

en

Operating manual

Wheel Loader

L507 Stereo

valid from serial no.: - 427 8500



LIEBHERR

Please enter the following details on receipt of your vehicle:
*You will find these details on the vehicle type plate. They will be useful when ordering spare parts.

* **Vehicle identity no.**

* **Year of construction**

Initial start-up date

Address

Address: LIEBHERR-WERK BISCHOFSHOFEN GMBH

Dr. Hans Liebherr – Straße 4
5500 BISCHOFSHOFEN
Österreich

Product identification

Manufacturer: LIEBHERR-WERK BISCHOFSHOFEN GMBH

Product group: Wheel loader

Type: L507

Construction number: 427

Serial number: 8500

Conformity: 

Document identification

Order number: 8450393

Author: LBH/Dept. - T-Dok

Document version: 01

This Operating 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, maintenance, 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 without prior notice all obligations such as guarantee agreements, service contracts etc. 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 - 3
1.1.1	Complete machine	1 - 3
1.1.2	Diesel engine	1 - 8
1.1.3	Travel hydraulics	1 - 8
1.1.4	Working hydraulics	1 - 9
1.1.5	Steering system	1 - 9
1.1.6	Electrical system	1 - 9
1.1.7	Axles	1 - 9
1.1.8	Tyres	1 - 10
1.1.9	Cab, Heating, Air conditioning system	1 - 12
1.1.10	Lift arm, Quick-change device	1 - 12
1.1.11	Attachments, Accessories	1 - 13
1.2	Technical description	1 - 19
1.2.1	Complete machine	1 - 19
1.2.2	Diesel engine	1 - 19
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 - 21
1.2.7	Brake system	1 - 22
1.2.8	Electrical system	1 - 22
1.2.9	Axles, Tyres	1 - 22
1.2.10	Vehicle frame, Ballast weight	1 - 23
1.2.11	Cab, Heating, Air conditioning system	1 - 23
1.2.12	Lift arm, Quick-change device	1 - 24
1.2.13	Attachments, Accessories	1 - 25

2	Safety regulations	2 - 1
2.1	Introduction	2 - 1
2.2	General safety precautions	2 - 1
2.3	Correct usage	2 - 3
2.4	Decals on the machine	2 - 3
2.4.1	Layout of decals	2 - 4
2.4.2	Safety decal	2 - 4
2.4.3	Information decals	2 - 6
2.4.4	Type plates	2 - 10
2.5	Instructions for avoiding crushing injuries and burns	2 - 10
2.6	Instructions for avoiding fires and explosions	2 - 11
2.7	Instructions for starting up safely	2 - 11
2.8	Safety precautions at start-up	2 - 12
2.9	Instructions for safe working	2 - 12
2.10	Safety instructions for driving on slopes	2 - 14
2.11	Parking safely	2 - 14
2.12	Transporting the machine safely	2 - 14
2.13	Towing the machine safely	2 - 15
2.14	Measures for ensuring safe maintenance	2 - 16
2.15	Safety instructions for welding work on the machine	2 - 18
2.16	Instructions for working safely on machine attachments	2 - 19
2.17	Safety regulations when transporting the machine by crane	2 - 19
2.18	Safe maintenance of hydraulic hoses and hose lines	2 - 20
2.19	Attachments and accessories	2 - 21
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 - 4
3.2.3	Driver's seat with gas-filled spring suspension	3 - 5

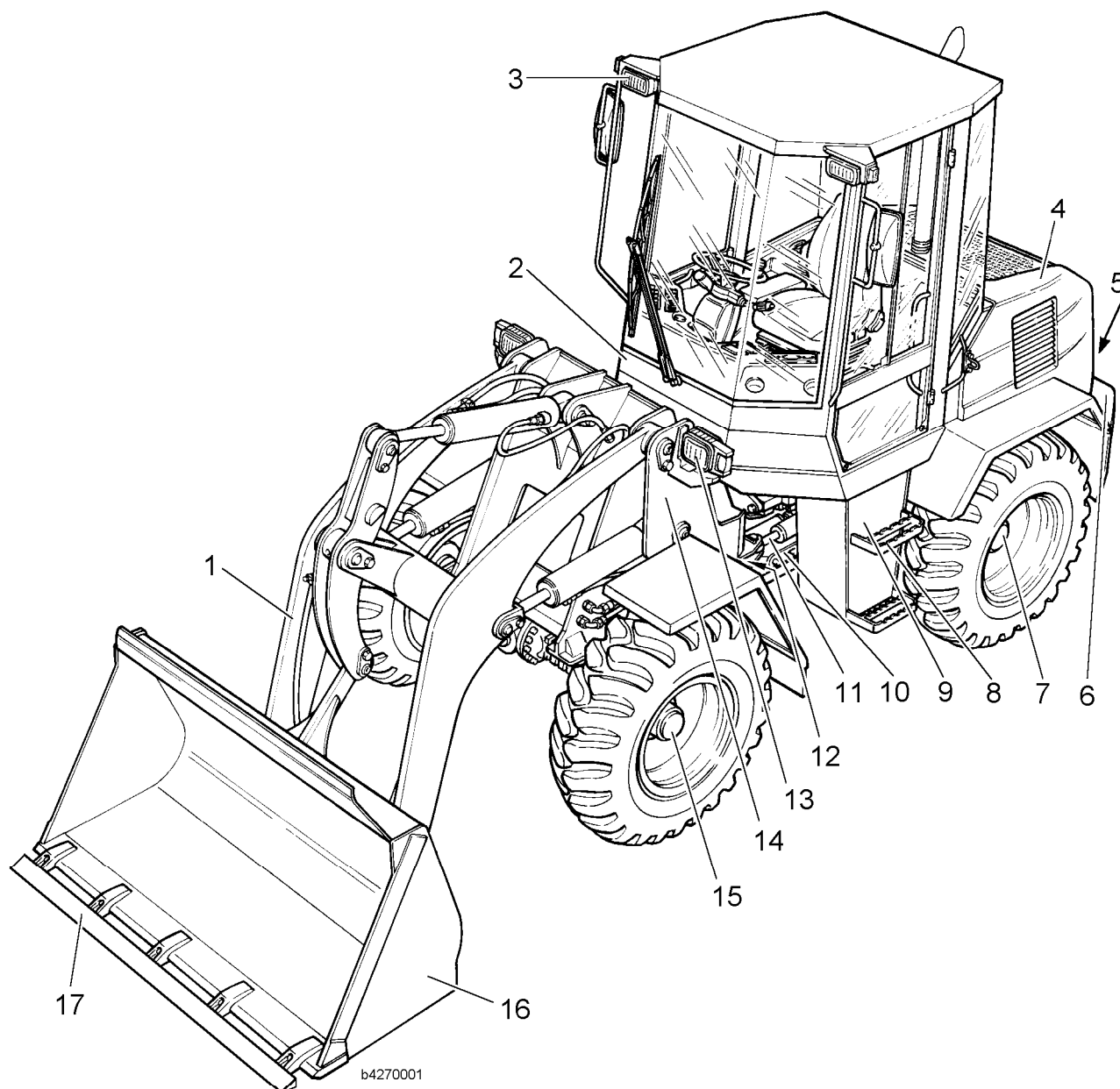
3.2.4	Safety belt	3 - 8
3.2.5	Starter switch	3 - 10
3.2.6	Steering column and steering wheel	3 - 10
3.2.7	Steering column switch	3 - 11
3.2.8	Display unit	3 - 13
3.2.9	Switches on the instrument panel	3 - 17
3.2.10	LIEBHERR control lever	3 - 19
3.2.11	Electrical actuation of additional functions (option)	3 - 21
3.2.12	Control lever for optional working functions	3 - 22
3.2.13	Heating, Ventilation	3 - 23
3.2.14	Air-conditioning (optional)	3 - 24
3.2.15	Internal cab illumination	3 - 25
3.2.16	Inside and outside mirrors	3 - 25
3.2.17	Sun visor	3 - 26
3.2.18	Electric windshield wiper and washer system	3 - 26
3.2.19	Reservoir for windshield washer fluid	3 - 28
3.3	Handling	3 - 29
3.3.1	Daily start-up routine	3 - 29
3.3.2	Starting the diesel engine	3 - 32
3.3.3	Driving mode	3 - 36
3.3.4	Shutting down the machine	3 - 45
3.3.5	Operating the lift arm	3 - 48
3.3.6	Actuating the hydraulic and mechanical quick-change device	3 - 57
3.3.7	Working with optional equipment	3 - 64
3.3.8	General working methods	3 - 66
3.3.9	Transporting the machine	3 - 79
3.4	Emergency operation	3 - 85
3.4.1	Towing the machine	3 - 85
3.4.2	Procedure for jump starting	3 - 90
4	Malfunctions	4 - 1
4.1	Error code tables	4 - 1

4.2	<u>Eliminating malfunctions</u>	4 - 5
4.2.1	<u>Changing fuses</u>	4 - 5
5	<u>Maintenance</u>	5 - 1
5.1	<u>Maintenance and inspection schedule</u>	5 - 1
5.2	<u>Lubricant chart, filling quantities</u>	5 - 5
5.2.1	<u>Table of filling quantities</u>	5 - 5
5.2.2	<u>Lubricant chart</u>	5 - 6
5.3	<u>Maintenance tasks</u>	5 - 9
5.3.1	<u>Preparatory tasks for maintenance</u>	5 - 9
5.3.2	<u>Maintenance tasks (daily) every 10 service hours</u>	5 - 12
5.3.3	<u>Maintenance tasks (weekly) every 50 service hours</u>	5 - 17
5.3.4	<u>Unscheduled maintenance tasks</u>	5 - 26
5.3.5	<u>Cleaning the machine</u>	5 - 29
5.3.6	<u>Corrosion protection work</u>	5 - 30
5.4	<u>Lubricants and fuels</u>	5 - 32
5.4.1	<u>Handling lubricants and fuels</u>	5 - 32
5.4.2	<u>Lubricant and fuel specifications</u>	5 - 33

1 Product description

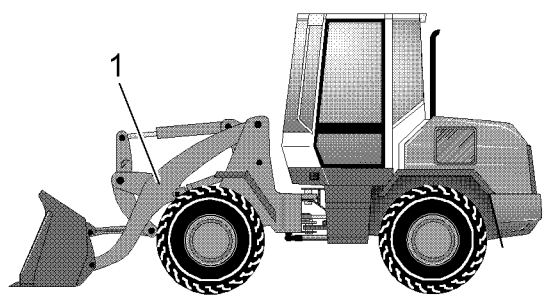
Equipment layout

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

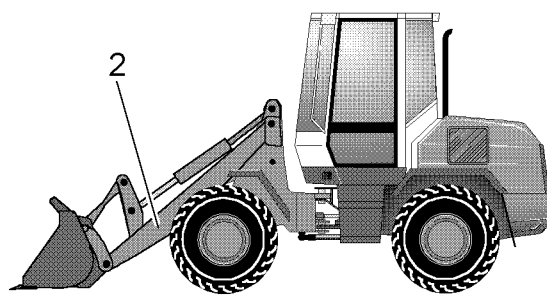


Full machine – View from left

- | | | |
|-----------------------------------|-------------------------------|-----------------------|
| 1 lift arm | 6 ballast weight | 12 articulation lock |
| 2 driver's cab | 7 rear axle | 13 lighting |
| 3 working floodlights | 8 cab access | 14 front section |
| 4 rear hatch – engine compartment | 9 cover – battery compartment | 15 front axle |
| 5 hitching device | 10 rear section | 16 loading bucket |
| | 11 steering cylinder | 17 bucket tooth guard |



1 Z-bar lift arm



2 P-lift arms

b4270002

design variants of the machine

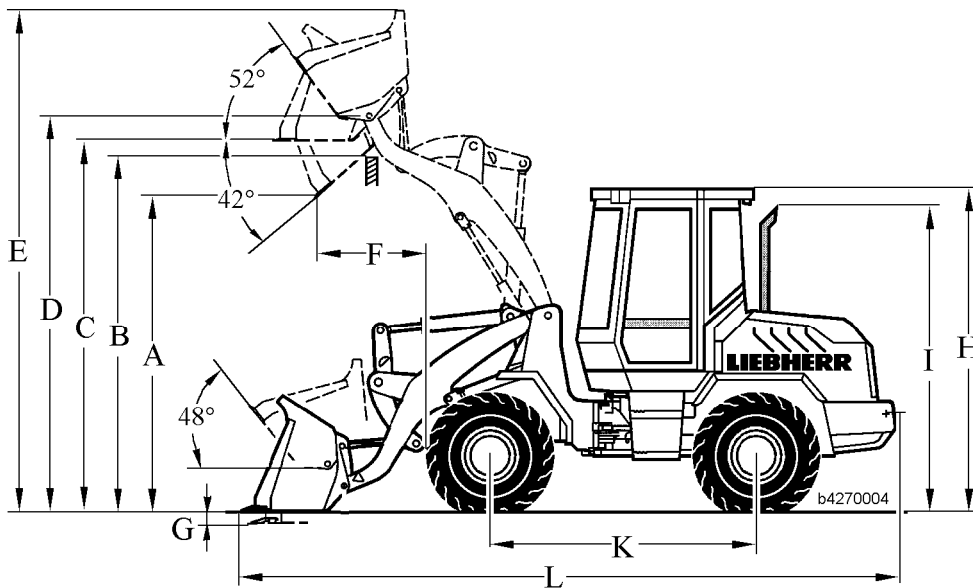
1.1 Technical data

1.1.1 Complete machine

Wheel loader with Z-bar lift arm

The values specified apply to:

- the machine with Z-bar lift arm (2100 mm) with hydraulic quick-change device
- a machine with a toothed loading bucket – 0.9 m³ and with 335/80 DUNLOP SPT9



Dimensions – machine with Z-bar lift arms

Name	Value	Units
Bucket capacity	09	m ³
Bucket width	1800	mm
Specific material weight	1.8	t/m ³
A - dump height at max. extension and 42° tilting out angle	2465	mm
B - max. dump height	2750	mm
C - max. height of bucket base	2945	mm
D - max. height of bucket pivot point	3145	mm
E - max. height of bucket upper edge	4035	mm
F - reach at max. lifting height and 42° tilt out angle	895	mm
G - digging depth	75	mm
H - height above cab	2700	mm
I - height above exhaust	2575	mm
J - ground clearance	325	mm
K - wheel base	2150	mm

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Name	Value	Units
L - overall length	5260	mm
Turning radius over bucket outer edge	3645	mm
Lifting force (SAE)	46	kN
Breakout force (SAE)	43	kN
Tipping load when straight *	3710	kg
Tipping load, articulated 28° *	3465	kg
Angle of articulation (on each side)	28	°
Angle of swing (on each side)	6	°
Operating weight *	4930	kg
Total content – hydraulic oil	61	l
Travel speed – travel range 1 (forward and reverse)**	0–6.0	km/h
Travel speed – travel range 2 (forward and reverse)**	0–20.0	km/h
Sound pressure level in the cab – L _{pA}	75	dB

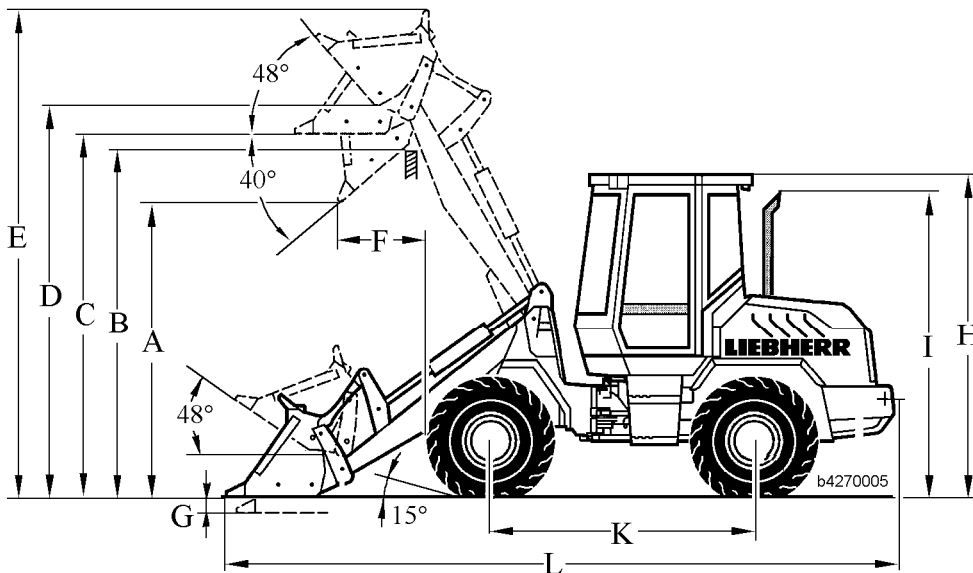
* The specified values assume 335/80 R20 DUNLOP SPT9 tyres, inclusive of all lubricants, full fuel tank, ROPS/FOPS cab and driver.

** With tyre size 335/80 R20

Wheel loader with P-lift arms

The values specified apply to:

- the machine with P-lift arms (2000 mm) with mechanical quick-change device.
- a machine with a toothed loading bucket – 0.9 m³ and with 335/80 R20 DUNLOP SPT9



Dimensions – machine with P-bar lift arms

Name	Value	Units
Bucket capacity	0.9	m ³
Bucket width	1800	mm

LBH1/01/003801/00037.03/en/Version: 06.2003

Name	Value	Units
Specific material weight	1.8	t/m ³
A - dump height at max. lifting height and 40° tilt out angle	2430	mm
B - max. dump height	2770	mm
C - max. height of bucket base	3010	mm
D - max. height of bucket pivot point	3230	mm
E - max. height of bucket upper edge	4145	mm
F - reach at max. lifting height and 40° tilt out angle	695	mm
G - digging depth	60	mm
H - height above cab	2700	mm
I - height above exhaust	2575	mm
J - ground clearance	325	mm
K - wheel base	2150	mm
L - overall length	5480	mm
Turning radius over bucket outer edge	3740	mm
Lifting force (SAE)	40	kN
Breakout force (SAE)	31	kN
Tipping load when straight *	3155	kg
Tipping load, articulated 28° *	2945	kg
Angle of articulation (on each side)	28	°
Angle of swing (on each side)	6	°
Operational weight *	4770	kg
Total content – hydraulic oil	61	l
Travel speed – travel range 1 (forward and reverse)**	0–6.0	km/h
Travel speed – travel range 2 (forward and reverse)**	0–20.0	km/h
Sound pressure level in the cab – L _{pA}	75	dB

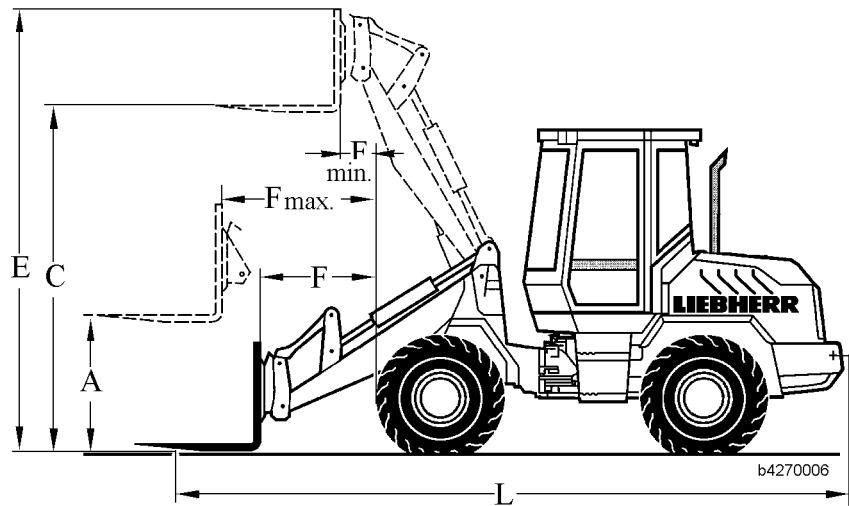
* The specified values assume 335/80 R20 DUNLOP SPT9 tyres, inclusive of all lubricants, full fuel tank, ROPS/FOPS cab and driver.

** With tyre size 335/80 R20

Wheel loader with forklift (optional)

The values specified apply to:

- the machine with P-lift arms (2000 mm) with hydraulic quick-change device
- the machine with Z-bar lift arm (2100 mm) with hydraulic quick-change device
- for the machine with a FEM II forklift and 335/80 R20 DUNLOP SPT9 tyres



Dimensions – machine with P-bar lift arm and forklift

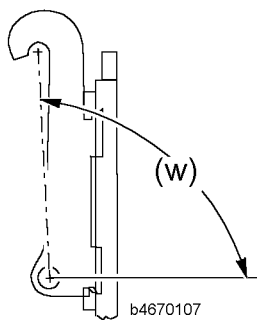
Loading geometry		P-kinematics		Z-bar kinematics	
Forklift equipment for quick-change device		FEM II forklift		FEM II forklift	
Name		Value	Units	Value	Units
A	Lifting limit at max. reach	1175	mm	1265	mm
C	Max. lifting height	2910	mm	2825	mm
E	Max. height above fork carrier	3720	mm	3635	mm
F	Loading position reach	1020	mm	920	mm
F max.	Greatest possible reach	1365	mm	1310	mm
F min.	Reach at max. lift height	365	mm	620	mm
G	Fork prong length	1200	mm	1200	mm
L	Total length of the basic machine	5980	mm	5880	mm
	Tipping load when straight *	2655	kg	2735	kg
	Tipping load, articulated **	2480	kg	2555	kg
	Operating weight *	4710	kg	4890	kg

* The specified values assume 335/80 R20 DUNLOP SPT9 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 permissible 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 types of terrain, angles (w) and various centre of gravity offsets are specified in the table below.

LBH/01/003801/00037.03/len/Version: 06.2003

Terrain - even and firm Load = 80% of the tipping load		Lift arms with P-kinematics: Loads in kg with different centres of gravity distances- CG in mm							
Tyres	Additional ballast	500	600	700	800	900	1000	1100	1200
12.5-18 Dunlop E91-2	--	1985	1905	1831	1763	1699	1640	1585	1534
335/80R18 Dunlop SPT9	--	1985	1905	1831	1763	1699	1640	1585	1534
335/80R20 Dunlop SPT9	--	1985	1905	1831	1763	1699	1640	1585	1534
335/80R20 Michelin XM27	--	1985	1905	1831	1763	1699	1640	1585	1534
375/75R20 Michelin XM27	--	2000	1919	1845	1776	1712	1653	1597	1545
9.00R20 Michelin X-Mine	--	2090	2006	1928	1856	1789	1727	1669	1615

Terrain - uneven Load = 60% of the tipping load		Lift arms with P-kinematics: Loads in kg with different centres of gravity distances - CG in mm							
Tyres	Additional ballast	500	600	700	800	900	1000	1100	1200
12.5-18 Dunlop E91-2	--	1490	1430	1374	1323	1276	1231	1190	1151
335/80R18 Dunlop SPT9	--	1490	1430	1374	1323	1276	1231	1190	1151
335/80R28 Dunlop SPT9	--	1490	1430	1374	1323	1276	1231	1190	1151
335/80R20 Michelin XM27	--	1490	1430	1374	1323	1276	1231	1190	1151
375/75R20 Michelin XM27	--	1500	1440	1384	1332	1284	1240	1198	1159
9.00R20 Michelin X-Mine	--	1570	1507	1448	1394	1344	1297	1254	1213

Terrain - even and firm Load = 80% of the tipping load		Lift arm with Z-bar kinematics: Loads in kg with different centres of gravity distances - CG in mm							
Tyres	Additional ballast	500	600	700	800	900	1000	1100	1200
12.5-18 Dunlop E91-2	--	2045	1961	1883	1811	1745	1683	1626	1572
335/80R18 Dunlop SPT9	--	2045	1961	1883	1811	1745	1683	1626	1572
335/80R20 Dunlop SPT9	--	2045	1961	1883	1811	1745	1683	1626	1572
335/80R20 Michelin XM27	--	2045	1961	1883	1811	1745	1683	1626	1572
375/80R20 Michelin XM27	--	2060	1975	1897	1825	1758	1695	1637	1583
9.00R20 Michelin X-Mine	--	2155	2066	1984	1909	1839	1774	1713	1656

Terrain - uneven Load = 60% of the tipping load		Lift arm with Z-bar kinematics: Loads in kg with different centres of gravity distances - CG in mm							
Tyres	Additional ballast	500	600	700	800	900	1000	1100	1200
12.5-18 Dunlop E91-2	--	1535	1472	1413	1360	1310	1263	1220	1180
335/80R18 Dunlop SPT9	--	1535	1472	1413	1360	1310	1263	1220	1180
335/80R20 Dunlop SPT9	--	1535	1472	1413	1360	1310	1263	1220	1180
335/80R20 Michelin XM27	--	1535	1472	1413	1360	1310	1263	1220	1180
375/75R20 Michelin XM27	--	1545	1481	1423	1368	1318	1272	1228	1187
9.00R20 Michelin X-Mine	--	1615	1548	1487	1430	1378	1329	1284	1241

LBH/01/003801/0003/7.03/rev/Version: 06.2003

1.1.2 Diesel engine

Diesel engine	Name	Value	Units
	Engine type	BF 4L 1011FT	
	Design	In-line engine	
	Combustion process	Four stroke, direct injection	
	Number of cylinders	4	
	Ignition sequence	1-3-4-2	
	Cylinder volume	2.732	dm ³
	Rated power according to ISO 9249	46 (62)	kW / hp
	Rated speed	2500	min ⁻¹
	Max. torque at 1800 min ⁻¹	199	Nm
	Idling speed	min.850 ^{±50} max.2700 ^{±50}	min ⁻¹ min ⁻¹
	Max. inclination - longitudinal/traverse	35 / 25	°
	Operating voltage of the ignition	12	V
	Power intake of the ignition	2.3	kW
	Output voltage across alternator	14	V
	Current flow from alternator	60	A
	Emission limit values in accordance with	97/68/EC	

Fuel system	Name	Value	Units
	Tank capacity	70	l
	Reserve tank	25	l

1.1.3 Travel hydraulics

Variable displacement pump	Name	Value	Units
	Type	A4VG 40 DA	
	Displacement max.	40	cm ³
	Flow at rated engine speed	98	l/min
	Pressure cut-off	425 ^{+5/-10}	bar

Variable displacement motor	Name	Value	Units
	Type	A6VM 80 HA 1R1	
	Displacement max.	80	cm ³

1.1.4 Working hydraulics**Constant pump**

Name	Value	Units
Type	1 SX 260C	
Displacement	26	cm ³
Flow at rated engine speed	65	l/min

Control valve block

Name	Value	Units
Type	SM 12	
Primary pressure relief valve	230 ^{+5/-10}	bar

Pilot control unit

Name	Value	Units
Type	4 THF 6	

Hydraulic tank

Name	Value	Units
Hydraulic tank	Steel container	

1.1.5 Steering system**Servostat**

Name	Value	Units
Type	Eaton 263 -4183	
Displacement	185	cm ³

1.1.6 Electrical system

Name	Value	Units
Power supply voltage	12	V
Battery voltage	12	V
Battery capacity	88	Ah
Number of batteries	One	

1.1.7 Axles**Front axle**

Name	Value	Units
Type	171/292	

Name	Value	Units
Locking value of the self-locking differential	45	%
Wheel base	1420	mm
Wheel lug tightening torque	450	Nm
Wheel lug spanner size	30	mm

Rear axle

Name	Value	Units
Type	313/271/050	
Locking value of the self-locking differential	25	%
Angle of swing	6	°
Wheel lug tightening torque	450	Nm
Wheel lug spanner size	30	mm

1.1.8 Tyres

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

Tyre size 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.

Hinweis: 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. permissible air pressure (bar)
12.5-18 E91-2	3.00	2.00	3.50
12.5-20 TG 32	2.80	1.80	3.50
14.5-20 E91	2.50	1.50	3.00
16/70-20 E91-2	2.30	1.50	4.00
335/80 R18 SPT9	3.50	2.50	4.50
365/70 R18 SPT9	3.50	2.30	4.50
405/70 R18 SPT9	3.00	2.00	3.75
15.5/55 R18 SPT9	4.00	2.50	4.75
335/80 R20 SPT9	3.50	2.30	4.50
365/80 R20 SPT9	3.00	2.00	4.50
405/70 R20 SPT9	2.80	1.80	3.75

MICHELIN – tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permissible air pressure (bar)
335/80 R18 XM27 TL	2.50	2.00	3.80
335/80 R20 XM27 TL	2.80	1.50	3.80
375/75 R20 XM27 TL	2.00	1.50	3.80
9.00 R20 XMine	3.00	3.00	5.00

Special tyres

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permissible 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 attachments

Particulars	Type of special attachments
1)	
2)	
2)	

Tyre size	Air pressure - front axle (bar)	Air pressure - rear axle (bar)	Max. permissible 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.

LBH/01/003801/0003/7.03/ent/Version: 06.2003

1.1.9 Cab, Heating, Air conditioning system**Driver's seat**

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

Heating, Ventilation

Name	Value	Units
Number of blower speeds	2	
Heat output	5.5	kW

Air-conditioning (optional)

Name	Value	Units
Type	Heating / air-conditioning unit	
Refrigerant	R134a	
Cooling output	4.7 ±10%	kW

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

Name	Value	Units
Length	2100	mm

P-lift arms

Name	Value	Units
Length	2000	mm

Quick-change device, hydraulic actuation

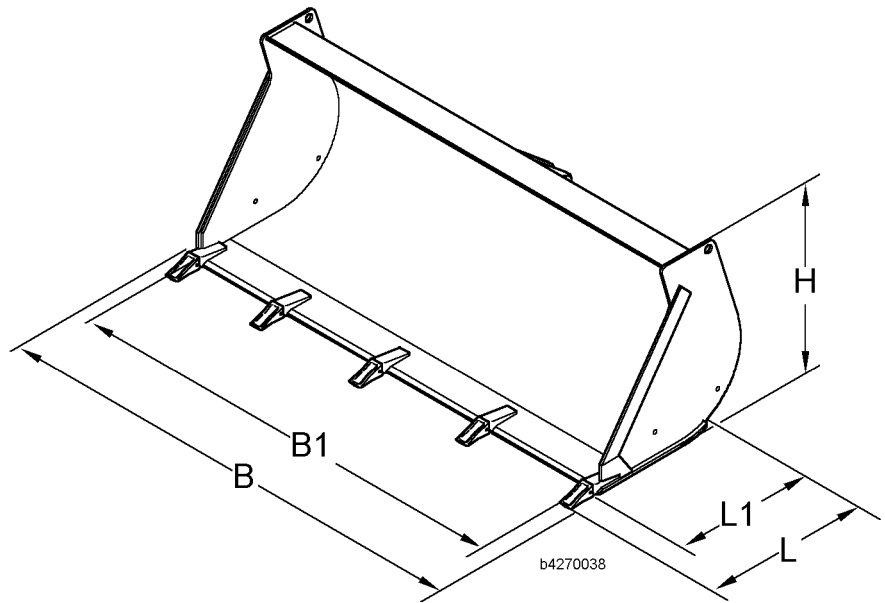
Name	Value	Units
Control	Additional control lever	
Shut-off	Changeover valve	

Quick-change device, electronic / hydraulic actuation (with easy control)

Name	Value	Units
Control	Comfort control	
Shut-off	Changeover valve	

1.1.11 Attachments, Accessories

Loading bucket for Z kinematics

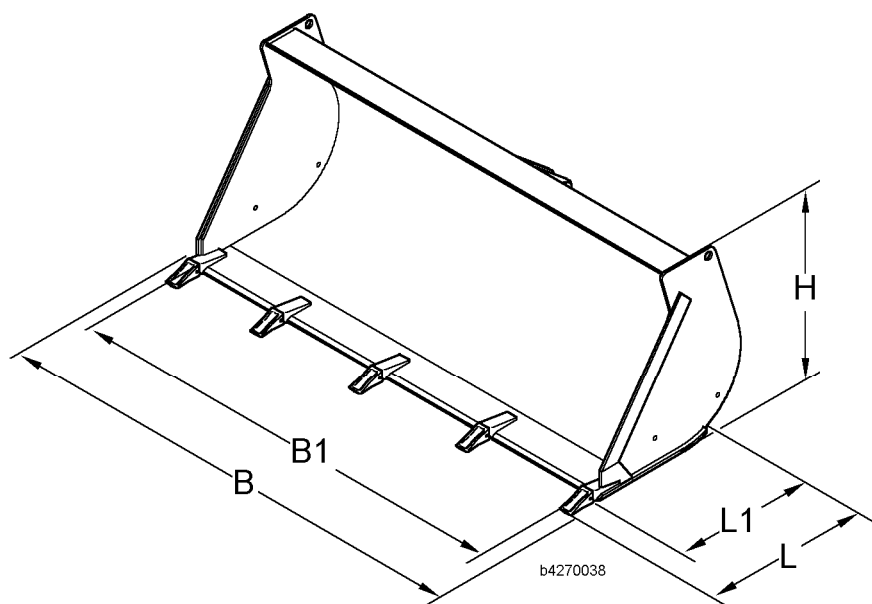


Main dimensions

Name	Value	Units
B - Bucket width	1800	mm
B1 - Loading dimension	1752	mm
H - Height	900	mm
L - Length with teeth	940	mm
L1 - Length without teeth	840	mm
Specific material weight	1,8	t/m ³
Heaped bucket capacity (ISO 7546)	0,9	m ³
Mass	295	kg
Teeth – MINI-Z-II	5	pieces

LBH/01/003801/0003/7.03/ent/Version: 06.2003

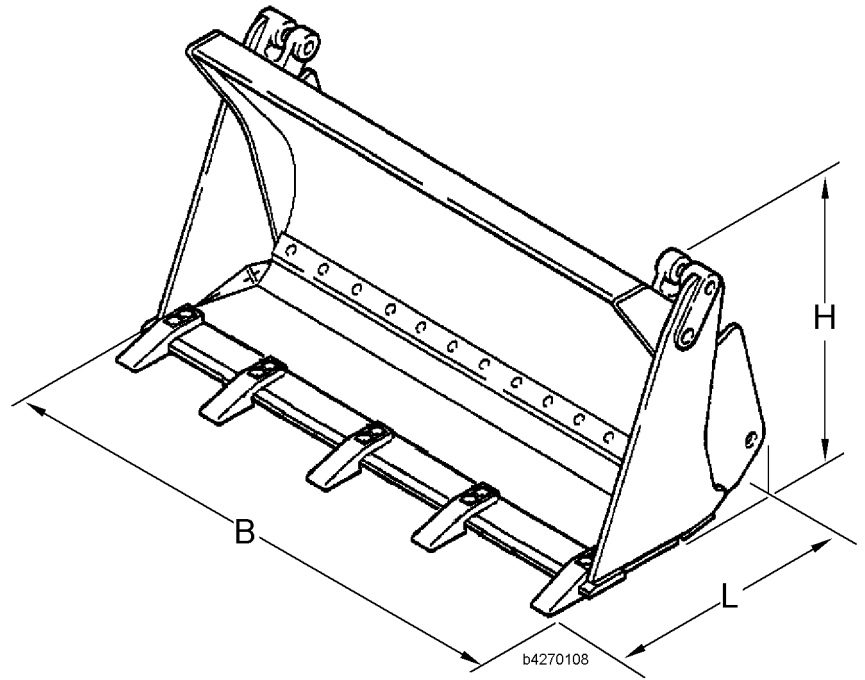
Loading bucket for parallel kinematics



Main dimensions

Name	Value	Units
B - Bucket width	1800	mm
B1 - Loading dimension	1752	mm
H - Height	925	mm
L - Length with teeth	1110	mm
L1 - Length without teeth	1010	mm
Specific material weight	1.8	t/m ³
Heaped bucket capacity (ISO 7546)	0,9	m ³
Mass	315	kg
Teeth – MINI-Z-II	5	pieces

4 in 1 bucket for Z kinematiks

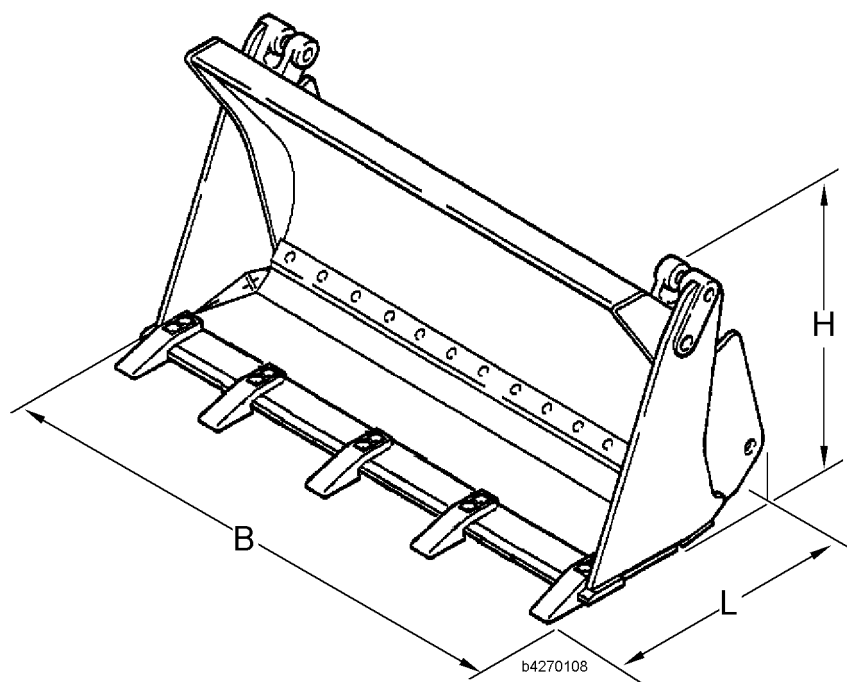


Main dimensions

Name	Value	Units
B - Bucket width	1800	mm
H - Height	920	mm
L - Length with teeth	870	mm
Specific material weight	1.8	t/m ³
Heaped bucket capacity (ISO 7546)	0.7	m ³
Mass	465	kg
Teeth – MINI-Z-II	5	pieces
Max. hydraulic operating pressure	230	bar

LBH/01/003801/0003/7.03/ent/Version: 06.2003

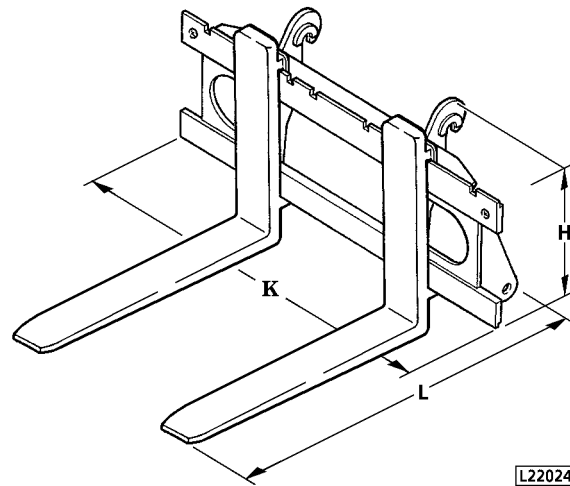
4 in 1 bucket for P kinematiks



Main dimensions

Name	Value	Units
B - Bucket width	1800	mm
H - Height	920	mm
L - Length with teeth	880	mm
Specific material weight	1.8	t/m ³
Heaped bucket capacity (ISO 7546)	0.7	m ³
Mass	550	kg
Toothing – MINI-Z-II	5	pieces
Max. hydraulic operating pressure	210	bar

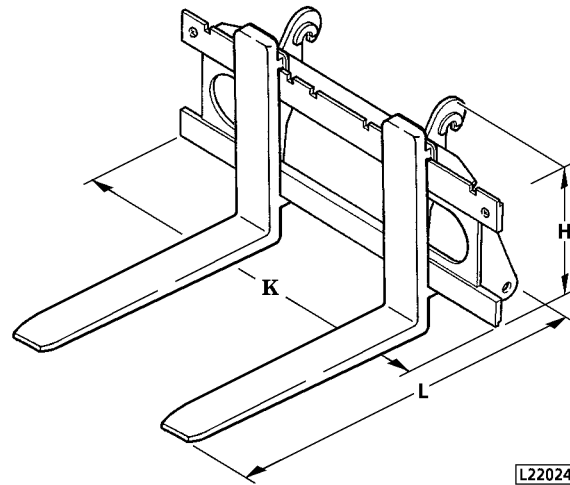
Forklift (option) for Z kinematics



Main dimensions

Name	Value	Units
Prong length	1200	mm
L – Length (fork carrier + prongs)	1585	mm
K – Fork carrier width	1245	mm
H – Height (fork carrier + prongs)	860	mm
Mass (fork carrier + prongs)	255	kg

Forklift (optional) for parallel kinematics



Main dimensions

Name	Value	Units
Prong length	1200	mm
L – Length (fork carrier + prongs)	1490	mm
K – Fork carrier width	1245	mm

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Technical data

Name	Value	Units
H – Height (fork carrier + prongs)	875	mm
Mass (fork carrier + prongs)	255	kg

1.2 Technical description

1.2.1 Complete machine

Wheel loader

The **Stereo loader® L507** is a fully hydraulic wheel loader with hydrostatic travel drive system.

The machine is articulated with rear axle steering.

Design variants of the machine:

- Z-bar lift arm with Z-bar kinematics
- P-lift arms with parallel-kinematics

1.2.2 Diesel engine

Diesel engine

The diesel motor is an oil/air-cooled, 4-stroke in-line engine with turbo charging.

The diesel engine is installed transversely on the rear section and elastically mounted on rubber bearings.

The cooling air is sucked in by an axial blower via a noise-absorbing suction shaft in the rear covering of the machine and is passed on to the cylinder heads. The out-going air is sent to the outside through the oil cooler and through the outlet nozzles.

Fuel system

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

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 inlet 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.

1.2.3 Cooling system

Cooling system

The cooling system is fitted in the engine compartment.

The cooling system cools the hydraulic fluid of the hydraulic system.

The electrically driven fan draws in cool air from outside the cooler units, feeding it over the cooling fins on the cooler and over the diesel engine.

The speed of the electrically driven cooler depends on the temperature of the hydraulic fluid.

1.2.4 Travel hydraulics

Travel hydraulics

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

This input enables:

- automatic adaptation of the travel speed to the tractive force in each travel range
- rapid changeover from forward travel to reverse travel by means of the LIEBHERR control lever
- control 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 swash plate design. The flow is adjusted in relation to the engine speed and load. The flow direction of the pump is determined by the travel direction valve.

Variable displacement motor

The variable displacement motor with a swash plate design drives the travel gear. The hydraulic regulation of the displacement enables a wide adjustment range.

A large tractive force at a low speed is achieved at the maximum pivoting angle.

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 gear 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.

Constant pump

The constant pump is a gear pump. The speed-dependent flow of the pump is distributed through the integrated flow valve to the working hydraulics and the steering.

Control valve block

Der control valve block is mounted on the back of the machine. The spool valves for the lift and tilt cylinders and for the quick-change device are integrated in the control valve block. An additional unit with spool valves for accessories can be attached to the existing control valve block.

Pressure relief valves protect the system from pressure peaks.

Pilot control

The working hydraulics are controlled using 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 a shut-off valve/working hydraulics shut-off. 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 float position function is controlled in the pilot control unit by means of a retaining solenoid.

Hydraulic tank

The hydraulic tank provides the drive hydraulics, the working hydraulics and the steering system with hydraulic oil.

The pumps deliver the oil via control units to the individual consumers and return it 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 system and for the cooling system 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 hydraulics and the steering. 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 machine is steered by a combination of articulated steering and rear axle pivot steering. The steering cylinder pushes the front and rear section together via the articulated joint. At the same time, the axle pivot steering of the rear axle is actuated by connecting rods.

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

Steering pump

The steering system is supplied with oil via the working hydraulics pump. The oil flow from the working hydraulics pump is distributed as required to the working hydraulics or the steering system.

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 working hydraulics 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

Service brake

The service brake consists of a dual hydraulic-mechanical braking system. The hydrostatic travel drive system when reversed also acts as a service brake. The hydrostatic travel drive system acts on all 4 wheels.

The service brake acts on two brake pads mounted in the drum brakes at the input shaft of the front axle.

The service brake is activated by oil pressure, which is built up by the inch- brake pedal via the main brake cylinder.

The action of the service brake on the drums brakes is independent of diesel engine running.

Parking brake

The parking brake acts on two brake pads mounted in the drum brakes at the input shaft of the front axle.

The parking brake is opened by cable control and closed by spring force.

1.2.8 Electrical system

Electrical system

The machine's electrical system operates at 12 V. The battery is underneath the left-hand cab access steps.

The battery main switch is in the driver's cab.

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

1.2.9 Axles, Tyres

Front axle

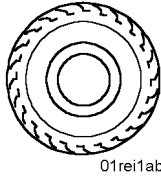
The front axle is a fixed axle and is rigidly bolted to the front section.

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

Rear axle

The rear axle is a steering axle with built-in transfer gear. The axle transfer gear is driven by the variable displacement motor. The oscillating axle casing is integrated in the differential housing; it is mounted on rotary bearings in the rear section.

The axle is equipped with a central tapered gear with an integrated disc-type self-locking differential. The planetary final drives are located in the wheel hubs. The wheel hubs can be rotated via the axle pivot steering and are actuated via connecting rods.



Tyres

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

It is essential that the tyres on all four wheels are of the same size and type.

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 attached to all four wheels!

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

1.2.10 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 bears various built-on assemblies such as the driver's cab, lift arms and drive aggregates.

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.

1.2.11 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 and ventilation systems.

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

In emergencies, exiting through the right-hand door is also possible.

Driver's seat

The ergonomically designed driver's seat offers a high degree of comfort. The adjustable seat, back support and suspension mean that the driver can individually adjust the seat for maximum 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 engine oil heating.

The inlet air is filtered via one dry filter cartridge and directed to the cab via the heating/air-conditioning unit and the adjustable ejection nozzles.

Air-conditioning (optional)

An air-conditioning system can be installed as an extra.

The inlet air is filtered via one dry filter cartridge and directed into the cab via a vaporiser and heat exchanger and the adjustable outlet nozzles.

1.2.12 Lift arm, Quick-change device

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 bar form a "Z." The "Z form" can be seen from the right-hand side.

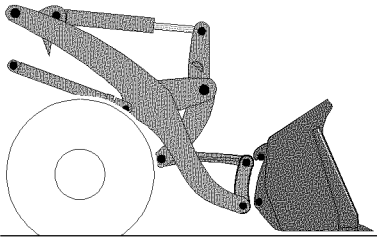
With the lift arm with Z-bar kinematics, no parallel load movement is possible

The lifting gear is equipped with an hydraulic quick-change device.

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

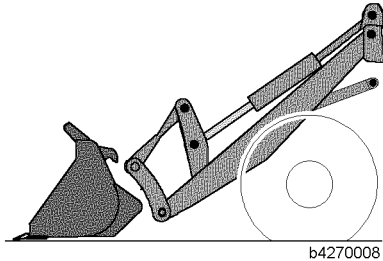
The lift arm is bolted to the front section via the bucket arm bearings and the cylinder bearings on the cylinder base side.

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



b4270007

Z-bar kinematics



b4270008

P-kinematics

P-lift arms

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

The P-lift arms have a parallel-kinematic design. That is to say, the layout of tilt cylinder and the bucket arm forms a parallelogram.

The parallel kinematics enable the load to be kept parallel to the ground, e.g. with a forklift, over the entire lifting range.

The lifting gear is equipped with a mechanical or hydraulic (optional) quick-change device.

A lift cylinder and a tilt cylinder are attached to the lifting 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 dirt and corrosion.

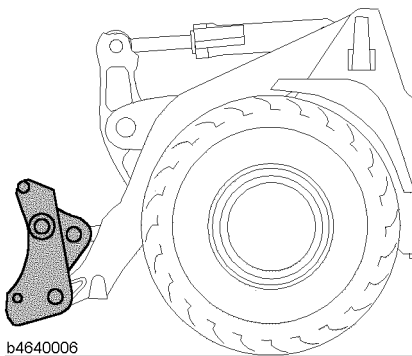
Quick-change device

The quick-change device is mounted on the lifting gear of the machine.

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

Design variants of the quick-change device:

- Variant 1 = mechanical actuation
(Actuation using the lever on the quick-change device)
- Variant 2 = hydraulic actuation
(Actuation using an additional operating lever)
- Variant 3 = combined, electronic /hydraulic actuation
(easy control with the button on the LH operating lever)



b4640006

1.2.13 Attachments, Accessories

Loading bucket

The loading bucket is one of a variety of attachments 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.

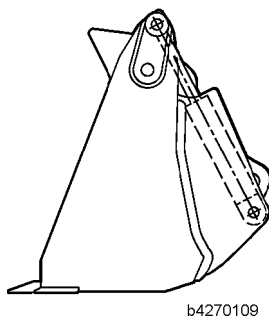
The loading bucket is mounted on the quick-change device.

4-in-1 bucket (optional)

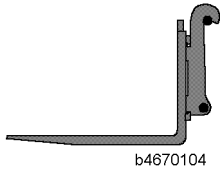
The 4-in-1 bucket is one of several attachments which can be mounted on the lifting arm.

The loading bucket is mounted on the quick-change device.

It can be used for pushing, as well as excavating and loading scrap, gripping awkward objects, for greater dumping heights, as an excavating bucket, and for depositing earth when open as well as for leveling.



b4270109



Forklift (optional)

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

The forklift is mounted on the quick-change device.

The forklift is intended for picking up, transporting 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 personnel who only occasionally work on the machine, for example, carrying out rigging or maintenance work.

The safety regulations listed below, if conscientiously followed, will ensure your own safety and that of others, and will prevent the machine from being damaged.

Whenever tasks which could cause danger for personnel 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 of 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 **“Operating manual”** before starting up the machine.

Make sure that you are in possession of and have read and understood additional instructions applicable to 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. Check occasionally that your personnel, in observance of the "**Operating manual**", are working safely and are aware of possible dangers.
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:
Procedure:
 - 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 "**Operating 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 deployments. 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 to the installation and adjustment of safety equipment and valves as well as for welding work on load bearing components.

2.3 Correct usage

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 “**Operating manual**” and adherence to the inspection and maintenance conditions.

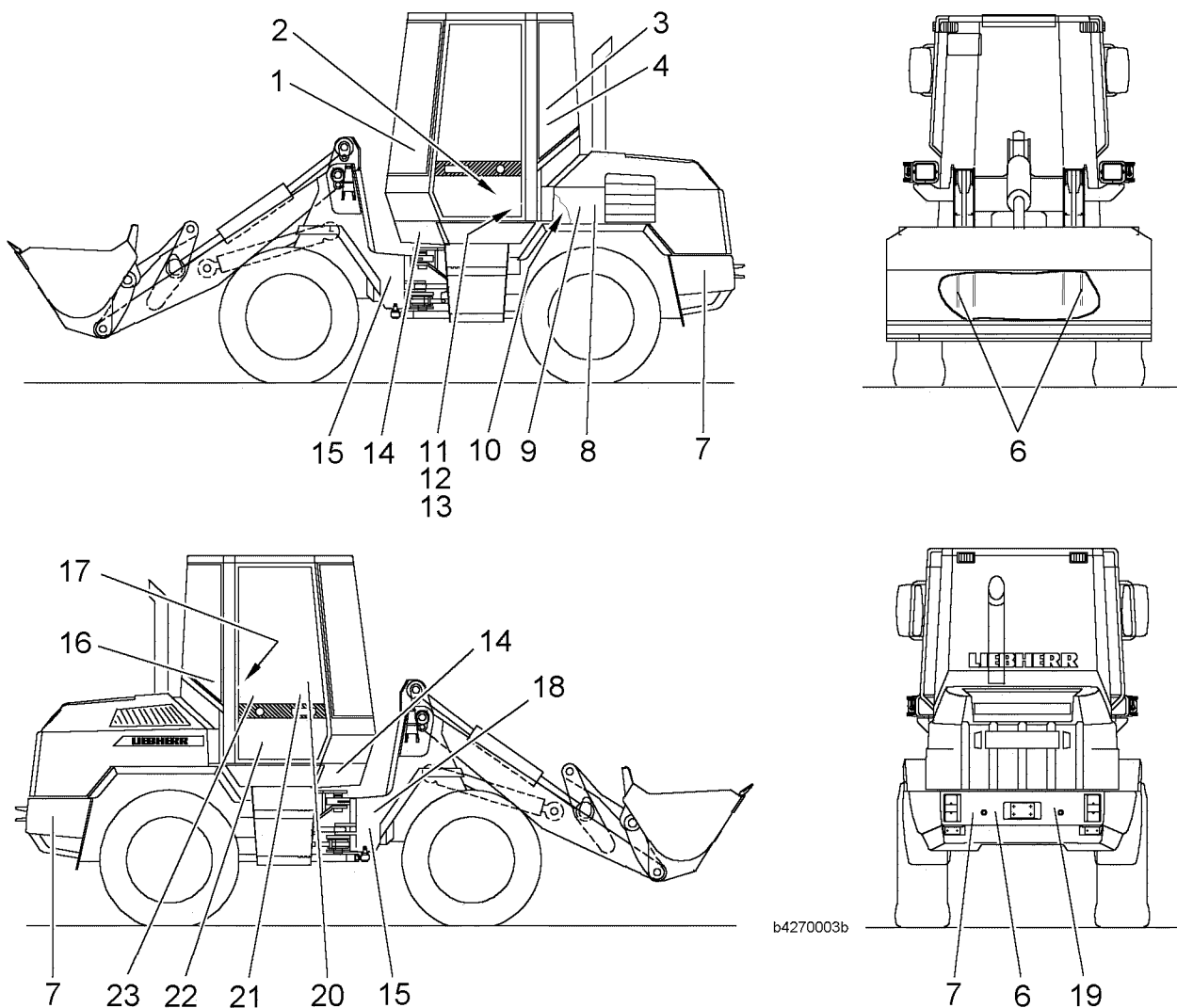
2.4 Decals on the machine

1. Your machine has several types of decals.
Types of decals:
 - safety decals
 - information decals
 - type plates

Their contents and locations are described below.

The order numbers are included in the spare parts list.

2.4.1 Layout of decals



Layout of decals

- | | | |
|--|------------------------------------|--------------------------------------|
| 1 steering decal | 10 brake fluid decal | 18 type plate – machine |
| 2 parking brake decal on/off | 11 ROPS decal | 19 decal for lashing point |
| 3 CE decal | 12 voltage decal | 20 decal for working hydraulics |
| 4 noise output decal – L _{WA} | 13 heating decal | 21 working hydraulics blocking decal |
| 6 decal for slinging - lifting point | 14 loiter warning decal | 22 lubricant chart |
| 7 speed limit decal 20 | 15 articulation area warning decal | 23 accident prevention decal |
| 8 cooler unit decal | 16 forklift decal | |
| 9 engine standstill decal | 17 cab ventilation decal | |

2.4.2 Safety decal

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

LBH/01/003801/00037.03/len/Version: 06.2003



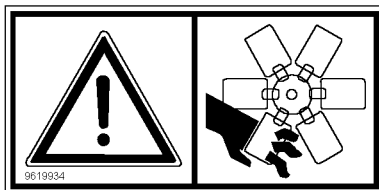
03sc01ab

Loiter warning decals

Decal 14 is affixed outside on the left side of the driver's cab.

Warns of risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Remaining in the danger area is prohibited!**



03sc04ab

Engine standstill decal

Decal 9 is affixed externally to the engine compartment hood on the left.

Warns of risk of accidents, possibly resulting in severe injuries.

Meaning: **Only open when the engine is shut down!**



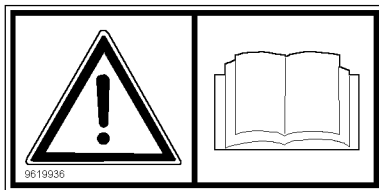
03sc02ab

Articulation area warning decal

Decal 15 is affixed outside on the left and right in the articulation area.

Warns of risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Remaining in the articulation area is prohibited, when this is unlocked!**



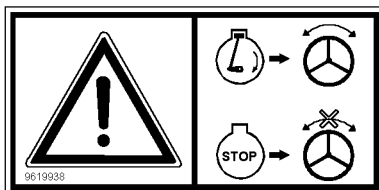
03sc03ab

Accident prevention decal

Decal 23 is attached 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!**



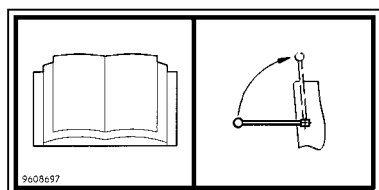
03sc05ab

Steering decal

Decal 1 is attached to the left-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!**



b4270061

Working hydraulics blocking decal

Decal 21 is attached 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 safety lever must be in the up position when the driver leaves his seat or in traffic.**

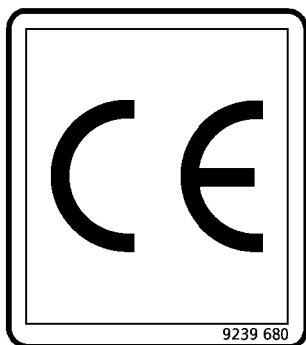
LBH/01/003801/0003/7.03/em/Version: 06.2003

2.4.3 Information decals

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

Mark of conformity decal - CE

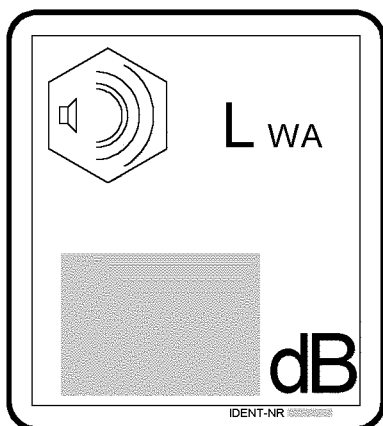
Decal 3 is affixed inside the left-hand window of the driver's cab. Indicates conformity with EU regulations - machine guidelines.



b4270057

Noise output decal – L_{WA}

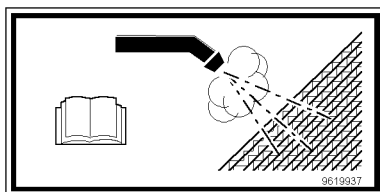
Decal 4 is affixed inside the left-hand window of the driver's cab. Specifies the L_{WA} – sound pressure level of the machine in decibels. You can find the value on the sign on the machine.



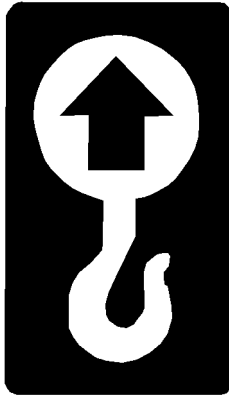
03sc24ab

Cooler unit decal

Decal 8 is affixed externally to the engine compartment hood on the left. Refers to cleaning the cooling system.



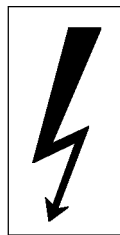
03sc07ab



03sc17ab

Decal for slinging - lifting point

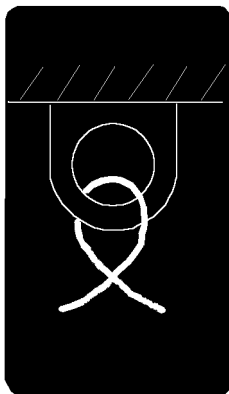
Decal 6 is affixed to the slinging-lifting points on the machine.
 Refer to the section "Slinging the machine from a crane."
 Refers to the slinging- lifting points on the machine.



b4670007

Voltage decal

Decal 12 is attached to the left-hand side of the machine.
 Indicates the activation of the battery main switch.



03sc16ab

Decal for lashing point

Decal 19 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.



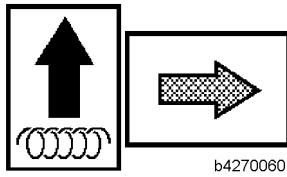
b4270062

Speed limit decal 20

Decal 7 is affixed to the rear of the machine and on the sides to the left and right-hand side of the ballast weight.
 Refers to the permitted speed limit for the machine.

LBH/01/003801/0003/7.03/len/Version: 06.2003

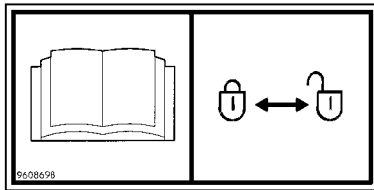
Decals on the machine



b4270060

Heating decal

Decal 13 is attached to the rear, left-hand side of the driver's cab. Indicates the activation of the motor-oil heating.



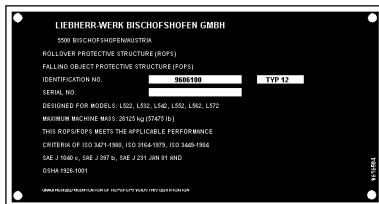
b4270056

Parking brake decal – on/off

Decal 2 is affixed to the parking brake control panel in the cab. It indicates the operating direction “on/off” of the parking brake.

Lubricant chart

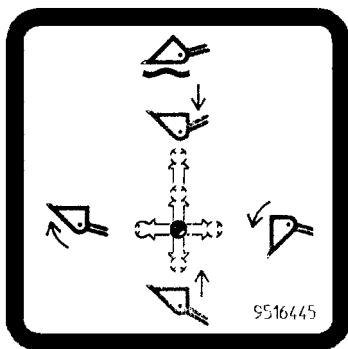
Decal 22 is attached to the door on the left-hand cab door. Figure – see the section “Maintenance.” Indicates the maintenance points and intervals in relation to lubricants and operating materials for the machine.



03sc09ab

ROPS decal

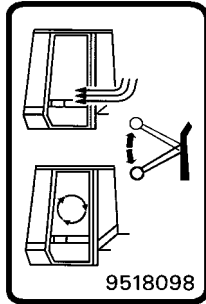
Decal 11 is affixed to the left of the driver's seat. Indicates the maximum loading of the rollbar structure.



b4270075

Decal for working hydraulics

Decal 20 is attached to the right-hand side of the driver's cab. Indicates the directions in which the LH control lever can be moved.

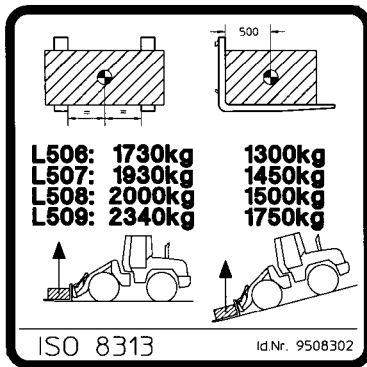


9518098

b4270066

Cab ventilation decal

Decal 17 is attached to the right-hand side of the driver's cab. Indicates the lever position for fresh or recirculated air.



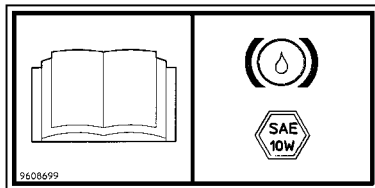
ISO 8313

Id.Nr. 9508302

b4270065

Forklift decal

Decal 16 is affixed on the right-hand side in the rear of the driver's cab. It indicates the maximum load when in forklift mode.



0608699

b4270076

Brake fluid decal

Decal 10 is attached to the cooler in the engine compartment. It indicates the brake-fluid specifications. Only use mineral motor oil SAE 10W.

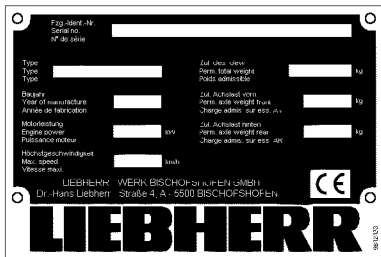
2.4.4 Type plates

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

Machine type plate

The decal 18 is affixed to the right-hand side of the front section. Details on the type plate:

- Type
- Vehicle ID No.
- Permissible total weight
- Year of construction
- Permissible front axle load
- Permissible rear axle load
- Engine output
- Maximum speed
- Homolog. no. (for Italian version only)
- Permissible trailer weight (for Italian version only)



typ00001
Type plate



typit001
Machine type plate - Italian version

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.

LBH101/003801/00037.03/lem/Version: 06.2003

- 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 “**Operating 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 dedealed 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 decals 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 "**Operating 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 safe working

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 supply 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 road-worthy.
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 **“Operating 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 “**Operating 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 “**Operating manual**”.
6. Lock the working hydraulics before leaving the driver’s cab.
Block the working hydraulics in accordance with the instructions in the “**Operating 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 of 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 decals.
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 starting 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 “**Operating 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 “**Operating 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 “**Operating 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 “**Operating manual**” for cyclical 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 “**Operating 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 “**Operating 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 equipment has to be dismantled for rigging, maintenance and repair work, it then must be re-installed and checked as soon as the respective job is finished.
12. When undertaking maintenance jobs, especially work under the machine, attach a warning decal “**DO NOT SWITCH ON**” to the ignition where it is clearly visible. Take out the starting 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 “**EXPLOSION**”!
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 discovered

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 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 equivalent. 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 unscrewing the breather 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 mix up hoses at 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 chain and a warning decal. 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, disconnect the multi-pin plug on the electronic gearbox control unit before starting any welding work on the machine, .

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 (decals, 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. Apply 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 “**Operating manual**”.
5. Lock the working hydraulics before leaving the driver’s cab.
Block the working hydraulics in accordance with the instructions in the “**Operating 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 “**Operating manual**”.

2.18 Safe maintenance of hydraulic hoses and hose lines

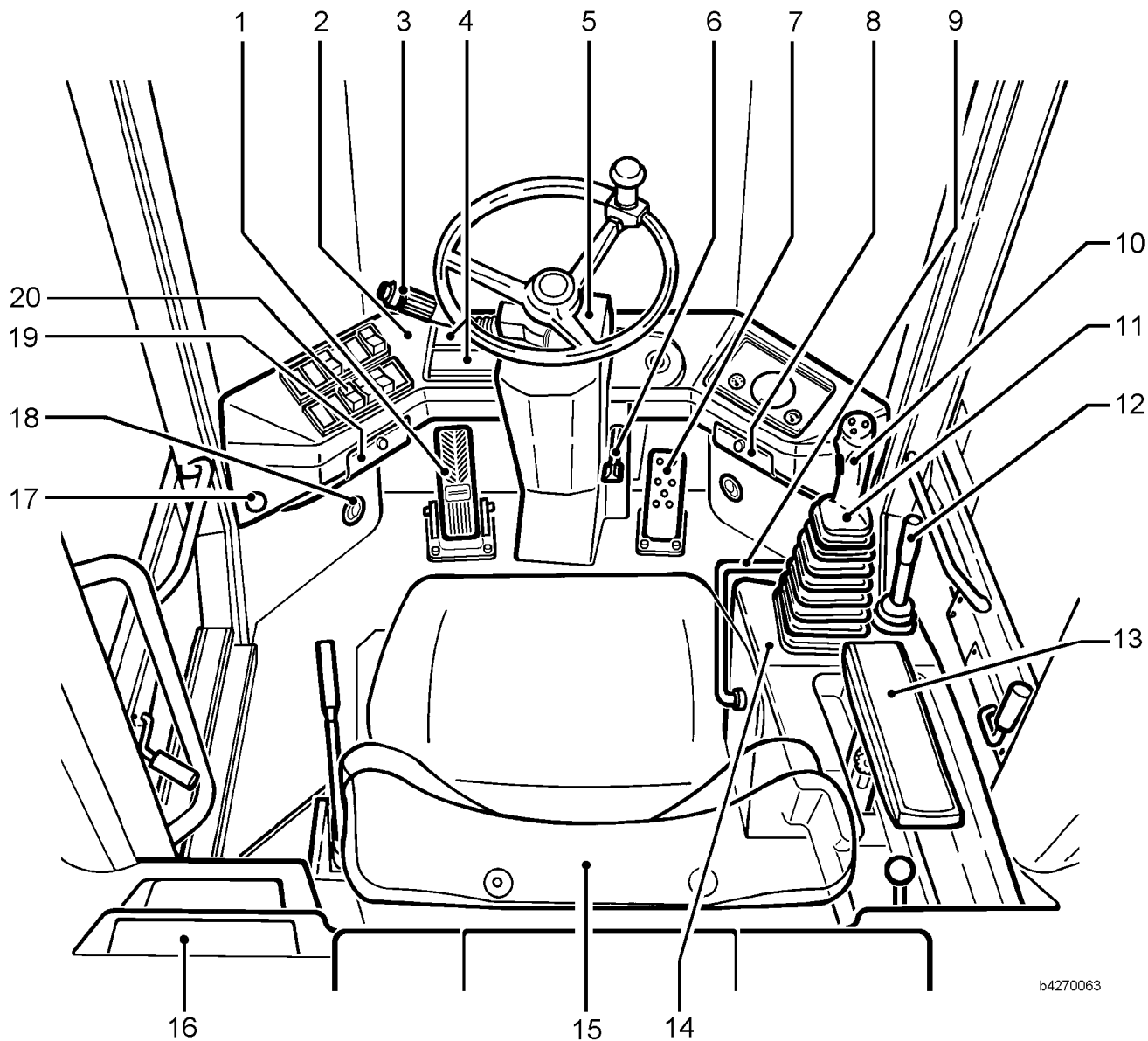
1. Repairing hydraulic lines and hydraulic hoses is prohibited!
2. All hoses, hose lines and threaded couplings must be checked regularly, at the very least once a year for leaks and visible decals of damage! Replace damaged parts immediately! Oil escaping under pressure can result in injuries and fires.
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

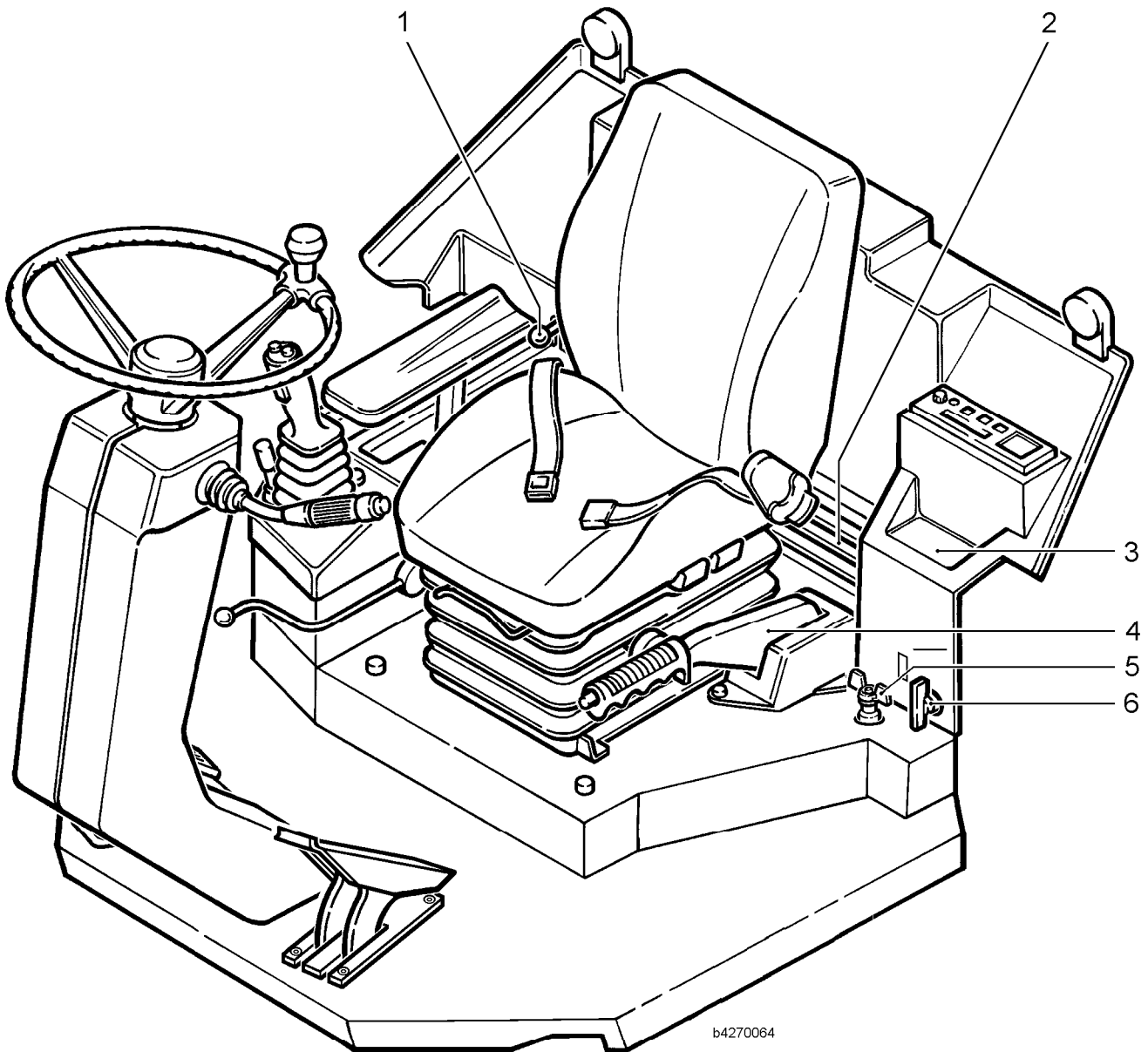


b4270063

Driver's cab - inside view

- | | | |
|---|---|---|
| 1 brake-inching pedal | 7 gas pedal | 14 control panel |
| 2 instrument panel | 8 control relay | 15 driver's seat |
| 3 steering column switch | 9 safety lever | 16 radio installation (optional) |
| 4 fuse box | 10 drive switch | 17 socket - cigarette lighter |
| 5 adjustable steering column
with steering wheel | 11 LIEBHERR control lever | 18 outlet nozzles -
heater/ventilation |
| 6 lever - steering column adjust-
ment | 12 control lever for optional work-
ing function | 19 control electronics |
| | 13 adjustable arm rest | 20 travel range button |

LBH/01/003801/0003/7.03/revVersion: 06.2003



driver's cab - inside view

1 lever - ventilation vent adjustment

2 outflow vent - incoming fresh air

4 parking brake

3 glove compartment

5 on/off tap for engine-oil heating

6 main battery switch

3.2 Operation

3.2.1 Cab access

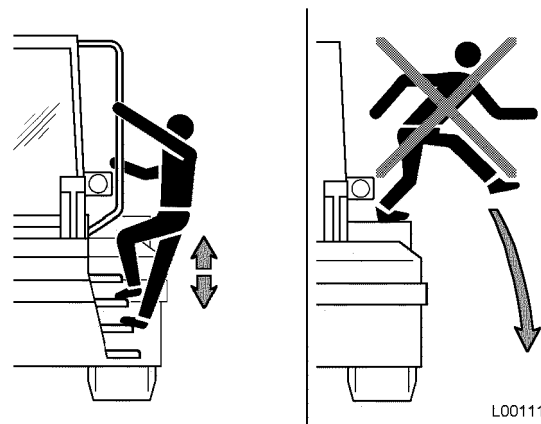
Personnel may only get on and off the machine using the access aids provided.

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.

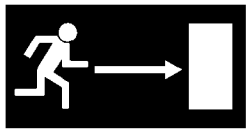
- Get on the machine via the left-hand cab access.

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.



bsym0002

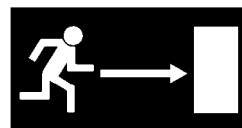
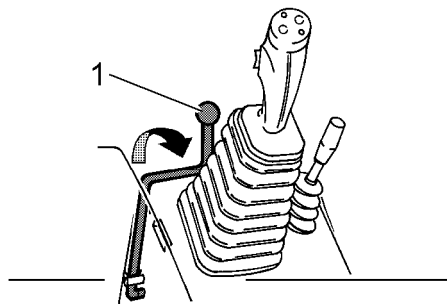
- Before starting up the machine, make sure that it is possible to leave the driver's cab through the right-hand driver's cab door from inside without hindrance.



b4670008

Driver's cab door, right

- Opening the driver's cab door: to do this, pull the lever 1 on the door lock upwards.



b4270009

Level – working hydraulics lock

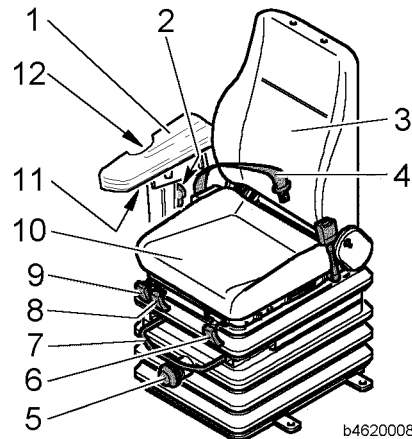
1 Level – working hydraulics lock

- Before leaving the driver's cab pull the lever 1 for the working hydraulics upwards.

The working hydraulics are no longer operational.

3.2.3 Driver's seat with gas-filled spring suspension

Layout



Driver's seat – main components and adjustable elements

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



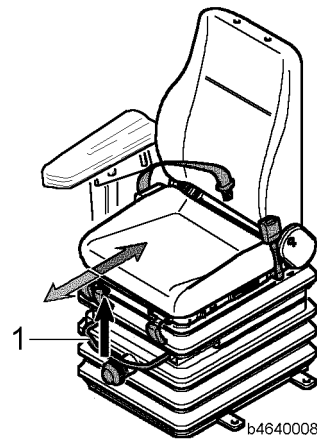
Risk of injuries if the driver's seat is improperly adjusted!

! 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.



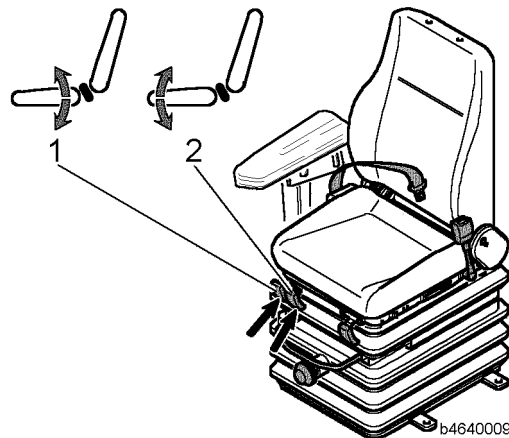
Adjustment – horizontal

1 lever – horizontal adjustment

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

Inclining the seat surface

Adjustments are 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.

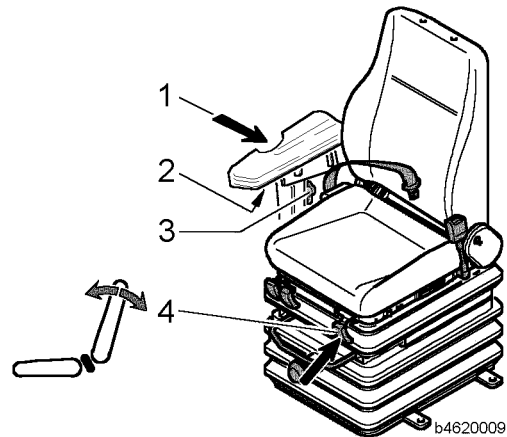
Adjusting the seat height

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.

Adjusting the 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
2 clamp screw – horizontal adjustment – arm rest

3 star-grip – height adjustment – arm rest
4 lever – adjustment – backrest

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

Adjusting the arm rest

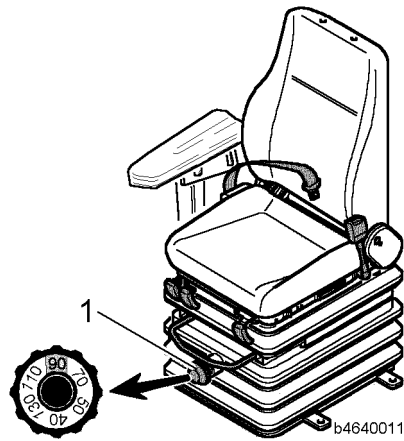
The height, inclination and horizontal position of the arm rests can be adjusted separately.

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

Adjusting seat suspension

The seat suspension can be adapted to the driver's individual body weight. Adjustments are 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.

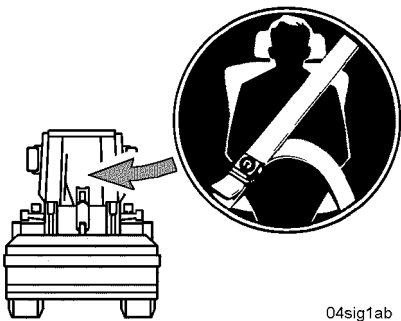
3.2.4 Safety belt

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.



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!

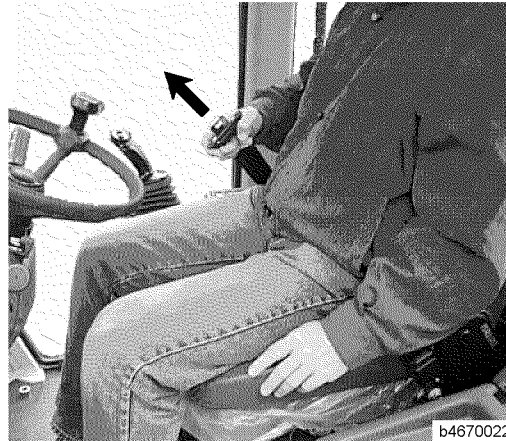
If the machine tips or rolls over, the driver could suffer fatal injuries!

! 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.

3.2.5 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

Layout

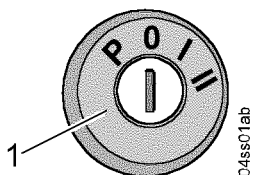
Switching positions:

P – parking position

0 – 0 position / engine shutdown

I – contact, operating preglow position

II – starting position



Starter switch

Switching electrical system on or off

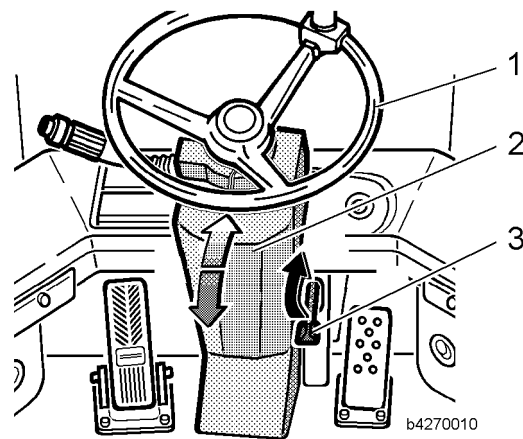
- Switch the machine electrical system on or off with the ignition key.

3.2.6 Steering column and steering wheel

Adjusting the 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 wheel
2 steering column

3 pedal

- Raise lever 3 by hand in the direction of the arrow.
- By pulling or pushing the steering wheel 1, adjust the steering column 2 as required.
- Lock the selected position of the steering column 2 by releasing the pedal 3.

3.2.7 Steering column switch

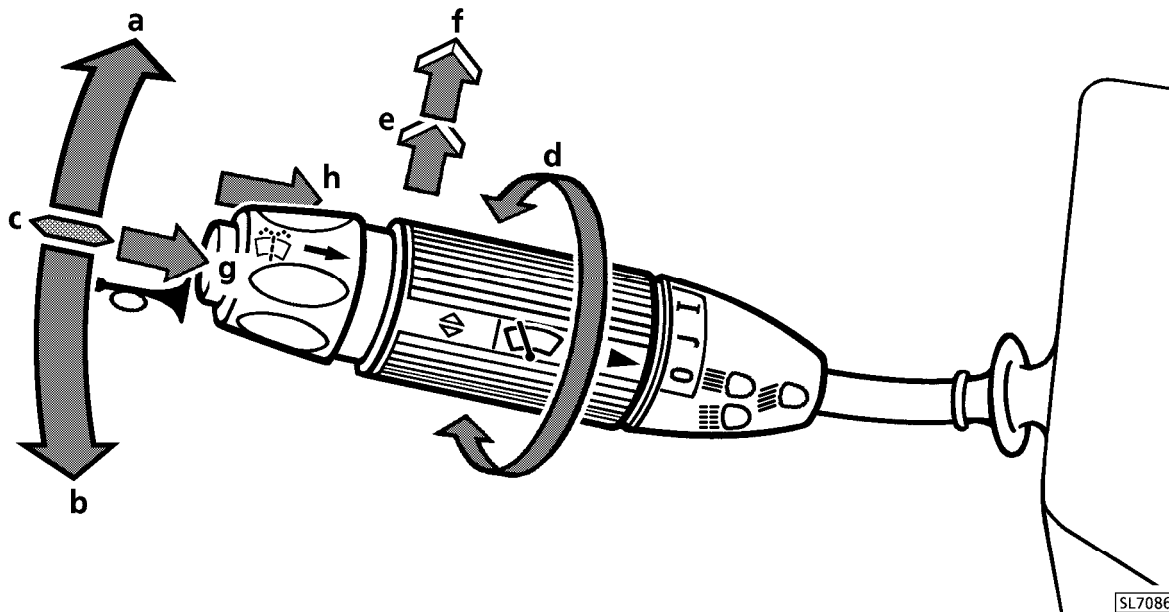
The steering column switch is mounted on the left-hand side of the steering column.

Layout

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

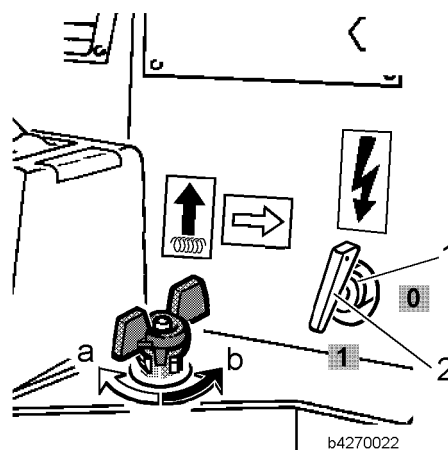


Steering column switch

Functions of the steering column switch when activated in direction:

- a – drive direction display: right-hand indicators
- b - drive direction display: left-hand findicators
- c - central position: neutral position
- d - windshield wipers: Front windshield
 - 0 – level-0
 - J – interval
 - I – level-I
- e - optical horn: light horn
- f - driving light: high beam
- g - acoustic horn: horn tone
- h - windshield wiping / washing system Front windshield

Operating driving light or high beam

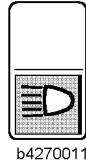


Main battery switch

Make sure that the machine's main battery switch is turned on.

- key 2 to position - 0 - = OFF
- key 2 to position - 1 - = ON

LBH/01/003801/0003/7.03/len/Version: 06.2003



b4270011

Switching on driving light – dipped beam

- Turn the switch - parking/driving light to level I.

The parking light goes on.

- Turn the switch - parking/driving light to level II.

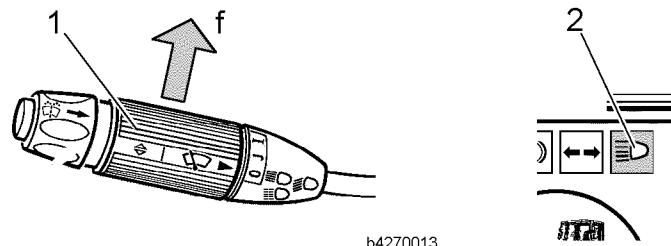
The driving light goes on.

- To switch off the parking light and driving light: push the switch all the way back.

All functions are switched off.

Switching on the driving light – high beam

Make sure that the switch for the parking/driving light is pushed down.



b4270013

Steering column switch and indicator unit

1 steering column switch

2 symbol field – headlight

- Press the switch for parking/driving light.

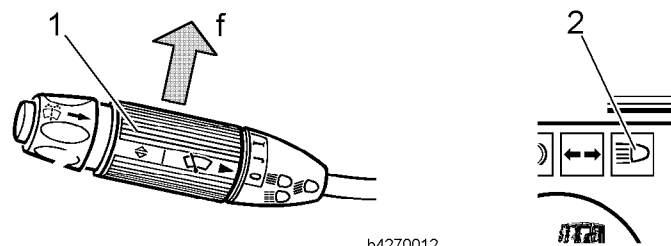
The driving light illuminates.

- Push the steering column switch 1 in direction - f.

The symbol field 2 for the driving light must light up.

The high beam lights up.

Switching back to driving light – dipped beam



b4270012

Steering column switch and indicator unit

1 steering column switch

2 symbol field – headlight

- Switching over to dipped beam: push the steering column switch 1 in direction - f.

The symbol field 2 for the headlight must go out.

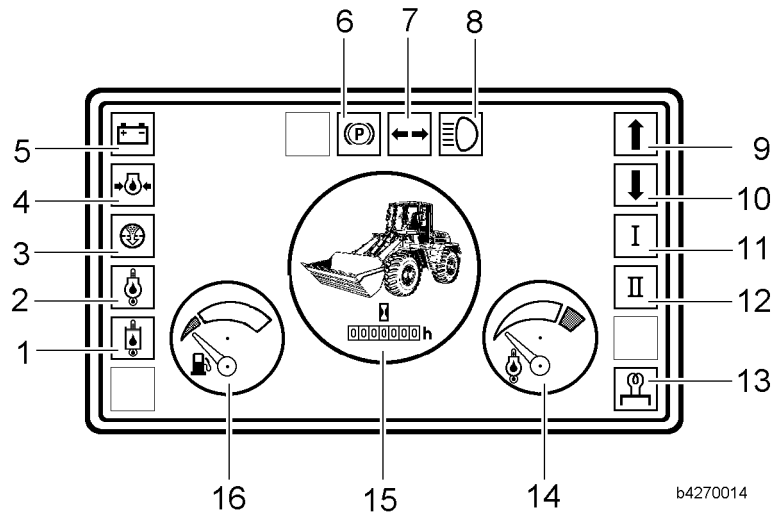
The driving light – dipped beam lights up.

3.2.8 Display unit

The layout and function of the control unit is described in this section. The detailed description of operation is to be found in the appropriate sections in the chapter 'Operation, handling'.

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Layout



b4270014

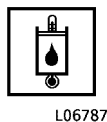
Display unit

- | | |
|--|--|
| 1 symbol field – hydraulic oil overheating | 8 symbol field – headlight |
| 2 symbol field – engine overheating | 9 symbol field – travel direction „forwards” |
| 3 symbol field – air filter contamination | 10 symbol field – travel direction „reverse” |
| 4 symbol field – engine oil pressure | 11 symbol field – travel range -I- |
| 5 symbol field – battery charging (charge control) | 12 symbol field – travel range -II- |
| 6 symbol field – parking brake | 13 symbol field – preglow monitor |
| 7 symbol field – direction indicator system | 14 engine oil temperature display |
| | 15 operating hours counter |
| | 16 fuel gauge |

The indicator unit is installed at the front on the instrument panel. It consists of symbol fields for the various warning and display functions. Each symbol field is assigned the appropriate colour (red, yellow, green or blue).

Function description

Hydraulic oil overheating display/message



L06787

Symbol field – hydraulic oil overheating 1

Symbol field colour – red

lights up when the hydraulic oil temperature is too high.

The warning function of the symbol field is supported by an acoustic signal.

When the symbol field lights up:

- the travel range is automatically switched back to - I,
- the symbol fields – travel range - I - and - II-light up.

LBH/01/003801/00037.03/len/Version: 06.2003

Displaying or indicating engine overheating



L06729

Symbol field – engine overheating 2

Symbol field colour – red

Warning functions:

- lights up when the engine oil temperature is too high
- lights up when the cool blower-drive breaks down

The warning function of the symbol field is supported by an acoustic signal.

Air filter contamination display



L06731

Symbol field – air filter contamination 3

Symbol field colour – red

lights up when the air filter is heavily contaminated. The air filter must be serviced.

Engine oil pressure display/message



L06728

Symbol field – engine oil pressure 4

Symbol field colour – red

Warning functions:

- lights up when the starting 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:** diesel engine is running

The warning function of the symbol field is supported by an acoustic signal.

Battery charging – charging control display



L06730

Symbol field – battery charging (charge control) 5

Symbol field colour – red

Warning functions:

- lights up 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-belt of the alternator drive tears

Parking brake – activation display



L06735

Symbol field – parking brake 6

Symbol field colour – red

Warning functions:

- lights up when the parking brake is engaged
When the parking brake is released, the symbol field goes out.

Direction indicator system – activation display



L06734

Symbol field – direction indicator system 7

Symbol field colour – green

Display functions:

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

Headlight – activation display



L06736

Symbol field – headlight 8

Symbol field colour – blue

lights up when the headlight is switched on.



L06727

Travel direction “forwards” display

Symbol field – travel direction „forwards” 9

Symbol field colour – green

displays the machine’s preselected travel direction “forward”

Refer to the section “LIEBHERR control lever.”



L06733

Travel direction “reverse” display

Symbol field – travel direction „reverse” 10

Symbol field colour – green

displays the machine’s preselected travel direction “reverse”

Refer to the section “LIEBHERR control lever”.



L22083

Displaying travel range - I -

Symbol field – travel range -I- 11

Symbol field colour – green

displays the machine’s preselected travel direction - I -

lights up when the machine is in travel range - I -

Refer to the section “Switches on the instrument panel”



L22084

Displaying travel range - II -

Symbol field – travel range -II- 12

Symbol field colour – green

displays the machine’s preselected travel range - II -

Lights up when the starting key is in position - I - and when the engine starts up.

Lights up when the machine is in travel range - II -.

See the section “Switches on the instrument panel”.



L22067

Preglow monitoring

Symbol field – preglow monitor 13

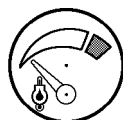
Symbol field colour – yellow

Function:

– at external temperature of 0° C and below

lights up when starting key turned to ignition, run, preglow position - I -

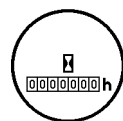
At the end of the preglow time and when the diesel engine is started, the symbol field goes out.



b4270098

Engine oil temperature display

Displays the engine oil temperature of the diesel engine.



L00188

Operating hours counter

Displays the operating hours.



b4270099

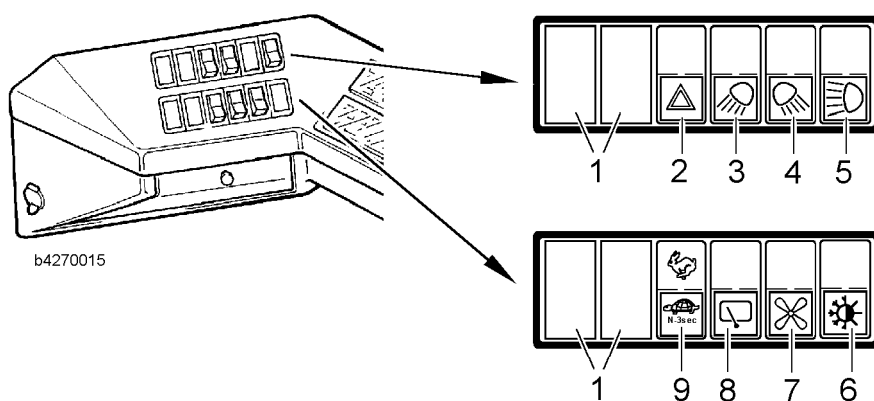
Fuel gauge

Indicates the level of the diesel fuel tank.

3.2.9 Switches on the instrument panel

The layout and function of the switches is described in this section. The description of operation is to be found in the appropriate sections in the chapter "Operation, handling"

Layout



Switches on the instrument panel

- | | |
|--|--|
| 1 dummy plug | 6 air-conditioning switch |
| 2 hazard warning system switch | 7 blower - heating/air-conditioning switch |
| 3 working floodlights/front switch | 8 back windshield wiper switch |
| 4 working floodlights/rear (optional) switch | 9 travel range button |
| 5 parking light/driving light switch | |

The switches are integrated in the instrument panel.

Function description

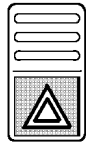
Dummy plug

Dummy plug 1
Not assigned.
Reserved for special functions.



b4670028

LBH/01/003801/0003/7.03/ent/Version: 06.2003



b4670027

Switching on the hazard warning system

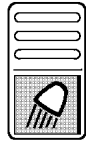
Switch – warning lights 2

Symbol field colour – red

For switching the hazard warning system ON or OFF.

When the switch is activated:

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



b4670030

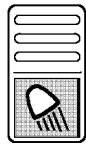
Switching on the working floodlights/front (optional)

Switch - working floodlights/front 3 – optional

Symbol field colour – red

For turning the working floodlights/front ON or OFF.

When the switch is pressed - the working floodlights/front go out.



b4670031

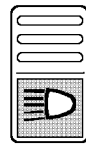
Switching on the working floodlights/rear (Optional)

Switch - working floodlights/rear 4 – optional

Symbol field colour – red

For turning the working floodlights/rear ON or OFF.

When the switch is pressed - the working floodlights/rear go out.



b4270067

Switching on parking or driving light

Switch – parking light/driving light 5

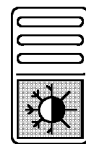
Field colour – green

Function for parking light - switch/level - I -:

- For switching the parking light ON or OFF
- After the switch has been turned to level - I -, the following lights on the machine must light up:
 - Driving headlamps – left/right (sidemarker lamp)
 - Tail lamps – left/right

Function for driving light – switch/level - II -:

- for turning the driving light ON or OFF
- After the switch has been turned to level - II -, the following lights on the machine must light up:
 - Driving headlamps – left/right
 - Tail lamps – left/right



b4270096

Switching on air-conditioning (optional)

Switch – air-conditioning 6

Field colour – green

For switching the air-conditioning system ON or OFF.

After actuating the switch, the air-conditioning is switched on/off.



b4270068

Switching on blower - heating/air-conditioning

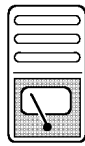
Switch – blower - heating/air-conditioning 7

Field colour – green

For turning the heating/air-conditioning ON or OFF.

After actuating the switch, the heating/air-conditioning blower is switched on/off.

Switching on or off the windshield wiping and washing system - rear window on or off



b4270069

Switch – windshield wiper and washer system – rear window 8

Field colour – green

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

Selecting travel ranges



b4270120

Travel range button 9

Field colour – green

For selecting travel ranges I, II and neutralising the travel direction.

After the electrical system has been turned on, travel range - II - is automatically activated.

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

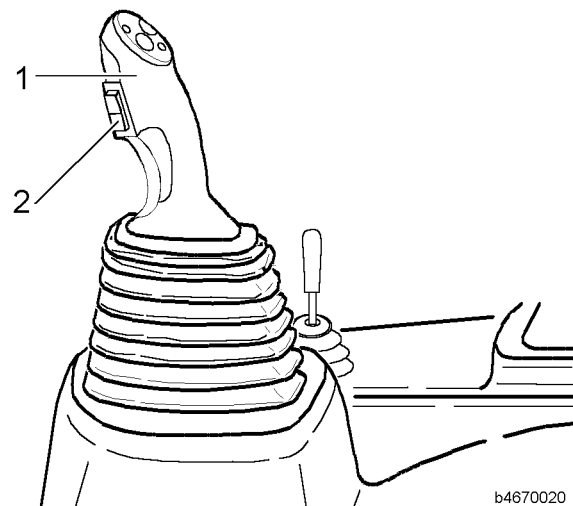
Selecting the travel ranges:

- Press the “Tortoise” symbol to switch the travel range down to I .
- Press the “Hare” symbol to switch the travel range up to II .

3.2.10 LIEBHERR control lever

Use the “LIEBHERR control lever” (LH control lever) to control the travel direction and movements of the working attachment.

Layout



b4670020

LH control lever

1 pilot control lever

2 travel direction switch

The LH control lever contains the controls for selecting the travel direction and operating the working attachment.

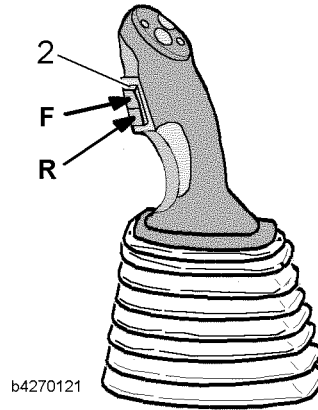
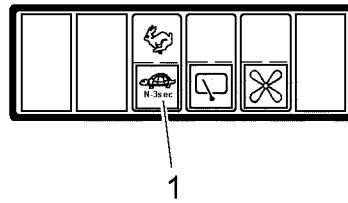
LBH/01/003801/0003/7.03/lem/Version: 06.2003

Travel direction switch

Function description

Move the travel direction switch to “F” or “R” to change the direction of travel.

See also the the “Driving mode” section.



Switching the direction of travel

- 1 button for switching the travel direction to neutral
- 2 switch for travel direction

- F Forward
- R Reverse

Functions of the travel direction switch:

- F is the direction – FORWARDS (Forward)
- R is the travel direction – REVERSE (Reverse)

Symbol fields are used to show the preselected driving direction on the instrument panel in the display unit.

See section “Indicator unit.”

Function – neutral selection:

- Pressing the **Tortoise** symbol on the button 1 switches the direction of travel to neutral - **N** - after approximately 3 seconds.

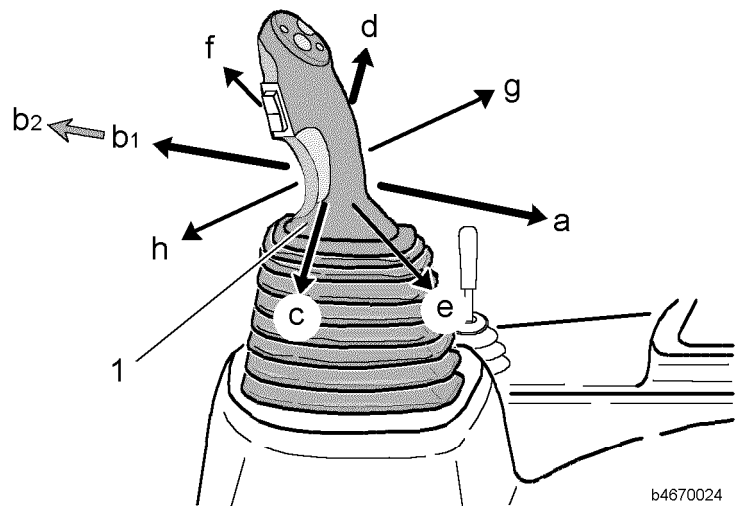
LH control lever for controlling the working attachment

Layout

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

Function description

See also the section “Working with the attachment.”



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” – lifting arms are lowered
- b2 – „Float position function” – lift arms move to float position
- 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 – The lift arms are lowered and the bucket is simultaneously tipped up

3.2.11 Electrical actuation of additional functions (option)

The machine can be optionally fitted with electrical actuation for an hydraulic quick-change device and additional attachments.

Function description

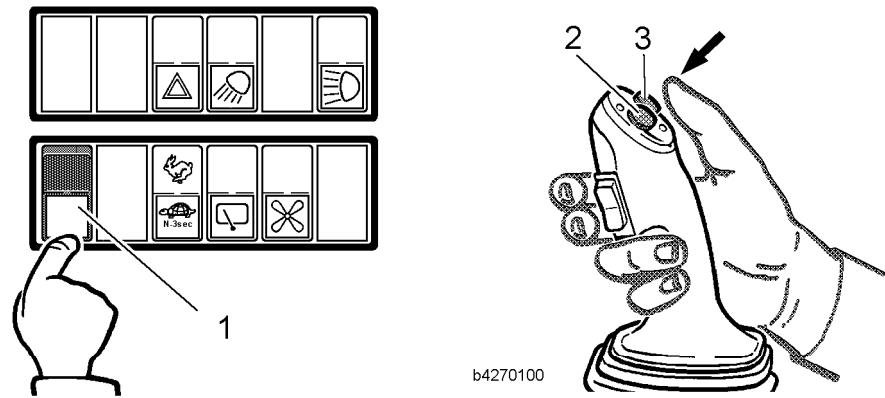
Electrical actuation is effected using a button on the LH operating lever.

Button actuation - hydraulic quick-change device

- 3. control circuit (additional operating lever does not apply)

button actuation - optional attachment

- 4. control circuit



Electrical actuation of optional functions

1 switch
2 button

3 button

Switching on switch 1 on the instrument panel activates the optional functions.

Actuation of button 2 und 3 on the LH operating lever and the resulting functions:

2 – (function depends on the type of optional attachment mounted)

3 – (function depends on the type of optional attachment mounted)

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

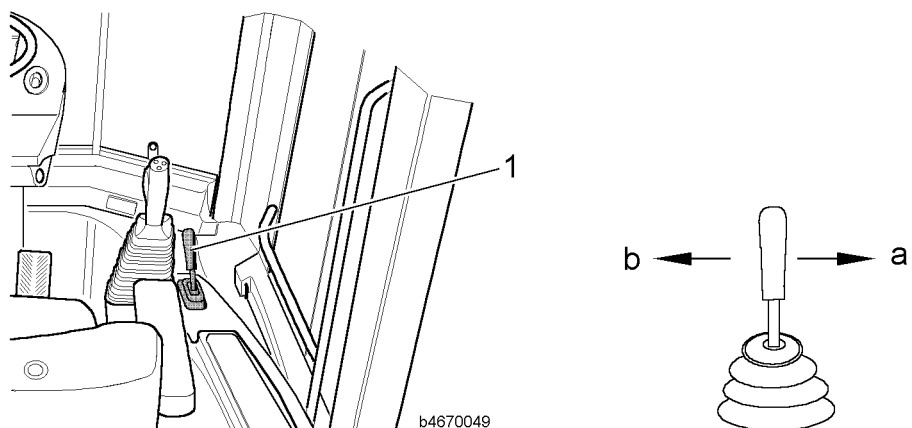
3.2.12 Control lever for optional working functions

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

LBH101/003801/00037.03/len/Version: 06.2003

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 section “Operation”, “Working with optional equipment”, or to the Operator's manual for the additional equipment.

3.2.13 Heating, Ventilation

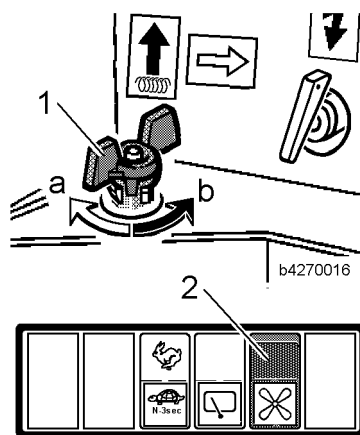
Switching the heating system on/off

Control elements for the heating:

- 1 – Turning the engine oil inlet on/off
- 2 – Switch – blower

Make sure:

- the machine electrical system is switched on
- the outlet nozzles for the required air stream are open e.g. to the body, front windscreen, rear window

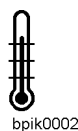


- Switching on the heater: Turn switch 2 to level 1

The air stream is blown into the driver's cab via outlet nozzles.

- The temperature can be continuously adjusted.

Regulating the temperature: Turn the on/off switch 1 to the required position.



bpic0002

Regulating the blower

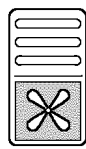
The blower is switched on/off with the blower switch 2.

Blower levels:

- Level 0 – position – OFF
- Level 1 – gentle air flow
- Level 2 – strong air flow

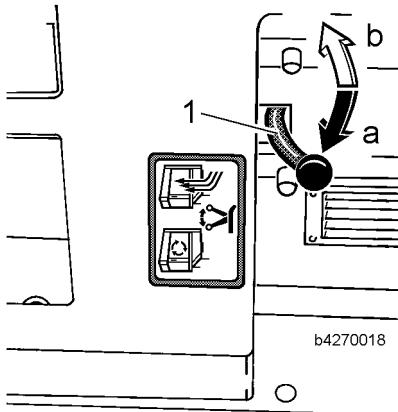
- Turn switch 2 to the required level.

The air stream is blown into the driver's cab via outlet nozzles.



b4270068

LBH/01/003801/0003/7.03/ent/Version: 06.2003



Regulating air supply

The lever for air vent adjustment is mounted behind the driver's seat on the right.

Lever – ventilation vent adjustment 1

Lever settings:

Position a – recirculated air

Position b – fresh air

- Switching between fresh and recirculated air: turn the lever 1 to the required position.

3.2.14 Air-conditioning (optional)

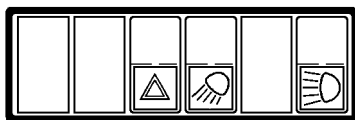
Operating the air-conditioning system

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.

The diesel engine must be running before the air-conditioning is switched on.

- Switching on the air-conditioning system: turn switch 1 to level 1 or 2.



Air-conditioning lever switch

- The required cab temperature can be set by turning the switch on the heater:

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

- turn switch 1 to level 2
- close heater on/off switch
- close cab windows and doors
- turn fresh air/circulate air to circulate
- air the cab well if there is warm stale air.

Re-heat mode

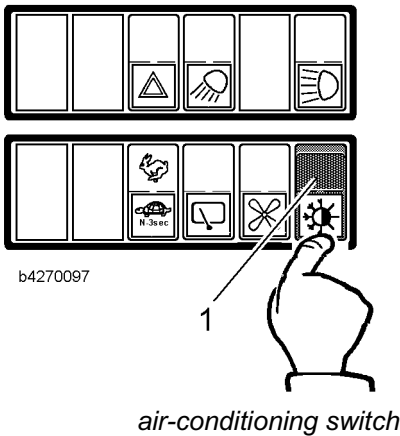
The air-conditioning system can be used to de-humidify the cab air when the weather is cool and damp.

- 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

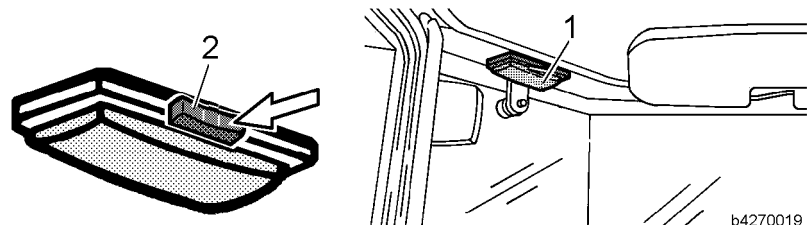
- Switching off the air-conditioning system: to do this press the button – air-conditioning system



3.2.15 Internal cab illumination

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

Switching the internal illumination on/off



Internal illumination

1 Internal illumination

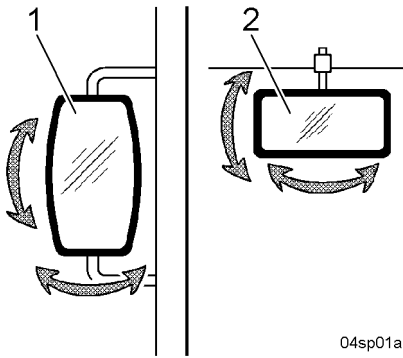
2 Switch

- Switching the internal illumination on/off: press switch 2 .

3.2.16 Inside and outside mirrors

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

Adjusting the mirrors



04sp01ab

Adjusting the mirror

- 1 exterior mirror
- 2 interior mirror

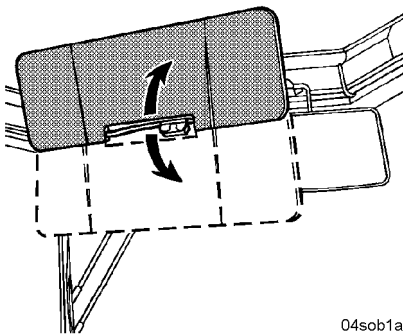
- Individually adjust all mirrors by turning them.

3.2.17 Sun visor

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

Adjusting the sun visor

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



04sob1ab

Adjusting the sun visor

3.2.18 Electric windshield wiper and washer system

Layout

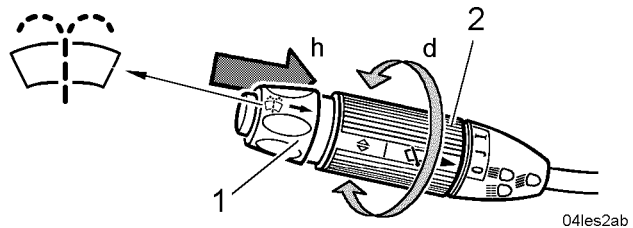
The machine is equipped with an electric windshield wiper and washer system for the front and rear windows.

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

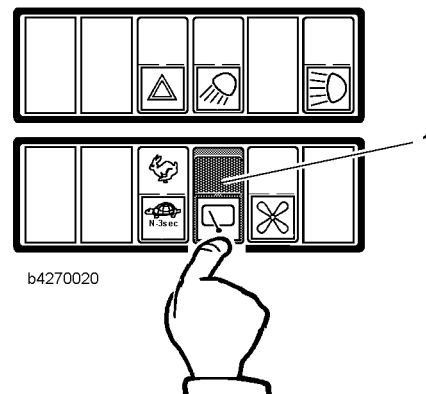
1 pushbutton
2 handle

h switching on the windshield wiper and washer system
d windshield wiper actuation

- Wipe window: turn handle 2 to the required level J – I
 - Wash window: press button 1 on the steering column switch
- Washing solution is sprayed onto the front windshield via outlet nozzles.

Switching on the windshield wiper and washer system – rear window

The window wiping and washing system is actuated by pressing switch 1



b4270020

Windshield wiper switch

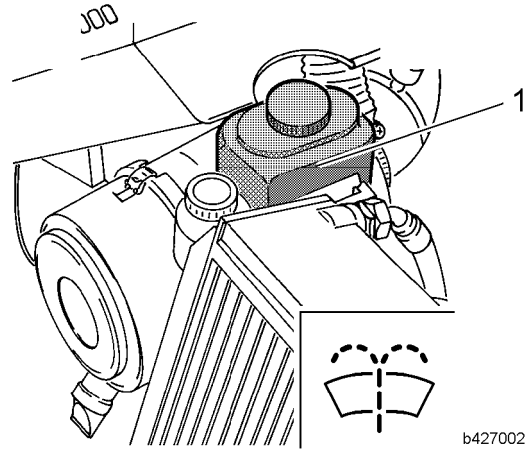
1 Switch for windshield wiper system– rear windshield

- Wiping the window: press switch 1 .
The back windshield wiper is activated.
 - Wiping and washing the window: press switch 1 press the button 1 on the steering column switch
- Washing solution is sprayed onto the rear window via an outlet nozzle.
- Switching off the window washing system: press switch 1 back.

LBH/01/003801/0003/7.03/lem/Version: 06.2003

3.2.19 Reservoir for windshield washer fluid

Layout



Windshield washer fluid container

1 container with filling inlet

The container 1 is on the left-hand side under the engine compartment cover above the air filter.

Topping up with windshield washer fluid

Filling quantity approx. 1.5 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!



04sy02ab

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

3.3 Handling

3.3.1 Daily start-up routine

Make sure that:

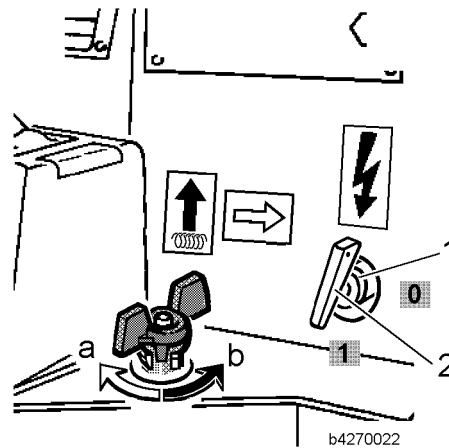
- before starting up the machine each day, the “(daily) maintenance tasks every 10 operating hours” should be carried out. See “Maintenance” chapter.
After the “maintenance jobs (daily) every 10 operating hours” have been completed, the machine should be moved into the operating position. See “Operating position” section .
- enough diesel fuel should be available for the foreseen daily workload. See “Refuelling with diesel fuel” section .

Operating position

To bring the machine into the operating position proceed as follows.

Turning on the main battery switch

The main battery switch is located on the left-hand side of the driver’s cab at the back.



Main battery switch

1 main battery switch

2 main switch - key

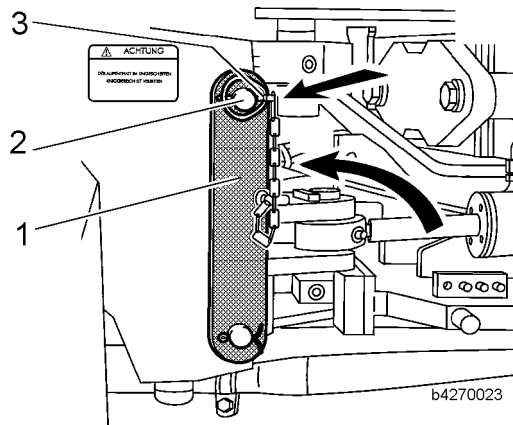
Closing service doors, hatches and hoods

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

Releasing the articulation lock

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

LBH/01/003801/0003/7.03/ent/Version: 06.2003



Articulation lock

1 safety bar
2 pin

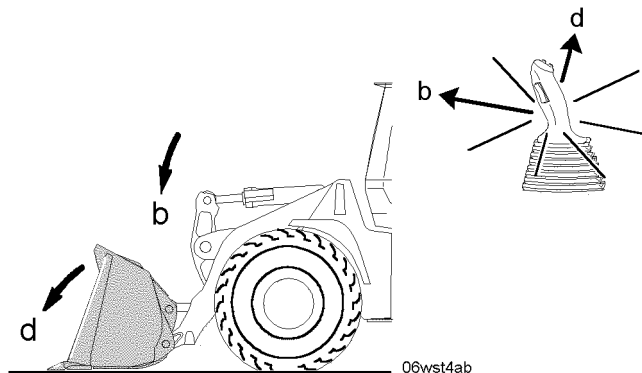
3 spring clip



Risk of accidents when steering is blocked!
When the articulation lock is engaged, no steering functions are possible.
! Release the articulation lock

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

Moving the working attachment to the starting position

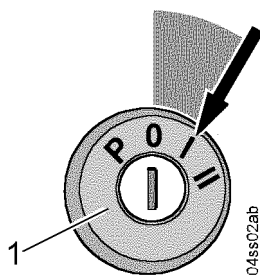


Starting position

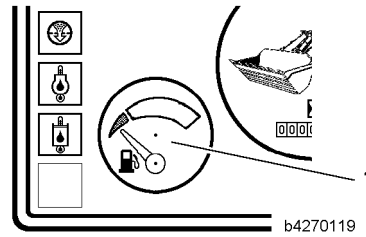
- Set the bucket down flat on the ground.

Refuelling with diesel fuel

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



Starter switch – contact position

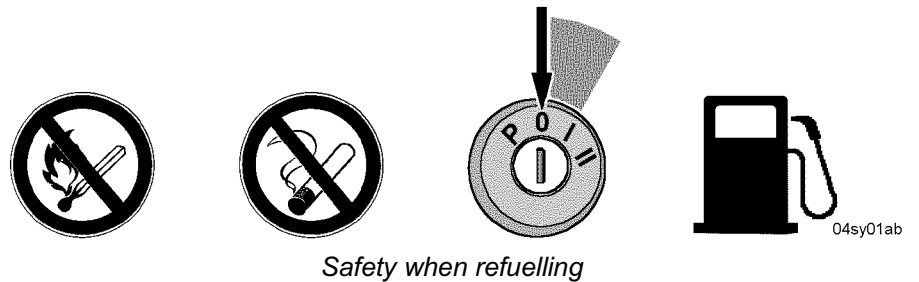


Display unit

1 Fuel gauge

- Read the display in the segment field – fuel gauge 1 to see if there is enough diesel fuel in the tank.

If there is too little diesel fuel “fuel needle” drops to the red range. There will still be a residual volume of approx. 25 l left in tank.



Danger

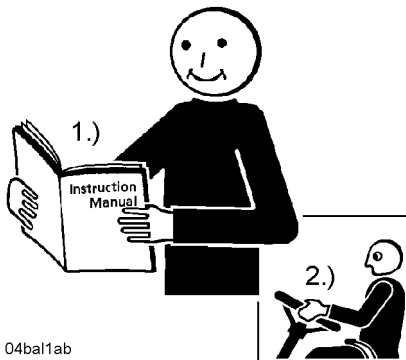
There is a risk of fires and explosions!

- ! 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 ready for operation.

3.3.2 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:

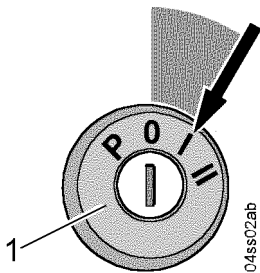
- the machine is equipped with a hydrostatic travel drive
- the engine cannot be bump-started or tow-started

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

Lamp check

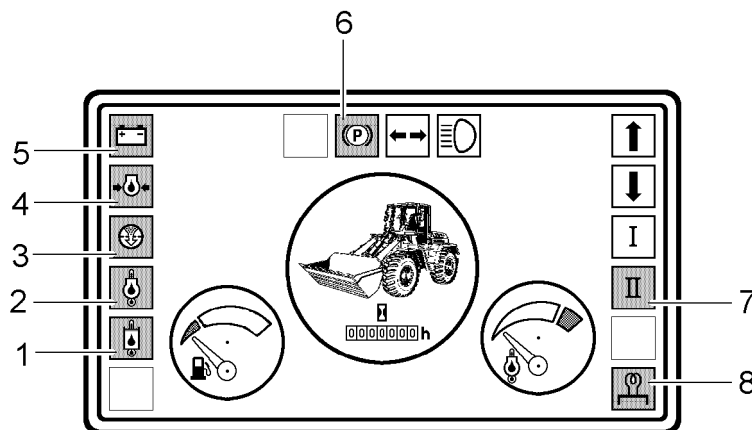


04ss02ab

During a "lamp check" the following symbol fields are checked by the control electronics.

- Switch on the electrical system by turning the ignition key to position - II -.

The following symbol fields briefly light up just briefly (duration approx. 2.5–3 secs):



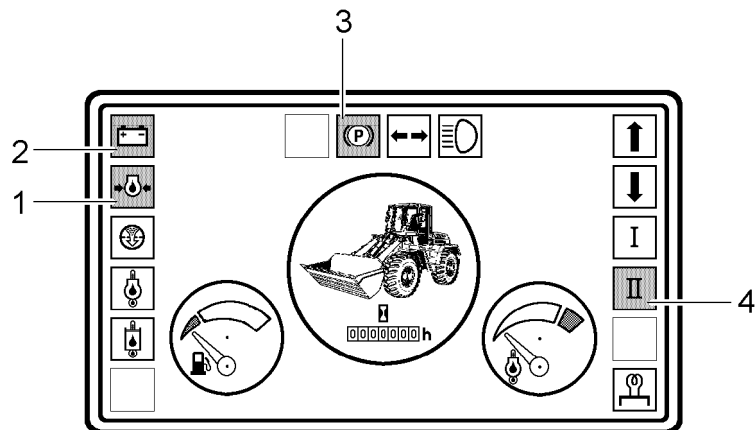
b4270024

Indicator unit – lamp check

LBH/01/003801/00037.03/len/Version: 06.2003

- symbol field – hydraulic oil overheating 1
- symbol field – engine overheating 2
- symbol field – air filter contamination 3
- symbol field – engine oil pressure 4
- symbol field – battery charging (charge control) 5
- symbol field – parking brake 6
- symbol field – travel range - II - 7
- symbol field – preglow monitor 8

After the “Check,” has been completed successfully, the following symbol fields must still be illuminated with the key at position - I -:



b4270025

Indicator unit – lamp check

- symbol field – engine oil pressure 1
- symbol field – battery charging (charge control) 2
- symbol field – parking brake 3
- symbol field – travel range - II - 4

Preheating the engine

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

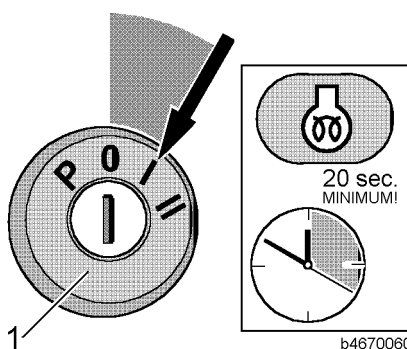
It takes at least 20 seconds and when ambient temperatures are extremely low it can last over 120 seconds.

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.

- Switch on the electrical system by turning the ignition key to position - I -.

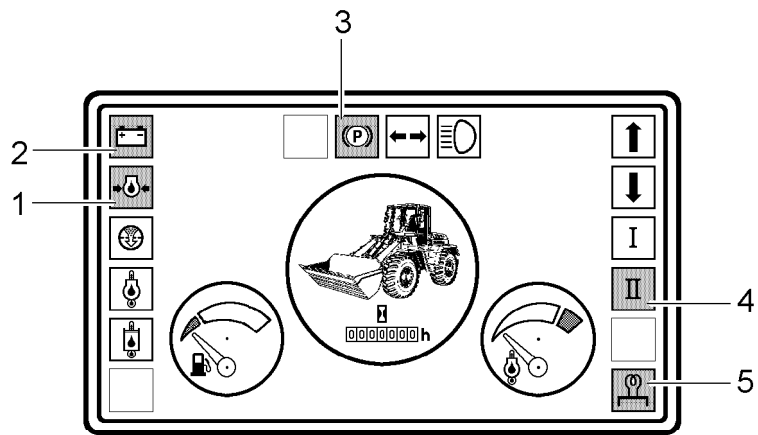
LBH/01/003801/0003/7.03/ent/Version: 06.2003



b4670060

Starter switch – contact- preglow position

The following symbol fields must light up:



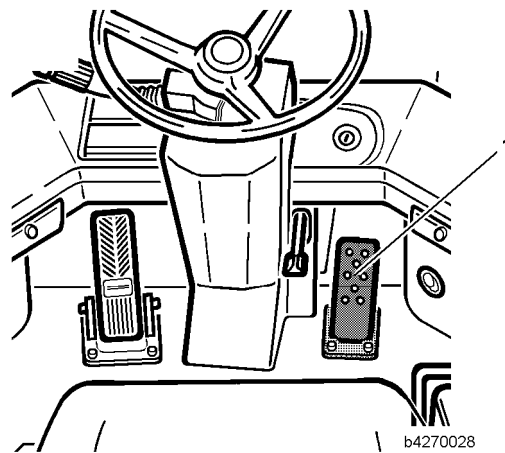
b4270026

Display unit

- symbol field – engine oil pressure 1
- symbol field – battery charging (charge control) 2
- symbol field – parking brake 3
- symbol field – travel range - II - 4
- symbol field – preglow monitor 5

Starting the engine

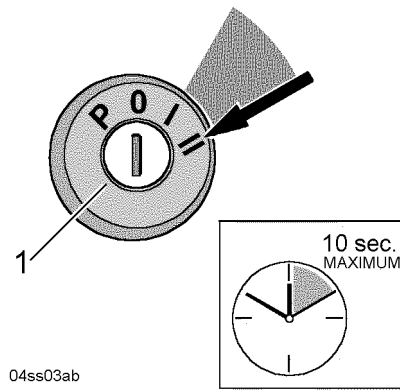
- Wait until symbol field 5 for the preglow monitor goes out. When the symbol field goes out, the preglow time is over. Note: when the engine is being preheated, the symbol field 5 goes out when the preglow time has elapsed, i.e. when the engine is ready. It takes at least 20 seconds and when ambient temperatures are extremely low it can last over 120 seconds. The engine can now be started.



b4270028

Gas pedal

- Press gas pedal 1 approx. 3/4 of the way down to adjust the diesel engine speed.



Starter switch – starting position

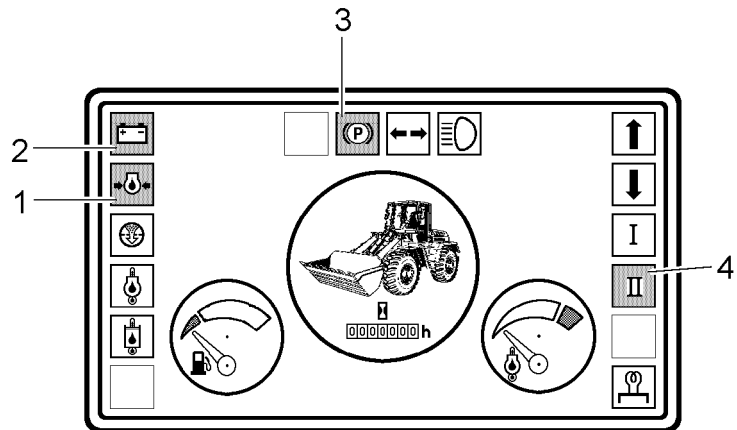
- Turn the starting key to the starting position - II - and keep it in this position until the engine starts.
- **Do not attempt to start the engine for longer than 10 seconds without interruption.**
- If the engine does not cut in:
turn the starting key back to the 0-position

Troubleshooting

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 using with the malfunction chart (see the “Malfunctions” section) and rectify it.

- As soon as the engine starts running, release the starting key. The starting key returns automatically to the operating position. When the engine cuts in, the following symbol fields must go out:



Display unit

LBH/01/003801/0003/7.03/ent/Version: 06.2003

- symbol field – engine oil pressure 1
- symbol field – battery charging (charge control) 2

When the engine cuts in, the following symbol fields must light up:

- symbol field – parking brake 3
- symbol field – travel range - II - 4

Troubleshooting

Do the symbol fields 1, 2 not go out or does the symbol field 4 not light up?

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

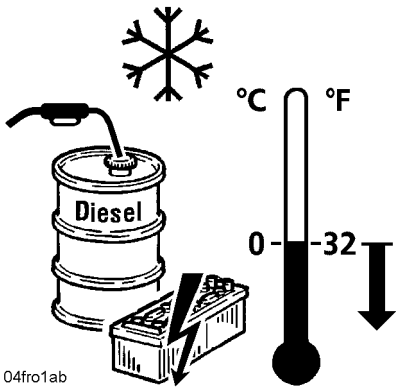
- Adjust the engine speed with gas pedal.

Precautions when starting at temperatures below freezing

The following measures improve the starting performance at low temperatures.

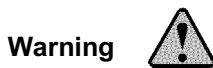
Precautions:

- check battery charging
if necessary recharge the battery
- use winter-grade fuel
See “Lubricants and fuels” section under Winter operation.



04fro1ab

Winter operation



Warning

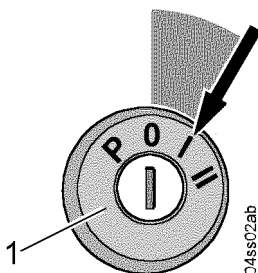
Risk of explosion with the diesel engine!
There is a risk of explosions, when using volatile fluids to start diesel engines with preglow systems!
! Do not use volatile starting aids.

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

3.3.3 Driving mode

Situation after the electrical system is switched on:

- when the parking brake is engaged, the travel lockout is active
- preselection of the travel direction is not possible
- The travel range - II - is automatically activated.
- Preselection of the travel ranges is possible.



04ss02ab

Preparations for driving mode

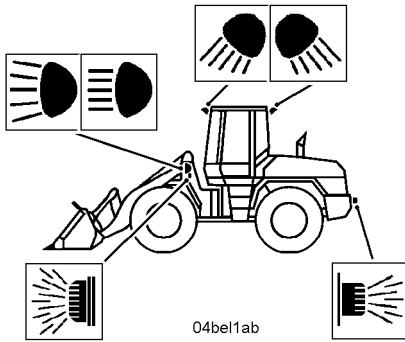
The preparations for driving mode should be carried out in the following sequence.

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

See "Operating position" section .

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

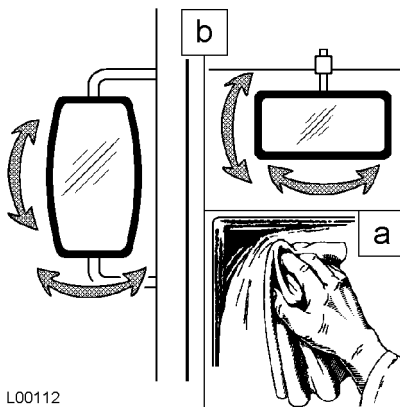
Checking the lighting equipment



Headlamp adjustment

Checking inside and outside mirrors

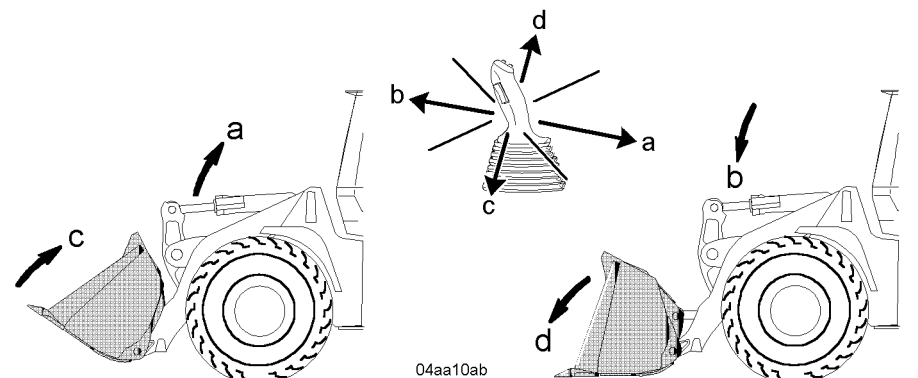
- Clean the inside and outside mirrors.
- Adjust the inside and outside mirrors.



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".



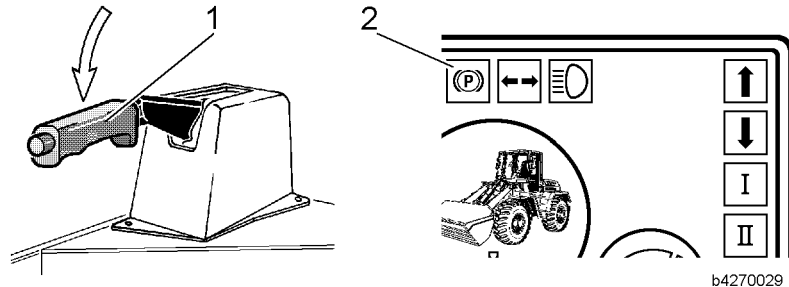
Bucket position

LBH/01/003801/0003/7.03/entVersion: 06.2003

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

Releasing the parking brake

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



Display unit and lever – parking brake

1 lever – parking brake

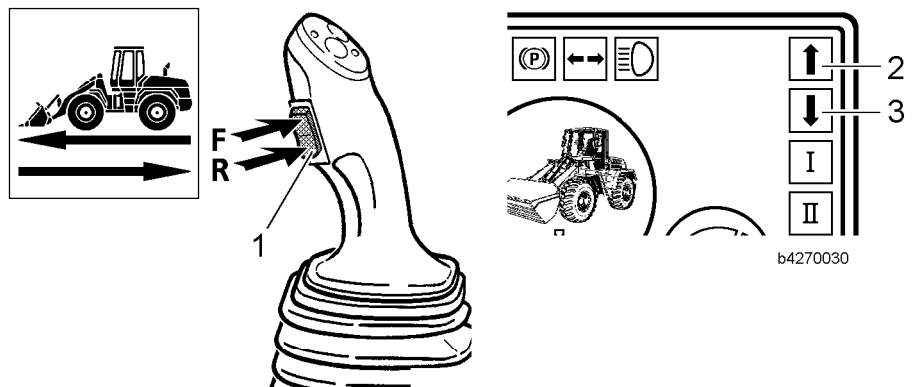
2 symbol field – parking brake

- Release the parking brake by pressing the lever down . 1
Symbol field 2 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.



Rocker switch and display unit

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 travel 2 or for Reverse travel 3 lights up.

Selection of travel ranges

After the electrical system has been turned on, travel range - II - is automatically activated. It is not possible to select another travel range until the travel direction has been selected.

The travel ranges are selected using the travel range switch. Also refer to the section "Switches on the instrument panel".

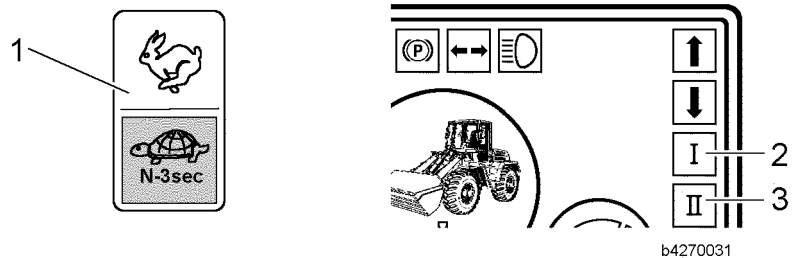
The selected travel range is shown on the instrument panel in the indicator unit. See also the "Indicator unit" section.

Selecting another travel range is possible at any travel speed. If the travel speed is high when shifting down, the machine is braked hydrostatically.

The following travel ranges can be selected:

- Travel range - I - for slow travel (e.g. on steep terrain).
- Travel range - II - for normal working operation.

Travel speeds: See the "Technical data" section.



button for shifting travel range

- 1 travel range button
- 2 symbol field – travel range - I -
- 3 symbol field – travel range - II -

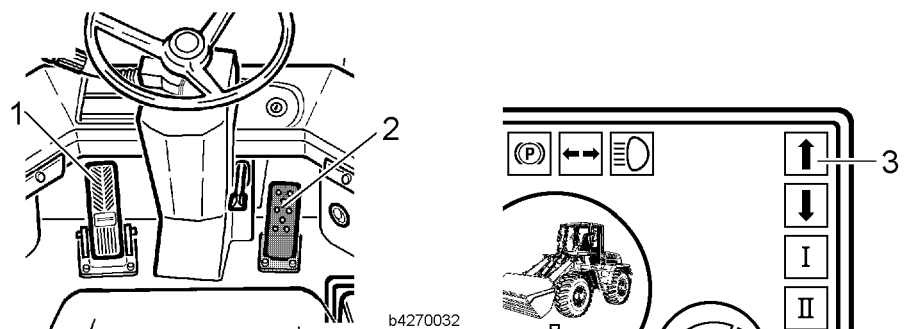
- Jog the button 1 to drive range - I - or - II -, depending on how the machine is being employed.

The selected drive range is indicated with the symbol fields 2, 3 in the display unit.

Moving off

After the electrical system has been turned on, travel range - II - is automatically activated.

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



Gas pedal

- 1 brake- inching pedal
- 2 gas pedal
- 3 symbol field – travel direction

- Push down the gas pedal 2.
- The machine moves off.
- Adjust the travel speed with the gas pedal.

LBH/01/003801/0003/7.03/ent/Version: 06.2003

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.

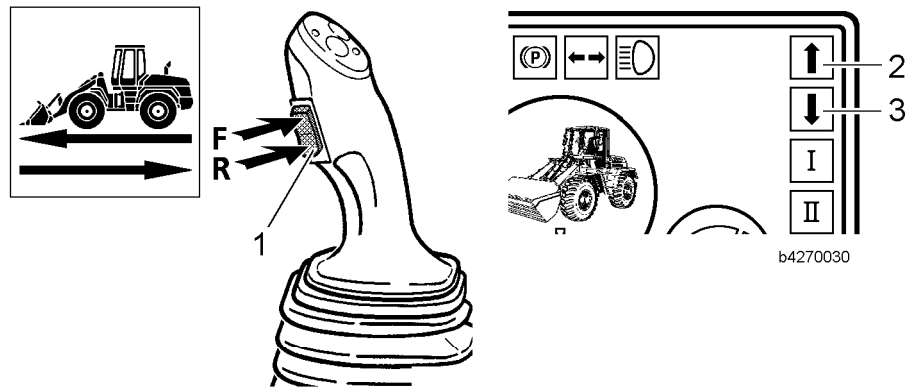
Refer to the section “Maintenance”.

Reverse travel

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

If the direction of movement is reversed at a high speed, the machine is braked hydrostatically.

This produces a smoother reversing performance.



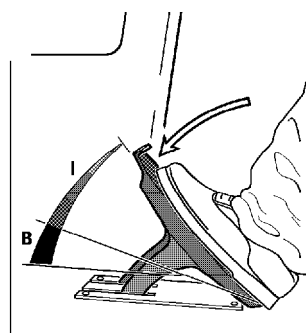
Rocker switch and display unit

- 1 rocker switch for travel direction
- 2 symbol field – travel direction „forwards”

- 3 symbol field – travel direction „reverse”

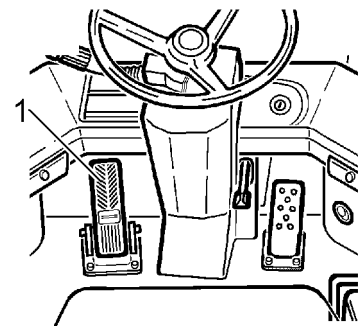
- Changing travel direction: actuate rocker switch 1 .

Depending on the switch position, the symbol field for Forward travel 2 or for Reverse travel 3 lights up.



b4270033

INCH- brakepedal



Reversing can be supported by reducing the diesel engine speed or by gently pressing the INCH- /brake pedal.

- **Support reversing in this way as necessary.**

This produces a smoother reversing performance.

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.

In the case of 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.

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

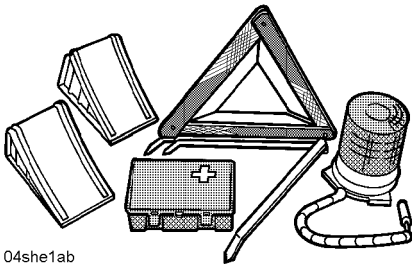
- warning triangle
- rotating beacon
- first aid box
- wheel wedge(s)

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

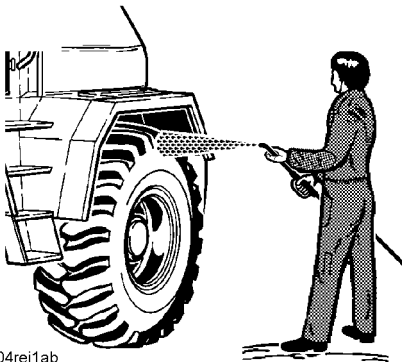
- Remove coarse dirt from the machine and clean the tyre treads.

See also the chapter “Maintenance”, section “Cleaning the machine”

Preparations for driving on public roads



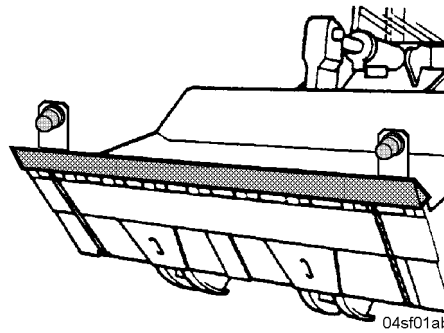
04she1ab



04rei1ab

Wet cleaning

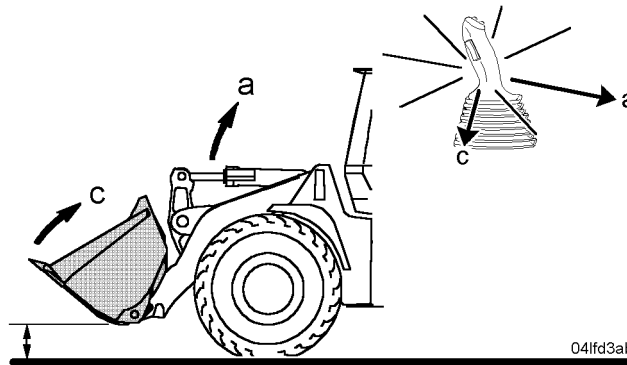
- Close all service hatches and hoods and where possible lock them.



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”.



Transport height

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

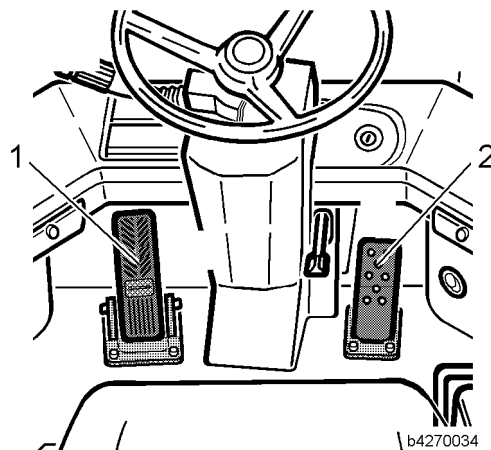
There are two ways in which the machine can be braked:

- with the hydrostatic circuit only
- with the hydrostatic circuit and the drum 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.



BRAKE- inching pedal and gas pedal

1 BRAKE- inching pedal 2 gas pedal

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

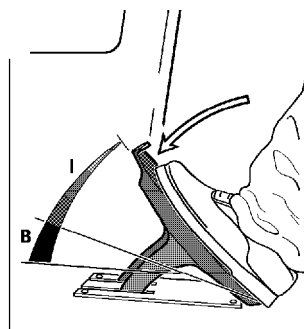
Service brake

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

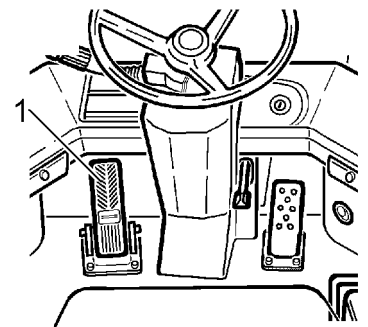
Braking with the BRAKE- inching pedal

During braking, there are two activation ranges for activating the BRAKE- inching pedal:

- range - **I** - for hydrostatic braking only.
- Range - **B** - for braking with the hydrostatic circuit and drum brakes.



b4270033



BRAKE- inching pedal

1 BRAKE- inching pedal B actuation range — B
I actuation range — I

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 brake- inching pedal 1 in range - **I** - of the pedal travel.

or

- with the hydrostatic circuit and the drum brake: activate brake- inching pedal 1 in range - **B** - of the pedal travel.
The machine will be braked quite strongly.

LBH/01/003801/0003/7.03/lem/Version: 06.2003

Troubleshooting

Little or no braking effect?

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

Braking in potentially dangerous situations



Risk of accidents due to inappropriate braking in dangerous situations!

! For full braking in dangerous situations, the brake- inching pedal must be pressed all the way down!

- Press down brake- inching pedal 1 in range - **B** - of the pedal travel to the limit.

The machine brakes heavily.

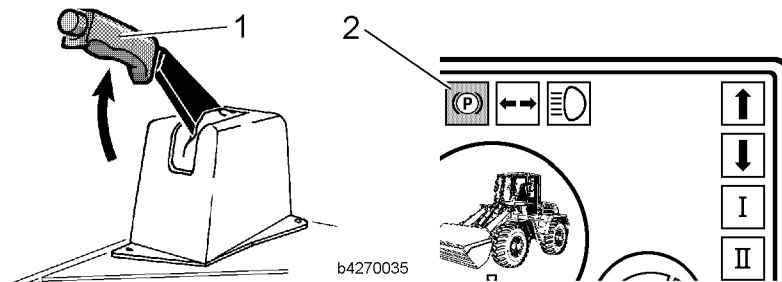
After the machine comes to rest

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

Engaging 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!



Display unit and switch – parking brake

1 lever – parking brake

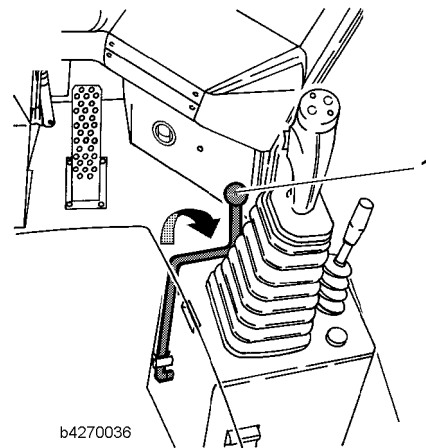
2 symbol field – parking brake

- Activate the parking brake with the lever 1.

The symbol field 2 for the parking brake lights up.

The parking brake is engaged and the travel direction is in neutral.

Locking working hydraulics



Working hydraulics lock

1 Level – working hydraulics lock

- Pull the lever 1 upwards to prevent unforeseen actuation of the working hydraulics lock.

The working hydraulics are no longer operational.

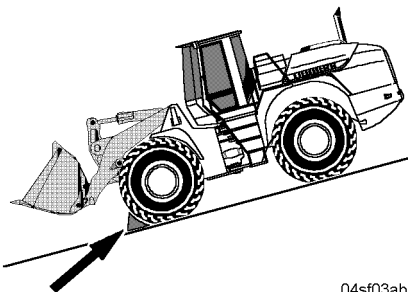
Locking up the machine

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.

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



On downhill slopes

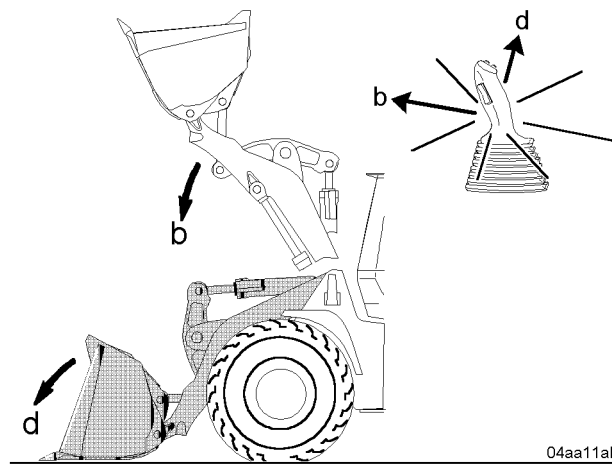
3.3.4 Shutting down the machine

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.

LBH/01/003801/0003/7.03/ent/Version: 06.2003



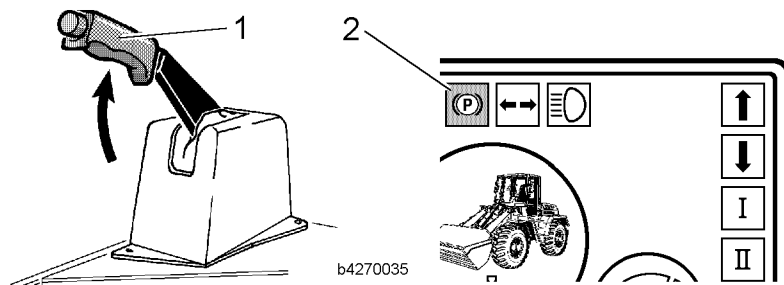
Bucket arm movement

- 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 parking brake is engaged, the selected travel direction is as a result shifted to neutral.

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



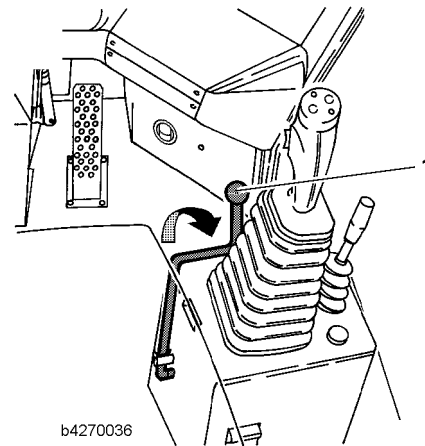
Display unit and switch – parking brake

1 lever – parking brake

2 symbol field – parking brake

- Activate the parking brake with the lever 1.
The symbol field 2 for the parking brake lights up.
The parking brake is engaged and the travel direction is in neutral.

Locking working hydraulics



Working hydraulics lock

1 Level – working hydraulics lock

- Pull the lever 1 upwards to prevent unforeseen actuation of the working hydraulics lock.

The working hydraulics are no longer operational.

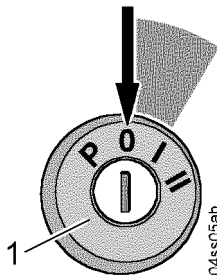
Shutting down the engine

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 starting key to position - 0 - and take it out.

All symbol fields go out.



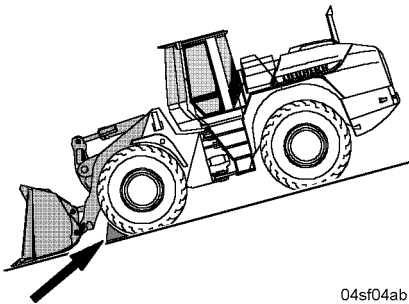
Starter switch - 0-position

Locking up the machine

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

Danger 

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



04sf04ab

On downhill slopes

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

Parking position

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

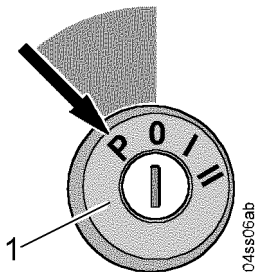
- Turn the starting key to position - **P** -.

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



04ss06ab

Starter switch - parking position

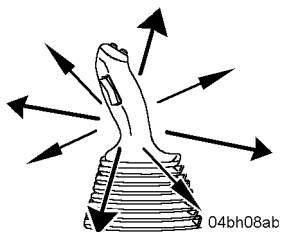
Danger 

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 starting key to position - **0** - and take it out.

3.3.5 Operating the lift arm



04bh08ab

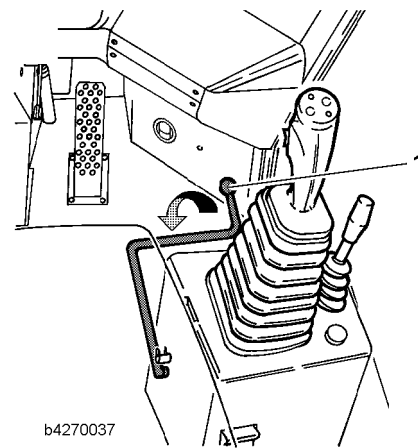
LH control lever

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 actuation of the working hydraulics

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



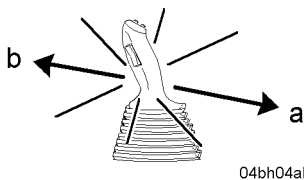
Working hydraulics lock

1 Level – working hydraulics lock

- Deactivate the working hydraulics lock by pulling lever 1 down. The working hydraulics are now ready for operation. The working attachment can now be operated.

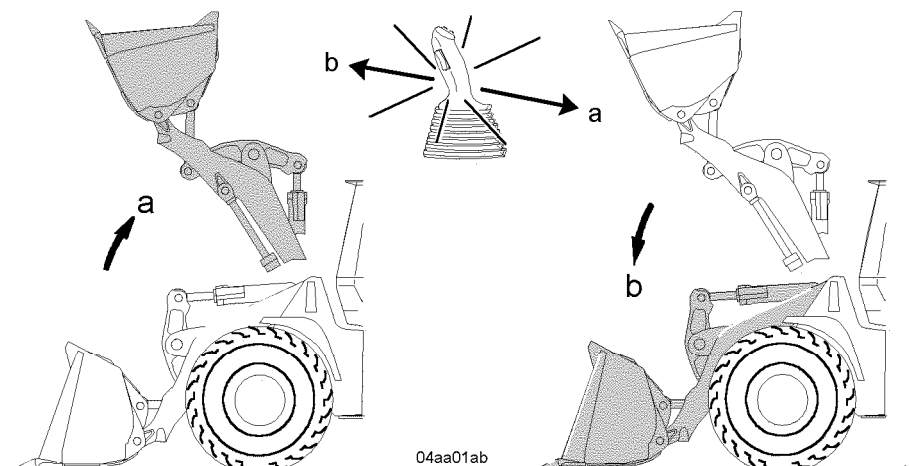
Operating the lift cylinder

The lift cylinders raise and lower the lift arm.



LH control lever

Raising the lift arm

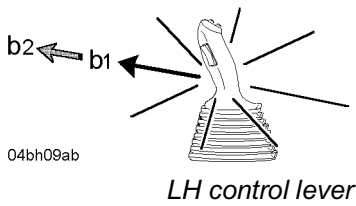


Bucket arm movement

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

LBH/01/003801/0003/7.03/ent/Version: 06.2003

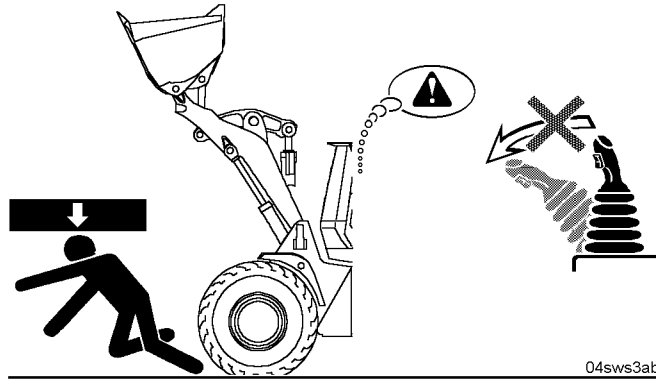
Lowering the lift arm



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.



Potentially dangerous situation

Danger

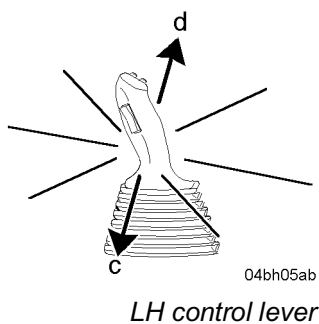


Risk of accidents due to rapid lowering of the working attachment!
 The raised working attachment is lowered rapidly when the “Quick-drop function” is activated!
 Persons standing under the raised working attachment risk severe crushing injuries!
 ! Remaining in the danger area is strictly prohibited!

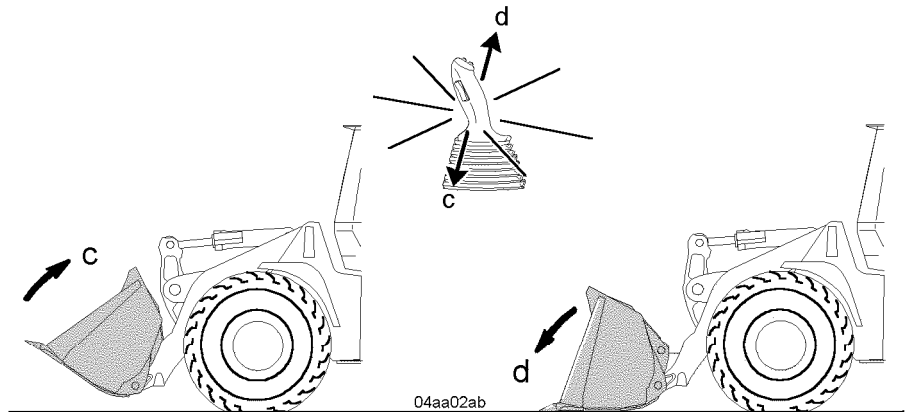
- Actuate the “quick-drop function”: move the LH control lever in direction - **b2** - through the action point to its limit.
- The lift arm is lowered rapidly.

Operating the tilt cylinder

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



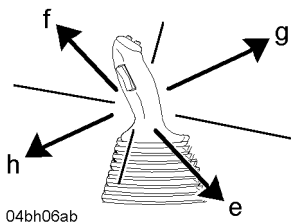
Tilting the bucket in



Bucket movement

- 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.

Tilting the bucket out



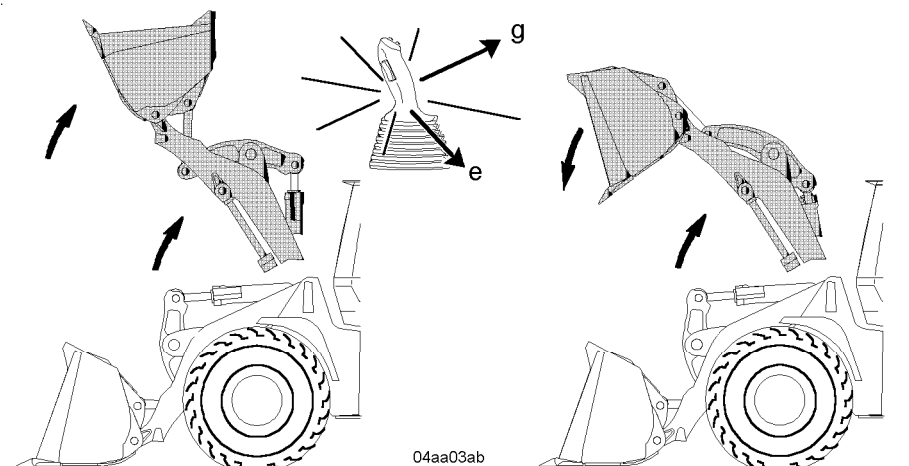
04bh06ab

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.

Raising the lift arm and simultaneously tilting the bucket in



04aa03ab

Working movements

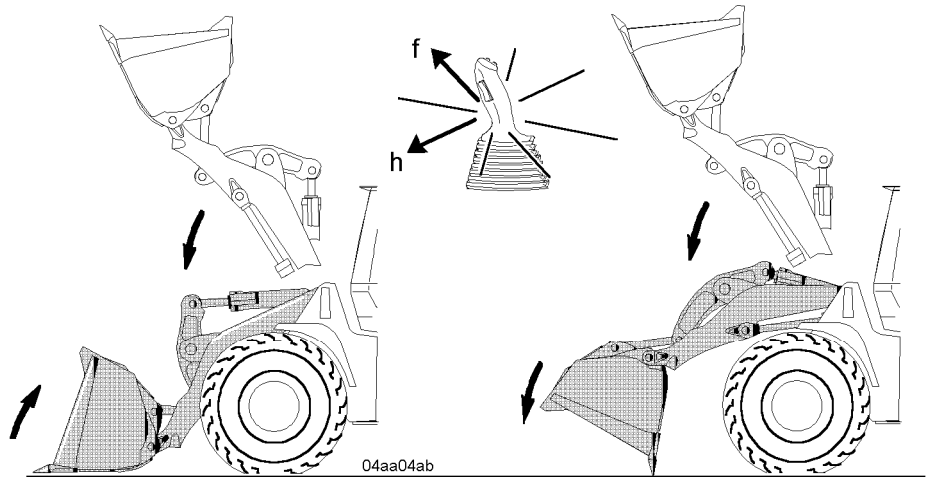
- Move the LH control lever in direction - e -. The lift arm is raised and the bucket is simultaneously tilted in.
- Move the LH control lever in direction - g -. The lift arm is raised and the bucket is simultaneously tilted out.

Raising the lift arm and simultaneously tilting the bucket out

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

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Lowering the lift arm and simultaneously tilting the bucket in



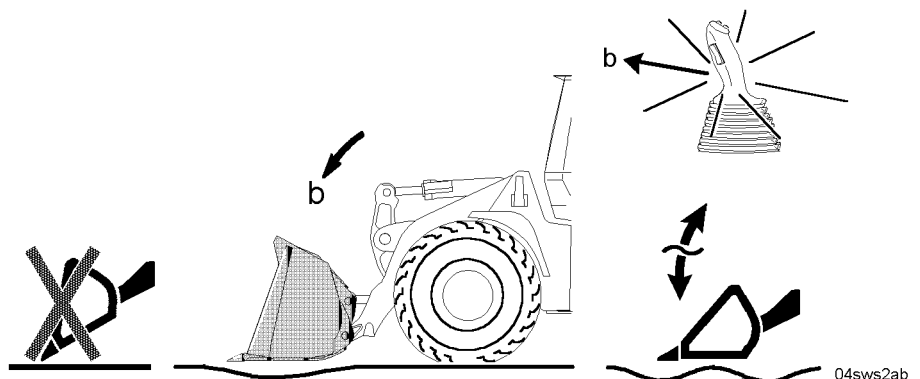
Working movements

- 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** - .

Lowering the lift arm and simultaneously tilting the bucket out

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

Activating the float position



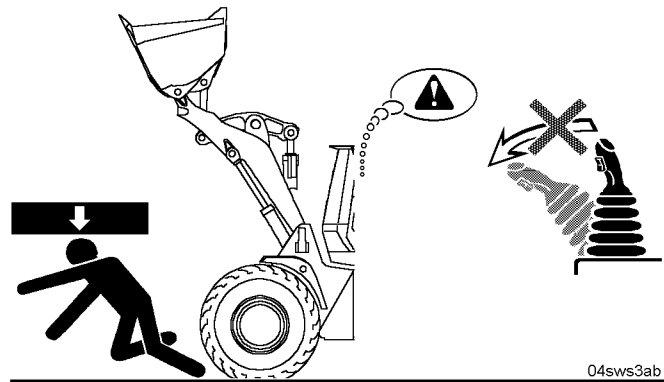
Bucket position for float position

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.



Potentially dangerous situation

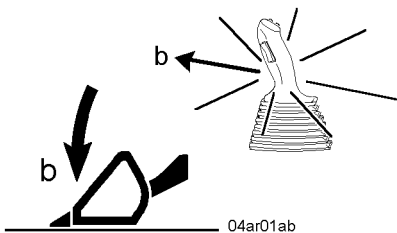
Danger 

Risk of accidents due to rapid lowering of the working attachment!
The raised working attachment is lowered rapidly when the float position is activated!

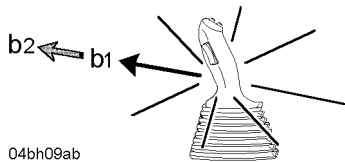
Persons standing under the raised working attachment risk severe crushing injuries!

! 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.



Bucket position



LH control lever

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

The LH control lever locks into this position.

The float position function is now active.

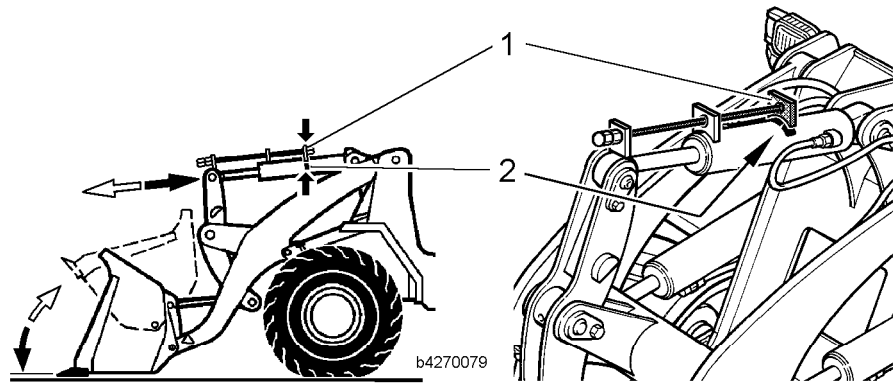
Working with the manual bucket return-to-dig

Actuating the manual bucket return-to-dig

For machines with Z kinematics and standard bucket.

The display 1 for bucket position shows the parallel position of the bottom of the bucket.

LBH/01/003801/0003/7.03/ent/Version: 06.2003



Display for bucket position

- Using the tilt cylinder, tilt the bucket in and out until the display 1 matches the mark 2 on the tilt cylinder.

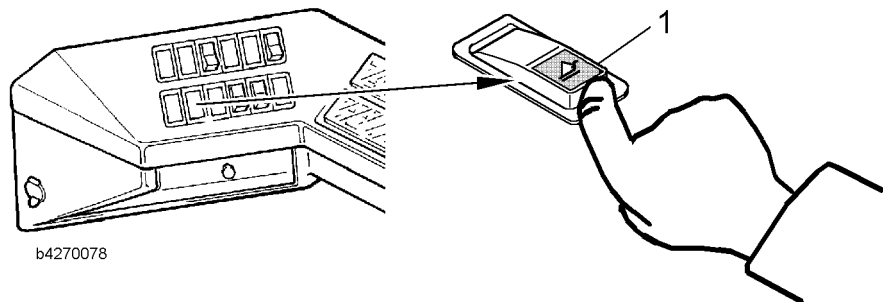
See also the “Actuating the tilt cylinder” section.

Actuating the automatic bucket return-to-dig (option)

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

Activating the automatic bucket return-to-dig

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



b4270078

Switches on the instrument panel

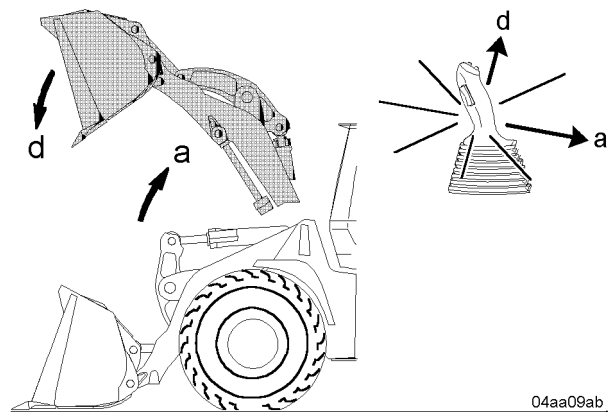
1 Switch – bucket return-to-dig

- Press switch 1 for bucket return-to-dig.

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

Working with the automatic bucket return-to-dig

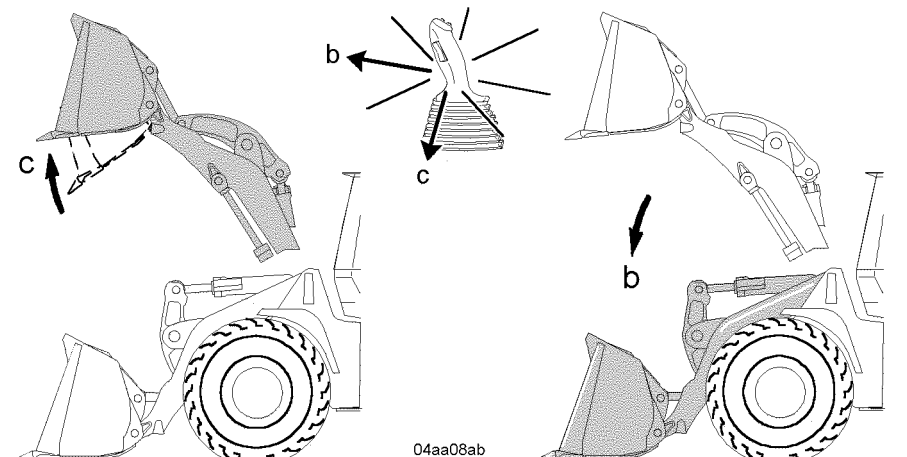
Make sure that the automatic bucket return-to-dig function is active.



04aa09ab

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** -.



04aa08ab

Working movements

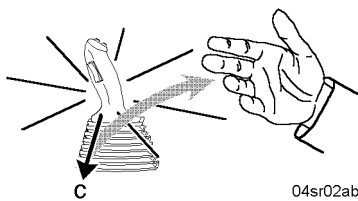
- Tilt in the loading bucket in the raised position: move the LH control lever in direction - **c** - through the action point to the stop and then let it go.

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/01/003801/0003/7.03/lem/Version: 06.2003

Adjusting the digging position

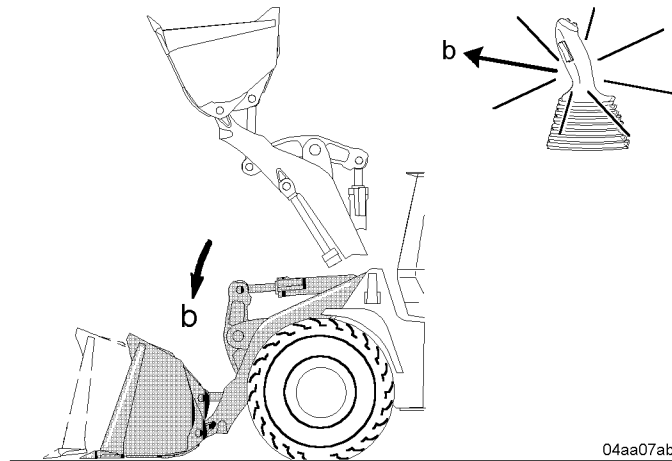
The proximity switch for the automatic bucket return-to-dig is adjusted ex-works.

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

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

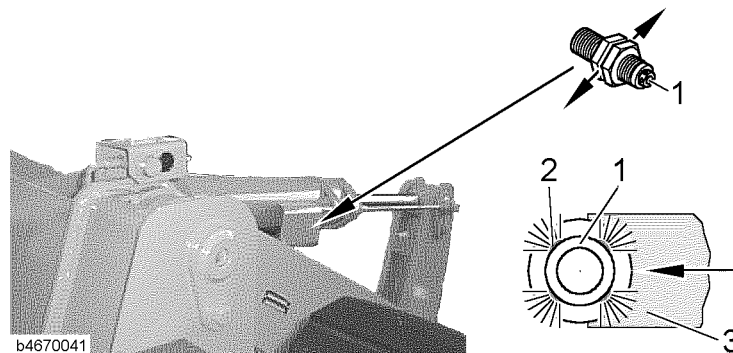
Coarse adjustment

Make sure that the lift arm is lowered and that the loading bucket is empty.



Digging position - coarse

- Move the loading bucket with the LH control lever into the required digging position.



Setting up - bucket return-to-dig

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

- 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.
- Testing the “coarse adjustment”: See the “Working with the automatic bucket return-to-dig” section .
- If required, carry out the “fine adjustment”.

LBH101/003801/00037.03/len/Version: 06.2003

Fine adjustment

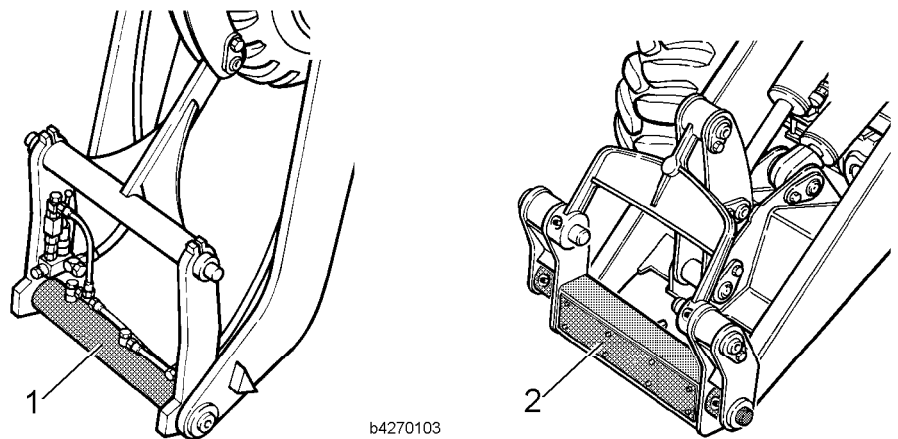
The required fine adjustment is obtained after several attempts.

- 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 .

3.3.6 Actuating the hydraulic and mechanical quick-change device

The hydraulic quick-change device is supplied as a series standard with the machine version with Z-bar lift arms.

In machines with P-lift arms, the mechanical quick-change device is a series standard and the hydraulic quick-change device is an option.



quick-change device

1 quick-change device for Z-lift arm

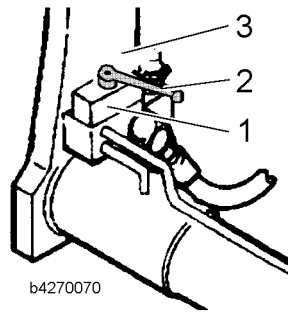
2 Quick-change device for P-lift arm

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.**

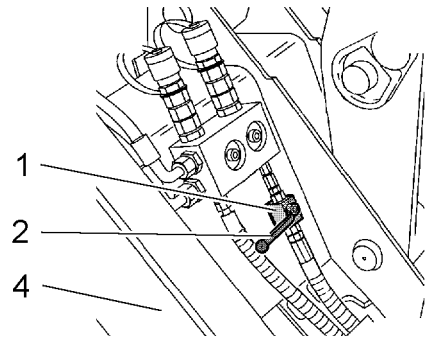
Operating the hydraulic quick-change device

The hydraulic quick-change device is activated or deactivated by manually actuating the changeover valve 1 using the changeover lever 2 .



b4270070

- 1 changeover valve
- 2 changeover lever



- 3 Z-bar lift arm
- 4 P-lift arms

The procedure for activating the hydraulic quick-change device is as follows:

Make sure that:

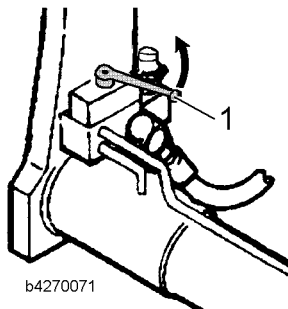
- the lift arm is lowered to just above the ground
- where a working attachment with an independent hydraulic supply is mounted, make sure that any cylinders, valves and so on are in the initial position or closed
- where a working attachment is mounted, make sure that this is tilted in

Danger



Risk of accidents due to the working attachment dropping!

! Do not actuate button when working attachment is raised!



b4270071

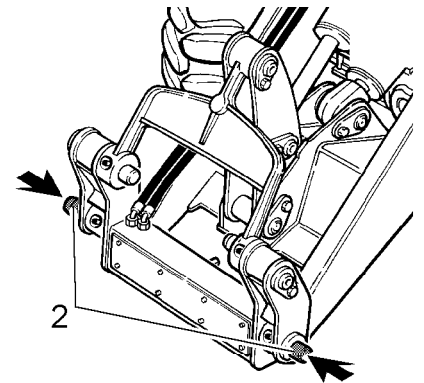
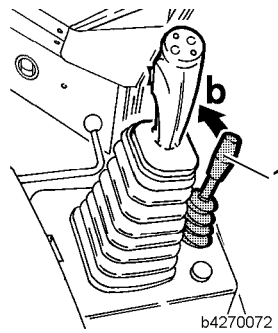
- Turn the changeover lever 1 in the direction of the arrow.

The function for unlocking the hydraulic quick-change device is thereby made ready.

Unlocking the hydraulic quick-change device

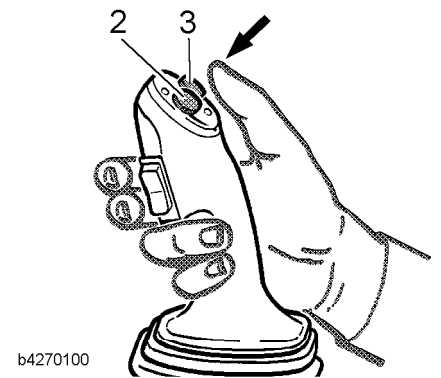
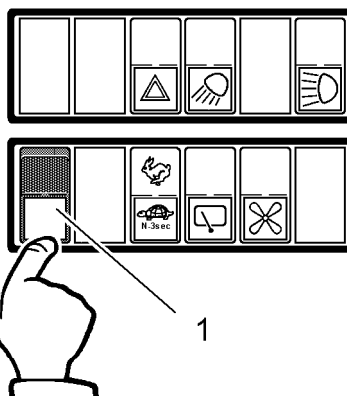
The procedure for unlocking the hydraulic quick-change device is as follows:

Make sure that the changeover lever – hydraulic quick-change device is pointing in the through flow direction .



- Move the actuation lever 1 for optional working functions in direction - b - to the limit.

or



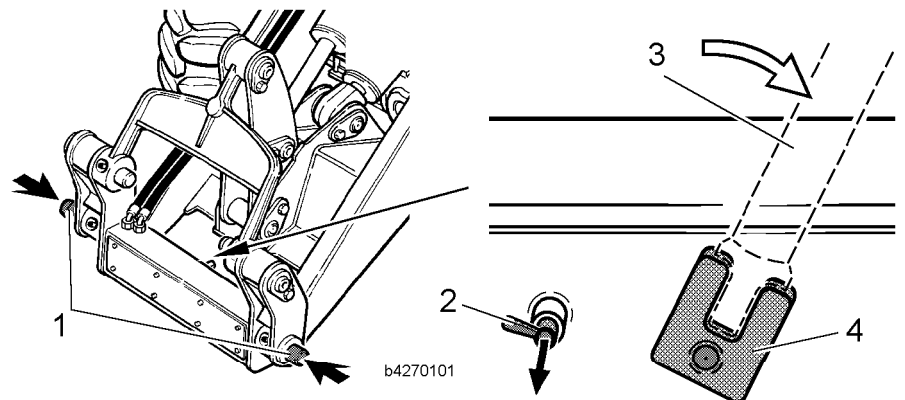
- When unlocking the hydraulic quick-change device using the electrical actuation (option), turn on the switch 1 on the instrument panel and press the push button 3 on the LH control lever for additional work functions.

The locking pins 2 for the hydraulic quick-change device are retracted.

Unlocking the mechanical quick-change device

The procedure for unlocking the mechanical quick-change device is as follows:

Make sure that the lever 3 is in the fork-shaped piece 4. The lever is stored to the left of the driver's seat.



- Before unlocking, pull out the locking pins 2.
- Press the lever 3 in the direction of the arrow.

The locking pins 1 for the mechanical quick-change device are retracted.

Decoupling the working attachment

The procedure for unlocking the hydraulic quick-change device is as follows:

Make sure when a working attachment is mounted with an independent hydraulic supply that the coupling to the hydraulic lines is released.



Risk of accidents due to incorrectly set down working attachment!

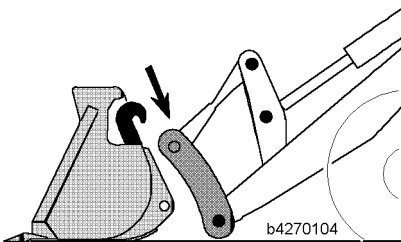
! The working attachment may in no event be set down in unsecured areas (roadways etc.).

- 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 operated 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:



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!

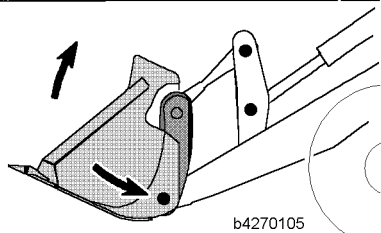
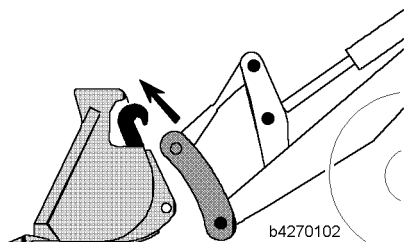
Contaminated soil must be removed for proper disposal as the hydraulic oil can pollute the ground water.

- 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:

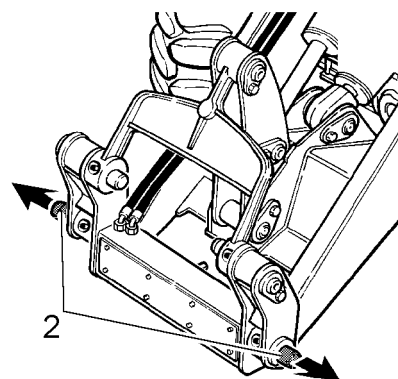
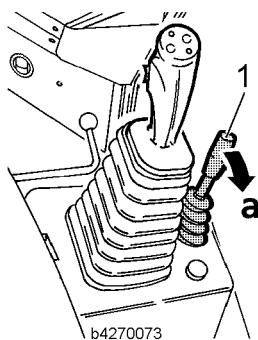
Make sure that:

- 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

Danger

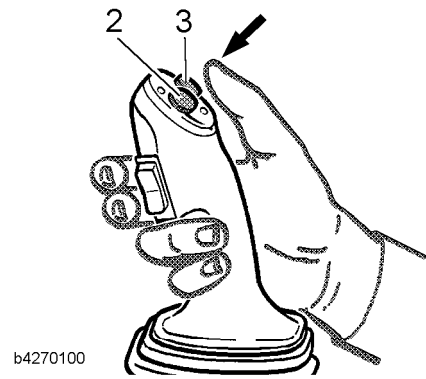
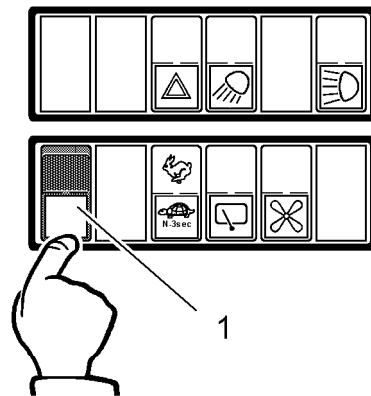
Risk of accidents due to the working attachment dropping!

! Check whether the working attachment is fully engaged with the quick-change device.



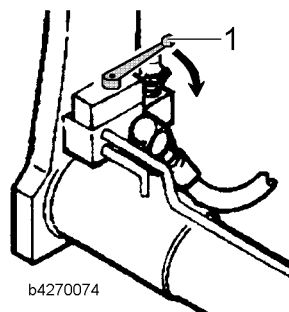
- Move the actuation lever 1 for optional working functions in direction - a - to the limit.

or

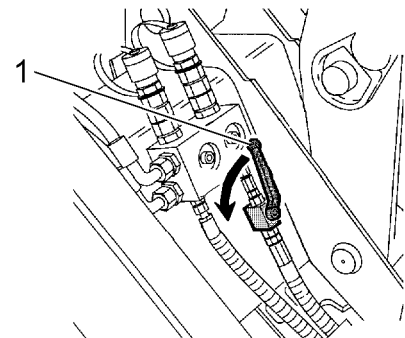


b4270100

- When locking the hydraulic quick-change device using electrical actuation (option), turn on the switch 1 on the instrument panel and press the push button 2 on the LH control lever for additional work functions. The locking pins 2 for the hydraulic quick-change device move out.



b4270074



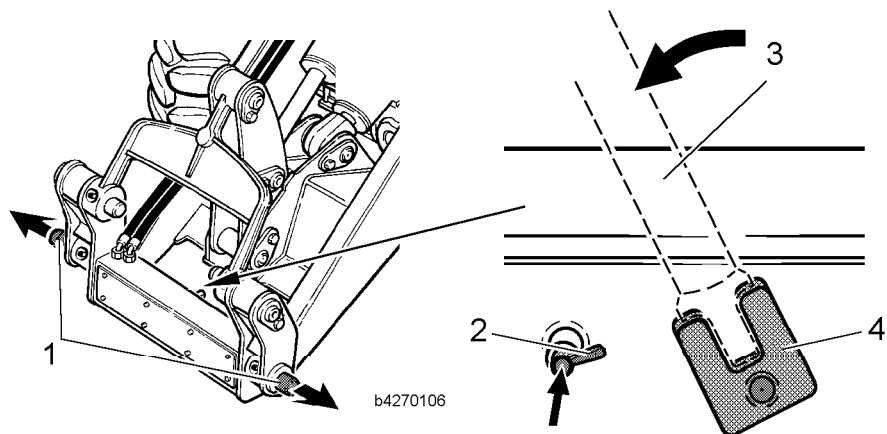
- Turn the changeover lever 1 in the direction of the arrow. The working attachment is now coupled.

Locking the mechanical quick-change device

The procedure for locking the mechanical 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 lever 3 is in the fork-shaped piece 4 . The lever is stored to the left of the driver's seat.



b4270106

LBH/01/003801/00037.03/len/Version: 06.2003

- Press the lever 3 in the direction of the arrow.

The locking pins 1 for the mechanical quick-change device are retracted.

- After unlocking, push in the locking pins 2 .

Check after locking procedure

To check the locking procedure proceed as follows.

Make sure that the quick-change device has been moved to a suitable position for inspection.

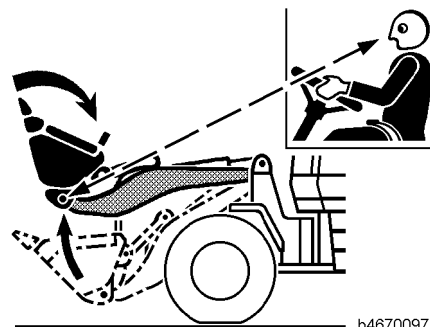
Danger



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.



- Raise the lift arms until the hydraulic quick-change device is visible from the driver's cab.
- Make a visual check to ensure that the locking pins have actually engaged in the working attachment.

You can see that the pins are properly locked by the degree to which they project from the side.

- 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 (optional)" and "Working with optional attachments."

Connecting the hydraulic lines for hydraulically actuated 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 connecting
- 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 connecting.

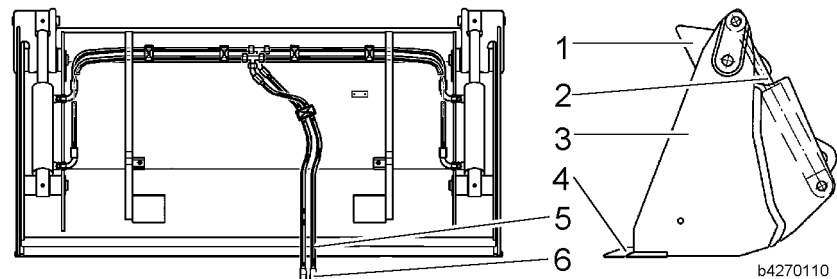
3.3.7 Working with optional equipment

Operating and working with various items of optional equipment is described in this section.

Optional equipment:

- operating the 4-in-1 bucket
- operating the forklift

Operating 4-in-1 bucket

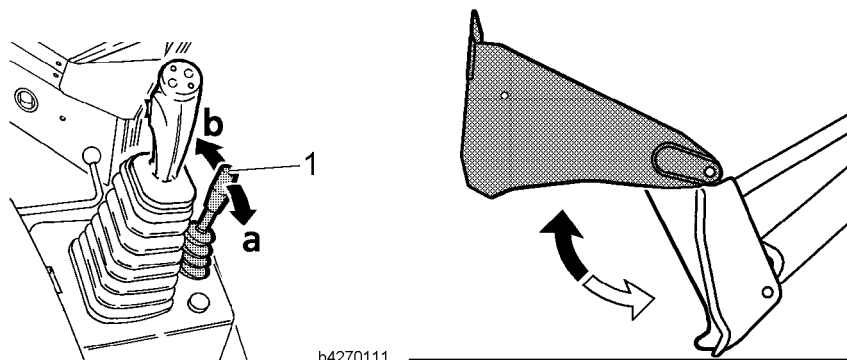


4-in-1 bucket

- | | |
|----------------------|--------------------------------|
| 1 back of the bucket | 4 teeth |
| 2 hydraulic cylinder | 5 hydraulic lead connections |
| 3 bucket cover | 6 quick-change device coupling |

Opening/closing the bucket cover

The procedure for opening/closing the bucket cover is as follows:



Opening/closing the bucket cover

Warning



Risk of accidents due to falling material!

Carry out a function check for the correct opening and closing of the bucket cover!

! Actuate the empty bucket once to check if the hydraulics are correctly connected.

- to open the bucket cover move the control lever 1 for additional working functions in direction **b**.
- to close the bucket cover move the control lever 1 for additional working functions in direction **a**.

Different uses of the 4-in-1 bucket

The 4-in-1 bucket may only be used for the stipulated functions for bulk goods with a maximum of 1.8 t/m³.

- for clearing, excavating and loading bulky material
- for all types of digging work
- for gripping awkward objects
- for piling up when open
- for levelling
- as a scoop
- for grester dumping heights

The manufacturer does not take any responsibility for damage caused by incorrect usage (such as, for example, breaking off rocks, hammering in posts or attaching load suspension weights).

Forklift operation

For forklift operation with P-kinematics lift arm:

- 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 lowering.

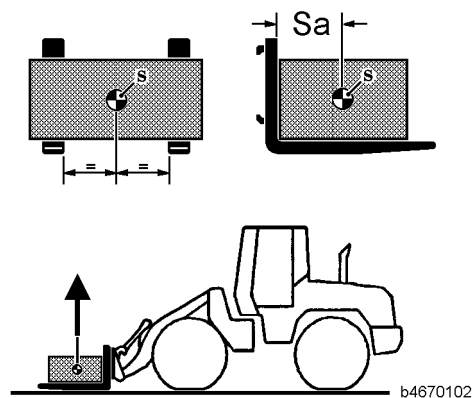
For forklift operation with lift arms with Z-bar kinematics:

- in the case of 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 .

The procedure for forklift operation is as follows.

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".



Distance from centre of gravity

S Centre of gravity

Sa Distance from centre of gravity

LBH/01/003801/0003/7.03/ent/Version: 06.2003



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 Sa of the load is correctly positioned.



Risk of accidents due to the machine tipping over!

! Make sure that forklifts are operated correctly!

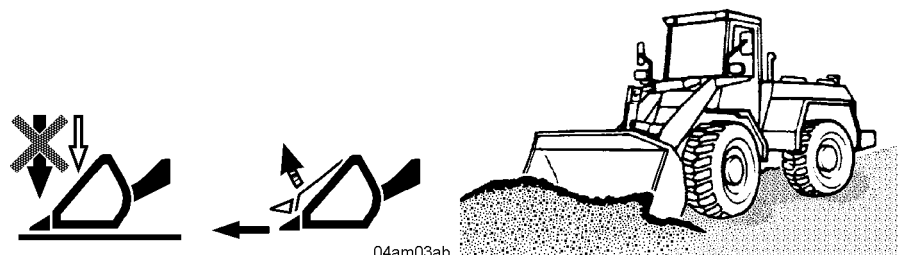
- Raise the lift arm to the transport position (approx. 30–40 cm above the ground).
- When the forklift is empty, tilt it in slightly and keep it low.
- When carrying a load, tip the forklift up slightly and keep the load low.
- When on slopes or inclines, always keep the load at the uphill end!
- Never 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.

3.3.8 General working methods

In this section, the routine working methods are described.

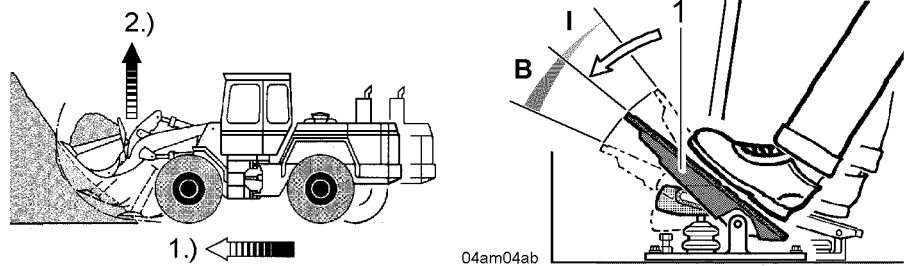
Picking up and transferring bulk materials

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: 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

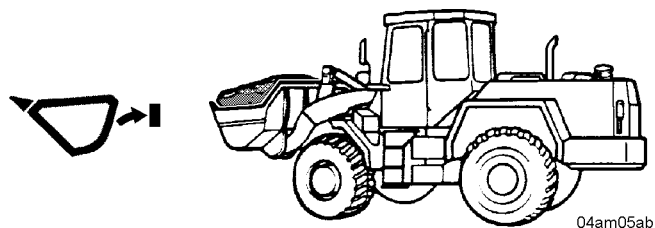
- In addition, push down the brake- INCHING PEDAL 1 in range - I - of the pedal travel with the required force.

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 spin unnecessarily
- fuel consumption is reduced



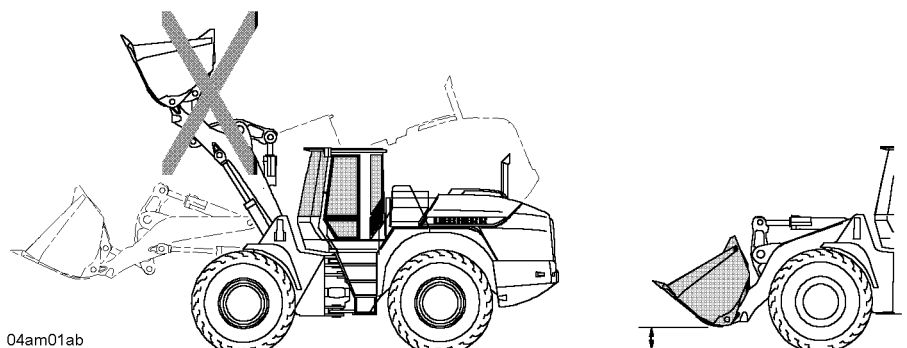
- The loaded bucket is tilted in to its limit and the lift arm is raised.

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



Danger of the machine tipping over

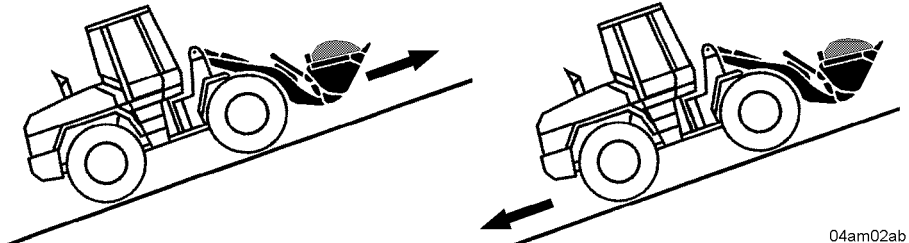
LBH/01/003801/0003/7.03/ent/Version: 06.2003



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



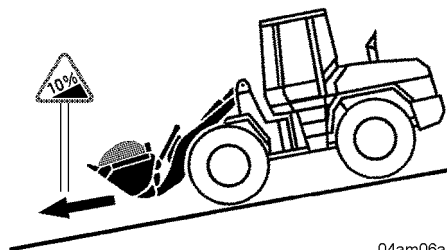
Risk of accidents due to the machine tipping over!
 ! When transporting a load on a steep slope, keep the loaded bucket low.

- 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



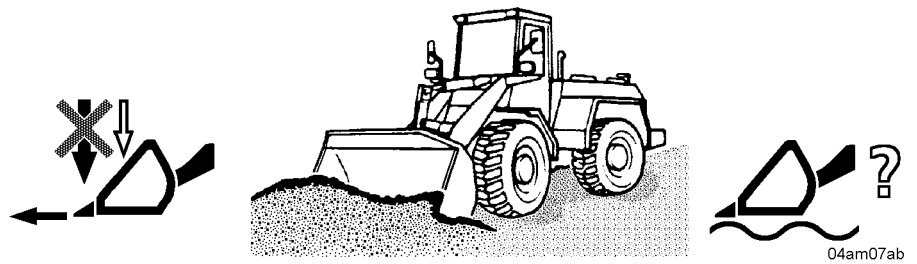
Risk of accidents due to the machine tipping over!
 The load at which the machine can tip over is reduced when driving on sloping ground!
 ! Always keep the loaded bucket low during transport!
 ! Do not suddenly change direction or brake abruptly!

- Select the lowest possible travel range.
- Ease off the gas pedal.
- Drive downhill carefully.

Grading work

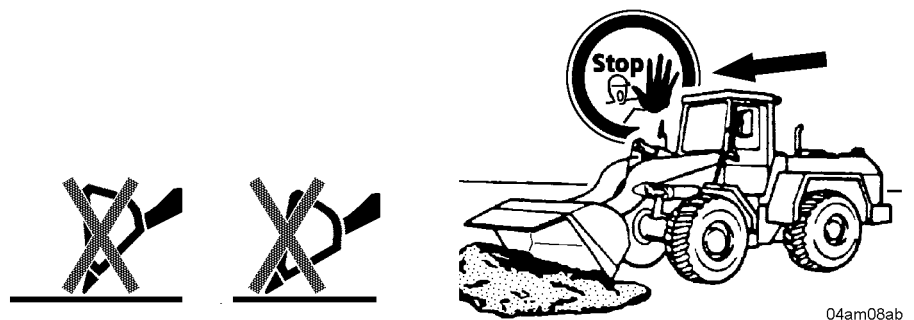
Keep the bucket base horizontal when grading.

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”.



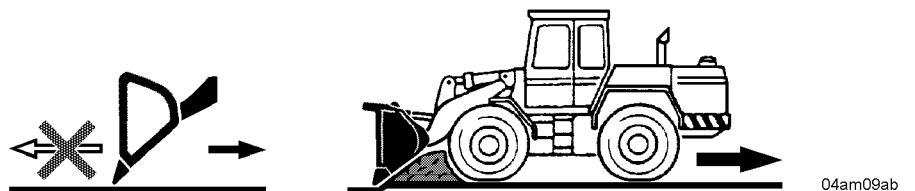
Impermissible bucket positions

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.

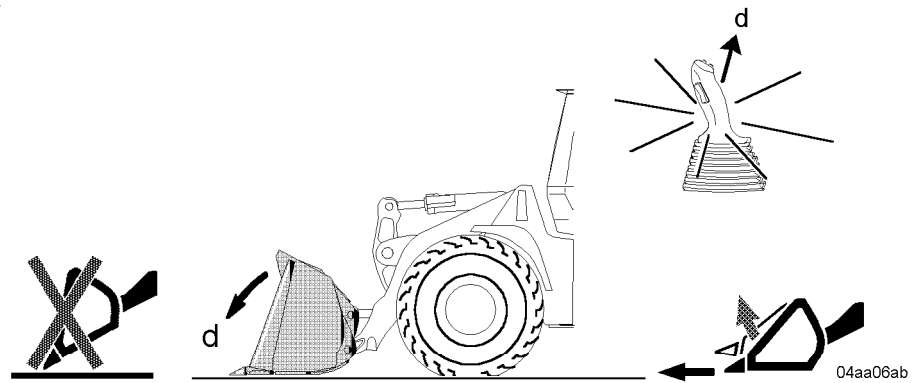
Bulldozing



- Tilt the bucket downwards and reverse the machine.

Loading from a tip

Picking up bulk material



Bucket position

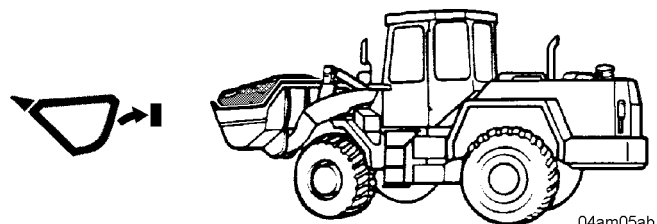


Risk of damage to the machine!

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 gently tilt it in and out while driving the bucket into the material..
- In addition, press down the brake- INCHING PEDAL: see the "Picking up and transferring bulk materials" section .

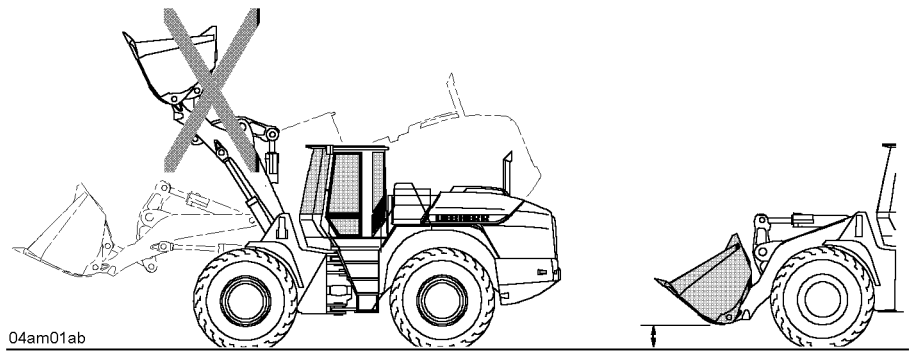


Bucket position

Bulk material transport

- The loaded bucket is tilted in to its limit and the lift arm is raised.

Keep the loaded bucket low during transport, in order to improve the machine's stability and to ensure good viewing conditions.



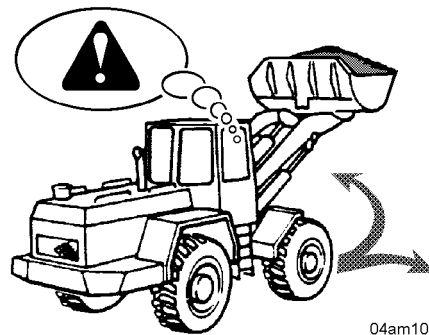
04am01ab

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



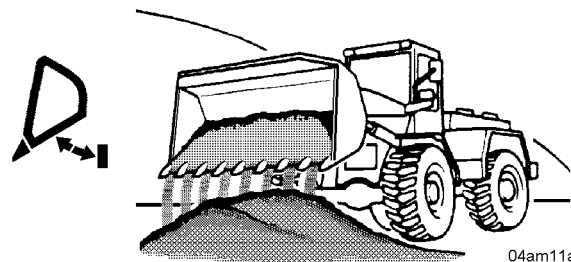
Risk of accidents due to the machine tipping over!

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

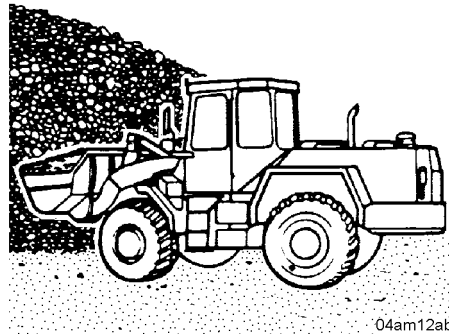
Dumping

- 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

Remove normal loading material such as sand or gravel as follows.



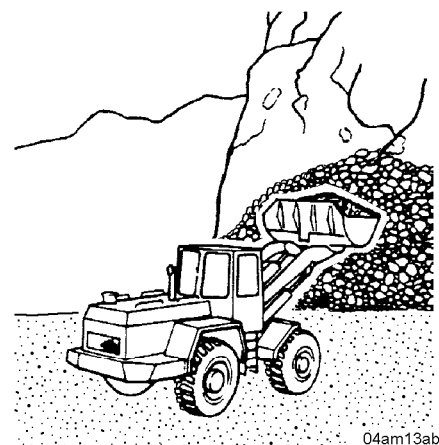
04am12ab

Bulk material removal 1

- Start removing the material at the foot of the slope, working your way upwards.

Material removal from a bank

Remove atypical hard materials such as rock as follows.



04am13ab

Bulk material removal 2

- Gently tilt the bucket base upwards.
- Start removing material at the top and work your way downwards.

Warning



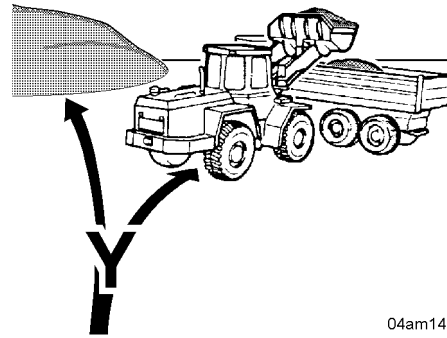
Risk of accidents due to falling material!

! Do not work under overhangs!

- Remove overhangs first and look out for after-slippage.

Loading bulk transport vehicles

Loading paths



04am14ab

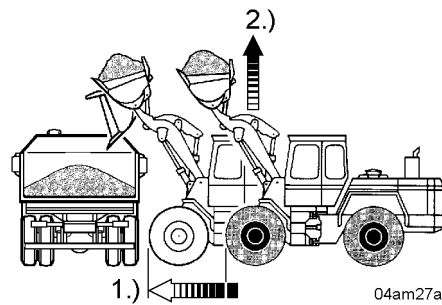
Y-movements

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

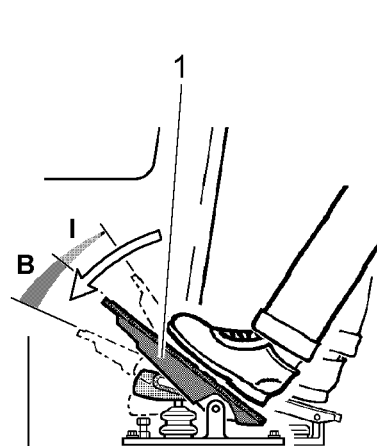
Unloading position

This yields the following benefits:

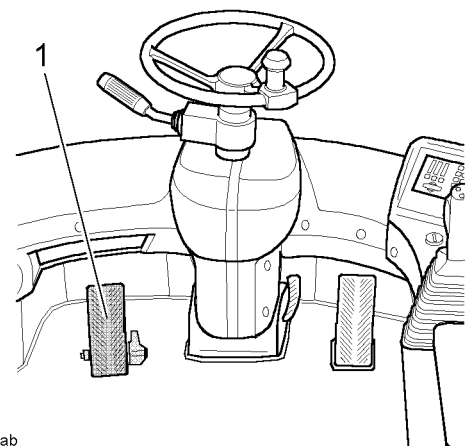
- 1.) responsive adjustment of the speed
- 2.) optimum performance adaptation for the working attachment

See also 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.



04ka05ab



Brake- inching pedal

1 brake/ INCHING PEDAL

I range - INCHING

LBH/01/003801/0003/7.03/entVersion: 06.2003

B range - BRAKING

- Brake the machine: push down the brake- INCHING PEDAL 1 in range - I - of the pedal travel with the required force.



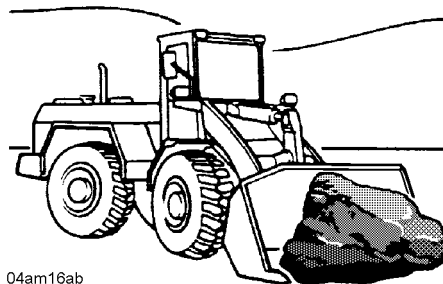
Risk of accidents due to falling material!

- ! 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 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.



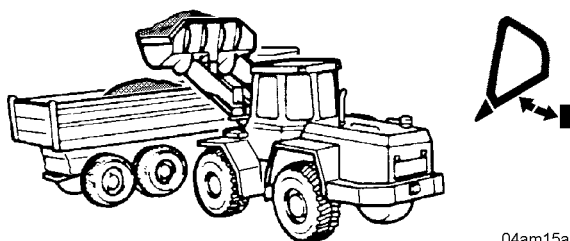
04am16ab

Bucket loading

- First place a load of smaller pieces of rock in the vehicle.
- Proceed to load the transportation vehicle.

Loading compacted material

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

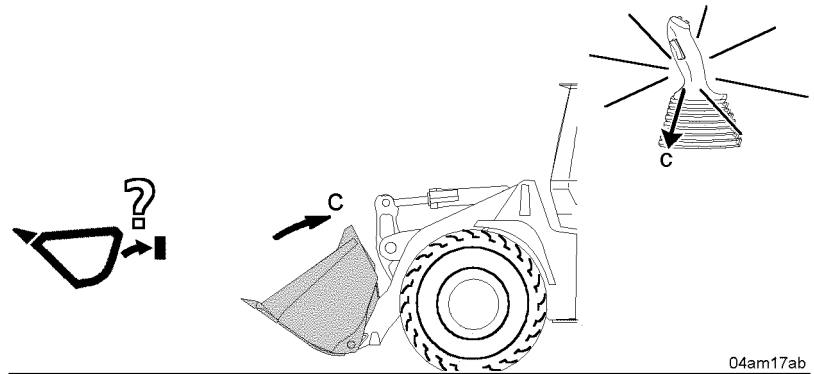
- Tilt the bucket out.

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

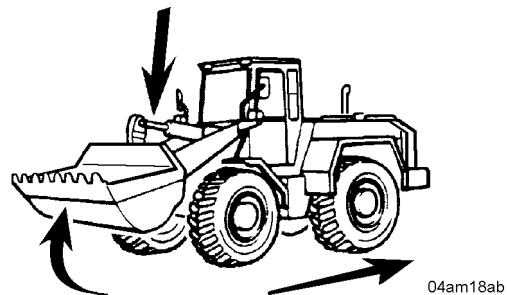


Bucket position

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.



Lift arm position

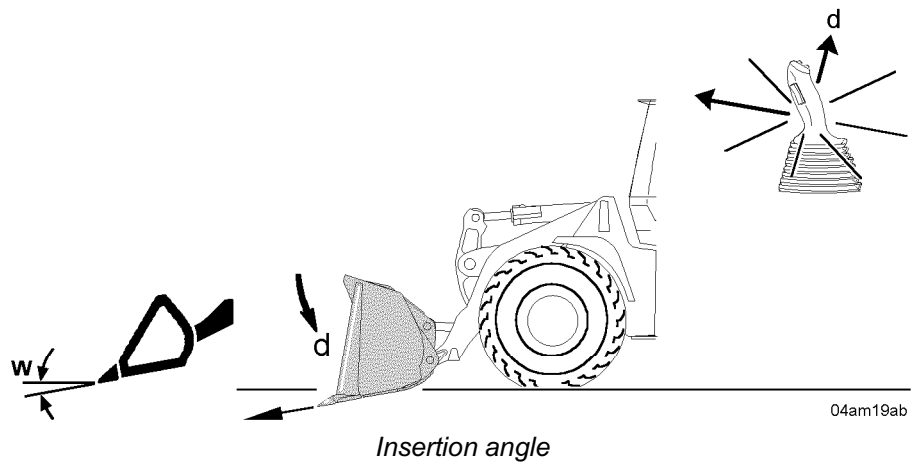
- When moving backwards, lower the lift arm.

Excavation

Excavating soft material

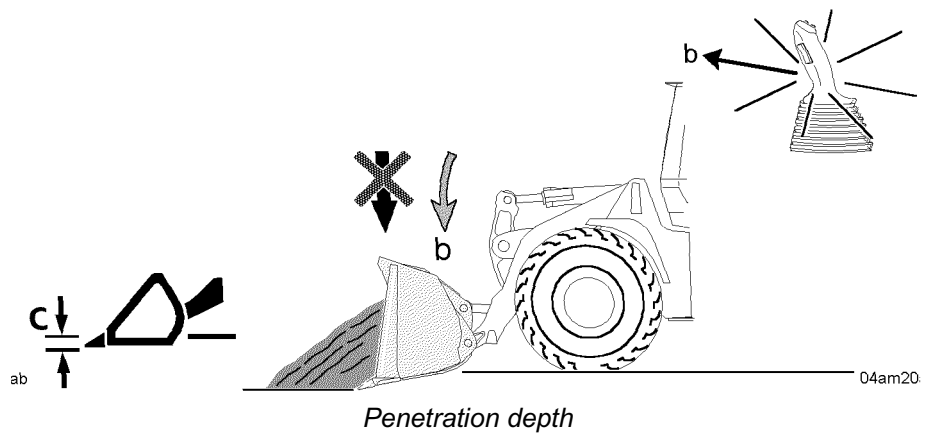
Excavate soft material as follows.

LBH/01/003801/0003/7.03/lem/Version: 06.2003



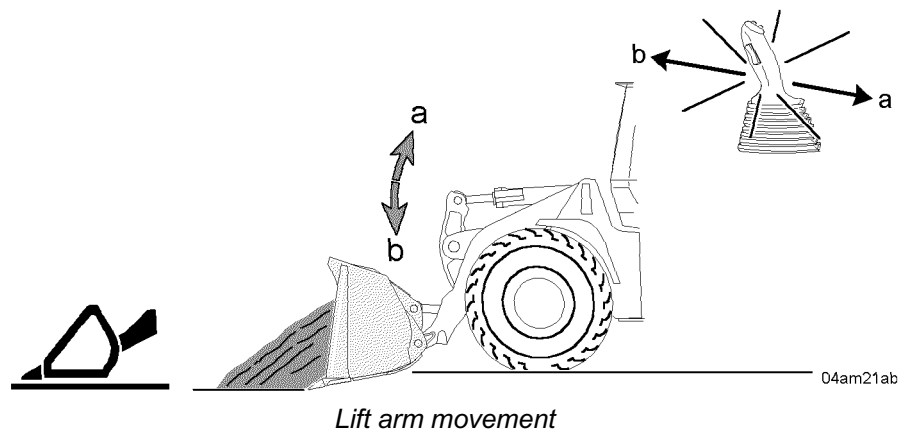
Insertion angle

- Lower the loading bucket onto the ground.
- Set a small insertion angle - **W** within a max. of 10°.



Penetration depth

- 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.



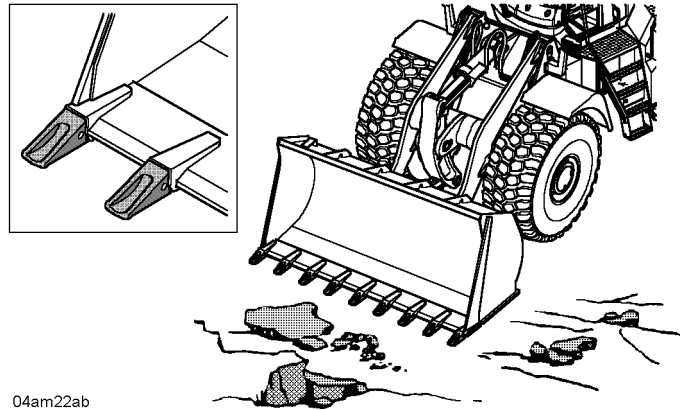
Lift arm movement

- 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.

LBH/01/003801/00037.03/len/Version: 06.2003

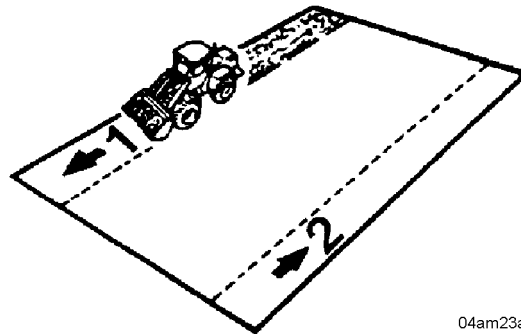


04am22ab

Working attachment

Example of foundation excavation

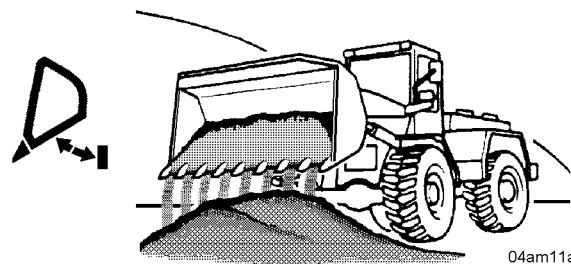
- Additional procedure: See the “Excavating soft material” section .
- Excavate foundations as follows.



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.

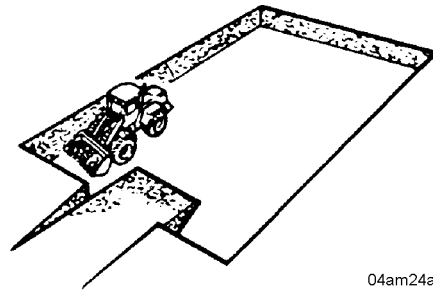


04am11at

Heaping material

- Pile up the bulk material in a corner, leaving the foundation banks exposed.

LBH/01/003801/0003/7.03/lem/Version: 06.2003



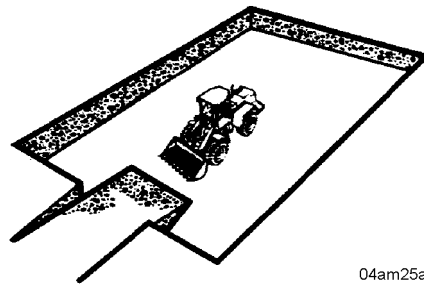
04am24ab

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

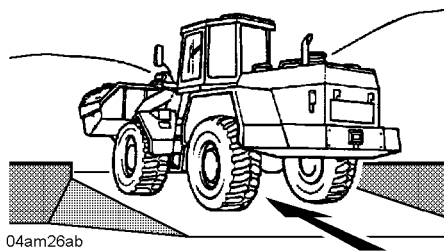
A ramp must be made so that the machine can drive out of the excavated area.



04am25ab

Exit ramp

- To make an exit for the machine: dig out the centre of the ramp.



04am26ab

Direction of transportation

- Keep the loaded bucket low during transport.
- Drive out of the excavated area forwards.

3.3.9 Transporting the machine

Slinging the machine from a crane

It is essential when the machine is being 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
- engage 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, see the “Operation, handling” section .

Obtain information about:

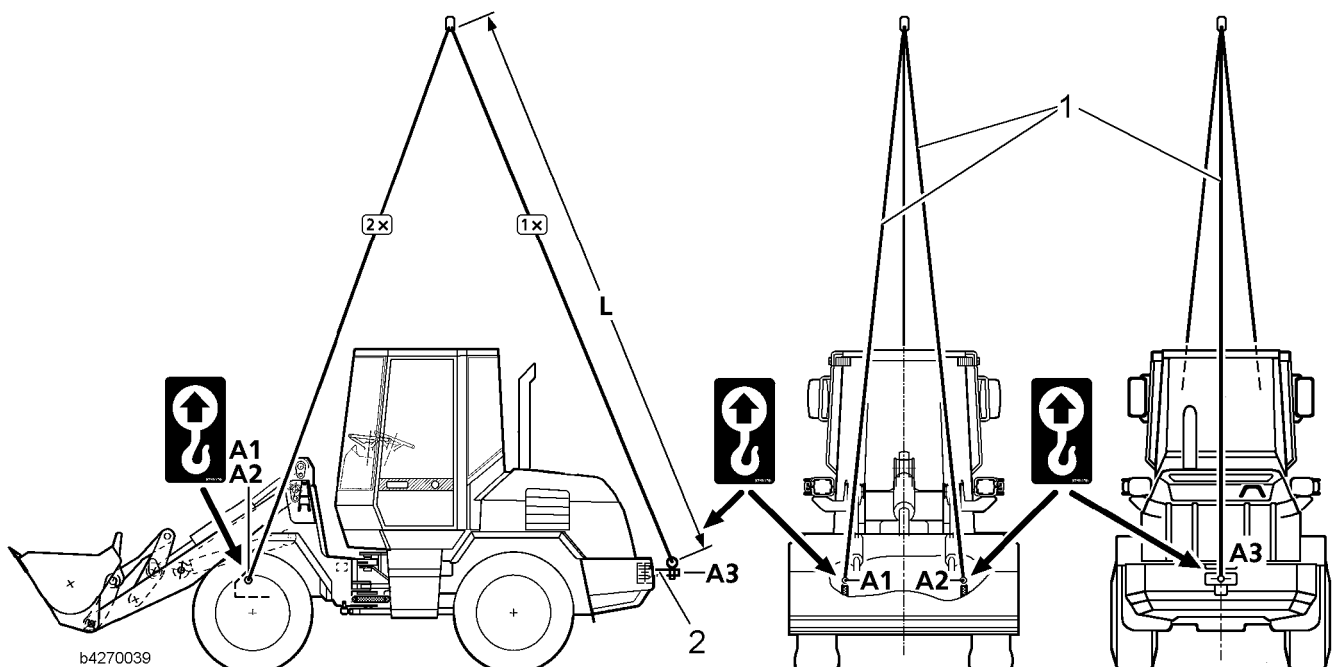
- weight and collision masses of the machine: see the “Technical data” section
- the required load bearing capacity and lengths of the lifting tackle

Loading for road, rail or sea transport

Execution: when necessary, sling the machine from a crane.

Required equipment:

- lifting tackle 1: rope length - Min. length = 6.0 m.
- loading device 2: available as an option, order No. 9616461



loading sketch

1 lifting tackle – 3-strand rope
2 loading device

A1 slinging and lifting point right-hand, front

A2 slinging and lifting point left-hand, front
A3 slinging and lifting point, rear

LBH/01/003801/0003/7.03/rev/Version: 06.2003

b4270039



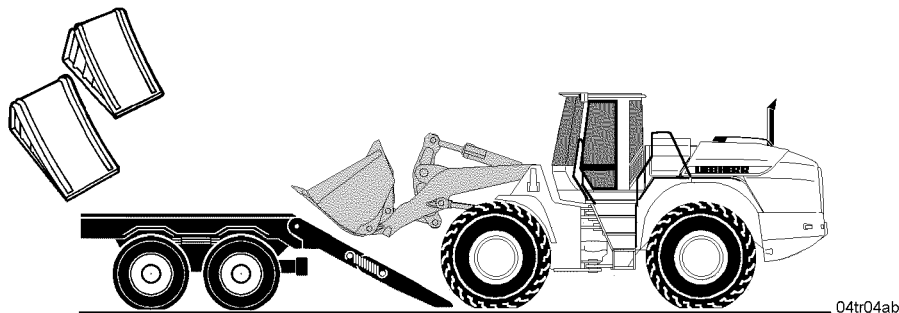
Risk of accidents due to suspended/falling load!
 ! Standing under the machine when it is suspended is strictly prohibited.

- 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.

Transporting the machine by road or rail

Before driving onto the loading bed

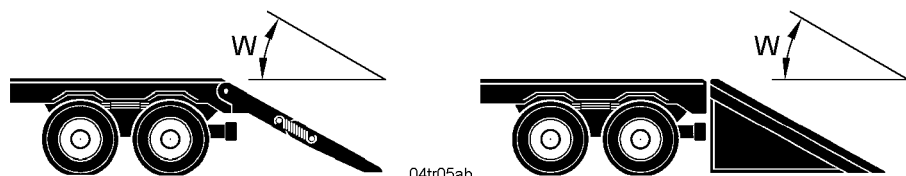
The following precautions should be undertaken before driving onto the loading bed.



Loading the machine onto the transporter

Precautions:

- have wheel wedges ready
- have suitable tensioning ropes or chains ready to lash the machine down

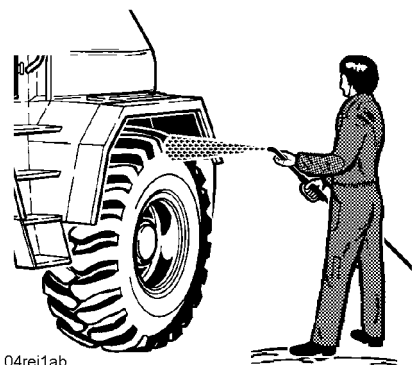


Ramp inclination

A ramp should be provided for driving the the machine onto the loading bed.

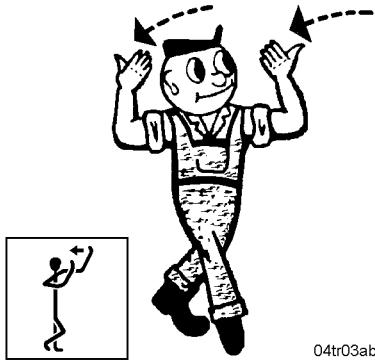
The inclination of the ramp - **W** - may be no more than 30°.

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



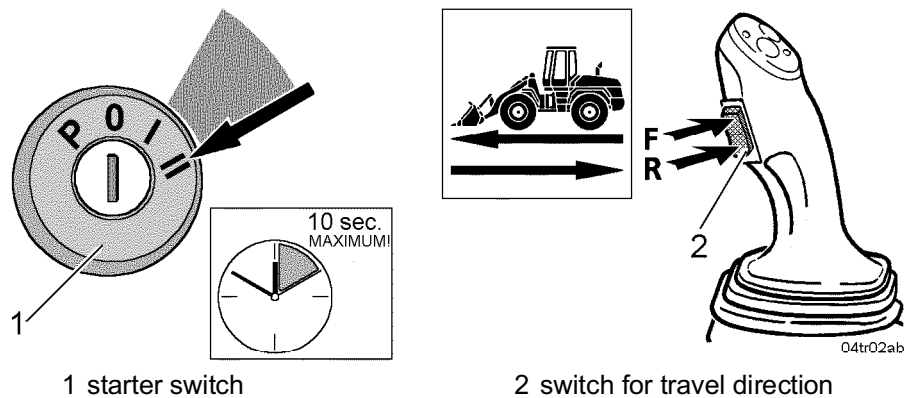
04tr03ab

For more detailed descriptions, see the “Operation, handling” section .
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!

When driving onto the transporter bed proceed as follows:



- Start up the engine.

Situation once the engine is started:

- travel range - II - is automatically activated
- when the parking brake is engaged, the travel lockout is active
- preselection of the travel direction is not possible
- travel range - II - is automatically activate.
- preselection of the travel ranges is possible

Also refer to the sections “Starting the diesel engine” and “Driving mode”.

- Release the parking brake.
- Select the travel direction.

Warning

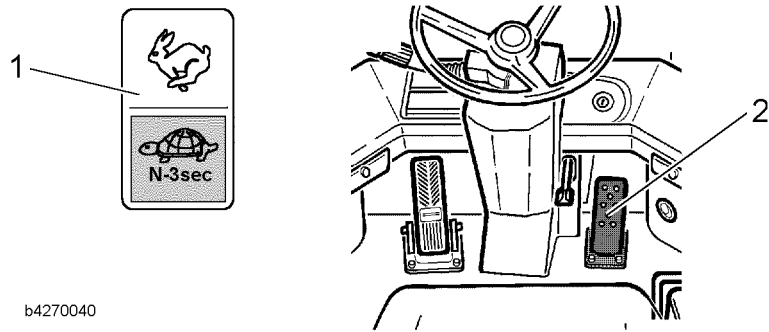
Risk of accidents if machine is driven without due care!
If the machine is driven without due care, the loading personnel, the person giving directions and the driver himself may be endangered.
! Always drive with due care when loading the machine!

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!

LBH/01/003801/0003/7.03/ent/Version: 06.2003



b4270040

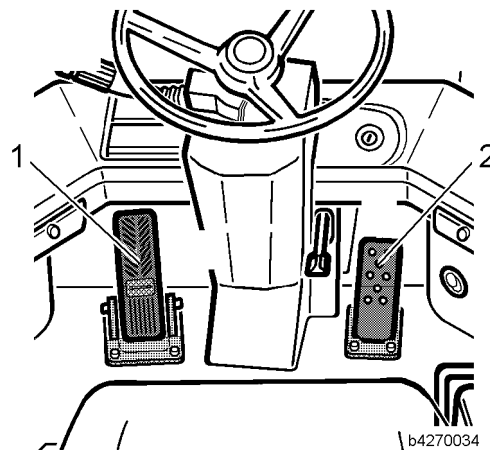
Moving off procedure

1 button for shifting travel range 2 gas pedal

- Select a low travel range: actuate the button 1.
- Push down the gas pedal 2 carefully.
- Carefully set the machine in motion.

After driving onto the loading bed

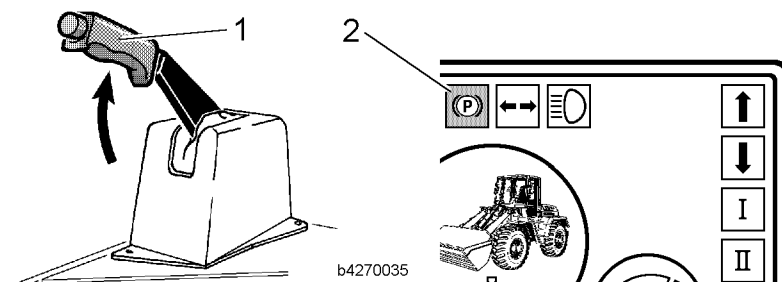
For more detailed descriptions, see the “Operation, handling” section .
 Make sure that the air stream cannot penetrate the exhaust pipe opening.
 This is particularly important with rail transport, as the direction of travel cannot be foreseen!



b4270034

BRAKE- inching pedal – gas pedal

- Stop the machine

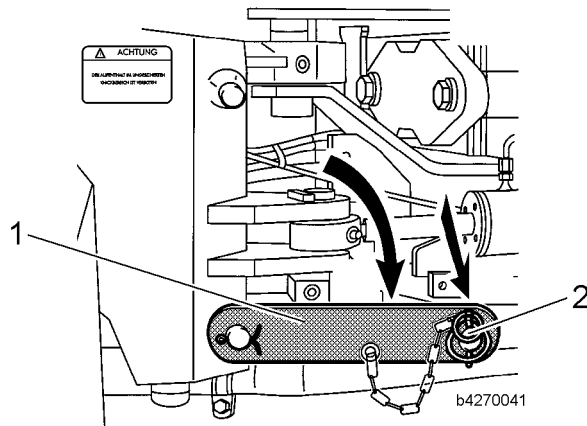


b4270035

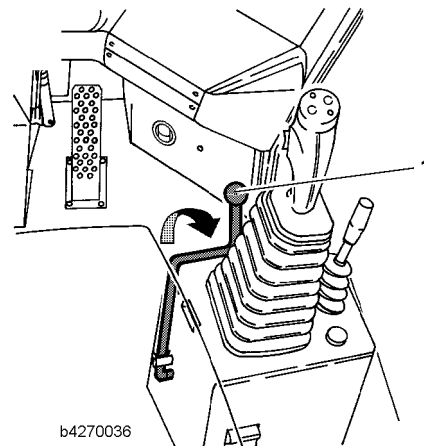
Parking brake

- Engage the parking brake.

LBH/01/003801/00037.03/len/Version: 06.2003

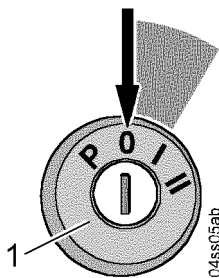


- Engage the articulation lock.
- Lower the lift arm and set the loading bucket down flat on the transporter bed.

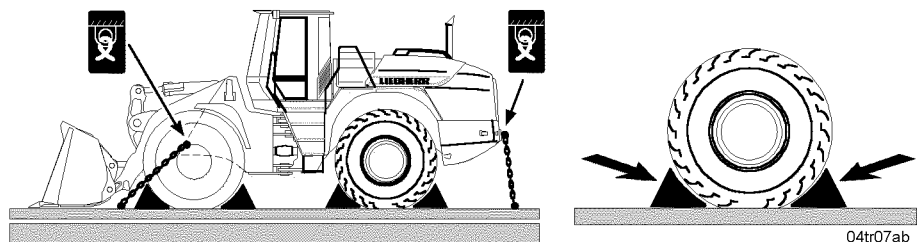


Working hydraulics lock

- Lock the working hydraulics.
- Shut down the engine.



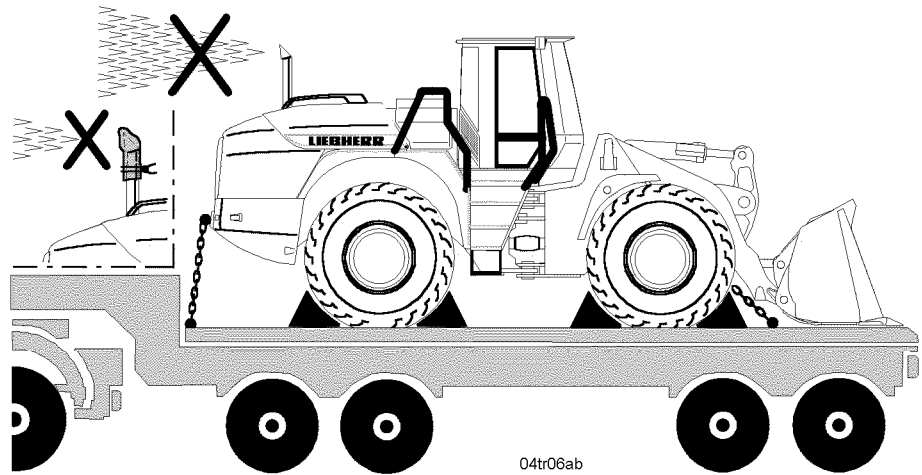
- Close and lock all doors and hoods on the machine.



Lashing points

LBH/01/003801/0003/7.03/len/Version: 06.2003

- 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.

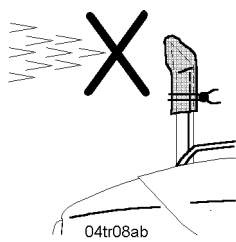


Exhaust pipe cover

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!



Blocking off the exhaust pipe opening

- 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.
- with windproof material securely block off the exhaust pipe opening so that it cannot slip.

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 through incorrect towing!

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

When the machine is under tow, the travel drive system must be switched to overrun drive.

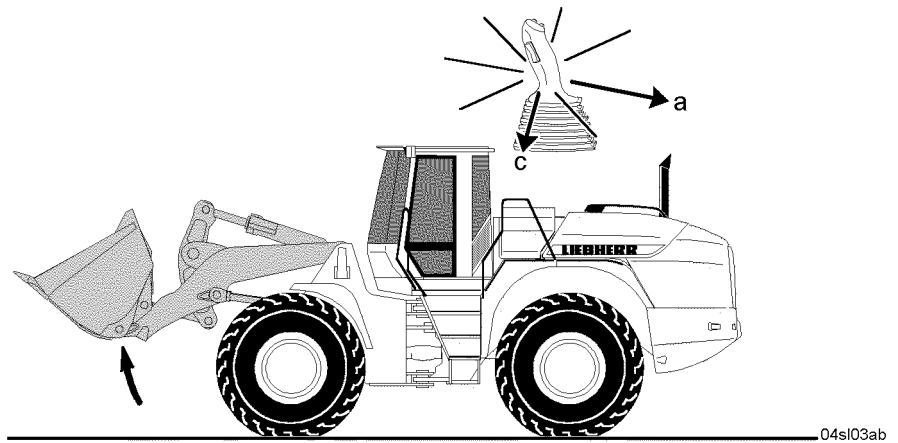
The braking effect of the brakes is impaired by switching over to overrun drive.

- The hydrostatic braking effect is not available.
- The machine can only be braked via the main braking cylinder using the brake pedal.

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.



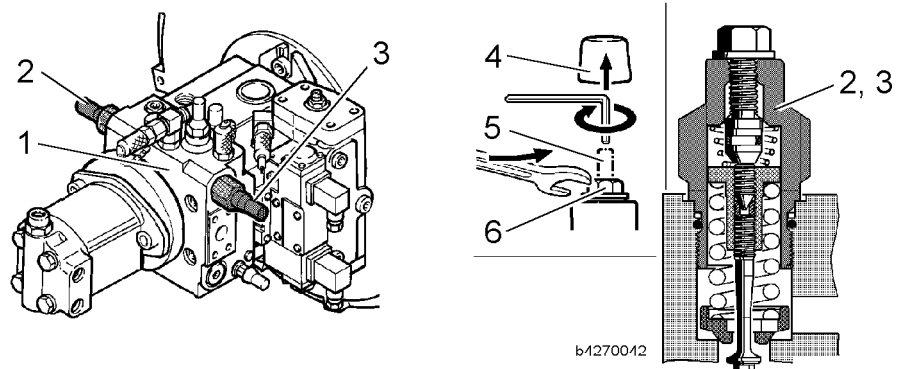
Caution

Risk of accidents due to restricted braking effect!

The braking effect of the brakes is impaired by switching over to overrun drive.

The machine can only be braked via the main braking cylinder using the brake pedal.

! Always drive carefully when under tow!



High pressure relief valves

- 1 variable displacement pump/travel hydraulics
- 2 high pressure relief valve
- 3 high pressure relief valve

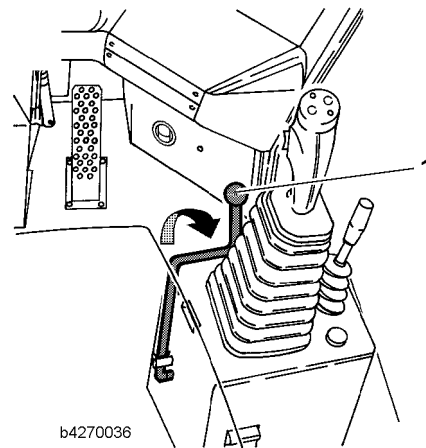
- 4 protective cap
- 5 setting screw
- 6 counter nut

Switch travel drive system to overrun by releasing the valve insert of the high pressure limiting valves 2, 3 .

- Remove the protective cap 4
- loosen the counter nut 6
- turn the adjusting screw 5 until it is flush with the counter nut 6
- tighten the counter nut 6 again

This enables the free circulation of the oil.

The machine's drive functions are now inoperational.

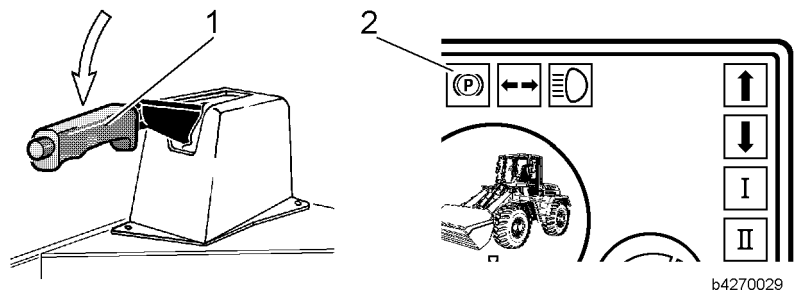


Working hydraulics lock

1 Lever – working hydraulics lock

- **If necessary:** pull the lever 1 upwards to prevent unforeseen actuation of the working hydraulics lock.

The working hydraulics are no longer operational.

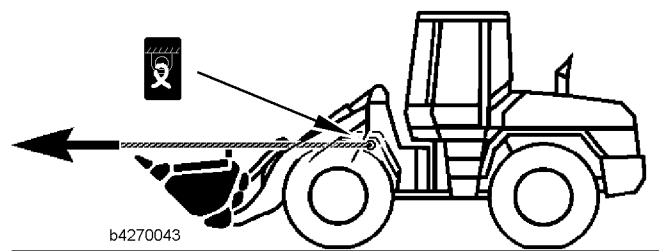


Display unit and lever – parking brake

1 lever – parking brake

2 symbol field – parking brake

- Release the parking brake by pressing the lever down. . 1
Symbol field 2 for the parking brake goes out.
The parking brake is released. The machine is now ready for towing.

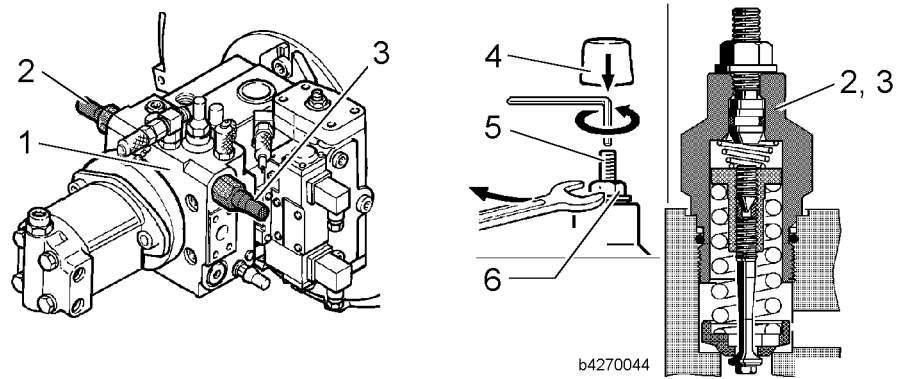


Attaching towing ropes

- Feed the two towing ropes through the bore holes provided in the front section and secure them.

Retighten the valve insert of the high pressure limiting valves 2, 3 on completion of towing.

LBH/01/003801/0003/7.03/ent/Version: 06.2003



High pressure relief valves

- | | |
|---|------------------|
| 1 variable displacement
pump/travel hydraulics | 4 protective cap |
| 2 high pressure relief valve | 5 setting screw |
| 3 high pressure relief valve | 6 counter nut |

- Loosen counter nut 6
- Unscrew the adjusting screw 5 to the limit
- Tighten the counter nut 6 again
- Put on the protective cap 4

The original adjustment of the high pressure relief valves is thus re-established.

Towing with the diesel engine switched off

In the event of serious damage to the machine, such as breakdown of the diesel engine, the braking and steering functions will be impaired.

The braking effect of the brakes is impaired by switching over to overrun drive.

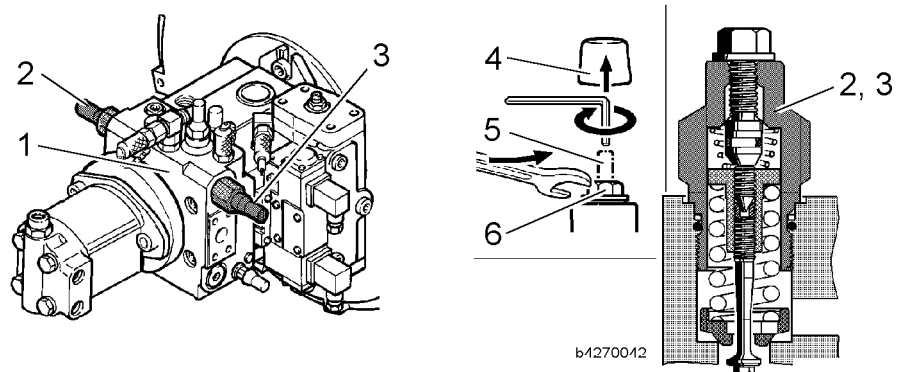
- The hydrostatic braking effect is not available.
- The machine can only be braked via the main braking cylinder using the the brake pedal.

The following precautions should be taken before towing the machine.

Precautions:

- turn the battery main switch 1 with the key 2 to position - I - ON
- adopt the transport position
- make all drive functions inoperational
- release the parking brake

When towing with diesel engine shut down proceed as follows.



High pressure relief valves

LBH/01/003801/00037.03/len/Version: 06.2003

- 1 variable displacement pump/travel hydraulics
- 2 high pressure relief valve
- 3 high pressure relief valve

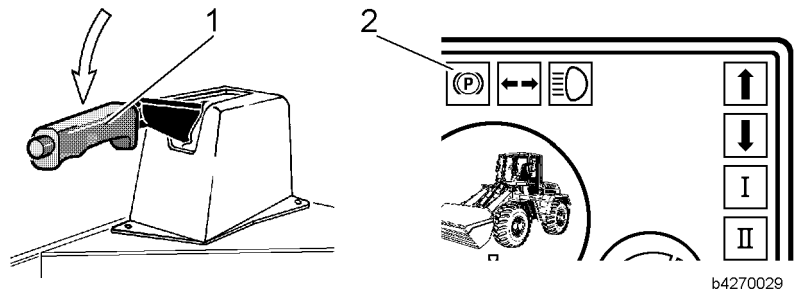
- 4 protective cap
- 5 setting screw
- 6 counter nut

Switch travel drive system to overrun by releasing the valve insert of the high pressure limiting valves 2, 3 .

- Remove the protective cap 4
- loosen the counter nut 6
- turn the adjusting screw 5 until it is flush with the counter nut 6+.
- Tighten the counter nut 6 again

This enables free circulation of the oil.

The machine's drive functions are now inoperational.



Parking brake

- Release the parking brake 1 .
- The symbol field 2for the parking brake must go out.

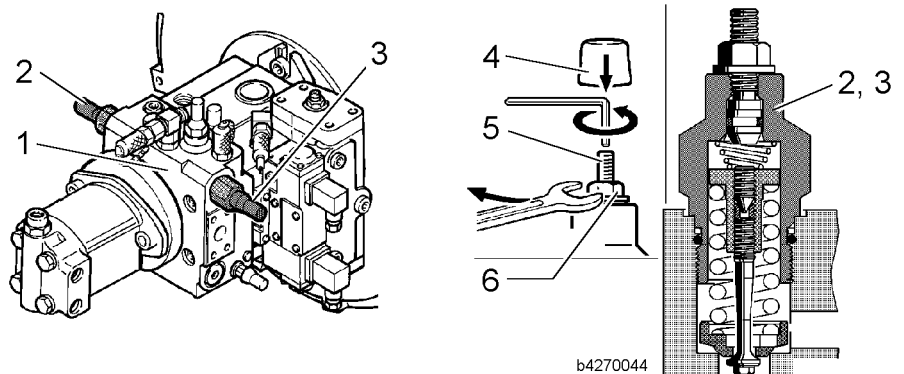
Warning



Risk of accidents when the machine is under tow!
! The steering function is limited!

- Switch on the ignition by turning the starting key to position - I -.
- Feed the two towing ropes through the bore holes provided in the front section and secure them.

Retighten the valve insert of the high pressure limiting valves 2, 3 on completion of towing.



High pressure relief valves

- 1 variable displacement pump/travel hydraulics
- 2 high pressure relief valve
- 3 high pressure relief valve

- 4 protective cap
- 5 setting screw
- 6 counter nut

LBH/01/003801/0003/7.03/ent/Version: 06.2003

- Loosen counter nut 6.
- Unscrew the adjusting screw 5 to the limit.
- Tighten the counter nut 6 again.
- Put on the protective cap. 4

The original adjustment of the high pressure relief valves is thus re-established.

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 taken.

Connecting the external battery

To jump start proceed as follows.



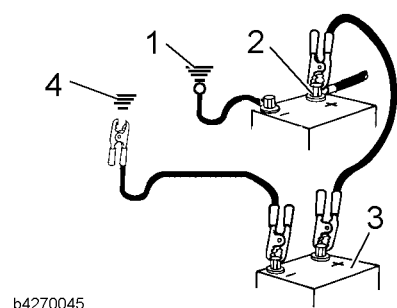
Risk of accidents due to incorrect or careless jump starting!

When external batteries are connected with old batteries there may be an increase in gas formation. 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.



b4270045

Procedure for jump starting

- 1 earth point of the discharged battery
- 2 positive terminal of the discharged battery

- 3 external battery
- 4 earth point for external battery

- 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 for the external battery 4 and then to the negative terminal of the external battery 3.
- 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 the lower idle speed.

Excess voltage can be avoided by switching on big consumers such as floodlights.

- First remove the jump start cable from the negative pole of the external battery 3 and then from the earth point for the external battery 4.
- Then remove the second jump start cable first from the positive pole of the external battery 3 and then from the positive pole of the discharged battery 2.

4 Malfunctions

Warning and fault messages

- Various faults are indicated by the corresponding indicator lamps (optically) or by display instruments on the instrument panel.
See chapter “Operation, handling”, section “Display unit” for further information.
- 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.

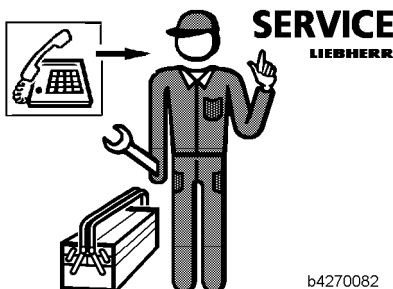
Therefore, carefully read the appropriate section of the operating and maintenance instructions each time a fault occurs.

- **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.

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**.



b4270082

4.1 Error code tables

Diesel engine		
Malfunction/error	Cause	Remedy
The engine will not start	Main battery switch is not switched on Main fuse is defect Battery defective or flat Battery terminals loose	Turn on the main battery switch Check main fuse, have replaced by service personnel Have battery checked and the malfunction rectified by service personnel Grease the battery points and tighten the terminals
Engine turns over but does not start	Engine is too cold Fuel tank is empty Fuel is not suited to the ambient temperature Start/stop solenoid does not switch	Preheat sufficiently when starting Fill the tank System does not need bleeding Use winter-grade diesel Change filter and clean sieve Check fuses FA1 and FB1 replace if necessary
Engine not up to full capacity	Engine is not getting enough fuel Engine is getting too little air Maximum number of diesel motor revolutions not reached	Clean fuel sieve Replace fuel filter Check/clean air filter when necessary Revolution adjustment pedal must stop at the full load limit when the pedal is fully pressed down If necessary, adjust the Bowden control
Diesel engine overheats	Engine is dirty Air filter is dirty V-belt is loose	Open service hatch Clean oil cooler Clean cooling fins Clean air shaft Clean air filter Tighten V-belt
Pilot lamp - battery recharging does not go out	V-belt is broken	Replace v-belt

Driving mode		
Malfunction/error	Cause	Remedy
The machine does not move although the motor is running Preselection of the travel direction is not possible	Battery charging pilot lamp does not go out Parking brake is on Fuse defective	Press gas pedal until the pilot lamp goes out Release parking brake, preselect drive direction Check FA7 fuse, replace if necessary
Parking brake is released, parking brake pilot light does not go out	Switch for parking brake is defective	Check/adjust switch, replace if necessary
The machine does not move although the motor is running, drive direction can be preselected	No hydraulic fluid Hydraulic fluid is too thick a) fluid is too cold b) fluid is not suitable for ambient temperature	Check level of fluid in hydraulics tank, fill up if necessary a) Allow engine to warm up b) use suitable oil
Hydraulic fluid overheats	No hydraulic fluid Hydraulic fluid is too thin Hydraulic fluid cooler is dirty Fan motor is not running Switch-on point is approximately 70°C	Check oil level in the hydraulic tank Fill up if necessary Use suitable oil Clean oil cooler Check FA2 fuse Replace if necessary

Steering system		
Malfunction/error	Cause	Remedy
Steering function not possible	No hydraulic fluid Articulation lock is engaged	Check oil level in the hydraulic tank Fill up if necessary Put safety bar in the upper position

Electrical system		
Malfunction/error	Cause	Remedy
Some of the lighting is not functioning	Fuse is faulty Bulb is defective	Replace fuse Replace bulb Check connections

Working attachment		
Malfunction/error	Cause	Remedy
The working attachment does not move when the control lever is actuated	No hydraulic fluid Safety lever for deactivating the working hydraulics is engaged	Check level of fluid in hydraulics tank, fill up if necessary Put the safety lever in the lower position

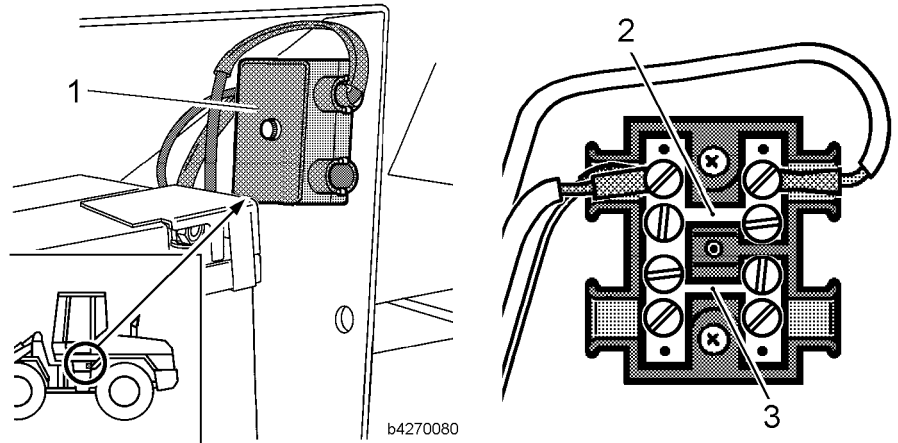
LBH/01/003801/0003/7.03/lem/Version: 06.2003

Braking system		
Malfunction/error	Cause	Remedy
The service brake has little or no effect	Too little brake fluid in the braking system	Check that the braking system is properly sealed, - check level in brake fluid container Refill if necessary with SAE 10W brake fluid
The parking brake has little or no effect	Setting of the brake cable is not correct	Set brake cable

Heating		
Malfunction/error	Cause	Remedy
The heating is not working	Oil input for heating is interrupted	Check on/off switch
The blower for the heating/air-conditioning	Fuse FA9 is faulty	Replace fuse

4.2 Eliminating malfunions

4.2.1 Changing fuses



Box – main fuse

In order to avoid damage to the electrical system, only fuses with the appropriate Amp rating may be used.

Before a fuse is replaced the relevant electrical circuit must be checked.

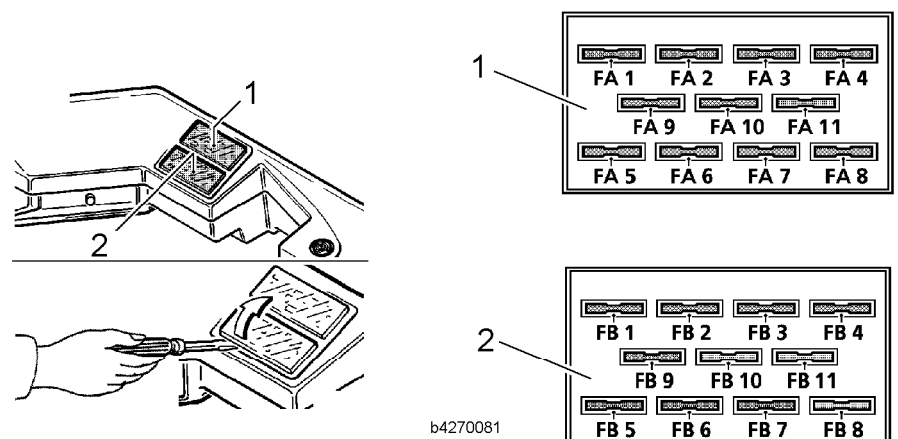
The fuse socket 1 is on the left-hand side of the machine in the battery compartment.

Fuse	Value	Units	Name/function
2	5.00	A	Main electrical circuit
3	25.0	A	Special attachment

Main fuse

Plug-in fuses

The plug-in fuses FA1 – FB8 for the functions in the table below are in the fuse base 1 and 2 to the left in the instrument panel.



Control unit with plug-in fuses FA1–FB8

LBH/01/003801/0003/7.03/ent/Version: 06.2003

- Open the cover to the “fuse base”, to the left in the instrument panel.
- Identify the fuse associated with the electrical failure with the aid of the fuse chart below.
- Take out the blown fuse and replace with a new one (Amp rating according to location).

Fuse	Value	Units	Name/function
FA1	10.0	A	Motorstop solenoid
FA2	20.0	A	Oil cooler motor
FA3	15.0	A	Working floodlights
FA4	15.0	A	Interior illumination, flashing beacon, radio, socket, relay K6, compressor-driver's seat
FA5	20.0	A	Reserve fuse
FA6	7.5	A	Hazard warning system
FA7	10.0	A	Control electronics, display instruments, message lamps
FA8	10.0	A	Brake light, indicators
FA9	15.0	A	Blower motor - heating
FA10	15.0	A	Windshield wipers, washer motor, horn
FA11	7.5	A	Reserve fuse
FB1	10.0	A	Relays K3, K8
FB2	7.5	A	Side marker light, back light, profile light- left, instrumenten lighting
FB3	7.5	A	Side marker light, back light, profile light- right, registration lighting
FB4	7.5	A	Sidemarket light, left
FB5	7.5	A	Sidemarket light, right
FB6	7.5	A	Headlights- left
FB7	7.5	A	Headlights- right
FB8	7.5	A	Reserve fuse
FB9	15.0	A	Preglowing, switch lighting
FB10	10.0	A	Reserve fuse
FB11	10.0	A	Reserve fuse

Fuse chart

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	
On delivery	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
Complete machine								
<input type="checkbox"/>								The driver should lubricate the machine in accordance with the lubrication chart and instructed on proper maintenance
<input type="checkbox"/>								Instruct the driver in the operation of all functions
<input type="checkbox"/>	●	●	○	○	○			Check the machine for external damage
							†	Check that all screwed connections are tight
<input type="checkbox"/>							†	Seal any external leaks as necessary
			<input type="checkbox"/>	○	○			Check hydraulic pressures according to the adjustment log - see service manual
Diesel engine								
<input type="checkbox"/>	●	●	○	○	○			Check the oil level in the diesel engine
		■	○	○	○	250h		Change oil filter (inspection interval is 250 h or 500 h depending on oil specification)
		■	○	○	○			Replace fuel filter
		●	○	○	○		†	Drain condensation from fuel filter
			○	○	○		†	Clean and if necessary replace the air filter main element.
			○	○	○		†	Clean cooling system motor
			○	○	○			Check engine speed
			○	○	○			Check and, if necessary replace V-belts
			○	○	○			Check air suction hoses
			<input type="checkbox"/>	○	○			Check valve play
			○	○				Clean and if necessary change supply pump fuel sieve fuel
			○	○				Check fuel backflow lines and change if necessary or every two years at the latest
			○	○				Make sure that the air inlet and exhaust lines are securely attached
			○				*	Check preglow system
							†	Clean dust extraction valve of the air filter
							†	Replace air filter safety element (after the main element has been replaced 3 times)
						4500h		Replace tooted belts and tension pully (with toothed belt ventilation after 3000 service hours) - or every five years at the latest
Working hydraulics								
<input type="checkbox"/>	●	●	○	○	○			Check oil level in the hydraulic tank
<input type="checkbox"/>		■	○	○	○	250h		Check the magnetic rod on the hydraulic tank
			○	○	○			Drain water and sediment from the hydraulic tank
			○	○	○			Replace return-suction filter
			<input type="checkbox"/>	○	○			Clean backflow sieve in the hydraulic tank (once a year)
			○	○				Replace breather filter on the hydraulic tank

LBH/01/003801/00037.03/len/Version: 06.2003

Customer: Machine type: Serial No.: Oper. hours: Date :

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED	
On delivery	Every 10	Every 50	Every 500	Every 1000	Every 2000	Special intervals	By maintenance personnel	By authorised qualified personnel
							■ One-off activity ● Repetition interval † If necessary * Annually at the start of the cold season	□ One-off activity ○ Repetition interval † If necessary
						○ ○	Clean pilot control device solenoids and lubricate universal joints	
						○	Replace hydraulic oil	
						+	Clean oil cooler	
Steering system								
□	●	●	○	○	○		Check the steering for proper functioning	
		●	○	○	○		Lubricate the bearing points on the steering cylinders	
Braking system								
□	●	●	○	○	○		Check the oil level in the equalizing reservoir	
□	●	●	○	○	○		Check that the service and parking brakes are functioning properly	
				○	○		Check overlapping of the brake- inching system	
				○	○		Check the play and wear of the brake pads	
Electrical system								
□	●	●	○	○	○		Check indicator lamps and lighting	
□				○	○		Check battery(ies), fluid level and points	
Travel gear								
□				○	○	○	Check the oil level	
				□	○	○	Change gear oil (once after 500 h only for L508/L509 from Serial. No. 4085)	
Axles, Tyres								
□						+	Check and if necessary, adjust tyre pressure on attachments and accessories	
□		■	○	○	○		Check the tightness of the wheel lugs (once after 50, 100 and 250 h)	
		●	○	○	○		Grease the lubrication points on the axle pivot steering on the rear axle	
		●	○	○	○		Lubricate the drive shaft	
□				○	○	○	Check the oil levels	
				□	○	○	Change gear oil (once after 500 h only for L508/L509 from Serial. No. 4085)	
Vehicle frame, Ballast weight								
		●	○	○	○		Grease lubrication points on the rear axle, oscillating axle casing, and the articulated pendulum bearing	
Covering, Cab access								
						+	Lubricate hinges on the hood of the engine compartment	

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Customer: Machine type: Serial No.: Oper. hours: Date :

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED	
On delivery	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
Cab, Heating, Air conditioning system (optional)								
			○	○	○			Check the indicator beads in the dryer-collector unit (optional)
						†		Clean or replace the fresh air filter
						†		Lubricate the door hinges
Lift arms, quick-change device								
		●	○	○	○			Check and lubricate bearings and lubrication points
		●	○	○	○	†		Lubricate bucket bearings (the lower bucket bearings - if necessary - daily)
			○	○	○			Check the lift arm and bucket stops

LBH/01/003801/00037.03/en/Version: 06.2003

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
Diesel engine	Lubricating oil	10.5	l
Travel gear	Lubricating oil	1.0	l
Differential front axle	Lubricating oil	3.7	l
Wheel hub front axle	Lubricating oil	2 x 1.0	l
Differential rear axle	Lubricating oil	3.5	l
Wheel hubs rear axle	Lubricating oil	2 x 1.0	l
Hydraulic tank	Hydraulic oil	45	l
Total contents of hydraulic system	Hydraulic oil	61	l
Brake pads total content	Engine oil	1.5	l

LBH/01/003801/0003/7.03/ent/Version: 06.2003

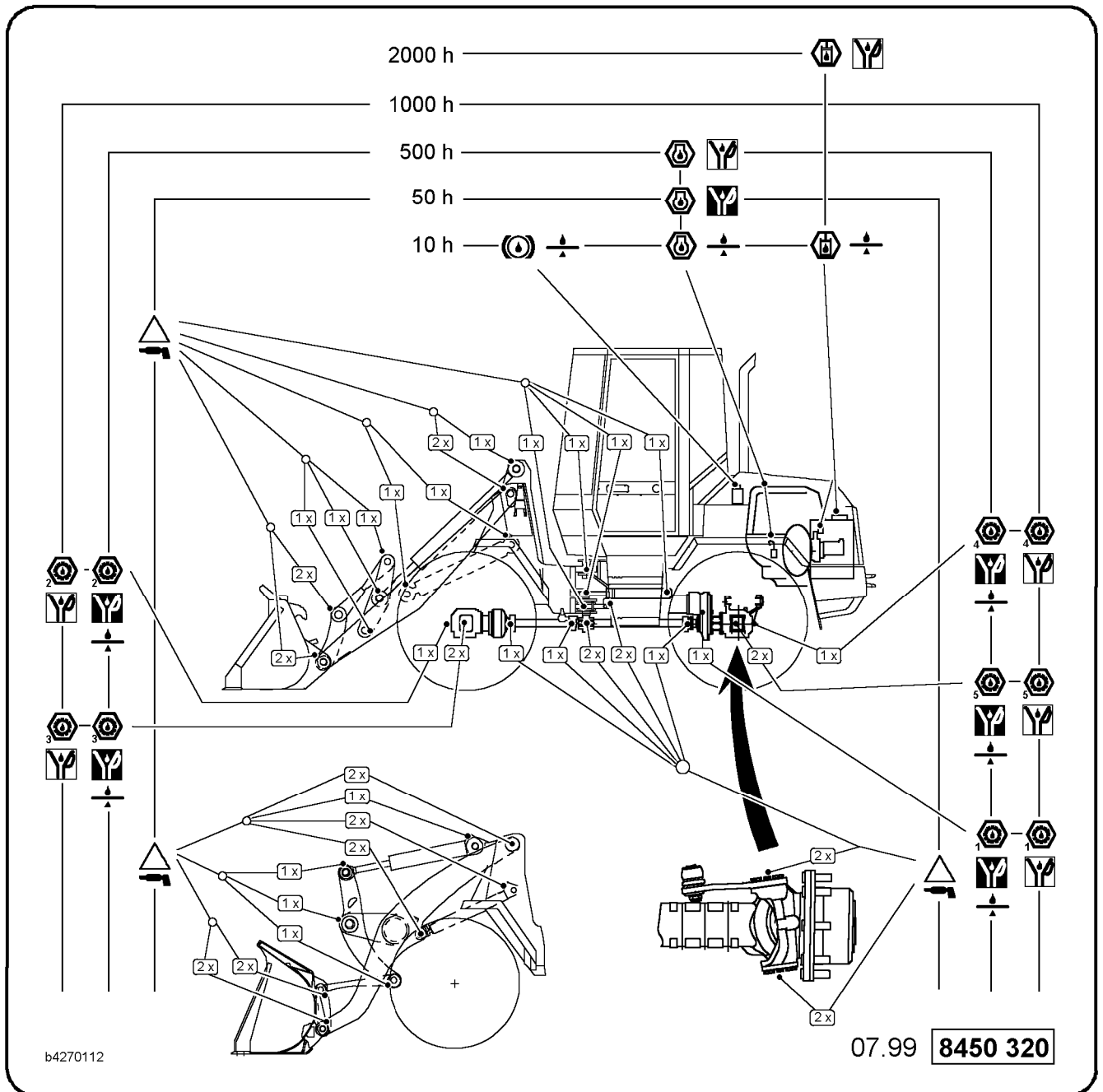
5.2.2 Lubricant chart






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” section.



Symbol	Name	Symbol	Name
 06sy09ab	General lubrication points	 06sy01ab	Lubrication
 06sy13ab	Check the oil level	 06sy11ab	Oil change
 06sy12ab	First oil change		

LBH/01/003801/0003/7.03/ent/Version: 06.2003

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:

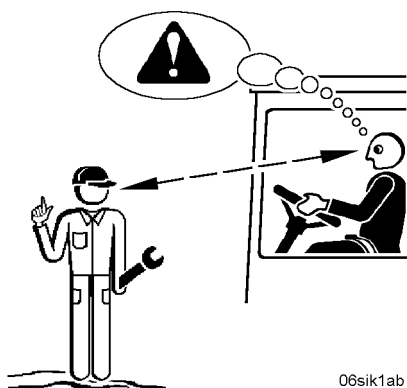
- lubricating the lift arm
- checking the oil level or changing the oil in the engine, transfer gear, axles, hydraulic tank, etc.
- replacing filter as well as adjustment and repair work on the hydraulic system

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

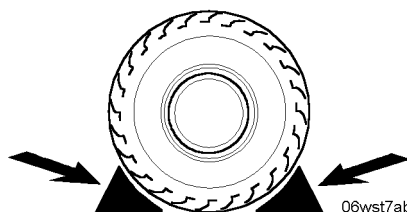


Risk of accidents for the maintenance personnel!

Unforeseen handling 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.

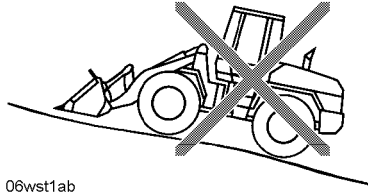
They enable access to the individual maintenance points.

LBH/01/003801/0003/7.03/entVersion: 06.2003

Maintenance position 1

To moving the machine into the maintenance position 1 proceed as follows.

For a detailed description of the individual procedures, see the Section "Operation, Handling".



06wst1ab



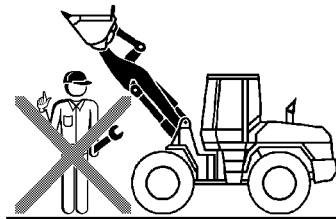
Maintenance position 1

- 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.

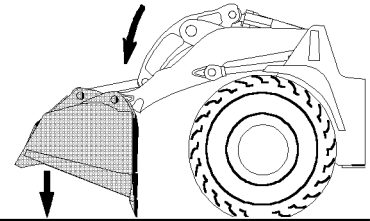
Maintenance position 2

To moving the machine into the maintenance position 2 proceed as follows.

For a detailed description of the individual procedures, see the Section "Operation, Handling".



06wst5ab



Maintenance position 2

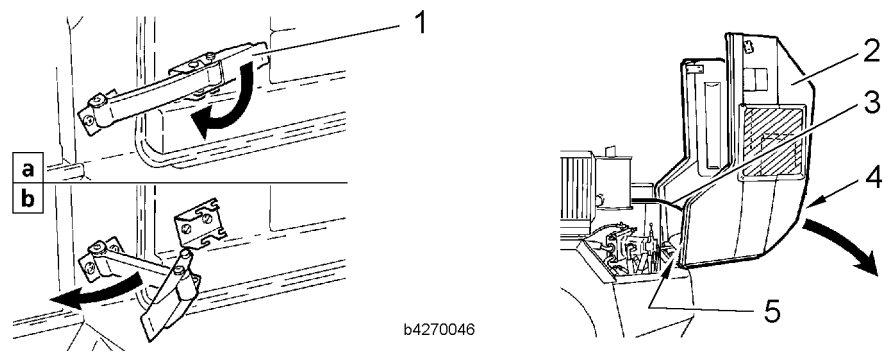
- Park the machine on level ground.
- Engage the articulation lock.
- Lower the lift arm.
- Tilt the bucket out and set it down on the ground on its teeth or cutting edge.
- Shut down the diesel engine.
- Take out the starting key.

Opening the service doors, hatches and hoods

Open engine compartment hood

When the hood is open, the following units can be reached:

- diesel engine
- variable displacement pump
- cooling system
- hydraulic tank
- air filter



Engine compartment hood

- | | |
|---------------------------|---------------------|
| 1 clamping lever | 4 handle |
| 2 engine compartment hood | 5 gas-filled spring |
| 3 holding rope | |

- Open the clamping levers 1 on the left and right of the engine compartment hood.

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 shut down.

- Completely open the hood 2 with the handle 4.
The hood is held in this position by a gas-filled springs 5.

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.

Troubleshooting

Is proper functioning not assured?

- Consult LIEBHERR CUSTOMER SERVICE!

Turning off the battery main switch

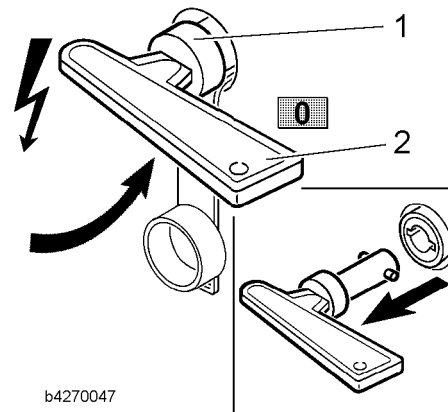
The main battery switch is located on the left-hand side of the driver's cab at the back.

For certain service tasks, the main battery 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 chapter "Maintenance tasks." . . .

Switch on the main battery switch after completing these maintenance tasks.

LBH/01/003801/0003/7.03/ent/Version: 06.2003



Main battery switch

1 main battery switch

2 key



Risk of damage to the electrical system!

! Do not turn off the main battery switch when the engine is running.

- Shut down the engine first and only then turn off the main battery switch.



Unforeseen handling 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 also the "Operation", "Operating position" section 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

Checking the oil level in the diesel engine

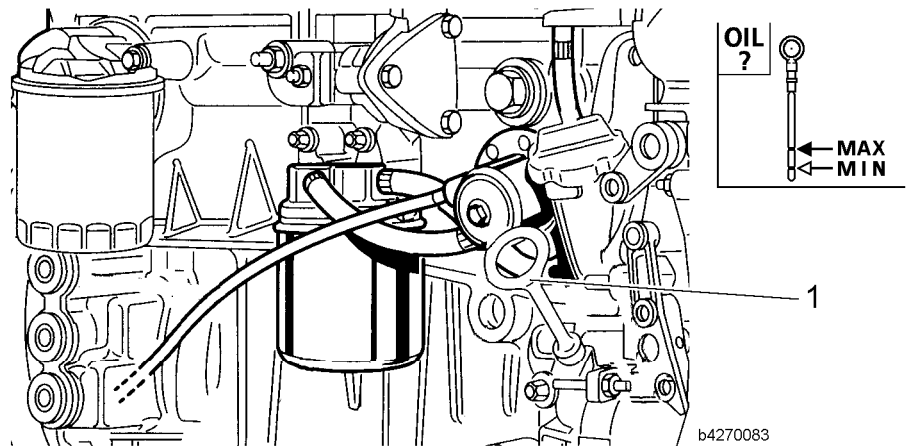
The dipstick is located on the right-hand side of the engine.

The oil filler neck is located on top of the engine on the valve cover.

Make sure that:

- the machine is in maintenance position 1
- the engine is level
- the engine is shut down
- the engine is cold
- the battery main switch if provided is switched off and the main switch-starter key is taken out.

Procedure



Diesel engine - oil dipstick

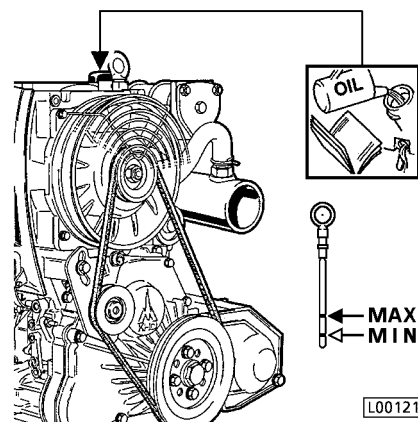
- Pull out the dipstick 1, wipe it clean, and re-insert it.
- Pull out the dipstick once again and read off the oil level.

The oil level must be between **MIN** and the **MAX** mark.

Troubleshooting

If the oil level is too low:

- do not start the engine
- remove the oil fill cap



Diesel engine - oil filler neck

LBH/01/003801/0003/7.03/ent/Version: 06.2003

- Fill with oil through the oil filler neck (oil quality, refer to the section “Lubricants and operating materials”).

Do not fill over the upper marking on the dipstick 1 (C).

- Clean the oil fill cap, put it back on the oil filler neck and tighten it.

Working hydraulics

Checking oil level in the hydraulic tank

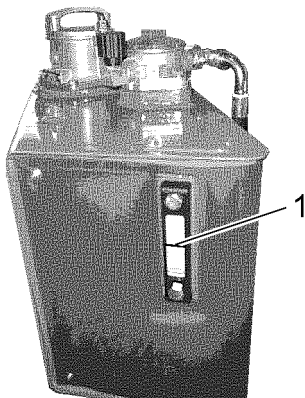
Make sure that:

- 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.” 1 shows the correct oil level.

- Check the oil level at the sight glass.
- If the oil level is below the required level:
Top up with hydraulic oil.



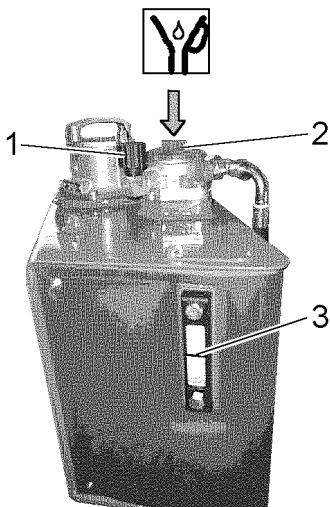
b4270048

Procedure for topping up with hydraulic oil.

- Release tank pre-pressure: screw out the breather filter 1 on the hydraulic tank.

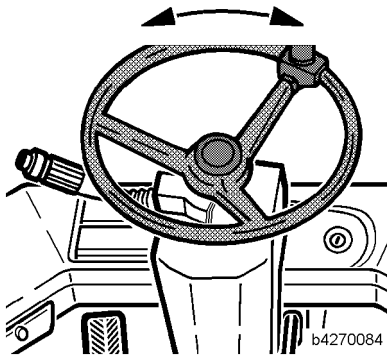
The hydraulic oil may only be poured in through the return strainer.

- Open the cover 2 of the return strainer.
- Fill with hydraulic oil up to the oil level marking 3.
- Put the cover with pressure spring on the housing and tighten it up.
- Tighten the breather filter.



b4270049

Checking the steering for proper functioning



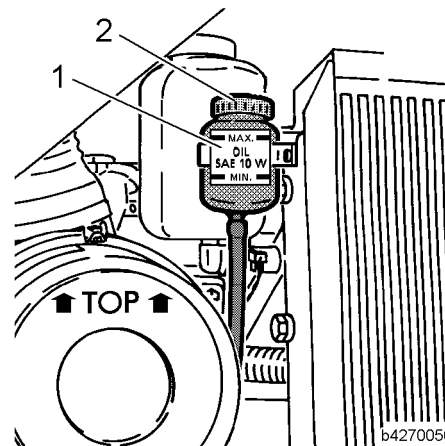
Steering system

- Start the diesel engine.
- Turn steering in both directions and check that it is functioning properly.

Checking the oil level in the equalizing reservoir

Braking system

Make sure that the machine is in maintenance position 1.



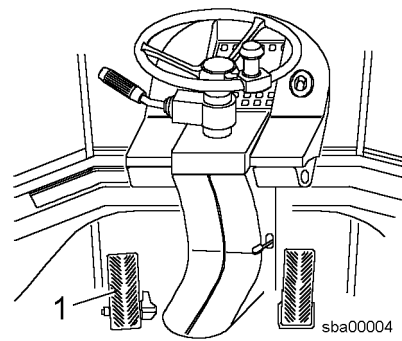
In order to avoid damage to the braking system, only use suitable engine oil (mineral oil).

! Make sure that only suitable oils are used when refilling (see in Section "Lubricants and operating materials").

- Open engine compartment hood and secure in open position.
- Check the oil level in the equalizing reservoir 1
- The oil level must lie between the minimum and maximum markings.
- If the oil level is at or below the minimum marking, remove cover 2 and top up as required with oil.
- Screw open the cover 2 of the equalizing reservoir.

Checking that the service brake is functioning properly

Move machine into operating position.



Pedal A service brake

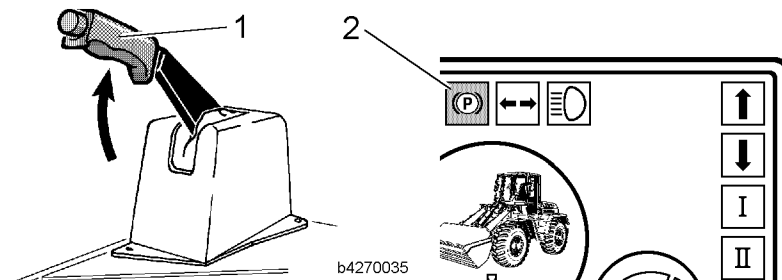
- Start the diesel engine.
- Keep the inch - brake pedal (A) pushed down as far as it will go.
- Release the parking brake.

Caution

Risk of accidents due to machine moving off!
The machine can move off during testing procedure.
! Carry out the test procedure with the appropriate degree of caution.

- Select forward drive and bring the diesel engine speed to full gas.
The machine must not move off.
Move machine into operating position.

Checking that the parking brake is functioning properly



lever – parking brake

Caution

The machine stops abruptly when the parking brake is engaged during motion!
! Fasten safety belt.

- Move machine forward at approx. 3 km/h and activate the parking brake with the parking brake lever 1.
The machine must come to an abrupt stop.

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,” in the chapter “Operation, handling” in the “Operator’s manual.”

Procedure

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

LBH101/003801/00037.03/lenVersion: 06.2003

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**".

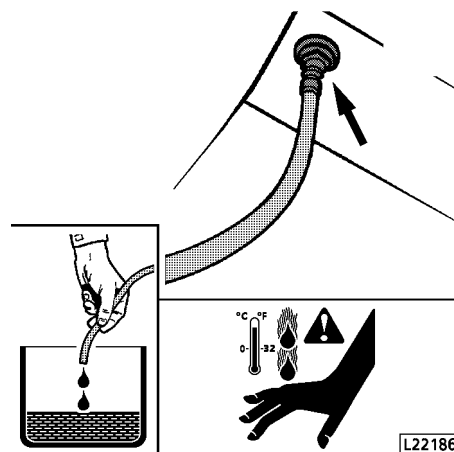
Diesel engine

Changing the engine oil

Make sure that:

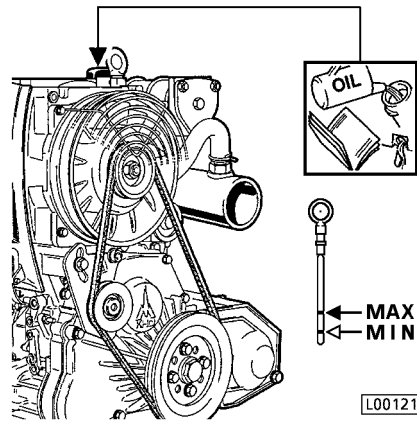
- the machine is in maintenance position 1
- the engine is level
- the engine is shut down
- the engine is warm
- the battery main switch is switched off and the main switch-key is taken out.
- a suitable container is in place with approx. 20 l capacity, and the oil draining hose and engine oil in accordance with the oil specifications are ready.

Procedure



Draining valve with draining hose

- Unscrew the sealing cover on the oil draining valve on the bottom of the oil pan.
- Screw the oil draining hose onto the oil draining valve.
- Let the oil drain off into the waiting container.
- Unscrew the oil draining hose and screw the sealing cover onto the oil draining valve.



Diesel engine - oil filler neck

- Fill the oil through the oil filler neck to between the **MIN** and **MAX** marking on the dipstick .
- Clean the filling cover, put it back on the oil filler neck and tighten it.
- Start the engine and check the oil pressure.
- Shut down the engine and check the oil level with the dipstick after 5 - 10 minutes.

Troubleshooting

Is the oil level not between the **MIN** / **MAX** marking?

- Correct the oil level.

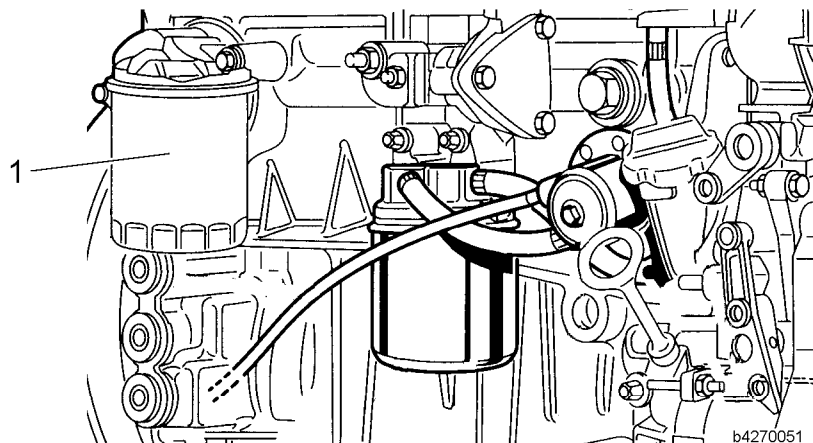
Replacing the oil filters

Only use original LIEBHERR oil filter cartridges (1 item).

Make sure that:

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

Procedure



Oil filters

- Release the oil filter cartridge 1 with a strap wrench and unscrew the filter.
 - Clean the seals on the filter bracket.
- The old filter seal and its residues must be removed.
- Brush the rubber gasket on the new oil filter cartridge lightly with engine oil.

- Refill new oil filter cartridge with fresh oil.
- Screw new oil filter cartridge onto the filter bracket until the seal contacts the filter bracket. Tighten by another half to three-quarter rotation.
- Start the engine.
- Check the oil pressure (engine oil pressure indicator unit) and the oil filter for leaks.
- Shut down the engine.
- Check the oil level with the dipstick after 5 - 10 minutes.

Troubleshooting

Is the oil level not between the **MIN** / **MAX** marking?

- Correct the oil level.

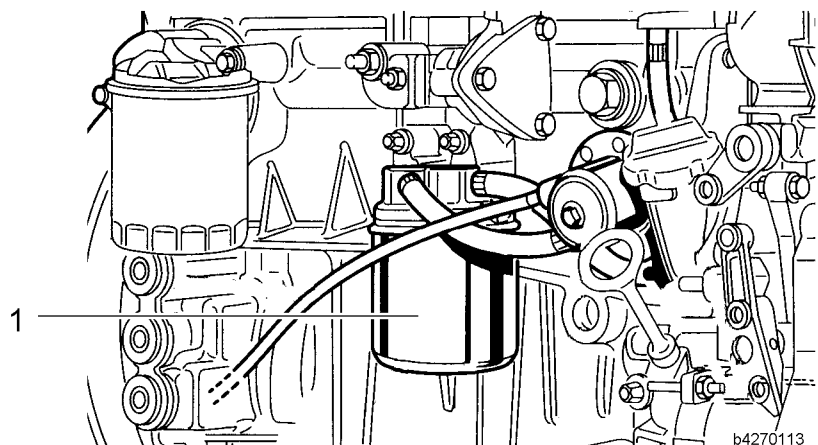
Replacing fuel filter

Only use original LIEBHERR oil filter cartridges (1 item).

Make sure that:

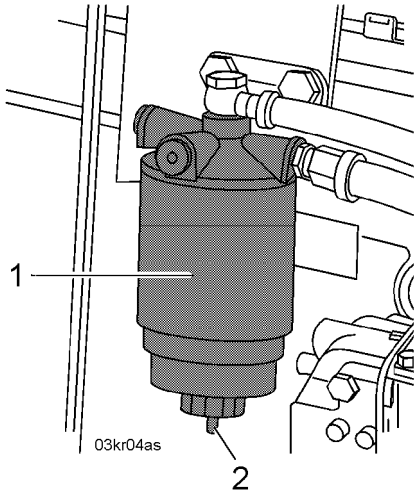
- the machine is in maintenance position 1
- the engine-compartment hood is open

Procedure



- Release the oil filter cartridge 1 with a strap wrench and unscrew the filter.
- Collect escaping fuel.
- Clean the seals on the filter bracket of any dirt.
- Smear the rubber seal ring on the new fuel filter cartridge lightly with oil or diesel fuel.
- Screw new fuel filter cartridge onto the filter bracket until the seal contacts the filter bracket. Tighten by another half to three-quarter rotation.
- Check that it is sealed properly.

Draining off condensate from the fuel filter



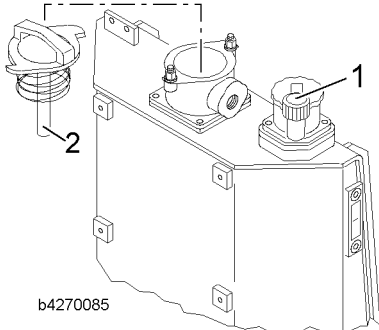
Make sure that:

- 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.

Checking and cleaning the magnetic rod on the hydraulic tank



Make sure that:

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

Checking the magnetic rod on the hydraulic tank

Procedure

- Release tank pre-pressure: unscrew the breather filter 1 on the hydraulic tank by two revolutions.
- Release the bolts on the lid and slowly lift the lid with the magnetic rod 2.

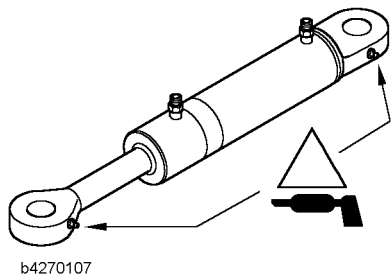
Troubleshooting

Heavy soiling or larger metal fragments on the magnetic rod could indicate damage in the hydraulic system.

- In this case, isolate and rectify the fault in the hydraulic system.

- Clean magnetic rod carefully.
- Place the O-ring and cover with magnetic rod on the housing.
- Tighten the bolts on the cover.
- Tighten the breather filter 1.

Lubricating the bearing points on the steering cylinders



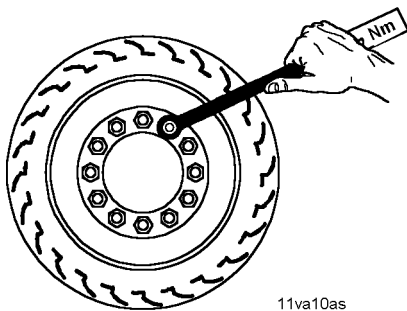
b4270107

Steering system

Make sure that the machine is in maintenance position 1.

- Turn the machine to the right to improve access to the articulated joint zone.
- Lubricate the bearing points on the steering cylinder.

Checking the wheel lug fixings



11va10as

Axles, Tyres

Make sure that:

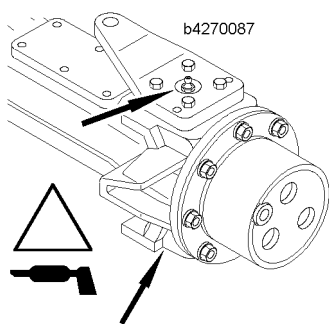
- the machine is in maintenance position 1
- and that a torque wrench with a measuring range of 450 Nm is available

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 the required tightening moment of 450 Nm.

Greasing the lubrication points on the axle pivot steering on the rear axle



b4270087

Make sure that the machine is in maintenance position 1.

Procedure

The lubrication point on the steering shaft of the wheel hub cannot be accessed until it is turned left or right. In addition the machine must be moved into such a position that the lubricating nipple can be accessed.

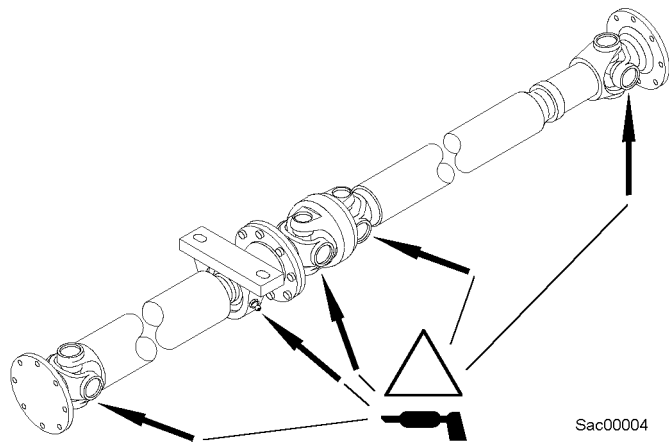
- Turn the machine to the left and right so that the respective lubrication points can be accessed.
- Grease the lubrication points on the axle pivot bearing at both wheel hubs.

Lubricating the drive shaft

Make sure that the machine is in maintenance position 1.

Procedure

LBH/01/003801/0003/7.03/revVersion: 06.2003



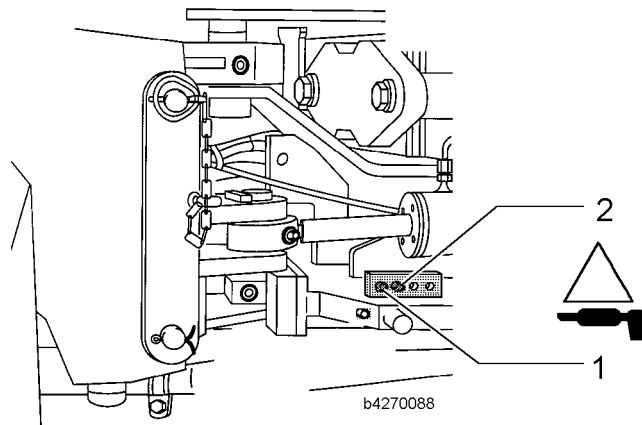
- Move the machine into the position where the lubricating nipples on the gear shaft point horizontally downwards.
- Turn the machine so that it is straight.
- Lubricate the 5 lubrication points on the gear shaft.

Vehicle frame, Ballast weight

Lubricating oscillating axle frame and articulation bearing

Make sure that:

- the machine is in maintenance position 1
- the articulation lock is engaged

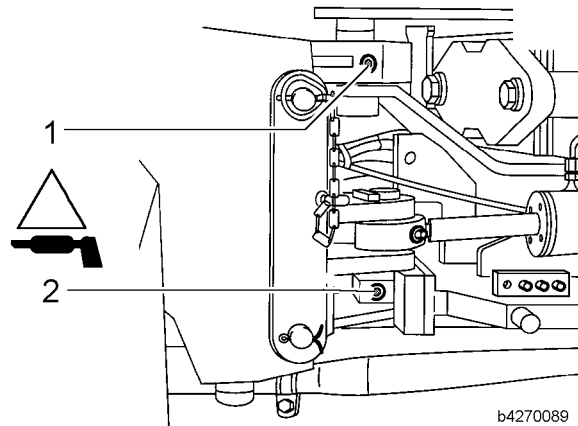


Lubrication points on the right-hand side of the central lubrication rail

1 lubrication point - front pendulum bearing

2 lubrication point - rear oscillating axle mount

- Lubricating front oscillating bearing: grease lubrication point 1 on the central lubrication rail.
- Lubricate rear oscillating axle mount: grease lubrication point 2 on the central lubrication rail.



Articulation bearing lubrication points

1 lubrication point - articulation bearing at top

2 lubrication point - articulation bearing at bottom

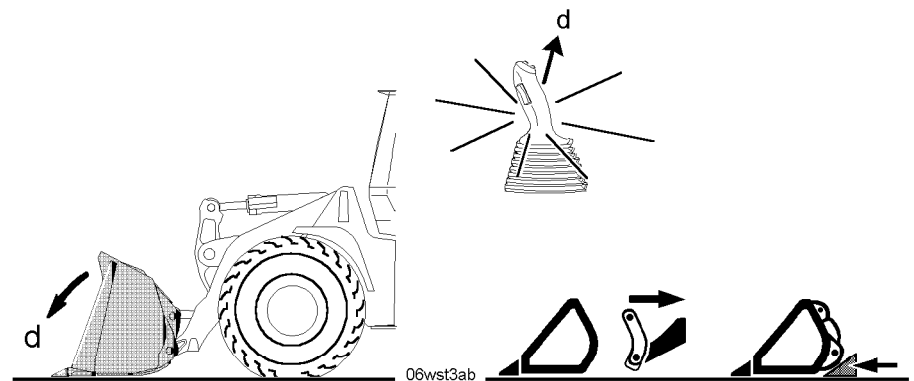
- Lubricate upper articulation bearing: lubricate lubrication point 1 on the articulation bearings.
- Lubricating lower articulation bearing: lubricate lubrication point 2 on the articulation bearings.

Lift arm, Quick-change device

Lubricating bearings and lubrication points

Make sure that the machine is in maintenance position 1.

You will find details on this in the section “Maintenance positions.”



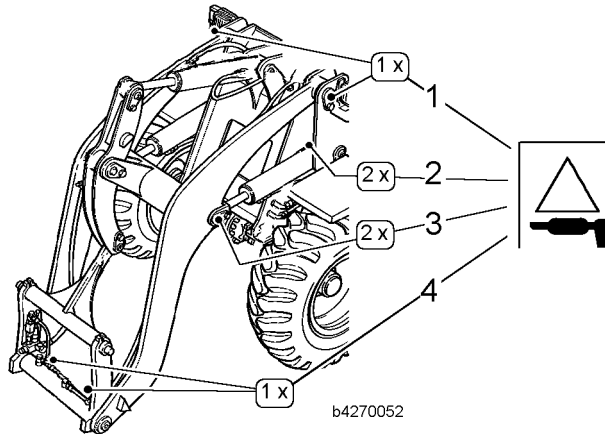
Maintenance position - lift arm

If the lubrication points near the bucket couplings are difficult to reach, make sure that the working attachment is decoupled.

This only applies to machines with optional attachments.

You can find more details in the chapter “Decoupling the working attachments.”

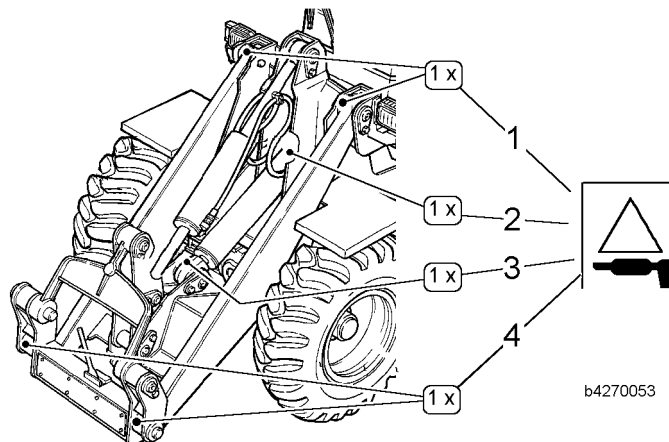
Lubricating the lift arm and lift cylinders



Lubrication points - lift arms and lift cylinders

- | | |
|--|---|
| 1 lubrication point - top of lift arm | 3 lubrication point - front lift cylinder |
| 2 lubrication point - rear lift cylinder | 4 lubrication point - bottom lift arms |

- Lubricate the bearing at the top of the lift arm: grease the left-hand lubrication point 1 and the right-hand lubrication point 1.
- Grease the two lubrication points 2, 3 on the left-hand lift cylinder.
- Grease the two lubrication points 2, 3 on the right-hand lift cylinder.
- Lubricate the two lubrication points on the lower lift 4 arms.



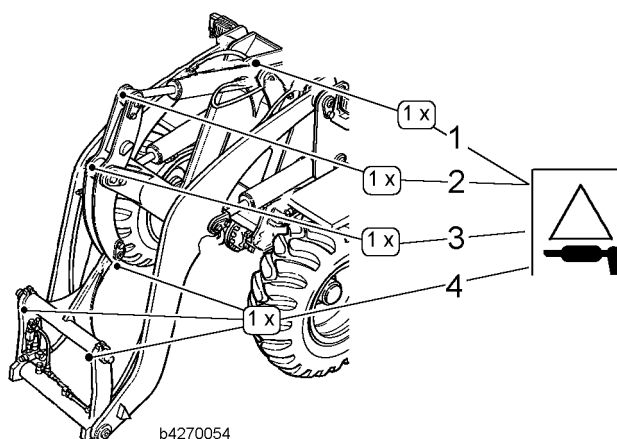
Lubrication points - lift arms and lift cylinders

- | | |
|--|---|
| 1 lubrication point - top of lift arm | 3 lubrication point - front lift cylinder |
| 2 lubrication point - rear lift cylinder | 4 lubrication point - bottom lift arms |

- Lubricate the bearing at the top of the lift arm: grease the left-hand lubrication point 1 and the right-hand lubrication point 1.
- Grease the two lubrication points 2, 3 on the left-hand lift cylinder.
- Grease the two lubrication points 2, 3 on the right-hand lift cylinder.
- Lubricate the two lubrication points on the lower lift 4 arms.

LBH101/003801/00037.03/lenVersion: 06.2003

Lubricating the tilt cylinder, Z-bar linkage and connecting bar

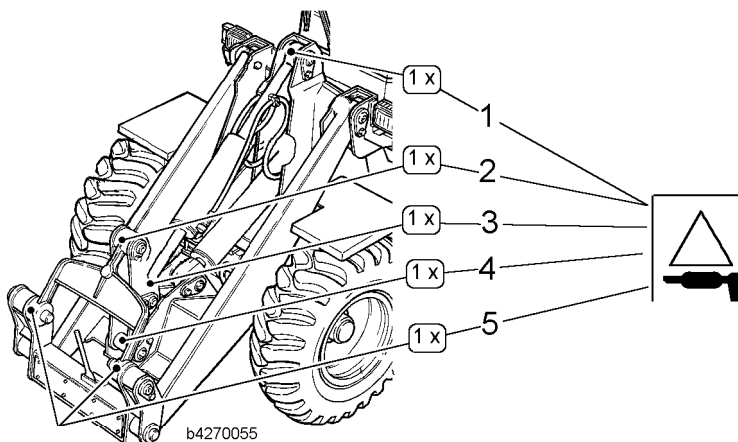


b4270054

Lubrication points - tilt cylinder, z-bar linkage and connecting bar

- | | |
|---|--------------------------------------|
| 1 lubrication point – rear tilt cylinder | 3 lubrication point – Z-bar linkage |
| 2 lubrication point – front tilt cylinder | 4 lubrication point - connecting bar |

- Lubricate the bearing on the tilt cylinder: grease the back lubrication point 1 and the front lubrication point 2.
- Grease a lubrication point 3 on the Z-bar linkage.
- Grease three lubrication points 4 on the connecting bar.



b4270055

Lubrication points - tilt cylinder, z-bar linkage and connecting bar

- | | |
|--|---|
| 1 lubrication point - rear tilt cylinder | 3 lubrication point - front tilt cylinder |
| 2, 5 lubrication point - connecting bar | 4 lubrication point – Z-bar linkage |

- Lubricate the bearings on the tilt cylinders: grease the back lubrication point 1 and the front lubrication point 3.
- Grease three lubrication points 2, 5 on the connecting bar.
- Grease a lubrication point 4 on the Z-bar linkage.

LBH/01/003801/0003/7.03/ent/Version: 06.2003

5.3.4 Unscheduled maintenance tasks

On completion of servicing, the machine should be moved back into the operating position.

See also the "Operation", "Operating position" section in the "**Operator's manual**".

Complete machine

Checking that all screwed connections are tight

Make sure that:

- the machine is in maintenance position 2
- 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

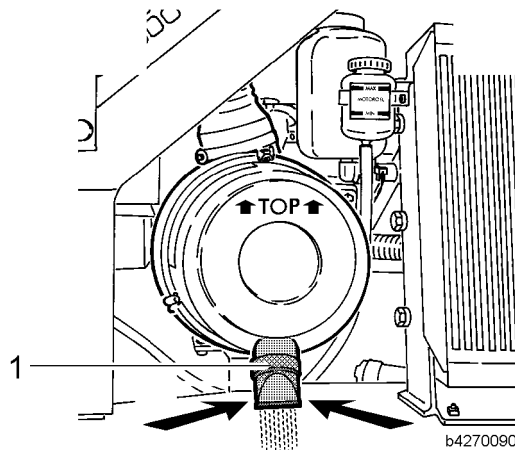
Procedure

- 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

Clean dust extraction valve of the air filter

Important: a damaged or hardened dust extraction valve renders the service cover ineffective, which in turn reduces 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 main battery switch is turned off
- the engine compartment – hood is open

Procedure

- Press the rubber lip on the dust extraction valve 1 several times to drain the air cleaner cover.
- When working in dusty conditions, empty the dust extraction valve more often.

Troubleshooting

Is the dust extraction valve damaged or does it stay open?

- Replace the dust extraction valve .

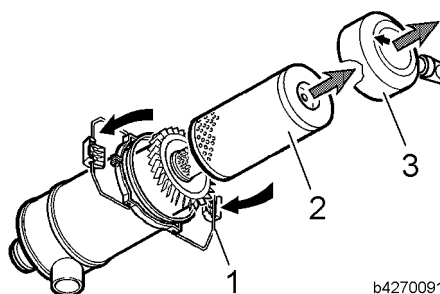
Cleaning or replacing the air filter main element

The main element should be cleaned or replaced when the symbol field – air filter contamination on the indicator unit lights up or every 1000 operating hours.

If the symbol field – air filter contamination continues to light after the main element has been serviced then the safety element must also be replaced.

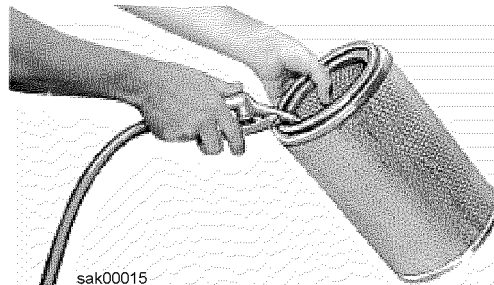
Make sure that:

- the machine is in maintenance position 1
- the main battery switch is turned off
- the engine-compartment hood is open

Procedure

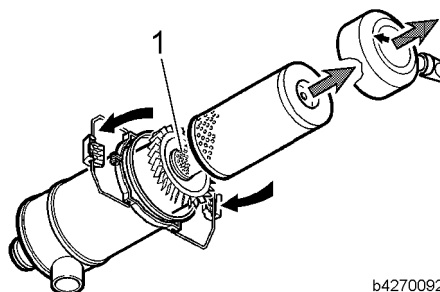
b4270091

- Open fixing clips 1 on the air cleaner cover 3 and take the lid off.
- Remove, clean or replace the main filter element 2.



sak00015

- Blow out the main filter element from the inside out with dry air. Avoid tapping the filter, as this could cause damage.



b4270092

- The safety element 1 should be replaced every third time the main filter element is replaced.
- Ensure that all soiling is removed from the housing before inserting a new or cleaned filter element.

- Before installing the filter elements, lightly oil the seal surfaces (inner surface of the main filter element and outer surface of the safety element). Re-insert filter elements and make sure that they are correctly fitted.
- Clean the air cleaner cover and put it back on the filter housing. The fixing clips can only be closed without major force being required when the full circumference of the cover is on the filter housing.
- Close the fixing clips .

Axles, Tyres

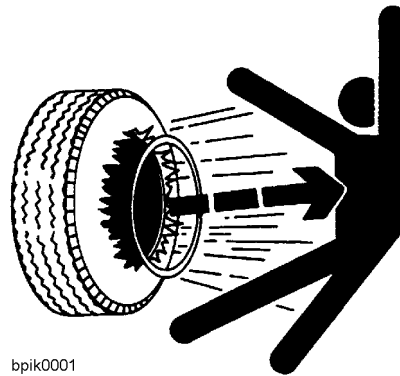
Checking and if necessary, adjusting tyre pressure on attachments and accessories

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.



bpik0001

Exploding tyres

Warning



Risk of accidents due to exploding tyres!

Incorrect or careless operation of the tyre inflation equipment or excess pressure could result in the tyres bursting or cause the rims to come off, 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.

Covering, Cab access

Lubricating hinges on the hood of the engine compartment

- Lubricate hinges on the hood of the engine compartment with a grease gun.

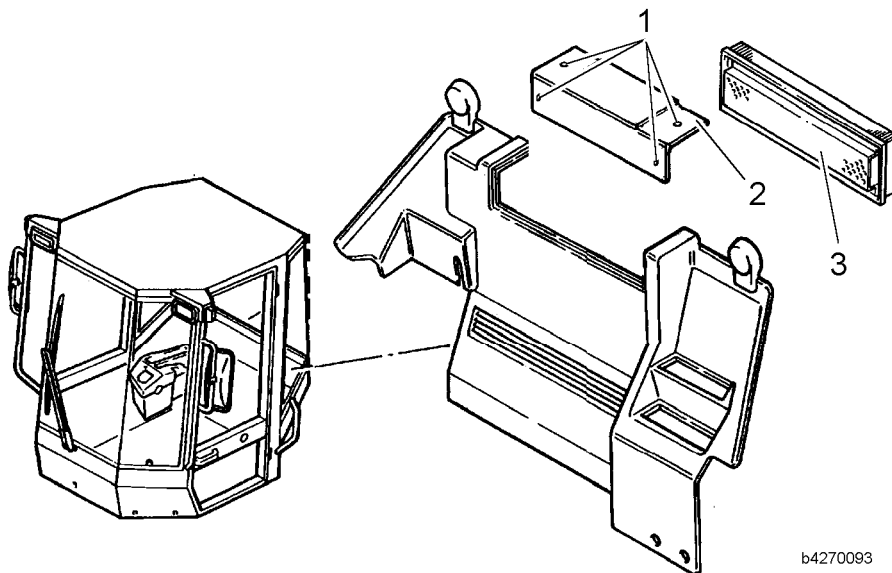
Cab, air-conditioning

Clean or replace the fresh air filter

The cab fresh air filter can be accessed from the behind the driver's seat .

Make sure that the machine is in maintenance position 1.

Procedure:



b4270093

- Remove screws 1 and remove cover 2.
- Take out filter 3.
- Clean the filters 3 (blow them out), replace if necessary.
- Reinsert cleaned or new filters.
- Replace cover 2 and tighten the screws 1.
- Lubricate the door hinges with a grease gun.

Lubricating the door hinges

5.3.5 Cleaning the machine

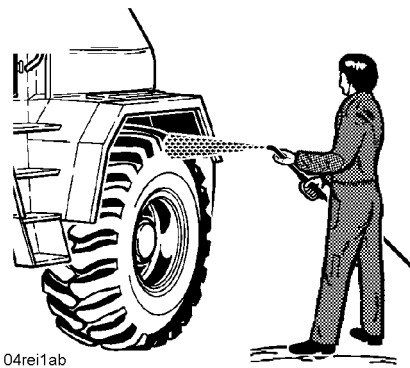
Wet-cleaning the machine

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.

LBH/01/003801/0003/7.03/ren/Version: 06.2003



04rei1ab

Wet cleaning



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.

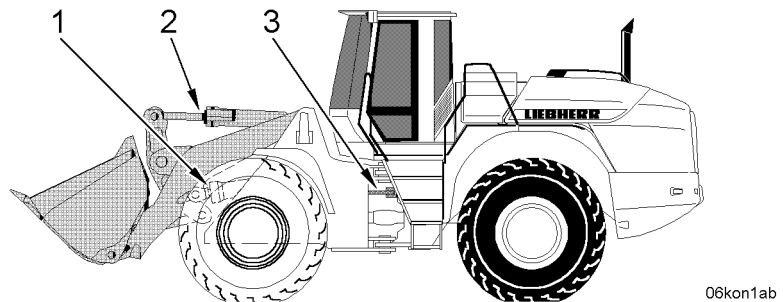
- Clean the engine carefully.

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.

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.

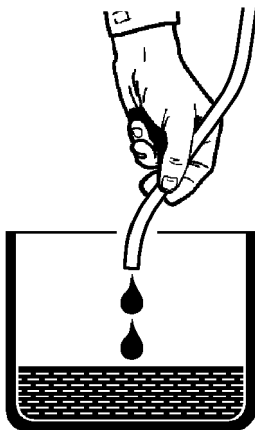
Environmental protection measures

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



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**.



Risk of damage to the machine's hydraulic system!
 Mixing "environmentally-compatible hydraulic fluids" with "mineral oils" produces an aggressive reaction that can damage the hydraulic system!
 ! Avoid mixing "environmentally-compatible hydraulic fluids" with "mineral oils"!

- **When the machine is converted to an "environmentally-compatible 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!

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"

Lubricating oils for diesel engines



06sy05ab

Specifications

Only high-alloy lubricating oils are used in modern diesel engines. They consist of basic oils blended with additives. The lubricating oil regulation for diesel engines is based on the following specifications and regulations:

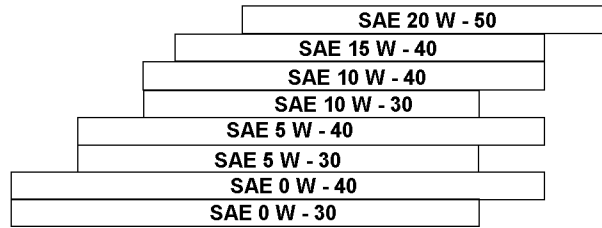
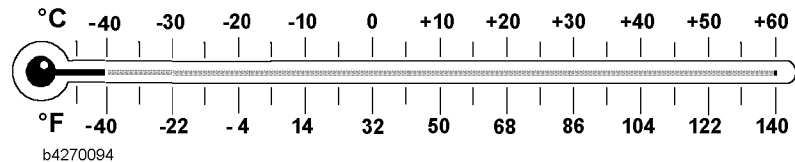
Name	Specifications
ACEA (CCMC) - Classification (Association des Constructeurs Européens de l'Automobile)	E1-96, E2-96, E3-96, E4-98
API - Classification (American Petroleum Institute)	CF, CF-4, CG-4, CH-4

Specifications and regulations

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 graphic are guidelines, which may be briefly exceeded or gone under.

LBH/01/003801/0003/7.03/ent/Version: 06.2003



Temperature dependent selection of the SAE class

Lubricant oil changing intervals

Changing intervals:

- first oil and filter-change with initial oil filling: see the "Maintenance and inspection schedule" chapter
- 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.

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 operating conditions apply, the oil change intervals defined in the "Maintenance and inspection schedule" given in the table below must be reduced by half.

Difficulty factor		Oil quality	
		E1-96	E3-96
Working conditions		E2-96	E4-98
		CF	CG-4
		CF-4	CH-4
		interval	
climate - normal, up to - 10 °C	Sulphur content in fuel 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).

Diesel fuels



06sy02ab

LBH/01/003801/00037.03/en/Version: 06.2003

Specifications The diesel fuels must meet the minimum requirements in the fuel specifications listed below.

Authorised fuel specifications:

- DIN EN 590
- BS 2869: A1 and A2 (observe sulphur content with A2)
- ASTM D 975-89 1D and 2D
- NATO code F-54 and F-75

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 max. limit in force in Europe of 0.05 % sulphur by weight can cause wear in the injection system (especially with distributor injection pumps).

“Branded fuels,” in Germany, contain these lubricant additives as part of their additive package. The fuel lubricosity must correspond to HFRR (60°) Test <400 µm.

The additives should be admixed by the supplier in his capacity as agent responsible for the quality of the fuel. The admixture of secondary lubricosity additives by the customer is not recommended.

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 -20 °C.

Diesel fuel containing additives with a working temperature down to -20 °C is also often available.

Use winter diesel fuel for external temperatures below 0 °C (to -20 °C).

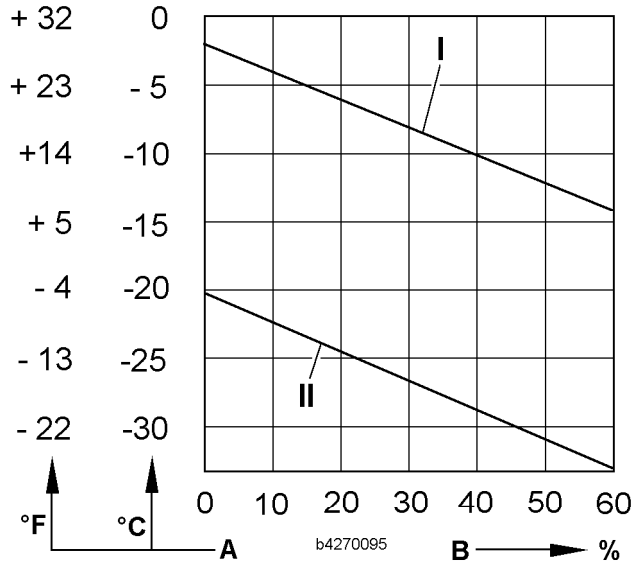
Petrol must be added when the temperature falls below -20 °C . Required mixture ratios, see diagram “diesel fuel – mixture ratio (Vol.-%)”.

For artic conditions to -44 °C special diesel fuel can be used.

If it is necessary to use summer diesel fuel below 0 °C, up to 60% can be added in accordance with the diagramme “diesel fuel – mixture ratio (Vol.-%)”.

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.-%)



Diesel fuels – mixture ratio (Vol.-%)

I summer diesel fuel
II winter diesel fuel

A external temperature
B petrol admixture proportion

Additives for diesel fuel (flow improvers)

Flow improvers available on the market will also improve the cold weather performance of the diesel fuel. When using flow improvers, the quantity and application recommendations of the manufacturer must be observed.



06sy03ab

Mineral oils Specifications

Hydraulic oils

Only engine oils meeting the Mercedes Benz service fuels specifications are permitted.

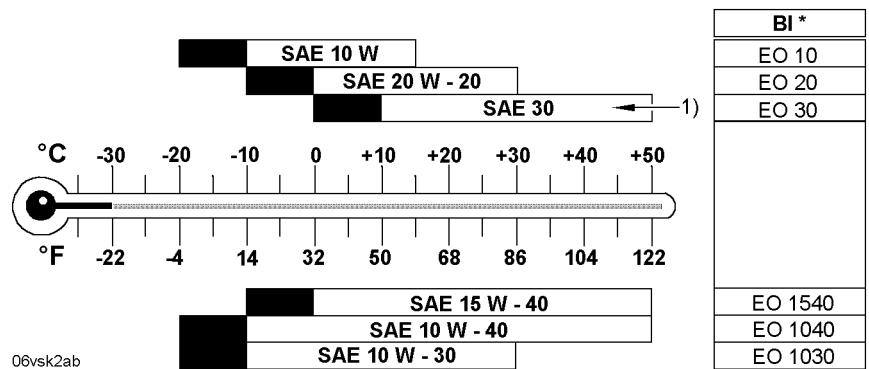
Mercedes-Benz - Information sheet - No.:	Specifications:
226.0 and 227.0 (single-grade oils):	API- CC / SF, CD / SF, CE / SF
227.1 and 228.1 (multi-grade oils):	CD / SF, CE / SF,
	CD+API- CC / SF (MIL-L-46152 B),
	CD / SF, CE / SF (MIL-L-2104 D),
	CD / SF (MIL-L-2104 D), CE / SF,
	CD+ (MIL-L-46152 B)

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/01/003801/00037.03/lenVersion: 06.2003



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”.

Lubricating oils for he transmissions



06sy08ab

LBH/01/003801/0003/7.03/ent/Version: 06.2003

Axles, travel gear



06sy06ab



06sy07ab

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 Chapter “BI * Standard lubricants”.

Grease for general lubrication points



06sy09ab

This grease must meet the specification **KP2k**– Consistency 2 of the NLGI 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:

- NLGI class 2 / BI * – MPG - A

BI * = code designation = container labelling, see the Section “BI * Standard lubricants”.

LIEBHERR special paste CTK



06sy20ab

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.

This grease is not suitable for use in automatic central lubricating systems.

Lubricant grease for automatic central lubrication systems



06sy09ab

Grease complying with the specification **KP2k** – Consistency 2 of the NLGI 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.

Approved greases

LIEBHERR 9610 special grease is a milling resistant, 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 milling 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)

LBH/01/003801/00037.03/en/Version: 06.2003

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.

Braking oil



bsym0027

Service brake

The engine oil **SAE 10W** is to be used as the braking oil for all ambient temperatures.



06sy06ab

Liebherr-Hydraulikbagger GmbH

Hans-Liebherr-Straße 12
D-88457 Kirchdorf/Iller
☎ + 49 7354 80-0
Fax + 49 7354 80-72 94
www.liebherr.com
E-Mail: info@lhb.liebherr.com

Liebherr-France SAS

2, Avenue Joseph Rey, B.P. 287
F-68005 Colmar Cedex
☎ + 33 389 21 30 30
Fax + 33 389 21 37 93
www.liebherr.com
E-Mail: info@lfr.liebherr.com

Liebherr-Werk Telfs GmbH

Hans-Liebherr-Straße 35
A-6410 Telfs
☎ + 43 5262 6 00-0
Fax + 43 5262 6 00-72
www.liebherr.com
E-Mail: info@lwt.liebherr.com

Liebherr-Werk Bischofshofen GmbH

Postfach 49
A-5500 Bischofshofen
☎ + 43 6462 8 88-0
Fax + 43 6462 8 88-3 85
www.liebherr.com
E-Mail: info@lbh.liebherr.com