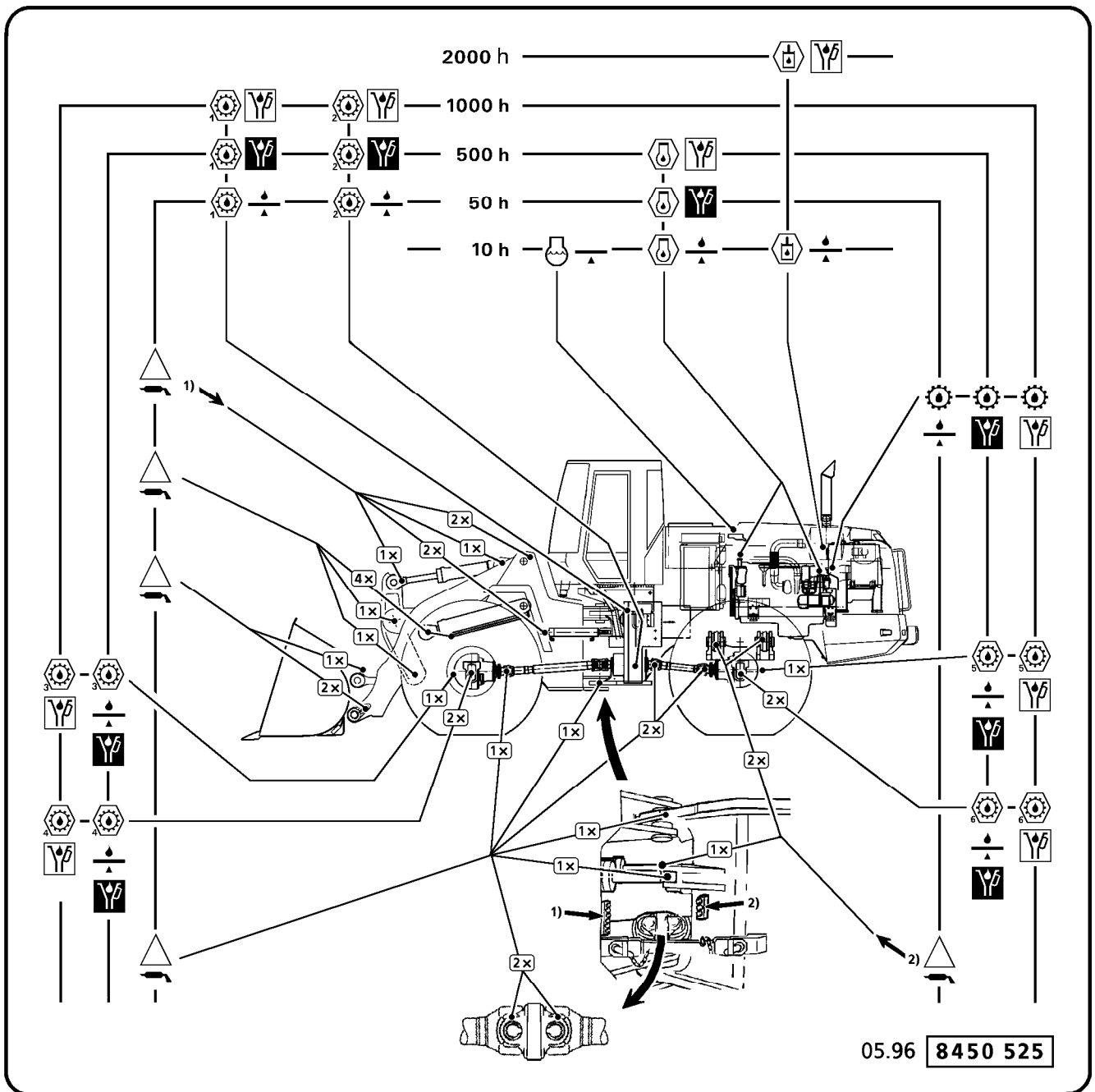
5.2.2 Lubricant chart


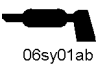

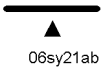


The lubrication chart provides an overview of the location of the maintenance points on the machine and of their maintenance intervals.

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

For more detailed information about the required lubricants and service fuels, see the Chapter “Lubricants and fuels”.

For information about the required filling quantities, see the “Tables of filling quantities” chapter.



Symbol	Name	Symbol	Name
 06sy09ab	General lubrication points	 06sy01ab	Lubrication
 06sy13ab	Check the oil level	 06sy21ab	Check coolant level
 06sy11ab	Oil change	 06sy12ab	First oil change

LBH/02/003801/0003/4.0/en

5.3 Maintenance tasks

5.3.1 Preparatory tasks for maintenance

Before the various maintenance tasks are performed, unless otherwise explicitly specified in the description, the machine must be moved into the maintenance position.

The various maintenance tasks include:

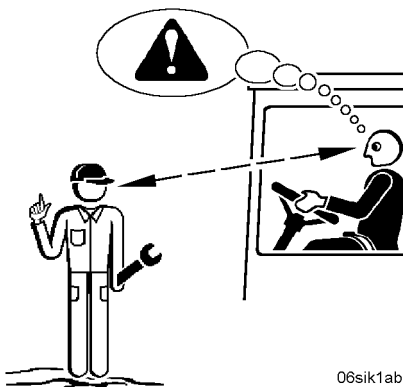
- lubricating the lift arm
- checking the oil level or changing the oil in the engine, transfer gear, axles, hydraulic tank, etc.
- replacing filter as well as adjusting and repair work on the hydraulic system

Safety precautions for maintenance

It is essential that the accident prevention regulations are observed during maintenance work!

See the “Measures to ensure safe maintenance” section .

Make sure that visual contact between the operator in the cab and the maintenance personnel is always maintained.



06sik1ab

Visual contact

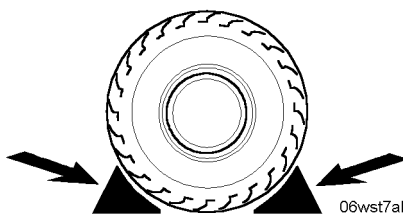
Danger 

Risk of accidents for the maintenance personnel!

Unforeseen operation of the machine by an unauthorised person can place the maintenance personnel in extreme danger!

! Never enter one of the machine's danger areas without making your presence known.

- Make yourself clearly visible before entering one of the machine's danger areas.
- Secure the machine against unforeseen rolling away with wheel wedges.



06wst7ab

Wheel wedges

Maintenance positions

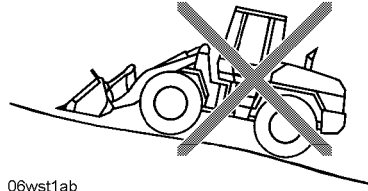
The maintenance position depends on the maintenance task to be performed.

The two basic maintenance positions 1 and 2 are described below. They enable access to the individual maintenance points.

Maintenance position 1

This is the procedure for moving the machine into the maintenance position 1.

For a detailed description of the individual procedures, see the “Operation, Handling” section.



06wst1ab



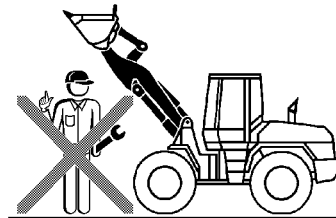
Maintenance position 1

- Park the machine on level ground.
- Lower the lift arm.
- Set the bucket down flat on the ground.
- Shut down the diesel engine.
- Take out the starter key.

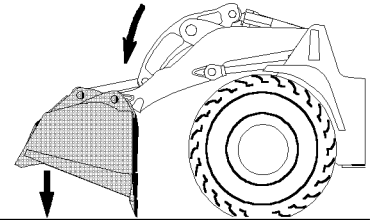
Maintenance position 2

This is the procedure for moving the machine into the maintenance position 2.

For a detailed description of the individual procedures, see the Section “Operation, Handling”.



06wst5ab



Maintenance position 2

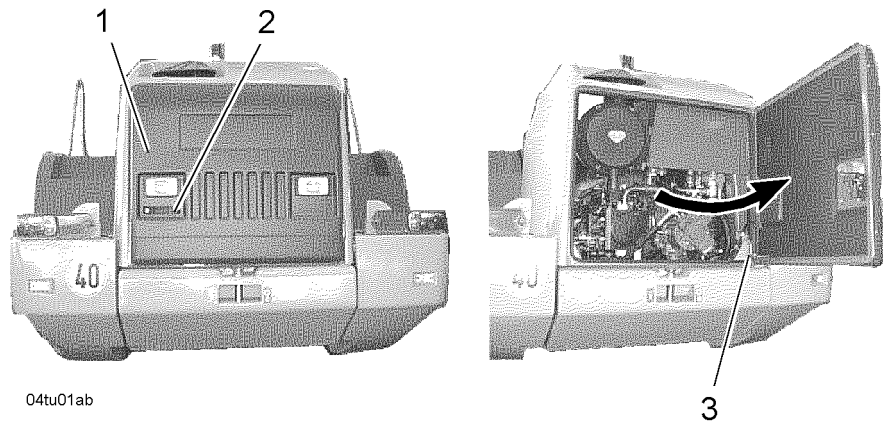
- Park the machine on level ground.
- Install the articulation lock.
- Lower the lift arm.
- Tilt the bucket out and set it down on the ground on its teeth or cutting edge.
- Shut down the diesel engine.
- Take out the starter key.

Opening the service doors and hoods

Open engine compartment door

When the door is open, the following units or components can be reached:

- hydraulic pumps
- hydraulic tank
- hydraulic tank shut-off valve
- air filter
- main battery switch



04tu01ab

Engine compartment door

- 1 Engine compartment door
- 2 handle with lock
- 3 spring lock

Caution 

Check that the fully-open door position is secured by the spring lock.
! Check that the completely open door position is guaranteed by the spring lock.

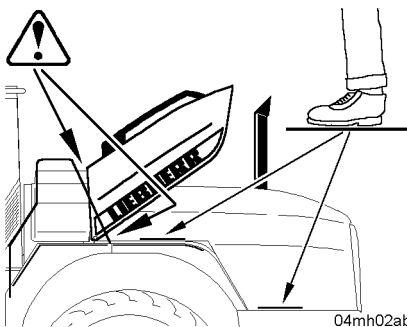
- Open the lock with the starting key.
 - Completely open the door 1 with the handle 2.
- The spring lock 3 snaps into place.

Open engine compartment hood

When the hood is open, the following units can be reached:

- diesel engine
- cooling system
- pump distributor gear

When opening or closing the hood: only climb onto the machine via the cab access and make sure that you have a secure footing.



Foot plates

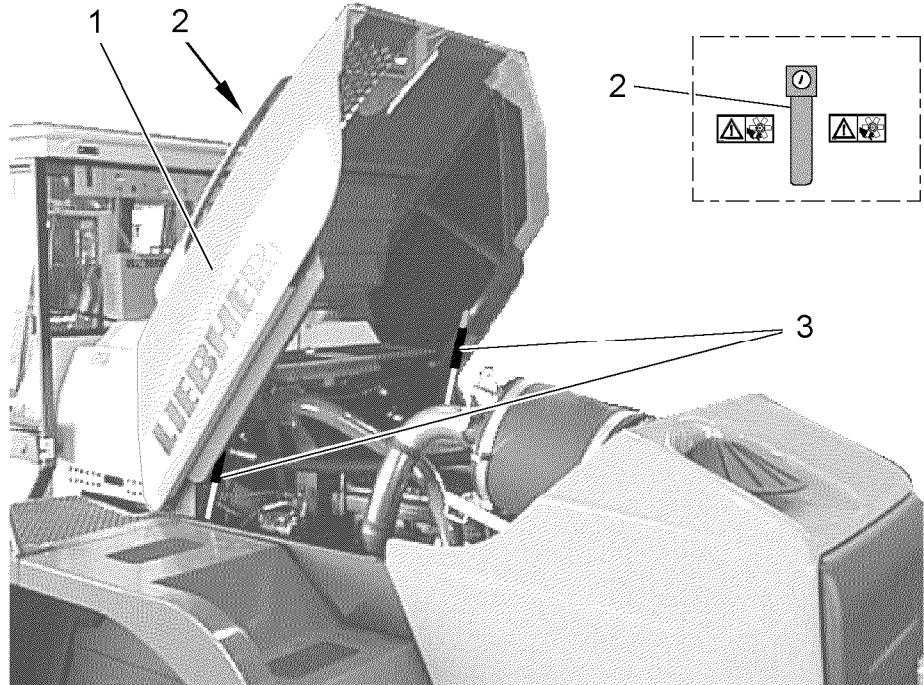
LBH/02/003801/0003/4.0/en

Caution 

Risk of accidents when opening or closing the hood!
There is a risk of injury to your feet when they are in the pivoting range of the hood.

! Ensure your feet are in a safe place when opening or closing the hood!

- Stand to one side of the hood with both feet on the foot plates provided!



04mh01ab

engine compartment hood

- | | |
|---------------------------|---------------------|
| 1 engine compartment hood | 3 gas-filled spring |
| 2 handle with lock | |

Warning 

Risk of accidents due to moving engine parts!

The rotating or moving engine parts such as – the fan blades or V-belts, for example, are potential sources of injury!

! Only open the engine compartment – hood when the engine is shutdown.

- Open the lock with the starting key.
- Open the hood 1 with the handle 1 and pull it up to its limit by the handle rod.

The hood is held in this position by two gas-filled springs 3.

Warning 

Risk of injuries due to hood falling closed!

! Check that the fully-open position is secured by the gas-filled springs.

- If this function is not guaranteed, the cause of the problem must be rectified immediately.

LBH/02/003801/0003/4_0/en

Trouble shooting

Is proper functioning not assured?

- Consult LIEBHERR CUSTOMER SERVICE!

Open cooling system hood

When the hood is open, the cooling system can be reached:

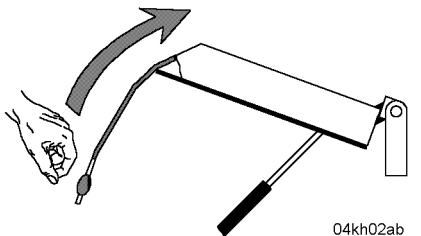
Make sure that the driver's cab door is closed on the left or right as appropriate.

- When opening or closing the hood: only climb onto the machine via the cab access and make sure that you have a secure footing.



cooling system hood

- | | |
|---------------------------------------|--|
| 1 cooling system hood, left-hand side | 2 cooling system hood, right-hand side |
| | 3 gas-filled spring |



cooling system hood

- Open the hood 1 completely by pulling the handle up. The hood is held in this position by the gas-filled spring 3.

Warning



Risk of injuries due to hood falling closed!

! Check that the fully-open position is secured by the gas-filled spring.

- If this function is not guaranteed, the cause of the problem must be rectified immediately.

LBH/02/003801/0003/4.0/en

Trouble shooting

Is proper functioning not assured?

- Consult LIEBHERR CUSTOMER SERVICE!
-

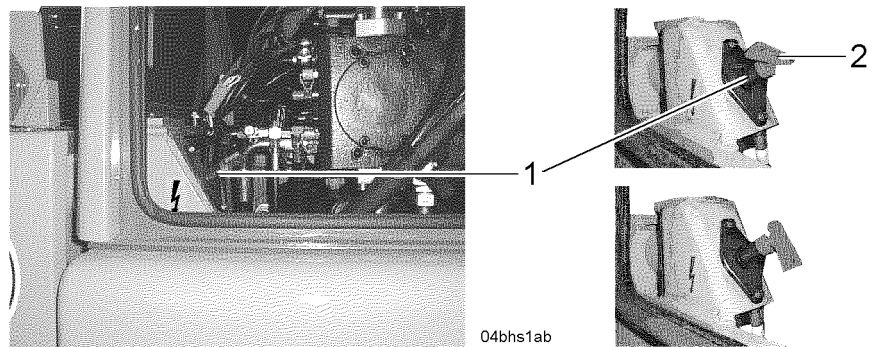
Turning off the battery main switch

The battery main switch is located at the rear left of the engine compartment.

For certain service tasks, the battery main switch must first of all be turned OFF.

Establish from the descriptions of the relevant maintenance jobs whether the battery main switch must be turned ON or OFF. See the Section "Maintenance tasks . . .".

When these maintenance tasks have been completed, turn the battery main switch back to ON.



Main battery switch

1 main battery switch

2 key

Danger

Risk of accidents for the maintenance personnel!

Unforeseen operation of the machine by an unauthorised person can place the maintenance personnel in extreme danger!

! For safety reasons, it is essential that the battery main switch is turned off!

! For security reasons, take the key out!

- Turn the battery main switch 1 with the key 2 to position - 0 OFF.

5.3.2 Maintenance tasks (daily) every 10 service hours

On completion of daily servicing, the machine should be moved back into the operating position.

See the "Operation" section, "Operating position" in the "Operator's manual".

Complete machine

Checking the machine for external damage

Make sure that the machine is in maintenance position 1.

Procedure

- Before starting up the machine, check for external damage which could detract from operational safety.
- Repair any damage with safety implications immediately.

Diesel engine, pump distributor gear

Checking oil level - diesel engine

Make sure that:

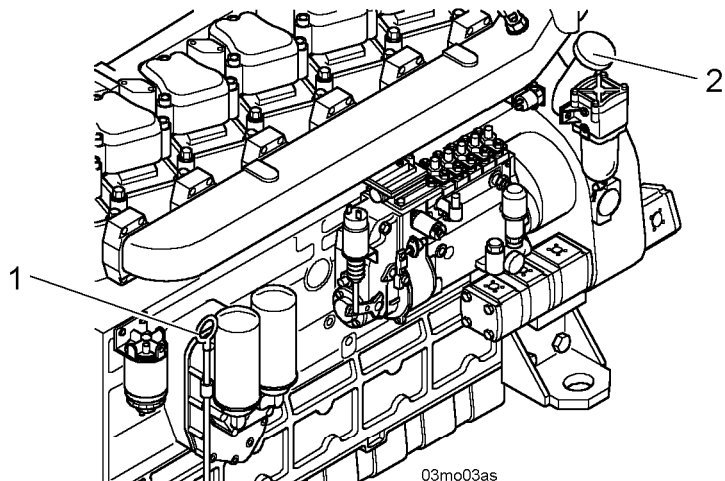
- the machine is in maintenance position 1
- the engine compartment – hood is open

Procedure

- Pull out the dipstick 1, wipe it clean and re-insert it.
- Pull out the dipstick once again and read off the oil level.

The oil level must be between the MIN and MAX markings.

- If the oil level is too low:
Take off the oil filler cap and top up with oil. Information on the required oil quality: See the “Lubricants and fuels” section .



03mo03as

Caution

Danger of oil leakage due to over-pressure!

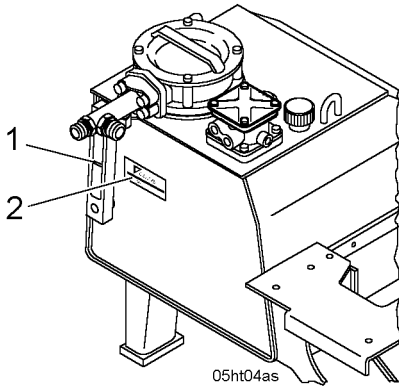
If the oil filler caps are mixed up, over-pressure can result in oil leakage in the pump distributor gear.

The oil filler cap for the diesel engine does not have a breather filter. The oil filler cap for the pump distributor gear is, however, equipped with one.

! Make sure that you do not mix up the oil filler caps!

- Top up with oil via the filler neck 2.
- Clean the filler cap, place it on the filler neck 2 and tighten it up.

Checking oil level in the hydraulic tank



Working hydraulics

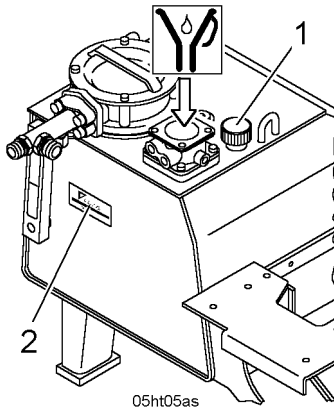
Make sure that:

- the machine is cold
- the machine is in maintenance position 1
- the engine compartment - hood is open

Procedure for checking the hydraulic oil level

The red marking "OIL LEVEL - max." 2 shows the required height of the oil level.

- Check the oil level at the sight glass 1.
- If the oil level is below the required level:
Top up with hydraulic oil.



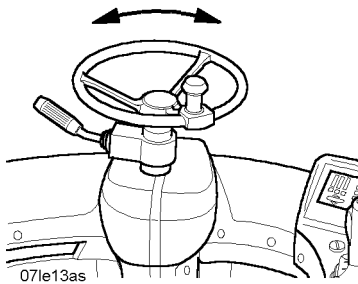
Procedure for topping up with hydraulic oil.

- Release tank pre-pressure: screw out the breather filter 1 on the hydraulic tank.

The hydraulic oil may only be poured in through the return strainer.

- Open the cover of the return strainer.
- Fill with hydraulic oil up to the oil level marking 2.
- Put the cover with pressure spring on the housing and tighten it up.
- Tighten the breather filter.

Checking the steering for proper functioning



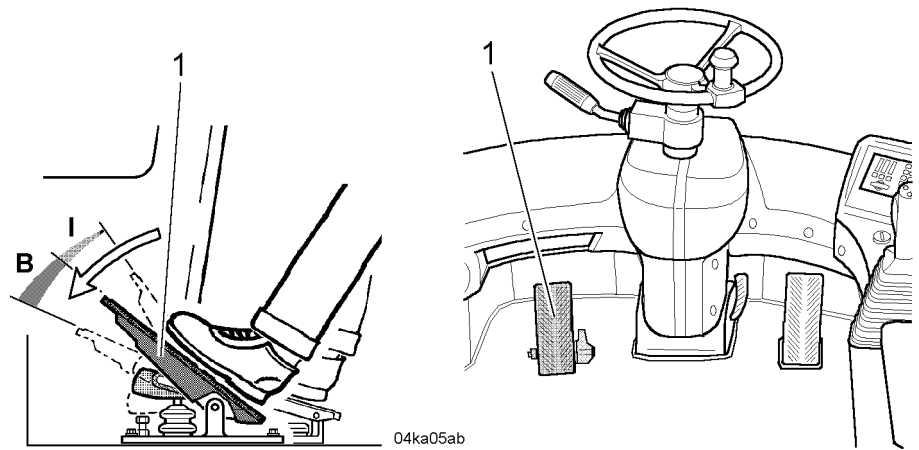
Steering system

- Starting the diesel engine
- Turn steering in both directions and check that it is functioning properly.

Checking that the service and parking brakes are functioning properly

Brake system

Procedure for checking that the service brake is functioning properly



- Start the engine in travel range 1 (1st gear) and drive at full throttle.

Warning

Danger of driving into bystanders or obstacles.

! Remaining in the danger area is strictly prohibited while these tests are being conducted!

- Push down the brake- inching pedal all the way; the machine must come to a complete, abrupt halt.

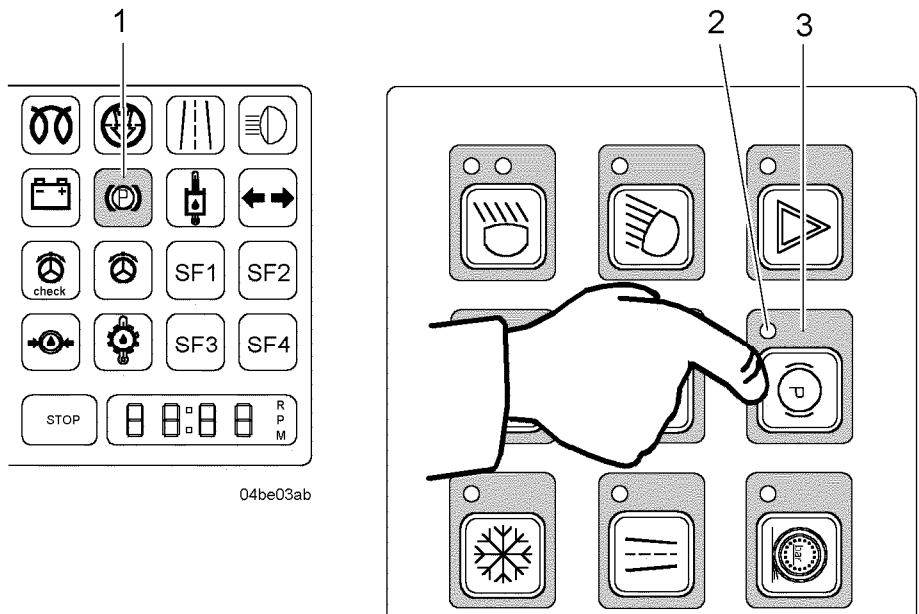
Trouble shooting

If the braking effect is too small or entirely absent:

- Have LIEBHERR SERVICE determine the problem and eliminate the error.

Procedure for checking that the parking brake is functioning properly

Move machine into operating position.



Symbol field 1 and pushbutton 3 of the parking brake

- Turn starting key to position - I -. The symbol field 1 on the display unit should light up.

LBH/02/003801/0003/4.0/en

- Start the engine and without pressing the pushbutton 3 parking brake, select the travel direction function forward or reverse. The forward or reverse symbol field should not light up, and the machine should not start moving even when the engine speed is increased.
- Press the pushbutton 3 parking brake. The symbol field 1 must go out. Select forward or reverse travel direction. The symbol field forward or reverse must light up and the machine should start moving when the engine speed is increased.
- Stop the machine and engage the parking brake with the pushbutton 3. The symbol field 1 must light up and the symbol fields for the travel directions must go out.

Electrical system

Checking indicator lamps and lighting

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

Procedure

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

5.3.3 Maintenance tasks (weekly) every 50 service hours

Daily maintenance must be completed before beginning weekly maintenance tasks.

See the "Maintenance jobs (daily) every 10 operating hours" section .

In the "Operator's manual", the "one-off jobs" are also described in this section.

On completion of weekly servicing or one-off servicing, the machine should be moved back into the operating position.

See also the "Operation", "Operating position" section in the "**Operator's manual**".

Diesel engine, pump distributor gear

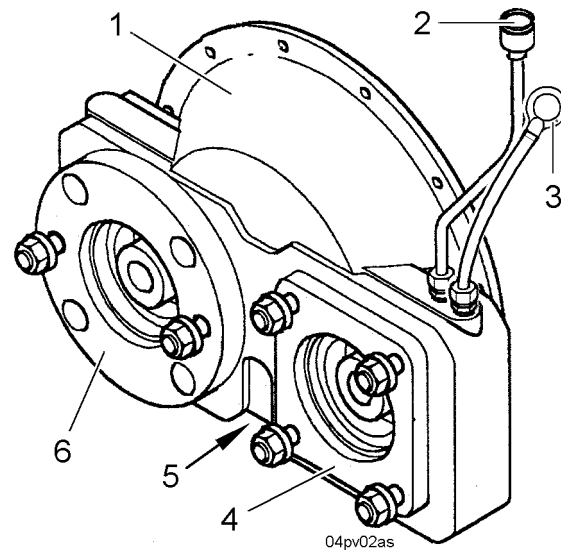
Checking the oil level in the pump distributor gear

The dipstick 3 and the oil inlet pipe 3 are located in the engine compartment directly adjacent to the hydraulic tank. Access is from above the engine on the right-hand side.

Make sure that:

- the machine is in maintenance position 1
- the engine compartment – hood is open

Procedure



- Pull out the dipstick 3, wipe it clean, and re-insert it.
- Pull out the dipstick 3 once again and read off the oil level. The oil level must be between the MIN and MAX markings.
- If the oil level is too low:
remove sealing cap from the oil inlet pipe 2 and top up with oil. For oil quality, see the Chapter "Lubricants and fuels".

Caution



The sealing cap of the oil filler neck 2 of the pump distributor gear is equipped with a ventilation and breather filter. The sealing cap for the diesel engine, however, does not have such a filter. If the oil filler caps are mixed up, excess pressure can result in oil leakage in the pump distributor gear.

! Make sure that you do not mix up the sealing caps

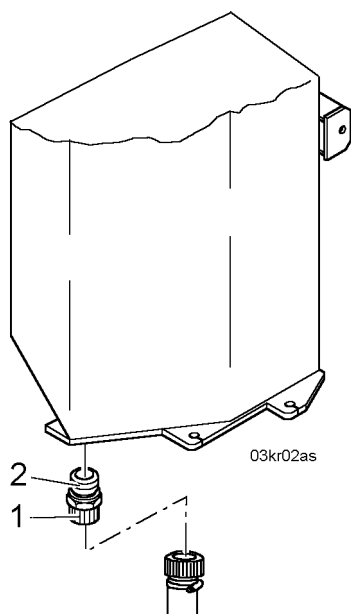
- Clean the sealing cap from the oil filler neck 2 and attach it to the oil filler neck 2 of the pump distributor gear and tighten it.

Draining off water and sediment from the fuel tank

Make sure that the machine is in maintenance position 1.

Procedure

- Unscrew the sealing cap 1 on the draining valve 1 on the underside of the diesel tanks.
- Screw the draining hose onto draining valve 2.
- Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.
- Unscrew the draining hose and screw the sealing cap 1 onto the draining valve 2 and tighten it up.



Changing the engine oil

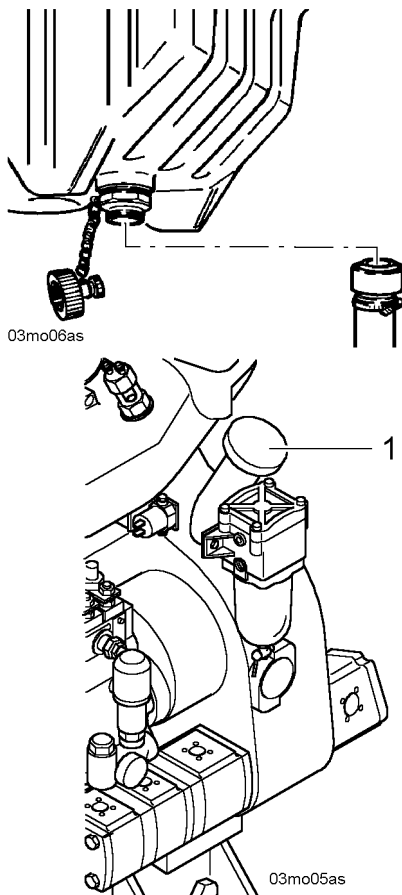
Make sure that:

- the machine is in maintenance position 2
- the engine compartment – hood is open
- a suitable receptacle with approx. 25 l capacity is in place, and the oil drain hose from the machine tool kit and engine oil in accordance with the oil specifications are read

Procedure

Only carry out an oil change when the engine is warm.

- Unscrew the the sealing cap on the oil drain valve on the oil pan.
- Screw oil drain hose onto the oil outlet valve and let the oil drain into the container provided.
- Unscrew the oil drain hose and screw the sealing cap onto the oil drain valve.
- Pour the fresh oil in through the filler neck 1 up to the marking MAX on the oil dipstick.
- Clean the filler cap, place it on the filler neck 1 and tighten it up.
- Start the engine and check the oil pressure.
- Turn off the engine and check the oil level on the dipstick. Top up with oil, if necessary.

**Replacing the oil filters**

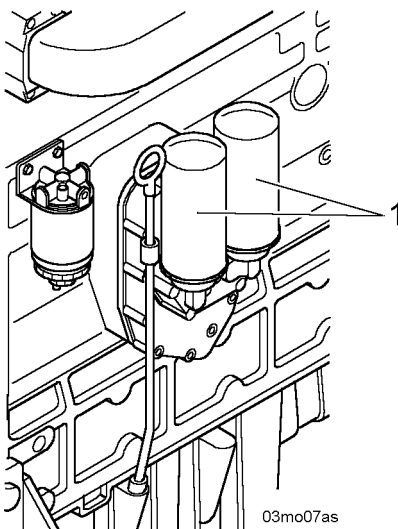
Only use original LIEBHERR oil filter cartridges (2 items).

Make sure that:

- the machine is in maintenance position 1
- the engine compartment – hood is open

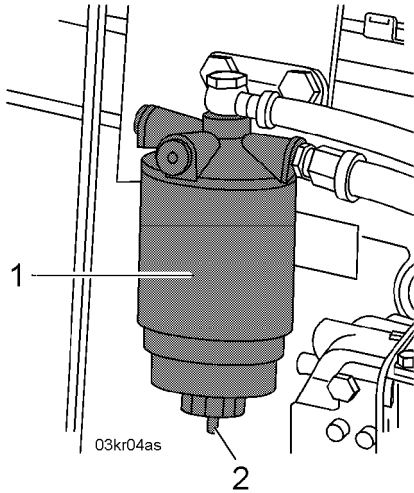
Procedure

- Release filter cartridges 1 with a strap wrench and unscrew the filters.
- Clean the seal faces on the filter bracket.
- Lightly coat the rubber gaskets on the new oil filter cartridges with engine oil.
- Screw the new filter cartridges onto the filter bracket and tighten them up by hand.
- Start the diesel engine up and check the oil pressure on the display unit – segment field - motor oil pressure.
- Turn off the engine; check the seals on the oil filters and the oil level. Top up with oil, if necessary.



LBH/02/003801/0003/4.0/en

Draining off condensate from the fuel fine filter



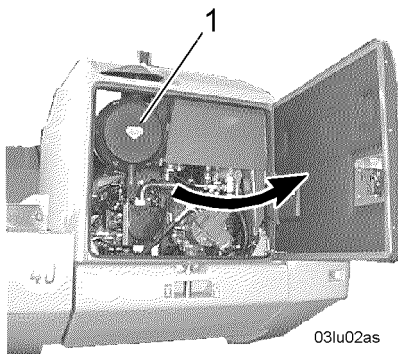
Make sure that:

- the machine is in maintenance position 1
- the engine compartment – hood is open

Procedure

- Open the drain plug 2 and let the condensate drain off into a suitable receptacle until clean fuel starts to flow.
- Close the drain plug 2 again.

Cleaning service cap and dust extraction valve on the air filter



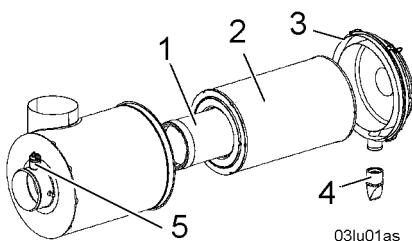
Important: a damaged or hardened dust-extraction valve 4 will impair the function of the service cover 4, which will in turn reduce the service life of the filter elements. The valve must also be closed whenever diesel engine speed exceeds 1/3 of the max. speed.

Make sure that:

- the machine is in maintenance position 1
- the engine compartment-door is open
- the battery main switch is switched off and the main switch – key is taken out

Procedure

- Press the rubber lip on the dust-extraction valve 4 several times to empty the dust from the service cover 3.
- When working in dusty conditions, empty the dust extraction valve 4 more often.
- Open the spring clips on the service cap 3 and take off the cap.
- Clean the service 3.
- Replace the service cover 3 on the filter housing. Once the cover rests over its full circumference on the filter housing, you can close the fixing clips without excess force.
- Close the fixing clips.



Cooling system

Checking coolant level

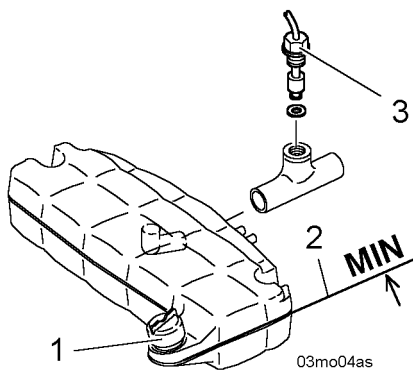
The coolant - equalizing reservoir with filler neck is located on the top side of the cooling unit. The equalizing reservoir can be accessed once the engine hood has been opened. The filler neck can be accessed after the left-hand cooler hood has been opened.

Make sure that:

- the machine is in maintenance position 1
- the engine compartment – hood is open

Procedure

The coolant level can be seen from outside through the transparent equalizing reservoir. The proper level for a cold engine is slightly below the middle of the equalizing 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 symbol field – engine overheating and coolant level, along with a simultaneous acoustic warning.



- Check the coolant level in the equalizing reservoir.
- The MIN marking 2 on the equalizing reservoir indicates the required coolant level.
- If the coolant level is below the MIN marking: 2
Top up coolant in the equalizing reservoir via the filler neck 1.

The coolant to be added must contain the appropriate concentrations of anti-freeze and DCA-4. See detailed description in the Chapter “Check anti-freeze and DCA-4 concentrations in the coolant”.

Caution

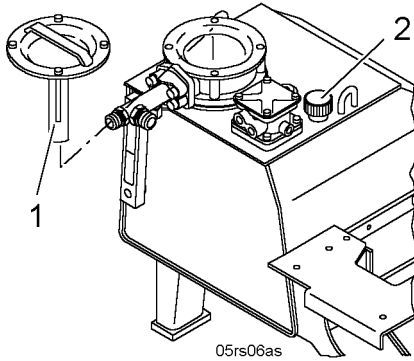


Danger of scalding due to coolant escaping under pressure!

- ! Never open the sealing cap on the filler neck 1 of the equalizing reservoir until the engine has cooled down - the coolant temperature display in the indicator unit should be in the lower third of the segment field.
- ! Under no circumstances may the cooling system be topped up when the engine is still hot.

- Turn the sealing cap on the filler neck 1 slightly anti-clockwise, allowing excess pressure to escape, then open it fully.
- Fill with coolant up to the marking MIN 2 on the equalizing reservoir.
- Place the sealing cap on the filler neck 1 and tighten it up.

Checking and cleaning the magnetic rod on the hydraulic tank



Working hydraulics

Make sure that:

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

Procedure

- Release tank pre-pressure: Unscrew the bleeder filter 2 on the hydraulic tank by two revolutions.
- Release the bolts on the lid and slowly lift the lid with the magnetic rod 1.
- Clean magnetic rod carefully.
- Place the O-ring and cover with magnetic rod on the housing.
- Tighten the screws on the cover.
- Tighten the breather filter 2.

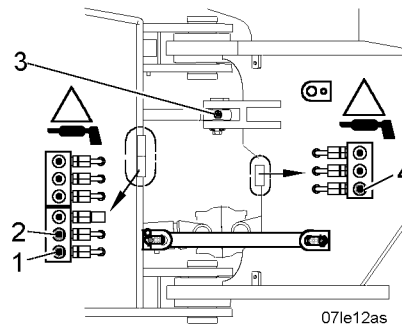
Trouble shooting

Heavy soiling or larger metal fragments on the magnetic rod could indicate damage in the hydraulic system.

- In this event, isolate the problem, then rectify it.
-

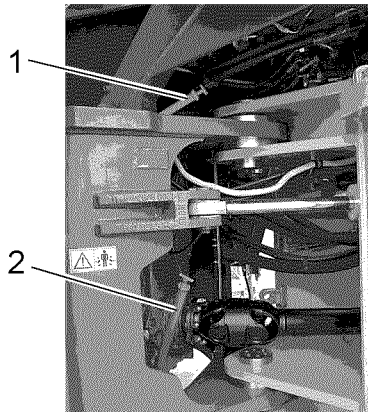
Lubricating the bearing points on the steering cylinders

Make sure that the machine is in maintenance position 2.



- | | |
|---|---|
| 1 lubrication point at base of right-hand steering cylinder | 3 lubrication point on piston rod of left-hand steering cylinder |
| 2 lubrication point at base of left-hand steering cylinder | 4 lubrication point on piston rod of right-hand steering cylinder |

- Lubricate the bearing points on the steering cylinders

Checking the oil levels

10av06as

Transfer gear

Make sure that:

- the machine is in maintenance position 1
- the diesel engine has been shut down for approx. 20 minutes before a measurement is made

Procedure

The transfer gear has two separate oil circuits; therefore, it also has two dipsticks. Oil is topped up via the eggestive tube for each oil circuit.

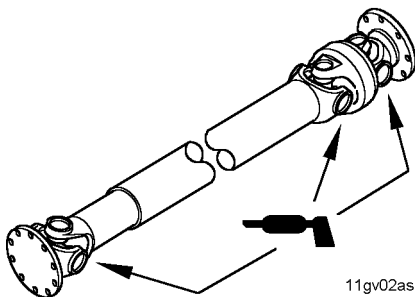
- Remove dipstick 1 and dipstick 2, wipe them with a clean cloth and reinsert them all the way.
- Pull out the dipsticks once again and read off the oil levels.
- If the oil level in the powershift section or final drive section is at or below the MIN marking, Top up with gear oil via the appropriate filling tube.

Lubricating front drive shaft

Make sure that the machine is in maintenance position 1.

Procedure

- Lubricate drive shaft at both universal joints.



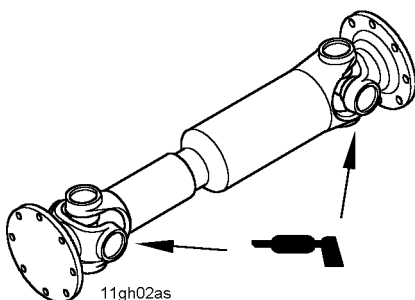
11gv02as

Lubricating the rear drive shaft

Make sure that the machine is in maintenance position 1.

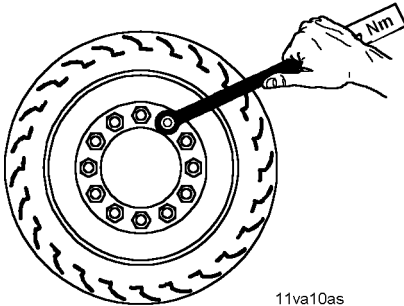
Procedure

- Lubricate drive shaft at both universal joints.



11gh02as

Checking the tightness of the wheel lugs (once after 50, 100 and 250 h)



Make sure that:

- the machine is in maintenance position 1
- and that a torque wrench with a measuring range of 650 Nm is available

Procedure

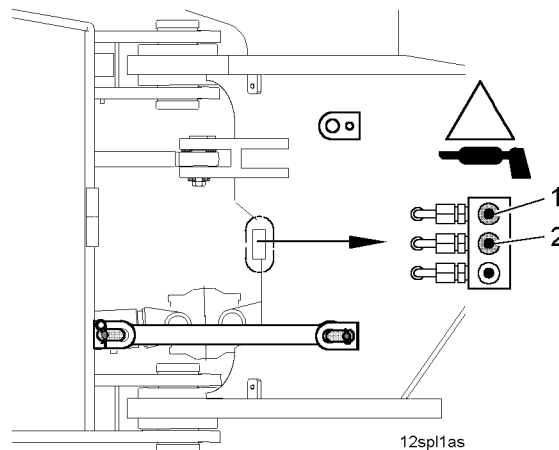
Note: The one-off maintenance tasks scheduled for 50, 100 and 250 service hours should also be performed every time the wheels are changed.

- Check that the nuts on all four wheels have been tightened with the required torque. See the “Technical data” section .

Lubricating oscillating axle frame and articulation bearing

Make sure that:

- the machine is in maintenance position 1
- the articulation lock is installed

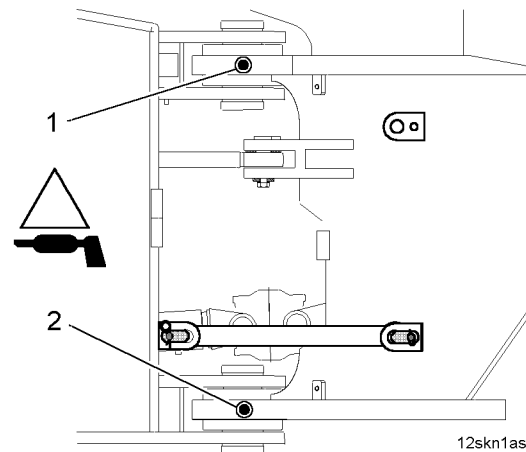


Lubrication points on the right-hand side of the central lubrication rail

1 lubrication point - front pendulum bearing

2 lubrication point - rear oscillating axle mount

- Lubricating front oscillating bearing: lubricate lubrication point 1 on the central lubrication rail.
- Lubricate rear oscillating axle mount: lubricate lubrication point 2 on the central lubrication rail.



Articulation bearing lubrication points

- | | |
|---|--|
| 1 | 2 |
| lubrication point - articulation bearing at top | lubrication point - articulation bearing at bottom |

- Lubricate upper articulation bearing: lubricate lubrication point 1 on the articulation bearings.
- Lubricating lower articulation bearing: lubricate lubrication point 2 on the articulation bearings.

Central lubrication system

Automatic central lubrication system

The automatic central lubrication system may be cleaned in washing systems or by means of high-pressure jets.

Stay within the minimum and maximum lubricant level indications!

Check whether metered quantities are adequate at the bearing points (grease collars)

- Visually examine whether metered quantities are adequate at the bearing points.
- If the bearing points are not sufficiently lubricated, isolate the problem, then rectify it.

Check the grease volume in the reservoir at regular intervals.

The reservoir has a sight glass where the rubber stripper on the agitator can be seen. This is the point where you can check how much grease is still available.

- If necessary, fill the reservoir via the conical grease fitting. Lubricant specifications - refer to the Section "Lubricants and fuels".

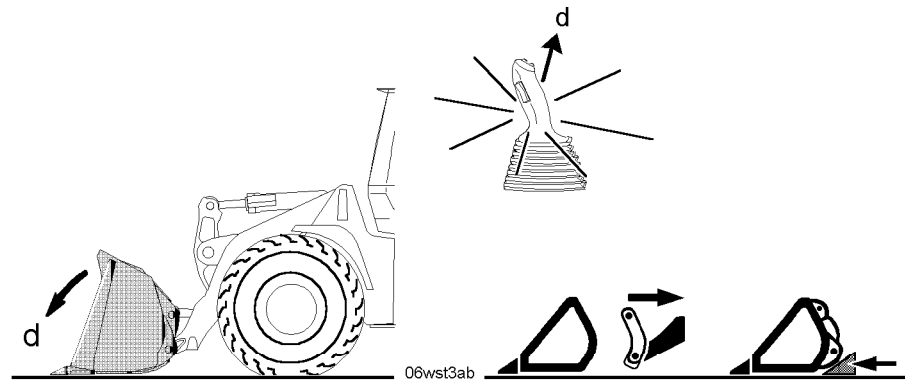
Check the hose lines (lubrication points, detached hoses, external leakage)

- Visually examine the hose lines for defects.
- In case of any defects, isolate and rectify the problem.

Lift arm, Quick-change device

Make sure that the machine is in maintenance position 1.

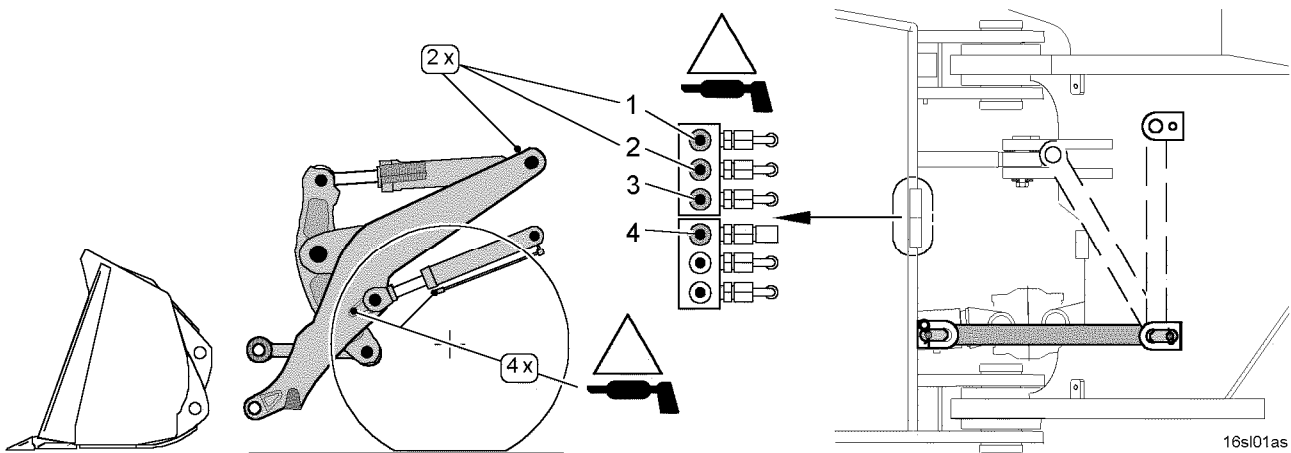
Lubricating bearings and lubrication points



Maintenance position - lift arm

If the lubrication points near the bucket couplings are difficult to reach, make sure that the working attachment is decoupled.

Lubricate the lift arm and lift cylinders

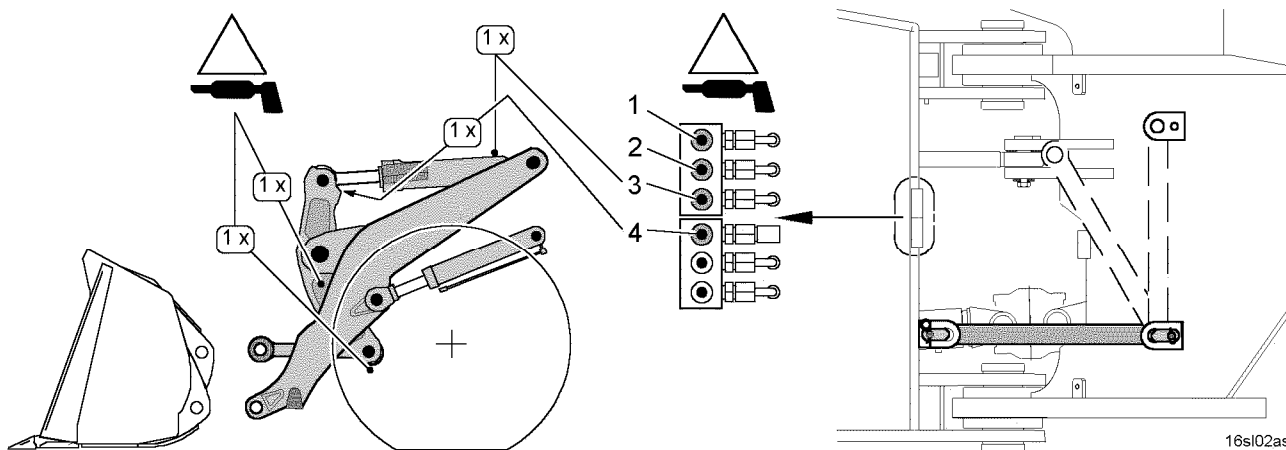


Lubrication points on the left-hand side of the central lubrication rail

- | | |
|---|---|
| 1 lubrication point - top right-hand side of lift arm | 3 lubrication point - rear tilt cylinder |
| 2 lubrication point - top left-hand side of lift arm | 4 lubrication point - front tilt cylinder |

- Lubricate the bearing at the top of the lift arm: lubricate lubrication point 1 and lubrication point 2 on the left-hand side of the central lubrication rail.
- Lubricate the two lubrication points on the left-hand lift cylinder.
- Lubricate the two lubrication points on the right-hand lift cylinder.

Lubricate the tilt cylinder, Z-bar linkage and connecting link



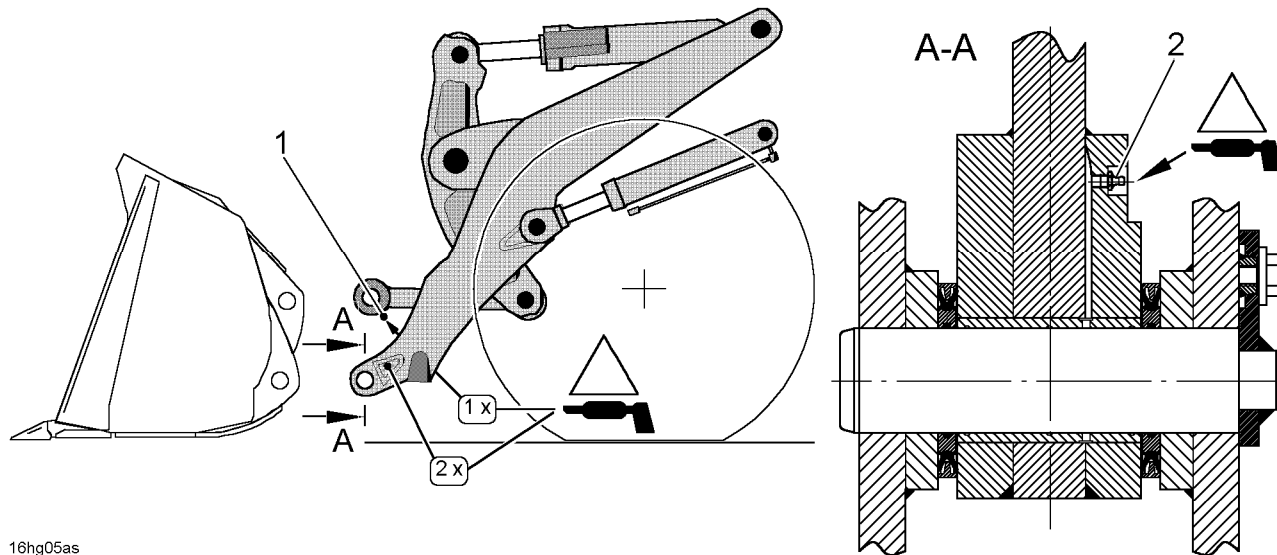
Lubrication points on the left-hand side of the central lubrication rail

- | | |
|---|---|
| 1 lubrication point - top right-hand side of lift arm | 3 lubrication point - rear tilt cylinder |
| 2 lubrication point - top left-hand side of lift arm | 4 lubrication point - front tilt cylinder |

- Lubricate the bearing on the tilt cylinder: lubricate lubrication point 3 and lubrication point 4 on the left-hand side of the central lubrication rail.
- Lubricate the lubrication point on the Z-bar linkage.
- Lubricate the lubrication point on the connecting link.

Lubricating the bucket bearings

The lower bucket bearings should be lubricated daily if necessary.



16hg05as

Lubrication points - bucket coupling

- | | | |
|---------------------------------------|--------------------------------------|-------------|
| 1 lubrication point - connecting link | 2 lubrication point - bucket bearing | A-A section |
|---------------------------------------|--------------------------------------|-------------|

- Lubricate the lubrication point on the connecting link.
- Lubricate the lubrication point on the bottom/left bucket bearing.
- Lubricate the lubrication point on the bottom/right bucket bearing.

LBH/02/003801/0003/4.0/en

Checking the bucket bearing seals

- Check bearing bushes for wear and replace if necessary.

5.3.4 Unscheduled maintenance tasks

On completion of servicing, the machine should be moved back into the operating position.

Also see the section "Operation", "Operating position" in the "**Operator's manual**".

Complete machine

Checking that all screwed connections are tight

Make sure that:

- the machine is in maintenance position ,
- the appropriate service doors or hoods are open

Procedure

- Tighten any loose screws or bolts with the required tightening torque.

Sealing any external leaks as necessary

Make sure that:

- the machine is in maintenance position 2
- the appropriate service doors or hoods are open.

Procedure

- Check the whole hydraulic system for leakage.
- Replace any damaged hydraulic seals.
- Tighten any loose hydraulic couplings.
- Also see the Section "Safe maintenance of hydraulic hoses and hose lines".

Diesel engine, Pump distributor gear

Cleaning or replacing the air filter main element

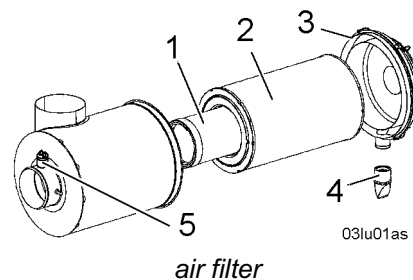
The main element 2 should be cleaned or replaced when the symbol field – air filter contamination on the display unit lights up or at least every 1000 service hours.

If the symbol field – air filter contamination continues lighting after the main element 2 has been serviced then the safety element 1 must also be replaced.

Make sure that:

- the machine is in maintenance position 1
- the engine compartment-door is open
- the battery main switch is switched off and the main switch – key is taken out

Procedure



- 1 safety element
- 2 main element

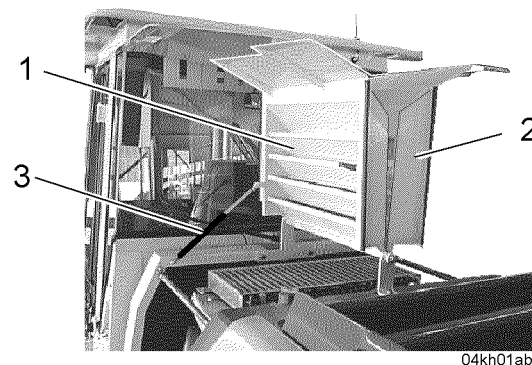
- 3 service cap
- 4 dust unloader valve

5 vacuum switch - air filter contamination

- Open fixing clips on the service lid 3 and take the lid off.
- Remove the main element 2 and the safety element 1. To do this pull or turn the elements gently upwards, downwards or to the side in order to release the seal.
- Blow the main element 2 from inside outwards with dry air. Avoid tapping the filter, as this could cause damage.
- Make sure that all contamination is removed before inserting a new or cleaned filter element.
- The safety element 1 should be replaced every third time the main filter element 2 is replaced.
- Lightly oil the seal surfaces before installing the filter elements (for the main element 2 this is on the inside, for the safety element 1 on the outside). Re-insert filter elements 1 and 2 and make sure that they are correctly fitted.
- Clean the service cover 3 and replace it on the filter housing. Once the cover rests over its full circumference on the filter housing, you can close the fixing clips without excess force.
- Close the fixing clips.

Cooling system

Cleaning the cooling system



hood – cooling system

In order to guarantee that the cooling media function perfectly, the coolers should be cleaned whenever necessary. When operating in dusty conditions, the coolers should be checked daily and cleaned if required.

Contaminated cooler units result in overheating. The consequence is an acoustic and visual warning with simultaneous power reduction of the travel drive.

Dust and other contaminants can be removed from the cooling fins with water under pressure, steam or compressed air. Compressed air is preferable.

Make sure that:

- the machine is in maintenance position 1
- the cooling system – left- and right-hand hoods are open

Procedure

- Clean cooler units with compressed air, steam or water.



The cooler fins may be damaged if not treated with due care.
! Do not use hard objects or excess water pressure for cleaning

- Reclose hood 1 and hood 2 - close cab doors previously.

Axles, Tyres

Checking and if necessary, adjusting tyre inflation pressure on attachments and accessories

Make sure that the air pressure in the tyres on both axles corresponds to the required values for the tyre type, the actual application and the working attachment.

The reference values can be found in the Section "Technical data", in the "**Operator's manual**".

Procedure

The air pressure in the tyres has a significant influence on the overall operating performance of the machine.



Exploding tyres



Risk of accidents due to exploding tyres!

Incorrect or careless operation of the tyre filling equipment or excess pressure could result in the tyres bursting or failure of the rims, with severe, possibly even fatal injuries as a consequence.

! Use a sufficiently long hose for pumping the tyres with a self-locking adapter.

! Personnel must always remain outside the danger zone when tyres are being pumped up.

- Check the air pressure in all tyres with a measuring gauge and adjust if necessary.

Cab, Heating, Air conditioning system

Clean or replace the fresh air and recirculated air filter as required

The existing fresh air filter has been replaced with a foam pre-filter and a foam fine filter.

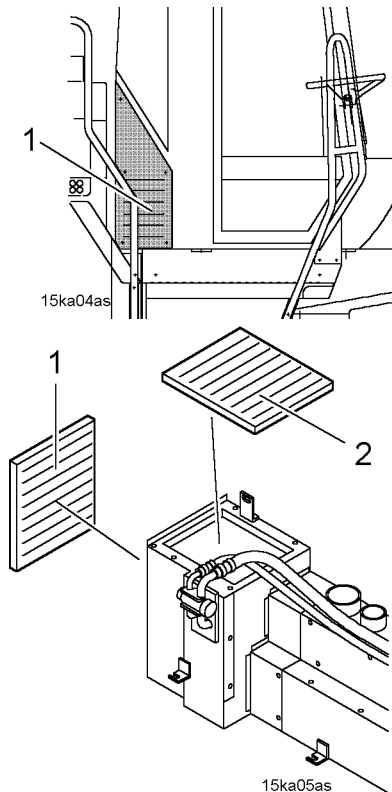
New version:

applies from serial No. 0547

Make sure that the machine is in maintenance position 1.

Procedure:

- Unscrew the sealing cap 1.
- Turn the air flap with "rotary switch – ventilation" (ignition on) to the "fresh air" position.
- Old version: lightly press down fresh air filter 1 at the top end and pull it out.
- New version: pull out the fresh air filter 1 (2 pieces).
- Carefully push out recirculated air filter 2 from inside / below via the open air flap and discard it.
- Old version: clean the filters (blow them out), replace if necessary.
- New version: clean the filters (flush), replace if necessary.
- Insert clean or new filters, make sure that they are correctly positioned (cast arrows on the filter frame show the direction of the drawn in air).
- Screw on cover 1.



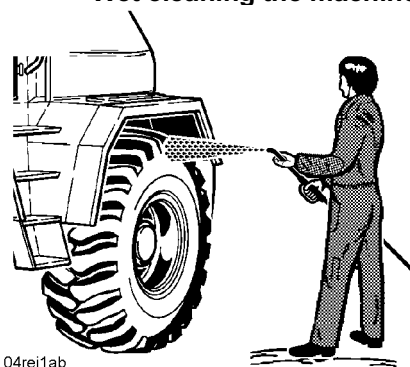
5.3.5 Cleaning the machine

Wet cleaning the machine

Cleaning the machine

Oil pressure switches are not watertight due to the necessity of diaphragm ventilation, therefore be careful when spraying with a high pressure spray!

Each time the machine is cleaned with a steam jet, all lubrication points on the machine should be re-greased.



Wet cleaning

LBH/02/003801/0003/4.0/en



Risk of damage to freshly painted surfaces!

With high pressure cleaning [more than 1379 kPa (13.8 bar)] freshly painted surfaces can be damaged.

! After the machine has been delivered, the paint should dry for at least 30 days in the air, before the machine or parts thereof are cleaned with a high pressure cleaner.

! Until this 30 day period has elapsed, only use a low pressure cleaner for washing!

- Wet clean the machine.
- Re-grease all lubrication points on the machine.

Cleaning the diesel engine

When the engine is being cleaned with water or steam, electrical transducers such as oil pressure switches, for example, must not be exposed to direct jets.



Risk of damage to the diesel engine!

Penetrating moisture results in corrosion of contacts and in outage of measuring functions.

! Do not expose electrical transducers, such as oil pressure switches to direct water or steam jets.

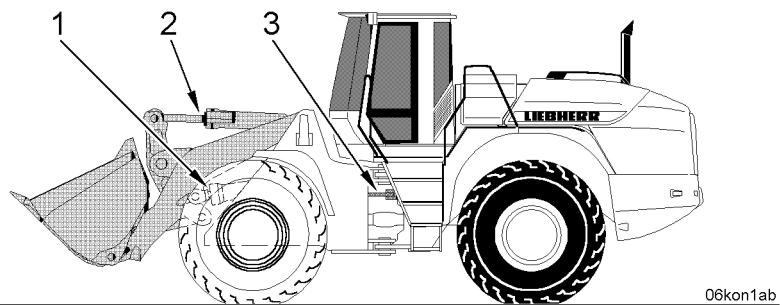
- Clean the engine carefully.

5.3.6 Corrosion protection work

When the machine is decommissioned for more than 4 weeks and especially for sea transport, the following measures must be carried out.

Protecting the piston rods from corrosion

LIEBHERR corrosion protection grease CTK ident. No. 8613 31301 is recommended.



1 lift cylinder
2 tilt cylinder

3 steering cylinder

- When the machine is switched off, all piston rods should be retracted as far as possible into the cylinders.
- Coat exposed parts of piston rods thickly with non-acidic corrosion protection grease.

- If the cylinder piston rods will not be wetted with hydraulic oil for a prolonged time period:
the piston rods must be coated with corrosion protection grease.

When the machine is moved for loading or transport, the corrosion protection layer on the cylinder piston rods is removed by the dirt scraper.

- When the machine is to be transported:
The corrosion protection on the piston rods should be checked after loading.

Corrosion protection of the fuel tank

When the machine is out of service for longer periods, condensation can build up in the tank.

Condensation in the tank leads to rust formation.

- If the machine is out of service for longer than 2 months:
Fill the fuel tank with diesel fuel.

5.4 Lubricants and fuels

5.4.1 Handling 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 sections "Maintenance and inspection schedule" and "Lubrication chart".

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

Observe the rules for the proper handling of lubricants and fuels, especially the environmental requirements.

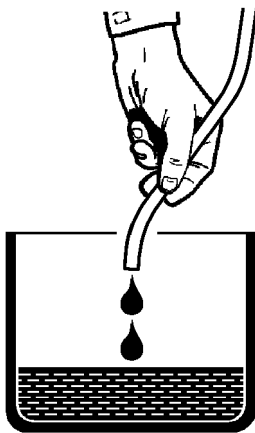
Environmental protection measures

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

Disposing of used materials

This applies to the following types of used materials:

- oils, lubricants, brake fluids, refrigerants etc.
- fuels
- filters, oil cartridges etc.
- rubber, tyres, insulating materials etc.
- batteries
- Observe the regulations for protecting the environment when disposing of used materials.
- Collect and store used materials separately in suitable receptacles, and only dispose of them at official depots in an environmentally friendly way.
- Observe national regulations.




06ens1ab

Disposal

Conversion from mineral oils to environmentally compatible hydraulic fluids


For the operation of LIEBHERR earth moving machines with "environmentally compatible hydraulic fluids", we recommend **AVIA SYNTOFLUID**.

Caution  Risk of damage to the machine's hydraulic system!
Mixing “environmentally-compatible hydraulic fluids” with “mineral oils” produces a vigorous reaction that can damage the hydraulic system!
! Avoid mixing “environmentally-compatible hydraulic fluids” with “mineral oils”!

- **When the machine is converted to an environmentally-friendly hydraulic fluid**, LIEBHERR CUSTOMER SERVICE must be consulted!
- It is essential that you order the “**INSTRUCTION SHEET**” and the “**CONVERSION GUIDELINES**” from LIEBHERR and that you observe them!

Handling coolants

Make sure that if you top up with coolant due to coolant loss, the level of anti-freeze does not drop below 50% vol.

Caution  Risk of damage to the diesel engine!
If the proportion of corrosion/ frost protection agent is too high, the cooling effect is reduced, causing damage to the diesel engine!
! Do not use more than 60% anti-freeze and corrosion protection agent.

- In the context of maintenance work, the mixture ratio of anti-freeze and corrosion protection agent and DCA 4 – concentration must be checked and if necessary corrected.
- Use the test set CC 2602 from Fleetguard for testing.
- In order to top up with new coolant: Check that the cooling system is clean and flush out if necessary.

5.4.2 Lubricant and fuel specifications

The values stated for the filling quantities in the table are only guidelines:

- in each case, the dipstick or level markings are definitive
- each time the lubricant or service fuel is replaced or topped up, the level in the appropriate unit must be checked
- for more detailed information about the required lubricants and service fuels, see the Sections “Lubrication chart, filling quantities” and “Lubricants and fuels”



Specifications

Lubricating oils for diesel engines

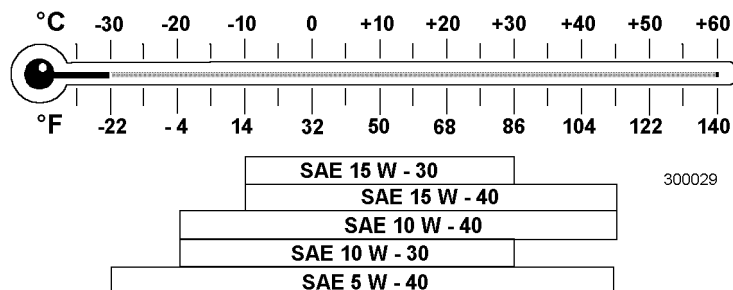
Only high-alloy lubricating oils are used in modern diesel engines. They consist of basic oils blended with additives. The lubricating oil regulation for LIEBHERR diesel engines is based on the following specifications and regulations.

Name	Specifications
ACEA (CCMC) - Classification (Association des Constructeurs Européens de l'Automobile)	E2-96, E3-96, E4-98, (D4, D5)
API - Classification (American Petroleum Institute)	CG-4, CF-4

Specifications and regulations for diesel engine lubricating oils

Lubricating oil viscosity

The lubricating oil viscosity is selected according to the SAE (Society of Automotive Engineers) classification. The decisive factor for the selection of the correct SAE class is the ambient temperature. The selection of SAE classification does not affect the quality of a lubricant oil. If the viscosity is too high, starting can be difficult; if it is too low, lubricant efficiency may be impaired. The temperature ranges detailed in the following graphic are guidelines; short-term deviations are permissible.



Temperature dependent selection of the SAE class

Lubricant oil changing intervals

- Changing intervals:
- first oil and filter-change with initial oil filling: see the section “Maintenance and inspection schedule”
 - first oil and filter-change with oils according to the lubricating oil guidelines: see the section “Maintenance and inspection schedule”
 - further filter replacements: see the section “Maintenance and inspection schedule”
 - oil change according to climate zone, sulphur content in the fuel and oil quality according to the following table

Even if the specified number of service hours (h) is not reached in a given year, the engine oil and filter should be replaced at least once.

LBH/02/003801/0003/4_0/en

Difficulty factors

Various difficulty factors or difficult working conditions can affect the maintenance interval.

Difficulty factors or difficult working conditions could include:

- frequent cold starts
- sulphur content greater than 0.5% in fuel
- service temperature under - 10 °C

If difficulty factors or difficult working conditions apply, the oil change intervals defined in the "Maintenance and inspection schedule" according to the table below must be reduced by half.

Difficulty factor		Oil quality	
		E2-96	E3-96
		D4	E4-98
		CG-4	D5
		CF-4	--
		interval	
Working conditions	Sulphur content in fuel		
climate - normal, up to - 10 °C	to 0.5%	250 h	500 h
	over 0.5%	125 h	250 h
under - 10 °C	to 0.5%	125 h	250 h
	over 0.5%	--	125 h

Oil change intervals in service hours (h)– applicable for turbocharged engines

Diesel fuels



06sy02ab

Specifications

The diesel fuels must meet the minimum requirements in the fuel specifications listed below.

Authorised fuel specifications:

- DIN EN 590
- ASTM D 975-89a 1D and 2D

Other fuel specifications are only permissible after consultation with the Diesel Engine Development department.

The sulphur content should not exceed 0.5% by weight. Higher sulphur content affects the oil change intervals and the engine lifetime.

Lubricosity

The lubricosity of the diesel fuel becomes a critical factor as the sulphur content drops. It has been found that diesel fuels with the 0.05 % sulphur by weight max. limit allowed in Europe can cause wear in the injection system (especially with distributor injection pumps).

"Branded fuels" (in Germany) contain these lubricant additives as part of their additives package. The fuel lubricosity must correspond to HFRR (60°) Test <400 µm.

The additives should be added by the supplier in his capacity as agent responsible for fuel quality. Addition of secondary lubricosity additives by the customer is not recommended.

LBH/02/003801/0003/4.0/en

Diesel fuel at very low temperatures

When external temperatures fall below approx. 0°C, the flow performance of summer diesel fuel may be insufficient as a result of paraffin separation. The same problem arises with winter diesel fuels below -15 °C.

Diesel fuel containing additives with a working temperature down to -20 °C is also frequently available.

To avoid breakdowns, the diesel fuel must be mixed with two star petrol or paraffin at low temperatures. Blending in two star petrol must be viewed as an emergency remedy and may not exceed 30% vol.

Supergrade petrol may not be used for blending.

Engine power can drop in relation to the additive mixture used for cold conditions. Blending in additives should therefore be kept to a minimum, taking into account the external temperatures.

For safety reasons, the fuel may only be mixed in a fuel container. When tanking up, pour in the fuel additive with lower specific gravity before the diesel fuel. The engine should then be run until the fuel mixture is circulating throughout the entire fuel system.

Diesel fuels – mixture ratio (Vol.-%)

External temperatures °C	Summer diesel %	Additive %
0 to -10	70	30
-10 to -15	50	50 *
-15 to -20	--	--
-20 to -25	--	--

Mixing proportion for summer diesel fuel

* if an additive of 50 % is necessary, only paraffin may be used (not two-star petrol).

External temperatures °C	Winter diesel fuel %		Additive %	
	-15 °C	-20 °C	-15 °C	-20 °C
0 to -10	100	100	--	--
-10 to -15	100	100	--	--
-15 to -20	70	100	30	--
-20 to -25	50	70	50 *	30

Mixing proportion for winter diesel fuel

* if an additive of 50 % is necessary, only paraffin may be used (not two-star petrol).

Additives for diesel fuel (flow improvers)

Flow improvers available on the market will also improve the cold weather performance of the diesel fuel. Their use requires the observance of quantity and application recommendations from the manufacturer.

Additive admixture for diesel particle filters:

The additive admixture can be made in various ways:

- by manual additive admixture at the service petrol station
- alternatively a ready blended diesel fuel can also be ordered directly from the fuel dealer

It is inadvisable due to its inaccuracy, to mix in additives manually at the machine.

Approved additive

BRAND	MANUFACTURER
SATACEN	SAT CHEMIE GMBH, D-44649 Herne / Germany

Brands and manufacturers of additives

We expressly recommend that you maintain sufficient additive stocks. Orders of containers with 10 litres of additive can be placed with the manufacturer under product No. 21840.

Metering during refuelling

It is absolutely essential for the continued operation of the particle filter system that the correct quantity of additive is always added. Each time the machine is refuelled, the additive must be added in the prescribed quantity to the diesel fuel, or added directly to the tank.
Additive mixing ratio: see seciton "Technical data" under "Diesel particle filters".



06sy03ab

**Mineral oils
Specifications**

Hydraulic oils

Only engine oils meeting the Mercedes Benz service fuels specifications are permitted.

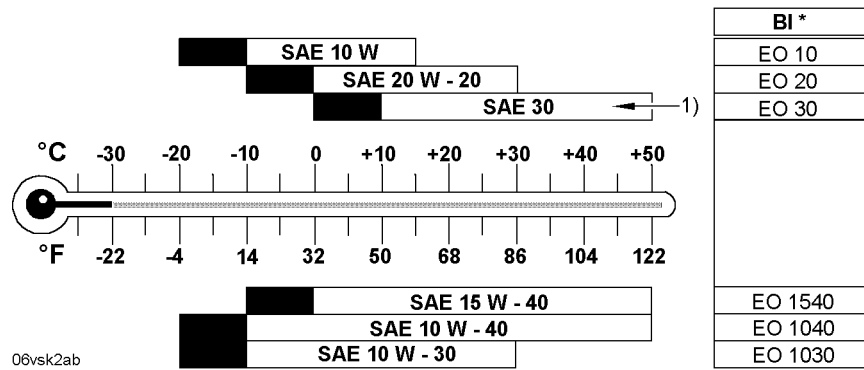
Mercedes-Benz - Information sheet - No.:	Specifications:
226.0 and 227.0 (single-grade oils):	API- CC / SF, CD / SF, CE / SF
227.1 and 228.1 (multi-grade oils):	CD / SF, CE / SF,
	CD+API- CC / SF (MIL-L-46152 B),
	CD / SF, CE / SF (MIL-L-2104 D),
	CD / SF (MIL-L-2104 D), CE / SF,
	CD+ (MIL-L-46152 B)

Mercedes-Benz service fuels requirements

Viscosity

The viscosity is selected according to the SAE (Society of Automotive Engineers) classification. The decisive factor for the selection of the correct SAE class is the ambient temperature. The selection of the SAE classification does not give any information about the quality of a hydraulic oil. The temperature ranges presented in the graphic are only provided as guidelines.

LBH/02/003801/0003/4.0/en



Temperature dependent selection of the SAE class

BI * = code designation = container labelling, see the Section “BI * Standard lubricants”.

Warm running regulations

For temperatures up to 10 °C below the specified limit:

- adjust the diesel engine after starting to just approx. ½ engine speed
- activate hydraulic cylinders and engines and briefly move the cylinders to their stops
- warm running duration approx. 10 minutes

For even lower temperatures:

- before starting the engine, prewarm the oil tank

1) = Exception for transfer gear (AVG - powershift transmission):

- **SAE 30**– can only be used when the ambient temperature is not lower than +10 °C.

Environmentally compatible hydraulic fluids

When operating LIEBHERR earth moving machines with environmentally compatible hydraulic fluids, we recommend **AVIA SYNTOFLUID** in each case with the viscosity specified by LIEBHERR.

Caution!

- If the conversion of the hydraulic system to an “environmentally compatible hydraulic fluid” is not carried out properly, there is a danger that the machine’s hydraulic system will be damaged!
See the section “Conversion from mineral oils to environmentally harmless hydraulic fluids”

With machines which were filled ex-works with “environmentally compatible hydraulic fluids”, an appropriate sign (decal - CAUTION) is attached to the driver’s cab and hydraulic tank.

Conversion of the hydraulic system:

- See the section “Conversion of the hydraulic system from mineral oils to environmentally compatible hydraulic fluids” for guidelines on retrofitting your machine to adapt it to a “environmentally compatible hydraulic fluid”.

LBH/02/003801/0003/4.0/en

Lubricating oils for he transmissions



06sy08ab

Pump distributor gear and axles

Gear oils must be in accordance with the specifications – API-GL-5-90 and MIL-L-2105 B, C or D and the viscosity class SAE 90 LS *.

* = Gear oil with limited – slip additives for disc brakes and self-locking differentials.

For the viscosity class SAE 90, an oil of the viscosity class SAE 80 W 90 can also be used.

Comparison to BI * – code designation:

- SAE 90 LS / BI * – GO 90 LS
- SAE 80 W - 90 / BI * – GO 90

BI * = code designation = container labelling, see the Section “BI * Standard lubricants”.



06sy06ab

Transfer gear

Oil in accordance with the Section “Hydraulic oils” must be used for lubricating the transfer gear.



06sy07ab

Grease for general lubrication points

This grease must meet the specification **KP2k**– 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 consist of a lithium complex and exhibit a four ball tester value of at least 2300 N according to DIN 51350 or ASTM D 2596.

Comparison to BI * – code designation:

- NL GI class 2 / BI * – MPG - A

BI * = code designation = container labelling, see the Section “BI * Standard lubricants”.



06sy09ab

LIEBHERR special paste CTK

Bonding, water resistant, complex saponified paste with high pressure additives and improved corrosion protection characteristics.

Contains ingredients which counteract frictional and vibrational corrosion.

Especially recommended for use in roller live ring connections.

Range of application: -30 °C to +100 °C.

Re-order from your LIEBHERR dealer under Identno.: 8613 3101.



06sy20ab

Lubricant grease for automatic central lubrication systems

Grease complying with the specification **KP2k** – Consistency 2 of the NL GI class according to DIN 51818 is suitable.

Composition: Lithium-saponified multi-purpose grease with a mineral oil base with EP active ingredients, without colouring.

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

Only use greases with the same type of saponification.

Lubricants with solid lubricant particles, e.g. graphite may not be used.



06sy09ab

Approved greases

LIEBHERR 9610 special grease is a 'walk-stable', aging resistant lithium grease, providing protection against corrosion with excellent lubricosity over a wide temperature range.

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

Description	ID No.	Quantity
LH special grease 9610	8613 01308	25 kg (drum)
LH special grease 9610	8613 02908	400 g (carton)

Corrosion protection grease

Non-acidic corrosion protection greases should be used to protect exposed piston rods.

LIEBHERR special paste CTK is especially recommended.

Refer to the Section "LIEBHERR special paste CTK".

Anti-seize for bolt installation

A molybdenum sulphide paste is recommended as anti-seize for the bolts.

BI * standard lubricants

See the brochure "STANDARD LUBRICANTS for construction machines and vehicles".

Published by the German Construction Industry Federation (Hauptverband der Deutschen Bauindustrie e.V.)

Bauverlag GmbH – Wiesbaden and Berlin.

Coolants for diesel engines

Anti-freeze and corrosion protection agents



In order to improve the quality of the coolant, coolant filter modules have been introduced in the LH diesel engines for earth-moving machines.

This ensures that the coolant is additionally filtered in the parallel flow and freed from contamination or rust particles that could result in leakage from the water pumps.

In addition, a chemical additive (DCA 4) protects the cooling system or the parts coming into contact with the coolant, such as water pump, cylinder sleeves etc., from cavitation, corrosion, calcification and foam formation.

Four different coolant filter modules have been introduced to deal with different coolant volumes and coolant filter assemblies on engines and machines.

Coolant with DCA 4 (DCA 4 = Diesel Coolant Additives)

The coolant must contain at least 50% vol. anti-freeze and corrosion protection agent all year round. This protects against freezing down to approx. -37 °C.

When coolant loss occurs, make sure that the proportion of anti-freeze has not dropped below the 50% vol. limit.

Caution!

– **Risk of damage to the diesel engine!**

If the proportion of anti-freeze and corrosion protection agent is too high, the cooling effect is reduced, causing damage to the diesel engine!

– **Do not use more than 60% anti-freeze /corrosion protection agent.**

In the context of maintenance work, the mixture ratio of anti-freeze and corrosion protection agent and DCA 4 – concentration must be checked and if necessary corrected.

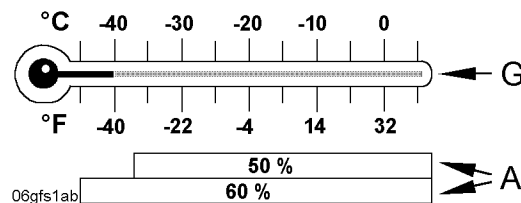
DCA 4 - concentration must be between 0.3 –0.8 units per litre.

The testing set CC 2602 M from Fleetguard is recommended for testing purposes.

The prescribed interval for coolant changes is 2 years.

Before adding new coolant, the system should be checked for cleanliness and flushed out if necessary.

Mixing ratio



Temperature dependent selection of mixing ratio of corrosion and anti-freeze protection agents

G Anti-freeze to – in °C

A Proportion in % of anti-freeze

Filling the cooling system for the first time

When the cooling system is filled for the first time or re-filled following repairs, additional fluid DCA 4 must be added to the DCA 4 concentration in the coolant filters for anti-freeze and corrosion protection.

DCA 4 is available in bottles (packs of approx. 0.47 litres each).

Cooling system	Required quantity of fluid DCA 4		DC 4 - coolant filter
	Content in litres	Packs	Description Identno.
24 - 39	3 or –	1,4	WF 2071 7367045
40 - 59	4 or –	1,9	WF 2072 7381493
60 - 79	5 or –	2,4	WF 2073 7367052
80 - 115	8 or –	3,8	WF 2073 7367052

DCA 4 mixture when filling the cooling system for the first time

Fresh water regulations

Clean water, as soft as possible, must be used for preparing the coolant. Tap water often, but not always, meets these requirements.

Sea water, brackish water, salt water and industrial waste water are not suitable.

LBH/02/003801/0003/4.0/en

Name	Value and unit
Total of alkaline earths (water hardness)	0.6 to 2.7 mmol/l (3 to 15° d)
pH value at 20 °C	6.5 to 8.0
Chloride ion content	max. 80 mg/l
Sulphate ion content	max. 80 mg/l

Fresh water quality for use of coolant with DCA 4

Use of DCA 4 without anti-freeze and corrosion protection agent

In exceptional cases and when ambient temperatures never drop below freezing, e.g., in tropical zones, where it is demonstrable that no approved anti-freeze and corrosion protection agent is available, the coolant may be composed solely of water and DCA 4.

In order also to protect the cooling system from corrosion in this case:

- approx. twice as much DCA 4 must be used in relation to the mixture ratio of anti-freeze and corrosion protection agent and DCA 4
- the DCA 4 – concentration must be between 0.6 and 1.06 units per litre

In the context of maintenance work, the DCA 4 – concentration must be checked and corrected if necessary.

The coolant must be replaced once a year.

No coolant improving agents (corrosion protection oil) may be used when water + DCA 4 are being used alone.

Approved anti-freeze and corrosion protection agents

BRAND		MANUFACTURER
A	Agip Antifreeze Plus	Agip Petroli S.p.A Rome Italy
	Agip-Auto Langzeit-Frostschutz	Agip Schmiertechnik GmbH, Würzburg
	Antigel DB 486	Sotragal SA, St. Priest / France
	Aral Antifreeze Extra	Aral AG, Bochum
	Aral Antifreeze T	Aral AG, Bochum
B	Avia Antifreeze APN	Deutsche Avia-Mineralöl GmbH, Munich
	BP Antifrost X 2270 A	Deutsche BP AG, Hamburg
	BP Nappgel C 2270/1	BP Chemicals Ltd., London/England
D	DEA Kühlerfrostschutz	DEA Mineral AG, Hamburg
	DEUTZ Kühlschutzmittel 0101 1490	DEUTZ Service International GmbH, Cologne
	DOW Kühlmittel D 542 / 1993	BOSS Chemie AG, Wittenbach/Switzerland
F	Frostschutz 600	Mobil Schmierstoffe GmbH, Hamburg
G	Glacelf SX	Elf Lubrifiants Paris/France
	Glyco Shell	Shell Chemie GMBH, Eschborn
	Glysantin (G 48-00)	BASF AG, Ludwigshafen
I	Igol Antigel Type DB	Igol France, Paris/France
M	Motul Anti-Freeze	Motul SA, Aubervilliers Cedex/France
O	ÖMV - Kühlerfrostschutzmittel	ÖMV AG, Vienna/Austria
	OZO Frostschutz S	Total Deutschland GmbH, Düsseldorf
T	Total Multiprotect	Total Deutschland GmbH, Düsseldorf

Brands and manufacturers of anti-freeze and corrosion protection agents

Sealing agents, safety agents and greases for diesel engines

This list contains all sealants, safety materials and greases required for installation or maintenance work on the engines.

Their application is described in the appropriate installation or maintenance procedure in the "Service Manual" for diesel engines.

Sealants and safety materials

Omnivisc 1050 or Hylomar SQ 32/M or Reinzoplast

Loctite 222 or Omnifit 50 M

Loctite 243

Loctite 262 or Omnifit 100 M

Loctite 270 or Omnifit 200 M

Loctite 577

Loctite 648 or Omnifit 230 M

Greases

Molykote Longterm 2 Plus

Barrierta L55/3

Staburags NBU 12