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Operating Manual

Crawler Loader
LR 632 B Litronic

LIEBHERR

en

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Crawler loader
LR 632 B Litronic

from S/N: 6851

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Author: LWT / Technical Documentation Dept.

Product identification

Manufacturer: LIEBHERR Werk Telfs GMBH

Type: LR 632 B

Type No.: 393

Conformity: CE

Address

Address: LIEBHERR Werk Telfs GMBH

Hans Liebherr - Straße 35,
A - 6410 TELFS Austria

Machine data

We recommend that you fill in the following information in the space provided as soon as you receive your machine:
This information will also be helpful when ordering spare parts.

Vehicle Id. No.: VAUZ . . . . . ZT . . . . . *

Year: . . . . . CE *

Delivery date: . . / . . / . .

* This information is found on the data tag of your machine, on the left front on the main frame.

Noise level

Sound pressure level LpA LR632 max. 80 dB(A) at the work place, according to ISO 6396

Noise emission level LWA LR 632 max. 110 dB(A) which is emitted to the surrounding area, according to regulation 2000/14/EG

Foreword

This operating manual has been written for the **operator** and for the **maintenance personnel** of this machine.

This manual contains descriptions for:
- Technical Data
- Safety information
- Operating instructions and guidelines
- Maintenance
- Instructions for special / optional equipment

This operating manual should be given to the operator and the maintenance personnel and any other person who works on the machine, who should read it carefully at regular intervals and before operating or servicing the machine.

Work with or on the machine is, for example:
- **Operation,** including set up, trouble shooting during operation, removal of debris, service, removal of oil, lubricants, fuels and operating fluids.
- **Maintenance,** including inspection, upkeep and / or repair.
- **Transportation** or loading the machine.

Reading this manual will familiarize the operator with the machine and prevent problems due to improper operation.

Following the operation and maintenance guidelines by maintenance personnel will:
- increase reliable service,
- increase the service life expectancy of your machine,
- reduce repair costs and downtime.

The Operating Manual is part of the machine. Keep a copy of this manual in the glove compartment in the operator's cab to assure that it can be consulted and referred to at any time.

Any existing federal, state and local safety requirements governing accident prevention and environmental safety must be added to this Operating Manual, in addition to safety and accident prevention regulations applicable to the country and job site you operate in, including any technical rules and regulations to assure safe and proper operation must be followed.

This Operating Manual includes the necessary information to operate and maintain your machine.
- Some illustrations in this manual might show details and machines which differ from your machine.
- For some illustrations, covers and protective devices were removed to provide a better view.
- Continuing improvements on our machines might result in changes, which are not reflected in this Operation and Maintenance Manual.

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If you need any additional information and / or clarification, please don't hesitate to contact LIEBHERR's Technical Documentation Department, Customer Service School or Service Department.

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Under extreme conditions, it might be necessary to increase maintenance intervals as compared to those listed in the inspection schedule.

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- We reserve the right to make changes of technical details on the machine which differ from the wording and illustrations in this manual.
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- Above and the following remarks will not expand LIEBHERR's general business conditions regarding warranties and liability.

Reply form

We need your assistance to continuously improve our machine documentation. Please copy this page and fax or mail us your comments, ideas and suggestions for improvement.

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Fax: 0043 5262 600 66

E-mail: info.lwt@liebherr.com

Ideas, comments (please note page number):

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Very good	
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Unsatisfactory	

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Machine S/N:

Company:

Name:

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Telephone number:

Dealer:

Thank you very much for your assistance!

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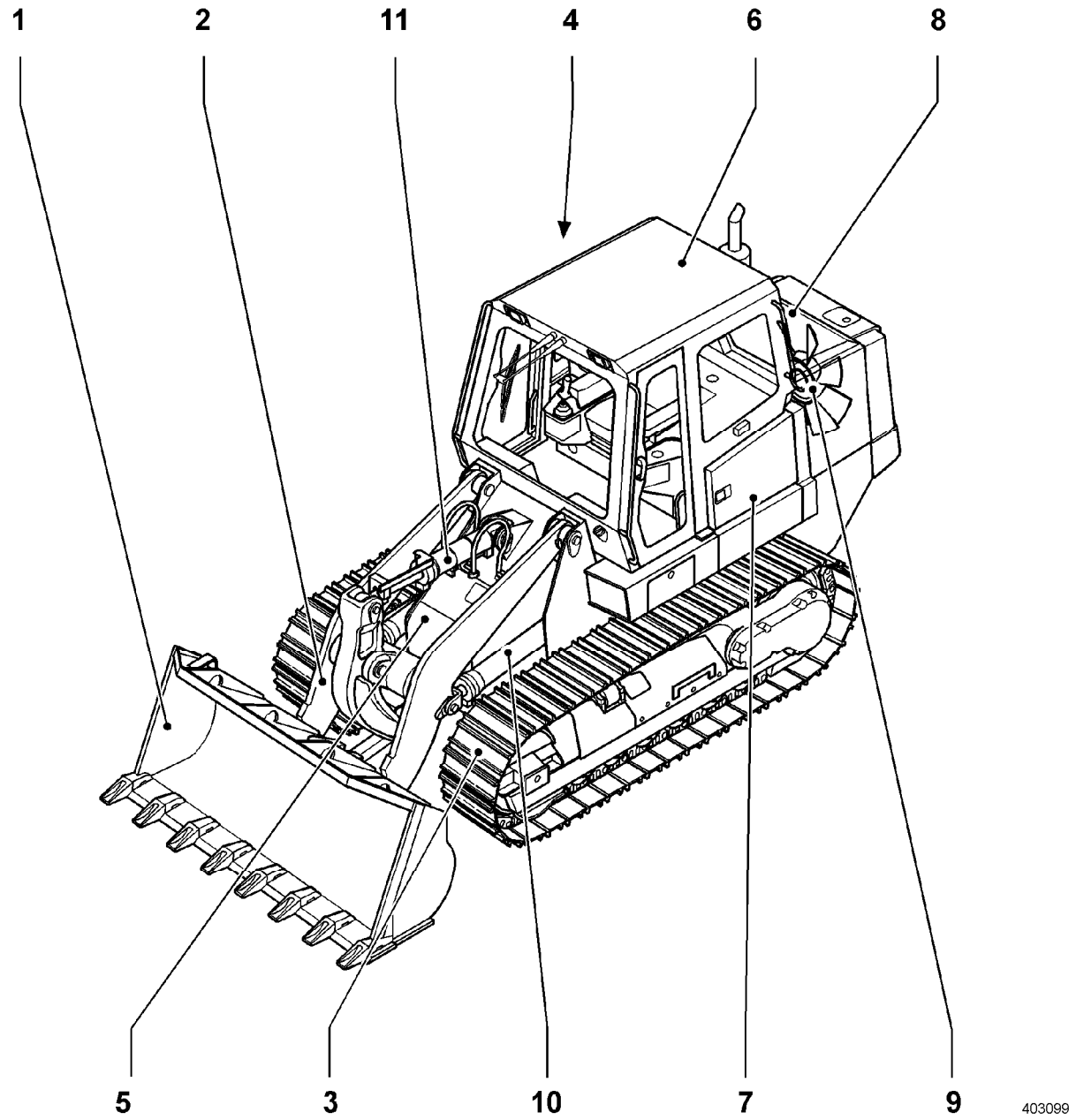
1. Product description

Design - Overview

This paragraph contains an overview of the machine with descriptions of the individual components.



Complete machine - view left

1 Bucket
2 Bucket arm
3 Roller Frame
4 Hydraulic tank
5 Fuel tank
6 Operator's cab
7 Battery compartment
8 Covers
9 Diesel engine
10 Lift cylinder
11 Tilt cylinder

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1.1 Technical Data

The most important technical data is noted in the attached technical description.

Crawler loaders. LR 622 B Litronic® LR 632 B Litronic®

Engine output: 97 kW / 132 HP – 132 kW / 180 HP
Bucket capacity: 1.54 - 2.40 m³ / 2.01 - 3.14 cu.yd

LIEBHERR

LR 622 B Litronic®

Technical Data:

Engine output:	97 kW / 132 HP
Operating weight:	15,400 - 17,000 kg
	34,000 - 37,500 lb
Bucket capacity:	1.54 - 1.80 m^3
	2.01 - 2.35 cu.yd

Hydrostatic travel drive with electronic control

LR 632 B Litronic®

Technische Daten:

Engine output:	132 kW / 180 HP
Operating weight:	21,100 - 23,500 kg
	46,500 - 51,800 lb
Bucket capacity:	1.90 - 2.40 m^3
	2.48 -3.13 cu.yd

Hydrostatic travel drive with electronic control

Performance

Liebherr crawler loaders provide exceptional handling performance even in difficult terrain. Quick work cycles, an optimum bucket capacity and outstanding machine handling under load give them optimum operating properties.

Cost-effectiveness

With their low fuel consumption and low service and maintenance requirement, the crawler loaders make a real contribution to your economic success: Reduced costs per every operating hour increase cost-effectiveness.

Reliability

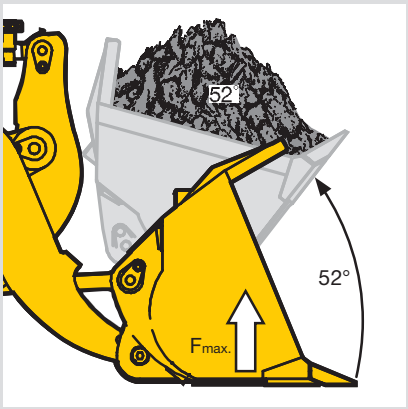
Liebherr crawler loaders are designed for longevity. Parts that are subjected to considerable stress are produced from high-strength materials, while critical components are well protected. The result is maximum reliability and availability.

Comfort

The crawler loader's cab is a spacious workplace designed according to state-of-the-art ergonomic standards and offering the operator an excellent view of the operating equipment. The single-joystick control enables the machine to be controlled easily and precisely.

Liebherr Diesel engine

- The inter-cooled Diesel engine enables powerful work cycles and has power reserves in any situation.
- Environmentally sound and economical: Complies with the latest European emissions standards 97/68 EC Stage 2 and EPA Tier 2 Standards.
- Operating reliability and long service life due to generously dimensioned components.



Performance

Liebherr crawler loaders are equipped to provide maximum benefits through maximum performance. They guarantee powerful and efficient work even in rough terrain.

High loading capacity

Large bucket capacity and high stability
The relation of bucket capacity to stability properties is ideally tuned. The resulting high tipping load guarantees reliable work cycles with optimum performance.

High bucket capacity
The large tipping angle of the bucket ensures optimum filling capacity in every work cycle.

Quick cycle times
The hydrostatic drive and counter-rotation ability enable quick and responsive work cycles.

Quick excavation work

High break-out forces
The powerful operating equipment allows quick bucket filling even during difficult excavation work.

Large drawbar pull transmission
The combination of a powerful transmission and long track frames also results in optimum performance when moving material.

Versatility

Continuously variable speed and constantly driven track chains
The hydrostatic travel drive enables the machine to be controlled easily and precisely in any situation.

Large ground clearance
The machine can be driven precisely even in uneven or rough terrain.

Great dumping height and range
The operating equipment is optimally tuned. This ensures that heavy loading work can also be carried out reliably and quickly.

Rear engine as counterweight
Reliable operating of the machine with a full bucket and unexcelled stability.

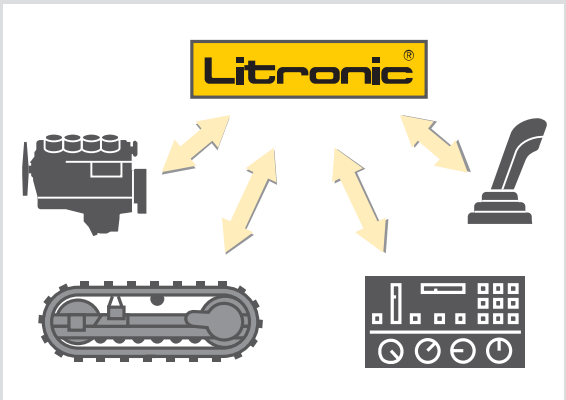
Z-bar linkage
Even in the toughest operations, the z-bar linkage offers sufficient power over the entire lifting distance of the operating equipment.

Powerful operating equipment

- Solid, cast steel z-bar linkage:high break-out forces and quick work cycles.
- The optimised shape and large tipping angle enable maximum bucket volumes to be loaded and transported.
- Load sensing hydraulic equipment: optimum fine control performance and handling in all operations.

Liebherr hydrostatic drive

- As a pioneer in hydrostatically driven crawler loaders, Liebherr has helped to prove a concept that is now undisputed accepted.
- Hydraulic variable-displacement pumps and motors are connected independently in two closed circuits and transfer the power of the Diesel engine to both final drives.



Litronic drive control

- The Litronic system manages the optimum interaction between the hydrostatic drive and the Diesel engine and protects all the components against overload in all applications and in temperature ranges from -50°C (-58°F) to +60°C (140°F).
- Due to the rapid control and low and constant engine speed the fuel consumption is minimized in every application.

Cost-effectiveness

Due to their low fuel and operating materials consumption, Lieberr crawler loaders offer significant benefits. Service and maintenance work can be carried out in a short period of time. This reduces down times and increases availability considerably.

Low fuel consumption

Economical drive system	The hydrostatic travel drive provides optimum efficiency over the entire speed range.
Hydrostatic fan drive	The operating temperature is reached quickly and the fan is only switched on when required.
Load Sensing hydraulic equipment	This system only consumes the energy that is actually required by the operating equipment. If the equipment is not activated, this doesn't result in additional fuel usage.

Low maintenance costs

Long maintenance intervals and permanently lubricated bucket pin	The maintenance intervals are optimally geared to the individual components. Maintenance-free design is used in especially dirty areas, e.g. maintenance-free solutions are used on the bucket pins.
Tilting cab and centralised maintenance points	Both the operator and maintenance staff have quick and easy access to the important maintenance points.

High track frame service lives

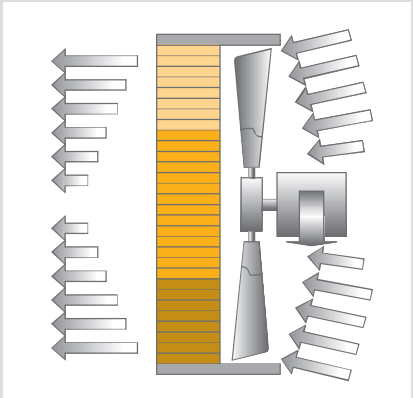
Large track frame components	The use of high-quality individual components with a large amount of wear material ensures high services lives on the track frame.

Superior design

- The permanently lubricated bucket pin increases operating reliability and reduces maintenance times.
- An optional central lubrication system enables maintenance-free operation.
- Engine oil change intervals of 500 operating hours reduce maintenance costs.

Cost-effective track frame

- Large, oil-lubricated track chains and strong double grouser pads offer a large amount of wear material for longer service lives. Due to the two track frame variants, the machine can be optimally configured for any application.



Modern cooling system

- The hydrostatic driven fan for the radiator adapts to the actual cooling requirement, reduces noise and fuel consumption.
- The wide-meshed radiator ensures the cooling of charge air, cooling water and hydraulic oil.

Reliability

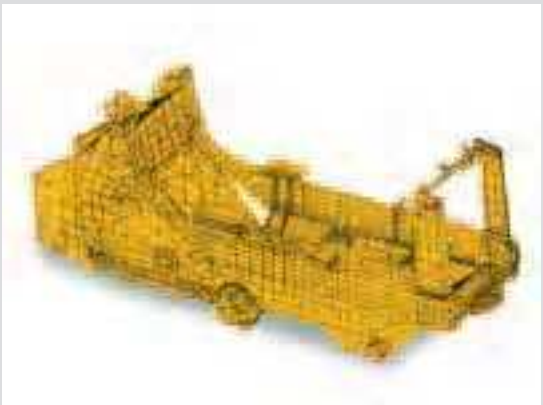
A fully developed technological concept and proven quality make Liebherr crawler loaders the benchmark for availability: Performance that you can trust. With robust cast steel components on parts that are subjected to considerable stress, the machines meet the most stringent demands over a long period of time.

Intelligent solutions for continuous use over extended periods

Low engine speed	The proven engine design ensures reduced noise exposure. The engine is also protected by the low rotational engine speed.
Large distance between the individual cooler fins	The high efficiency and large radiator means that the fin spacing could be made wider. This solution considerably reduces the risk of blockage and subsequently that of overheating.
Hydrostatic fan drive	The operating temperature is controlled reliably and independently. This supports a long service life of the main components.
Bucket z-bar linkage from cast iron	Due to the use of high-strength material in highly loaded components such as the bucket z-bar linkage, a long service life is achieved.
Top-quality protection and laying of the wiring harness	Top-quality material for cable harnesses and the completely isolated laying of the wiring harnesses enable the safe operation of the machine over a long time.
Automatic dust extraction	This additional function extends the maintenance intervals.

Strong z-bar linkage

- The bell crank and cross beam are produced from high-strength cast steel.
- The horizontal configuration of the Liebherr cylinders enables optimum and constant power over the entire lifting range.
- Due to the many variants of front and rear attachments and tooth systems, the machine can be optimally configured for any application.



Proven design

- The torsionally stiff main frame with a box-type design lends stability to the construction in all positions.
- The high ground clearance prevents material from accumulating and enables optimum performance and mobility even in the toughest applications.
- Optimum weight distribution means stability in any application.

Ergonomic control

- The travel speed is continuously variable within the 2 speed ranges.

1. Continuous forward travel
2. Continuous reverse travel
3. + 4. Right turn and counter-rotation
5. + 6. Left turn and counter-rotation
7. Selection switch for speed ranges

Ease of maintenance

1. Oil dipstick
2. Oil filler
3. Oil filter cartridges
4. Coolant filling connection
5. Drain tap fuel/water separator
6. Fuel filter cartridges
7. Air filter elements
8. Coolant filter cartridge

Comfort

The cabs of the Liebherr crawler loaders offer the operator a spacious work environment, comfortable seating and ease of operation. The ergonomic design increases the operator's performance by minimizing fatigue.

Optimum view

Lower mounting point of the bucket arm
The very low mounting point of the bucket arms allows for a large front window and thus an excellent view of the bucket.

ROPS/FOPS cab
Optimum outward visibility due to the ROPS and FOPS protection integrated into the cab frame.

Low sound levels

Low sound pressure level
Liebherr crawler loaders offer the operator a noise level within the cab that is far below the legal requirements.

Low sound attenuation level
Also with regard to exterior sound, Liebherr crawler loaders are exemplary and easily comply with the strict legal requirements.

Sensitive and precise control

Liebherr single-joystick control
All travel movements can be easily controlled with only one joystick – including a continuous speed range and the counter-rotation function.

Optional control
On request, Liebherr crawler loaders can also be fitted with the foot pedal steering.

Simple and quick maintenance

Centralised maintenance points
All the maintenance points of the drive are located on one side of the machine to keep daily maintenance to a minimum.

Maintenance-free bucket bolt
Maintenance-free service points are offered as standard in the dirtiest areas, e.g. in the area of the bucket bolt.

- All service points are located on one side of the engine, which enable quick and easy maintenance.
- Wide-opening engine doors and the tilting cab enable optimum access for maintenance.

Excellent visibility

- Optimum outward visibility due to a large front window and integrated ROPS/FOPS.
- Large front window for an optimum view of the front attachment

Basic machine

Engine

	LR 622 B	LR 632 B
Liebherr diesel engine	D 924 T-E	D 926 TI-E
Rating per ISO 9249	97 kW / 132 HP	132 kW / 180 HP
Rated speed	2000 1/min	1800 1/min
Displacement	6.7 l / 409 in³	10.0 l / 610 in³
Cylinders	4	6
Design	in-line engine, turbocharged	in-line engine, turbocharged, intercooled
Starter	6.6 kW / 9 HP	6.6 kW / 9 HP
Battery	110 Ah	143 Ah
Operating voltage	24 V	24 V
Alternator	55 A	55 A
Injection	direct fuel injection, mechanical governor, cold-start injection advance	direct fuel injection, mechanical governor
Air cleaner	dry-type air cleaner with 2 elements, pre-cleaner with automatic dust ejector	
Cooler	hydraulically driven and thermostatically controlled	

Travel drive, control

Design	Closed-loop fully hydrostatic travel drive and control
Travel speed	Continuously variable Speed range 1: 0-6.5 km/h / 0-4.3 mph Speed range 2: 0-11.0 km/h / 0-6.8 mph
Electronic engine speed sensing control	Litronic regulation system ensures a constant balance between the travel speed and the necessary drawbar pull using engine speed sensing
Steering	Hydrostatic
Service brake	Hydrostatic, wear-free
Parking and emergency brake	Multi-disc brake, wear-free, automatically applied with neutral joystick position
Cooling	Separate oil cooler
Filter system	micro cartridge filters in cooling circuit
Final drive	2-stage planetary reduction gear
Control	1 joystick for all travel and steering motions, counter rotation possible from every position

Track frame

	LR 622 B	LR 632 B
Mount	Elastic components at the pivot shaft and the oscillating equaliser bar	
Chains	Lubricated, track chain tension via grease tensioner and cylinders, double or triple grouser pads	
Chain links	42	39
Track rollers/ carrier rollers	6/1	6/1
Sprocket segments	9	5

Hydraulic equipment

	LR 622 B	LR 632 B
Pump flow max.	156 l/min / 45.9 gpm	209 l/min / 55.2 gpm
Pressure limitation	260 bar / 3,770 PSI	260 bar / 3,770 PSI
Hydraulic system	Load sensing (demand-controlled)	
Pump type	Swash plate piston pump	
Control valve	2 segments, expandable to 4	
Filter system	Return filter with magnetic rod in the hydraulic tank	
Control	Single servo-assisted joystick lever for all bucket functions, electrical switches for lift electrically activated bucket return and float position	

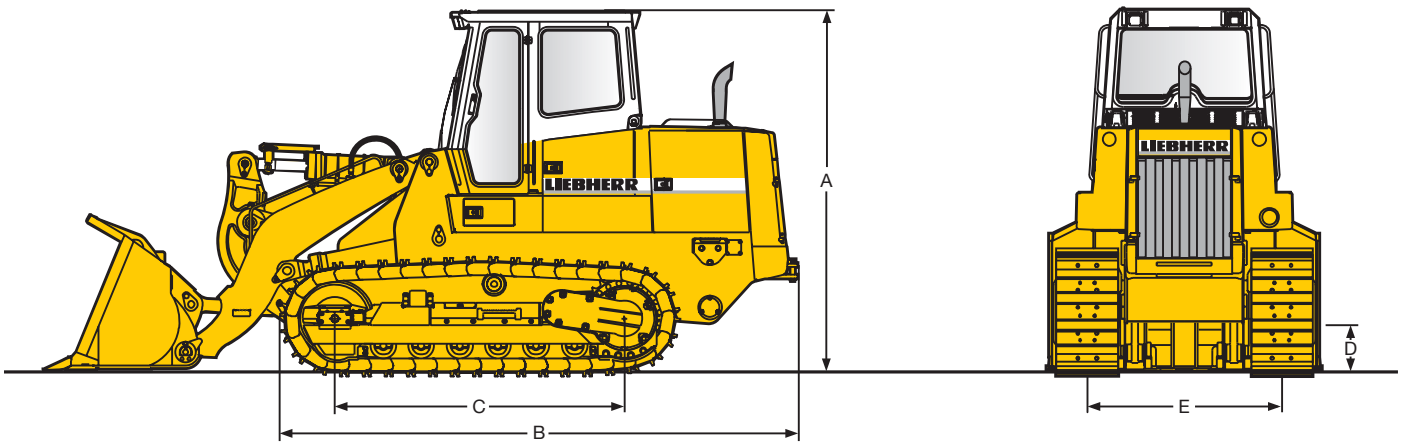
Operator's cab

Cab	Resiliently mounted cab with enclosed positive pressure ventilation, can be tilted with the hand pump 40° to the rear. With integrated ROPS Rollover Protective Structure (ISO 3471) and FOPS Falling Objects Protective Structure (ISO 3449)
Operator's seat	Fully adjustable suspended swivel seat adjustable to operator's weight
Monitoring	Comprehensive instrument panel
Sound pressure level	80 dB(A) at the workplace (ISO 6396:1992), in accordance with EC Directive 86/662/EEC

Refill capacities

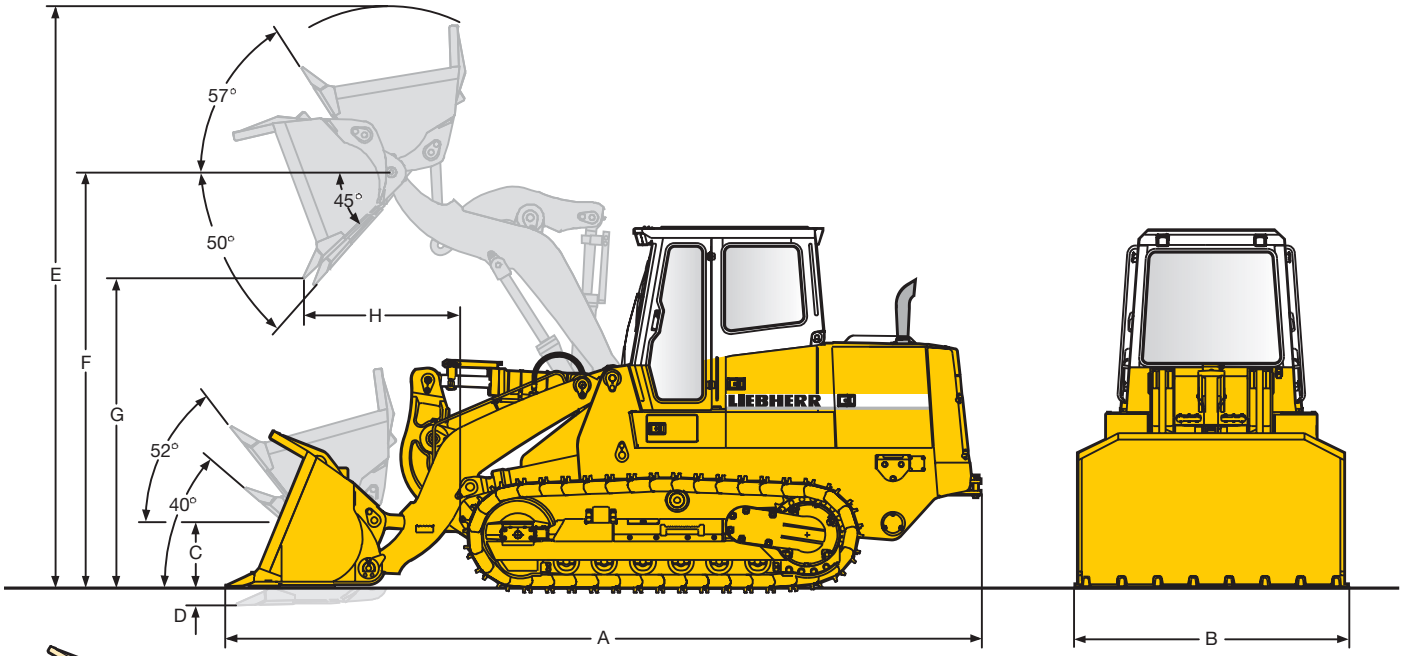
	LR 622 B	LR 632 B
Fuel tank	260 l / 68.6 gal	320 l / 84.5 gal
Cooling system	42 l / 11.1 gal	58 l / 15.3 gal
Engine oil	18 l / 4.8 gal	22 l / 5.8 gal
Splitter box	2.5 l / 0.7 gal	2.8 l / 0.7 gal
Hydraulic tank	130 l / 34.3 gal	175 l / 46.2 gal
Final drive, each	13 l / 3.4 gal	17 l / 4.5 gal

Dimensions



Dimensions		LR 622 B	LR 632 B
A Height over cab	mm	3,129	3,304
	ft-in	10’3”	10’10”
B Overall length without attachments	mm	4,339	4,801
	ft-in	14’3”	15’9”
C Distance idler/sprocket centre	mm	2,478	2,673
	ft-in	8’2”	8’9”
D Ground clearance	mm	395	426
	inch	15.55”	16.77”
E Track gauge	mm	1,680	1,800
	ft-in	5’6”	5’11”
Track gauge low ground pressure version	mm	1.780	1.900
	ft-in	5’10”	6’3”

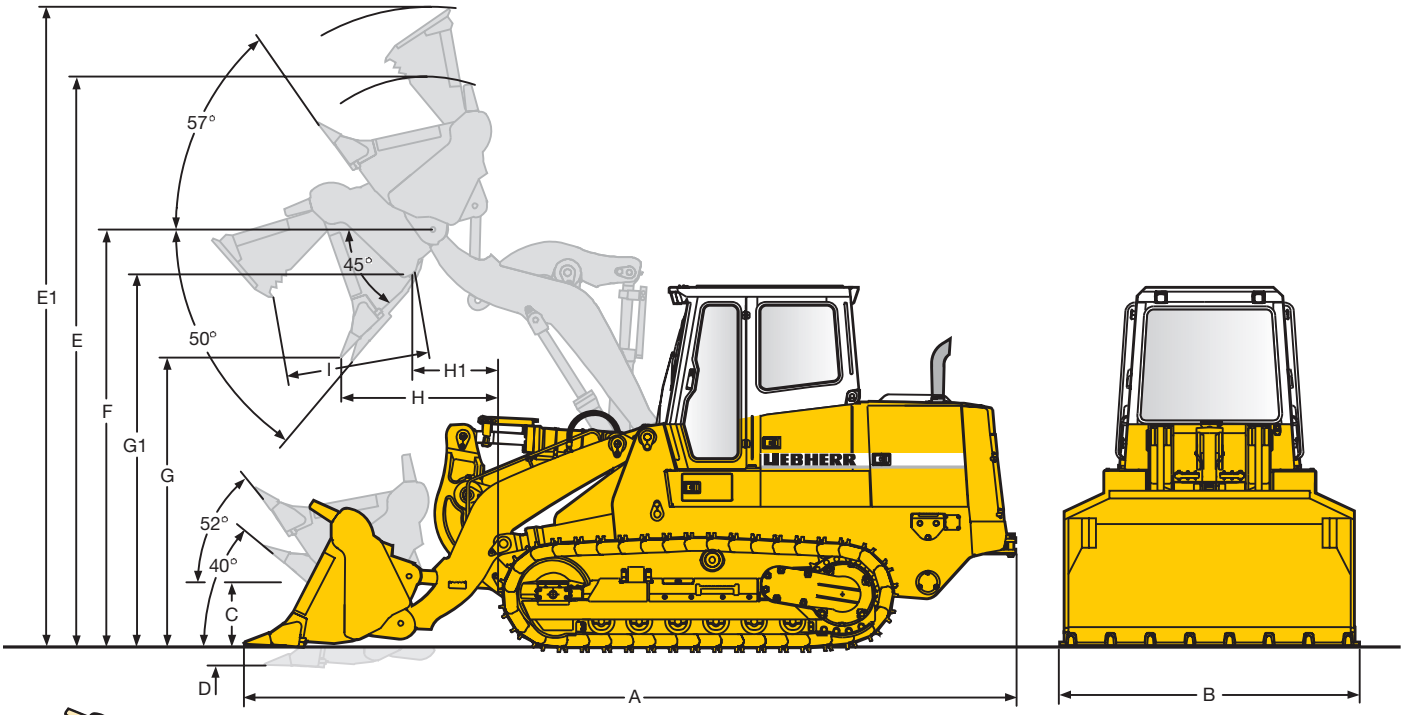
Front attachment

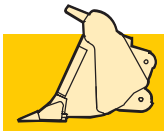


Standard bucket Version with		LR 622 B weld-on teeth and segments	LR 622 B bolt-on teeth	LR 622 BM weld-on teeth	LR 632 B Weld-on teeth and segments	LR 632 B bolt-on teeth	LR 632 BM weld-on teeth
Capacity heaped in accordance with ISO 7546	m^3	1.75	1.80	1.75	2.30	2.40	2.30
	cu.yd	2.29	2.35	2.29	3.01	3.14	3.01
Breakout force	kN	136	127	140	177	162	192
	lb.	30,563	28,541	31,462	39,777	36,406	43,148
Static tipping load	kg	10,600	10,470	10,820	13,895	13,520	14,020
	lb.	23,373	23,086	23,858	30,638	29,812	30,914
A Overall length	mm	6,117	6,191	6,092	6,747	6,863	6,671
	ft-in	20'1"	20'4"	20'	22'2"	22'6"	21'1"
B Width of bucket	mm	2,450	2,440	2,600	2,500	2,514	2,750
	ft-in	8'	8'	8'6"	8'2"	8'3"	9'
C Height of hinge pin, transport position	mm	503	503	503	573	573	573
	ft-in	1'8"	1'8"	1'8"	1'11"	1'11"	1'11"
D Digging depth below grade	mm	110	132	110	120	145	125
	inch	4.33"	5.22"	4.33"	4.72"	5.71"	4.92"
E Overall height max.	mm	5,000	5,000	4,978	5,505	5,505	5,425
	ft-in	16'5"	16'5"	16'4"	18'1"	18'1"	17'9"
F Height of hinge pin max.	mm	3,662	3,662	3,662	4,040	4,040	4,040
	ft-in	12'0"	12'0"	12'0"	13'3"	13'3"	13'3"
G Dumping height at 45°	mm	2,905	2,849	2,923	3,149	3,061	3,202
	ft-in	9'6"	9'4"	9'7"	10'4"	10'1"	10'6"
H Reach at 45°	mm	1,025	1,048	1,007	1,160	1,199	1,110
	ft-in	3'4"	3'5"	3'4"	3'10"	3'11"	3'8"
Operating weight *	kg	15,400	15,590	15,800	21,140	21,490	21,980
	lb.	33,957	34,376	34,838	46,614	47,385	48,466
Ground pressure *	kg/cm^2	0.61	0.62	0.48	0.71	0.72	0.58
	PSI	8.68	8.82	6.83	10.1	10.24	8.25

* Machine with ROPS/FOPS cab, lubricating and operating materials, standard bucket, operator, track pads 508 mm / 20" (LR 622 B), 660 mm / 26" (LR 622 BM) or 560 mm / 22" (LR 632 B), 711 mm / 28" (LR 632 BM)

Front attachment

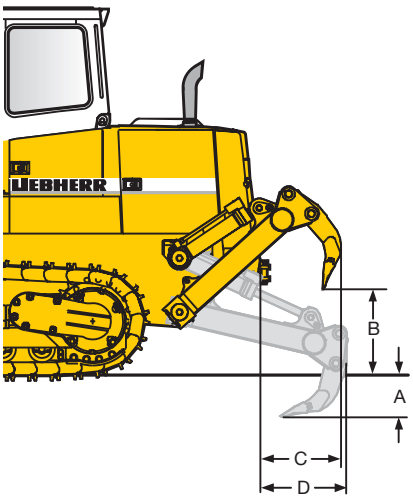


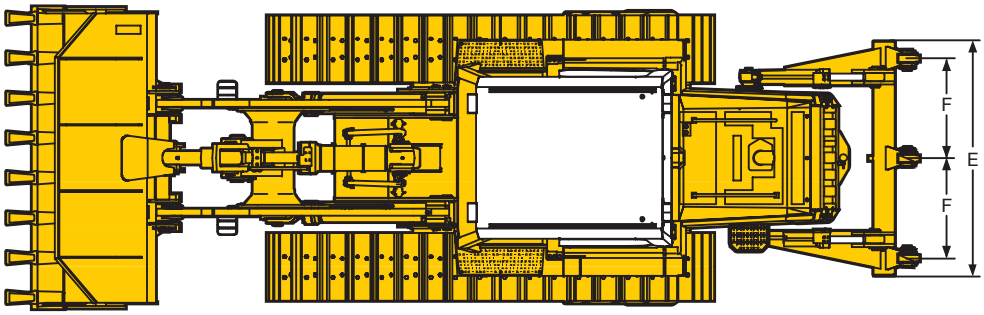


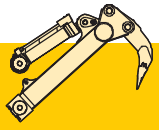
Multi-purpose bucket Version with		LR 622 B weld-on teeth	LR 622 B bolt-on teeth and segments	LR 632 B weld-on teeth	LR 632 B bolt-on teeth and segments	LR 632 BM weld-on teeth
Capacity heaped in accordance	m^3	1.54	1.60	1.90	2.00	1.90
with ISO 7546	cu.yd	2.01	2.09	2.49	2.62	2.49
Break-out force	kN	120	113	167	154	184
	lb.	26,968	25,394	37,530	34,608	41,350
Clamping force max.	kN	92	92	100	100	100
	lb.	20,675	20,675	22,473	22,473	22,473
Static tipping load	kg	9,325	9,185	12,660	12,405	13,100
	lb.	20,562	20,253	27,915	27,353	28,886
A Overall length	mm	6,250	6,330	6,860	6,968	6,760
	ft-in	20’6”	20’9”	22’6”	22’10”	22’2”
B Width of bucket	mm	2,450	2,440	2,500	2,514	2,750
	ft-in	8’0”	8’0”	8’2”	8’3”	9’0”
C Height of hinge pin, transport position	mm	503	503	567	567	567
	inch	19.8”	19.8”	22.3”	22.3”	22.3”
D Digging depth below grade	mm	160	180	190	225	190
	inch	6.3”	7.09”	7.48”	8.86”	7.48”
E Overall height (bucket closed)	mm	4,896	4,896	5,424	5,424	5,331
	ft-in	16’1”	16’1”	17’10”	17’10”	17’6”
E1 Overall height (bucket opened)	mm	5,505	5,556	6,053	6,134	5,988
	ft-in	18’1”	18’3”	19’10”	20’1”	19’8”
F Height of hinge pin max.	mm	3,662	3,662	4,040	4,040	4,040
	ft-in	12’0”	12’0”	13’3”	13’3”	13’3”
G Dumping height at 45° (bucket)	mm	2,796	2,741	3,057	2,973	3,128
	ft-in	9’2”	9’0”	10’0”	9’9”	10’3”
G1 Dumping height at 45° (blade)	mm	3,252	3,252	3,574	3,574	3,574
	ft-in	10’8”	10’8”	11’9”	11’9”	11’9”
H Reach at 45° (bucket)	mm	1,064	1,089	1,153	1,187	1,082
	ft-in	3’6”	3’7”	3’9”	3’11”	3’7”
H1 Reach at 45° (blade)	mm	629	629	656	656	656
	inch	24.8”	24.8”	25.8”	25.8”	25.8”
I Width of opening	mm	1,212	1,212	1,285	1,285	1,285
	ft-in	4’0”	4’0”	4’3”	4’3”	4’3”
Operating weight *	kg	16,000	16,135	21,705	21,935	22,415
	lb.	35,280	35,578	47,860	48,367	49,425
Ground pressure *	kg/cm^2	0.64	0.64	0.73	0.73	0.59
	PSI	9.1	9.1	10.38	10.38	8.39

* Machine with ROPS/FOPS cab, lubricating and operating materials, multi-purpose bucket, operator, track pads 508 mm / 20” (LR 622 B) or 560 mm / 22” (LR 632 B), 711 mm / 28” (LR 632 BM)

Rear attachment







Ripper 3 shanks		LR 622 B	LR 632 B
A Ripping depth (max./min.)	mm	352	385
	inch	13.9”	15.2”
B Lifting height (max./min.)	mm	712	771
	inch	28.0”	30.4”
C Additional length, attachment raised	mm	676	660
	inch	26.6”	26.0”
D Additional length, attachment lowered	mm	729	635
	inch	28.7”	25”
E Toolbar width	mm	1,996	2,100
	ft-in	6’7”	6’11”
F Distance between teeth	mm	850	900
	inch	33.5”	35.4”
Weight	kg	790	1,070
	lb	1,742	2,359

Equipment

Basic machine

	S	O
Exhaust catalytic		(1)
Tow switch	•	
Towing hitch rear	•	
Forestry equipment		•
Landfill equipment		•
Battery compartment, lockable	•	
Filling with environmentally-friendly oil		•
Filling with oil SAE 30		•
Filling with oil SAE 10		•
Tank guard, complete		•
Refuelling pump, electric		•
Belly pans, heavy-duty	•	
Cold start device with ether		(2)
Cold start device, glow plug	•	
Radiator, wide-meshed	•	
Radiator guard, heavy-duty		•
Radiator guard, hinged	•	
Liebherr diesel engine	•	
Fan, hydraulically driven	•	
Fan guard	•	
Engine cover, perforated	(2)	(1)
Engine doors, perforated		•
Engine doors, hinged, lockable	•	
Lugs for crane lifting		•
Special paint		•
Fuel water separator	•	
Fuel water separator with electric heater		•
Air filter, dry type, dual step	•	
Pre-cleaner with automatic dust ejector	•	
Toolkit	•	

Travel drive

	S	O
Parking brake, automatic	•	
Function control, automatic	•	
Control, single joystick	•	
Load limit control, automatic	•	
Electronic control	•	
Steering with foot pedals		•
Travel control, 2-speed	•	
Hydrostatic travel drive	•	
Emergency stop	•	
Final drives planetary gear	•	
Safety lever	•	

Track frame

	S	O
Resilient mounting	•	
Track frames, closed	•	
Sprocket segments, bolted	•	
Master link, two-piece	•	
Track shoes with mud hole track pads		•
Track guide centre part		•
Tracks oil-lubricated	•	
Track guard		•
Undercarriage standard	•	
Undercarriage low ground pressure		•
Track frames oscillating	•	
Pivot shaft, separate	•	
Sprocket segments with recesses		•

Electrical system

	S	O
Starter motor 6.6 kW	•	
Working lights, front, 2 units	•	
Working lights, rear, 2 units	•	
Batteries, heavy-duty cold start, 2 units	•	
Battery main switch, electric	•	
On-board system 24 V	•	
Alternator 55 A	•	
Alternator 80 A		•
Back-up alarm		•
Beacon		•
Horn	•	
Start lock, electronic		•
Additional lights, rear		•
Additional lights, front		•

Operator's cab

	S	O
Stowing box	•	
Armrest 3D adjustable	•	
Ash tray	•	
Pressurised with air filter	•	
Operator's seat, 6-way adjustable	•	
Operator's seat, air-suspended		•
Fire extinguisher		•
Dome light	•	
Coat hook	•	
Air conditioner		•
FM radio		•
Radio installation kit		•
ROPS canopy		•
ROPS/FOPS	•	
Rear mirror inside	•	
Safety glass, tinted	•	
Windshield washer system with intermittent function	•	
Windshield wipers front, rear	•	
Sliding windows		•
Protective grids for windows		•
Extension, seat back		•
Sun visor	•	
Socket 12V	•	
Hot water heating	•	

Instruments – Indicators

	S	O
Battery charging	•	
Engine-hour meter	•	
Electronic control	•	
Speed range	•	
Engine oil pressure	•	
Engine temperature	•	
Oil pressure cooling circuit	•	
Oil level final drives	•	
Float position bucket	•	
Fuel level	•	
Contamination hydraulic filter	•	
Contamination air filter	•	
Cold start diesel engine	•	
Oil temperature warning indicator		•

Hydraulic equipment

	S	O
Hydraulic control 4in1-bucket		•
Hydraulic control ripper		•
Hydraulic control winch		•
Bucket positioner automatic	•	
Variable flow pump, load-sensing	•	
Oil filter with strainer in hydraulic tank	•	
Bucket quick drop	•	
Control valve for 2 circuits	•	
Bucket float position	•	
Hydraulic servo control	•	
Hydraulic tank oil level control		•

Attachments

	S	O
Back drag edge for bucket		•
Drawbar rear, rigid		•
Trash grid for bucket		•
Counterweight, rear	•	
Ripper 3 shanks		•
Bucket – standard bucket		•
Bucket – 4in1-bucket		•
Bucket – heavy duty bucket		•
Bucket – landfill bucket		•
Bumper rear		•
Quick release system for bucket		•
Guard tilt cylinder		•
Guard 4in1-bucket clamp cylinders		•
Winch		•
Spill plate for bucket		•
Bolt-on cutting edge for bucket		•
Central lubrication electrical		•
Additional weight rear		•

S = Standard, O = Option, • = LR 622B and LR 632B, (1) = only for LR 622 B, (2) = only for LR 632 B

Subject to changes.

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.



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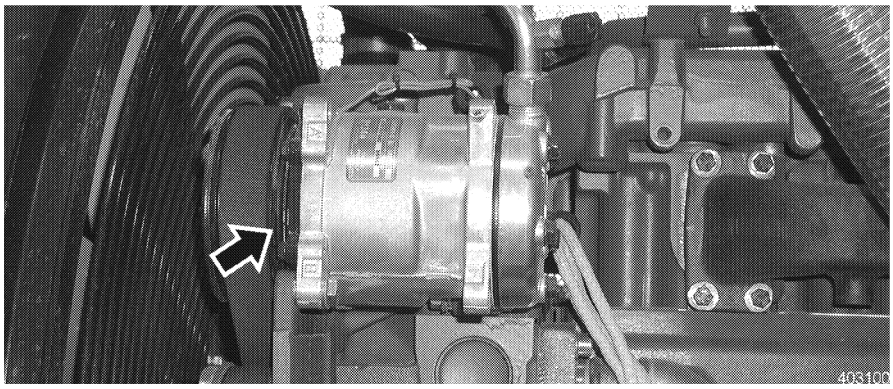
1.1.1 Air conditioning system

The special, robust heating and air conditioning system installed in LIEBHERR machines conditions the air in the operator's cab at any temperature.

Technical data

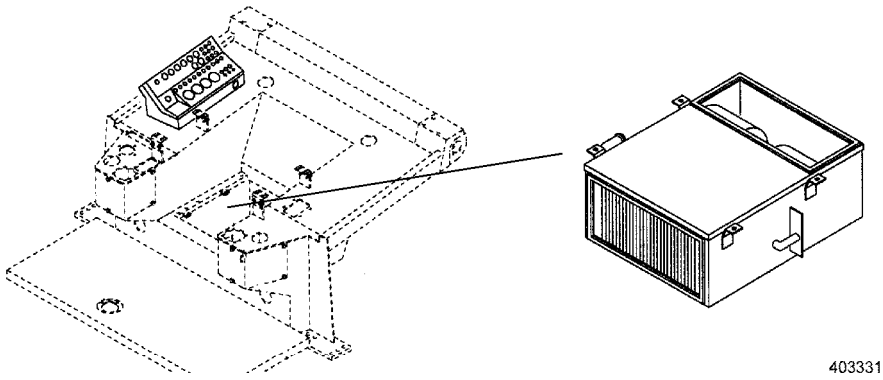
Refrigerant	R134a
Nominal voltage	24 V
Operating voltage	24 V
Fan	3-stage
Fill quantity in complete system	Refrigerant R134a = 1700g
Oil quantity - air conditioner compressor	200 ccm

Components of air conditioning system



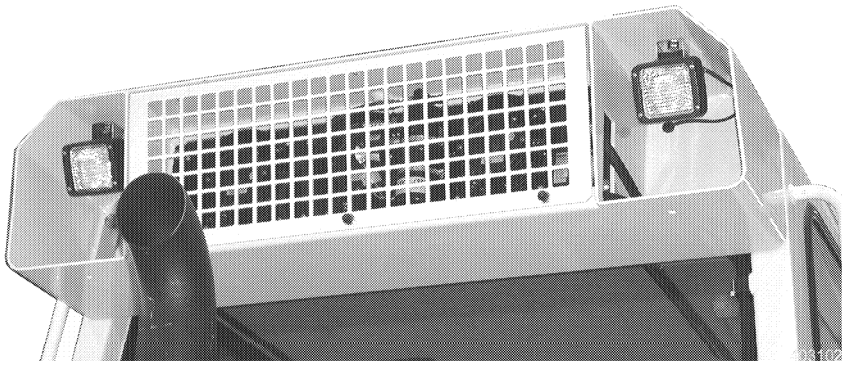
Compressor

Compressor The air conditioning compressor is installed in the engine compartment.



Heater unit

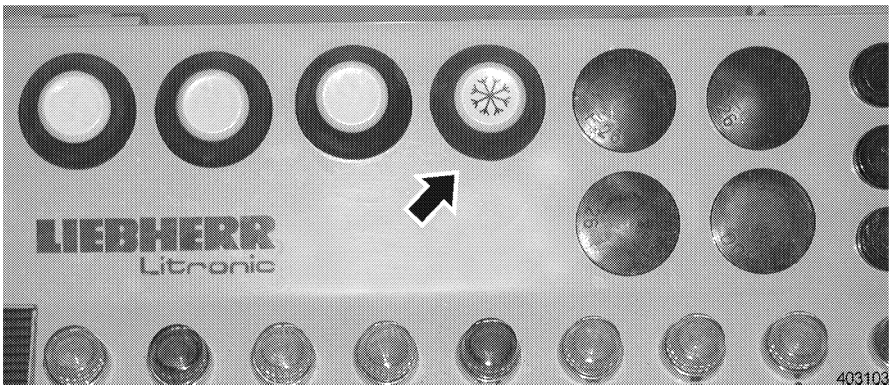
Heater unit The heater is installed on the floorboard area of the operator's cab, under the seat.



Evaporator unit

Evaporator unit

The evaporator unit is installed on the rear section of the roof of the operator's cab.



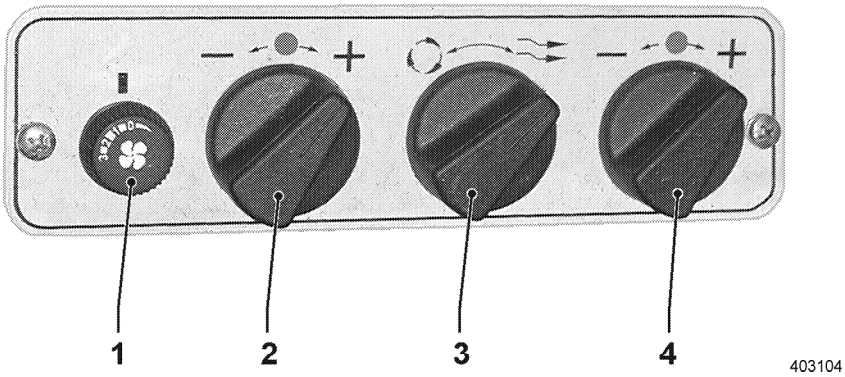
Main switch

Control elements of air conditioning system

Main switch

The main switch for the air conditioner is installed in the instrument panel (marked with the air conditioner star).

Control element
The control element is located on the right hand side of the operator's seat.



Control element

1 Fan switch, 3-stage
2 Regulating knob, heater
3 Regulating knob, air vent
4 Regulating knob, air conditioning system

1.2 Tightening torques

Installation preload F_M and tightening torques M_A for shank screws with metric standard or fine threads according to DIN ISO 262 and DIN ISO 965 T2 (replacement for DIN 13 part 13) and head dimensions of hex head screws with shank DIN EN 24014 (replacement for DIN 931 part 1) or Allan head screws DIN EN ISO 4762 (replacement for DIN 912)

The chart values are valid for screws with ”black” surface or phosphated, zinc-plated and DACROMET 500. Screws and nuts with “black” surface, phosphated and galvanized, lightly lubricated. Medium friction µG = 0,12.

Any tightening torque values given in drawings / parts lists, instructions or component descriptions and / or tightening procedures must always be used and observed before using the factory standard values.

Beginning with grade 10.9, the use of lock washers does no longer provide any safety action.

Always use a torque wrench with the correct measuring range – upper third of the range should include the listed torque value.

When using impact wrenches, care must be taken that the given torque values are retained – use a torque wrench for prechecks and intermediate checks.

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1.2.1 Preload values and tightening torques for screws with standard metric threads according to factory standard WN 4037 H

Standard metric thread	Preload value F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size for hex head screws		Wrench size for socket head screws	
	8.8	**10.9**	**12.9**	**8.8**	**10.9**	**12.9**	**mm**	**inch**	**mm**	**inch**
M 4 x 0,7	4 050	6 000	7 000	2,8	4,1	4,8	7	9/32	3	--
M 5 x 0,8	6 600	9 700	11 400	5,5	8,1	9,5	8	5/16	4	5/32
M 6 x 1	9 400	13 700	16 100	9,5	14	16,5	10	--	5	--
M 7 x 1	13 700	20 100	23 500	15,5	23	27	11	--	--	--
M 8 x 1,25	17 200	25 000	29 500	23	34	40	13	1/2	6	--
M 10 x 1,5	27 500	40 000	47 000	46	68	79	(17)16	(11/16)	8	5/16
M 12 x 1,75	40 000	59 000	69 000	79	117	135	(19) 18	(3/4)	10	--
M 14 x 2	55 000	80 000	94 000	125	185	215	(22) 21	(7/8)	12	--
M 16 x 2	75 000	111 000	130 000	195	280	330	24	--	14	9/16
M 18 x 2,5	94 000	135 000	157 000	280	390	460	27	1 - 1/16	14	9/16
M 20 x 2,5	121 000	173 000	202 000	390	560	650	30	1 - 3/16	17	--
M 22 x 2,5	152 000	216 000	250 000	530	750	880	(32) 34	--	17	--
M 24 x 3	175 000	249 000	290 000	670	960	1 120	36	1 - 7/16	19	3/4
M 27 x 3	230 000	330 000	385 000	1 000	1 400	1 650	41	1 - 5/8	19	3/4
M 30 x 3,5	280 000	400 000	465 000	1 350	1 900	2 250	46	1 - 13/16	22	7/8
M 33 x 3,5	350 000	495 000	580 000	1 850	2 600	3 000	50	2	24	--
M 36 x 4	410 000	580 000	680 000	2 350	3 300	3 900	55	2 - 3/16	27	1 - 1/16
M 39 x 4	490 000	700 000	820 000	3 000	4 300	5 100	60	2 - 3/8	27	1 - 1/16

1.2.2 Preload and tightening torques for screws with fine metric thread according to factory standard WN 4037 H

Fine metric thread	Preload value F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size for hex head screws		Wrench size for socket head screws	
	8.8	**10.9**	**12.9**	**8.8**	**10.9**	**12.9**	**mm**	**inch**	**mm**	**inch**
M 8 x 1	18 800	27 500	32 500	24,5	36	43	13	1/2	6	--
M 9 x 1	24 800	36 500	42 500	36	53	62	--	--	--	--
M 10 x 1	31 500	46 500	54 000	52	76	89	17	11/16	8	5/16
M 10 x 1,25	29 500	43 000	51 000	49	72	84	17	11/16	8	5/16
M 12 x 1,25	45 000	66 000	77 000	87	125	150	19	3/4	10	--
M 12 x 1,5	42 500	62 000	73 000	83	122	145	19	3/4	10	--
M 14 x 1,5	61 000	89 000	104 000	135	200	235	22	7/8	12	--
M 16 x 1,5	82 000	121 000	141 000	205	300	360	24	--	14	9/16
M 18 x 1,5	110 000	157 000	184 000	310	440	520	27	1 - 1/16	14	9/16
M 18 x 2	102 000	146 000	170 000	290	420	490	27	1 - 1/16	14	9/16
M 20 x 1,5	139 000	199 000	232 000	430	620	720	30	1 - 3/16	17	--
M 22 x 1,5	171 000	245 000	285 000	580	820	960	32	--	17	--
M 24 x 1,5	207 000	295 000	346 000	760	1 090	1 270	36	1 - 7/16	19	3/4
M 24 x 2	196 000	280 000	325 000	730	1 040	1 220	36	1 - 7/16	19	3/4
M 27 x 1,5	267 000	381 000	445 000	1 110	1 580	1 850	41	1 - 5/8	19	3/4
M 27 x 2	255 000	365 000	425 000	1 070	1 500	1 800	41	1 - 5/8	19	3/4
M 30 x 1,5	335 000	477 000	558 000	1 540	2 190	2 560	46	1 - 13/16	22	7/8
M 30 x 2	321 000	457 000	534 000	1 490	2 120	2 480	46	1 - 13/16	22	7/8
M 33 x 1,5	410 000	584 000	683 000	2 050	2 920	3 420	50	2	24	--
M 33 x 2	395 000	560 000	660 000	2 000	2 800	3 300	50	2	24	--
M 36 x 1,5	492 000	701 000	820 000	2 680	3 820	4 470	55	2 - 3/16	27	1 - 1/16
M 36 x 3	440 000	630 000	740 000	2 500	3 500	4 100	55	2 - 3/16	27	1 - 1/16
M 39 x 1,5	582 000	830 000	971 000	3 430	4 890	5 720	60	2 - 3/8	27	1 - 1/16
M 39 x 3	530 000	750 000	880 000	3 200	4 600	5 300	60	2 - 3/8	27	1 - 1/16

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2. Safety guidelines, decals

Working on earth moving machinery can be dangerous, it could result in injury or death for operator, driver or maintenance personnel. We urge you to read these safety notes repeatedly and carefully and to observe them to prevent danger and accidents.
This is especially important for any personnel that works on the machine only occasionally, such as during set up and / or maintenance on the machine.
Careful adherence to the below listed safety information will insure safe operation and maintenance and potentially prevent personal injury to yourself and others and possible damage to your machine.
Important safety notes are used throughout this manual when describing tasks, which could endanger personnel or machine.
They are marked with the notes - **Danger** or **Caution.**

2.1 Introduction

In this Operation and Maintenance Manual, the notes are defined as follows:

"Danger"
Denotes an extreme intrinsic hazard, which could result in a high probability of death or serious injury if proper precautions are not taken.

"Caution"
Denotes a reminder of safety practices or directs attention to unsafe practices if proper precaution are not taken, which could result in personal injury and / or damage or destruction of the machine.

Following these notes does not relieve you of your obligation to observe all additional regulations and guidelines!

In addition, the following must be observed:
- all safety regulations which are valid at the job site,
- any federal, state, and local governing travel on public highways,
- any guidelines issued by trade and professional associations.

2.2 Proper and intended use

1. With the standard loading attachment, the machine may only be used to loosen, take up, load and dump soil, rock, broken rock or other materials and load them onto trucks, trailers, barges, conveyor belts or breaker systems.
2. Any other use above and beyond the intended use, such as breaking out rock or demolishing buildings, tamping in poles or stakes, transporting persons, etc. is not considered to be intended use. The manufacturer / dealer will not be responsible for any damage resulting from such or any other unauthorized use and the user alone must carry those risks.
3. Machines used in special applications are subject to additional special conditions and guidelines and, among other things, must be equipped with special safety device.

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4. Proper and intended use also includes observance of guidelines given in the Operation and Maintenance manual and careful adherence to inspection and maintenance schedules and guidelines.

2.3 Decals on the machine

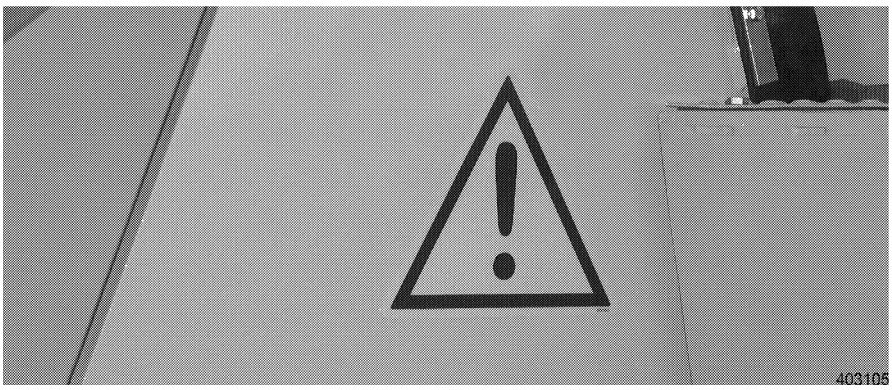
1. Several types of d decals are attached to your machine.

Types of decals:
- Safety decals
- Reference decals
- Data tags

Contents and location are described below.
The Id. numbers are given in the spare parts list.

2.3.1 Safety decals

1. The warnings given in the safety decals must be strictly observed to prevent death and serious injury.
These safety decals must be checked regularly to insure they are still complete and legible.
Missing and illegible safety decals must always be replaced immediately.



Warning label Stay Clear

Warning labels Stay Clear

This decal is attached on the outside, on the left and right hand side of the carrier frame.
Warns that a dangerous accident could occur which could result in death or severe injury.
Meaning: No one may remain it the danger zone, everyone must stay clear of the machine!

Decal Engine standstill

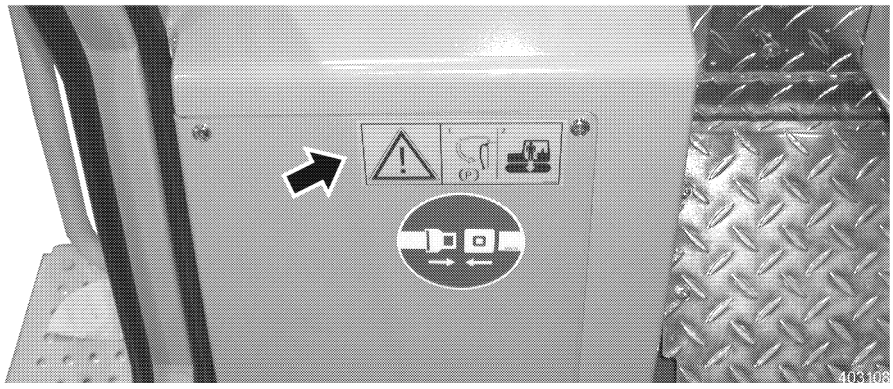
Decal Engine standstill

The decal is installed on the left and right hand side on the engine compartment doors.
Warns that a dangerous accident could occur which could result in severe injury.
Meaning: Open only when the engine is not running!

Decal Battery

Decal Battery

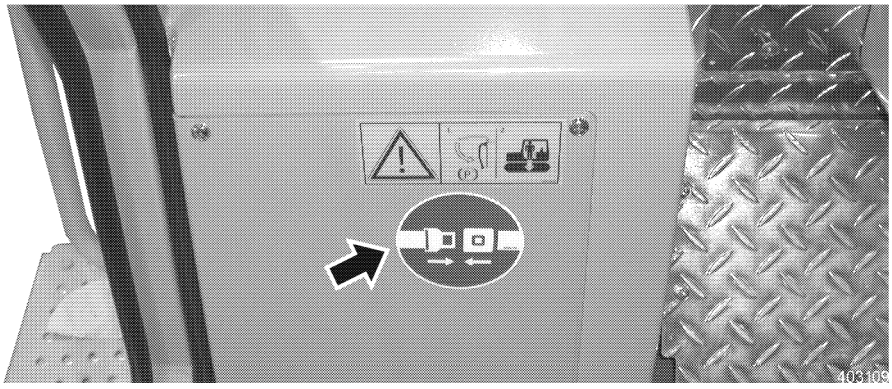
The decal is installed in the battery compartment.
Warns that a dangerous accident could occur which could result in severe injury.
Meaning: Do not smoke or keep an open flame near batteries.



Decal Safety lever

Decal Safety lever

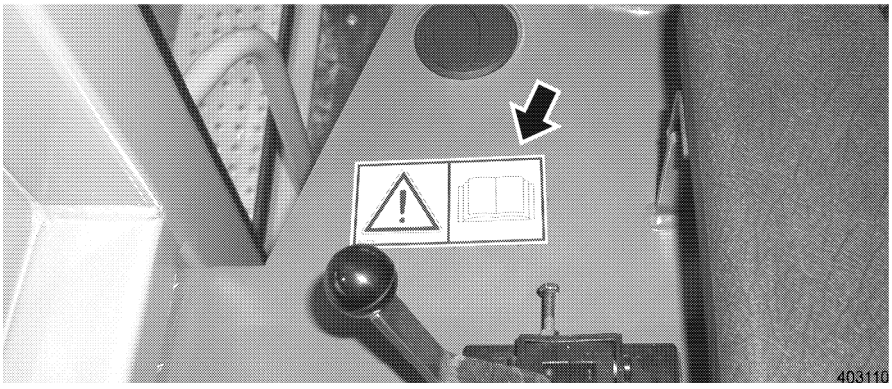
The decal is installed on the left and right hand side of the operator's seat.
Warns that a dangerous accident could occur which could result in death or severe injury.
Meaning: Before leaving the operator's seat, place the safety lever down. In dangerous situations, immediately lower the attachment, then the safety lever.



Decal Seat belt

Decal Seat belt

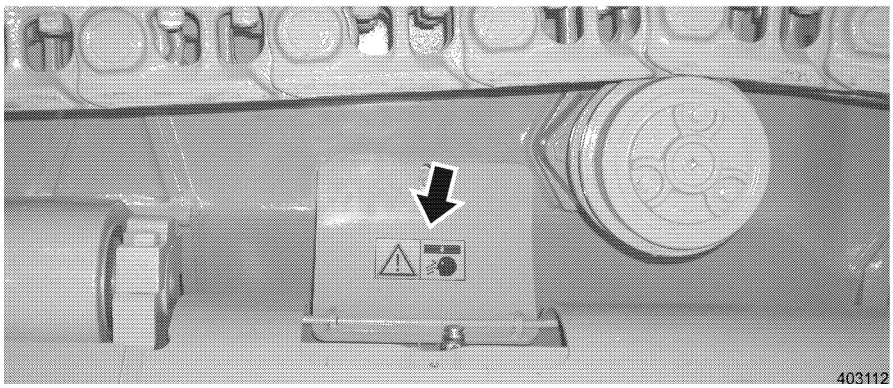
The decal is installed on the right hand side of the operator's seat.
Notes the importance of wearing the seat belt.
Meaning: Always wear the seat belt before operating the machine.



Decal Accident prevention

Decal Accident prevention

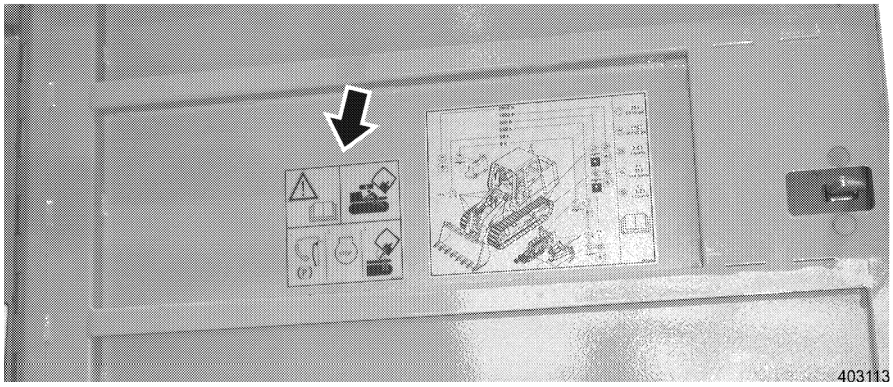
The decal is installed on the left hand side of the operator's seat near the travel joystick.
Reminds the operator to read the Operating Manual and to read and observe the safety guidelines to prevent accidents.
Meaning: Operate the machine only if you have read and understand the instructions given in the Operating Manual.
When operating the machine, the accident prevention guidelines printed in the Operating Manual must be strictly observed!



Decal Chain tension

Decal Chain tension

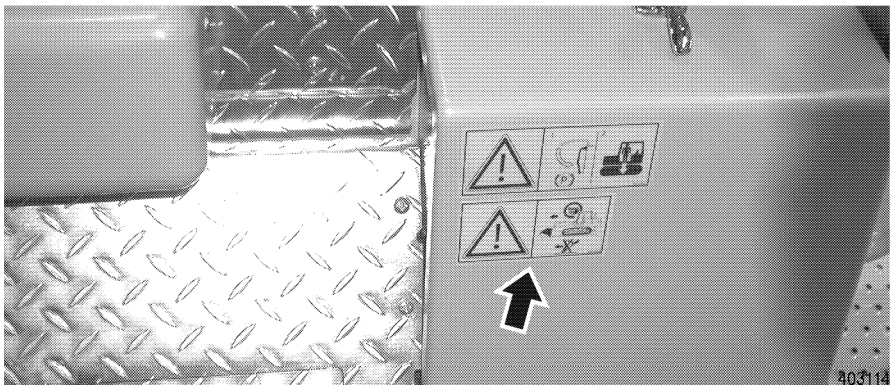
The decal is installed on the left and right hand side of the track roller frame near the grease cylinder.
Warns that a dangerous accident could occur which could result in severe injury.
Meaning: When releasing the chain tension, keep your head clear of the track roller frame - the chain might drop and the grease can squirt out.



Decal cab - tilt device

Decal cab - tilt device

The decal is installed in the battery compartment near the hydraulic hand pump.
Warns that a dangerous accident could occur which could result in death or severe injury.
Meaning: Do not stand under the cab unless the safety bar is be placed to secure the tilted cab. The machine may not be started or driven if the safety bar is in place, the safety lever must always remain in the lowest position (safety lever down).



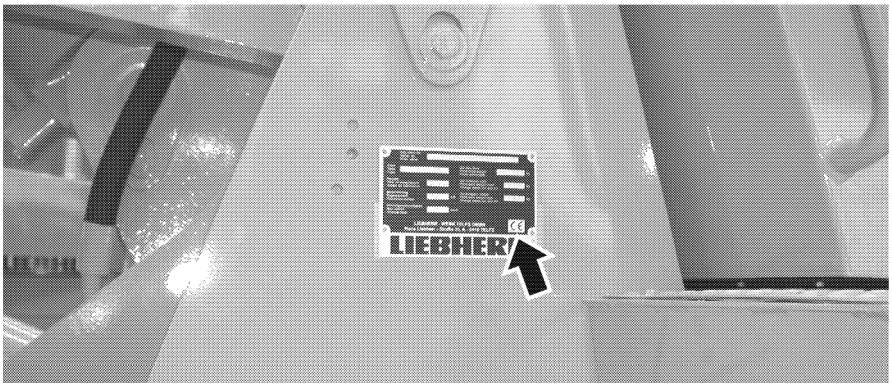
Decal bucket position

Decal bucket position

The decal is installed on the left front in the operator's cab.
Warns of possible damage to the attachment.
Meaning: Never use the machine to doze forward with the bucket tilted out. This can damage the loading attachment.

2.3.2 Reference decals

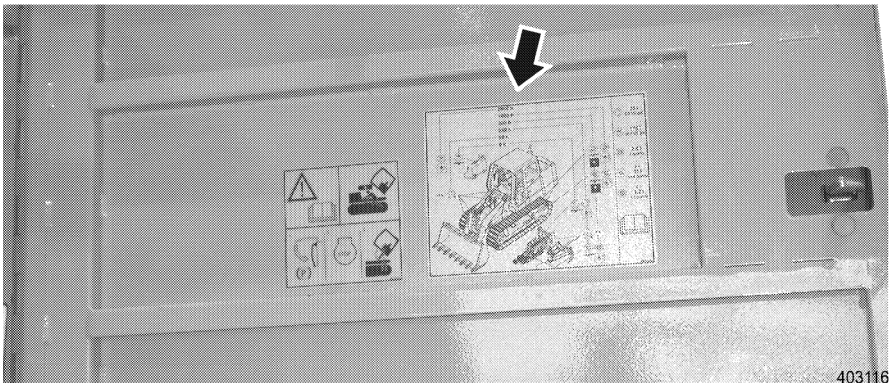
The reference decals show certain points regarding operation, maintenance and machine characteristics.



CE mark

Decal conformity mark - CE

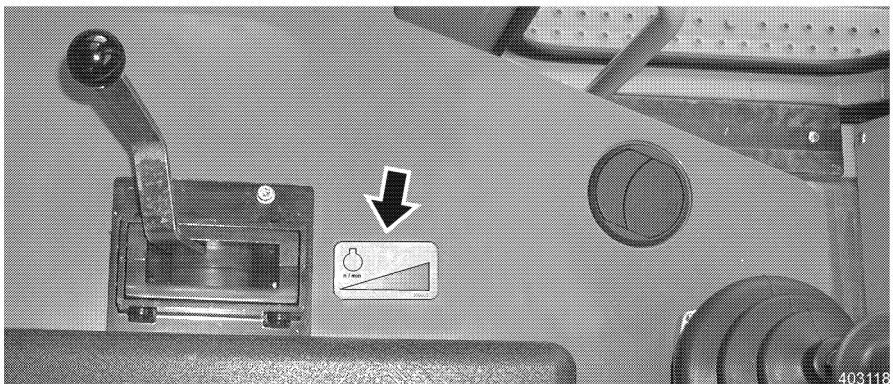
This mark is included in the data tag on the left hand side on the main frame.
Shows conformity to the regulations of EU machine guidelines.



Decal lubrication chart

Decal lubrication chart

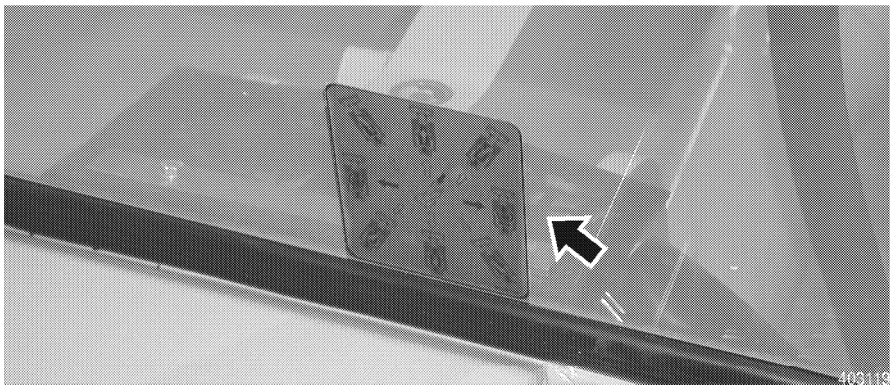
The decal is installed on the left hand side in the battery compartment.
The lubrication chart illustration shows all components, which use oil or grease as well as the inspection and change intervals for these parts.



Decal engine operation

Decal engine operation

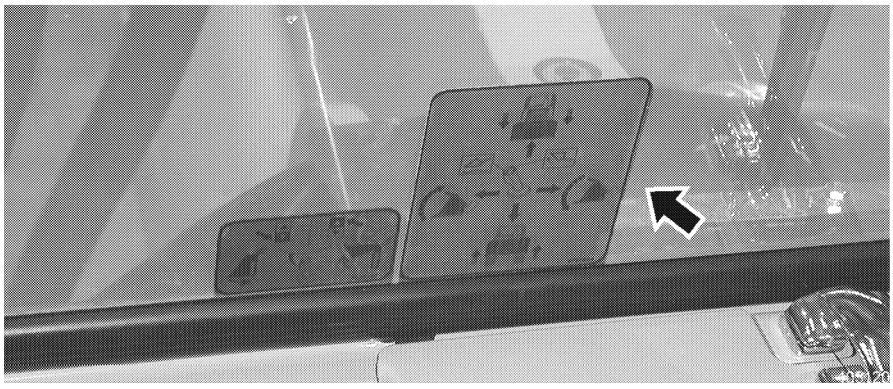
The decal is installed on the left hand side of the operator's seat.
Shows the operation of the throttle control lever for the Diesel engine.



Decal travel hydraulic

Decal travel hydraulic

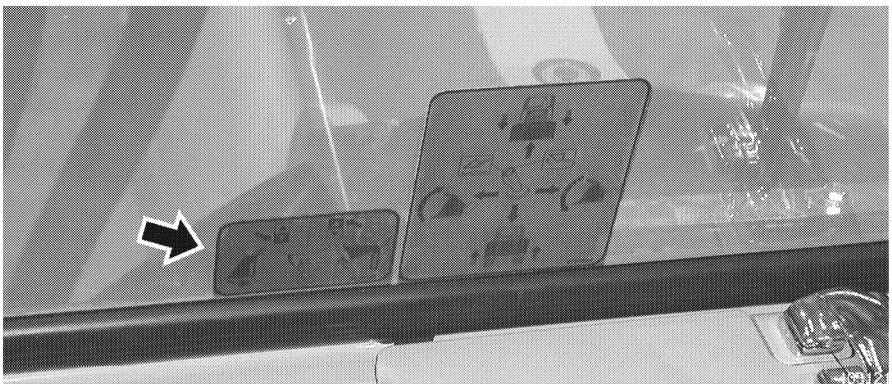
The decal is installed on the left hand side of the operator's seat.
Shows the operation of the travel joystick and the pedals for the travel function of the machine.



Decal working hydraulic

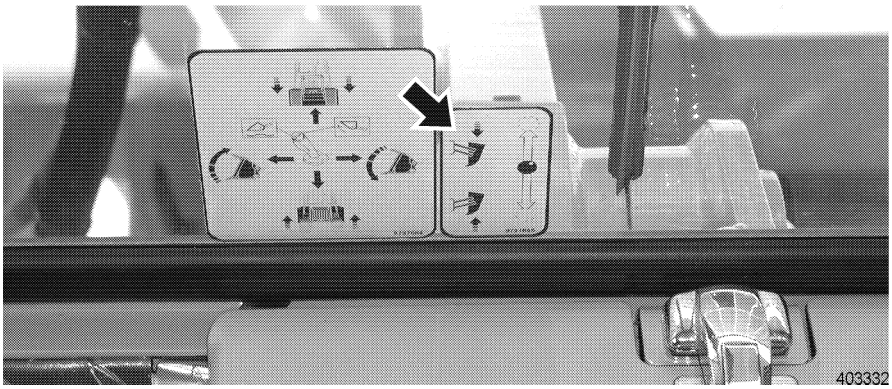
Decal working hydraulic

The decal is installed on the right hand side of the operator's seat.
Shows the operation of the machine's loading attachment.



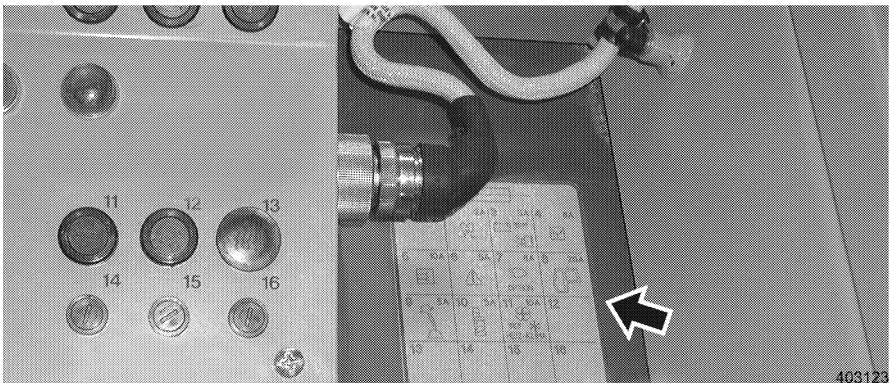
Decal 4 -1 bucket

Decal 4 -1 bucket The decal is installed on the right hand side of the operator's seat.
Shows the operation of the 4 in 1 bucket.



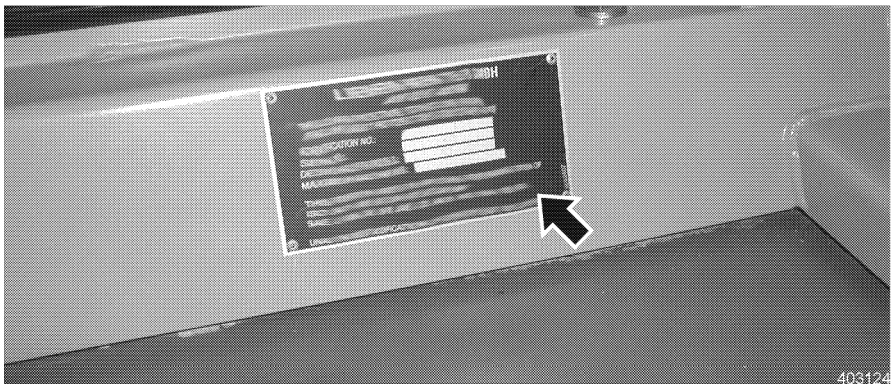
Decal ripper

Decal ripper The decal is installed on the right hand side of the operator's seat.
Shows the operation of the ripper.



Decal fuses

Decal fuses The decal is installed on the right hand side behind the instrument panel.
Shows the location and rating of fuses.



Decal Rops - Fops

Decal Rops - Fops

The decal is installed on the operator's cab, on the left hand side of the operator's seat.
Shows the maximum load for roll over protection.

Decal sound protection

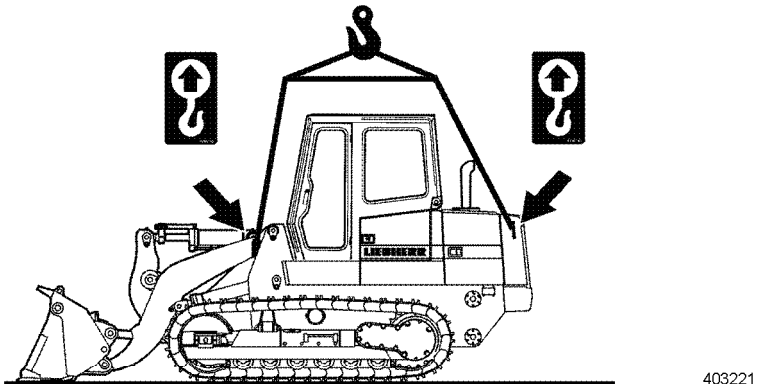
Decal sound protection

The decal is installed on the inside of the window pane in the operator's cab.
LWA = Sound output level (sound output level emitted to the surrounding area).

Decal rigging points

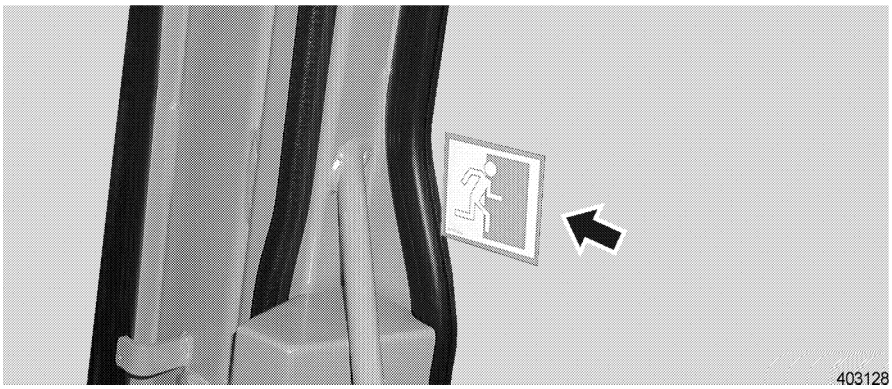
Decal rigging points

The decal is installed on the rigging points of the machine.
Shows the rigging points of the machine.



Decal lifting points

Decal lifting points The decal is installed on the lifting points of the machine.
Shows the lifting points of the machine.

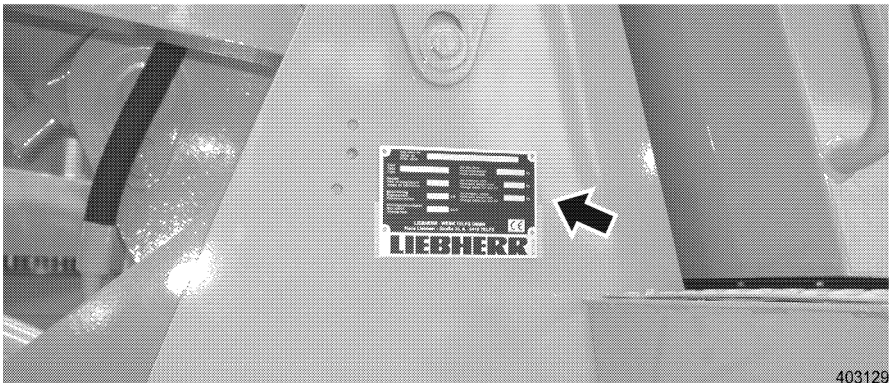


Decal emergency exit

Decal emergency exit The decal is installed on the right door of the operator's cab.
Shows the emergency exit.

2.3.3 Data tags

The machine and components, such as the Diesel engine, gear, pumps etc. are marked with a data tag, which shows the serial numbers for the individual components.



Data tag - Machine

Data tag - Machine The data tag is installed on the left front of the main frame.
Data noted on the data tag:
– Type

- Vehicle Id. No.
- Permissible total weight
- Year
- Engine output
- Maximum speed

2.4 Safety guidelines

2.4.1 General Safety Guidelines

1. Study the Operation and Maintenance Manual before operating the machine.
   - Make certain that you have additional information for the special attachments of your machine, read it and make sure you understand it.
2. Only trained and authorized personnel may operate, maintain, service and repair this machine.
   - Make sure you are aware of the permissible minimum age requirements, as stated by law.
3. Utilize only trained or specially instructed personnel, make sure everyone is aware of the person / persons responsible for the operation, installation of attachments, maintenance and repair of the machine.
4. Determine the responsibility of the operator (to include adherence to traffic regulations) and permit him to refuse to carry out unsafe instructions and practices given by a third person.
5. Do not allow any personnel, either still to be trained or already in training to work on the machine unless that person is under constant supervision of an experienced instructor or operator.
6. Periodically check to see if all persons observe all safety guidelines and work cautiously, as noted in the **"Operation and Maintenance Manual".**
7. Always wear proper clothing when operating or working on the machine.
   - Avoid wearing rings, watches, bracelets, ties, scarves, open jackets, loose clothing, such as unbuttoned or unzipped jackets, etc. they are dangerous as they could get caught in the machinery resulting in serious injury.
   - Wear proper safety equipment for certain work, such as safety glasses, safety shoes, hard hats, gloves, reflective vests, ear protection,...
8. Consult your employer or supervisor for specific safety equipment requirements and safety regulations applicable to the job site.
9. Never use the safety lever, control levers or joysticks as handholds when entering or leaving the cab. This could trigger inadvertent movement of the machine and cause serious accidents.
10. Never jump off the machine! Climb on and off the machine only by using the steps, rails and handles provided. When climbing on or off the machine, use both hands for support and face the machine.
11. Keep steps, ladders and handrails and handles free of oil, grease, mud, snow and ice. These precautions will minimize the danger of slipping, stumbling or falling.
12. Familiarize yourself with the emergency exit route through the right cab door.
13. If no other instructions were given, proceed as follows for maintenance and repairs:

    Procedure:

- Park the machine on firm and level ground and lower the attachment to the ground.
- Bring all operating and control levers into neutral position.
- Turn the engine off, leave the ignition key in contact position.
- Actuate the operating lever / joystick several times to relieve the pressure in the hydraulic lines.
- Bring all operating and control levers into neutral position.
- Place the safety lever in the full down position before leaving the machine.
- Remove the ignition key.

14. Before any work on the hydraulic circuit, you must also - with the ignition key in contact position - actuate all pilot controls (joysticks and pedals) in both directions to relieve pressure in the servo and hydraulic circuit. Then relieve the hydraulic tank pressure.
15. The safety lever must always be placed in the full down position before leaving the operator's seat and the cab.
16. Secure all loose parts on the machine.
17. Never operate the machine until you have performed a complete walk-around inspection. Also check if all warning decals are on the machine and if all of them are legible.
18. Check and follow all instructions on the warning and safety decals.
19. The machine must be equipped with specific safety devices for use in special applications. Utilize the machine only if they are installed and fully functioning.
20. Never change, add or modify anything on the machine which could influence the safety of the machine without explicit written permission of the manufacturer. This also applies to the installation and adjustment of safety devices and valves as well as for any welding on load carrying machine parts or sections.

2.4.2 Crushing and burn prevention

1. Never work underneath the attachment unless it is safely placed on the ground or properly blocked and supported.
2. Never use damaged or insufficient load carrying devices, such as chains, ropes, ...). Always wear gloves when handling wire rope or cables.
3. When working on the attachment, never align bores with your fingers, always use proper alignment tools when installing, changing or servicing attachments.
4. When the engine is running, make sure that no objects touch the radiator fan. Rotating fans will swirl and throw out objects which can become very dangerous and in addition to damaging the fan, they can cause sever injury to yourself and others.
5. Avoid contact with components containing coolant. At or near operating temperature, the engine coolant is hot and under pressure and could cause severe burns.
6. Check the coolant level only after the radiator cap is cool enough to touch. Remove the cap slowly to relieve pressure.
7. Do not allow your skin to come into contact with hot oil or components containing hot oil. At or near operating temperature, engine and hydraulic oil is hot and can be under pressure.
8. Always wear safety glasses and protective gloves when handling batteries. Make sure there are no sparks and open flames in the vicinity.

9. Never permit anyone to hand-guide the attachment into its proper position.
10. Secure the engine compartment doors in open position to avoid unwanted closing. Use the supports installed for this purpose.
11. Insure that all engine and battery compartment doors are closed and locked before operating the machine.
12. Never work underneath the machine if the machine has been raised with its attachment. Prior to working underneath, the machine and / or its attachment must always be properly blocked and supported with wooden blocks. Do not use steel on steel support.

2.4.3 Fire and explosion prevention

1. Always shut the engine off before refueling.
   – In addition, the heater must also be turned off before refueling.
2. Never smoke or allow an open flame in refueling areas and / or where batteries or flammable materials are being charged or stored.
3. Always use the proper engine starting procedure, as described in the **"Operating Manual".**
4. Check the electrical system frequently. Correct any defects, such as loose connections, chafed wiring, or burnt out fuses and bulbs immediately.
5. Never store or carry any flammable fluids on the machine, except in the storage tank intended for machine operation.
6. Regularly check all components, lines, tubes, and hoses for oil and fuel leaks and / or damage. Replace or repair damaged components immediately.
   – Oil and fuel leaks can cause fires.
7. Be certain that all clamps, guards and heat shields are installed. These components prevent vibration, rubbing and heat build up. Install tie wraps to fasten hoses and wires, as required.
8. Cold start ether is extremely flammable! Never use cold start ether near heat sources, open flames, or near anyone who is smoking cigarettes. Use only in well ventilated area and as directed.
9. Never use the flame glow plug or preheat system when you use an ether cold start aid. Danger of explosion!
10. Know the location of the fire extinguishers, make sure you know how to use them properly. Check out the location of where to report a fire and inform yourself about fire fighting capabilities on the job site before you start to work.

2.4.4 Machine start up safety

1. Before starting the machine, perform a thorough walk-around inspection.
2. Check the machine for loose bolts, cracks, wear, leaks and any evidence of vandalism.
3. Never start or operate an unsafe or damaged machine.
4. Be certain that all defects are taken care of immediately.
5. Make sure that all covers and doors are closed and locked. Check if all warning and safety decals are on the machine, make sure that all of them are legible.
6. Clean all windows and mirrors, secure all doors and windows to prevent any inadvertent movement.

7. Always enter and leave the cab through the left door. Use the right door only in emergencies.
8. Make sure that no one is on or under the machine. Warn all personnel in the surrounding area on the job site before operating the machine.
9. After entering the operator's cab, adjust the operator's seat, the mirrors, the arm rests and the seat belt so you can work comfortably.
10. All noise level protection devices on the machine must be operational when operating the machine.
11. Never operate the machine without a cab or canopy.

2.4.5 Engine start up safety

1. Before starting the engine, check all indicator lights and instruments for proper function. Place all operating and control levers into neutral position.
2. Before starting the engine, warn any personnel in the surrounding area by sounding the horn.
3. Start the machine only while seated in the operator's seat.
4. If no other instructions were given, follow the engine starting instructions are outlined in the **"Operating Manual".**
5. Start the engine and check all indictor lights, gauges, instruments and controls.
6. Start the engine only in a well ventilated area. If necessary, open doors and windows to assure a sufficient fresh air supply
7. Warm up the engine and hydraulic system to bring the engine and hydraulic oil to operating temperature, as low oil temperatures cause the machine to be unresponsive.
8. Check that all attachment functions are operating properly.
9. Move the machine slowly and carefully into an open area and check the travel and brake functions, the steering function as well as the turn signals and lights.

2.4.6 Machine operating safety

1. Make sure that you are aware of any special circumstances on the jobsite, make sure you are familiar with any special guidelines and warning signals. Familiarize yourself with the jobsite before starting to work, any special hindrances and obstacles influencing the operation or movement, the ground conditions and any special protection required to secure the job site from public highway traffic.
2. Always keep a safe distance from overhangs, walls, drop offs and unstable ground.
3. Make sure you are especially aware of changing ground conditions, visibility or weather conditions.
4. Make sure you know the location of utility lines. Be aware of underground cables, gas and water lines. You must be especially careful when working near supply lines. If necessary, contact the appropriate utility company for information and location of utility lines.
5. Keep sufficient distance from electrical lines with the attachment. Avoid working near high voltage electrical lines.
   - There is a **DANGER OF LOSS OF LIFE!**
   - You must inform yourself of proper distances to assure your safety while working.

6. **If you do touch an electrical line with the attachment or machine, proceed as follows:**
   - Do not leave the machine!
   - If possible, move the machine a sufficient distance away from the danger area.
   - Warn all personnel in the surrounding area not to come close to the machine and / or touch the machine.
   - Instruct somebody to turn the electrical power off.
   - Do not leave the machine until you are assured that the electrical line which has been touched or damaged is no longer energized, and the power has been turned off!
7. Before moving or working, make sure you always check that the attachments can be operated safely.
8. When traveling or moving the machine on public roads, highways or properties make sure to observe all applicable laws, rules and regulations. After moving a machine it may become necessary to reassemble it and to bring it back to proper operating conditions.
9. Always turn on the lights if visibility is poor or as dusk approaches.
10. Never allow another person to ride along on the machine.
11. Always work while seated in the operator's seat and with the seat belt secured.
12. In the event the machine should tip, remain in the operator's seat with the seat belt securely fastened. Experience has shown that it is safer to remain in the cab in the event of an overturn.
13. Report any functional problems or defects immediately and make sure that all necessary repairs are completed before resuming operation.
14. Be certain that no one is endangered by moving the machine.
15. Do not get up from the operator's seat as long as the machine is still moving.
16. Never leave the machine unattended with the engine running.
17. When traveling, make sure that the attachment is in transport position and keep the load as close to the ground as possible.
18. Avoid any working movement, which could cause the machine to tip over or overturn. However, if the machine does begin to tip or slide or slip on a grade, immediately lower the attachment and load to the ground and turn the machine downhill. If possible, work downhill or uphill, never sideways on a slope.
19. Always move slowly on rocky, rough or slippery ground or on a slope.
20. Always adapt your travel speed to working conditions.
21. Never travel on slopes that exceed the maximum permissible gradeablity of the machine.
22. Never travel downhill at maximum speed, always at low speed to prevent loss of control. The engine must be at high idle and the speed must be reduced by preselecting the low speed range. Always change to low speed range before reaching the slope, never move onto a slope and then change the speed range.
23. When loading a truck, the driver must leave the cab, even if the cab is FOPS protected.
24. The machine must always be equipped with proper protective devices designed for the specific purposes. The machine must be equipped with proper protection when it is utilized in demolition work, land clearing, crane operation, etc.
25. Always have another person guide you if visibility is restricted. Always take signals from one person only.

26. Utilize only experienced personnel to attach loads and direct operators. The person giving signals must be visible to the operator or be equipped with two way radios.

2.4.7 Machine parking safety

1. Park the machine only on firm and level ground. If it becomes necessary to park the machine on a grade, it must be properly blocked with wedges to secure it and prevent any unintentional movement.
2. Lower the attachment to the ground and lightly anchor it in the ground.
3. Bring all operating levers and controls into neutral position, place the safety lever in full down position and turn the engine off, as outlined in the Operation and Maintenance Manual, before you leave the operator's seat.
4. Lock the machine, remove all keys and secure the machine against vandalism and unauthorized use.
5. Never park the machine in such a way as to block access to entrances, exits, ramps, fire hydrants, etc.

2.4.8 Machine transporting safety

1. Use only safe transportation and lifting devices with adequate carrying load capacity.
2. Park the machine on level ground and use wedges to hold chains or wheels.
3. If necessary, remove part of the attachment of the machine for transport.
4. Never use a ramp that is steeper than 30° to move the machine onto the transporting vehicle, the ramp should be covered with wooden planks to prevent slipping.
5. Before moving onto the ramp, remove any snow, ice and / or mud from chains or wheels.
6. Align the machine with the ramp.
7. Use another person as a guide to signal you, the operator. Move very slowly and carefully towards the ramp and the transporting vehicle.
8. Raise the attachment and move onto the ramp. Hold the attachment as close as possible to the loading platform.
9. After the loading procedure, lower the attachment onto the trailer platform.
10. Secure the machine and all remaining parts with chains and wedges to prevent any slipping or movement during transport.
11. Relieve pressures from hydraulic liens and hoses, remove the ignition key, lock the operator's cab and covers before leaving the machine.
12. Carefully check out the transporting route beforehand, check any regulations regarding width, height and weight.
13. Make sure that there is enough clearance underneath all bridges and underpasses, utility lines and tunnels.
14. During off loading, use the same care and caution as during the loading procedure.
    Proceed as follows:
    – Remove all chains, wedges and blocks. Start the engine as noted in the Operating Manual.

– Carefully move from the trailer platform down the ramp.
– Hold the attachment as close as possible above the ground.
– Use a guide to signal you.

2.4.9 Machine towing safety

1. Always follow the correct procedure as noted in the **"Operating Manual",**see "Towing the machine".
2. Tow the machine only in exceptional cases, such as removing the machine from a dangerous area to have the machine repaired.
3. Be sure that all towing and pulling devices, such as cables, hooks, etc. are safe and adequate.
4. The cable or towing bar, which is used to tow the machine, must be adequate to pull the machine and must be connected to the appropriate bores or couplers. Any damage or accident which is the direct result of towing this machine is expressly excluded from the manufacturer's and / or LIEBHERR warranty.

   Notes for towing with a cable:
   – Make sure that no one is near the tensioned cable when pulling or towing the machine.
   – Keep the cable tight and free of kinks.
   – Carefully pull the cable tight, do not jerk!
   – A sudden jerk can cause a slack cable to snap.
5. When towing, keep the machine in the correct transport position, and maintain the permissible speed and route.
6. When returning the machine to operation, proceed as noted in the Operating Manual.
7. After towing the machine, and before continuing operation, be certain to return the machine to a safe operating condition.

2.4.10 Machine maintenance safety

1. Never perform any maintenance or repairs for which you are not qualified or you do not understand.
2. Any maintenance and inspection should be performed in the intervals noted in the Operation and Maintenance Manual.
   To perform any repairs, make sure you have the proper tools.
3. Maintenance work should be performed according to the chart at the end of this Operation and Maintenance Manual. It is also noted who should or may perform what type of work. The operator should only perform items marked OM on the maintenance and inspection chart. The remaining work should only be performed by trained personnel.
4. All spare parts must conform to the technical requirements set forth by the manufacturer. This is only assured if Original LIEBHERR spare parts are used.
5. Always wear proper and safe work clothing. For certain jobs, in addition to hard hats and safety shoes, additional safety equipment is required, such as safety glasses and gloves.
6. Keep unauthorized personnel from the machine during maintenance and repair work.
7. Secure the maintenance area, as necessary.

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8. Inform operators if any special tasks or maintenance work is required. Appoint one supervisory person to assure that this work has been done properly.
9. Perform all maintenance work with the machine parked on firm and level ground and with the engine turned off, unless otherwise specified in the Operation and Maintenance Manual.
10. The cab may only be raised if the machine is parked and the engine is turned off! Before raising the cab, make sure no personnel is within the proximity of the cab. Always secure the raise cab with the safety bar before working under the raised cab. The machine may **NEVER** be moved when the cab is raised! The safety lever must always remain in the full down position!
11. After any maintenance and repair work on the machine, make sure that all screw connections or fittings, which had to be loosened, are retightened.
12. If it becomes necessary to remove any safety devices during maintenance and repair, the safety devices, which were removed, must be reinstalled immediately and then be inspected for proper function.
13. Before servicing the machine, especially when working under the machine, attach an easily visible warning label **DO NOT OPERATE** to the ignition switch. Remove the ignition key.
14. Before any maintenance or repair, clean off any oil, fuel or service fluids from connections and couplings. Do not use harsh cleaning fluids. Use lint free cleaning rags.
15. To clean the machine, do not use flammable fluids.
16. Before any welding, cutting or grinding, clean the machine and surrounding area of dust, and assure adequate ventilation.
    – Otherwise, there is a **DANGER OF EXPLOSION.**
17. Before cleaning the machine with water, steam (high pressure cleaning systems) or other cleaning fluids, cover or tape all openings, make sure that no water, steam or cleaning fluids enters these openings for safety and functional reasons.
    Electrical motors, switch boxes, and battery compartments are especially endangered.

    In addition:
    – Make sure that during cleaning work, the temperature sensors for the fire warning and sprinkler system do not come in contact with the hot cleaning fluid, or the sprinkler system could be actuated
    – After the cleaning procedure, completely remove all covers and tapes.
    – After cleaning the machine, check all fuel, engine oil, and hydraulic lines for leaks, for loose connections, for chafed and damaged areas.
    – All problems must be remedied immediately.
18. Adhere to the product safety instructions issued for handling oils, grease and other chemical substances.
19. Make sure to dispose of any operating and service fluids as well as replacement parts properly and in an environmentally sound manner.
20. Be very careful when handling any hot components or fluids on the machine as there is a danger of burns and scalding.
21. Use combustion motors and fuel operated heaters only in areas with adequate ventilation. Before start up, make sure that the ventilation is adequate. Follow and adhere to any local regulations and guidelines and instructions pertaining to the present jobsite.

22. Perform any welding, cutting or grinding work on the machine only if this work has been explicitly authorized, as there can be a danger of fire and / or explosion.

23. The window panes in the operator's cab are made of safety glass. Always replace damaged window panes in the operator's cab immediately.
    - The window panes in the operator's cab must be made of safety glass.
    - Use only Original LIEBHERR spare parts.

24. Do not try to lift heavy parts. Always use appropriate lifting aids and devices with sufficient load carrying capacity.
    Procedure:
    - To lift spare parts and component assemblies for replacement on the machine, they must be securely mounted and secured onto the lifting device to prevent accidents.
    - Use only suitable and flawless lifting devices as well as hooks, ropes, slings, shackles, etc. with sufficient load carrying capacity.
    - **Do not allow anybody to work or remain underneath a suspended load.**

25. Do not use damaged or insufficient wire ropes. Always wear gloves when handling wire ropes and cables.

26. Only experienced personnel may attach loads and signal the operator. The person used as a guide must be visible by the operator or be in direct voice contact with the operator via a two way radio.

27. When installing parts higher up or when working overhead, always use safe scaffolding, ladders or working platforms. Do not step on any parts to get closer to the work area. You must wear safety harnesses or similar safety equipment when working higher up. Make sure that all handles, steps, walk ways, cat walks, and ladders etc. are always free of dirt, snow and ice.

28. When working on or changing any part of the attachment, for example when changing the teeth, make sure that the attachment is properly supported. Never use metal on metal supports.

29. Never work underneath the machine if the machine has been raised by its attachment. Prior to working underneath, the machine and / or its attachment must always be properly blocked and supported with wooden blocks.

30. Always block the machine in such a ways that any change in the center of gravity will not endanger its stability. Never use metal on metal support.

31. Only authorized, trained personnel may work on the travel gear, brake and steering system.

32. If the machine must be repaired while parked on a slope, the track chains or wheels must be blocked with wedges to prevent any movement. The attachment must be brought to proper maintenance position.

33. Only authorized personnel who have received specialized training may work on the hydraulic system.

34. Always wear gloves when checking for leaks. Never check for leaks with your bare hands. A thin stream of fluid escaping from as small hole can have enough force to penetrate the skin.

35. Never loosen the hydraulic lines or connections until the attachment has been lowered to the ground, the engine has been turned off - with the ignition key in contact position - all servo controls (joysticks and pedals) have been actuated in both directions to release any servo pressure and to release all pressures in the working circuit and the tank pressure has been release by slowly opening the bleeder screw.

36. Regularly check all hydraulic lines, hoses and connections for any leaks and damage. Any defects must be repaired immediately. Any escaping fluid can cause serious injury and fire.
37. Before beginning repairs, you must also make sure that all air pressures are relieved in any of the systems you need to gain access to. To be certain, refer to the description for the various component groups and assemblies.
38. Route and install all hydraulic and air pressure lines properly. Mark and check all connections to prevent any mix ups. All the fittings, including length and quality or type of hoses used must match the requirements set forth by the manufacturer.
    For that reason, use only Original LIEBHERR spare parts.
39. Replace hydraulic hoses and lines in regular intervals, as stated, even if no defects can be seen.
40. Work on the electrical components of the machine may only be performed by a certified electrician or by a person working under the guidance and supervision of such a licensed electrician and according to electro-technical procedures, rules and regulations.
41. Use only Original fuses with the same amperage. In case of problems in the electrical power supply, turn the machine off immediately.
42. Inspect / check the electronic components of the machine regularly. Repair any problems or defects, such as loose connections or chafed wires and replace any burnt out fuses and bulbs immediately.
43. If any work is necessary on energized, voltage carrying parts a second person must be utilized to disconnect the main battery switch in case a problem should arise. Rope off the working area with a red / white safety chain and a warning sign. Use only insulated tools.
44. When working on high voltage carrying components or sections, turn off the power supply, then connect the power supply cable to the ground wire and use the grounding rod to ground these parts, such as the condenser, for example.
45. Check the disconnected parts first to see if they are really voltage free, ground them and then close them off. Insulate the voltage carrying parts close by.

2.4.11 Safety guidelines to be observed when welding on the machine

1. Disconnect the battery, when working on the electrical system or before any arc welding on the machine.
   - Disconnect the negative (- minus) terminal first, and reconnect it last.
   - **In addition, before any welding, always remove the electronic box.**

2.4.12 Safety guidelines to be observed when working on the attachment

1. Never work underneath the attachment unless it is securely placed on the ground or is properly supported.
2. When replacing or changing any part of the attachment, such as blade, cutting edges, teeth, ...) never use metal on metal support.
3. Never try to lift heavy parts. Always select and use appropriate lifting devices with sufficient lifting capacity.
4. When handling wire ropes, always wear gloves!

5. Do not disconnect any lines or hoses or remove fittings, caps or covers before the attachment has been placed down and the engine has been turned off. To release pressures - with the ignition key in contact position - move all servo controls (joystick and pedals) in both directions to release the servo pressure and any pressure remaining in the hydraulic circuit, then release the tank pressure by turning the bleeder screw.
6. After completion of all maintenance and repairs, make sure that all lines and hoses and fittings are properly connected and retightened.
7. Removing and installing the steel pins with a hammer can be very dangerous. Metal chips can cause injury.
   – Always wear gloves and safety glasses.
   If possible, use appropriate tools for the job, such as pin pullers, punches, etc.).

2.4.13 Safety guidelines to be observed when loading the machine with a crane

1. Lower the attachment to the ground.
2. Bring all operating and control levers into neutral position.
3. Turn the engine off, as described in the Operating Manual and place the safety lever in the full down position before you leave the operator's seat.
4. Securely close all doors, covers and hoods.
5. Utilize only experienced personnel to attach loads and direct the crane operator. The person giving signals must be visible by the operator or be equipped with a two way radio.
6. Install the shackles and hooks to the appropriate and designated brackets / bore holes on the machine.
7. Make sure the length of the lifting device is sufficient.
8. Carefully lift the machine.
9. **DANGER! Make sure no one is near or underneath the raised machine.**
10. When the machine is placed back in service, proceed according to the guidelines given in the Operation and Maintenance Manual.

2.4.14 Safe maintenance of hydraulic hoses and lines

1. Hydraulic hoses and lines may never be repaired!
2. All hoses, lines and fittings must be checked regularly, but at least once a year for leaks and any externally visible damage! Any damaged sections must be replaced immediately! Escaping oil can cause injuries and fire.
3. Even if hoses and lines are stored and used properly, they undergo a natural aging process. For that reason, their service life is limited.
4. Improper storage, mechanical damage and improper use are the most frequent causes of hose failures.
5. The service life of a hose may not exceed six years, including a storage period of no more than two years (always check the manufacturing date on the hoses).
6. Using hoses and lines close to the limit ranges of permitted use can shorten the service life (for example at high temperatures, frequent working cycles, extremely high impulse frequencies, multi-shift or around the clock operation).

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7. Hoses and lines must be replaced if any of the following points are found during an inspection:
   Criteria:
   – Damage on the external layer into the inner layer (such as chafing, cuts and rips);
   – Brittle outer layers (crack formation of the hose material);
   – Changes in shape, which differ from the natural shape of the hose or line, when under pressure or when not under pressure, or in bends or curves, such as separation of layers, blisters or bubble formation;
   – Leaks;
   – Non-observance of installation requirements;
   – Damage or deformation of hose fittings, which might reduce the strength of the fitting or the connection between the hose and the fitting;
   – Any movement of the hose away from the fitting;
   – Corrosion on the fittings, which might reduce the function or the strength of the fitting;
   – Storage or service life has been exceeded.
8. When replacing hoses or lines, use only Original replacement parts.
9. Route and install the hoses and lines properly. Do not mix up the connections.

2.4.15 Safety guidelines for maintenance work on machine with hydro accumulators

1. Any work on hydro accumulators may be carried out only by especially trained personnel.
2. Improper installation and operation of hydro accumulators can cause severe accidents.
3. Never operate damaged hydro accumulators.
4. Before working on a hydro accumulator, the pressure in the hydraulic system (hydraulic system, including hydraulic tank) must be relieved as described in this operating manual.
5. Welding or soldering is not permitted on the hydro accumulator, never carry out any mechanical work!
   The hydro accumulator can be damaged through heat exposure and it can burst if any mechanical work is done on the unit. THERE IS A DANGER OF EXPLOSION!
6. Fill the hydro accumulator only with nitrogen! If oxygen or air is used, there is a DANGER OF EXPLOSION!
7. The accumulator housing can get hot during operation, there is a danger of burns.
8. New hydro accumulators must be filled with the required pressure to suit the application.
9. The operating data (minimum and maximum pressure) is permanently marked on the hydro accumulators. Make sure that the labeling remains clearly visible!

2.4.16 Roll over protection (ROPS) and falling object protection (FOPS)

These are protective devices, which are integrated in the operator's cab.
To reduce a weakening of the roll over or falling object protection, always check with your LIEBHERR dealer or Service Department before making any changes.
– Do not attach fire extinguishers, first aid kits, floodlights or similar objects to these protective structures.
– Welding points or drilling of holes could weaken the structure.
For similar work, always consult with your LIEBHERR dealer.

1. Any changes, which have not been explicitly approved by LIEBHERR would invalidate the roll over or falling object protection permit.
   – Damage to the structure can also be caused by a roll over accident or falling objects, etc.

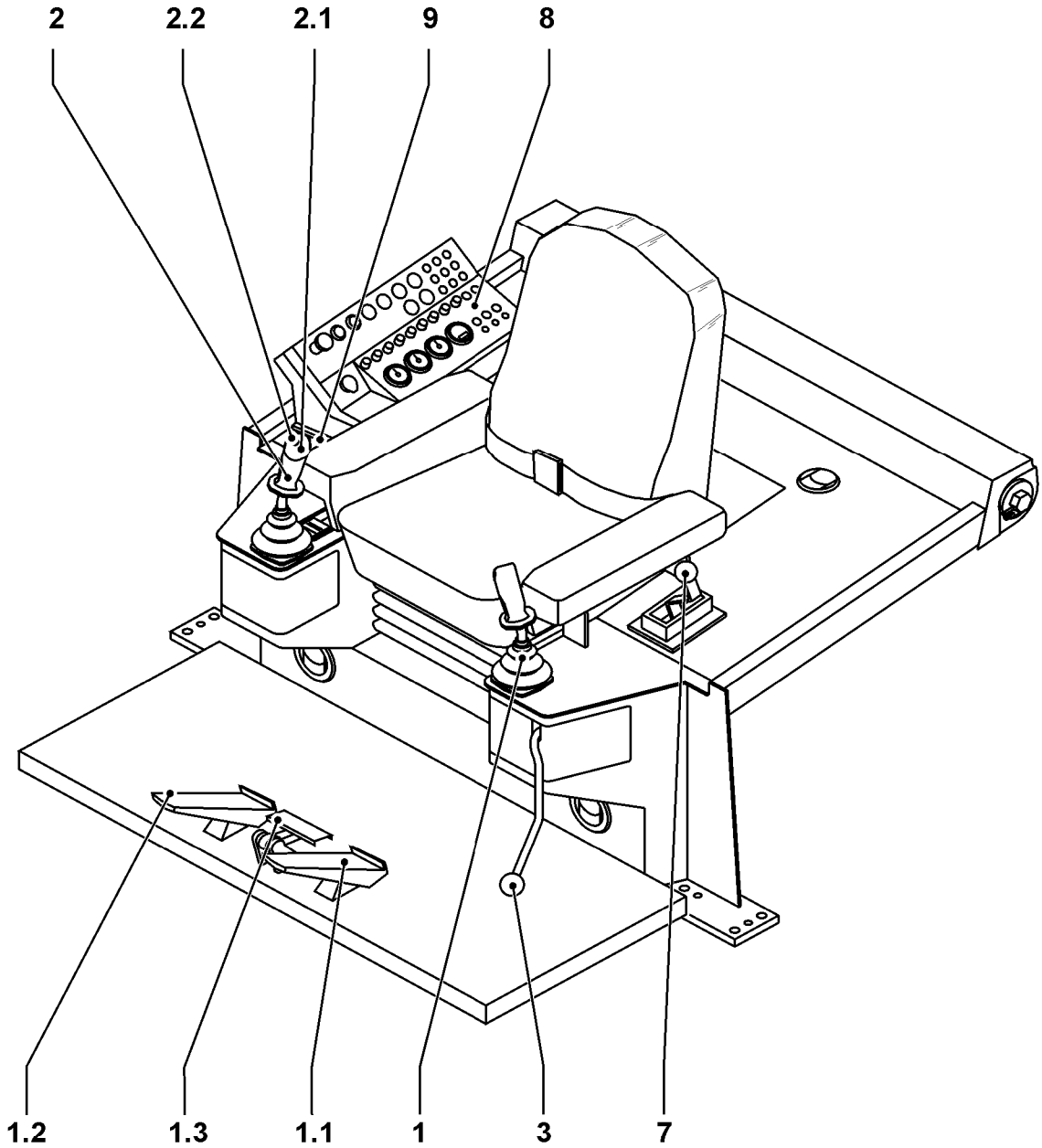
2.4.17 Attachments and installations

1. Attachments and installations from other sources or parts which have not been approved by LIEBHERR for installation may not be installed on the machine without prior written permission by LIEBHERR.
2. The necessary technical documentation must be forwarded to LIEBHERR.

3. Control, instrumentation

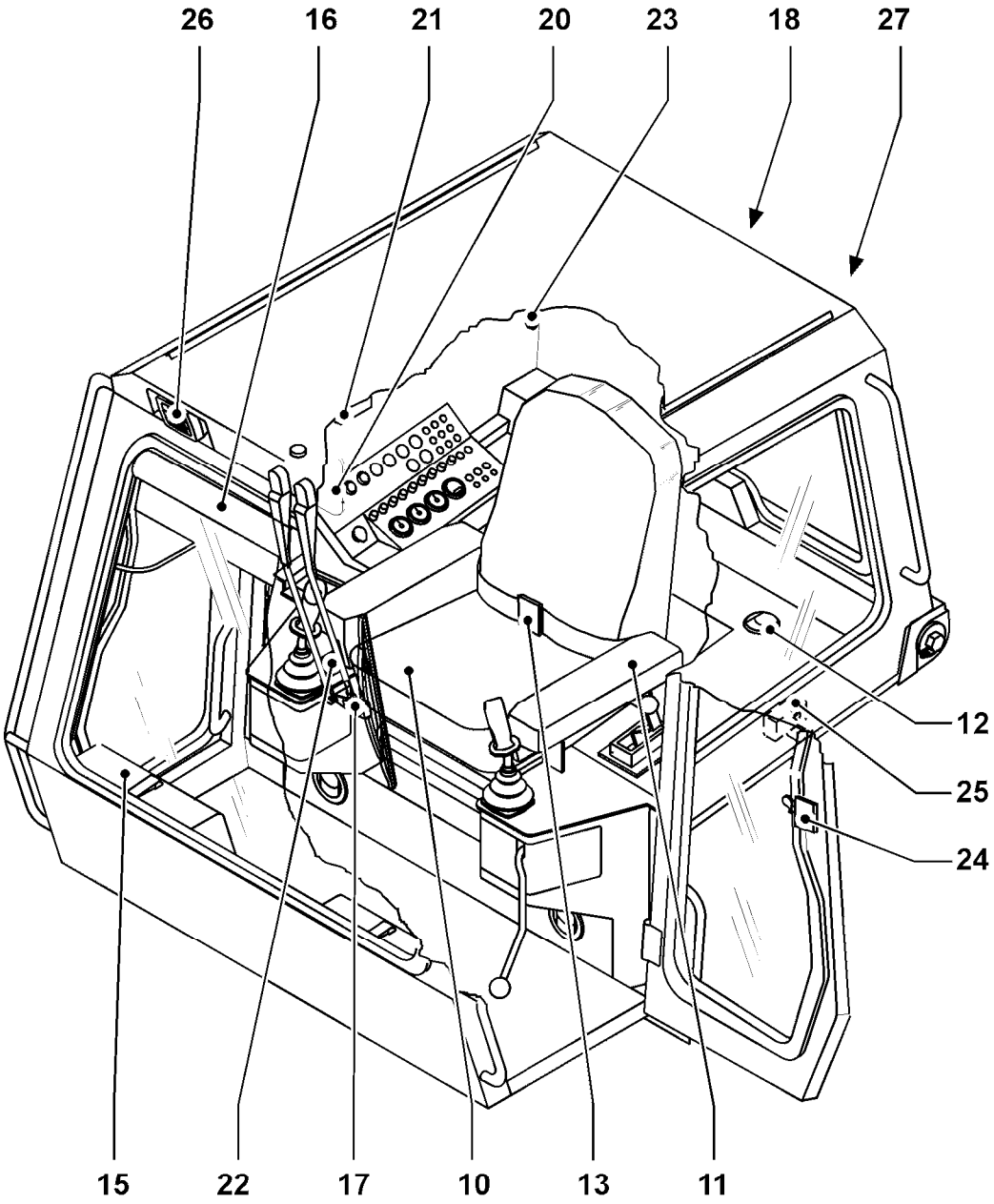
3.1 Location of controls and instrumentation

3.1.1 Operator's cab



Interior view - operator's cab

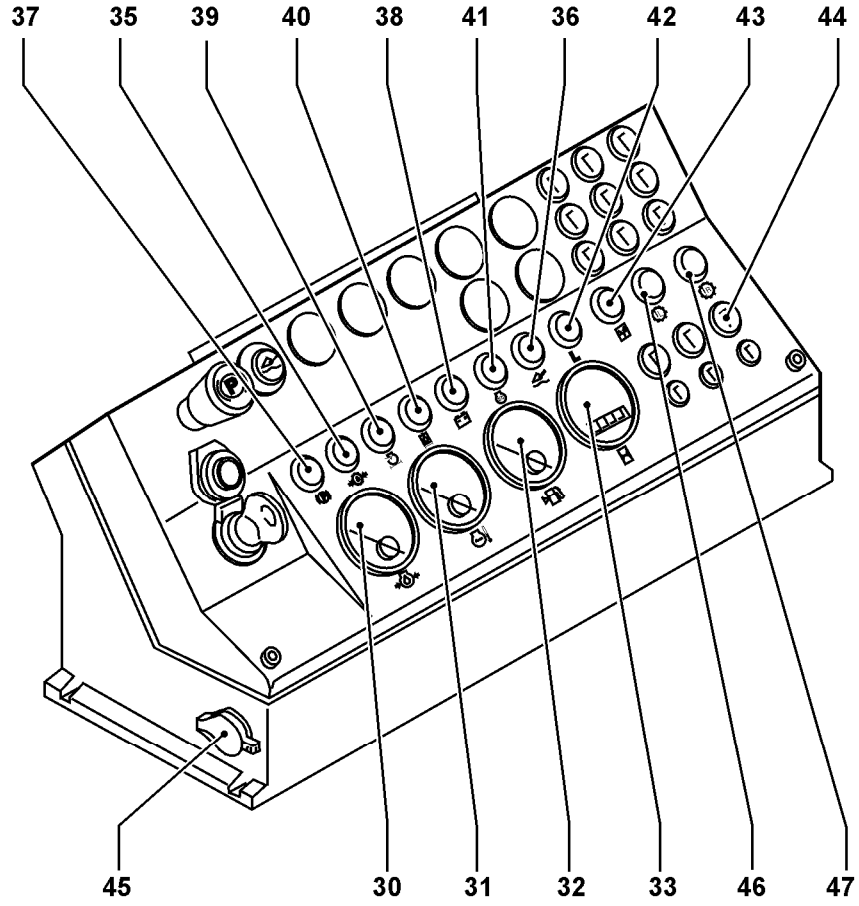
1 Travel lever - joystick
1.1 Steering pedal, left
1.2 Steering pedal, right
1.3 Brake pedal
2 Bucket control lever
2.1 Push button - bucket float position
2.2 Push button - bucket return
3 Safety lever
7 Engine throttle control
8 Instrument panel
9 Heater A/C control



Interior view - operator's cab

10 Operator's seat
11 Arm rests
12 Heater vents
13 Seat belt
15 Compartment for documentation
16 Sun shade
17 Windshield wiper - front window
18 Windshield wiper - rear window
20 Rear view mirror
21 Innenbeleuchtung
22 Ashtray
23 Coat hanger
24 Door lock
25 Door latch
26 Headlight front
27 Headlight rear

3.1.2 Indicators and gauges on the instrument panel



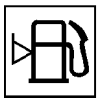
Indicators and gauges on the instrument panel

30 Engine oil pressure gauge

Shows the oil pressure of the Diesel engine.
The oil pressure may not drop below the following values:
At low idle: 1 bar
At full load: 3.5 bar
If the engine oil pressure drops below these values, turn the engine off and check for and correct the problem (change the engine oil and filter, if necessary.)

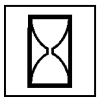
31 Coolant temperature gauge

Shows the coolant temperature of the Diesel engine.
If the coolant temperature stays consistently above 100°C, turn the engine off and correct the problem (for example, clean the radiator, add coolant, check for leaks or check the water pump.)



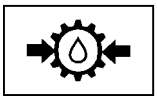
32 Fuel gauge

Shows the contents of the Diesel fuel tank.
To reduce condensation, always maintain a high fuel level in the tank.



33 Hour meter

Shows the operating hours of the machine.
The hour meter is the basis for the timely maintenance intervals in the inspection schedule.



35 Indicator light - Replenishing oil pressure

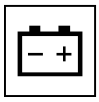
Color: red
– Lights up if there is a drop in replenishing oil pressure.
Stop the machine and turn the Diesel engine off immediately if the indicator light lights up during machine operation and fix the problem.

36 Indicator light - Float position

Color: yellow
– Lights up if the float position is turned on.

37 Indicator light - Parking brake

Color: yellow
– Lights up if the parking brake is applied.
– Lights up if the safety lever is in the down position.
– Lights up if there is a drop in replenishing pressure.



38 Indicator light - Battery charge

Color: red
Turns off after the Diesel engine is running.
– Lights up, for example in case of a broken V-belt.
If the indicator light comes on, turn the Diesel engine off and check for and correct the problem.

39 Indicator light - Air filter contamination

Color: yellow
– Lights up if the air filter is very dirty.
Maintain the air filter.

40 Indicator light - Return filter

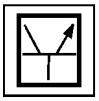
Color: yellow
– Lights up if the hydraulic oil - filter insert is dirty. (Hydraulic oil at operating temperature.)
Carry out hydraulic oil - filter maintenance.

41 Indicator light - Preglow system

Color: yellow
– Lights up if the starter key is in preglow position for approx. 20 seconds.
As soon as the indicator light turns off, continue to turn the starter key to starting position to start the Diesel engine.

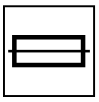
42 Indicator light - Low speed range

Color: yellow
– Lights up in reduced travel speed range.
The travel speed of the machine is limited to 0 - 6.5 km/hr.



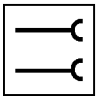
43 Indicator light - Electronic

Color: red
– Lights up if there is a problem in the electrical system.
If the light comes on, turn the machine off and restart it. If the indicator light does not turn off or lights up again, contact Liebherr Service.



44 Fuses

Location as well as size of fuses are described in this Operating Manual.



45 Electrical outlet 24 V

– Additional electrical users (max. load 10A) can be connected via the 24V electrical outlet.
Can only be used if the starter key is in contact position.

46 Indicator light - Travel gear - Left lifetime seal area

Color: red
– Lights up if the oil level in the lifetime seal area is too low.
– Lights up for approx. 3 seconds when the starter key is in contact position (self check).
If the indicator light lights up, turn the machine off, check the external area of the travel gear for leaks.

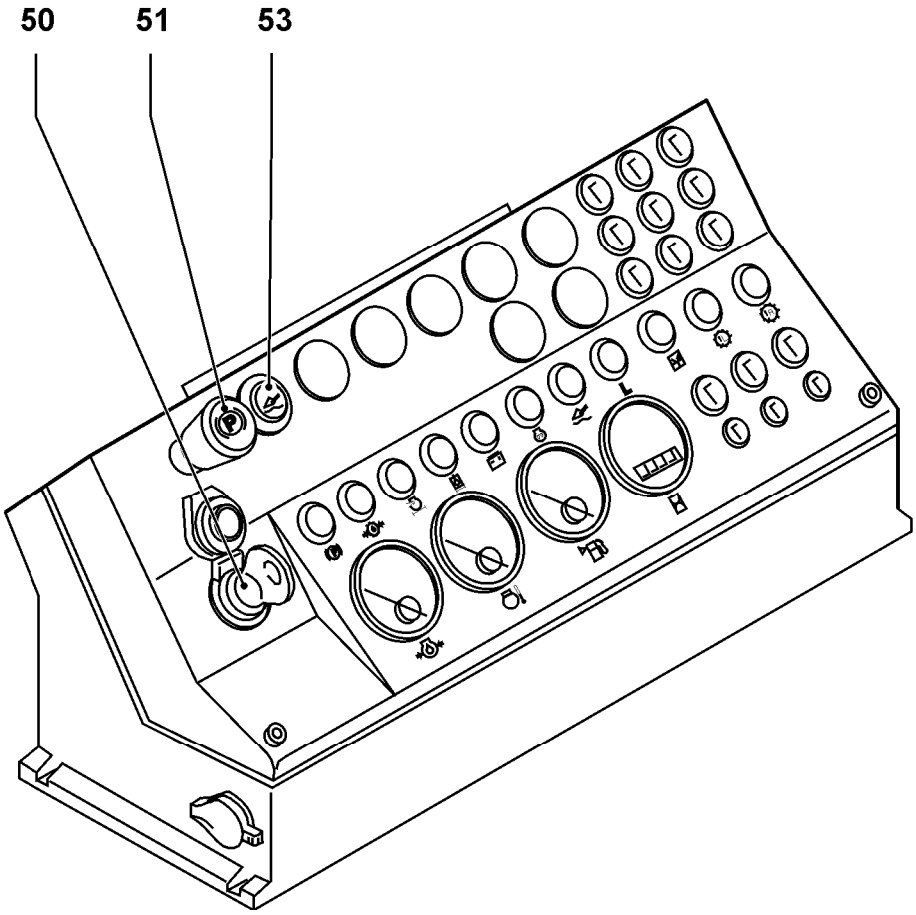
Contact Liebherr Service.
– To be able to continue working in the meantime, add oil to bring the oil level to normal level.

47 Indicator light - Travel gear - Right lifetime seal area

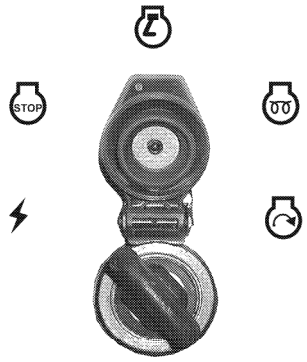
Color: red
– Lights up if the oil level in the lifetime seal area is too low.
– Lights up for approx. 3 seconds when the starter key is in contact position (self check).

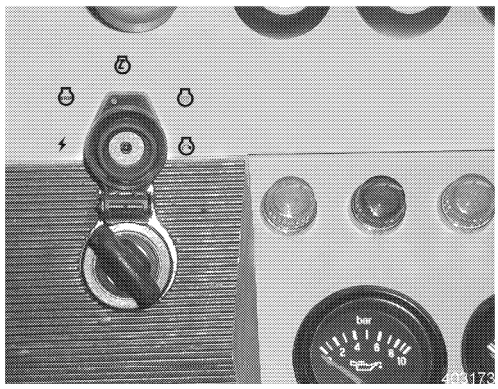
If the indicator light lights up, turn the machine off, check the external area of the travel gear for leaks.
Contact Liebherr Service.
– To be able to continue working in the meantime, add oil to bring the oil level to normal level.

3.1.3 Controls on the instrument panel



Controls on the instrument panel





Starter switch

50.0 Off position

50.1 Contact position

50.2 Preglow position

50.3 Starting position

50.4 Parking position

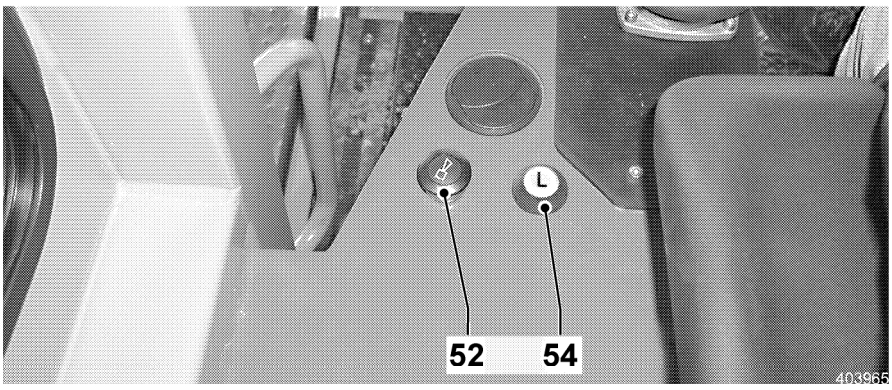
51 Emergency off button

– The machine stops immediately when the emergency off button is pressed.

The attachment can still be operated.

53 Switch - Preselection float position

– Push the switch to preselect the bucket float position.



Control elements - cab

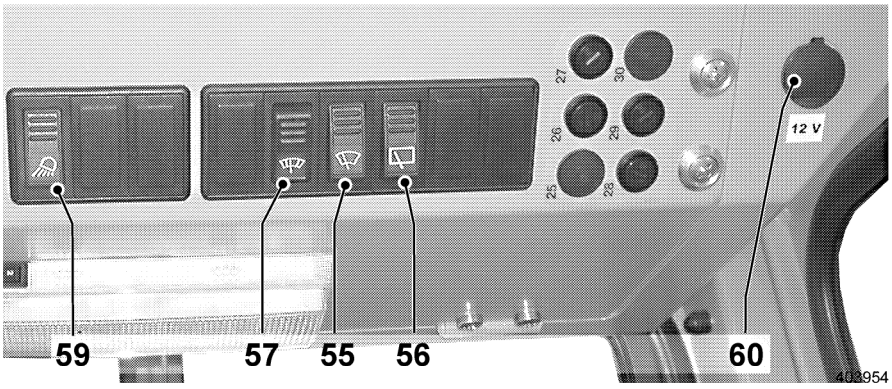
52 Horn

– Push the button to sound the horn.

54 Button - Low speed range

– Push the button to reduce the speed range of the machine to 0 - 6.5 km/hr.

3.1.4 Control and indicators in the roof console



Roof console

55 Switch - windshield wiper, front

Turn on - turn off

56 Switch - windshield wiper, rear

Turn on - turn off

57 Switch - windshield wiper- intermittent/ washer system

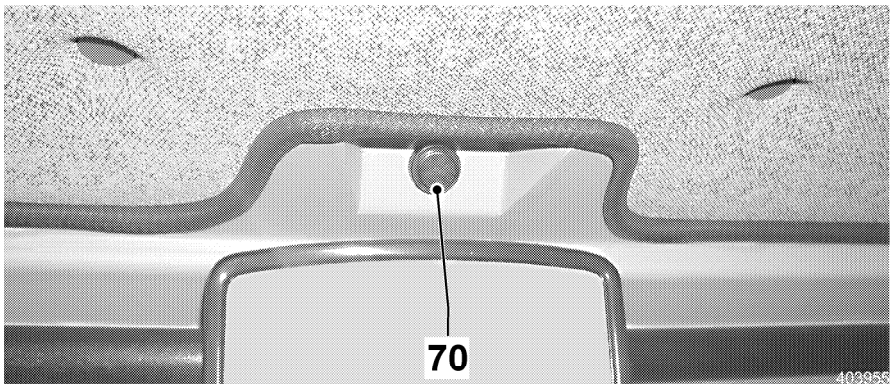
Stage 1 (pushed on top): Button windshield washer system
Stage 2 (center position): continuous wipe
Stage 3 (pushed on the bottom): intermittent wipe
– The windshield wiper, which was turned on with switch 55 and 56 is changed from continuous wipe to intermittent wipe.

59 Switch - working floodlight

Turn on - turn off
The working floodlights turn on / off after pressing the switch.

60 Electrical socket 12 V

Auxiliary equipment (max. load 10A) can be connected via the integrated 12V electrical socket.
Can only be used if the starter key is in contact position.



Warning light – operator's cab

70 Warning light – operator's cab

The warning light blinks:
– at increased Diesel engine coolant temperature
– at a drop in Diesel motor oil pressure
– at a drop in pump replenishing pressure
– if starter switch is in contact position as long as the Diesel engine is not running.

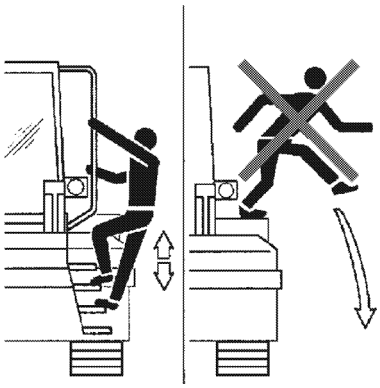
If the warning light – cab lights up, turn the Diesel engine off and remedy the problem.

3.2 Operation

3.2.1 Entry

Entering and leaving the operator's cab

Always use the steps, rails and handles provided to enter and leave the cab.
Make sure the steps and chains are cleaned before stepping on them.
Always enter and leave the operator's cab through the left door of the operator's cab.
Make yourself familiar with the emergency exit through the right door in the operator's cab.
See also "Emergency exit".



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Entering and leaving the operator's cab

Caution

Do not jump off the machine, danger of injuries due to falling or jumping off the machine!

! Always use the steps, ladders or rails provided to enter or leave the cab.

! Never jump off the machine.

Caution

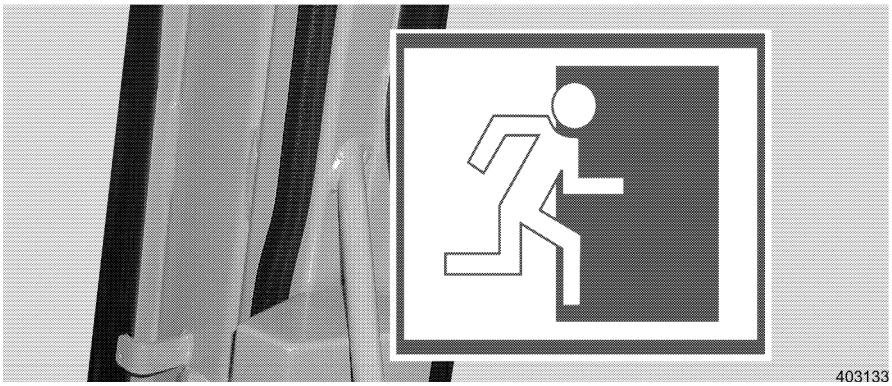
Danger of injuries due to inadvertent movement of the machine!

! When entering or leaving the machine, never grasp the safety lever or the control levers and use them as handholds.

- Enter the machine only via the left side.

3.2.2 Emergency exit

Always enter and leave the operator's cab through the left door.



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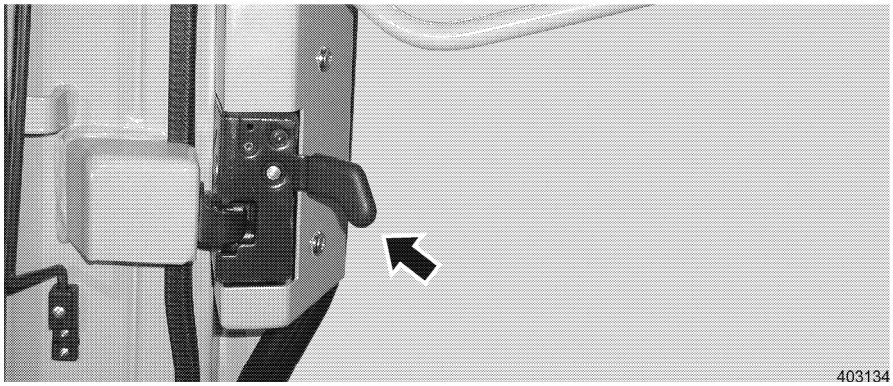
Emergency exit

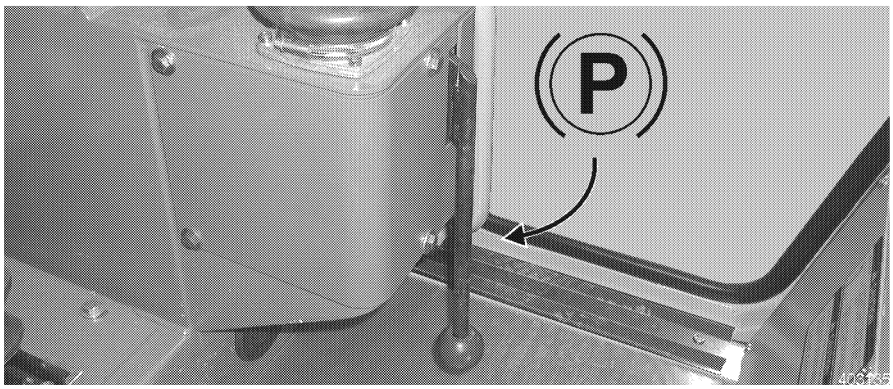
Leave the operator's cab through the emergency exit

The right door in the operator's cab is intended as the emergency exit and should only be used in true emergency situations.



Open the right operator's cab door

- Before machine start up, check if you can leave the cab through the right door without a problem.
- Open the operator's cab door by pulling the lever on the door lock upward.



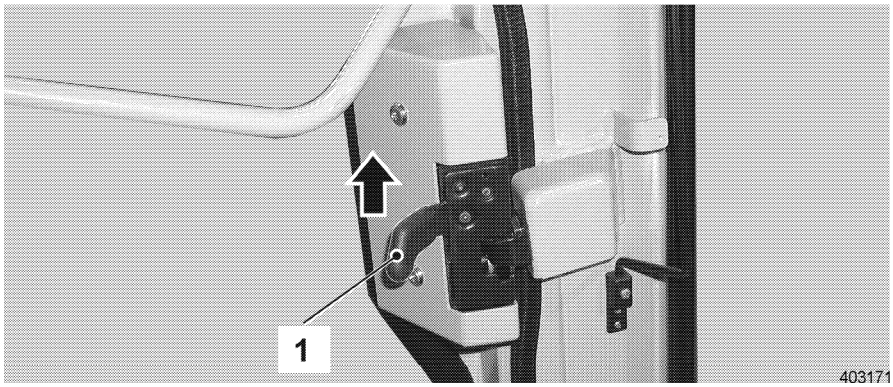
Safety lever down

- Before leaving the operator's cab, always place the safety lever in the full down position.

– The indicator light - travel brake - must light up.

3.2.3 Door lock

The doors of the operator's cab are held in closed position by the door lock.



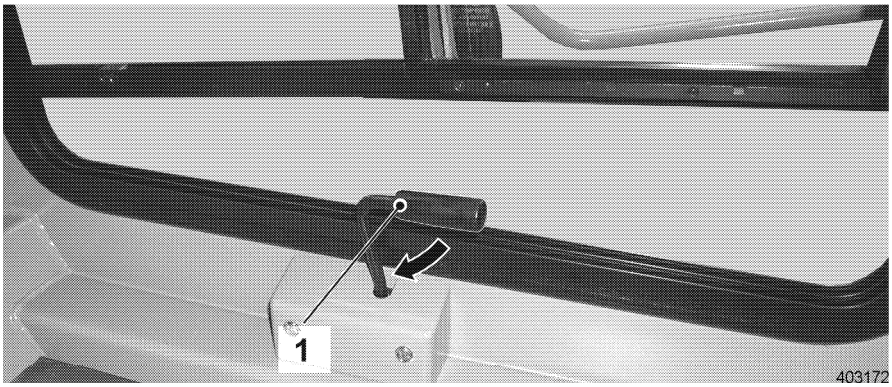
To open the door

From the inside

- pull the lever 1 on the door lock up.

Door retainer

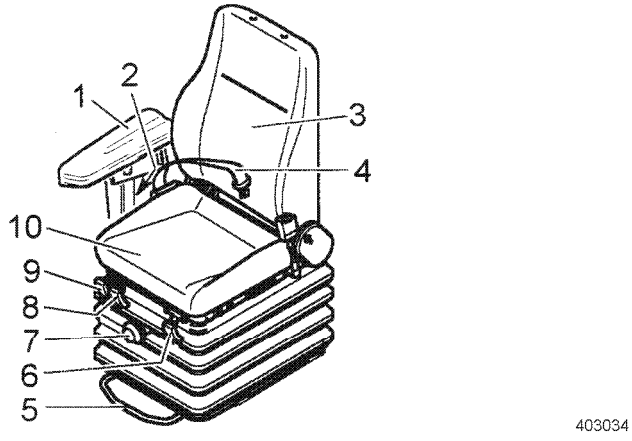
To lock the fully opened door, engage the door retainer 1 in this position.



Release the door retainer

- To release the door retainer: pull the lever 1 forward.

3.2.4 Operator's seat



Operator's seat - main components and control elements

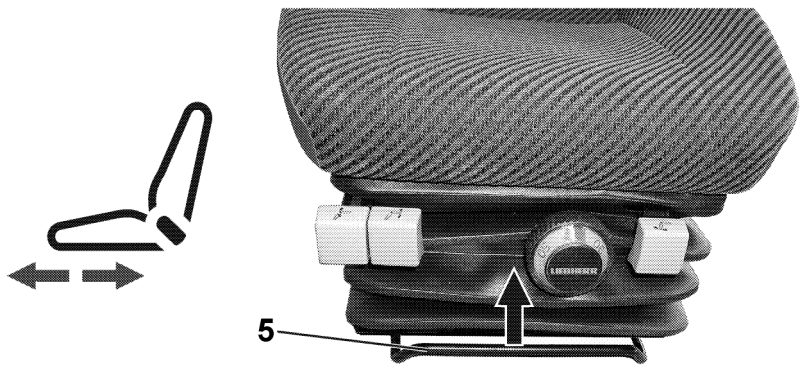
1 Armrest
2 Arm rest adjustment
3 Backrest
4 Seat belt
5 Lever - horizontal adjustment
6 Lever - backrest adjustment
7 Knob - seat suspension
8 Lever - incline adjustment forward
9 Lever - incline adjustment backward
10 Seat surface

Individual adjustment for ergonomic seat position

The operator's seat can be adjusted for optimum operator comfort.

Horizontal adjustment

The seat can be moved forward or backward with the lever 2 on the front of the operator's seat.



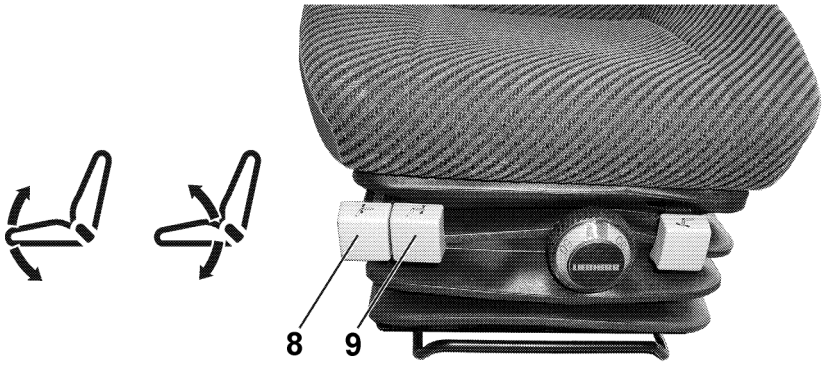
Horizontal adjustment

5 Lever - Horizontal adjustment

- Pull the lever 5 in direction of the arrow.
- Bring the operator's seat to the desired horizontal position and release the lever.

Adjustment of seat surface incline

The adjustment can be made with lever 8 and lever 9 on the right front of the operator's seat.



Adjustment of seat surface, height

8 Lever - incline adjustment to the rear
9 Lever - incline adjustment to the front

- Incline adjustment, rear: Lift lever 8 in direction of the arrow, adjust the incline and release the lever.
- Incline adjustment, front: Lift lever 9 in direction of the arrow, adjust the incline and release the lever.

Adjustment of seat height

The height of the seat can be adjusted with lever 8 and lever 9 on the right side of the operator's seat.

- Lift lever 8 and lever 9 at the same time.
- Raise the seat to the desired height and release both levers.

Backrest adjustment

The incline of the backrest can be adjusted with lever 3 on the left hand side of the operator's seat.

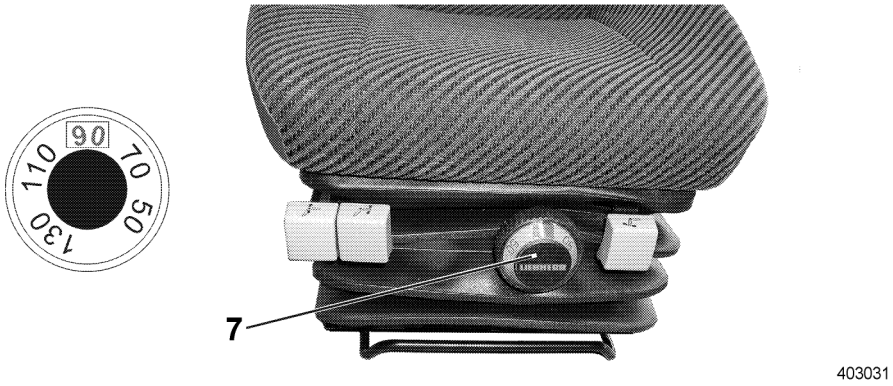
Adjustment - backrest

3 Lever - backrest adjustment

- Lift lever 3.
- Bring the backrest to the desired incline and release the lever.

Adjustment of seat suspension

The seat suspension can be set to the bodyweight of the operator.
The adjustment is made via the knob on the front of the operator's seat.
The knob shows the adjusted weight in kg.



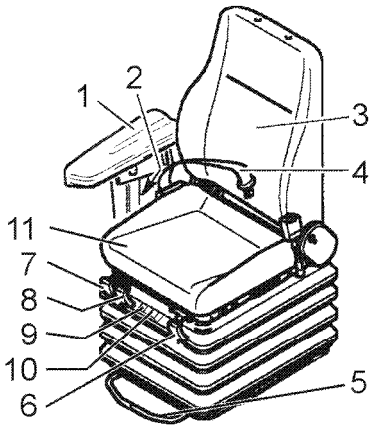
Adjustment - seat suspension

7 Knob - Seat suspension

- Set the body weight of the operator with knob 7.

3.2.5 Operator's seat - air cushioned

(Optional equipment)



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Operator's seat - main components and control elements

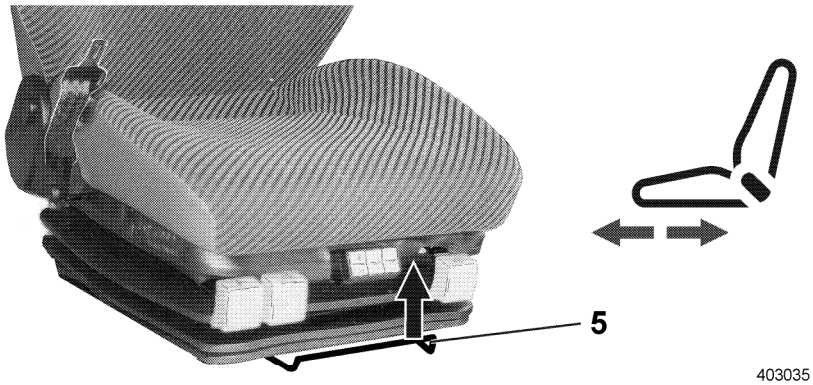
1 Armrest
2 Adjustment - armrest
3 Backrest
4 Seatbelt
5 Lever - horizontal adjustment
6 Lever - adjustment - backrest
7 Lever - incline position - front
8 Lever - incline position- rear
9 Button - seat suspension
10 Button - back support
11 Seat surface

Individual adjustment for ergonomic seat position

The operator's seat can be adjusted for optimum operator comfort.

Horizontal adjustment

The seat can be moved forward or backward with the lever 5 on the front of the operator's seat.



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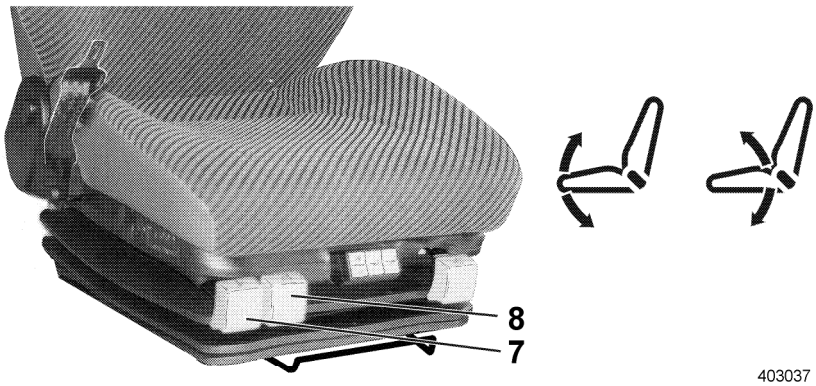
Horizontal adjustment

5 Lever - Horizontal adjustment

- Pull lever 5 in direction of the arrow,
- Set the operator's seat in horizontal position and release the lever.

Seat surface incline

The adjustment can be made with lever 7 and lever 8 on the right front of the operator's seat.



Adjustment - seat surface, height

7 Lever - incline position on the rear
8 Lever - incline position on the front

- Incline adjustment on the rear: Lift lever 7 in direction of the arrow, set the incline and release the lever.
- Incline adjustment on the front: Lift the lever 8 in direction of the arrow, set the incline and release the lever.

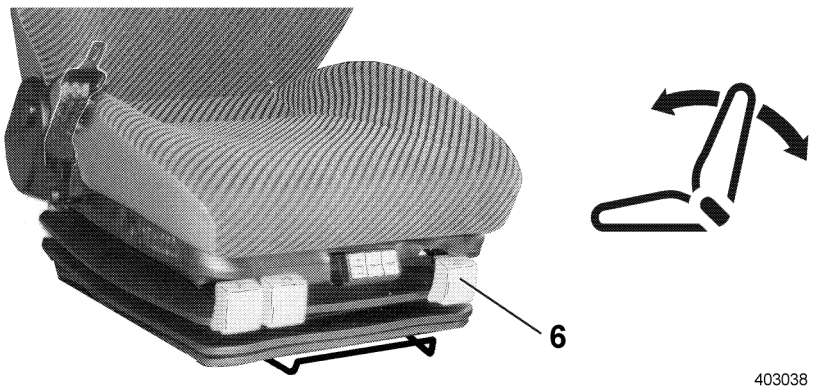
Adjustment of seat height

The height of the seat can be adjusted with lever 7 and lever 8 on the right hand side of the operator's seat.

- Lift lever 7 and lever 8 at the same time.
- Move the seat to the desired height and release both levers.

Backrest adjustment

The incline of the backrest can be set with lever 6 on the left side of the operator's seat.



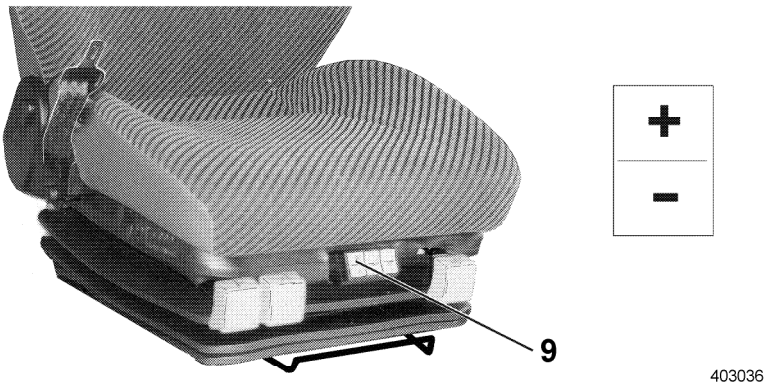
Adjustment - backrest

6 Lever - adjustment - backrest

- Lift lever 6.
- Bring the backrest into the desired incline and release the lever.

Adjust the seat suspension

The seat suspension can be set to the bodyweight of the operator.
The adjustment is made with the button on the front side of the operator's seat.
Press the button in "+" or "-" direction until the desired seat suspension is set.



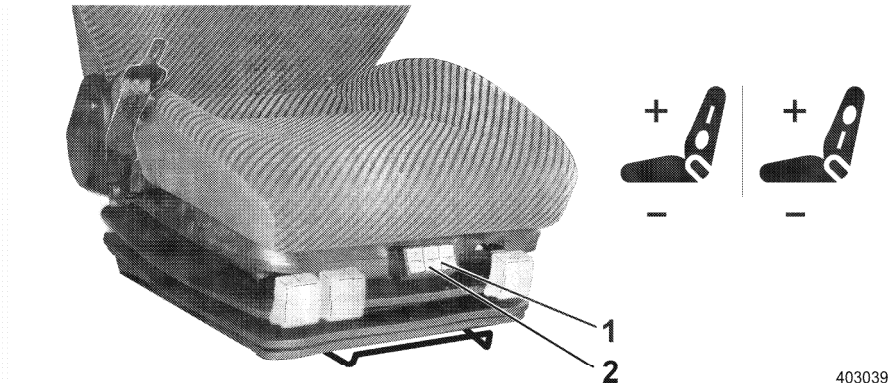
Adjustment - seat suspension

9 Button - seat suspension

- Press button 9 to set the corresponding bodyweight.

Adjustment of back support

The lower back supports in the backrest can be individually adjusted. Two lower back supports are installed in the backrest: one in the upper and one in the lower area of the backrest.
The adjustment is made via buttons 1 and 2.



Adjustment - back support

- Adjust the back support with buttons 1 and 2.

3.2.6 Vibration absorber

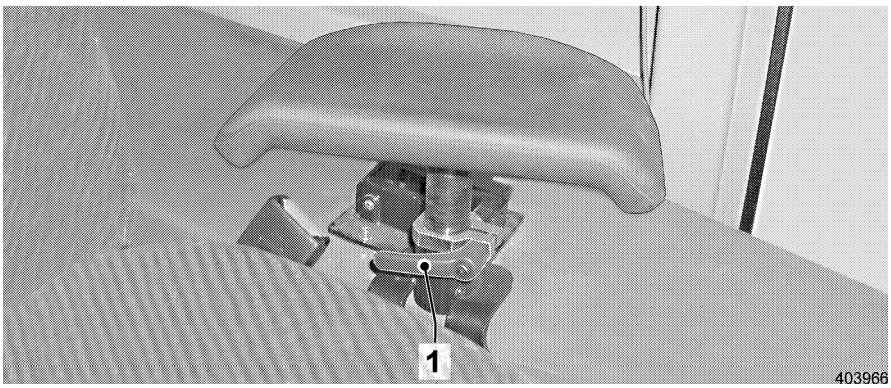
The installed seat conforms to ISO 7096.

If the machine is used as intended, the values of the vibration load are smaller or the same as the test exciter vibration for the corresponding machine class according to ISO 7096.

The values of the vibration accelerations a_{zw}, measured according to ISO 2631-1, therefore meet the requirements for full body vibration protection according to EN 474-1.

3.2.7 Armrests

The height and the horizontal position of the armrests can be individually adjusted.

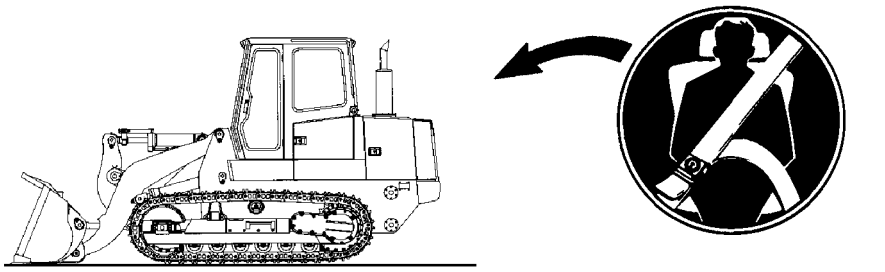


Adjustment - armrest

- Adjustment: release the handle 1, set the height and the horizontal position and lock.

3.2.8 Seatbelt

Observation of safety aspects
The operator's cab of the machine is equipped with a roll over protection - **ROPS.**
The roll over protection - ROPS is only a safety device for the operator, if he wears the seatbelt.
The safety aspects of the seatbelt are described as follows.



Fasten seatbelt

Caution

There is a danger of injuries if the seatbelt is not fastened! If the machine is suddenly slowed down or stopped and the operator did not fasten the seatbelt, he can be seriously injured!

! The operator must always fasten the seatbelt before operating the machine.

Danger

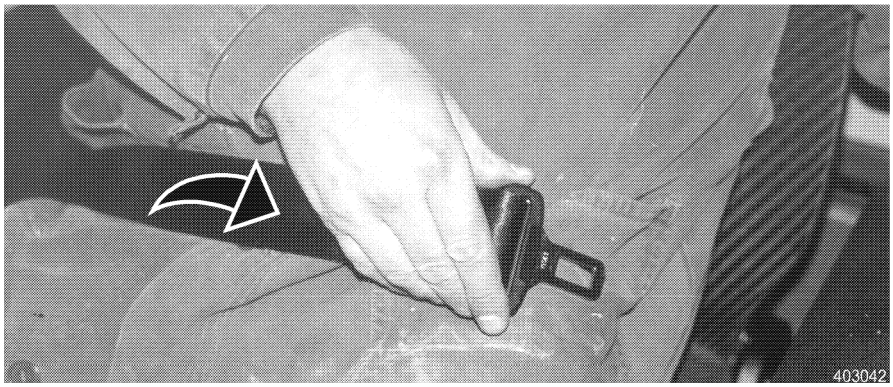
There is a danger of injuries if the seatbelt is not fastened! If the machine tips or rolls over, death or serious injury may occur if the seatbelt is not fastened!

! Always fasten the seatbelt before operating the machine!

- To ensure safety, check the condition, function and mounting of the belt frequently and replace worn, damaged or defective pasts immediately.
- Make sure that the seatbelt is not twisted when in use.

To place the seatbelt

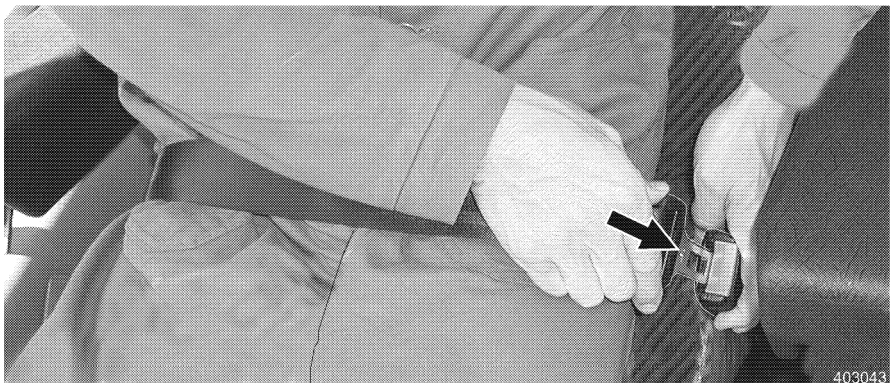
The seatbelt adjusts automatically. The length of the belt does not need to be adjusted.



To place the seatbelt

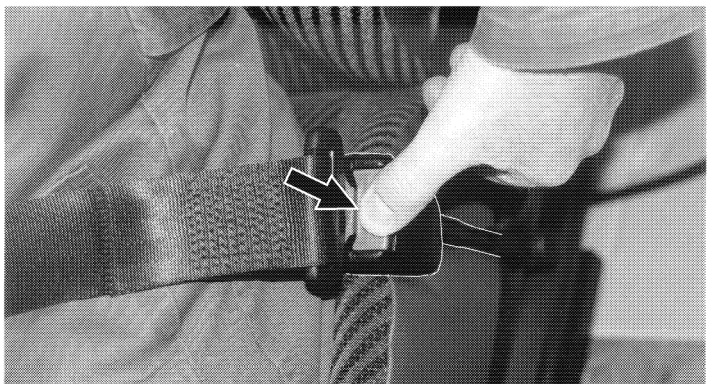
- Hold the belt with the right hand and slowly pull the belt from the housing.

NOTE: If the seatbelt is pulled out too quickly, the retainer will lock up the belt.



To close the seatbelt

- Hold the lock with the left hand and pull the belt over your lap.
- Insert the belt into the lock to engage. Pull the belt to make sure it is locked.



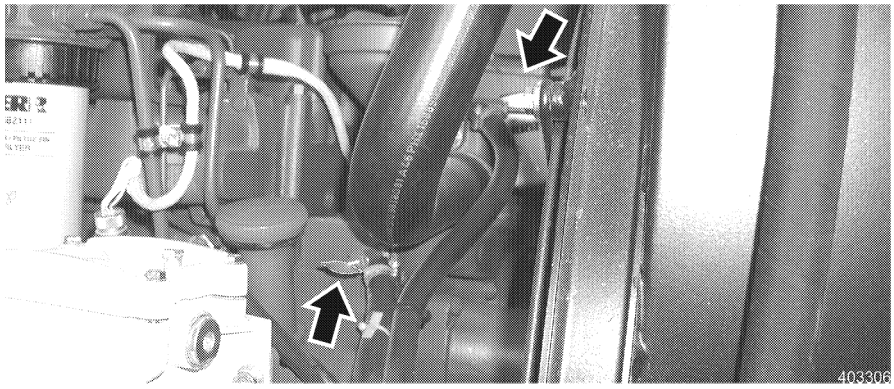
To release the seatbelt

Release the seatbelt

- To release the seatbelt: push the button on the lock downward with your thumb.

3.2.9 Heater, ventilation

The operator's cab is equipped with a warm water heater. The operator's cab can also be equipped with an air conditioning system, if desired.

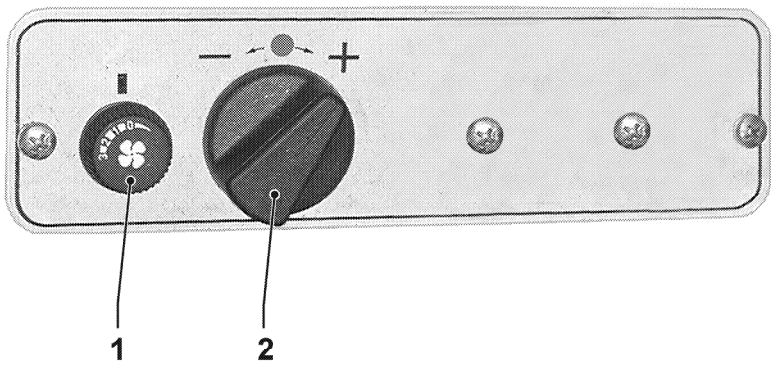


Shut off valves

The operator's cab can only be heated if the Diesel engine is at operating temperature and the shut off valves are open.

To turn the heater on / off

Control elements on the heater:
1 - Knob - Fan
2 - Regulating knob - Temperature

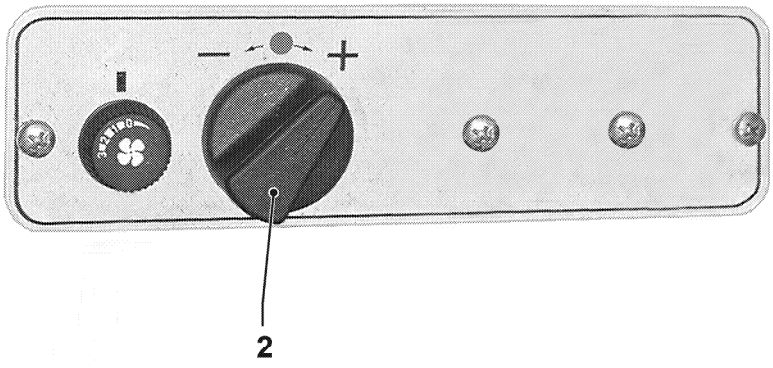


Heater control elements

Make sure that
– the electrical system on the machine is turned on,

– the air vents are open to direct the air flow, as desired, to the body, to the front window or to the rear window.

- To turn the heater on: Turn the knob 1 to stage 1. The air flow is blown into the operator's cab via the air vents.



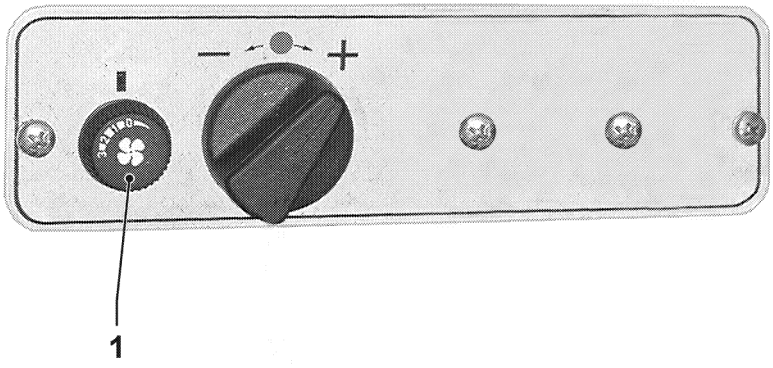
Temperature regulator

The temperature can be regulated steplessly: Turn the regulating knob 2 in clockwise direction for warm, in counter clockwise direction for cold.

- To regulate the temperature: Turn the regulating knob 2 in the desired direction.

To regulate the blower

Turn the blower on or off with knob 1.



Blower - knob

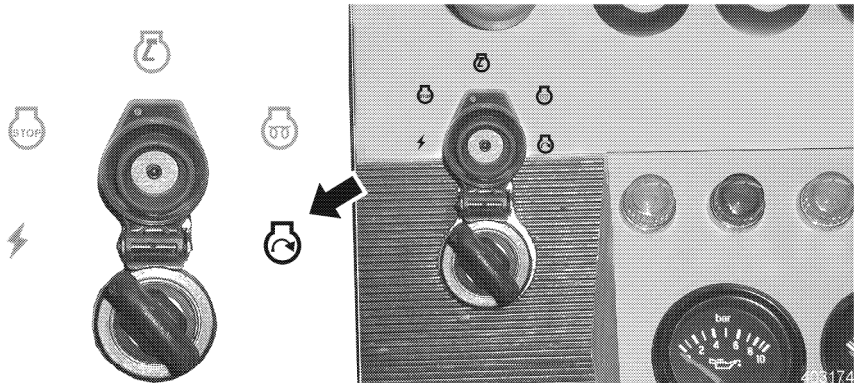
Blower stages:
Stage 0 - position - OFF
Stage 1 - slight air flow
Stage 2 - medium air flow
Stage 3 - strong air flow

- Turn the knob 1 to the desired setting.

The air flow is blown via the air vents into the operator's cab.

3.2.10 Air conditioning system

To ensure the function of the air conditioning system, we recommend to turn the system on at least once every 2 weeks.
The shaft seal ring in the compressor is lubricated during operation of the air conditioning system to prevent refrigerant leakage from the compressor.
On damp days, the air conditioner can be used to dehumidify the air in the cab (operator the heater and air conditioner).
Then use the heater to compensate the cooling to obtain a comfortable temperature setting and to prevent the windows from fogging up.

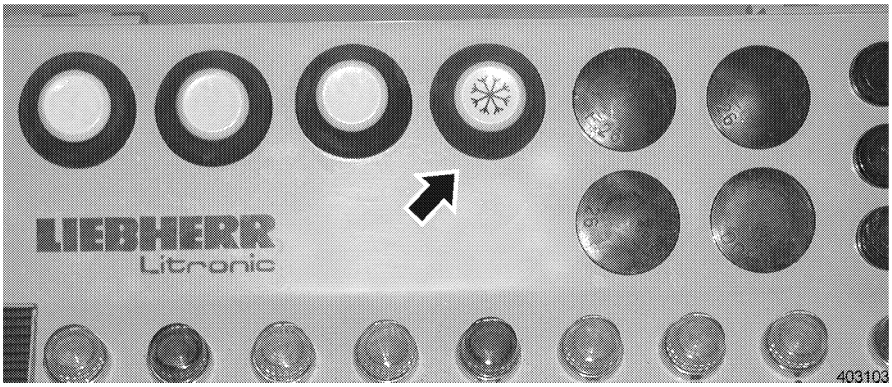


Start the Diesel engine

Turn on the air conditioning system

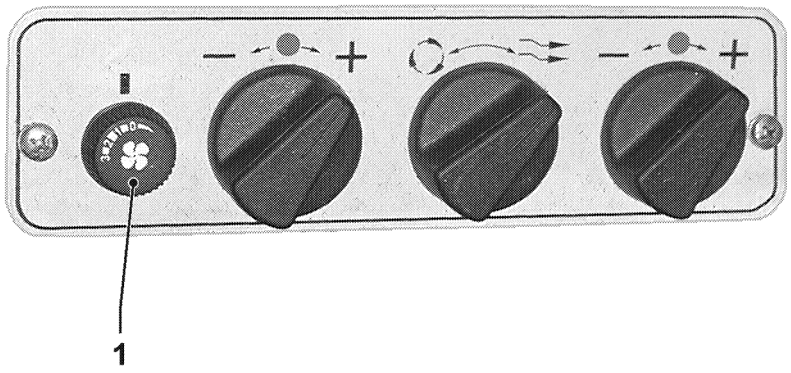
The air conditioning system can only be operated if the Diesel engine is running.

- Start the Diesel engine.



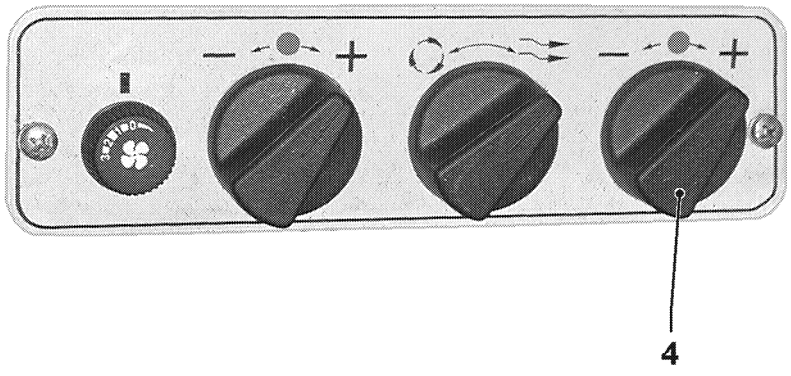
Main air conditioner switch

- Push the main air conditioner switch on the instrument panel.



Blower switch

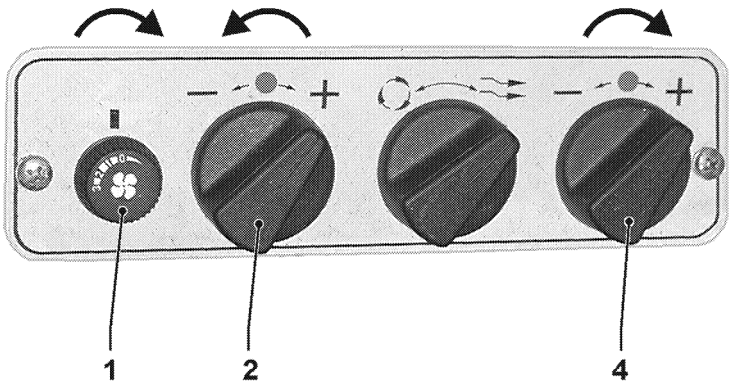
- Set the blower switch at least to stage 1.



Regulating knob - Air conditioning system

- Select the desired temperature with the regulating knob for the air conditioning system.

Turn the knob in clockwise direction to increase the output of the air conditioning system, the temperature in the operator's cab drops.
The higher the cooling output is set, the higher the blower stage setting must be set.
Due to the integrated de-icing protection, the evaporator will not ice up.



Air conditioning system - full power

Air conditioning system - full power

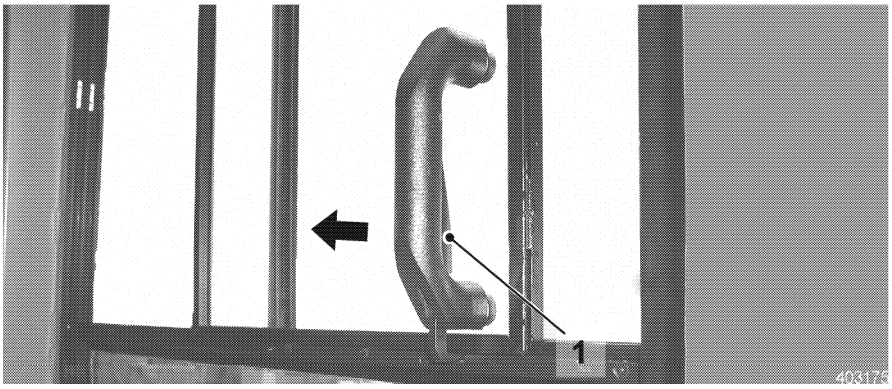
The greatest cooling output is reached:

- By turning the regulating knob for the air conditioning system in clockwise direction to the stop.

- Set the highest blower stage.
- Turn the heater off.
- Close the windows.

3.2.11 Sliding window

The sliding windows in the operator's cab can be opened by pulling the handle and locked in position at several points.



To open and close the sliding window

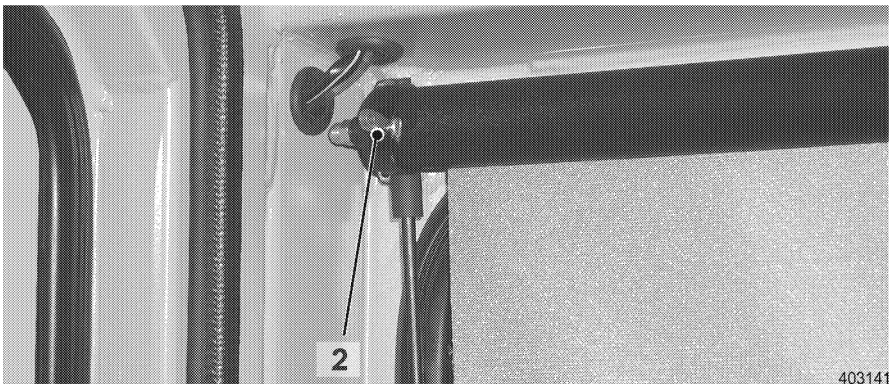
- Push the lever 1 on the handle and move the sliding window to the desired position.

Lock the window in the notches on the window frame.

3.2.12 Sun shade

Adjustment of sun shade

The operator's cab is equipped with a sun shade.



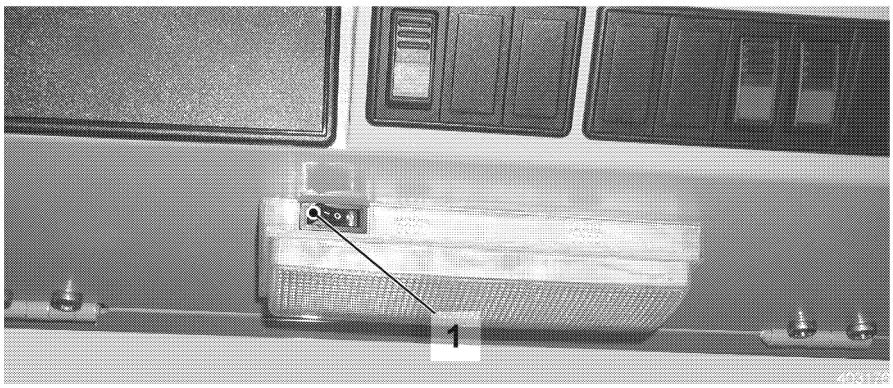
Adjustment - Sun shade

- Adjust the sun shade by pulling it down to the desired level.
- To roll up, pull the lever 2 on the left hand side of the sun shade down.

3.2.13 Cab interior lighting

Turn the interior lights on / off

The interior light is located in the roof of the operator's cab, to the right of the operator's seat.



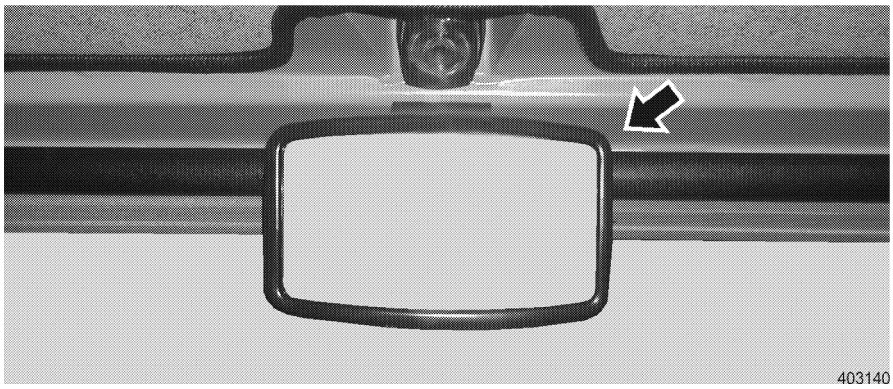
Interior light

- Turn the interior light on / off: press switch 1.

3.2.14 Rear view mirror

Adjustment of mirror

The operator's cab is equipped with a rear view mirror.



Adjustment - mirror

- Adjust the mirror before operating the machine.

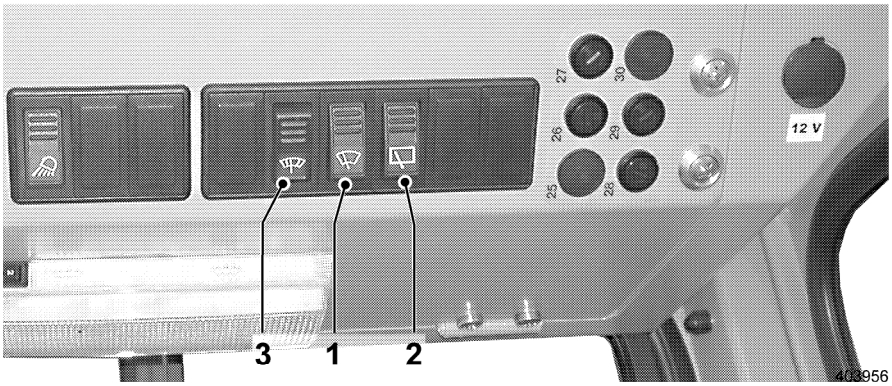
3.2.15 Electric windshield wiper and washer system

The machine is equipped with an electric windshield washer system for the front and rear window.
It consists of control elements, windshield wipers, reservoir and nozzles for the windshield washer fluid.
Make sure that the electrical system of the machine is turned on before operating the windshield wiper and washer system.

Operation of windshield wiper and washer system

The windshield wiper system can be operated with switches 1 and 2.

Press switch 3 to use the windshield washer system and the intermittent wipe control.



Switch - Windshield wiper and washer system

1 Switch - Windshield wiper, front window
2 Switch - Windshield wiper - rear window
3 Switch - Intermittent control / windshield washer system

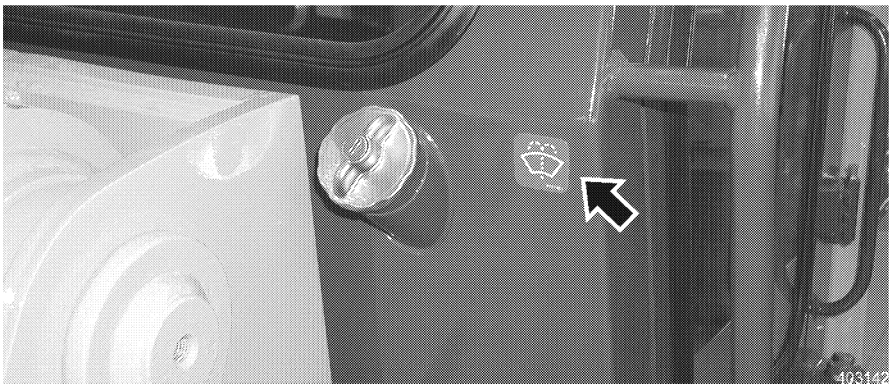
- To wipe the window: Press switch 1 or 2. The selected windshield wiper will be activated.
- Windshield wiper - intermittent control: Move switch 3 to stage 3 (press on bottom). The windshield wiper, turned on with switches 1 or 2, is changed over from continuous wipe to intermittent wipe.
- To wash the window: Press switch 3 on top and hold down.

The windshield washer fluid is sprayed onto the front and rear window through the nozzles.

- To turn the windshield washer system off: Release switch 3.
- To turn the windshield wiper - intermittent control off: Set switch 3 to center position.
- To turn the windshield wiper system off: Press switch 1 or 2 on the rear.

3.2.16 Reservoir for windshield washer fluid

The reservoir is integrated on the front in the operator's cab.



Reservoir - windshield washer fluid

To add windshield washer fluid

- Open the cover.
- If necessary, add commercially available windshield washer fluid.

For fill quantity, see "Lubricants and service fluids".

Caution

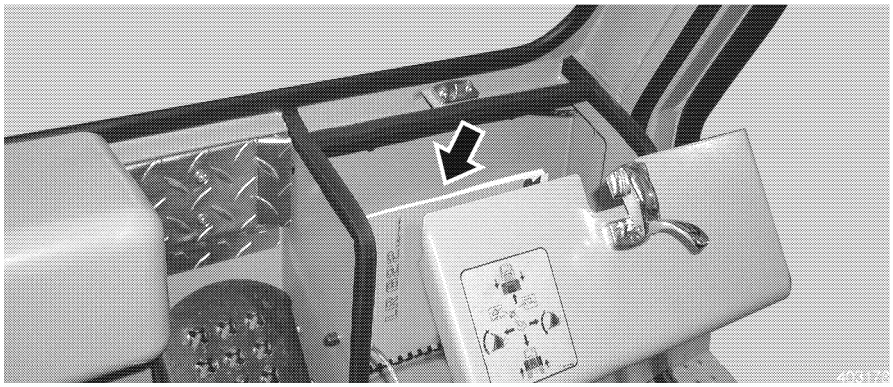
The windshield wiper and washer system can be damaged if it freezes! Due to the ice formation, the windshield wiper and washer system can be damaged or fail. If the front or rear window is not cleaned, it poses a safety risk, wich is an increased danger!

! For that reason, the windshield wiper and washer system must be protected from freezing!

- Use commercially available window antifreeze fluid.
- Before the start of the cold season, add the correct amount of windshield antifreeze fluid.

3.2.17 Compartment for documentation

A compartment for the machine documentation has been installed on the front in the operator's cab.



Compartment for documentation

To open the compartment for documentation

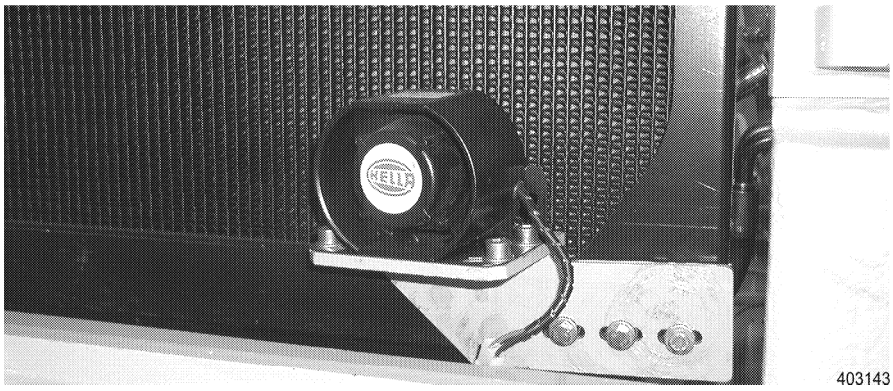
- Pull the lever on the quick lock upward and open the cover.

One set of the machine documentation (Operating Manual, spare parts list) should always be available in the compartment.

One set of the documentation is part of the machine!

3.2.18 Back-Up Alarm

(Optional equipment)

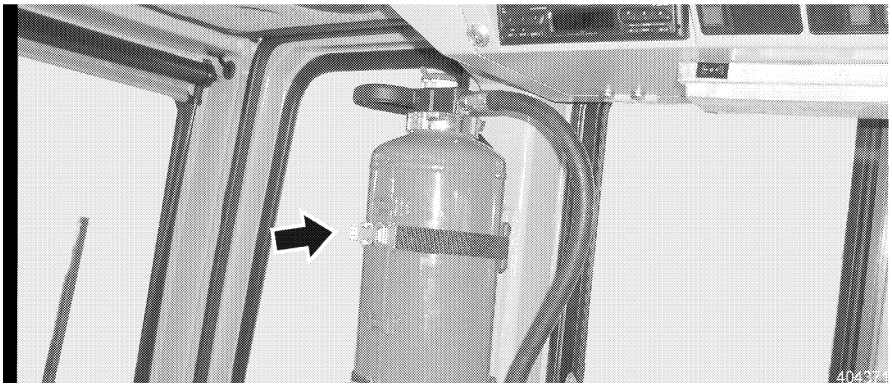


Backup alarm

The backup alarm can be heard if the travel joystick is moved to "reverse travel" position.
– The horn warns personnel behind the machine.
The backup alarm is in the rear of the machine, the sound level is set automatically.

3.2.19 Fire extinguisher

(Optional equipment)



Location of fire extinguisher

Location of fire extinguisher

A mounting location is available for retrofit installation of a fire extinguisher on the right hand side on the cab arm.

- For the installation kit of the fire extinguisher, contact your Liebherr dealer.

3.2.20 Beacon

(Optional equipment)
Your machine is also prepared for the retrofit installation of a beacon.

- For the installation kit of the beacon, contact your LIEBHERR dealer.

3.3 Operation

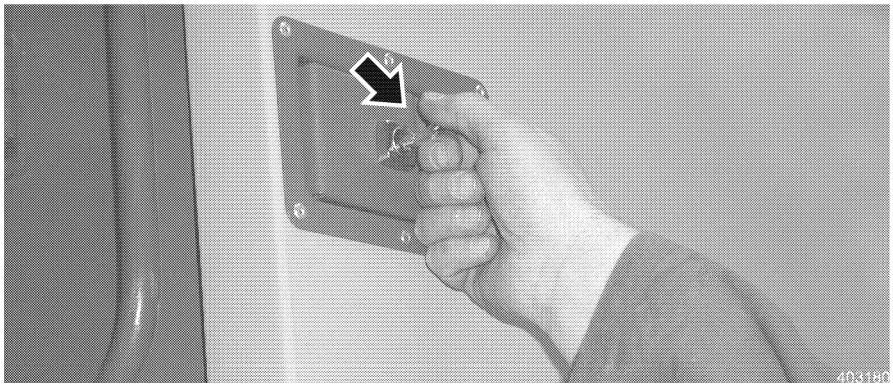
3.3.1 Daily operation

Before operating the machine, make sure to carry out the "Maintenance tasks for every 8 - 10 operating hours". See "Maintenance and inspection schedule".
After completion of the "Maintenance tasks for every 8 - 10 operating hours", bring the machine in operating position, see paragraph "Operating position".
Make sure that the

- "Maintenance tasks for every 8 - 10 operating hours" have been completed before putting the machine in service for its daily operation.
- fuel tank is full. See paragraph "Add Diesel fuel".

Operating position

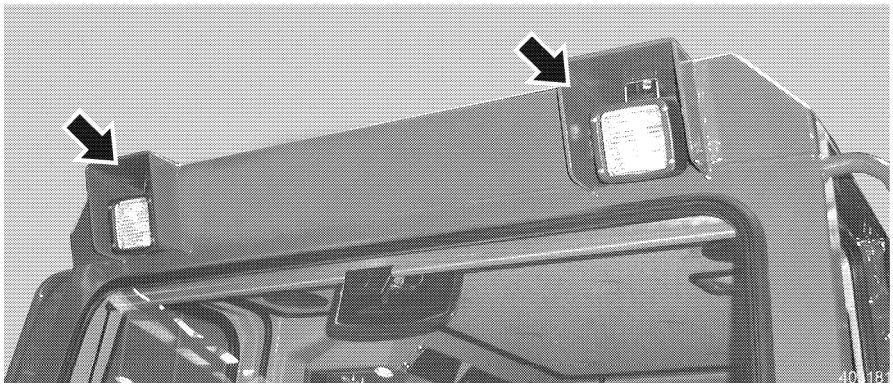
To bring the machine in operating position, proceed as follows.



Doors - lock

Close all service doors, compartments and hoods

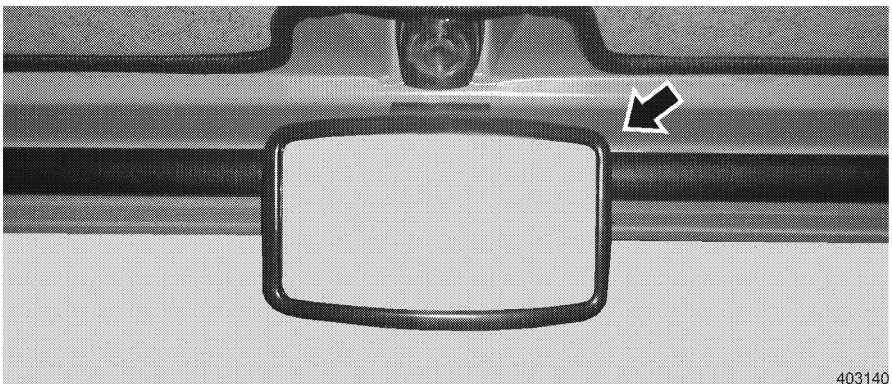
- Close all service doors, compartments and hoods and lock, if possible.



Adjustment of floodlights

Check the lighting system

- Check the lighting system.
- If necessary, adjust the floodlights.

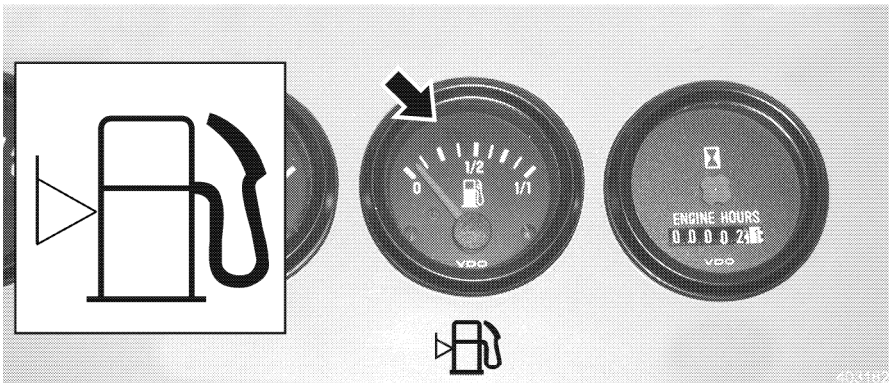


Rear view mirror

Adjust the rear view mirror

- Adjust the rear view mirror.

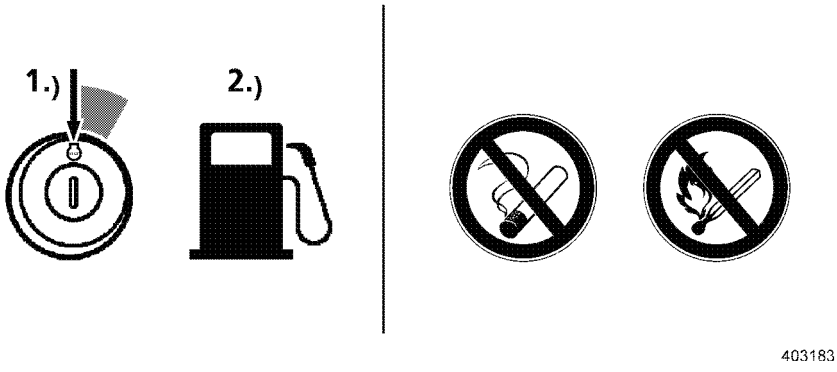
Add Diesel fuel



Fuel gauge

Fuel gauge

- Set the starter switch to contact position.
- Check the fuel gauge to ensure that sufficient Diesel fuel is in the tank.



Refueling safety

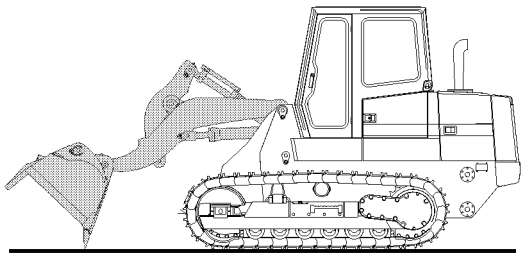
Danger

When adding fuel, there is a danger of fire and explosion.
! Do not smoke and do not allow an open flame in refueling areas.
! The Diesel engine must be turned off before refueling.

- Make sure to observe all safety regulations for refueling. See also the chapter regarding Safety Guidelines.

Danger

There is a danger of injuries due to the raise attachment.
! Lower the attachment into maintenance position.
! Never work under the raised attachment!



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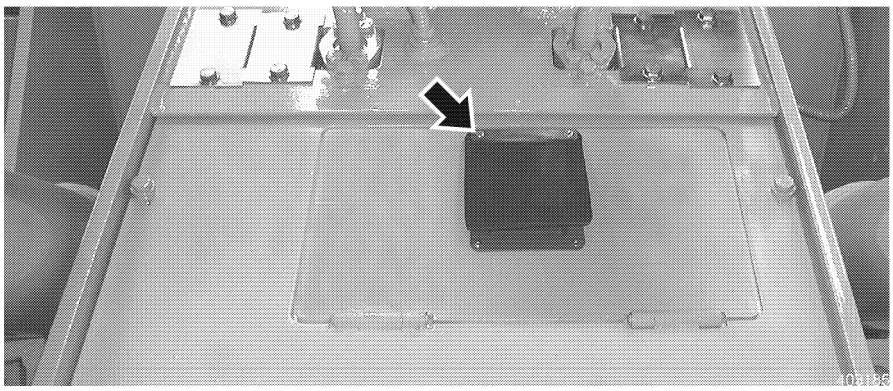
Front attachment - maintenance position

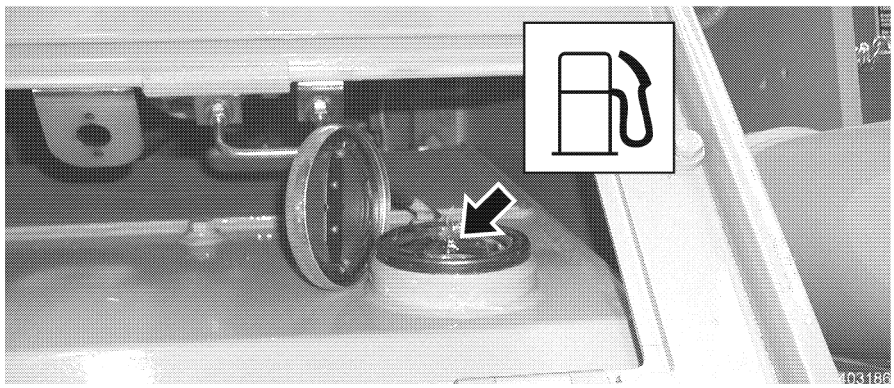
Maintenance position

- Lower the attachment to maintenance position. Set the bucket completely tilted out, with the blade onto the ground.



Tank cover

- Open the fuel tank cover.



Tank cover

- Remove the tank cover.
- Add only clean Diesel fuel.

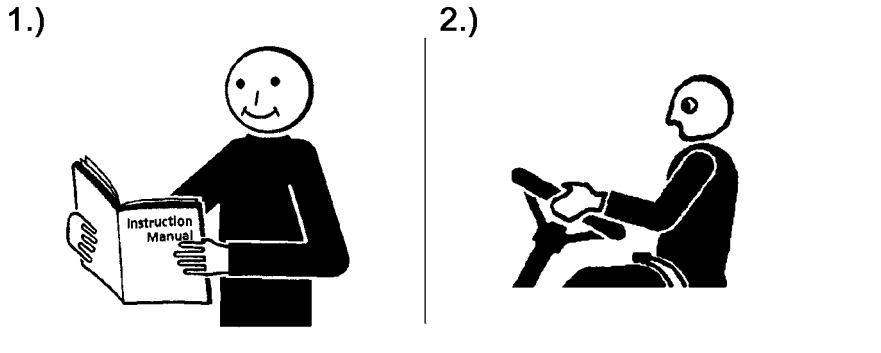
– Add Diesel fuel only via the installed strainer.

To avoid condensation in the fuel tank, maintain a high fuel level at all times. Add fuel at the end of the day or after a shift change.

3.3.2 Machine operation in low ambient temperatures

Your machine can be operated without additional special equipment to an ambient temperature of -25°C .
If the ambient temperatures remain constantly below -25°C, then special equipment should be installed to ensure proper operation.
When using the machine below -25°C, contact your LIEBHERR service or the manufacturer directly.

3.3.3 Start the Diesel engine



Operating manual

1.) read and understand
2.) travel and work
Operate the machine only if you have read and understand the Operating manual!

Notes for machine travel drive:
– The machine is equipped with a hydrostatic travel drive.
– The Diesel engine cannot be started by pushing or towing the machine.

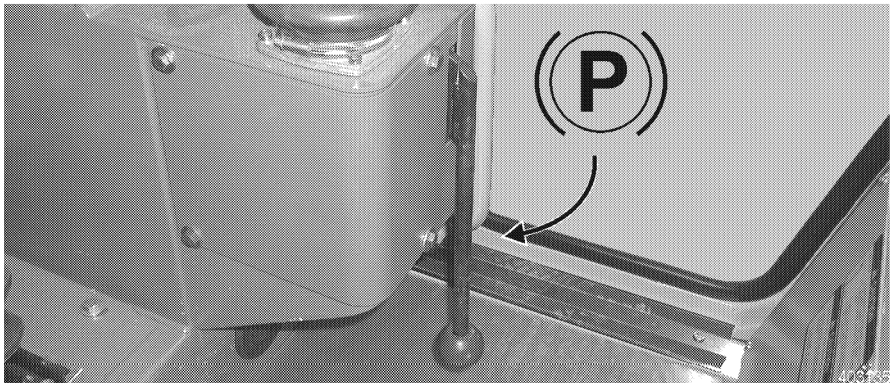
Preparations before starting the machine

Before starting the machine, make the following preparations.

Make sure that the machine is in operating position.
See paragraph "Operating position".

Caution

– The engine can only be started if the safety lever is in the full down position.
– If the engine starts if the safety lever is in another position, then this defect must be fixed before machine operation.

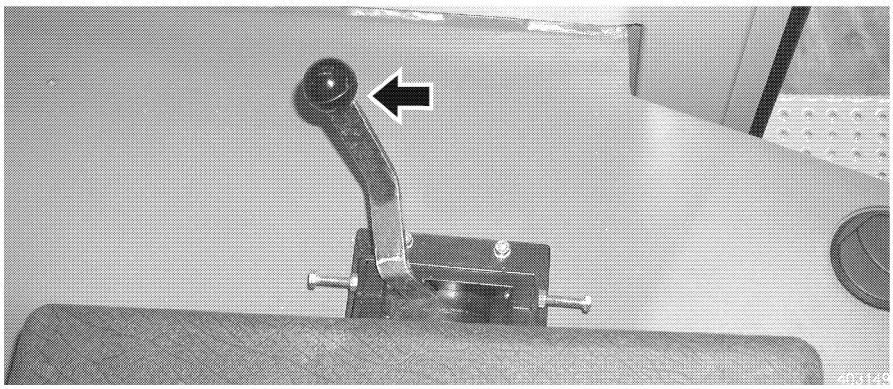


Safety lever down

• Move the safety lever down.

Check the travel joystick position

• The travel joystick must be in neutral position.



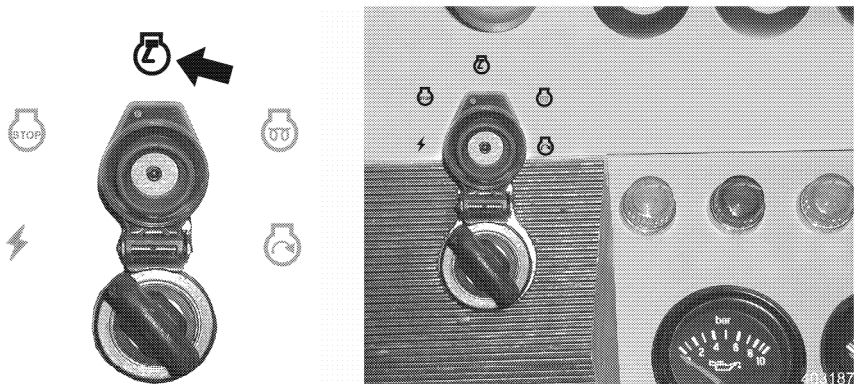
Throttle control lever - full load

• Set the throttle control lever to full load.
– Pull the throttle control lever to the rear.
! After the starting procedure, move the throttle control lever immediately to low idle and let the Diesel engine warm up for a short time before subjecting it to a full load. Do not place a full load on a cold Diesel engine!

Starting procedure

Check the indicator lights

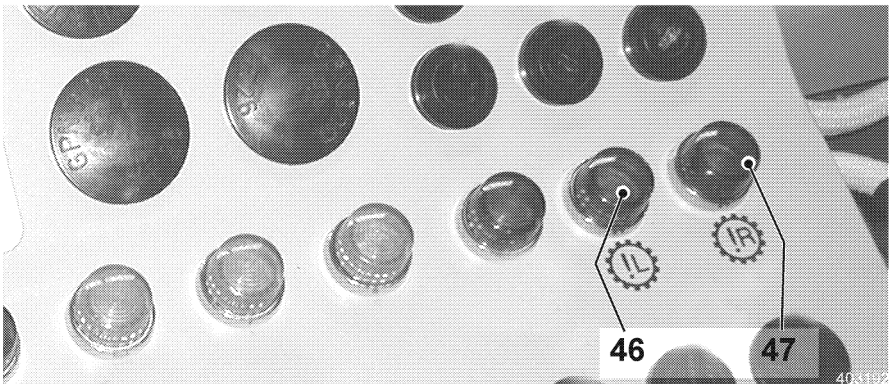
With the starter key in contact position, the indicator lights are checked by the control electronic.



Starter switch – contact position

- Turn the starter key to contact position.

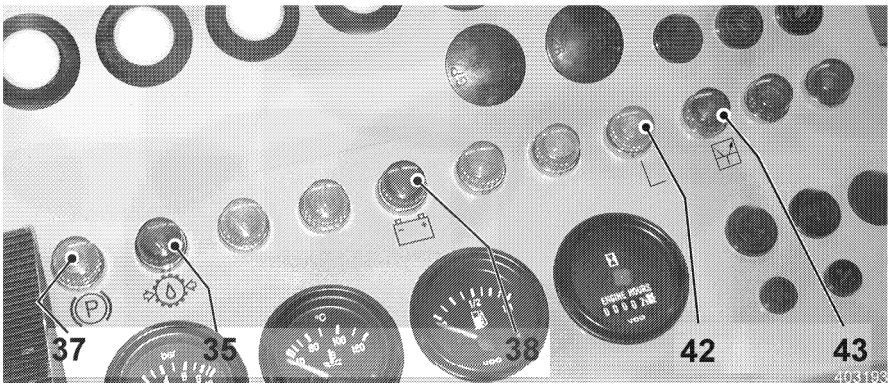
The following indicator lights light up for a short time (duration 2.5 - 3 sec.).



Indicator lights

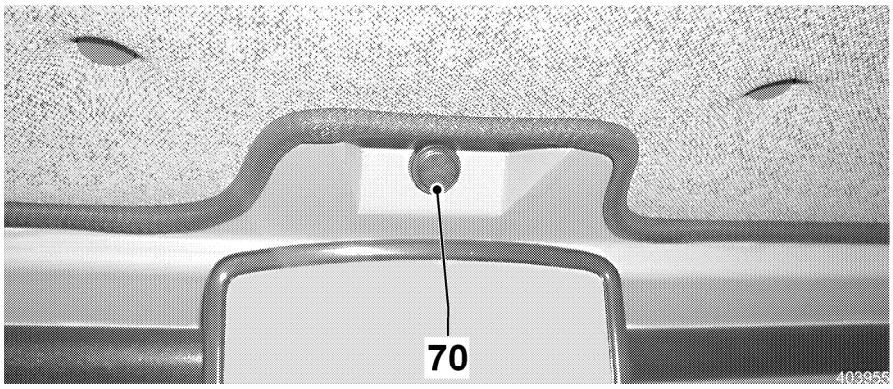
46 Indicator light – Lifetime seal area, left
47 Indicator light – Lifetime seal area, right

The following indicator lights must still be on:



Indicator lights

35 Indicator light – pump replenishing pressure
37 Indicator light – travel brake
38 Charge indicator light
42 Indicator light – low speed range
43 Indicator light - electronic



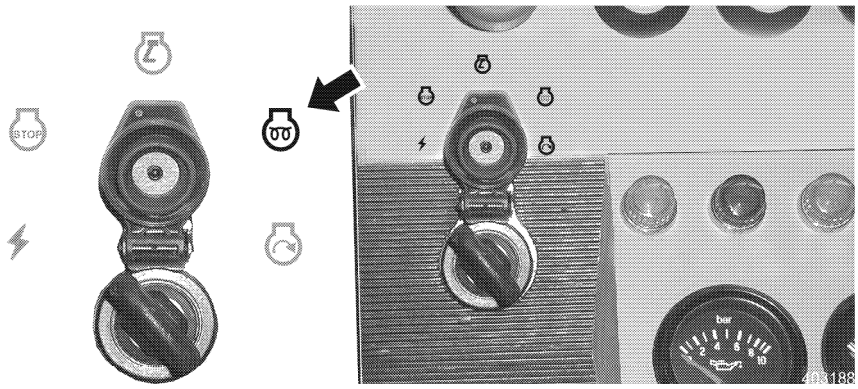
Warning light - cab

The warning light – cab 70 blinks.

Preglow the engine

The preglow time depends on the ambient temperature and the electric starting conditions.
It is approx. a minimum of 20 seconds and can be more than 120 seconds in extremely low ambient temperatures.
If the Diesel engine is already warm and in high ambient temperatures, it is not necessary to wait for the preglow time to end!

Note: Do not preglow if the Diesel engine is already at operating temperature!

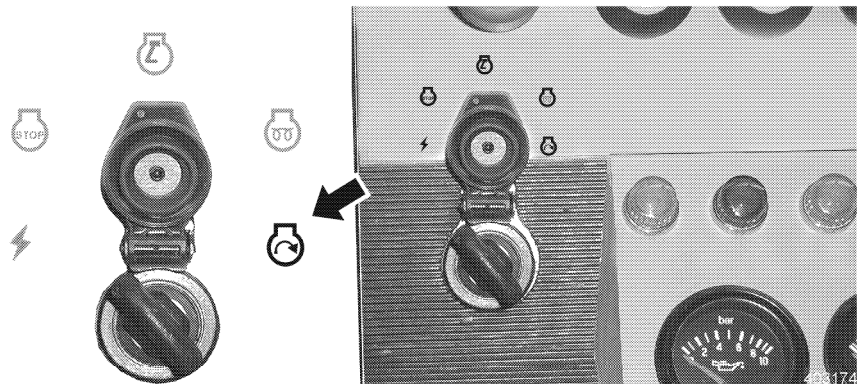


Starter switch – preglow position

Start the engine

- Wait until the indicator light – preglow system turns off. The preglow time has ended when the indicator light turns off.

– The engine is ready to start.



Starter switch – starting position

- Turn the starter switch to starting position and hold it in this position until the engine starts.
- Do not hold the switch in this position for more than 10 seconds.

If the engine does not start:

- Turn the starter switch back to zero position.

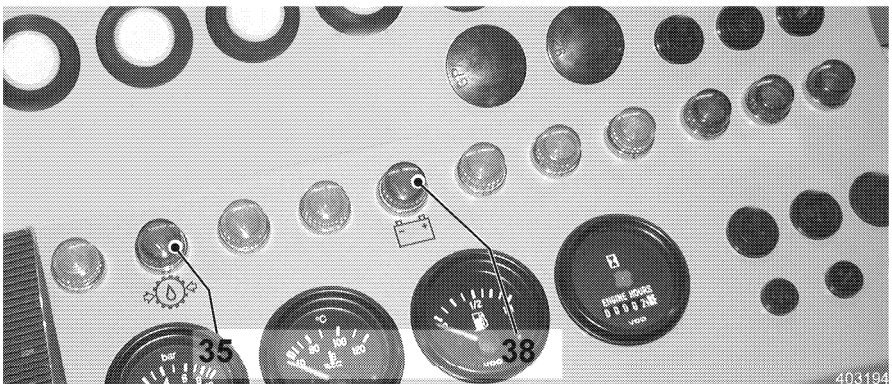
Troubleshooting

The engine does not start?

- Wait for 120 seconds before repeating the starting procedure.
- If the engine is not running after two starting procedures, check the troubleshooting chart to find the problem and fix it (see paragraph "Operating problems").

- As soon as the engine is running, release the starter switch. The switch returns to operating position by itself.

When the engine is running, the following indicator lights must turn off:



Indicator lights turn off

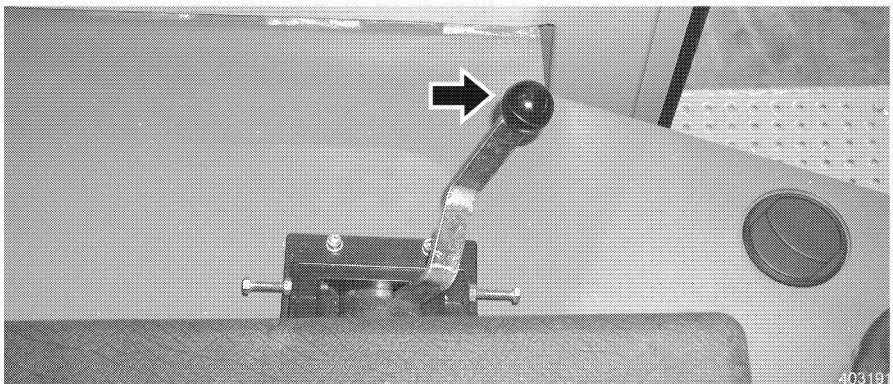
35 Indicator light – pump replenishing pressure
38 Charge indicator light

Warning light - cab

Troubleshooting

The indicator lights do not turn off?

- Turn the engine off and remedy the problem, see paragraph "Operating problems".



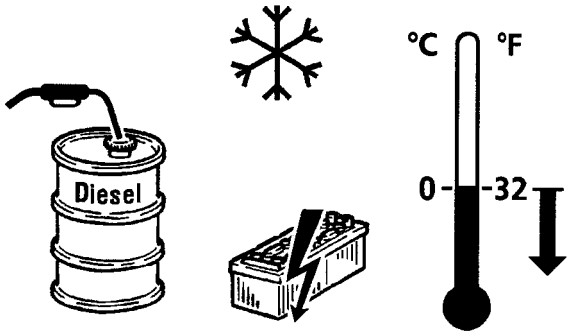
Throttle control lever - low idle

- Regulate the engine RPM via the throttle control lever.

– Wait until the engine is at operating temperature before subjecting it to a full load.

Preparations for starting the engine in freezing temperatures

The following preparations improve the starting behavior in low temperatures.



Winter operation

Preparations:

– Check the battery charge, if necessary, recharge the battery.

– Use Winter fuel. See paragraph "Lubricants and service fluids" for Winter operation.

Danger

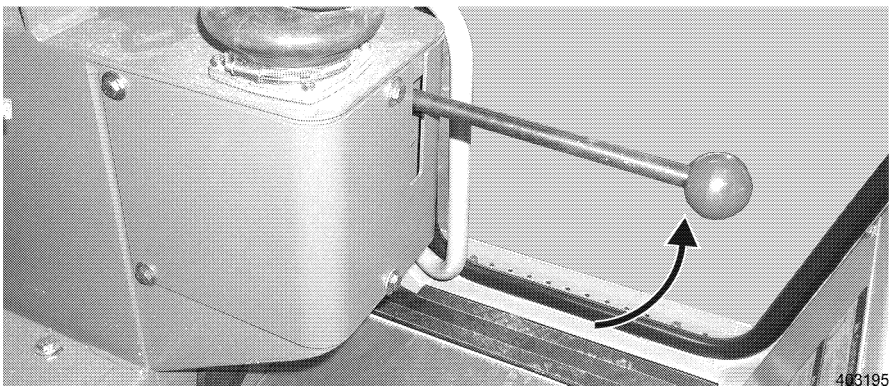
There is a danger of engine explosion!
When using ether-based starting aids to start Diesel engines with preglow systems, there is a danger of explosion!
! Do not use ether based starting aids.

- The listed preparations to start the Diesel engine in low temperatures must be carried out.

3.3.4 Travel operation

Preparations for travel operation

The preparations for travel operation must be carried out in the given sequence.
Make sure that the machine is in operating position.
See paragraph "Operating position".



Safety lever up

- Raise the safety lever.

Self check of electronic system

- After approx. 3 seconds, the indicator light - reduced travel speed turns on momentarily.

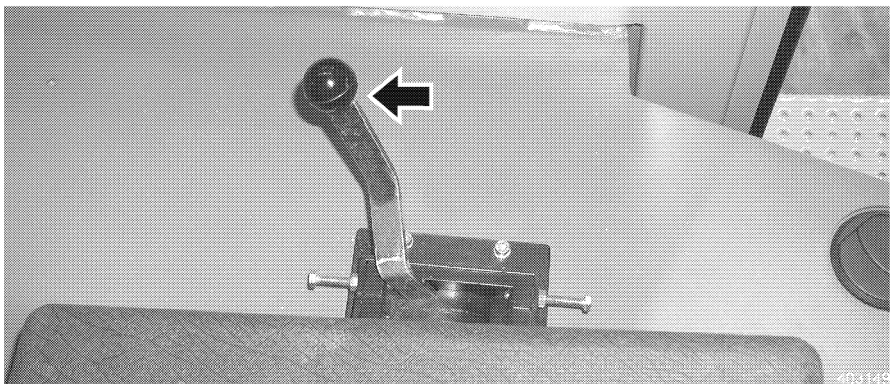
– Do not deflect the travel joystick until the indicator light - reduced travel speed lights up. The electronic system carries out a self check.

The machine is now ready to travel.

Operating temperature

If the hydraulic oil is too cold, the machine is sluggish.

– Bring the hydraulic oil to operating temperature by repeatedly actuating the working hydraulic.



Throttle control lever - full load

- Set the throttle control lever to full load.

– Always work with the machine at full engine RPM. In some cases, the machine may be operated at reduced engine speed.

Preselection of speed ranges

The machine is equipped with a push button switch in the cab to control the travel speed.

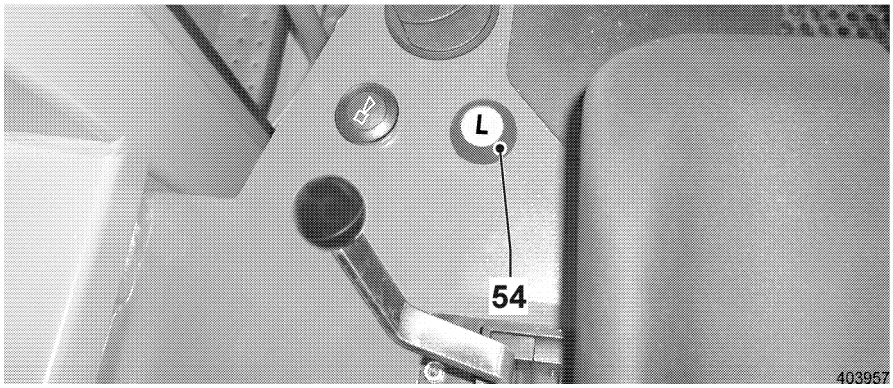
Caution

If the machine is used constantly in dozing operation and on slopes, switch to the low speed range.

In neutral position (not shifted), the travel speed can be varied between 0 and 11 km/hr. (forward and reverse).

Low speed range

By pushing the switch, the travel speed is limited to a range between 0 and 6.5 km/hr. (forward and reverse).



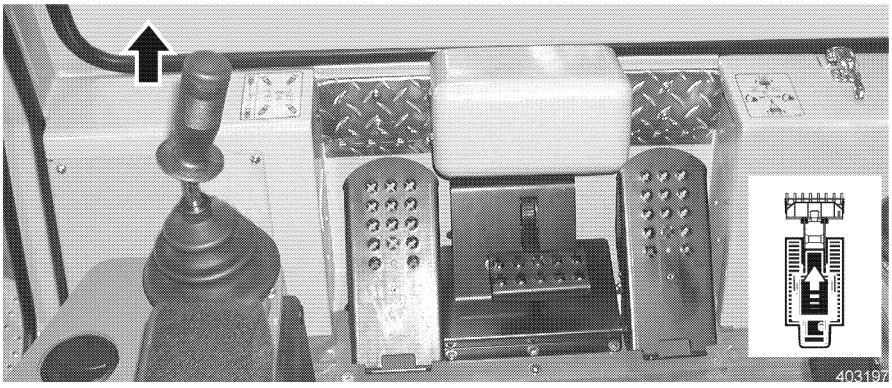
Low speed range

- Press button - low speed range 54.

– The indicator light - low speed range 42 lights up.

3.3.5 Travel

Straight travel



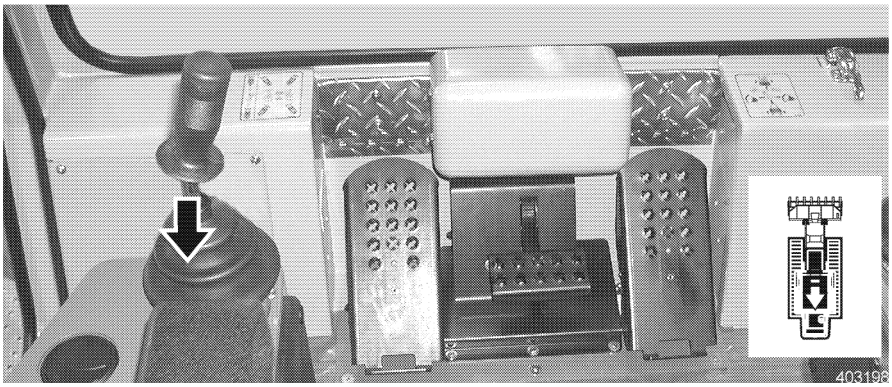
Forward travel

Forward travel

- Push the travel joystick slowly forward.

– The machine drives forward.

The further the travel joystick is pushed forward, the higher the travel speed.



Reverse travel

Reverse travel

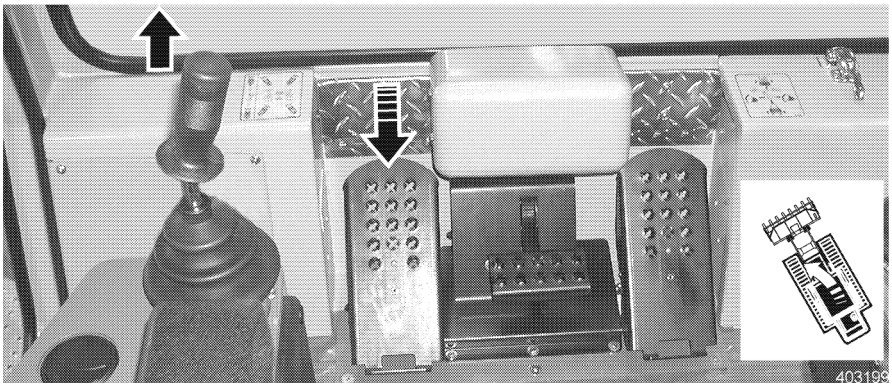
- Slowly pull the travel joystick back.

– The machine drives back.

The further the travel joystick is pulled back, the higher the travel speed.

Other steering maneuvers

In addition to forward and reverse travel, any desired steering movement can be carried out, at variable speeds.



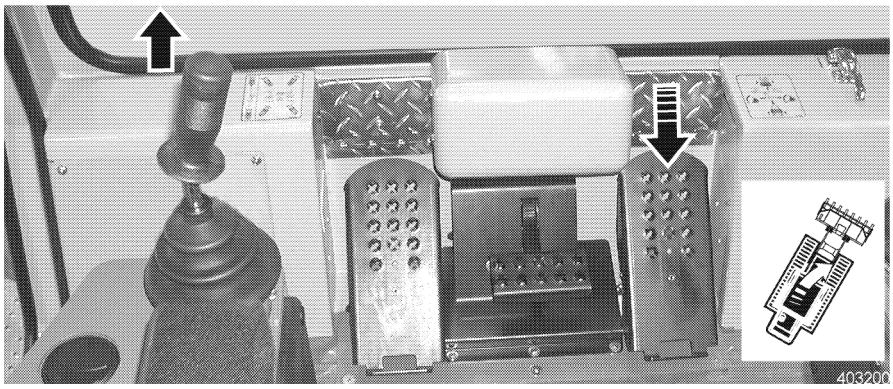
Left hand turn

Left hand turn

- Deflect the travel joystick to the front and press down on the left steering pedal.

– The machine moves forward at a slight left hand turn, both chains are moving.

The further the left steering pedal is pressed down, the tighter the curve.



Right hand turn

Turn to the right

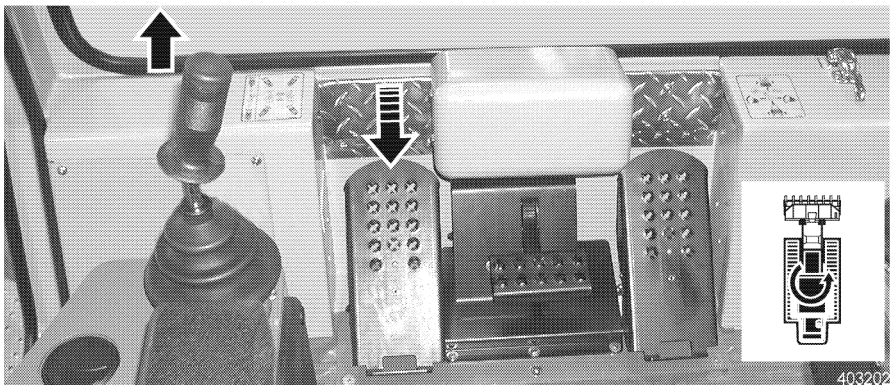
- Deflect the travel joystick to the front and press down on the right steering pedal.

– The machine moves forward at a slight right hand turn, both chains are moving.

The further the right steering pedal is pressed down, the tighter the curve.

Counterrotation

During counterrotation, the two chains turn in the opposite direction.
The counterrotation speed depends on the deflection of the travel joystick.

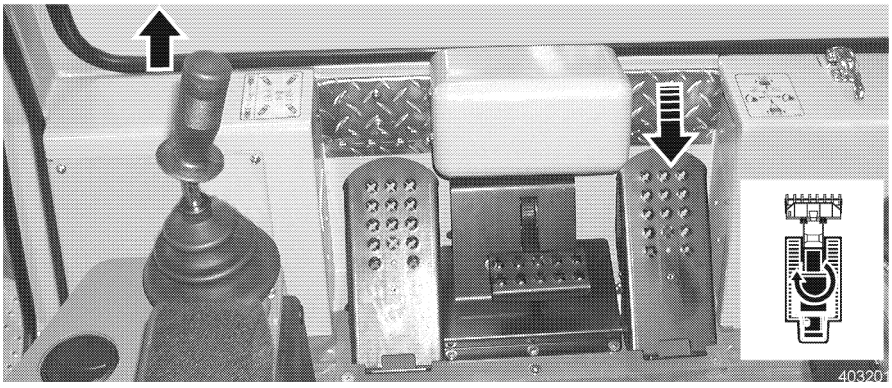


Left hand turn

Pivot turn to the left

- Press the left steering pedal all the way down.
- Push the travel joystick to the front.

– The machine turns to the left.



Right hand turn

Pivot turn to the right

- Press the right steering pedal all the way down.
- Push the travel joystick to the front.

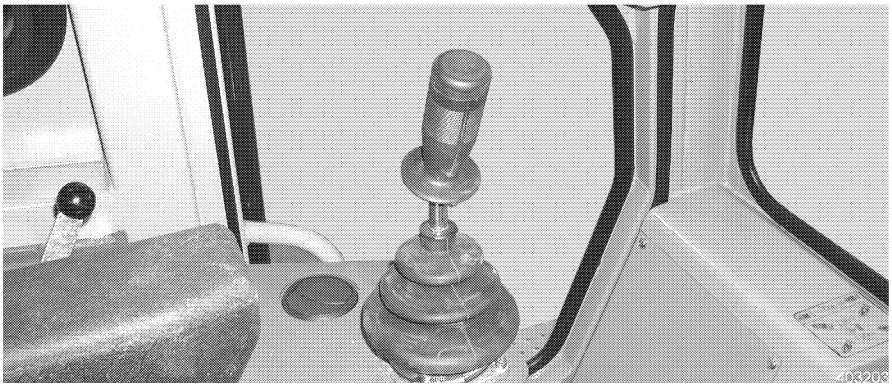
– The machine turns to the right.

3.3.6 Brakes

Travel joystick

Braking with the travel joystick

The hydrostatic travel drive on the machine also acts as an operating brake.
If the travel joystick is moved back in direction of neutral position, the travel speed is reduced in the same ratio.



Travel joystick - Neutral position

- Set the travel joystick to neutral position.

If the travel joystick is in neutral position, the hydrostatic drive protects the machine from rolling off.
In neutral position, the parking brake is applied automatically after approx. 5 seconds. The attachment can still be moved.

Caution

A dangerous accident can occur if the machine is not slowed down carefully!
Moving the travel joystick into neutral position to fast will cause the machine to stop suddenly and abruptly.
! Make sure to wear the seatbelt before operating the machine!

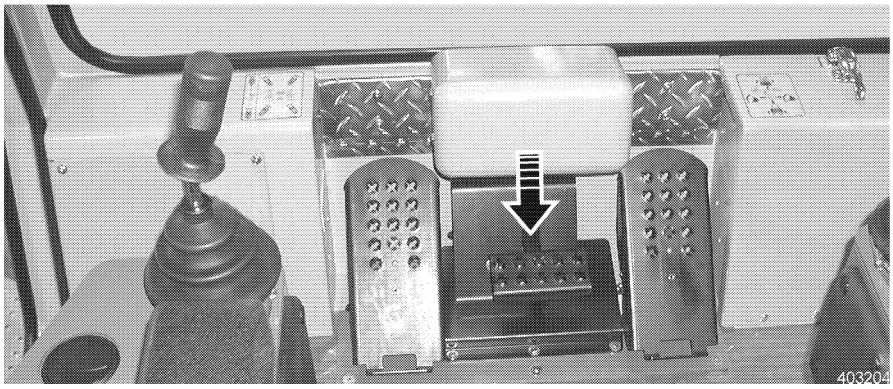
Brake pedal

Braking with the brake pedal

Press down the brake pedal to reduce the speed set with the travel joystick to a standstill.
! Press the brake pedal down only for emergency stops.

Caution

If the brake pedal is pushed past a noticeable point of resistance, then the parking brake will be applied.
! Danger of damage to the parking brake.
– Press the brake pedal all the way down only in emergency situations.



Brake pedal

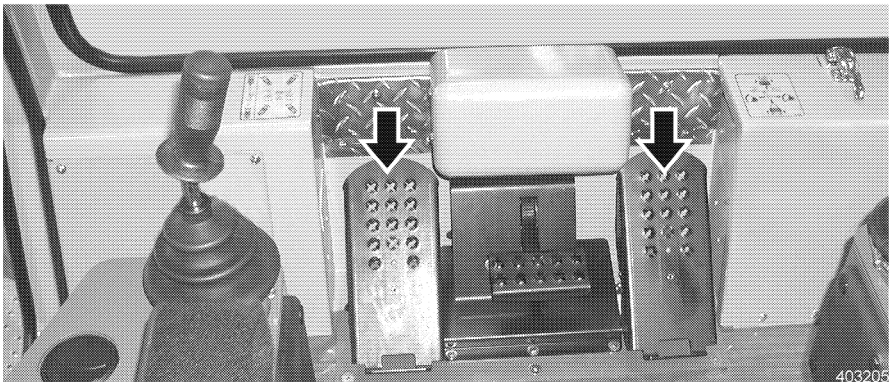
- Press the brake pedal down.

After releasing the brake pedal, the machine will continue to move at the preselected travel speed and travel direction.

Steering pedals

Braking with the steering pedals

By pressing both steering pedals down, the travel speed set with the travel joystick can be reduced until the machine comes to a standstill.



Braking with the steering pedals

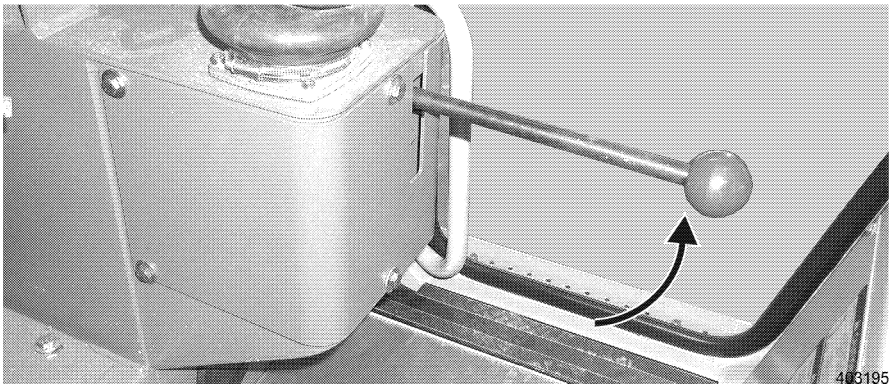
- Press both steering pedals down.

After releasing the steering pedal, the machine will continue to move at the preselected travel speed and travel direction.

Parking brake

Activate the parking brake

The parking brake is activated by:
- moving the safety lever down.
- if the travel joystick is in neutral position for more than 5 seconds.
- if the travel joystick is in neutral position and the chains turn by approx. 2 cm.



Safety lever up

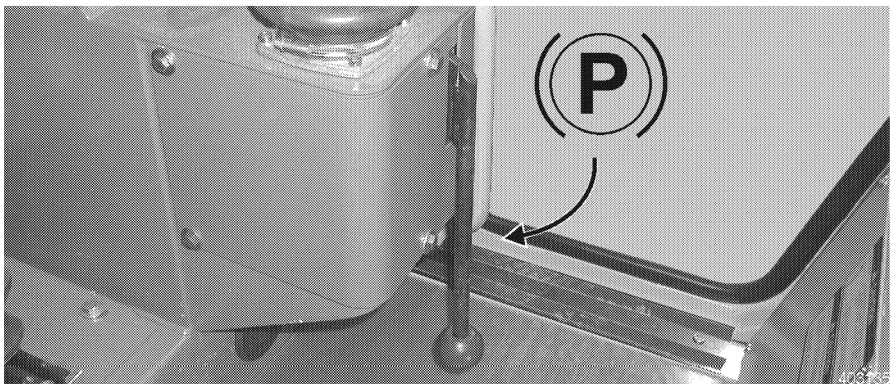
Release the parking brake

When the Diesel engine is running:

- Raise the safety lever.
- Deflect the travel joystick.

Park the machine

When the Diesel engine is turned off, the safety lever must always be in the full down position.
- The indicator light - travel brake lights up.



Safety lever down

- Lower the safety lever.

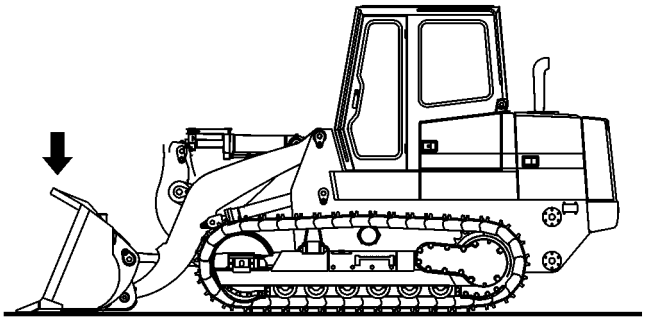
If the Diesel engine is inadvertently turned off, bring the travel joystick into neutral position and the safety lever in the full down position. This activates the parking brake.

3.3.7 Stop the machine

Before turning the engine off and before leaving the machine, proceed as follows.

Working attachment

Make sure that the bucket is empty.



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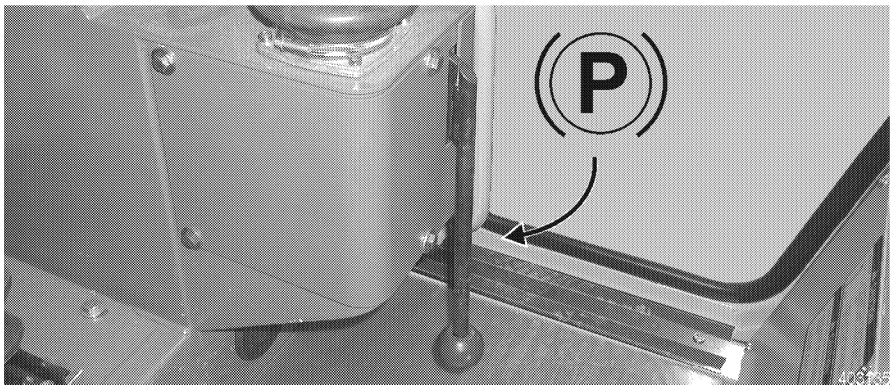
Lower the working attachment

- Lower the working attachment.

For detailed information, refer to "Working with the attachment".



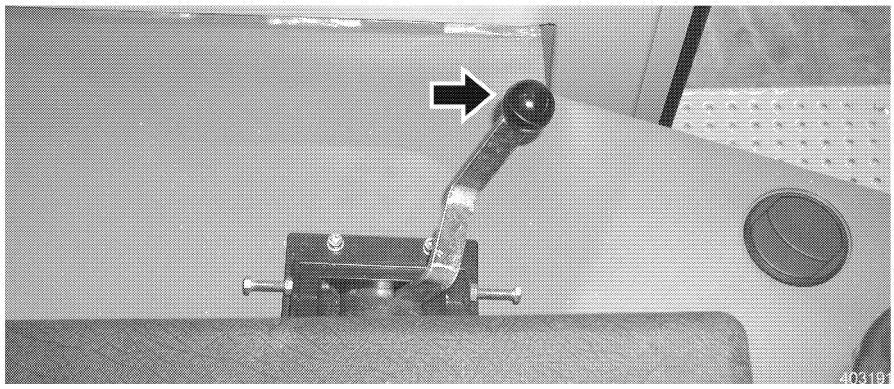
Safety lever down

- Lower the safety lever.

– The indicator light - travel brake lights up.

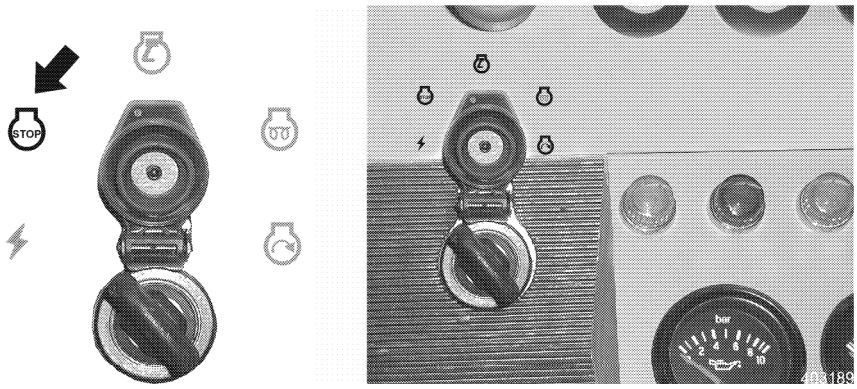
Turn the Diesel engine off

Do not suddenly turn the Diesel engine off from full load. This is especially important for turbo-charged engines.
If the engine is suddenly turned off, the turbo-charger runs for some time without oil supply.



Diesel engine - low idle RPM

- Reduce the engine RPM to low idle.
- Let the engine run for a short time - approx. 10 to 15 seconds at low idle.
- Turn off all activated users (such as lights, windshield wipers, ...) before turning off the starter switch.



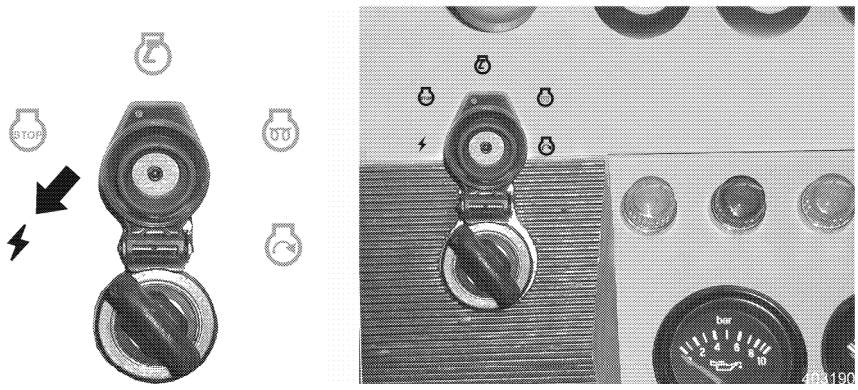
Starter switch - zero position

- Turn the starter switch to zero position and pull it off.

– All indicator lights turn off.

Parking position

The starter switch cannot be pulled in parking position.



Starter switch - parking position

- Turn the starter switch to parking position.

The following users are operational:
– Interior light
– Electrical socket
– Radio

Danger

Do not allow another person to work on the machine, as this can endanger the maintenance personnel, and a serious accident can occur!
! Secure the machine to prevent access to other persons!

When you leave the machine:

- Turn the starter switch to zero position and pull it off.

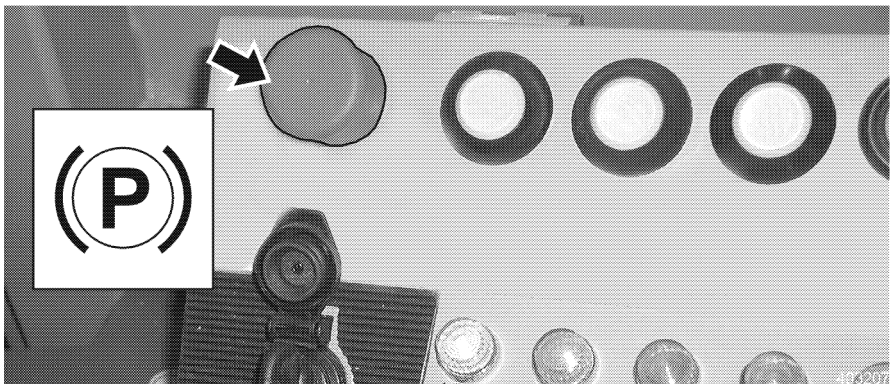
Emergency off button

Caution

An accident can occur if the machine stops suddenly.
The machine stops suddenly.
! Wear the seat belt before operating the machine.

Stop the travel drive

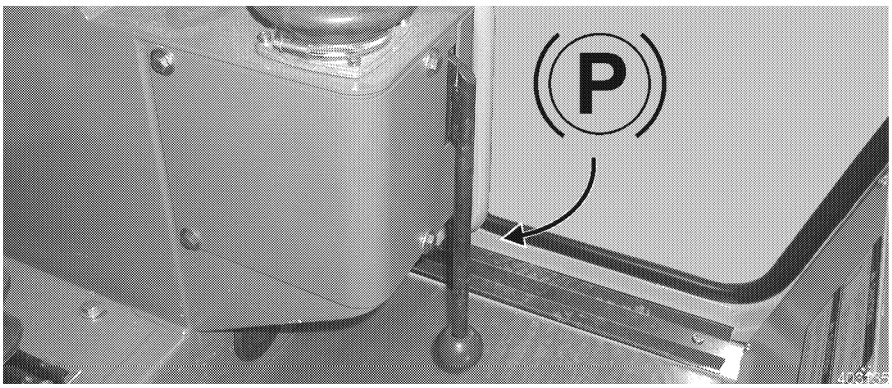
In dangerous or emergencies, the machine can be stopped by pushing the emergency off button.



Emergency off button

- Push the emergency off button.

– The travel drive is stopped suddenly, the Diesel engine continues to run. The attachment can still be operated.

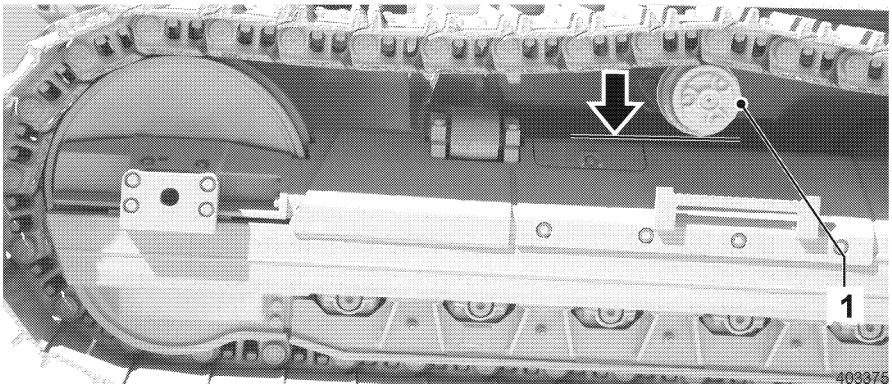


Safety lever down

To continue travel operation

- Move the travel joystick to neutral position.
- Move the safety lever in the full down position.
- Lift the emergency off button until it engages.
- Raise the safety lever.
- Deflect the travel joystick into the desired direction, see also "Travel".

3.3.8 Guidelines for working in water



Lower edge - carrier roller

When driving through wet areas or when working in water, the maximum fording depth (lower edge of carrier roller 1) may not be exceeded.

- After working in water, lubricate all lube points.

Caution

! Danger of fan damage!
– If the maximum fording depth is being exceeded, the fan will be destroyed.

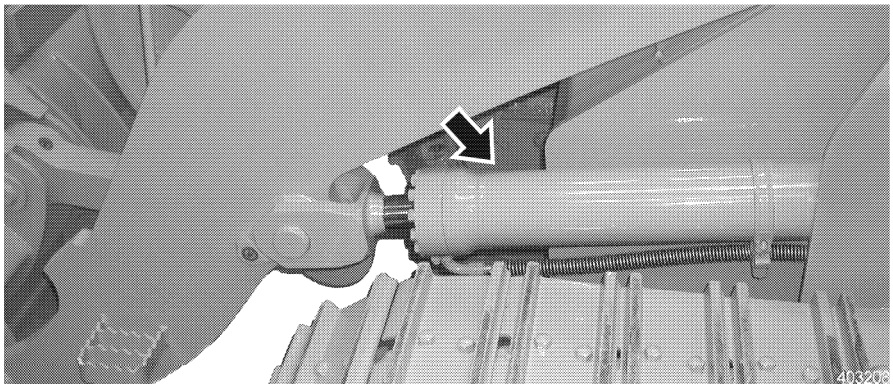
Never exceed the maximum fording depth (lower edge of carrier roller).

3.3.9 Working with the attachment

Danger

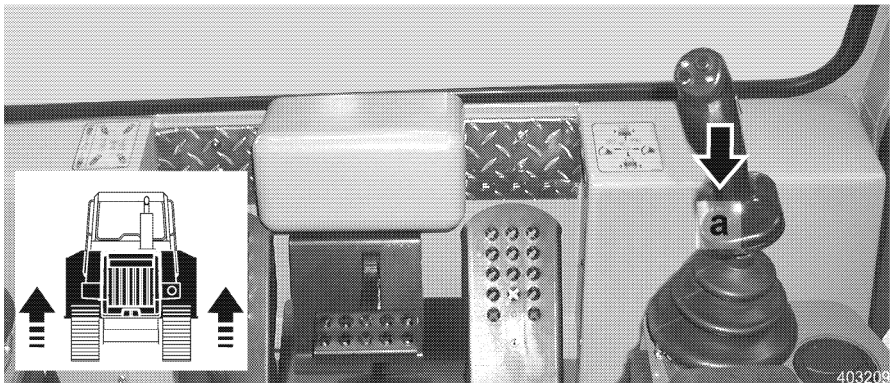
Danger of accidents due to raised attachment.
! Never work or allow work under the raised attachment.
– Always support the attachment or rest it on the ground first.

To move the lift cylinder



Lift cylinder

The bucket is raised or lowered with the lift cylinders.
The speed with which the bucket is raised or lowered to the pre-selected working position depends on the joystick deflection. The speed with which the bucket is moved into the preselected working height depends on the joystick deflection.
The joystick will return automatically to neutral position as soon as the bucket control lever is released. The attachment remains at the preset height.

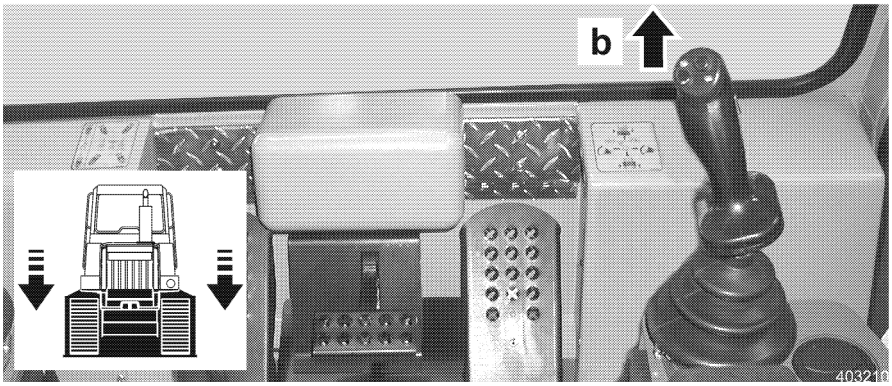


Raise the bucket

Raise the bucket

- Move the bucket control lever in direction - a -.

– The bucket is raised.



Lower the bucket

Lower the bucket

- Move the bucket control lever in direction - b -.

– The bucket is lowered.

Bucket quick drop

In case the Diesel engine or the hydraulic fails, the bucket can be lowered by moving the bucket control leer in direction - b -.
The safety lever must be in the raised position.

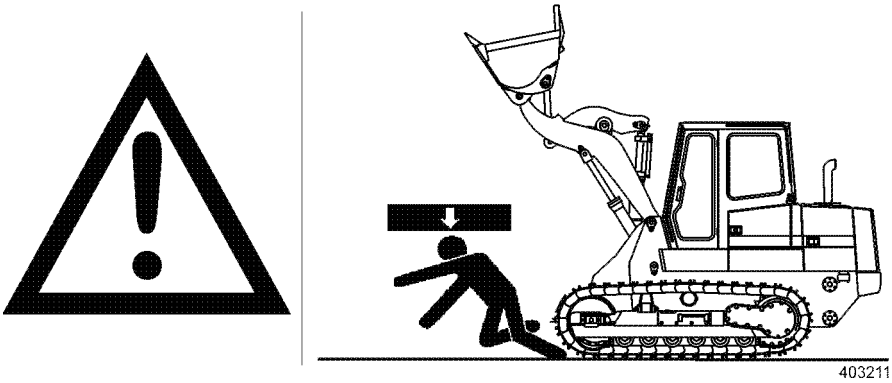
- Move the bucket control lever in direction - b -.

Caution

In dangerous situations, lower the attachment immediately and then move the safety lever into the full down position.

Bucket float position

As soon as the button is pressed, the attachment will drop to the ground float immediately due to its own weight and can freely follow ground contour.



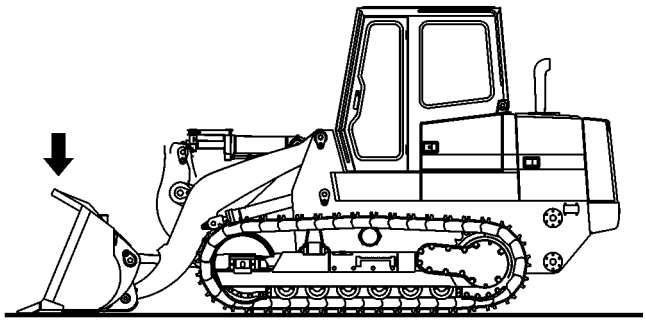
Danger situation

Danger

There is a danger of accidents if the attachment is lowered too quickly!
By activating the float position, the raised attachment is lowered quickly!
Any person underneath the raised attachment would be crushed!

! For that reason, no one may remain within the danger zone of the machine, this is strictly prohibited!

Never activate the float position with the attachment raised!

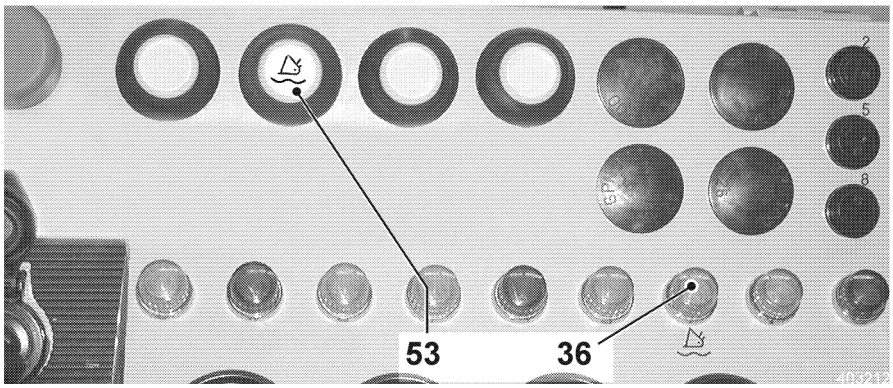


403377

Lower the attachment

Activate the float position

- Lower the bucket to the ground.

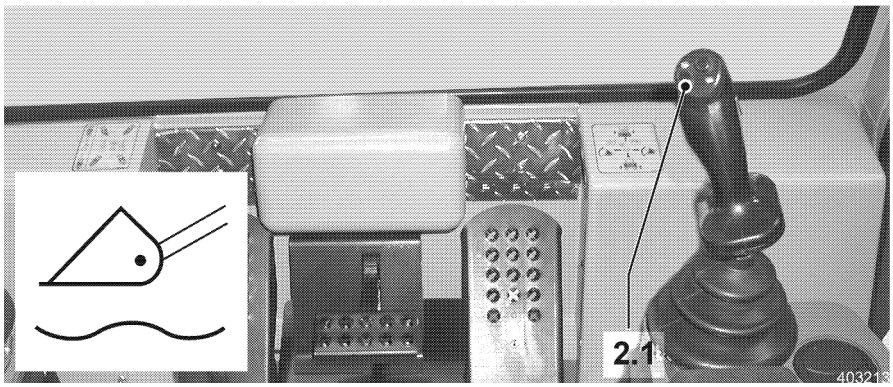


Switch - float position

Press the button on switch 53 for float position to preselect the function.

- Press switch 53 for float position.

– The indicator light - float position lights up.



Button - float position

- Push the button 2.1 on the bucket control lever.

– The function of the float position is activated.

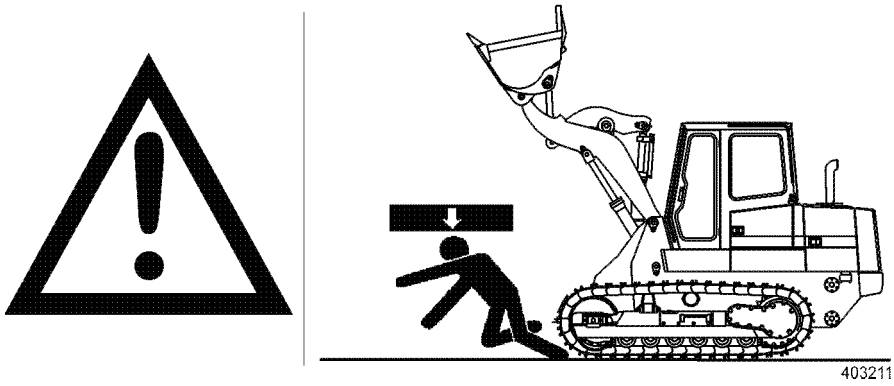
Push the button again to turn the float position off.

Always turn the float position off on the button on the bucket control lever before turning off the switch - float position in the instrument panel.

Automatic hoist limit shut off

For loading tasks, which do not require the full dumping height, a reduced dumping height can be pre-selected via the hoist limit shut off.

The hoisting procedure is then automatically interrupted.

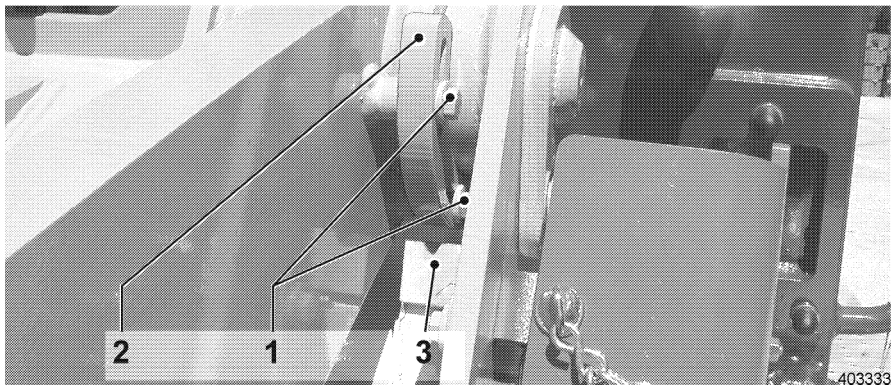


Danger situation

Danger

Danger of accidents if the attachment is raised!
Persons underneath the raised attachment can be crushed!

! For that reason, no one may remain within the danger zone of the machine, this is strictly prohibited!



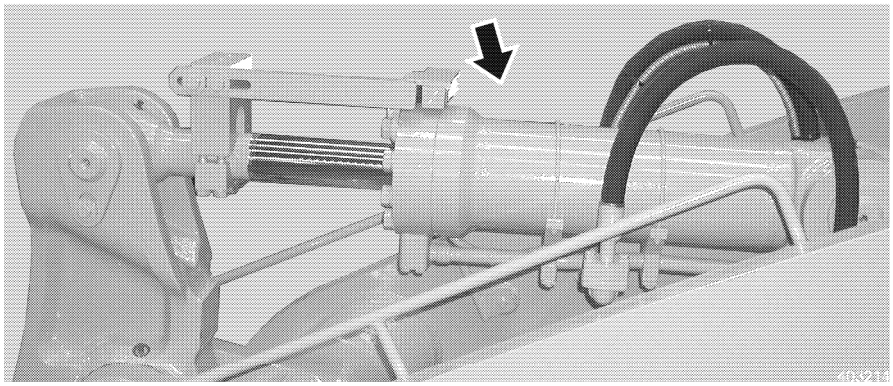
Hoist limit shut off

Adjustment procedure

- Raise the loading attachment to the desired height.
- Loosen the hex head screws 1 and move the control bar 2 until the limit switch 3 is covered.
- Tighten the hex head screws.
- Check the dumping height and readjust, if necessary.

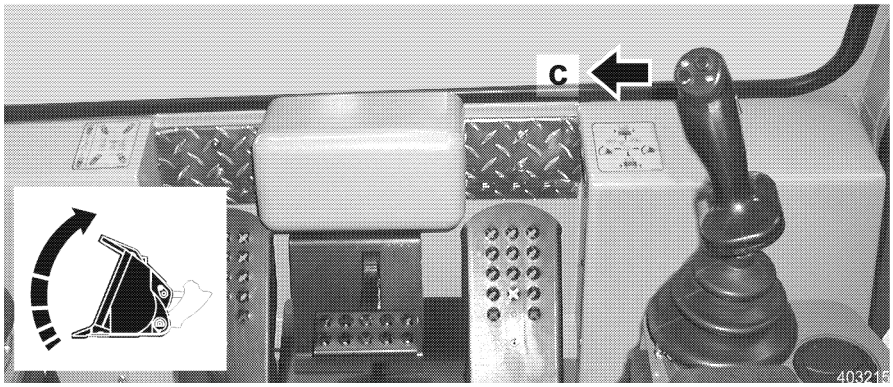
Control of tilt cylinder

The bucket can be curled in or out with the tilt cylinder.



Tilt cylinder

The tilt cylinder is installed on the front of the bucket arm.

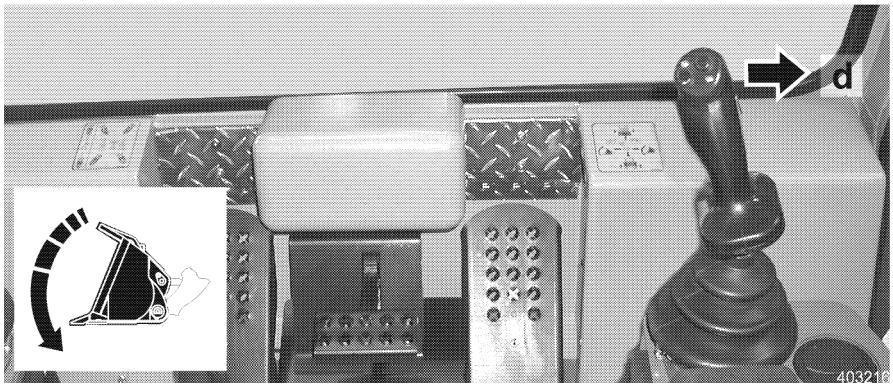


Curl the bucket in

Curl the bucket in

- Push the bucket control lever to the left in direction - c -.

– The bucket is curled in.



Curl the bucket out

Curl the bucket out

Push the bucket control lever to the right in direction - d -.
The bucket is curled out.

Caution

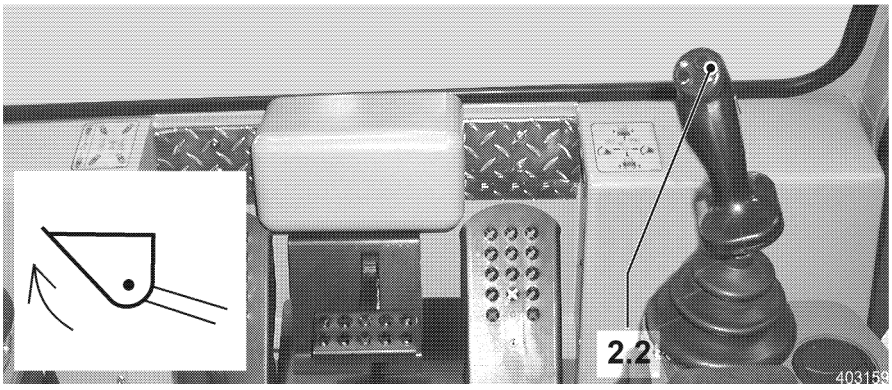
Possible danger of the attachment damage!
! Never use the machine to doze forward with the bucket in the extreme dump position.
– This can cause damage to the loading attachment.

Control of automatic bucket float position

For repeated loading work with a certain grading position, the automatic bucket float position can be actuated.
The automatic bucket float position makes it possible to move the bucket into a preselected grading position.

Turn on the bucket float position

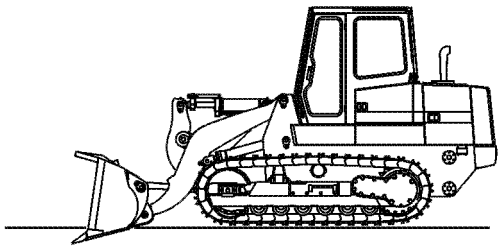
The bucket float position is activated by pressing the button 2.2 on the bucket control lever.



Button - bucket float position

- Press the button 2.2 on the bucket control lever.

– The bucket is moved into the pre-selected grading position.



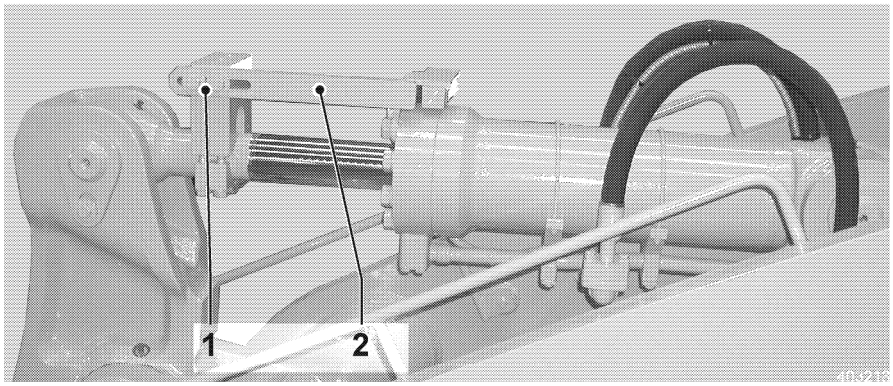
Bucket - grading position

Set the grading position

- Bring the bucket into the desired grading position.

The bucket must be lowered and empty!

- Park the machine properly.



Adjustment procedure - control bar

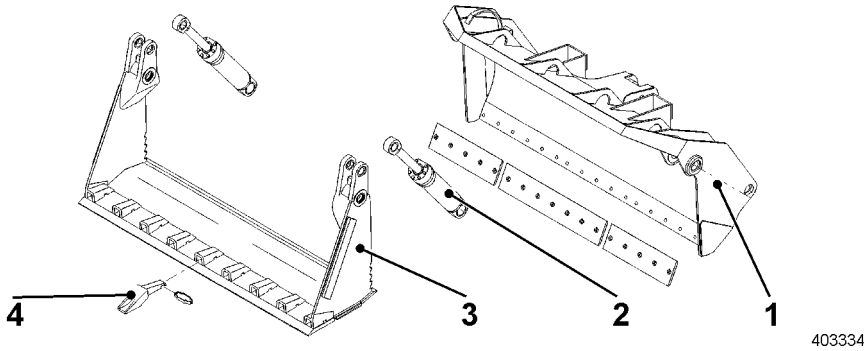
- Loosen the hex head screws 1 and move the control bar 2 until the limit switch 3 is no longer covered.
- Tighten the hex head screws 1.

Check the bucket float position, repeat the adjustment procedure, if necessary.

3.3.10 Working with optional attachments

Operation or working procedure with various optional attachments is described in this section.

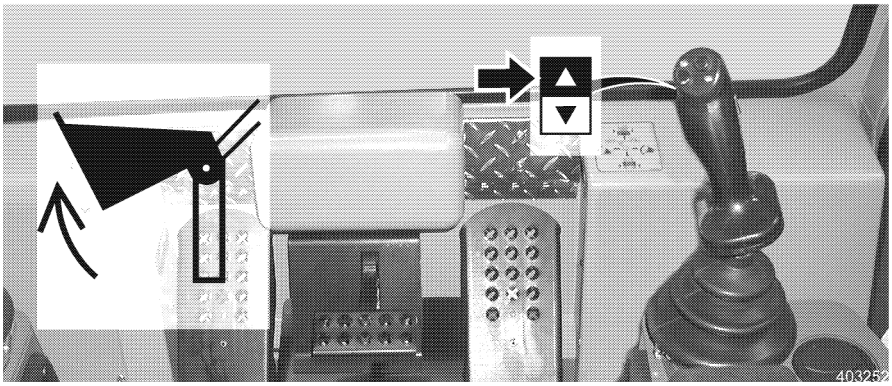
Control of 4 in 1 bucket



4 in 1 bucket

1 Bucket back
2 Bucket flap cylinder
3 Bucket flap
4 Teeth

The bucket can be opened / closed with the button on the bucket control lever.

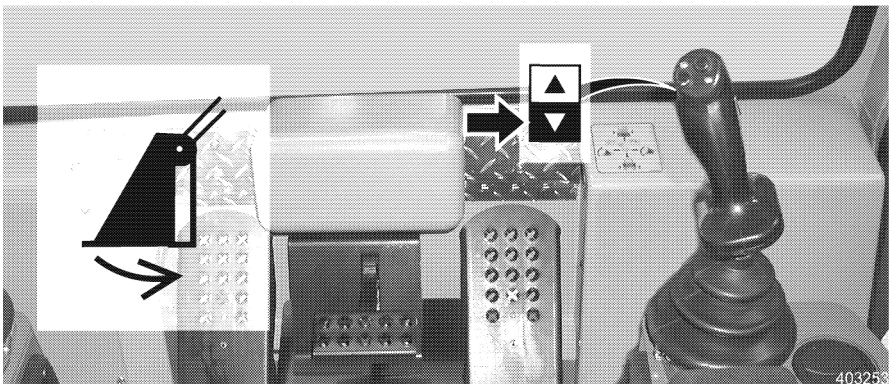


Open the bucket

Open the bucket

- Push the button on the bucket control lever on top.

– The bucket is opened.



Close the bucket

Close the bucket

- Push the button on the bucket control lever on the bottom.

– The bucket is closed.

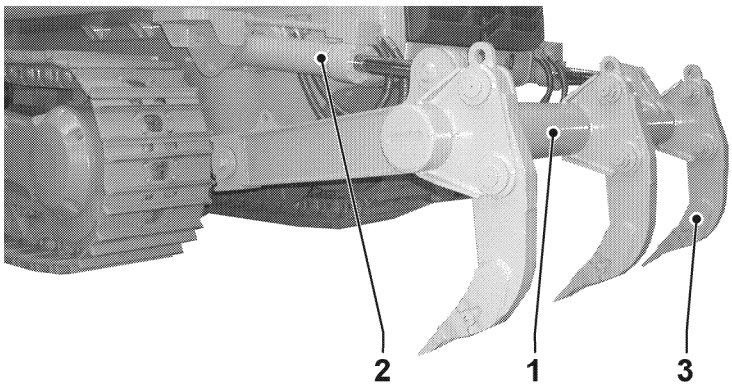
Variations of 4 in 1 bucket

The 4 in 1 bucket may only be used for the following tasks:

– to push, grade and load material
– for all digging work
– to grasp bulky items
– to dump in open condition
– to doze
– as grading bucket
– for larger dumping height

The manufacturer (or supplier) is not responsible for any damage, which is the result of non-intended or inappropriate use (such example breaking out rocks, knocking in poles or attaching load tackle).

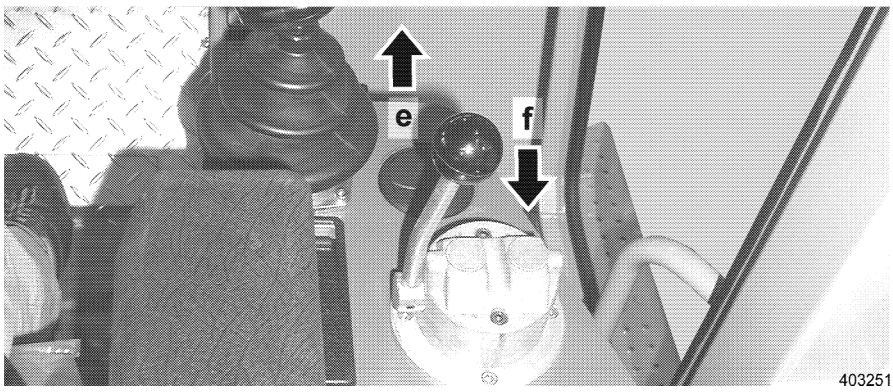
Control of ripper



Ripper

1 Pull bar
2 Hydraulic cylinder
3 Ripper tooth

The ripper is operated via the ripper control lever on the right hand side of the operator's seat.



Ripper control lever

Lower the ripper

- Push the ripper control lever to the front in direction - e -.

– The ripper is lowered.

Raise the ripper

- Pull the ripper control lever to the rear in direction - f -.

– The ripper is raised.

Winch operation

Caution

There is a danger of injury when working with winches!

! When operating a winch, the operator's compartment must be protected with a protective grid.

For installation of the protective device, contact your LIEBHERR dealer or Service.

3.4 General working methods

In this section, routine working methods are described.
To prevent loss of traction, do not exert strong downward pressure on the bucket.

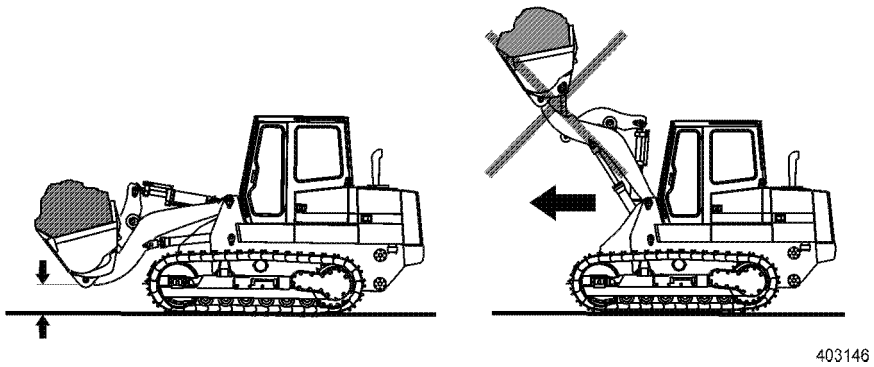
- To make penetration into the material easier, tilt the bucket a little upward and outward.

3.4.1 Transporting and handling of material

For good machine stability, as well as for good visibility during transporting and handling of material, bring the bucket into transport position.

Danger

Danger of tipping the machine over!
! Because of a change of the center of gravity when the lift arms are raised, there is a danger of tipping the machine over!
– Handle the material with the bucket in transport position.

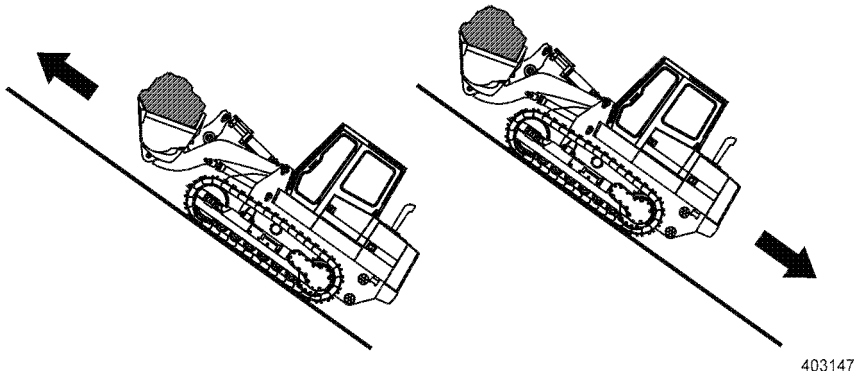


Transport position

Transport position

- Bring the loaded bucket into transport position.

– Hold the bucket about 40 cm above the ground level.



Travel direction for transport

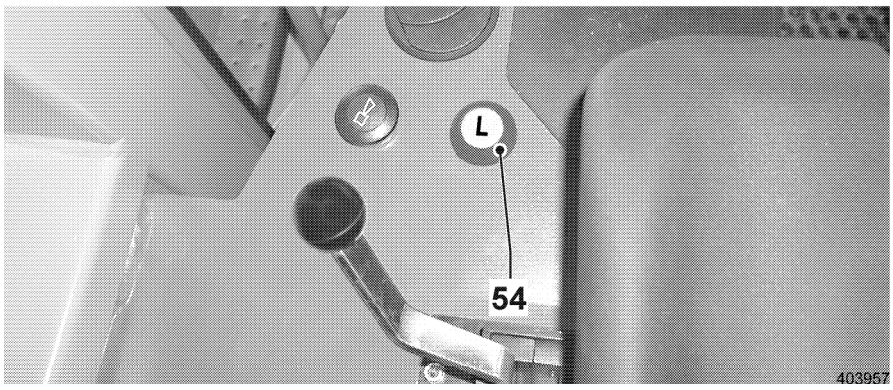
- When moving material uphill, drive forward.
- When moving material downhill, drive backwards.

Driving on downhill slopes

When driving downhill, make sure to observe all safety notes.

Danger

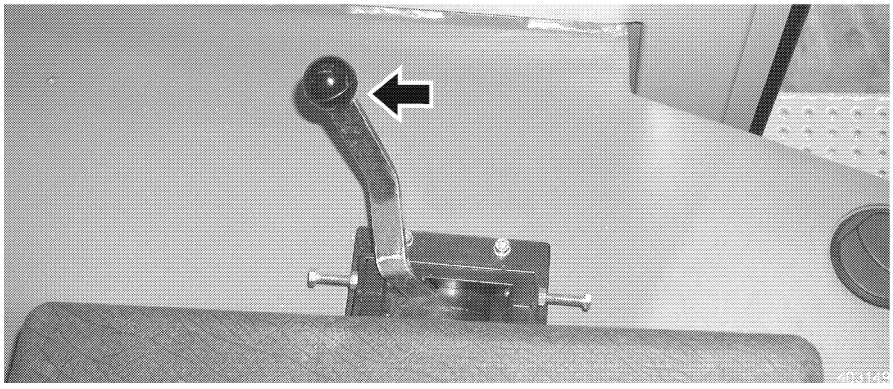
Danger of accidents, the machine can tip over!
! On slopes, always drive in low speed range.
– Never change when driving downhill, always change into low speed range before.
! When moving uphill, always hold the filled bucket in front.
! Never turn the machine around on an uphill or downhill slope.



Select low speed range

- Press the button for low speed range 54 on the instrument panel.

– The indicator light - low speed range 42 lights up.



Throttle control lever - full load

- Set the throttle control lever to full load.

3.4.2 Dozing work

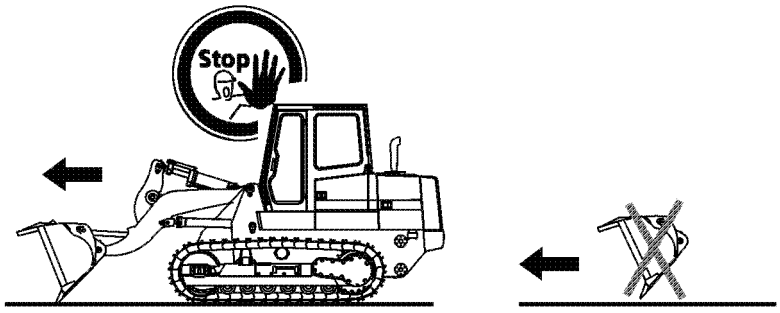
For dozing, hold the bottom of the bucket in horizontally.

Dozing

To prevent loss of traction, do not exert strong downward pressure on the bucket.

Caution

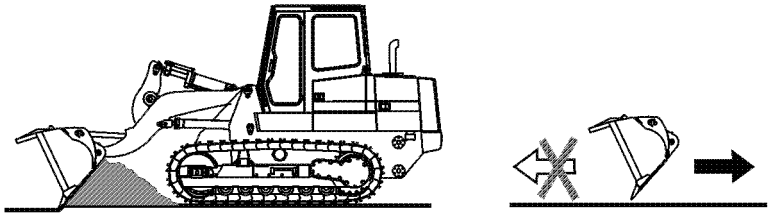
Possible danger of damage to the loading attachment.
! Never grade in forward direction with the bucket curled out!
– This can cause serious damage to the attachment.



403150

Non-permitted bucket position

- Align the bottom of the bucket parallel to the ground or curl it out slightly.



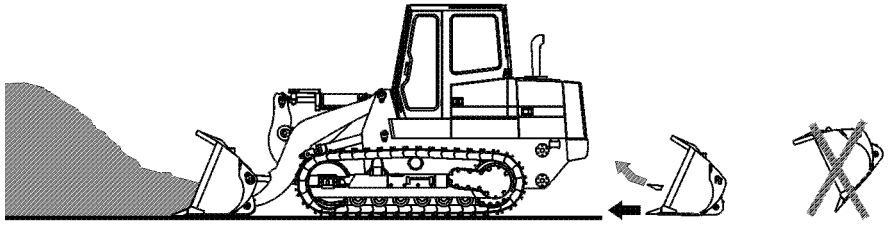
403151

Pull back in reverse

Scrape off material

- Curl out the bucket slightly and move backward.

3.4.3 Loading material from a pile



403152

Bucket position

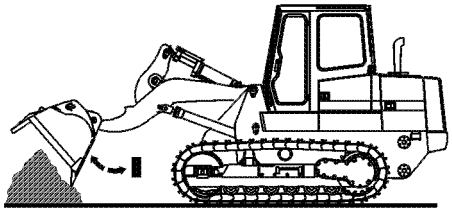
Loading material

- Lower the bucket horizontally to the ground.
- Move into the material in forward direction while curling the bucket in slightly.

Note: To make penetration into the material easier, tilt the bucket a little upward and outward.

- When the bucket if fully loaded, curl it in all the way and raise the bucket to transport position.

Do not raise the bucket to the required dumping height until you have reached the dumping site.



403153

Empty the bucket

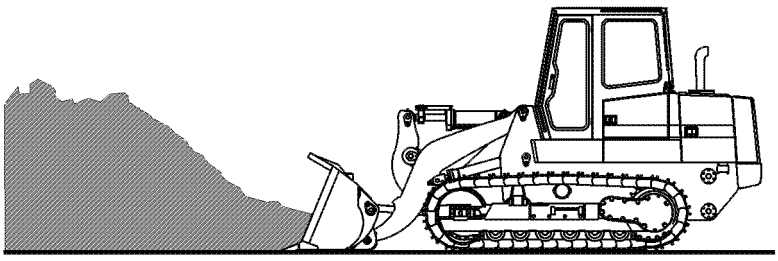
- Tilt out the bucket
- To loosen stuck material in the bucket: tilt the bucket in and out quickly, letting the bucket hit the stops on the bucket arms momentarily.

Caution

Possible danger of damage or increased wear of the loading attachment.
! Avoid hitting the bucket to the bucket stops when tilting the bucket in.

3.4.4 Loading from a bank or wall

When loading from a bank or wall, proceed as follows:



403154

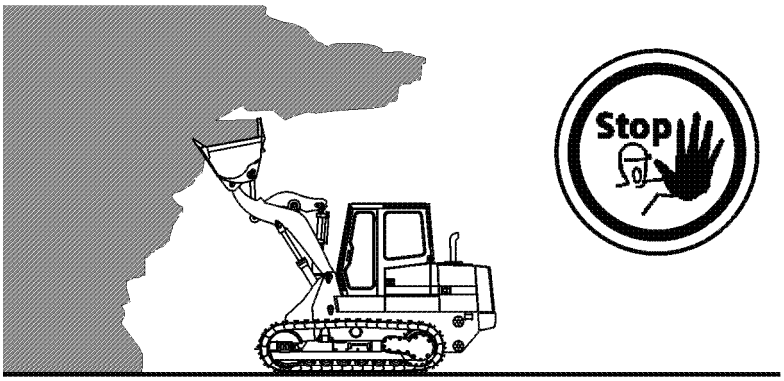
Material removal - bank

Material removal from a bank

- Start at the bottom of the bank and continue upward.

Material removal from a wall

- Tilt the bucket in slightly.
- Start from the top and continue towards the bottom.



403155

Danger of accidents

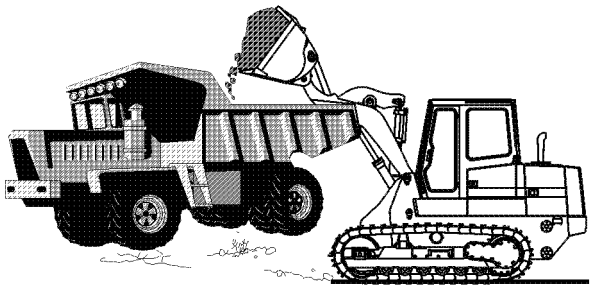
Danger

Danger of accidents due to falling material.
! Do not work under overhangs.

- Remove overhangs and be aware of sliding material.

3.4.5 Loading of transport vehicles

Position the vehicle in such a ways that the transport route is as short as possible.



403156

Transport route

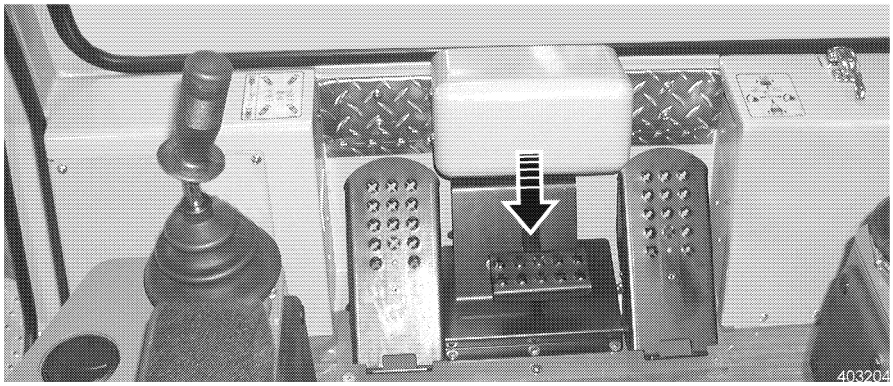
Transport route

- Select a short transport route.

Do not raise the bucket until shortly before reaching the dumping site.

Loading procedure

To accelerate the loading procedure, slow down the machine with the brake pedal before reaching the dump truck.



Brake pedal

- Slow down the machine with the brake pedal before reaching the dump truck.

Danger

Danger of accidents due to falling material.

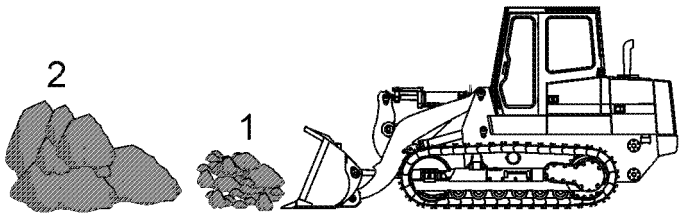
! The driver of the truck must leave the cab if the truck is not equipped with a protective structure (FOPS).

– Avoid moving the attachment over the cab of the vehicle.

- When loading the vehicle, dump the material in the center of the bed.
- Load longer transport vehicles from the front to the rear.

Loading of large pieces of rock

The bed of the transport vehicle must be protected from the shock of large pieces of rock.



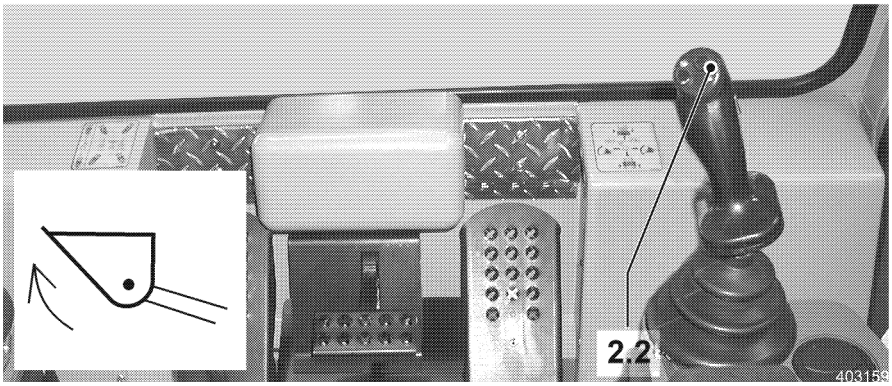
403158

Large pieces of rock

- Dump a bucket of smaller rocks into the truck bed first.
- Now continue to load the dump truck.

Automatic bucket float position

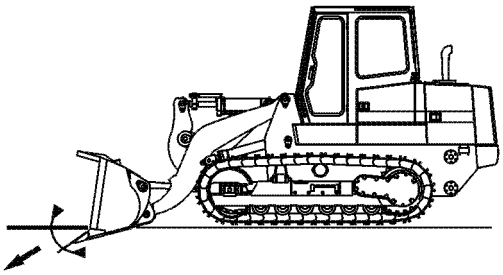
For repeated loading work with a certain grading position, the automatic bucket float position can be actuated.



Button for bucket float position

- Press the button 2.2 on the bucket control lever. See also "Working with the attachment".

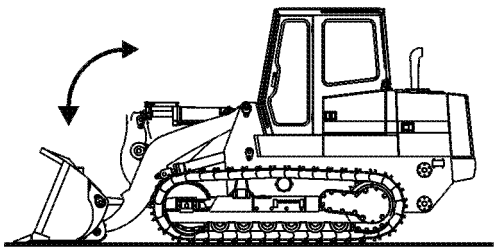
3.4.6 Excavation



403160

Insertion angle - bucket

- Lower the bucket to the ground, set it to a small insertion angle (max. 10°).
- When moving the machine, push the hoist arms down at the same time until sufficient insertion depth is obtained.



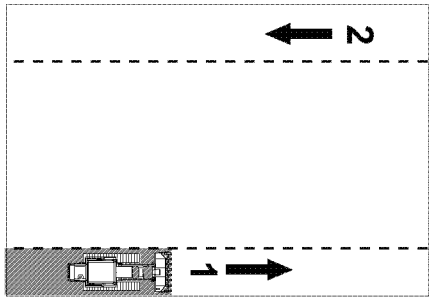
403161

Hoist arm movement

- Raise or lower the hoist arms while driving forward to make horizontal cuts.

3.4.7 Example: Foundation excavation

When excavating a foundation, proceed as follows:



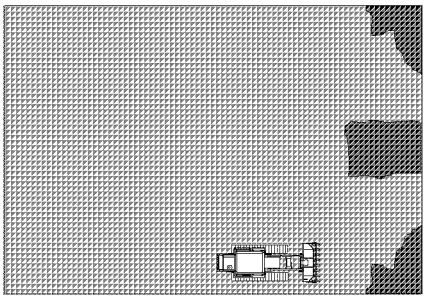
403162

Length cuts

- Use the bucket to cut the first cut along the outside of the building site.

When the first cut has reached a depth of approx. 1 meter, start the second cut on the opposite side.

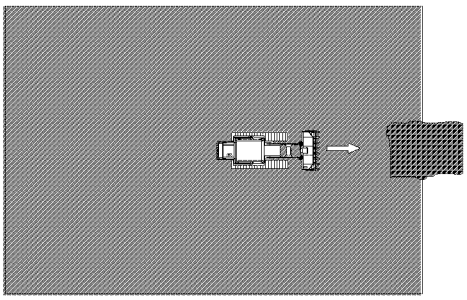
- Heap the material in one corner, leave the sides of the foundation clear.
- Continue excavation of the center area to the same depth as the side cuts.



403163

Corner

- When the building site has reached the desired depth, excavate the corners and move the material from the site.



403164

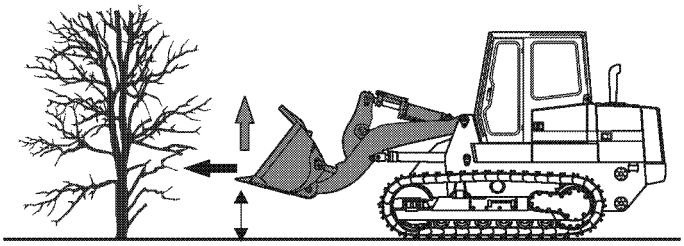
Exit ramp

- Excavate the center of the ramp and provide an exit for the machine.

3.4.8 Land clearing operation

Removal of shrubs to medium sized trees

- Pull hedges from the ground by lowering the bucket about 5 to 10 cm under the ground level while driving forward.
- Curl the bucket out to let the soil fall from the roots.

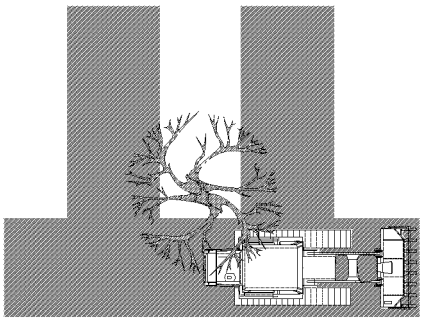


403165

Push over trees

Tall shrubs and medium sized trees

- Approach the tree with the bucket about 30 to 40 cm above the ground and push it over. Continue to raise the bucket while driving forward.



403166

Cut roots

Felling of trees

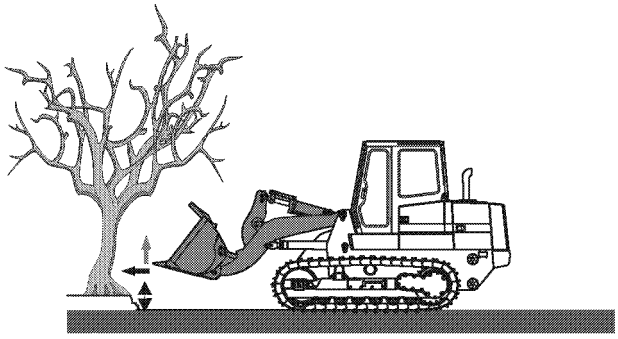
- Clear the surrounding area.
- Cut the tree roots on the opposite and parallel to the desired drop direction with the bucket.

Caution

Danger of accidents due to falling trees.

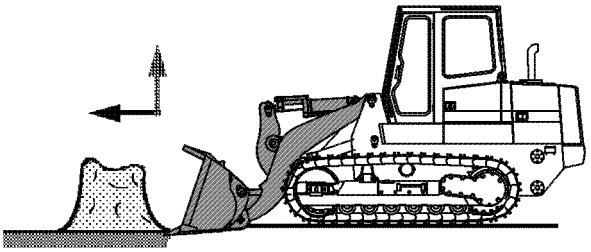
! As soon as the tree starts to fall, back up immediately!

! Do not move on top of the root system of the falling tree.



Felling trees

- Slowly move towards the tree in the direction you want the tree to fall, with the bucket raised.



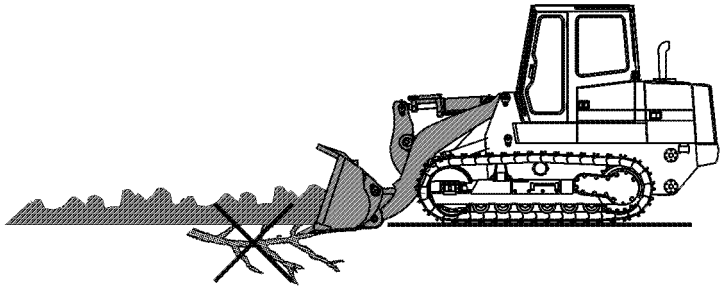
403168

Removal of tree stumps

Removal of tree stumps

- Move toward the tree stump with the blade below ground and rip it from the ground while slowly raising the blade at the same time.

When moving over the terrain, be sure to check ground clearance, watching for tree stumps and rocks!



403169

Covering up cleared material

Covering up cleared material

- Placed cleared material as far as possible under the ground level.

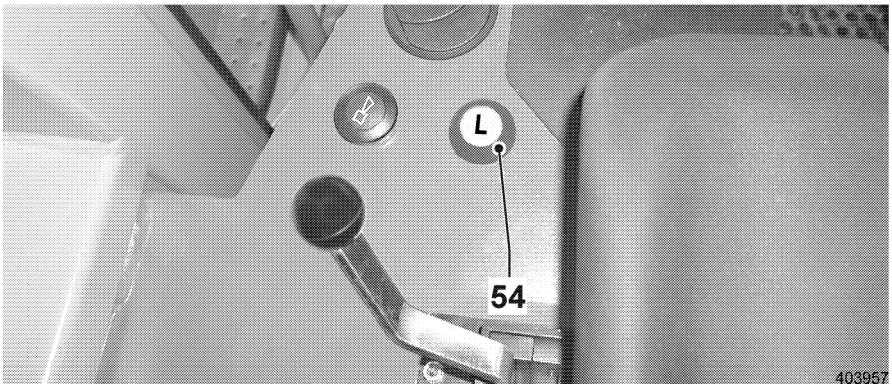
If the level is not deep enough, then the material might be ripped out again when grading or scraping the surface.

Site preparation

Basically, the following applies:
The more even the site it prepared, the more efficient and considerate you will be able to work with the machine.

3.4.9 Ripping operation

Rip only at low travel speed.

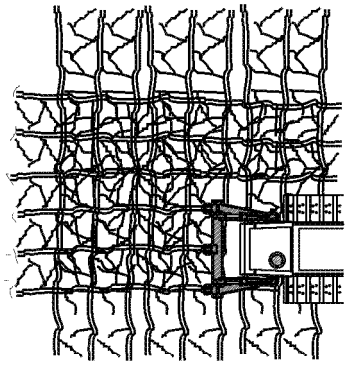


Turn on low speed range

- Press the switch - low speed range 54 on the operator's cab.

– The indicator light - low speed range 42 lights up.

For multi tooth rippers it is often more advantageous to install additional ripper teeth than to select a high travel speed.
Rip any material which is difficult to rip or which breaks up into large pieces only with one ripper tooth.
For material which is easy to rip or which breaks into small pieces use a multi tooth ripper with two or three teeth.
During ripper operation, always make sure that both tracks are on the ground over their full length. If necessary, prepare the terrain accordingly.
Generally, the ground should be ripped as deep as possible. If the terrain is in layers, then it is most often more advantageous to rip in layers. To reach the desired depth, it might be necessary to rip the same track several times.
The distance of the ripper tracks depends on how small the pieces are to be chopped.



403236

Crosswise ripping

In certain cases, it might be necessary to rip the terrain in crosswise direction.
On slopes, always rip going downhill.

Caution

Do not turn the machine or travel backwards, if the ripper teeth are in the ground.
! The teeth can be damaged due to the high rotational stress.

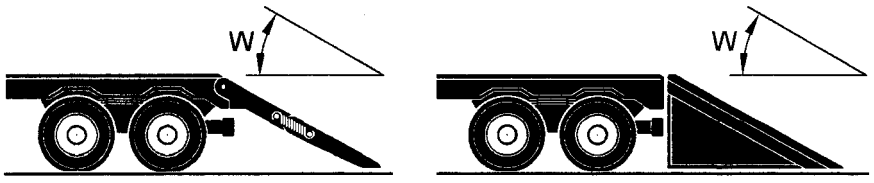
- Check the teeth often for wear and damage.

3.4.10 Transporting the machine

Transporting the machine on trucks or railroad cars

Before driving onto the loading surface

Before driving onto the loading surface, complete the following preparations.
If necessary, remove part of the attachment for the duration of transport.
– Have suitable tension cables or chains ready for rigging.



403048

Ramp incline

Have a suitable ramp ready to drive onto the loading surface. The ramp incline angle - **W** - should be no more than 30°.

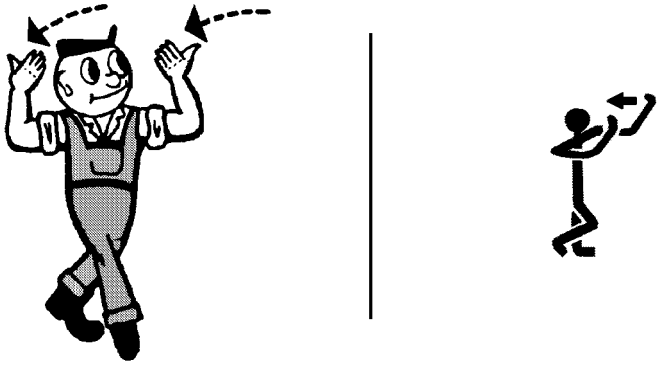
403220

Cleaning

Before driving onto the ramp, clean the chains of the machine to remove ice or mud.

Driving onto the loading surface

For detailed description, see "Control, operation". When driving onto the loading surface, use a guide to signal you!
Make sure that the guide is ready to signal the operator.



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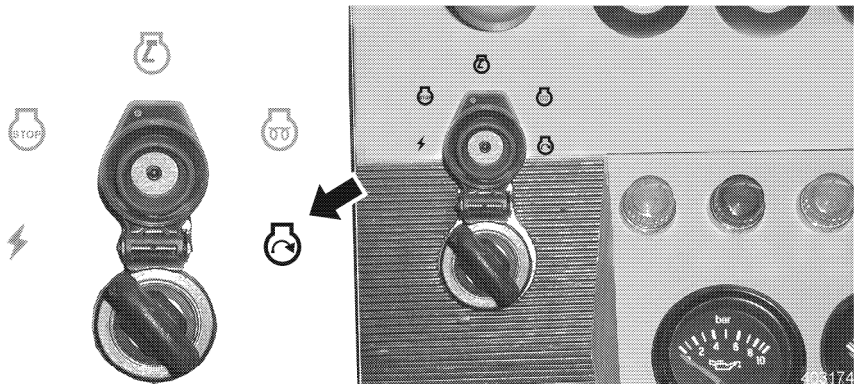
Guide

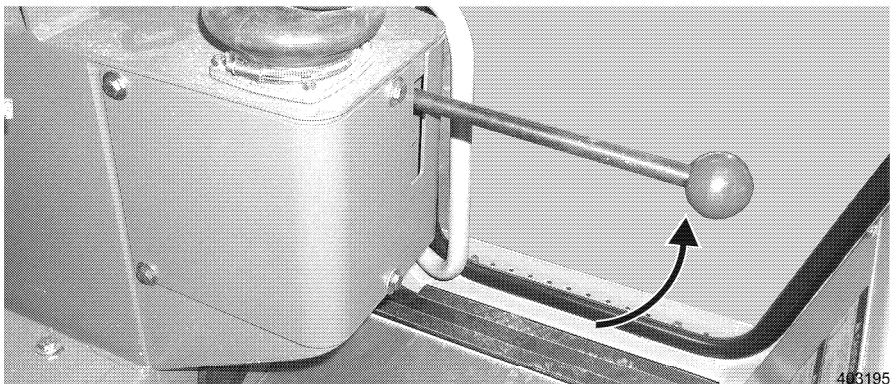
Any persons who serve as guides must be positioned to the side of the machine!



Starting procedure

- Start the Diesel engine.

See also "Start the Diesel engine" and "Travel operation".



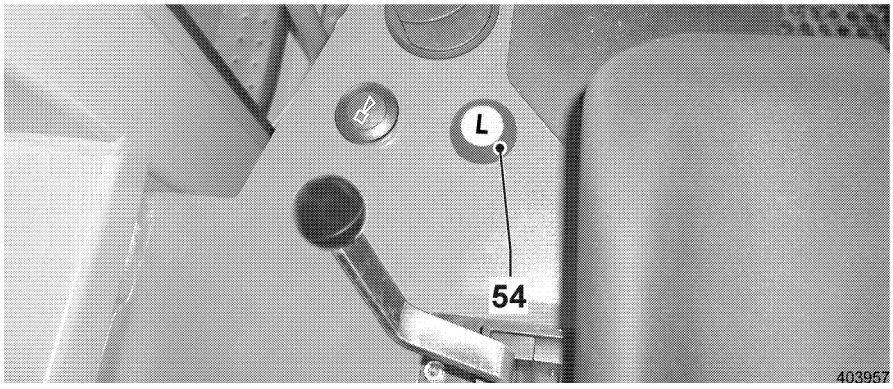
Safety lever up

- Move the safety lever up.

Danger

There is a danger of accidents due to careless driving!
Careless driving can cause accidents for the loading personnel, guide as well as for the machine operator.
! When loading the machine, always drive with extreme care!

Drive onto the ramp only in low speed range!



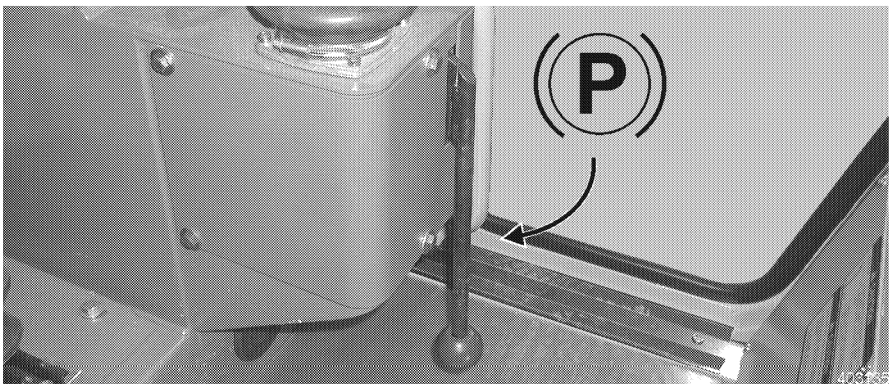
Low speed range

- To select low speed range: press button 54.
- Start driving carefully.

For detailed description, see "Control, operation".

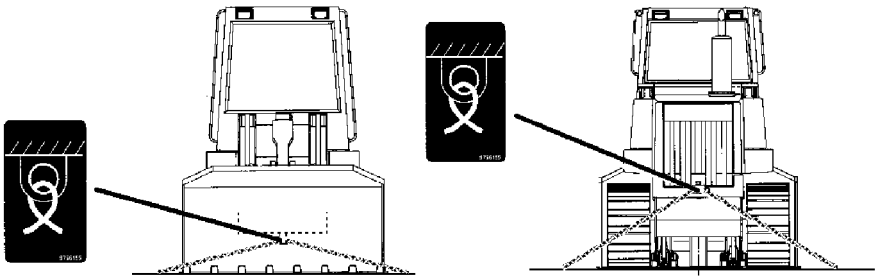
After driving onto the loading surface

- Stop the machine.
- Lower the attachment and lower the attachment horizontally to the loading surface.



Safety lever - down

- Move the safety lever down.
- Turn the Diesel engine off.
- Close and lock all doors and covers on the machine.



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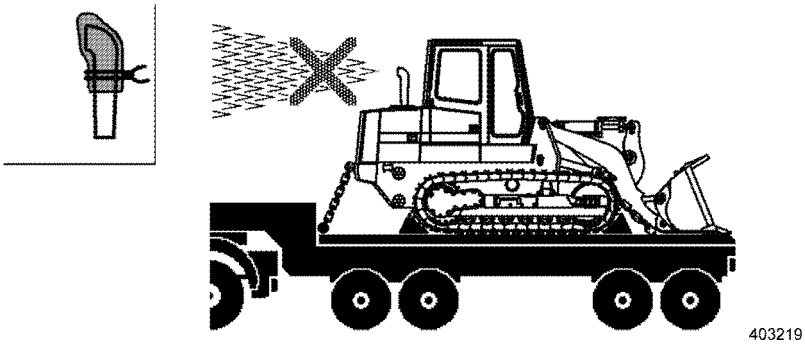
Rigging points

- Secure the machine to prevent it from slipping: use wedges as well as cables or chains.
- Attach the cables or chains to the marked rigging points on the machine.

If the machine is positioned against the transport direction for transport, then wind could enter through the smoke stack.
As a result, the wind could drive the turbocharger of the Diesel engine.
To prevent damage during transport, proceed as follows:
This is especially important when transporting the machine by rail, since the travel direction is not known in advance!

Caution

The turbocharger can be damaged!
Penetration of wind into the smoke stack can drive the turbocharger of the Diesel engine.
Since the engine is not running, the turbocharger is not lubricated.
Lack of lubrication will damage the turbocharger.
! Prevent wind from getting into the smoke stack!



Cover the smoke stack

- To cover the smoke stack opening: step on the machine via the ladder and select a safe position.
- Cover the smoke stack opening with a windproof material. Make sure the cover doesn't slip or blow off!

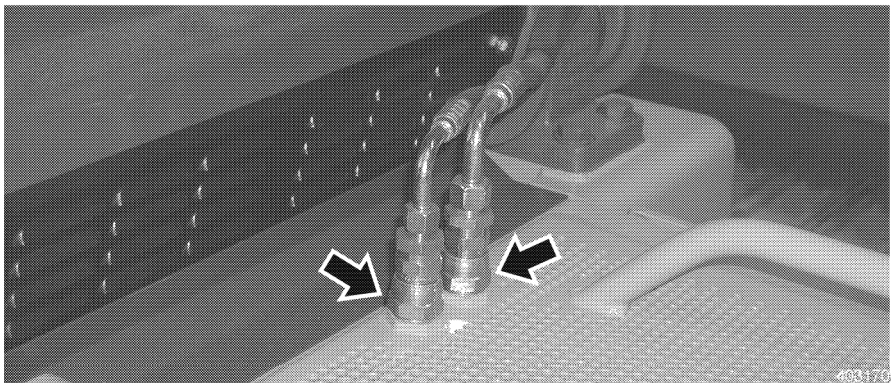
Reduce the transporting height

Remove the operator's cab

The operator's cab can be removed for the duration of transport.
Make sure that:
– a suitable lifting device is readily available.
– three eyebolts are available, they are in the tool box.

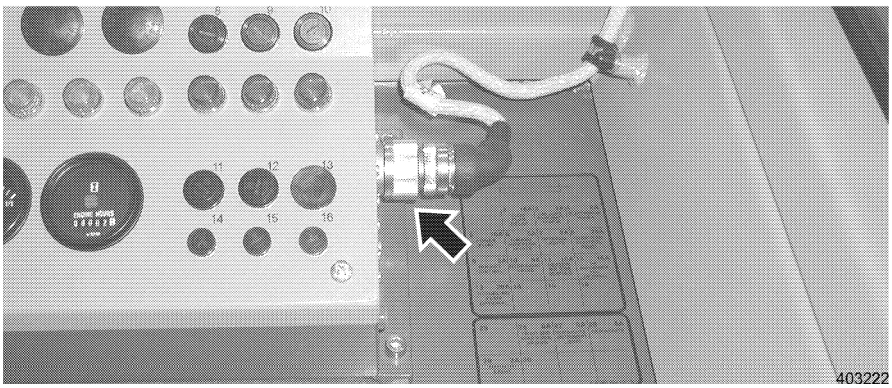
Operator's cab with air conditioning system

If an air conditioning system is installed on the machine, then the air conditioner hoses between the operator's cab and the cab base must be disconnected.
Shut off valves are installed in the lines to prevent loss of refrigerant.
The air conditioner lines may only be disconnected on the quick couplings.



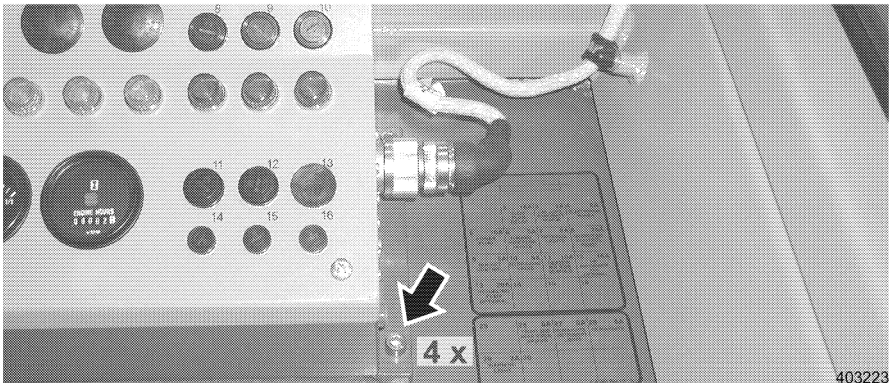
Air conditioner lines - Operator's cab

- Disconnect the air conditioner lines on the quick couplings.



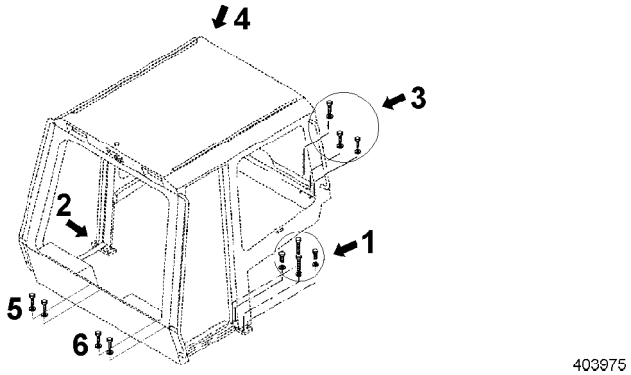
Wiring harness - Operator's cab

- Disconnect the wiring harness for the operator's cab on the instrument panel by releasing the screws.



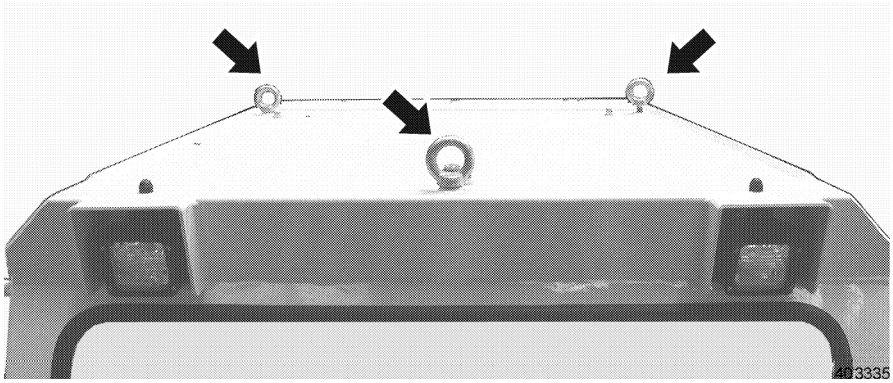
Instrument panel

- Remove the mounting screws on the instrument panel.
- Push the instrument panel in direction of the operator's seat, so that it is not damaged when lifting the cab.



Mounting screws - Operator's cab

- Remove the mounting screws 1 and 2 on the left and right front of the operator's cab.
- Remove the mounting screws 3 and 4 on the inner and outer rear of the operator's cab.
- Remove the mounting screws 5 and 6 on the front in the documentation compartment.



Eye bolts

- Remove the plugs from the roof of the cab.
- Remove three eyebolts from the tool box and install in the roof of the operator's cab.
- Carefully lift the operator's cab on the intended lifting points.
- Set the operator's cab down safely and secure it to prevent it from tipping over.

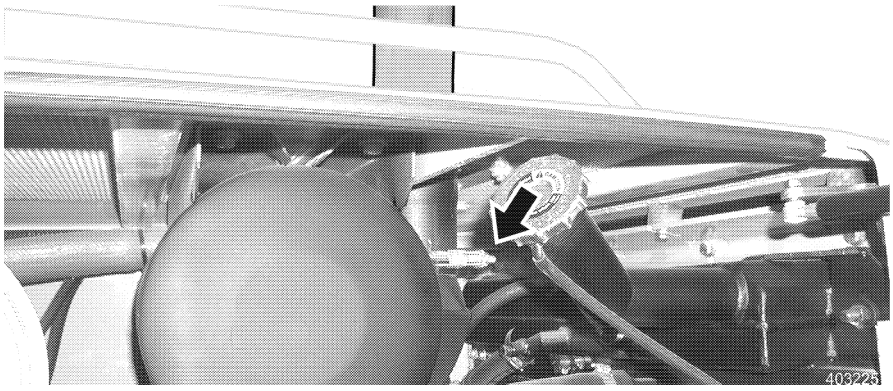
Caution

Danger of damage to the electrical system of the machine.
– Cover the removed cab as well as the exposed operator's platform to protect it from environmental influences, such as rain, snow, ...

After removal

- Protect the cab platform with suitable covers to protect it from environmental influences.

Install the operator's cab in reverse order.



Smoke stack

Removal of the smoke stack

- Loosen the lock screw on the smoke stack and remove it by turning it slightly to the left and right.
- After removal, close off the opening.

To cover the smoke stack opening: step on the machine via the ladder and select a safe position.

- Cover the smoke stack opening with a windproof material. Make sure the cover doesn't slip or blow off!

3.4.11 Loading the machine with a crane

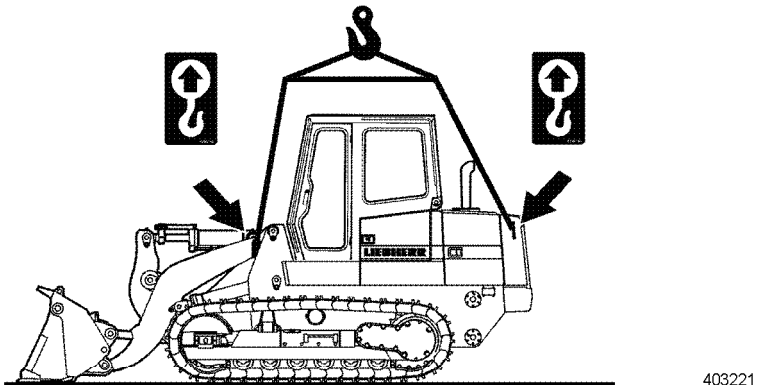
Observe all accident prevention guidelines when loading the crane!

See "Safety guidelines to be observed when loading the machine with a crane".
Before loading the machine with a crane, proceed as follows.
Preparations:
– Lower the attachment.
– Bring all control levers into neutral position.
– Move the safety lever down.
– Turn the Diesel engine off.
– Close and lock all doors, hoods and cover on the machine.

For detailed description, see "Control, operation".
Check the following:
– Weight and dimensions of the machine: see "Technical Data"
– The required load carrying capacity and length of the tackle.

Danger

Danger of accidents due to suspended / falling load!
! Never step or stand underneath a raised machine or load!



Tackle - lifting points

Loading the machine on a truck or railcar for transport

- Attach the lifting devices to the intended rigging and lifting points on the machine.
- Lift the machine carefully and load.

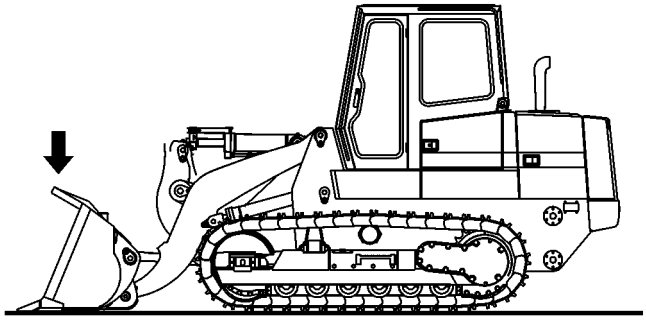
3.5 Installation guidelines to be observed for removal and installation of attachments

To remove and install the attachments, a suitable lifting device is needed.
Clean all bearing points, pins, threads and similar and check for damage.
Before removing the attachment, proceed as follows:
Preparations:
– Lower the attachment.
– Bring all control levers into neutral position.
– Move the safety lever down.
– Turn the Diesel engine off.

Check the following:
– Weight and dimensions of the machine: see "Technical Data".
– The required load carrying capacity and length of the tackle.

Danger of accidents due to suspended / falling load!
! Never step or stand underneath a raised machine or load!

3.5.1 Removal and installation of the bucket



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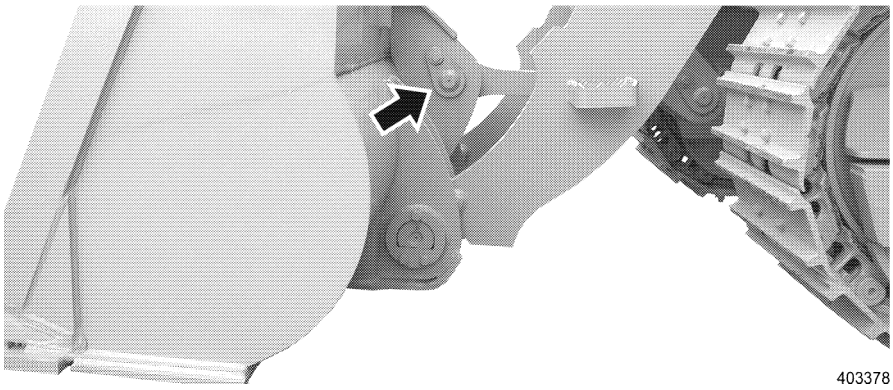
Lower the attachment

- Lower the bucket to the ground.



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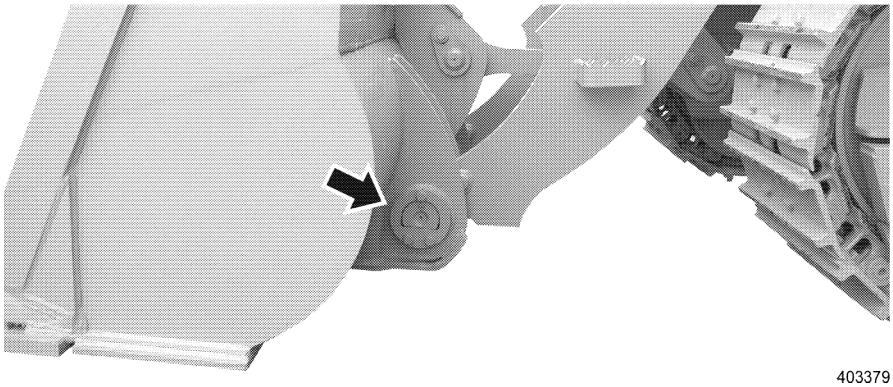
Bearing pin - connector bracket

- Remove the retaining screw of the bearing pin on the connector bracket on the bucket. Knock the pin out with a suitable tool.



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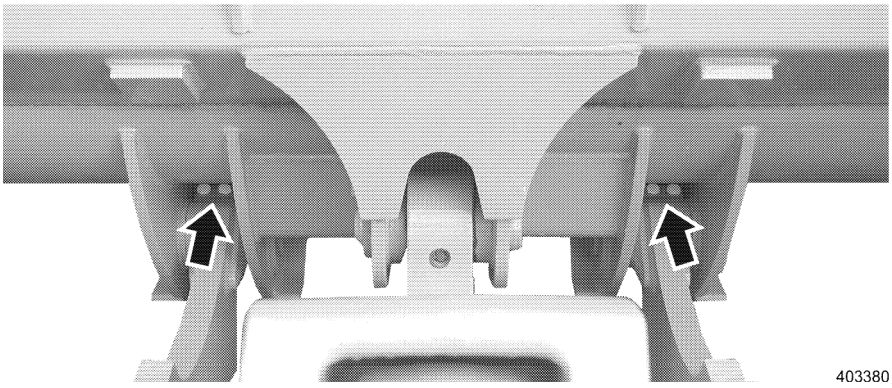
Retaining plate - bucket

- Remove the retaining plates for the bearing pin on the left and right hand side on the bucket arm.



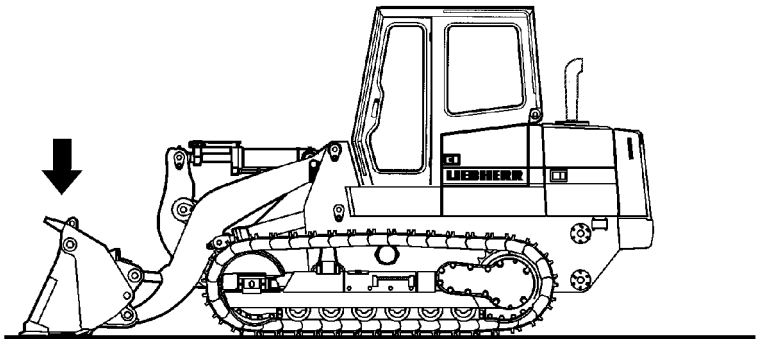
Lock screws

- Loosen the lock screws on the bucket arm and drive out the bearing pins from the inside to the outside.
- Carefully move the machine backward until the bucket stands by itself.

Install in reverse order.

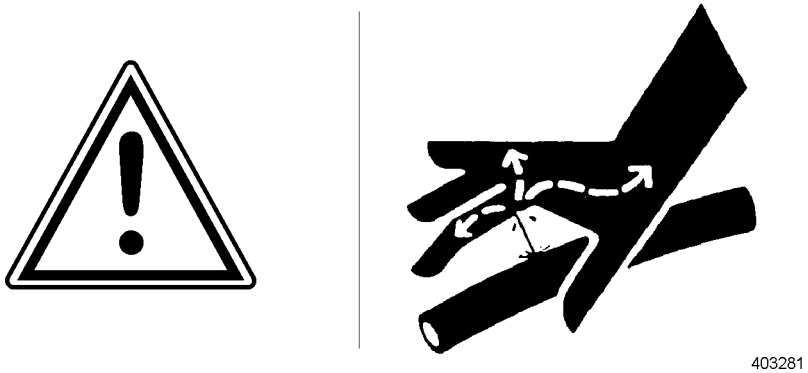
– If the attachment is to be stored for a longer period of time, protect all parts from corrosion.

3.5.2 Removal and installation of 4 in 1 bucket



Lower the attachment

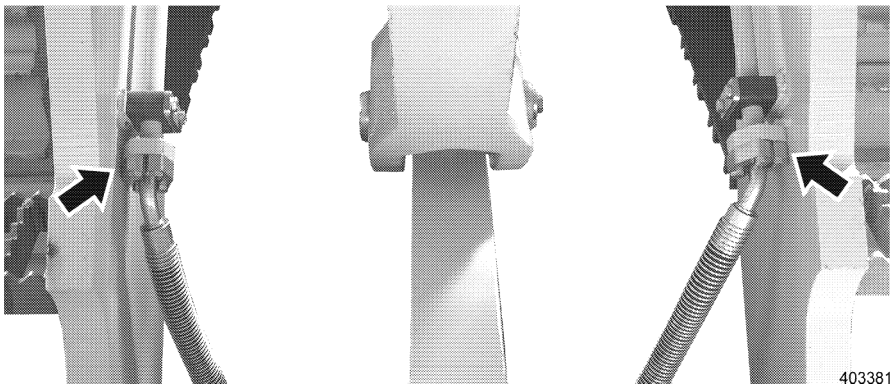
- Place the 4 in 1 bucket on the ground.



Hydraulic pressure

! Do not remove any lines, hoses, connectors as long as the hydraulic system is under pressure.

With the Diesel engine turned off and the ignition key in the on position, actuate all functions to reduce the pressure in the hydraulic lines.

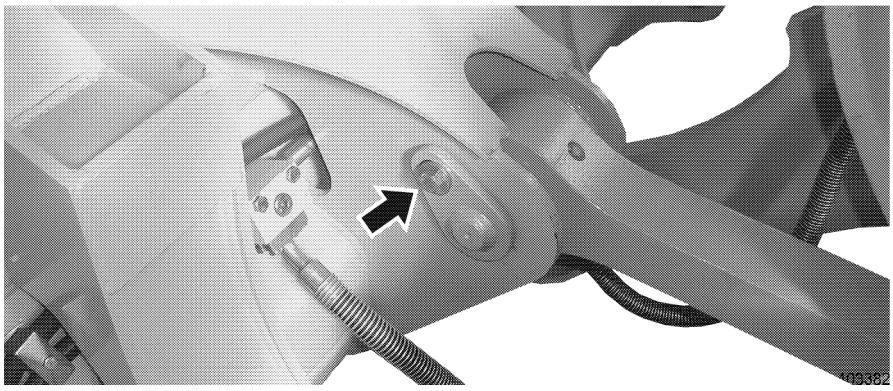


Hydraulic lines

- Remove the hydraulic lines for the bucket cylinder on the bucket arm.

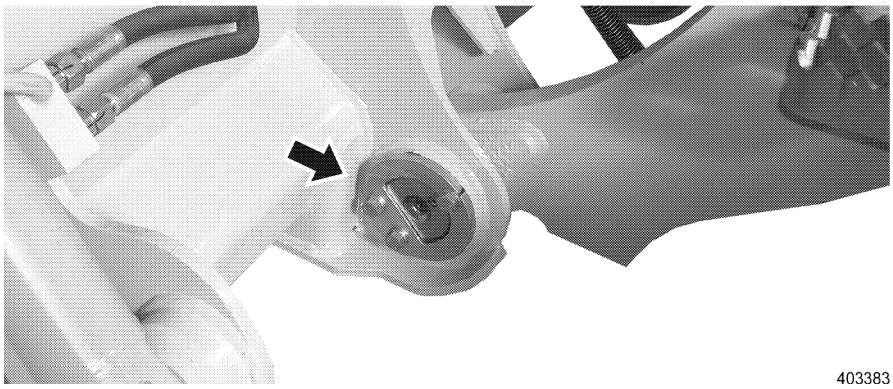
– Catch any emerging hydraulic oil in a suitable container.

- Close off the hydraulic lines and connections on the splitterbox with covers.



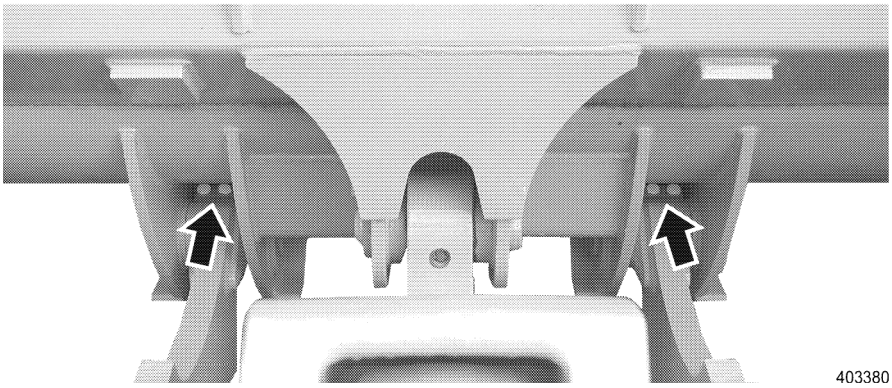
Retaining screw - bearing pin

- Remove the retaining screw of the bearing pin on the connector bracket on the bucket. Knock the pin out with a suitable tool.



Retaining plate - bucket

- Remove the retaining plates of the bearing pin on the left and right hand side of the bucket arm.



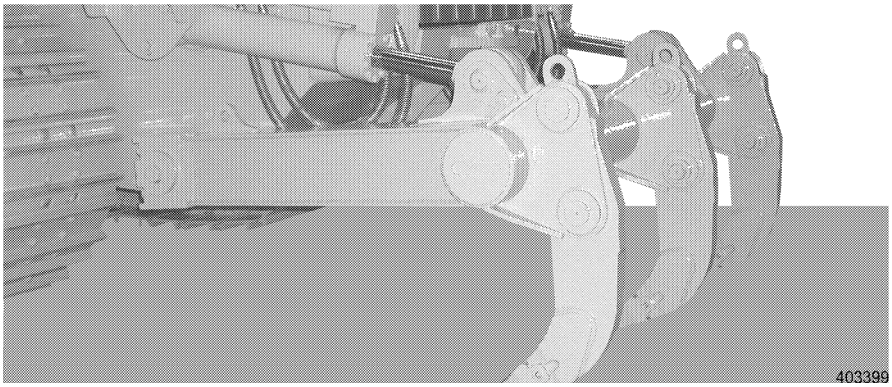
Lock screws

- Loosen the lock screws on the bucket arm and drive out the bearing pin from the inside to the outside.
- Carefully move the machine backward until the bucket stands by itself.

Install in reverse order.

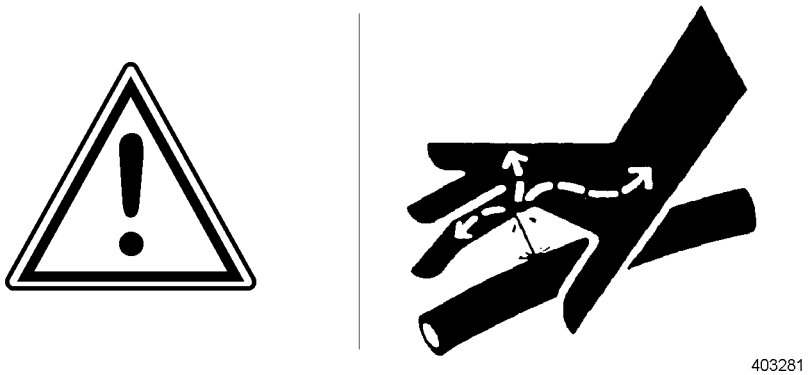
– If the attachment is to be stored for a longer period of time, protect all parts from corrosion.

3.5.3 Removal and installation of ripper



Lower the attachment to the ground

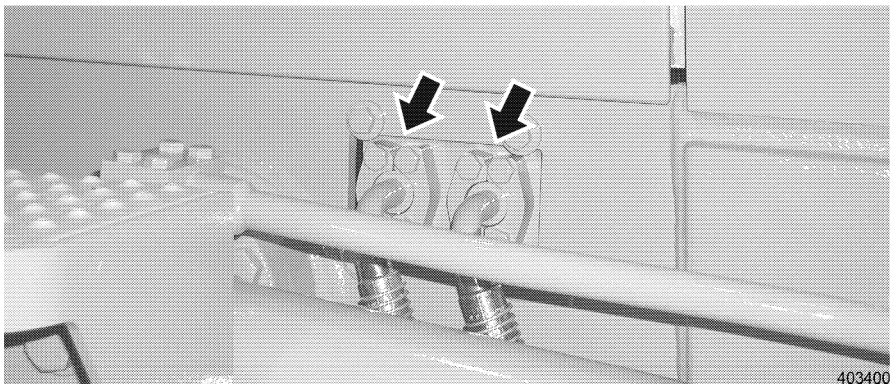
- Lower the ripper to the ground.



Hydraulic pressure

! Do not remove any lines, hoses or connectors as long as the hydraulic system is under pressure.

With the Diesel engine turned off and the ignition key in the on position, actuate all functions to reduce the pressure in the hydraulic lines.

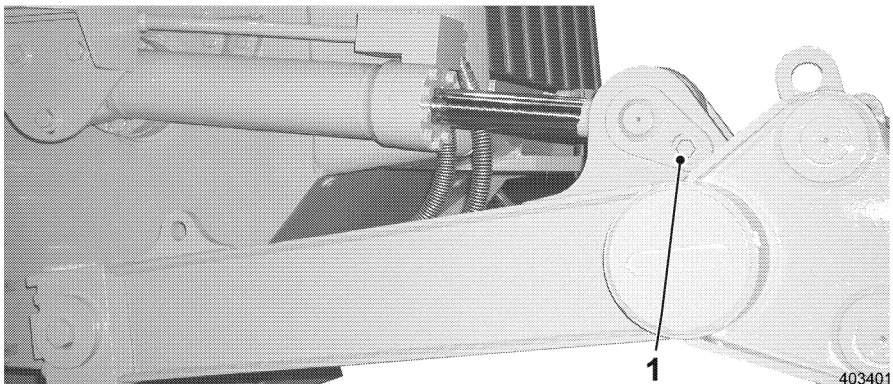


Hydraulic lines

- Remove the hydraulic lines for the ripper on the left and right hand side of the carrier frame.

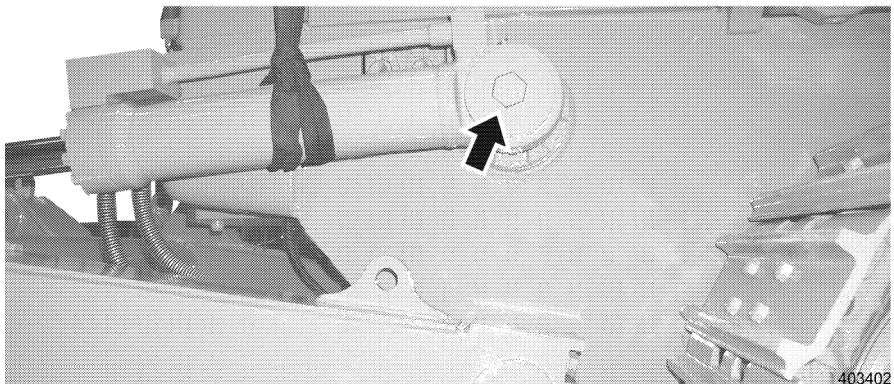
– Catch any emerging hydraulic oil in a suitable container.

- Close off the hydraulic lines and connections on the carrier frame with covers.



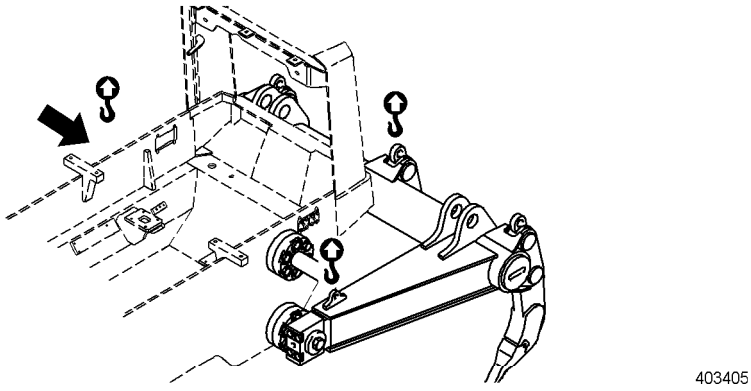
Bearing pins - ripper cylinder

- Remove the lock screw 1 of the bearing pin for the ripper cylinder. Knock the pins out with a suitable tool.
- Lift the hydraulic cylinder slightly with a suitable lifting device.



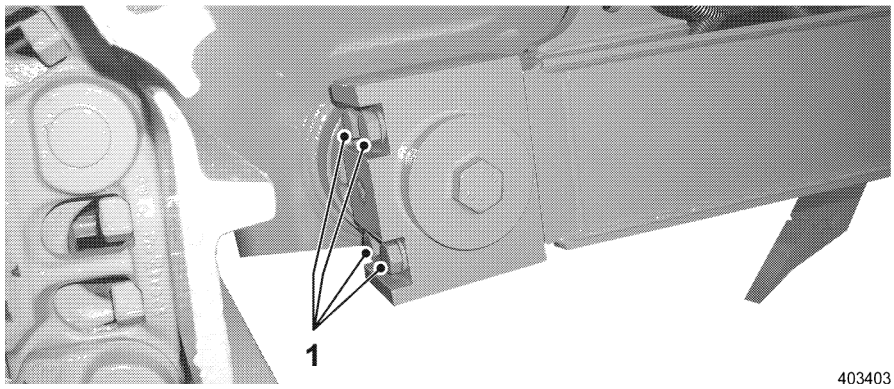
Hex head screws on the ripper bearing

- Remove the hex head screws on the ripper bearing and remove the washer.
- Pull the ripper cylinder on the left and right hand side with the lifting device from the bearing pin and place down.
- Remove the sleeves from the bearing pin.



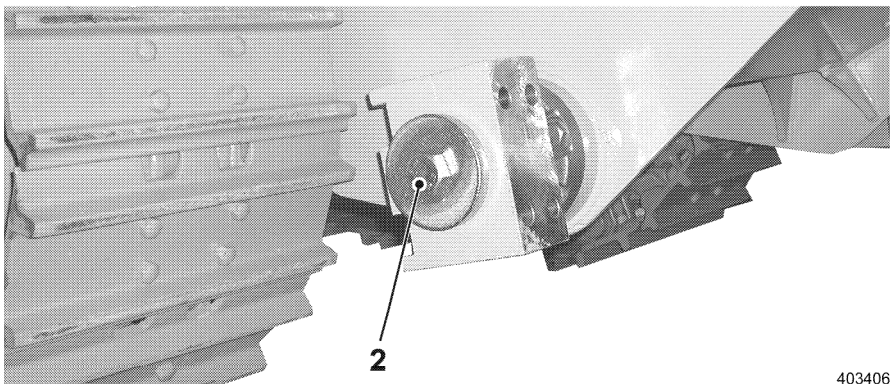
Tackle points - ripper

- Attach the lifting device to the intended points and lift the ripper slightly.



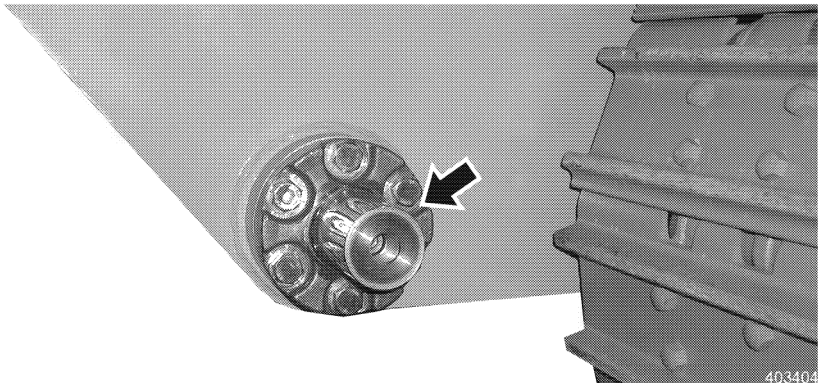
Screws - bearing

- Remove the hex head screws 1 on the left and right hand side of the bearing and lift the ripper from the machine.



Mounting screws - bearing

- Remove the mounting screws 2 of the bearing and remove the bearing.



Bearing pin

- Remove the bearing pin on the carrier frame on the left and right hand side.

! Danger of accidents!
– When the ripper is removed, the stability of the machine does to conform to the series design!
! When working with the machine, the ripper or the rear counter weights must be installed.

3.6 Emergency operation

In case of a problem on the machine, it might become necessary to tow the machine from a danger zone.
The following towing instructions apply only for exceptional cases, to move the disabled machine to a location where it can be repaired or loaded for transport.
Towing speed and distance:
– The max. towing speed is no more than 2 km/hr. (step by step speed).
– Permissible only for a short distance to remove the machine from a danger zone.
Always haul the machine over long distances!

3.6.1 Towing the machine

Towing the machine is always problematic and the responsibility always rests with the person or persons performing the towing service.
Defects or accidents, which may occur during towing are never covered by the manufacturer's warranty.

Towing safety

See also "Machine towing safety".

Danger

Danger of accidents due to improper towing!
Improper towing of a disabled machine could result in severe injury or death!

! Always block and secure the machine against movement before disconnecting or releasing the brakes!

- When towing a machine, observe all safety rules and follow the below listed recommendations.

– Keep the angle of the towing cable to the machine at a minimum. It may never deviate by more than 30° from the machine length axle.
– Always start out and move the machine slowly and evenly. Jerky movement can overload the towing cable or rod and cause it to break or snap.
– When towing a machine on a hill, the towing machine must be at least as large as the machine being towed. Power, weight and brake force of the towing machine must be sufficient to keep both machines under control. If necessary, add a machine of the same size to the rear for braking purposes.

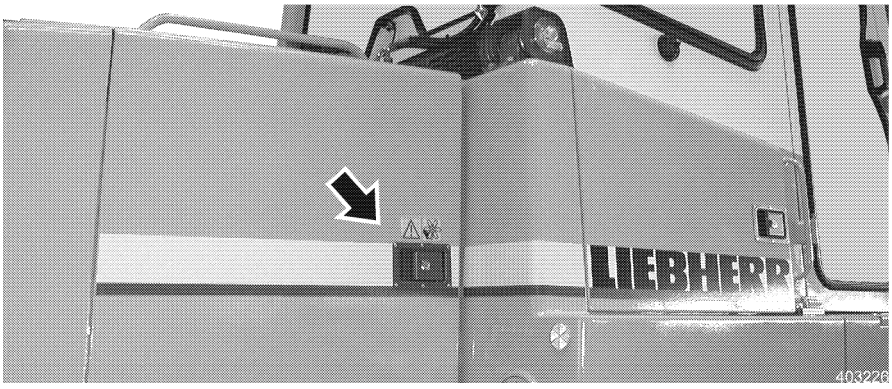
Towing the machine

The machine is equipped with a parking brake, which is vented via hydraulic pressure, the hydrostat acts as a service brake. If the machine is disabled, the parking brake is applied and the machine cannot be moved.

Prepare the machine for towing

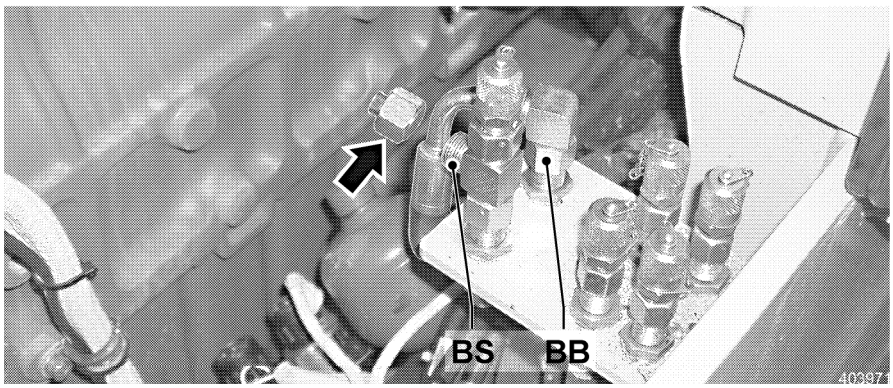
To be able to tow the machine, the hydrostat must be short circuited and the parking brake must be released.

! Towing the machine is only possible if the electrical system is fully functioning.



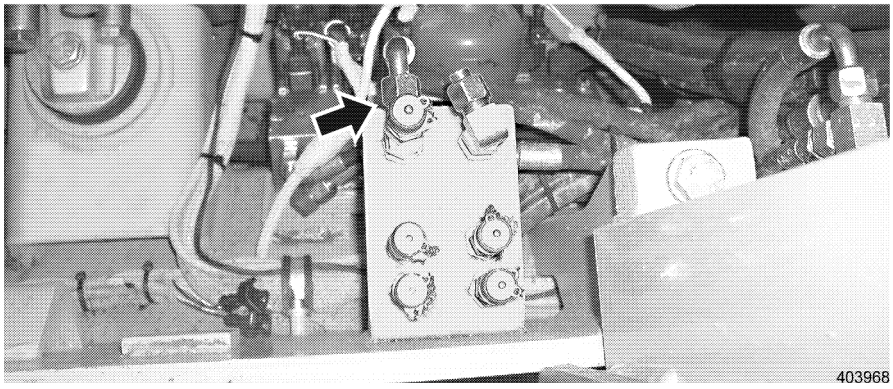
Open the right engine compartment door

- Open the right engine compartment door.



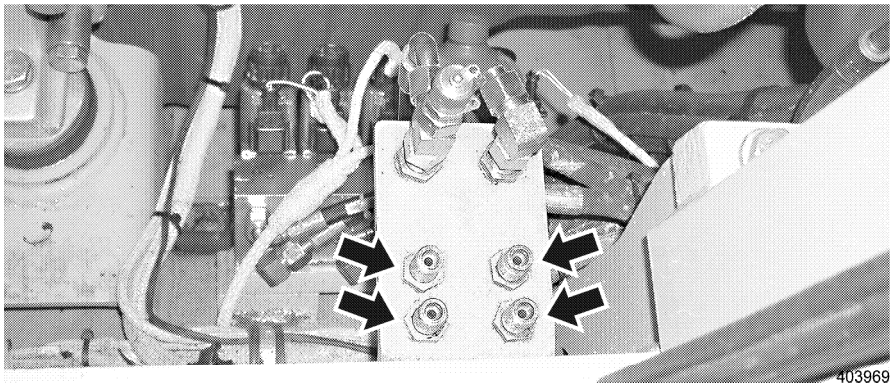
Connection "BS"

- On the test console, remove the union nut and fitting on connection "BS".



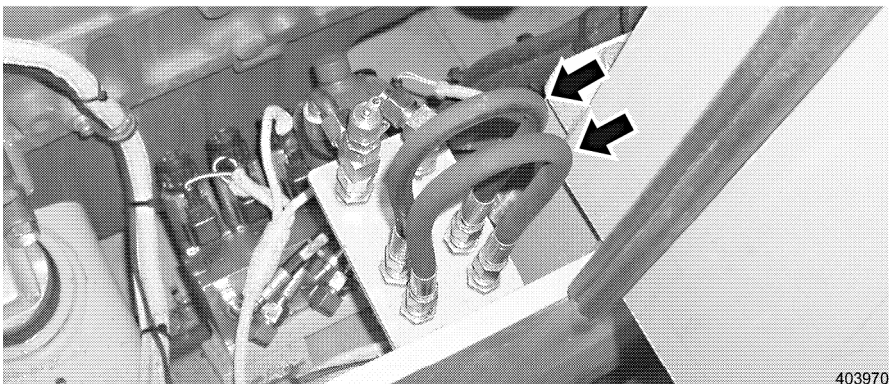
Connect a hose

- Remove the hose from connection "BB" and connect it on connection "BS".
- Install the fitting and union nut on connection "BB" of the removed hose.



Remove the test fittings

- On the console, remove the four test fittings.
- Remove the hydraulic lines to short circuit from the tool box.

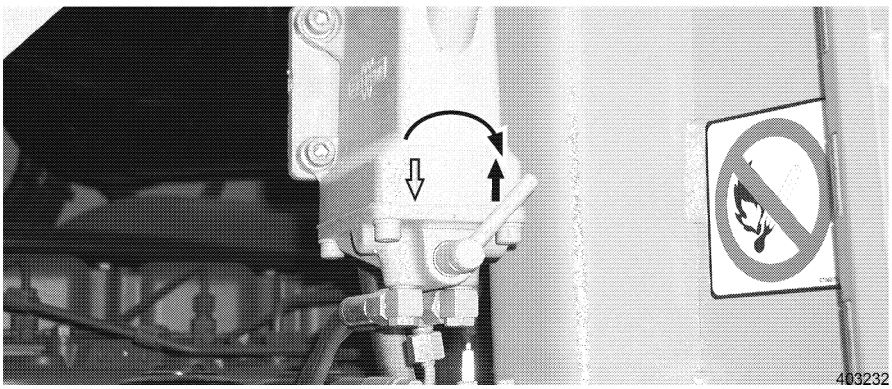


Short circuit the connections

- Short circuit the connections "M1L-M2L" and "M1R-M2R" with hydraulic lines.
- Close the right engine compartment door.

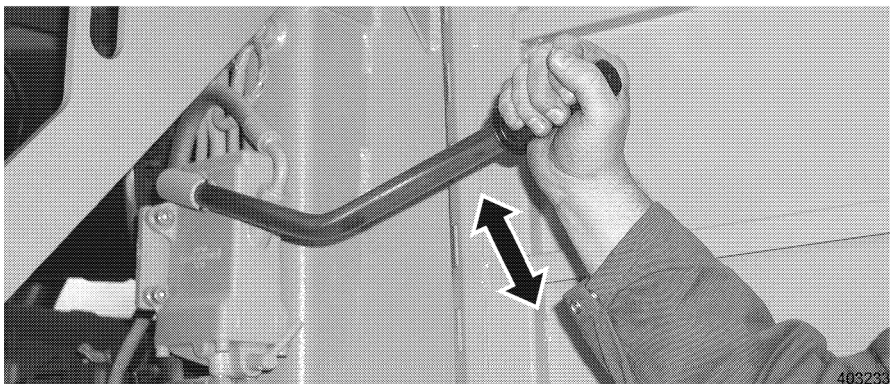
Battery compartment door

- Open the battery compartment door.



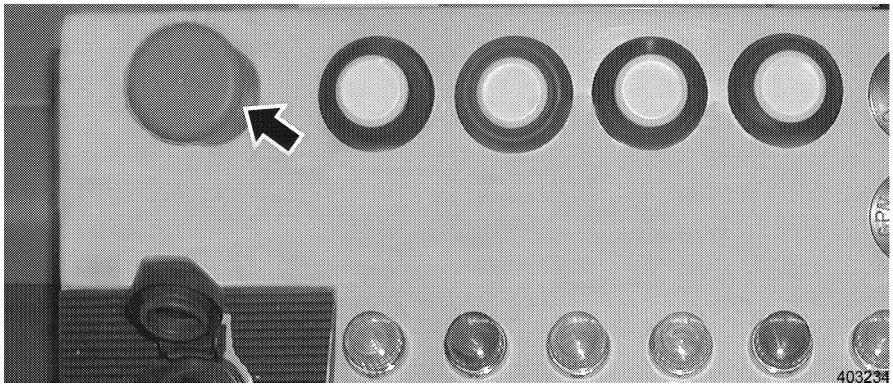
Hand pump - Lever "LIFT"

- Set the lever on the hand pump to the "LIFT" position.



Actuate the hand pump

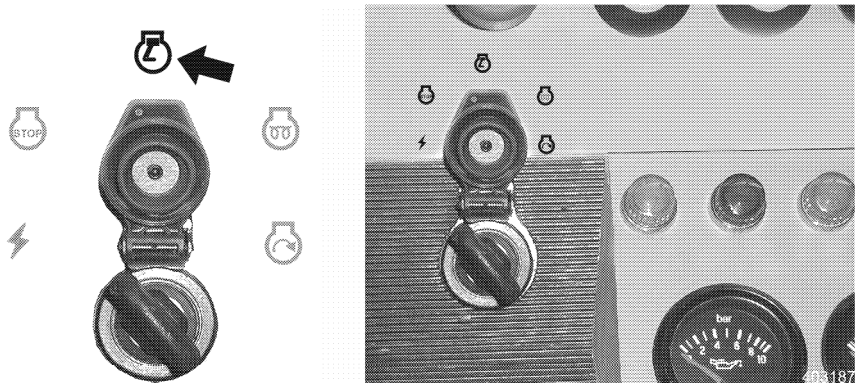
- Take an extension pipe from the tool box.
- Actuate the hand pump (approx. 20 times) until you can feel a noticeable increase in pressure and until you can hear a noise (when the pressure relief valve of the hand pump actuates).
- Close the battery compartment door.



Emergency off button raised

- Check the position of the emergency off button.

– For the towing procedure, the emergency off button must be in operating position (raised).

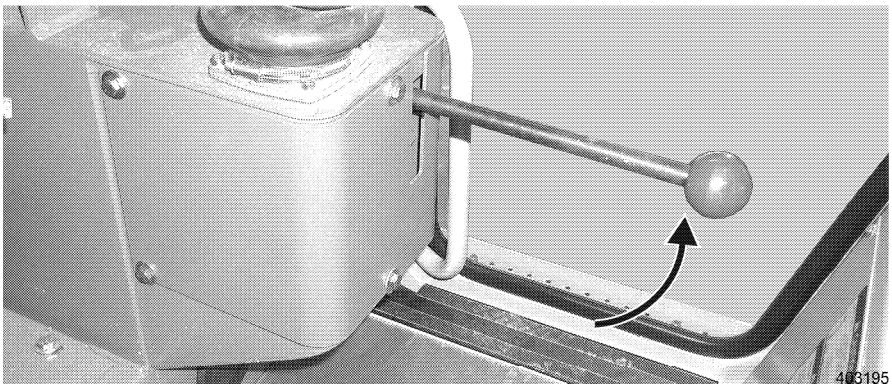


Starter switch - contact position

- Set the starter switch to contact position.

The following indicator lights light up:
– Indicator light - travel brake
– Indicator light - replenishing pressure
– Charge indicator light
– Indicator light - low speed range

– Indicator light - electronic



Safety lever up

Raise the safety lever, the hydraulic pressure, which is built up with the hand pump releases the parking brake.

- Raise the safety lever.

– Indicator light - travel brake turns off.

Danger

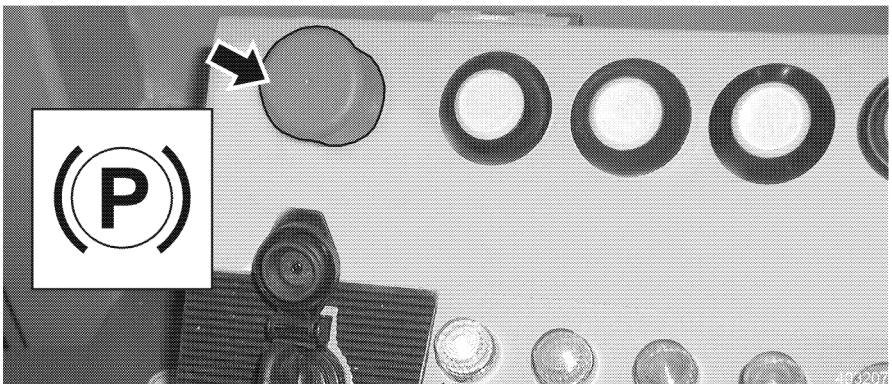
The braking system on the machine is now released.
– Carry out the towing procedure while observing all safety guidelines.

Stop the machine

By pressing the emergency off button or placing the safety lever down, the parking brake is applied.

Caution

In dangerous or unclear situations, the machine can be stopped by pressing the emergency off button.

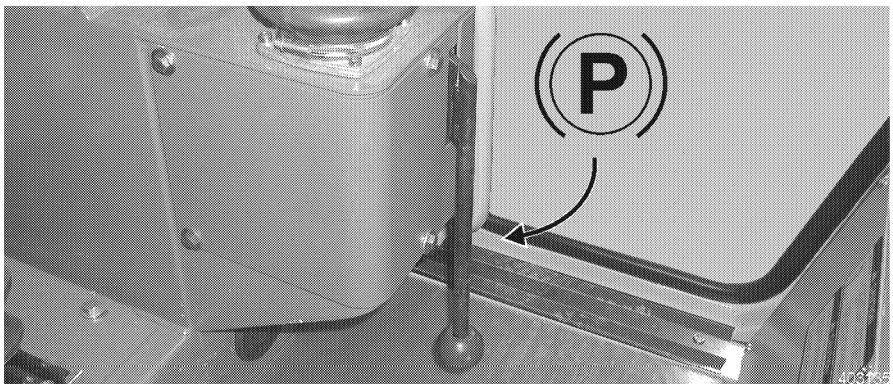


Press the emergency off button

- Press the emergency off button.

– The parking brake is applied.

To continue the towing procedure, repeat the procedure following the hand pump actuation.



Safety lever down

After the towing procedure

- Press the emergency off button.

– The parking brake is applied.
– The indicator light - parking brake - must light up.

- Move the safety lever to the down position.
- Turn the ignition off
- Open the battery compartment door.
- Move the lever on the hand pump to "DOWN" position.

Danger

Before putting the machine back into service, make sure that all parts used for towing have been removed and the machine is returned to series condition.

3.6.2 Auxiliary starting procedure

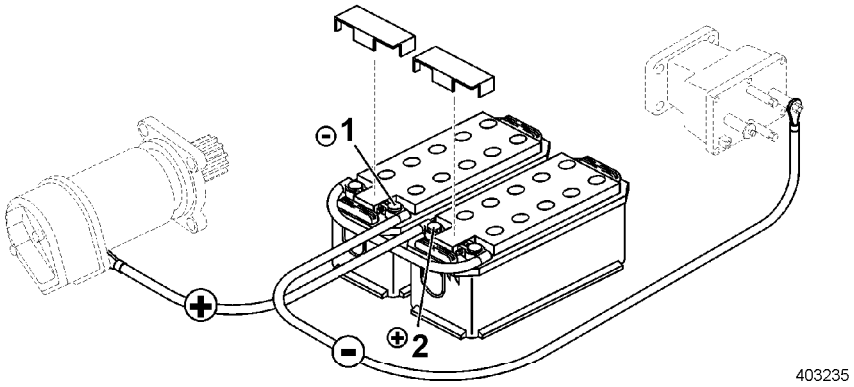
In case of starting problems due to old batteries, the machine can also be started with an external battery.
Make sure that the following safety preparations have been made.

Attach the auxiliary battery

Danger

Danger of accidents due to incorrect or unsafe procedure when starting the machine with auxiliary batteries!
When connecting the auxiliary batteries, increased gas formation on aging batteries can cause an "EXPLOSION"!

! Avoid open flames and sparks in the area near the batteries.
! Make sure to wear protective glasses and gloves during the auxiliary starting procedure.
! Use a sufficiently sized auxiliary starting cable.



Auxiliary starting procedure

1 Ground point of discharged battery
2 Positive terminal of discharged battery

- Connect an auxiliary starting cable first to the positive terminal of the discharged battery 2 and then to the positive terminal of the external battery.
- Connect the second auxiliary starting cable first to the ground point for the discharged battery 1 and then to the negative terminal of the auxiliary battery.
- Start the Diesel engine. See section "Start the Diesel engine".

Disconnect the auxiliary battery

Before removing the auxiliary starting cable, bring the Diesel engine to low idle speed.
If necessary, turn on a large power user, such as the floodlights, to avoid over voltage.

- Remove the auxiliary starting cable first from the negative terminal of the auxiliary battery and then from the ground point of the discharged battery 1.
- Then remove the second auxiliary starting cable from the positive terminal of the auxiliary battery and then from the positive terminal of the discharged battery 2.

4. Operating problems

Warning and problem reports

– Diverse problems are shown optically via the corresponding indicator lights or indictors and gauges on the instrument panel.

See also "Control, operation", paragraph "Indicator unit".

– Warning functions are sometimes also acoustically supported.

Recognition and remedy of problems and errors

– Often problems are caused by improper machine operation or maintenance.

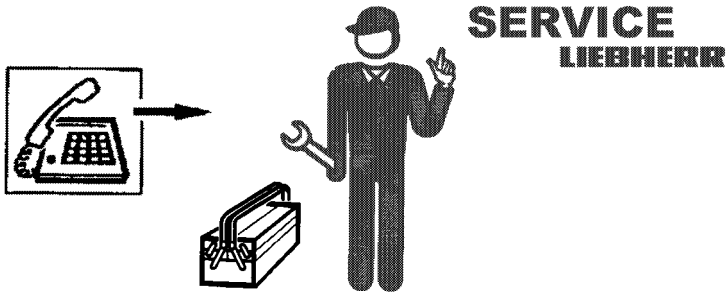
For that reason, always read the corresponding section in the Operating Manual if a problem occurs.

– Analyze the cause of the problem and fix it immediately!

– If you contact LIEBHERR Service, please describe the problem and all corresponding circumstances in detail.

Detailed information makes it possible to find and fix the cause of the problem quickly. Have the machine data and serial number of the machine available.

– Do not perform any work for which you are not trained.



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LIEBHERR Service

If you cannot find the cause of the problem with the "Error code charts", or if you cannot fix the problem, contact LIEBHERR Service.

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4.1 Problems and remedy

Diesel engine and fuel system

Problem / error	Cause	Remedy
The engine does not start	The safety lever is in uppermost position	Place safety lever down
	Engine shut off control is not in operating position (PR732B/742B/LR632)	Bring engine shut off control into operating position
	Fuel tank is almost or completely empty	Add fuel and bleed the fuel system
	Shut off valve in fuel line is closed	Open shut off valve
	Fuel filter displaced	Clean or change filter and bleed the system, drain fuel / clean tank
	Ambient temperature below 0°C	Control and operation for special climatic conditions, see Operation and Maintenance Manual
	Starter does not operate	Check the line connections
	Starter does not operate	Overhaul the starter or change the starter ring (Inst)
	Battery capacity is low	Recharge / replace
Engine starts but stops again or runs unevenly	Fuel tank empty	Add fuel and bleed the system
	Fuel pre-cleaner is dirty	Clean and bleed the system
	Fuel filter is dirty	Clean the filter and bleed the system (tank)
	Especially in winter: engine oil is too viscous	Use engine oil recommended for the ambient temperature.
	Air filter is dirty	Clean or change the primary filter element
	Air in fuel system	Bleed the system
	Vent on fuel tank is plugged	Clean
	Fuel line is kinked	Check and fix line
Exhaust is gray or black	Air filter is dirty	Clean or replace filter

!	?	✓
Exhaust is white (vapor)	Water in combustion chamber	Call Service Dept.
Engine does not reach full RPM	The throttle control lever is not set to full load	Set the throttle control lever to full load
	Dry air filter is dirty	Clean or replace filter
	Bad fuel supply	Check fuel pre-cleaner, fuel filter, lines, drain tank
Engine is getting too hot	Not enough coolant	Add coolant, check for leaks
	Water pump is defective	Check for leaks / fix
	Thermostats are not working	Change thermostats
	Radiator is dirty	Clean radiator
Engine oil pressure is insufficient **NOTE:** Turn the engine off immediately!	Oil level too low	Correct oil level
	Oil pressure gauge is defective	Change oil pressure gauge
Engine uses too much oil	External leak on engine	Retighten screws, replace seals if necessary
Oil in coolant or coolant in oil		Call Service Dept.
Whistling noise on exhaust side	Exhaust system is not tight, leaks	Check / fix exhaust system

Hydraulic system

! Problem / error	? Cause	✓ Remedy
Indicator light for replenishing oil pressure does not turn off after starting the engine **NOTE:** Turn the engine off immediately!	Increased leakage	Call Service Dept.
Abnormal noise on hydraulic pumps **NOTE:** Turn the engine off immediately!	Shut off valve on hydraulic tank is closed	Open shut off valve
	Hydraulic pumps draw in air	Check the oil level in the hydraulic tank, check the suction lines for leaks
No reaction if travel lever is deflected	Safety lever in down position or emergency off switch is pressed	Raise the safety lever / pull the emergency off switch
No reaction when actuating the blade up function	Float position is turned on	Turn off float position

Tracks / travel gear

Problem / error	Cause	Remedy
Oil emerges on track rollers, carrier rollers or idlers	Seal is defective	Replace seal
Deficient chain guidance on idler	Idler guide on track roller frame has too much play	Adjust the play of the idler guide
Chain jumps off or over	Chain tension too low / sprocket is worn	Adjust / replace chain tension
Correctly tensioned chain looses tension quickly during operation	Chain tension cylinder is defective	Check chain tension cylinder, change if necessary or reseal (only by authorized expert personnel)
Track roller or carrier roller is stuck	Track is extremely dirty	Clean

Electrical system

Problem / error	Cause	Remedy
Charge indicator light does not turn off	V-belt for alternator is loose or broken	Tension or replace V-belt
	Alternator is defective	Change alternator
Batteries are not charging or insufficiently charged	Batteries are defective	Change the batteries
	Battery terminals are dirty / corroded	Clean battery terminals
	Cable is loose or defective	Connect or replace cable
No function or erroneous function of an indicator light or gauge	Bulb is burnt out, gauge is defective	Replace defective part
Failure of some or all instrument panel functions	Plug connector is unplugged or defective, ground is interrupted, short circuit - fuse is defective	Connect or change plug connector, fix short circuit, replace fuse

Heating system

Problem / error	Cause	Remedy
Heater does not put out warm air	Shut off valves on coolant line on engine are closed	Open shut off valves
	Engine is not at operating temperature	Bring engine to operating temperature
Heater fan is not running	No power supply	Check fuse and check wires / fix if defective

!	?	✓
	Fan motor defective	Change fan motor
Insufficient fresh air in operator's cab	Fresh air filter is dirty	Clean air intake openings, replace fresh air filter

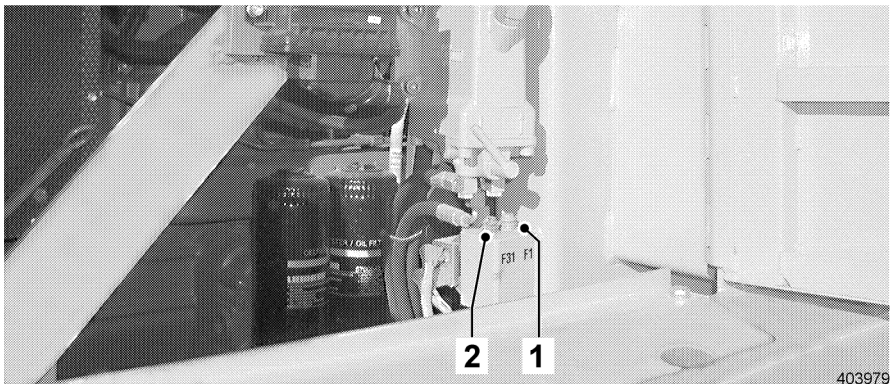
Working attachment

! Problem / error	? Cause	✓ Remedy
Cylinder gives way under load	Piston seal in cylinder is defective	Overhaul cylinder
PR- chain scrapes on push frame	Blade adjustment incorrect	Adjust correctly
Increased bearing play on attachment	Bearing points worn	Replace bearing sections

4.2 Problem remedy

4.2.1 Change fuses

To prevent damage to the electrical system, always use fuses with the correct amperage. Before replacing the fuse, check the affected circuit!



Fuses in battery compartment

Main fuse

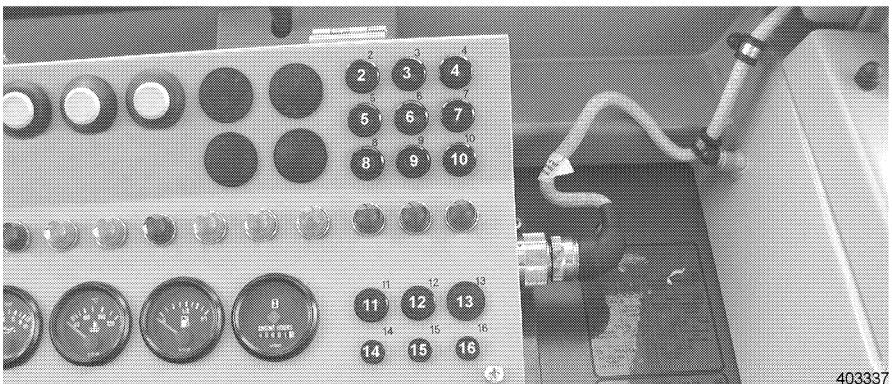
The main fuse (size 35A) 1 is installed on the right hand side of the machine in the battery compartment.

Fuse - flame glow system

The fuse for the flame glow system 2 (size 35A) is installed on the right hand side of the machine in the battery compartment.
If the safety fuse is triggered, it is important to find the cause of the overload and remedy the problem before turning the safety fuse back on.

- The power supply of the machine is reestablished by pushing the push button on the safety fuse.

Additional fuses
The remaining fuses are located in the instrument panel as well as in the roof console of the operator's cab.
After opening and removing the screwed in cover, the individual fuses can be removed and checked.



Location of fuses F2 to F16

Fuses in instrument panel.

Location of fuses F25 to F30

Fuses in roof console.

- Depending on the electrical problem, check the following chart for the description and fuse size.
- Pull the affected fuse and replace it with a new fuse (amperage according to location).

Fuse chart

Fuse	Value	Unit	Description / Function
F 2	2	A	Preglow system
F 3	6.3	A	Charge indicator, cab illumination, radio, transformer
F 4	8	A	Electronic supply, starter lock relay
F 5	10	A	Electrical socket
F 6	5	A	Indicators / gauges, indicator lights, fan control
F 7	8	A	Auxiliary floodlights (optional equipment)
F 8	25	A	Power supply roof console
F 9	20	A	Shut off solenoid
F 10	5	A	Hydraulic valves
F 11	10	A	Heater fan, air conditioning system, operator's seat with air suspension
F 12	16	A	Condenser fan, air conditioner
F 13	20	A	Refueling pump
F 14	5	A	Control line bucket float position, hoist limit switch, float position

F 15			Not used (For optional equipment)
F 16			Not used (For optional equipment)
F 25			Not used (For optional equipment)
F 26	8	A	Windshield wiper and washer system, front and rear
F 27	8	A	Headlight, left front and right rear
F 28	8	A	Head light, right front and left rear
F 29	2	A	Warning light - cab
F 30			Not used (For optional equipment)

Fuse – electrical socket 12 V

Fuse – electrical socket 12 V

The 12 V electrical socket is protected with a separate fuse in the wiring harness.

- In case of failure of the 12 V electrical socket 1, remove the 4 screws 2 on the roof console and fold the console down.

– The fuse for the electrical socket is integrated in the wiring harness.

- Check the fuse and replace it, if necessary.
- Fold the roof console up and secure with the 4 screws 2.

Fuse	Value	Unit	Description / Function
F 50	7.5	A	Electrical socket 12 V

5. Maintenance

Englisch LWT - TD 8/6/2004

5.1 Maintenance and inspection schedule

Maintenance / Inspection at operating hours							Work to be carried out	Performance guidelines
At delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	**By maintenance personnel** ❑ First and only interval ❍ Repeat interval **By authorized personnel** ■ First and only interval ● Repeat interval **OM - Operation and Maintenance Manual** **SM - Service Manual** **Bh - Operating hours**	
							Diesel engine	
●	❍	❍	❍	●	●	●	Check oil level and oil pressure	OM
●	❍	❍	❍	●	●	●	Check coolant level	OM
	❍	❍	❍	●	●	●	Check engine, coolant location and pan for contamination / clean as necessary	OM
	❍	❍	❍	●	●	●	Check fuel / water separator / empty as necessary	OM
		❍	❍	●	●	●	Drain condensation and sediments from fuel tank - at least 1x per week	OM
			❍	●	●	●	Change engine oil [1)] - at least 1x per year	OM
				●	●	●	Change lube oil filter [1)] - at least 1x per year	OM
				●	●	●	Check radiator cap and fan	OM
				●	●	●	Replace coolant filter, check antifreeze and DCA4 content in coolant	OM
				●	●	●	Check V-belt - condition and tension	OM
●				●	●	●	Check oil, coolant and fuel system for leaks and condition	OM
●				■	●	●	Check intake and exhaust system for mounting and leaks	OM
				■	●	●	Check mounting tightness of oil pan and engine brackets	OM
				■	●	●	Check / adjust engine RPM	
				●	●	●	Replace fuel prefilter - filter insert	OM
					●	●	Check / adjust valve play - with cold engine	
					●	●	Check and service mechanical control to injection pump and potentiometer	OM
					●	●	Change fuel fine filter cartridges	OM
					●	●	Grease gear ring on flywheel	
					●	●	Check flame glow system - before start of cold season	
							Replace air filter inserts - as necessary / once a year	OM
							Replace oil separator - every 2 years	OM
							Replace coolant with antifreeze and DCA4 - every 2 years	OM
							Check / adjust injection valves - as necessary / every 3000 hrs.	

Maintenance / Inspection at operating hours							Work to be carried out	Performance guidelines
At delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000		
							By maintenance personnel ❑ First and only interval ❍ Repeat interval **By authorized personnel** ■ First and only interval ● Repeat interval **OM - Operation and Maintenance Manual** **SM - Service Manual** **Bh - Operating hours**	
Hydraulic system								
●	❍	❍	❍	●	●	●	Check oil level in hydraulic tank	OM
●	❑	❑	❑	●	●	●	Clean magnetic rod - up to 250 hrs. daily	OM
				●	●	●	Replace main hydraulic return filter insert, check all replenishing return filter inserts for deposits (only authorized personnel)	OM
				●	●	●	Replace hydraulic filter (inserts) - replenishing circuit	OM
●				●	●	●	Check working and travel hydraulic system for function and leaks, check hose routing for chafing.	OM
				●	●	●	Hydraulic tank - drain condensation and sediments - at least once every 6 months	OM
				●	●	●	Check / clean oil cooler for contamination	OM
				●	●	●	Check / adjust all hydraulic pressures according to adjustment check list	
				●	●	●	Check mounting and fittings for tight seating	OM
						●	Replace oil in hydraulic system (add oil via filter) - at least every 4 years - when using environmentally friendly hydraulic oils, request / observe special guidelines	OM
Splitterbox								
●			❍	●	●	●	Check oil level	OM
				●	●	●	Replace gear oil - at least once every 2 years	OM
Electrical system								
●	❍	❍	❍	●	●	●	Check system function, incl. indicators and gauges	OM
●				●	●	●	Check electrolyte level in battery	OM
				●	●	●	Clean / check / grease battery terminals	OM
				●	●	●	Check cable routing and connections	OM
				■	●	●	Check / adjust control system according to adjustment check list	
					●	●	Check battery charge - before start of cold season	

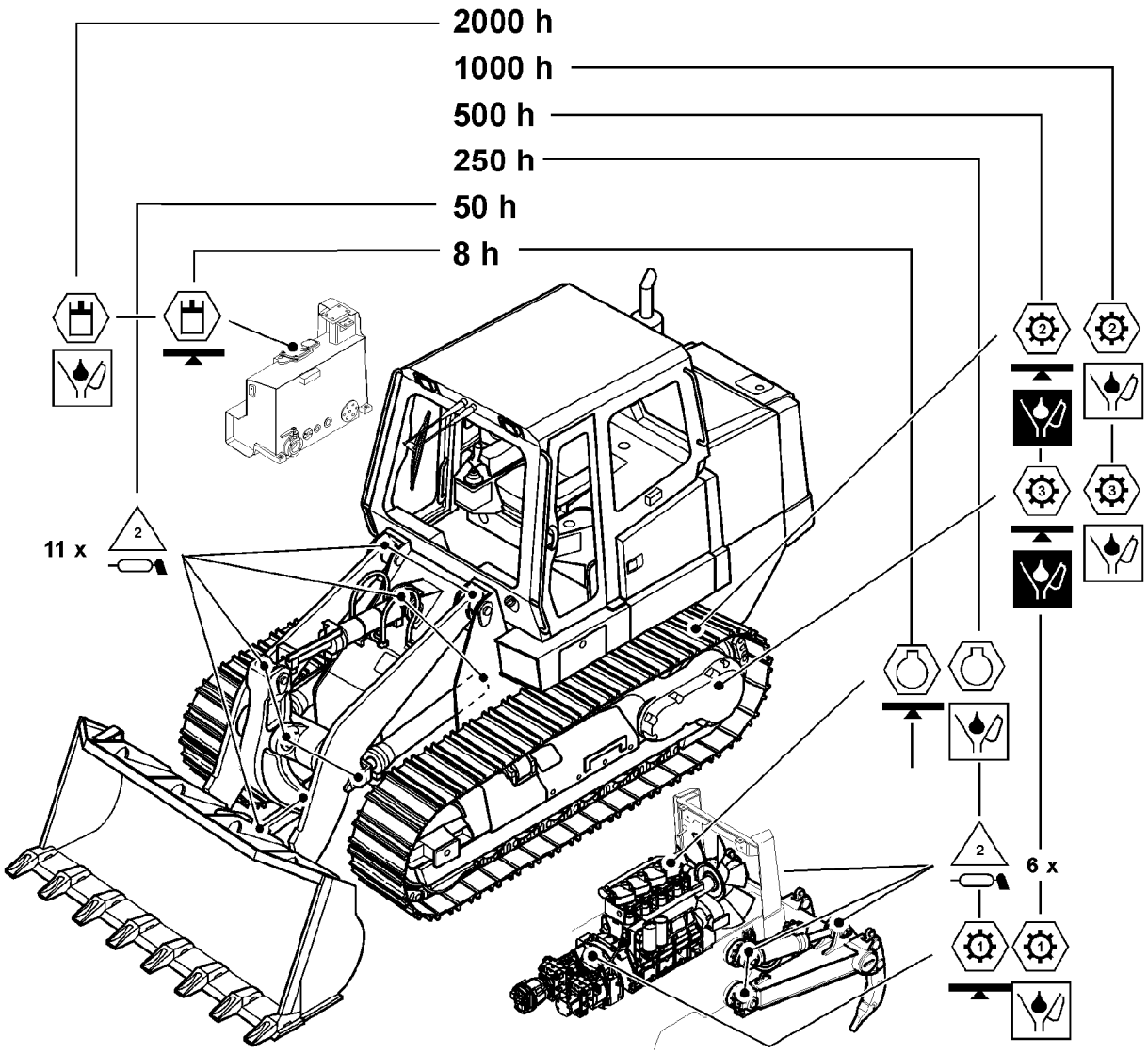
Maintenance / Inspection at operating hours							Work to be carried out	Performance guidelines
At delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	**By maintenance personnel** ❑ First and only interval ❍ Repeat interval **By authorized personnel** ■ First and only interval ● Repeat interval **OM - Operation and Maintenance Manual** **SM - Service Manual** **Bh - Operating hours**	
Heater/ventilation								
●				●	●	●	Check system for function and leaks	OM
							Replace fresh air filter - as necessary	OM
Travel gear								
●				●	●	●	Check oil level - clean magnetic plug	OM
				●	●	●	Check fittings for tight seating	OM
				■	●	●	Replace gear oil [1] - magnetic plug - at least once every 4 years	OM
				■	●	●	Replace lube oil in sealing chamber - at least once every 4 years	OM
Track components								
		❑	❑	●	●	●	Check mounting screws and nuts on track components, specifically pad and chain gear segment screws for mounting tightness	OM
		❑		●	●	●	Check carrier rollers, track rollers, idlers for leaks	OM
				●	●	●	Check / adjust idler guides, replace parts as necessary	OM
							Adjust chain tension to suit application - as necessary	OM
							Clean travel gear - as necessary	OM
							Check track wear - as necessary	

Maintenance / Inspection at operating hours							Work to be carried out	Performance guidelines
At delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	**By maintenance personnel** ❑ First and only interval ❍ Repeat interval **By authorized personnel** ■ First and only interval ● Repeat interval **OM - Operation and Maintenance Manual** **SM - Service Manual** **Bh - Operating hours**	
Working attachment								
●	❍	❍	❍	●	●	●	Check cutting edges, bucket and ripper teeth for wear / make sure attachment is suited to application	OM
●		❍	❍	●	●	●	Lubricate all bearing points according to the lubrication chart - Shorten intervals, as necessary	OM
				●	●	●	Check all bearing points for wear / check bearing play	OM
●		❑		●	●	●	Check bucket attachment - stops and adjustment of limit switch	OM
		❑		●	●	●	Check screws, nuts and pin retainers for tight seating	OM
				●	●	●	Check attachment for damage	OM
General								
●				●	●	●	Check the complete machine for proper maintenance and condition	OM
							Lubricate door hinges on the operator's cab - as necessary	OM
●							Explain machine literature, special operating instructions / safety guidelines to operator	OM

1) For oil specification and viscosity, refer to "Lubricants and service fluids".

5.2 Lubrication chart

The lubrication chart is used as an overview for the location of the maintenance points on the machine and the maintenance intervals.
For detailed information, refer to "Maintenance and Inspection plan", as well as individual descriptions of maintenance procedures, see "Maintenance".
For detailed information about required lubricants and service fluids, as well as fill quantities, see "Lubricants and service fluids".



Lubrication chart - Illustration

Diesel engine

Hydraulic tank

Splitterbox

Travel gear

Travel gear lifetime seal

Lube points

Hinges

Intervals in operating hours

Check oil level

Oil change - once

Oil change

Lubricate

5.3 Lubricants and service fluids

5.3.1 Handling lubricants and service fluids

Careful adherence to the handling instructions for lubricants and service fluids increases the reliability and life expectancy of your machine.
It is especially important that the lubrication specifications are adhered to.
Cleanliness is of utmost importance when changing engine, gear and hydraulic oil. Always clean fittings, covers and the surrounding area before removing them.
For information regarding maintenance intervals, refer to "Maintenance and inspection schedule" and "Lubrication chart".
For information regarding procedure for lubrication, fluid level check and changing of service fluids, refer to "Maintenance", "Maintenance tasks...".
When handling lubricants and service fluids, proceed as follows and observe environmental guidelines.

Environmental measures

- Always adhere to and observe environmental measures.
- Observe all regional and local regulations.
- Before draining service fluids, make sure you know the correct way to dispose of the fluids.

Disposition of used service fluids and materials

Affected are used service fluids and materials, such as:
– oils, lubricants, coolants, etc.,
– fuels,
– filters, oil filter elements, etc.,
– rubber, insulating panels, etc.,
– batteries.

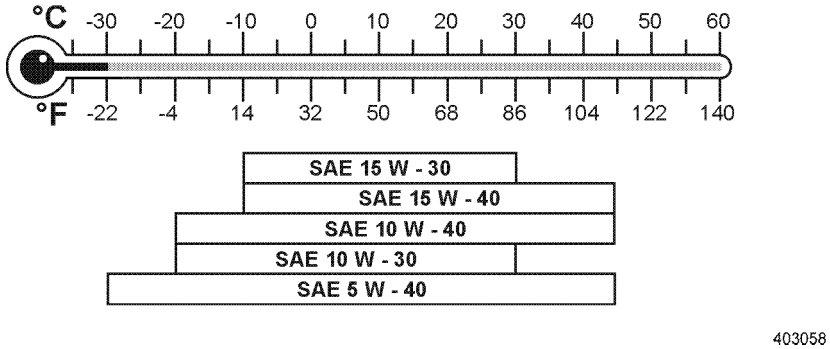
- Please observe all environmental protection regulations and guidelines when disposing of used service fluids and material.
- Collect all used service fluids and materials in a suitable container, store and dispose of them only in an environmentally safe manner in officially designated locations.
- Observe all local and regional regulations.

5.3.2 Lubricant and service fluid specifications, filling quantities

The filling quantities noted on the lubricant and service fluid chart are only guidelines:
– In any case, the level marks on the dipstick are applicable.
Always recheck the fluid level in the corresponding component every time lubricants or service fluids are changed or refilled.

Diesel engine

Fill quantity	Service fluids	Specification
22 l (5.8 US gal.)	Engine oil, viscosity per SAE	API CF-4, CG-4, CH-4 ACEA E2, E3, E4, E5, (D4, D5)



Temperature dependent selection of SAE classification

Lube oil viscosity

The selection of the lube oil viscosity is made according to the SAE classification (Society of Automotive Engineers).
The determining factor for the correct selection of the SAE classification is the ambient temperature.
The choice of the SAE classification gives no information about the quality of the lube oil.
If the viscosity is too high, the machine may be hard to start, if the viscosity is too low, it may provide insufficient lubrication.
The temperature ranges noted in the chart are guidelines, they may be exceeded in either direction for a short time period.

Lube oil change intervals

Change intervals
– Oil change intervals depend on climate zone, sulfur content in fuel, and oil quality, as noted in the following chart.

If the noted annual operating hours are not reached, change the engine oil and filter once a year.

Aggravating circumstances

Various factors or difficult applications can change the maintenance intervals:
Aggravating circumstances or difficult applications can be:
– repeated cold starts
– sulfur content in fuel of more than 0.5%
– ambient temperature below -10°C

If aggravating circumstances or difficult applications are present, then the oil change intervals noted in the "maintenance and inspection schedule" must be cut in half, according to the following chart.

Ambient temperature	Sulfur content in fuel	E2, D4, CG-4, CF-4, CH-4	E3, E4, E5, D5
to -10 °C	to 0.5 % above 0.5 %	250 hrs. 125 hrs.	500 hrs. 250 hrs.
below -10 °C	to 0.5 % above 0,5 %	125 hrs. -	250 hrs. 125 hrs.

Fuel system

Fill quantity	Service fluids	Specification
320 l (84.5 US gal.)	Fuel	DIN EN 590, ASTM D 975-89a 1D and 2D

Specification

Diesel fuels must meet the minimum requirements of the above noted fuel specifications.
For additional fuel specifications contact Diesel engine design at LIEBHERR Machines Bulle S.A.
The sulfur content may not exceed 0.5 %. A higher sulfur content affects oil change intervals and the service life of the Diesel engine.

Viscosity

Lowering the sulfur content changes the viscosity of the Diesel fuel. Tests showed that Diesel fuels with max. 0.05% sulfur content, as valid in Europe, can cause increased injection pump wear (especially on distributor type injection pumps).
"Brand fuels" (in Germany DIN EN 590) contain these additives. The fuel viscosity must be less than 460 µm, per HFRR (60) test. (Lubricity corrected "wear scar diameter" (1.4) at 60°).
Request a written confirmation from the fuel supplier.
The additives should be added by the supplier as the responsible party for fuels. We do not recommend that our customers add secondary additives to fuels.

Diesel fuels in low ambient temperatures

When working in ambient temperatures below 0°C, the flow capacity of the standard warm weather Diesel fuel might be insufficient due to paraffin excretion. The same applies for cold season Diesel fuels below -15°C.
Diesel fuels with additives for use in temperatures to -20°C are often available.
To prevent operating problems in colder temperatures, Diesel fuel must be mixed with regular gasoline or petroleum. Adding regular gasoline should be considered a temporary measure and may not exceed **30 %** of the total volume.

Do not use Super gasoline for mixing.
These cold season additives can influence engine output. For that reason, always add as little as possible, just enough for that particular ambient temperature range.
For safety reasons, always mix fuel additives only in the fuel tank. When refueling, fill the specifically lighter fuel before refueling the Diesel fuel. Then run the Diesel engine until the two types of fuel are spread throughout the fuel system.

Diesel fuel mixing ratio (% of the total volume)

Ambient temperature in °C	Summer Diesel fuel %	Additive %	Winter Diesel fuel %	Additive %
0 to -10	70	30	100	--
-10 to -15	50	50	100	--
-15 to -20	--	--	70	30
-20 to -25	--	--	50 *	50

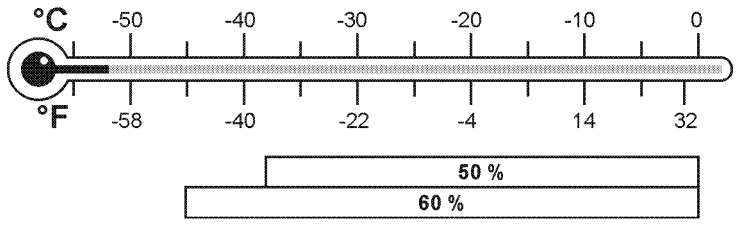
* If more than 50% are necessary, use only petroleum (no regular fuel).

Additives to Diesel fuel (flow improvers)

Commercially available flow additive can also help to improve the Diesel fuel for cold temperatures. Make sure to follow the manufacturing instructions regarding quantities and use.

Cooling system

Fill quantity	Service fluids	Specification
58 l (15.3 US gal.)	Corrosion inhibitor - antifreeze fluids	Corrosion inhibitor - antifreeze fluids according to chart



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Percentage (%) of corrosion inhibitor - antifreeze fluids

Coolant with DCA4

(DCA4 = Diesel Coolant Additives)
The cooling system must contain at least 50 % corrosion inhibitor - antifreeze fluids year round. This corresponds to an antifreeze protection to approx. -37°C. In case any coolant is lost, check the ratio, do not fall below 50 % of the total volume.

Caution

Danger of damage to the Diesel engine!

! Do not use more than 60% of corrosion inhibitor / antifreeze fluid, a higher percentage would actually reduce the cooling efficiency and the antifreeze protection, which could subsequently cause damage to the Diesel engine.

– Do not use more than 60 % corrosion inhibitor - antifreeze fluids.

Check and correct the ratio during maintenance checks.
The DCA4 concentration must be between 0.3 and 0.8 units per liter.
Use test kit CC2602 M by Fleetguard for testing.
Change the coolant at least once every 2 years.

Fresh water guidelines

When preparing the coolant, use water which is not too hard. Often, but not always, drinking water can be used. Sea water, brackish water, brine and industrial waste water are not suitable.

Fresh water quality
Sum of alkaline earths (water hardness): 0.6 to 2.7 mmol/l (3 to 15° d)
Ph-value at 20 °C: 6.5 to 8.0
Chloride ion content: max. 80 mg/l
Sulfate ion content: max. 80 mg/l

Refilling the cooling system

Before refilling the cooling system, check the system for cleanliness and flush, if necessary.
When filling or refilling the cooling system after repairs, DCA4 in liquid form must be added to the corrosion inhibitor - antifreeze fluid (see chart), in addition to the DCA4 concentration in the water filters. Premix the coolant in a suitable container.

– Premix the coolant in a suitable container.

Mixing ratio

Machine type	Fill quantity	Part water	Part corrosion inhibitor - antifreeze fluids	Part liquid DCA
LR 632	approx. 58 l	28 l	28 l	2 l

Use of DCA4 without corrosion inhibitor - antifreeze fluids

In **exceptional cases** and in constant ambient temperatures above the freezing point, for example in tropical regions, where no corrosion inhibitor - antifreeze fluids are available, water and DCA4 may be used as coolant.
To be able to protect the cooling system from corrosion:
– use approximately twice the amount of DCA4 as compared to the mixing ratio of corrosion inhibitor / antifreeze fluid noted above.
– keep the DCA4 concentration between 0.6 - 1.06 units per liter.
Check the DCA 4 concentration during regular maintenance, correct as necessary.
Change the coolant at least once a year.

Caution

When using water and DCA4, do not use other coolant refiners (corrosion protective oils)!

Disposal of corrosion inhibitors / antifreeze fluids

Handle non-diluted corrosion inhibitors / antifreeze fluids as hazardous waste. For the disposal of used coolant fluids (mixed with water), observe the regulations issued by the local agencies.

Approved corrosion inhibitors / antifreeze fluids

Brand	Manufacturer
Agip Antifreeze Plus	Agip Petroli S.p.A Rom Italy
Agip Langzeit-Frostschutz	Autol Werke GmbH, Würzburg
Antigel DB 486	Sotragal SA, St. Priest/France
Aral Kühler Frostschutz A	Aral AG, Bochum
Avia Frostschutz APN (G48-00)	Deutsche Avia - Mineralöl GmbH, Munich
BP anti-frost X 2270 A	Deutsche BP AG, Hamburg
BP Napgel C 2270/1	BP Chemicals Ltd., London/England
Caltex Engine Coolant DB	Caltex (UK) Ltd., London/England
Caltex Extended Life Coolant	Caltex (UK) Ltd., London/England
Castrol Anti-Freeze O	Deutsche Castrol Vertriebsges.mbH, Hamburg
Century F.L Antifreeze	Century Oils, Hanley, Stoke-on-Trent / England
Chevron DEX-COOL Extended Life Anti-Freeze / Coolant	Chevron Texaco
Deutz Kühlschutzmittel 0101 1490	Deutz Service International GmbH (DSI), Cologne
Esso Kühlerfrostschutz	Esso AG, Hamburg
Fricofin	Fuchs Mineralölwerke GmbH, Mannheim
Frostschutz Motorex (G 48-00)	Bucher+Cie, Langenthal / Switzerland
Frostschutz 500	Mobil Oil AG, Hamburg
Glacelf Auto Supra	Total
Glycoshell AF 405	Shell
Glycoshell N	Shell
Glysantin (G 48-00)	BASF AG, Ludwigshafen
Havoline XLC	ARTECO
Havoline DEX-COOL Extended Life Anti-Freeze / Coolant	Chevron Texaco
Igol Antigel Type DB	Igol France, Paris/France
Labo FP 100	Labo Industrie, Nanterre / France
Motul Anti Freeze	Motul SA, Aubervilliers Cedex/France

OMV - Kühlerfrostschutzmittel	OMV-AG, Schwechat / Austria
Organifreeze	Total
OZO Frostschutz S	Total Deutschland GmbH, Düsseldorf
Total Antigel S-MB 486	Total Deutschland GmbH, Düsseldorf
Total Frostfrei	Total Deutschland GmbH, Düsseldorf
Veedol Antifreeze O	Deutsche Veedol GmbH, Hamburg
Wintershall Kühlerschutz	Wintershall Mineralöl GmbH, Düsseldorf

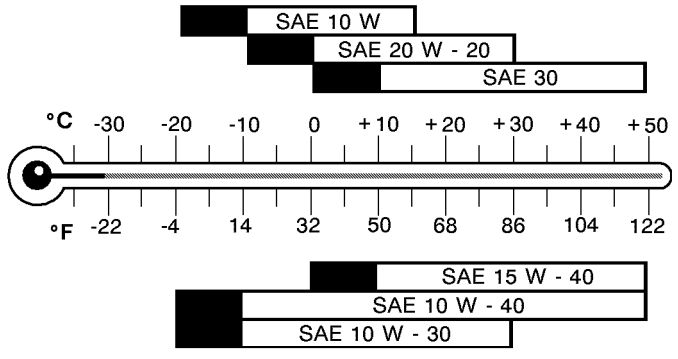
Approved premixed corrosion inhibitors / antifreeze fluids
Corrosion inhibitors / antifreeze fluids for Diesel engine cooling systems in mixing ratio 50:50 (PREMIX)

Brand	**Manufacturer**
Liebherr Anti-Freeze APN Mix Id.No. 8611045 - 20l package	LIEBHERR
Caltex Extended Life Coolant Pre-Mixed 50/50 (ready to use version)	Caltex
Chevron DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
Havoline XLC, 50/50	ARTECO
Havoline DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
Organicool 50/50	Total

Hydraulic System

Fill quantity	**Service fluids**	**Specification**
175 l (46.2 US gal.)	Engine oil, viscosity per SAE Only Diesel engine lube oils or especially approved oils may be used in the hydraulic system.	 API: CF-4, CF, CG-4, CH-4 ACEA: E2, E3, E4, E5

In addition to the quality, the oil must also meet a certain viscosity. The selection is made according to the SAE - classification.
The determining factor for the correct selection of the SAE classification is the ambient temperature.
The temperature ranges shown in the chart are only guidelines. If a machine is operated within the black temperature range, then the following warm up procedure must be carried out.



Temperature dependent selection of SAE classification

Warm up procedure

1. In temperatures to 10°C below the indicated limit: (black range)
– After starting, run the Diesel engine only at approx. ½ speed. Carefully actuate the working hydraulic. Actuate the hydraulic cylinders and move to stop for a short time. After approx. 5 minutes, carefully actuate the travel hydraulic too. The warm up procedure takes approx. 10 minutes.
2. At even lower temperatures:
– Preheat the hydraulic tank before starting the Diesel engine, then proceed with the warm up procedure, as outlined in paragraph 1.

Splitterbox

Fill quantity	Service fluids	Specification
2,8 l (3 quarts.)	Gear oil, viscosity per SAE SAE 85 W 140 EP SAE 80 W 90 EP SAE 90 EP SAE 90 LS	API GL-5 and MIL-L-2105 B,C or D

Travel gear

Fill quantity	Service fluids	Specification
2 x 11 l (11.6 quarts.)	Gear oil, viscosity per SAE SAE 85 W 140 EP	API GL-5 and MIL-L-2105 B,C or D

Lifetime seal travel gear

Fill quantity	Service fluids	Specification
2 x 1,2 l (1.3 quarts.)	Hydraulic oil, viscosity per SAE See Hydraulic System (use the same oil quality and viscosity as for the hydraulic system.)	

Lube points on attachments, chain tensioner and door hinges

	Service fluids	Specification
	Grease, viscosity per SAE The grease must be Lithium based, with a VKA value of at least 2300 N per DIN 51350 or ASTM D 2596.	High pressure grease KP2k, consistency 2 of NLGI classification per DIN 51818 and DIN 51825 or EP 2 per NF-T-60 132

Hinges and joints

	Service fluids	
	Engine oil, viscosity per SAE	

Windshield washer system

Fill quantity	Service fluids	
5 l (5.3 quarts)	Commercially available windshield cleaning fluid	

Rubber seals on doors and covers

	Service fluids	
	Silicon spray or Talcum powder	

Corrosion protection

	Service fluids	
	Corrosion protective grease To protect exposed piston rods, apply a thick layer of acid free corrosion protective grease.	LIEBHERR corrosion protective grease CTK Id.No.861331301

5.3.3 Change from mineral oils to environmentally friendly hydraulic fluids

To operate the LIEBHERR crawler with "environmentally friendly hydraulic fluids", we recommend **Panolin HLP Synth 46**.

Caution

Danger of damage to the hydraulic system of the machine!
Mixing "environmentally friendly hydraulic fluids" with "mineral oils" can cause a strong reaction, which can damage the hydraulic system.
! Avoid mixing "environmentally friendly hydraulic fluids" with "mineral oils".

Change over guidelines

- Contact LIEBHERR service before changing the machine to "environmentally friendly hydraulic fluids"!

Request and follow the instructions in the "**Instruction sheet**" and the "**Change over guidelines**"!

5.3.4 Timely oil diagnostics - Analysis

Oil is subjected to various influences. Oil is affected by temperature pressure, foreign matter, such as dust, metallic particles, water and air, and decomposes. For the long term, the risk of damage to the hydraulic system, the Diesel engine and the gear increases.
Unplanned repairs and down time can be prevented by taking oil samples; the results of the oil analysis will provide details about the condition of your machine.
When using this procedure, oil samples should be taken in certain time intervals for an oil analysis.

Advantages

- You will receive a complete report about the condition of your machine.
- Impending damage will be recognized in time.
- Unplanned repairs and down time will be prevented.

- Oil can be changed at the right point in time (only hydraulic system.)
- You will help your environment by disposing of less used oil (only hydraulic system.)

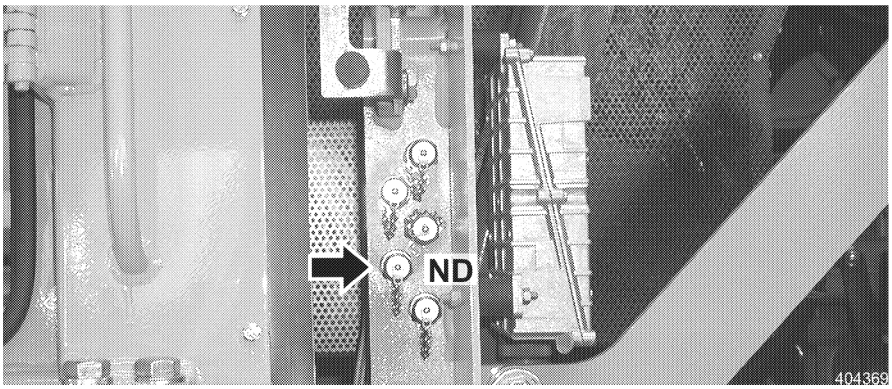
Oil change interval

An extension of the oil change intervals by taking oil samples is only permitted for hydraulic oil!

Taking oil samples

Take the oil sample:
- Shortly after the machine comes to a standstill - at that point, dirt and wear particles and any condensation have not yet settled.
- With the manual suction pump: Place the hose approximately in the center of the oil volume.
- At operating temperature – warm oil can be removed faster.
- Always in the same way and on the same location.
- Never from the filter.
- Not shortly after an oil change or after adding large amounts of oil.
- Only in a clean and dry container.

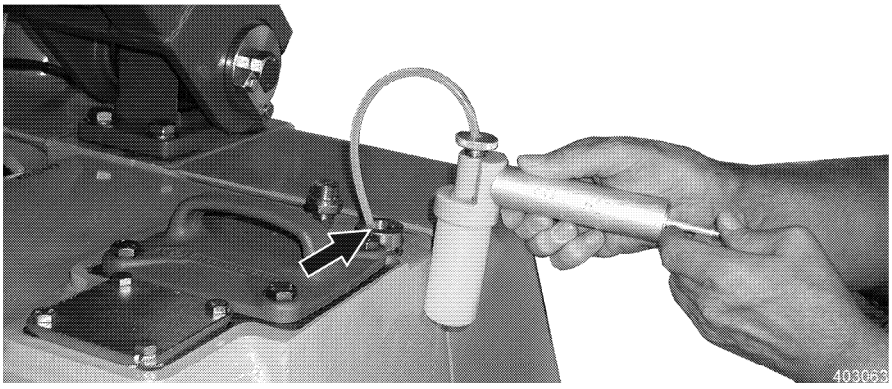
Locations to take oil samples



ND - connection

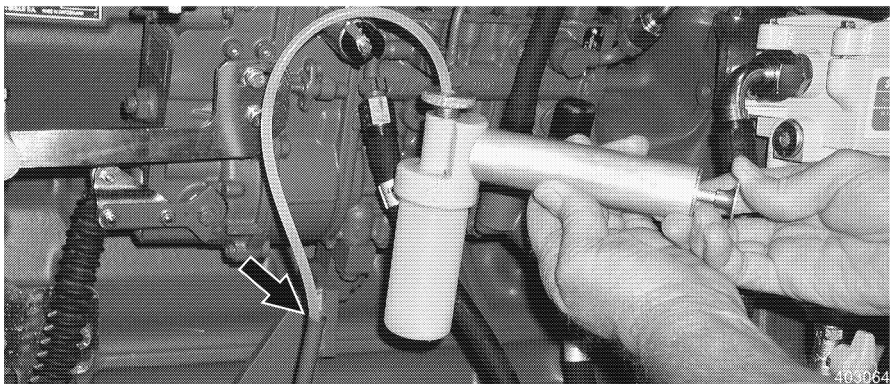
Hydraulic system

a) On the ND- connection with mini test hose (recommended method) or



bleeder screw

b) Remove the bleeder screw at hydraulic tank and take oil sample with suitable manual suction pump.



Dipstick tube

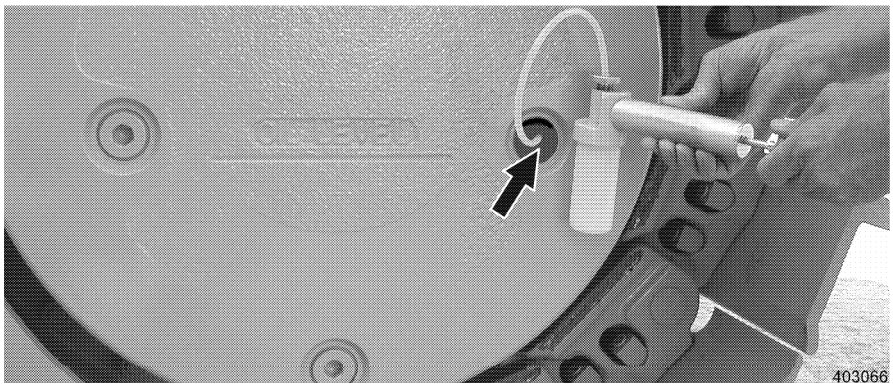
Diesel engine

a) With the manual suction pump via the dipstick tube or
b) take oil sample from the draining oil flow when changing oil.

Dipstick tube

Pump distributor gear

a) With the manual suction pump via the dipstick tube or
b) take oil sample from the draining oil flow when changing oil.



Oil filler port

Travel gear

With the manual suction pump via the oil filler port

Oil sample intervals

Component	Oil sample intervals
Hydraulic system	Every 500 hrs.
Diesel engine	At every oil change
Pump distributor gear	At every oil change
Travel gear	At every oil change

Oil analysis

An oil analysis should contain at least the following data:

Method	Determination of
Atom Emissions Spectroscopy (AES)	wear metals, additives, contamination iron, chromium, tin, aluminum, nickel, copper, lead, molybdenum, silver, silicium, calium, calcium, magnesium, borax, zinc, phosphorous, barium
FT-Infrared spectroscopy (FT-IR),	Oil condition and contamination Oil oxidation, glycol, water, nitration, fuel, carbon
Viscosity	Viscosity test - viscosity at 40°C and 100°C, viscosity index Note about lubrication and mixing ability
Analex PQ-Index	Magnetic metallic particles Report about the quantity of the total magnetic metallic particles in the oil which are larger than 5 microns

Liebherr recommends send the oil samples to " Wear Check company " for oil analysis. A set with test bottles, hose, documentation and mailing pouch is available from LIEBHERR under the following Id. No.:
Id. No.: 70 18 369 (12 units)
Id. No.: 70 18 368 (6 units)
A manual pump to take the oil samples is required and can be ordered separately. (Id. No.: 81 45 666).

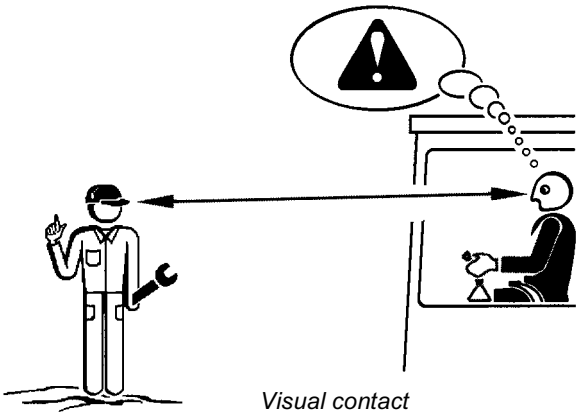
5.4 Preparations for maintenance

Before carrying out diverse maintenance tasks on the machine, bring the machine into maintenance position, it not otherwise noted.
Diverse maintenance tasks are, for example:
– Lubrication of attachment,
– oil level check or oil change on engine, splitterbox, travel gear, hydraulic tank, etc.,
– filter change as well as maintenance tasks on the hydraulic system.

Safety preparations for maintenance

Always observe all accident prevention guidelines when carrying out maintenance tasks!

See "Measures for safe maintenance".
Make sure that the operator in the operator's cab is always in visual contact with the maintenance personnel.



Visual contact

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Danger

Danger of accidents for maintenance personnel!
Never let other persons work on the machine, this would severely endanger the maintenance personnel!
! Never step unnoticed into the danger zone of the machine.

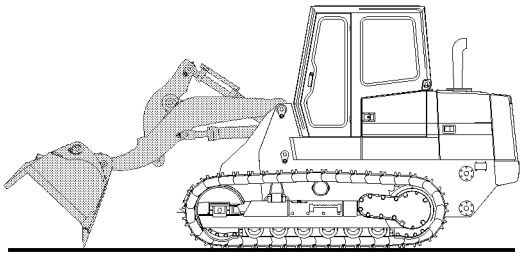
- Alert the operator before stepping into the danger zone of the machine!

5.4.1 Maintenance position

The basic maintenance position of the machine is described below.
It allows access to the individual maintenance points.

Maintenance position

To bring the machine into maintenance position, proceed as follows.
For detailed description of various procedures, see "Control, operation".



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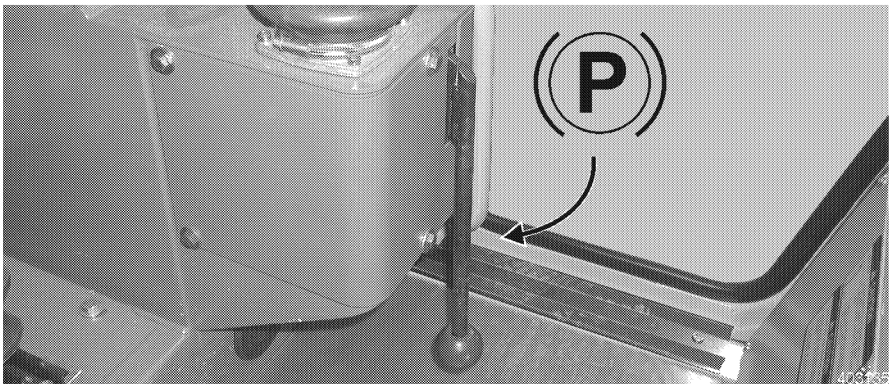
Maintenance position

- Park the machine on level ground.
- Lower the attachment to the ground.



Safety lever down

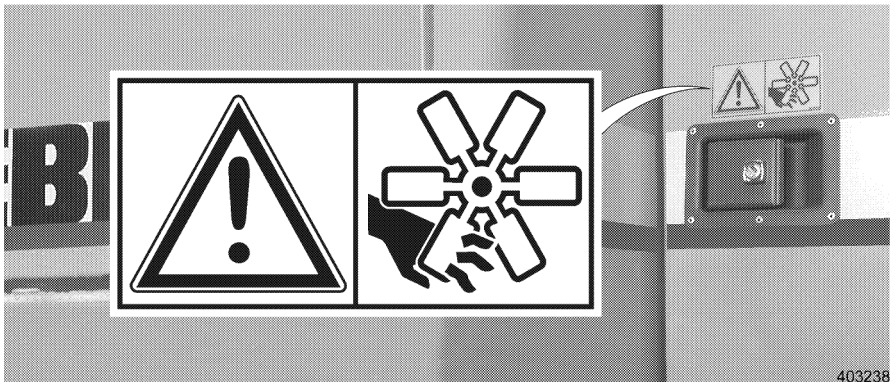
- Place the safety lever down.
- Turn the Diesel engine off.
- Pull the starter key.

Open the engine compartment doors

Open the service doors and hoods

When the doors are open, the following components can be accessed:

– Diesel engine
– Cooling system
– Air filter
– Splitterbox

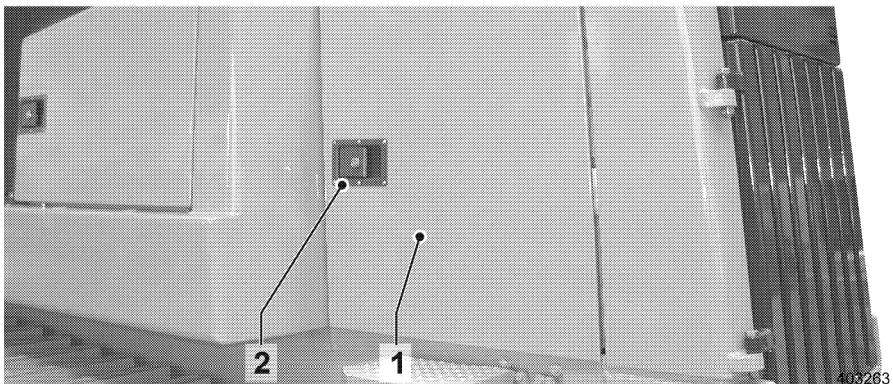


Open only if the engine is at a standstill!

Danger

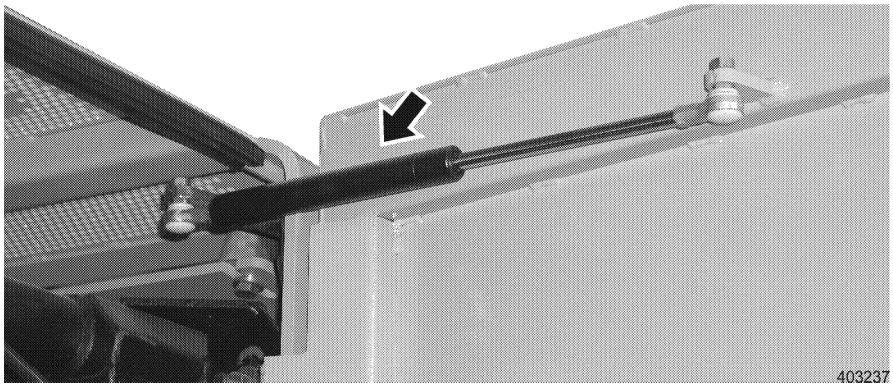
Danger of injury due to turning engine parts!
Turning or moving engine parts, such as fan blades or V-belt can cause injuries!

! Open the engine compartment doors only if the engine is at a standstill.



Open the engine compartment doors

- Open the lock with a key.
- Open the door 1 with handle 2.
- The engine compartment door is held in this position by a gas cylinder.



Gas cylinder

Caution

Danger of injury if the engine compartment door closes!
! Check if the completely door is held in open position by the gas cylinder.

– If the function is not ensured, then the problem must be fixed.

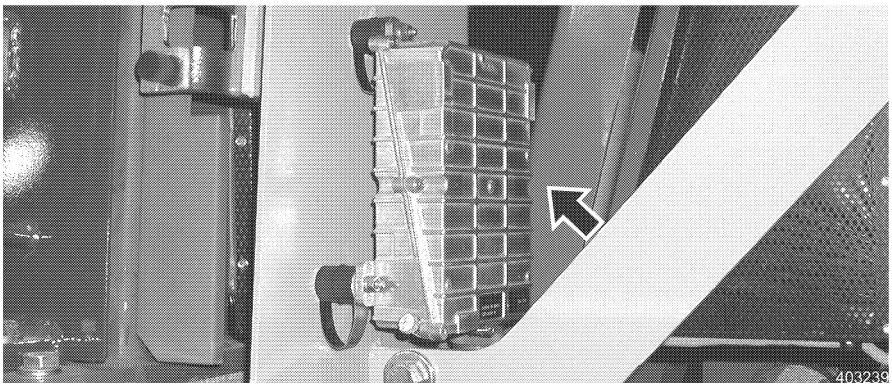
5.4.2 Electrical system

When working on the electrical system of the machine and before any welding on the machine, always disconnect the battery.

- Disconnect the negative terminal (-) first and reconnect is last.

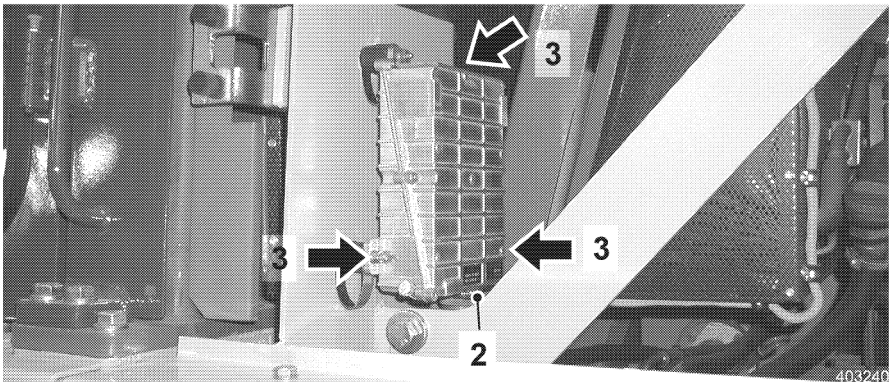
Disconnect the battery and remove the electronic box before any arc welding on the machine.
In addition, disconnect the plug connections on the proximity switches (bucket return, hoist limit switch).

Remove the electronic box



Electronic box

The electronic box is installed in the battery compartment.



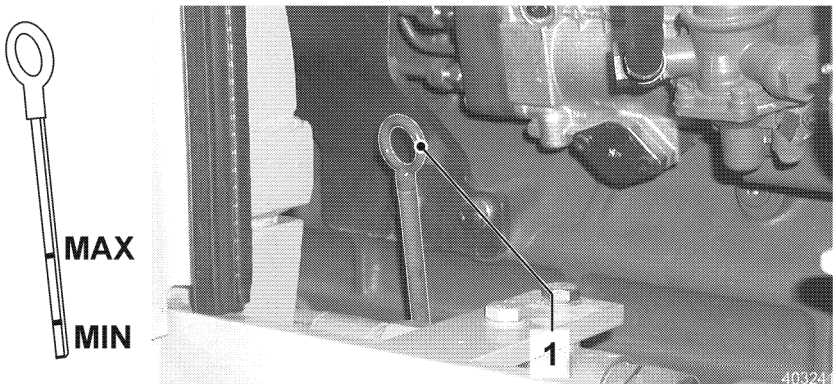
Remove the electronic box

- Disconnect the cable fitting 2 on the bottom of the electronic box.
- Remove the mounting nuts 3.
- Remove the electronic box from the battery compartment.

5.5 Diesel engine

5.5.1 Check the engine oil level

Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.

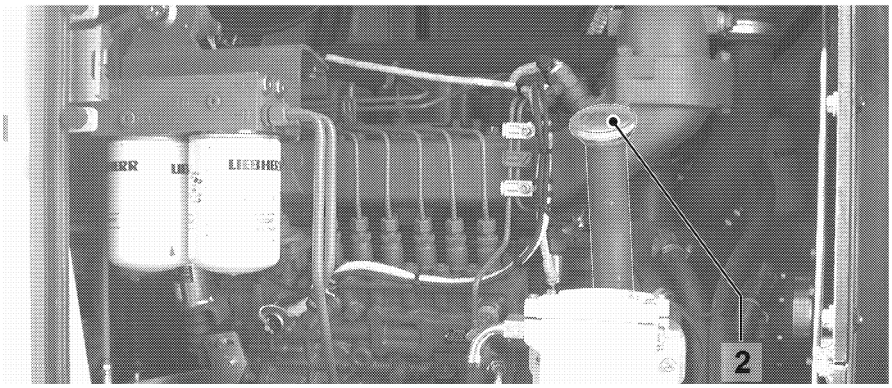


Dipstick

After engine shut down, wait for a few minutes for the oil to collect in the oil pan.

- Pull the dipstick 1, wipe it with a clean cloth. Reinsert it all the way.
- Pull the dipstick out again and check the oil level.

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



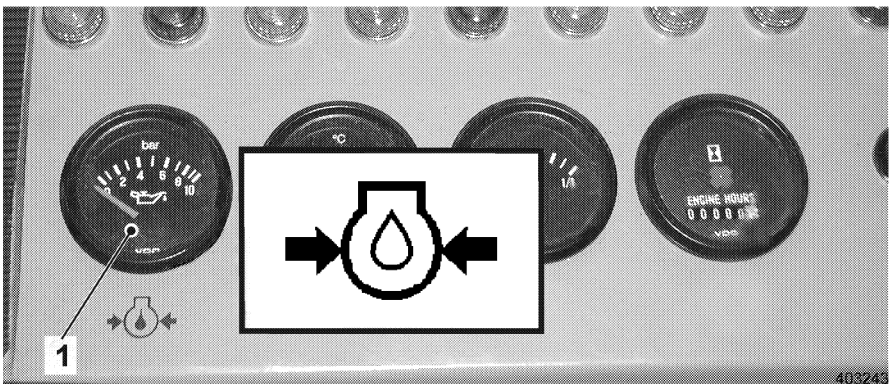
Add oil

If the oil level is too low:

- Remove the cap 2 and add oil. For oil specification, see "Lubricants and service fluids".
- Add oil via the filler neck.
- Check the oil level again, do not fill the Diesel engine above the "MAX" mark.
- Clean the cap, reinstall it on the filler neck and tighten.

5.5.2 Check the engine oil pressure

- Start the Diesel engine.



Engine oil pressure gauge

The oil pressure is shown on the oil pressure gauge 1.
The oil pressure may not fall below the following values:
– at low idle RPM 1 bar
– at full load 3.5 bar

Troubleshooting

If the engine oil pressure is below these values, turn the engine off immediately and find the problem (change the engine oil and filter, if necessary).

5.5.3 Engine compartment

Make sure that:
– the machine is in maintenance position, see "Maintenance position",
– the engine compartment doors are open.

Check the Diesel engine location and oil pans for contamination

- Check the complete engine compartment for damage and contamination.

If very soiled, clean the engine - cooler and oil pan area.

Clean the Diesel engine

When cleaning the engine with water or steam, make sure that the sending units, such as oil pressure switch are not subjected to a direct blast.

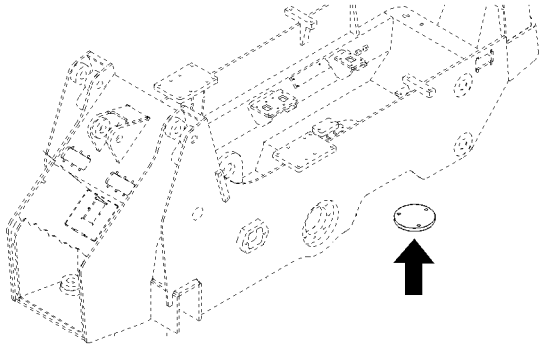
Caution

Danger of damage to the Diesel engine!
Infiltrating moisture can cause corrosion and failure of the measuring function.
! Do not subject electrical sending units, such as oil pressure switch to a direct water or steam blast.

- Carefully clean the engine with steam.

5.5.4 Change the engine oil

Make sure that:
– the engine oil is at operating temperature,
– the machine is in maintenance position,
– the left engine compartment door is open,
– a suitable container or drain hose with valve connection is available,
– oil with the correct oil specification and quantity according to "Lubricants and Service fluids" is available.



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Oil pan cover

- Remove the oil pan cover.

– In case of heavy deposits in the oil pan area, the oil pans must be removed and cleaned.

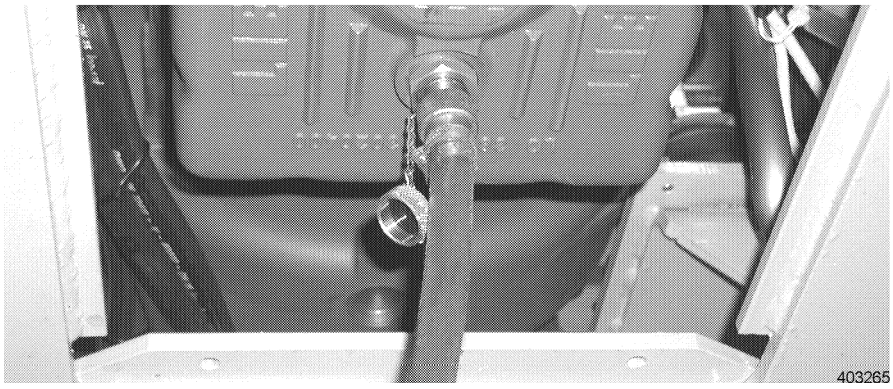
Danger

! Danger of injury when removing the oil pans.
Due to space restrictions and heavy weight of the oil pans, removal is very difficult.
To remove the oil pans, use a suitable lifting device.

- Remove the cap on the oil drain valve on the oil pan.

Caution

! When draining hot engine oil, there is a danger of scalding.
Avoid skin contact with engine oil.
Always wear gloves when changing oil.



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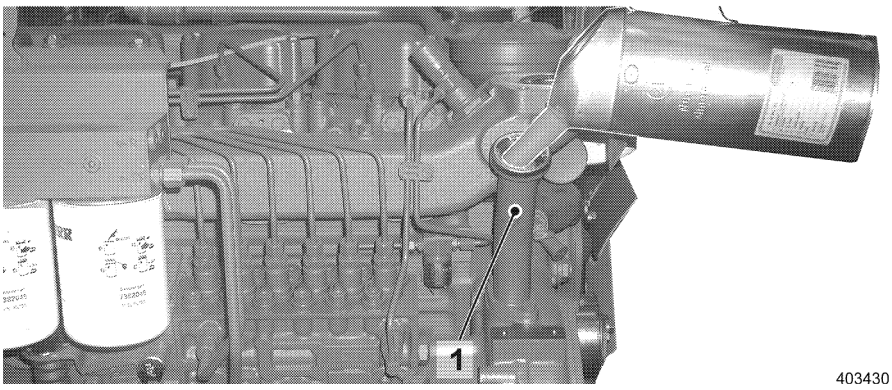
Drain the oil

- Attach the oil drain hose to the oil drain valve and drain the oil in a suitable container.
- Remove the oil drain hose and install the cap on the oil drain valve.
- Install the oil pan cover.

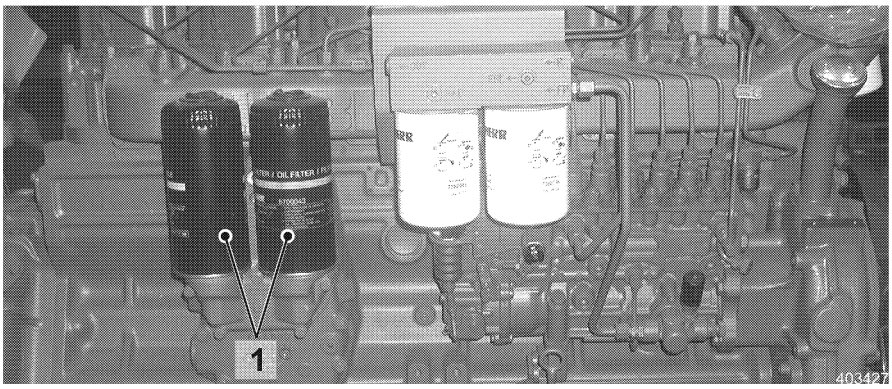


Add oil

- Add clean oil via the filler neck 1 to the MAX mark on the dipstick.
- Clean the filler cap, install on the oil filler neck 1 and tighten.
- Start the Diesel engine and check the oil pressure.
- Turn the Diesel engine off and check the oil level on the dipstick after approx. 1 - 2 minutes. Correct the oil level as necessary.

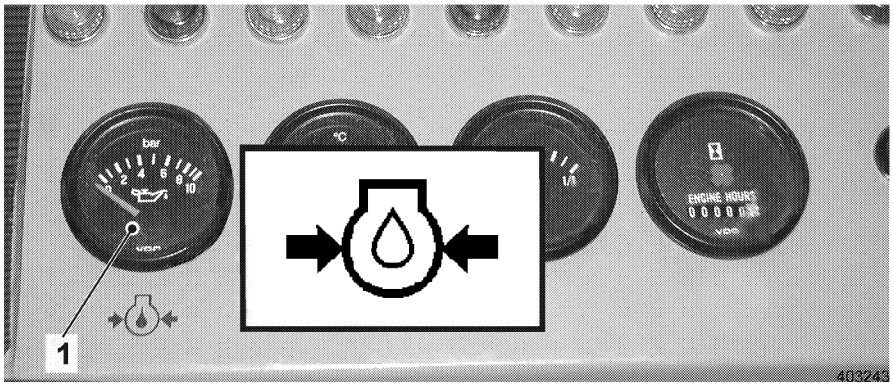
5.5.5 Change the lube oil filter

Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open,
– two LIEBHERR oil filter elements are available.



Filter elements

- Release filter elements 1 with a filter wrench and remove.
- Clean the sealing surfaces on the filter console.
- Apply a thin layer of engine oil to the rubber seal rings on the new filter elements.
- Install new filter elements on the filter console and tighten by hand.

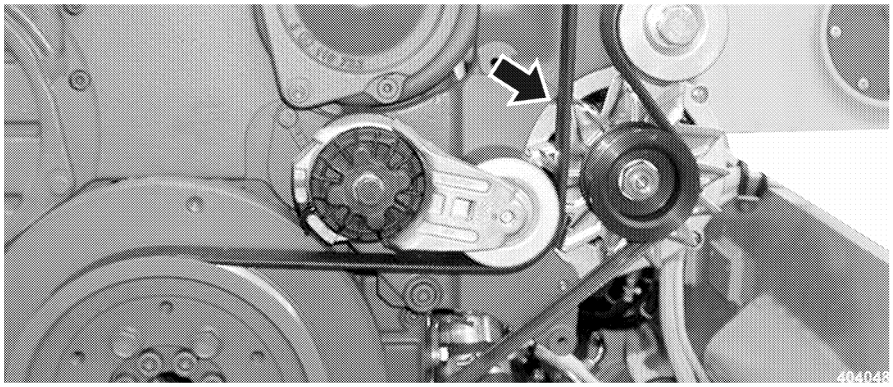


Engine oil pressure gauge

- Start the Diesel engine and check the oil pressure on the engine oil pressure gauge.
- Turn the engine off, check for leaks on the oil filters and check the oil level. Correct the oil level, as necessary.

5.5.6 Check / change the V-belt

The V-belt installation is self-tensioning and maintenance free. Only the V-belt and the tension pulleys need to be checked for damage or wear.
To check, access from the right side of the engine.
Always replace broken or damaged belts with new belts.
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.

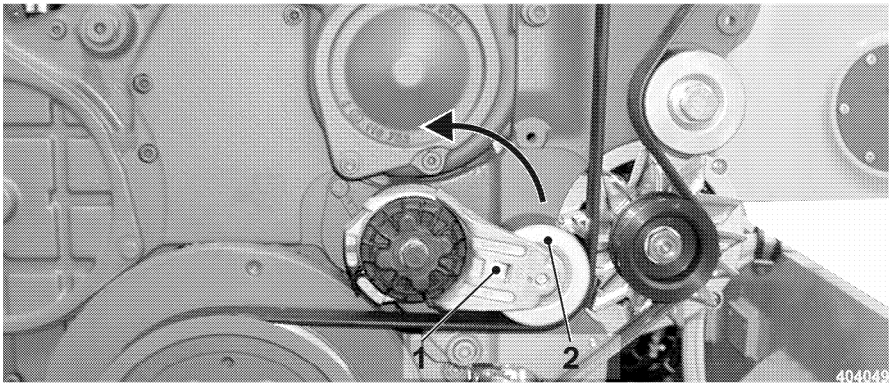


V-belt

Check the belt assembly

- Check the V-belt for cracks or damage.
- Check the pulleys and tension pulley for proper condition and play (such as worn belts, damaged tension pulley)

– If any parts are damaged, replace damaged parts immediately with new parts.



Change the V-belt

Change the V-belt

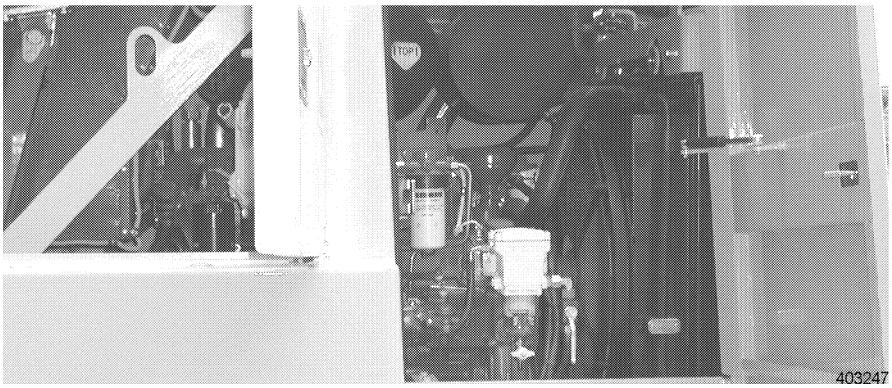
- Insert a ratchet per DIN 3122 D 12,5 (1/2") into the square hole 1 of the tension device 2.
- Swing back the tension device 2 against the spring force in counterclockwise direction to the stop and remove the V-belt.
- Check the pulleys and tension pulley for proper condition and play (such as worn belts, damaged tension pulley).

– If any parts are damaged, replace damaged parts immediately with new parts.

- With the tension device 2 swung back, place the new V-belt on all pulleys and the tension pulley.
- Return the tension device 2 to tension position.

5.5.7 Check the Diesel engine area for leaks and condition

Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.



Diesel engine area

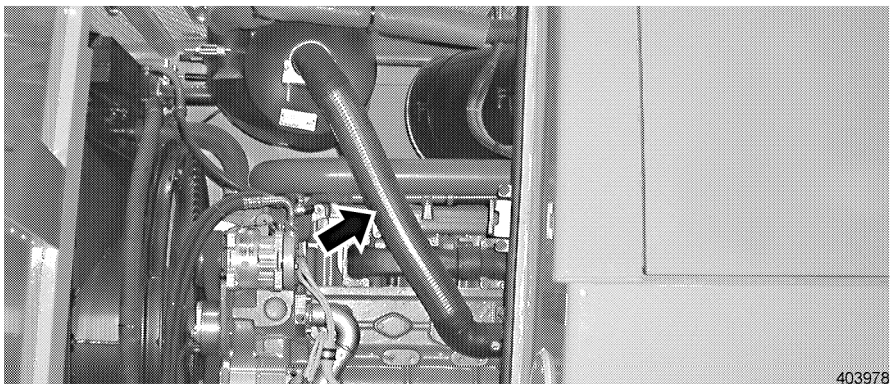
- Check the complete engine area for condition and leaks.

– Check the fuel lines especially careful.

- Replace defective seals immediately.

5.5.8 Check the mounting of intake and exhaust lines

Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.



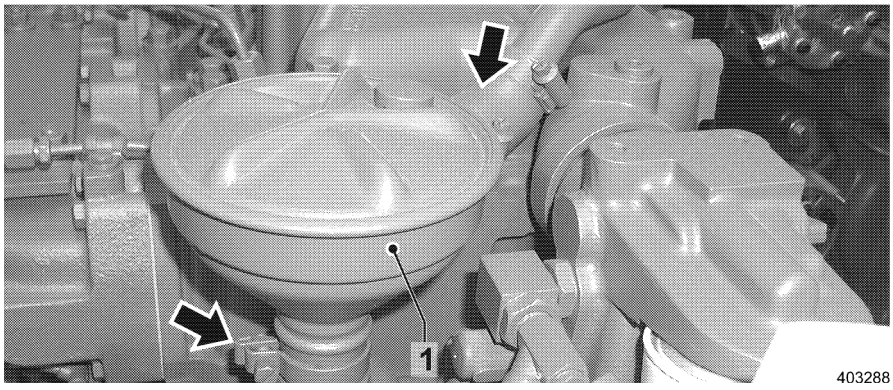
Intake - exhaust lines

- Check the intake lines between turbo charger, cooler and engine for leaks and mounting.
- Check the exhaust lines between engine and turbo charger, muffler and exhaust pipe for leaks and mounting tightness.

5.5.9 Oil separator

Change the oil separator

A damaged or pushed in oil separator can influence the function. The oil separator must be replaced. The oil separator must also be replaced if oil vapor emerge from the bleeder bore on the cover.
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



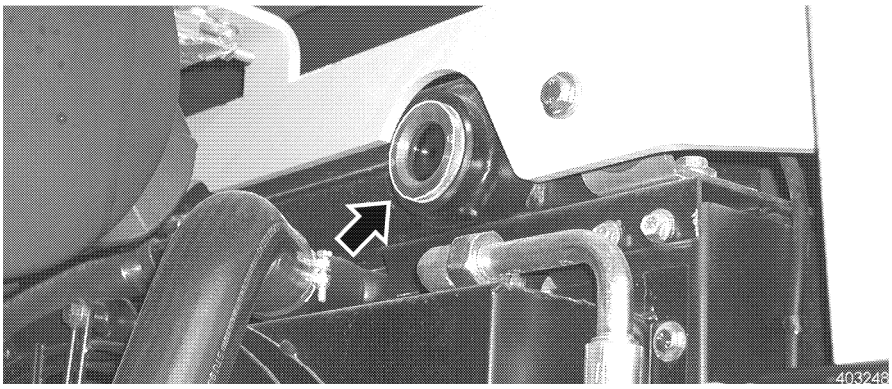
Oil separator

- Loosen the mounting clamps on the oil separator 1 and on the hose and remove the oil separator.
- Insert a new O-Ring into the oil separator.
- Add the new oil separator and tighten the mounting clamp.
- Push on the hose and tighten the hose clamp.
- Prevent infiltration of cleaning fluid (when cleaning the engine).

5.6 Cooling system

5.6.1 Check the coolant level

The coolant expansion tank with filler fitting is on the upper side of the cooling unit. Access is provided after opening the maintenance cover on top of the engine hood.
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



Inspection port - coolant

- The coolant must be visible in the inspection port when the Diesel engine is turned off.
- If the coolant is not visible in the inspection port, add more coolant.

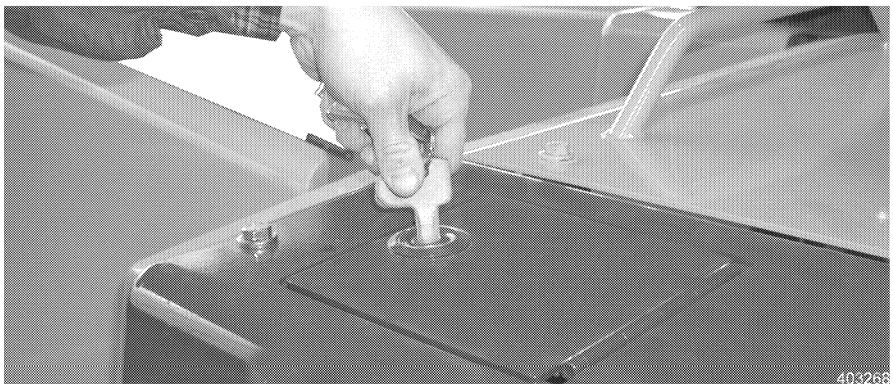
Antifreeze concentration

The coolant must have the correct antifreeze and DCA-4 concentration. For details, see "Check antifreeze and DCA-4 concentration in coolant".

Danger of scalding

Caution

There is a danger of scalding due to splashing coolant!
! At or near operating temperature, the engine cooling system is hot and under pressure.
! Open the cap on the filler neck of the expansion tank only after the engine has cooled off.
! Check the coolant level only after the cap on the expansion tank is cool enough to touch. Then turn the cover slowly to relieve the pressure.
! Never add coolant if the engine is not.



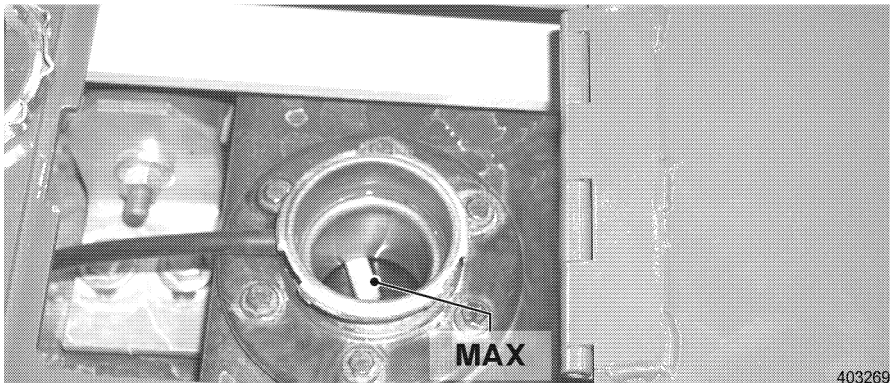
Maintenance cover - coolant

Add coolant

- Open the maintenance cover on the engine hood with a special key.
  - Use a suitable ladder for access.
- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open.

Caution

! Avoid skin contact with the coolant!
! Observe manufacturer's instructions.
– When mixing coolant, always wear rubber gloves and safety glasses.
– In case of an accidental splash, flush eyes or skin immediately with plenty of water.



Coolant mark - MAX

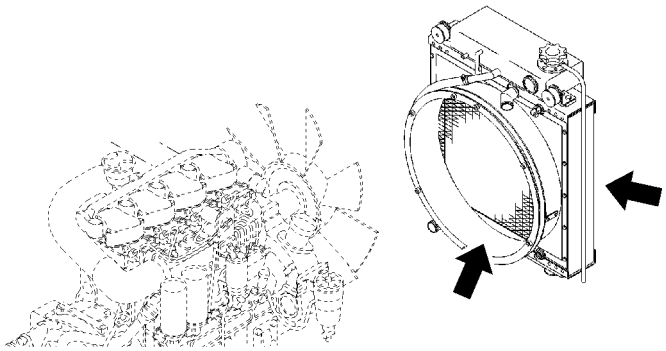
- Add coolant on the filler neck to the MAX mark.
- Install the cap on the filler neck and tighten.

5.6.2 Clean the cooling system

To ensure proper cooling function, it is necessary to clean the cooler. In dusty job applications, check the cooler daily and clean, if necessary.
Dirty cooling units can cause overheating, which will trigger a visual warning.
Dust and other dirt can be removed from the cooling fins with water spray, steam or air pressure. We recommend the use of pressurized air.
Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.

Caution

Be careful not to damage the cooling fins.
! Do not use hard objects or high water pressure for cleaning.



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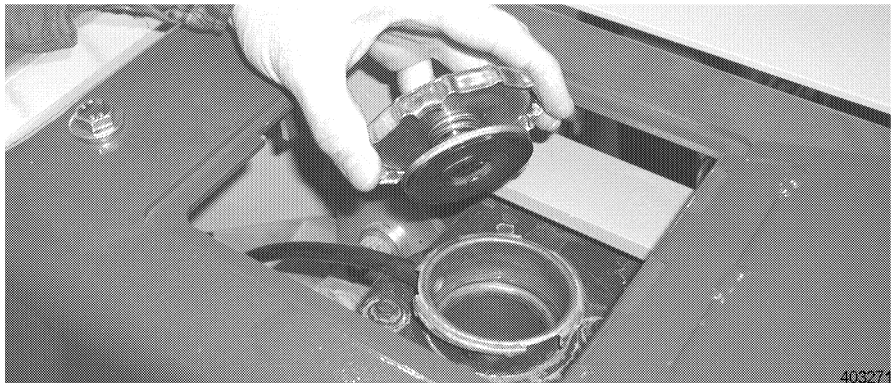
Cooler

- Clean the cooler units with air pressure, steam or water.
- Close the engine compartment doors again.

5.6.3 Check the cooling system for leaks

Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



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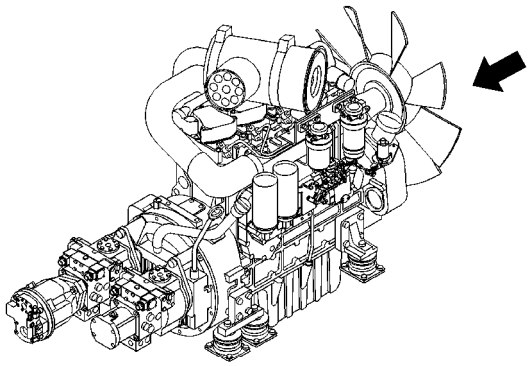
Cover

- Open the maintenance access on top of the engine hood with a special key.
– Use a suitable ladder for access.
- Check the cover for leaks.



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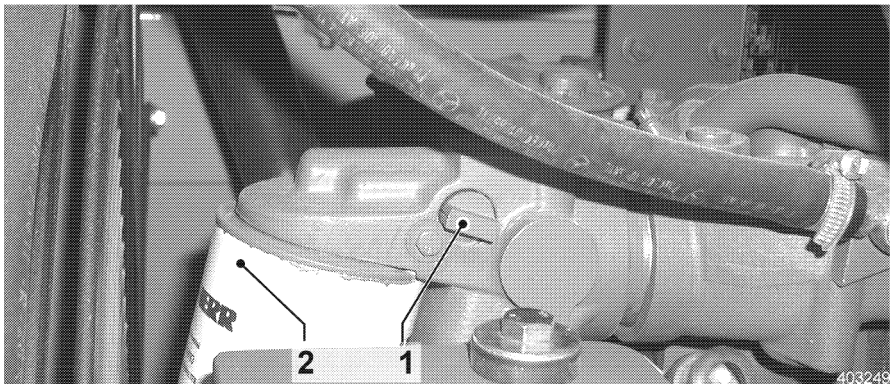
Fan

Check the fan

- Check the fan for damage.

5.6.4 Change the coolant filter

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



Coolant filter

- Close the shut off valve 1 on the filter housing.

(The handle on the shut off valve is in vertical position).

- Release the water filter 2 with a filter wrench and remove.
- Clean the sealing surfaces on the filter console to remove any remains of the seal.
- Apply a light layer of engine oil to the rubber seal ring on the new water filter.
- Install the new water filter 2 on the filter console until it touches and tighten by hand.
- Open the shut off valve 1.

(The handle on the shut off valve is then in horizontal position).

5.6.5 Check the antifreeze and DCA-4 concentration in the coolant

The cooling system must contain at least 50% corrosion inhibitor / antifreeze fluids year round. This corresponds to an antifreeze protection to approx. -37°C. The coolant must contain the correct DCA-4 concentration. The correct DCA-4 concentration is between 0.3 - 0.8 units per liter.
Make sure that:
– The test kit CC 2602 M by Fleetguard for the DCA-4 concentration and the antifreeze concentration in the coolant is available.

Caution

Danger of scalding due to splashing coolant!
! Open the cap on the filler neck 1 only if the engine is cooled off - the coolant temperature gauge on the segment field of the indicator unit should be in the lower third of the segment field.

- Open the maintenance cover on top of the engine hood with a special key.
– Use a suitable ladder for access.
- Carefully open the cap on the filter neck 1.
- Check the antifreeze concentration and the DCA-4 concentration with test kit CC 2602 M by Fleetguard.
- If the concentration deviates from the correct value:

Add antifreeze and DCA-4 until the nominal value is obtained.
See "Lubricant and service fluid specification".

5.6.6 Change the coolant

Make sure that:
– the machine is in maintenance position,
– the engine compartment door is open,
– the heater valves are open,
– a suitable container is available,
– the required amount of coolant with DCA4 is available (for mixing ratio, see "Lubricants and service fluids").

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Danger of scalding

Caution

Danger of scalding due to splashing coolant!

! At or near operating temperature, the engine cooling system is hot and under pressure.

! Open the cap on the filler neck of the expansion tank only if the engine has cooled off.

! Open the cap on the expansion tank only if it is cool enough to touch. Then turn the cover slowly to relieve pressure.

! Never fill the cooling system if the engine is hot.

Drain the coolant

- Turn the cap on the filler neck in counterclockwise direction to relieve pressure, then open.

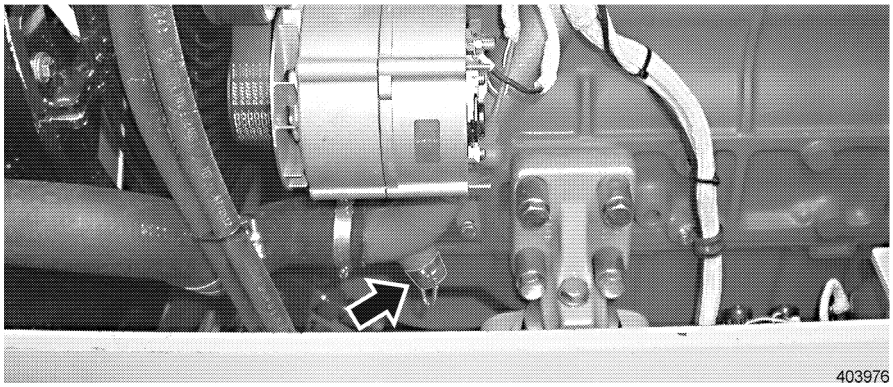
Caution

! Avoid skin contact with coolant.

! Observe manufacturer's instructions.

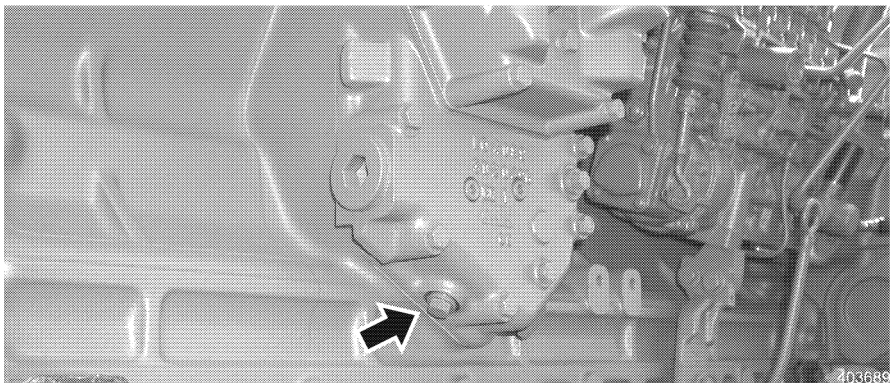
– When mixing coolant, always wear rubber gloves and safety glasses.

– In case of an accidental splash, flush eyes or skin immediately with plenty of water.



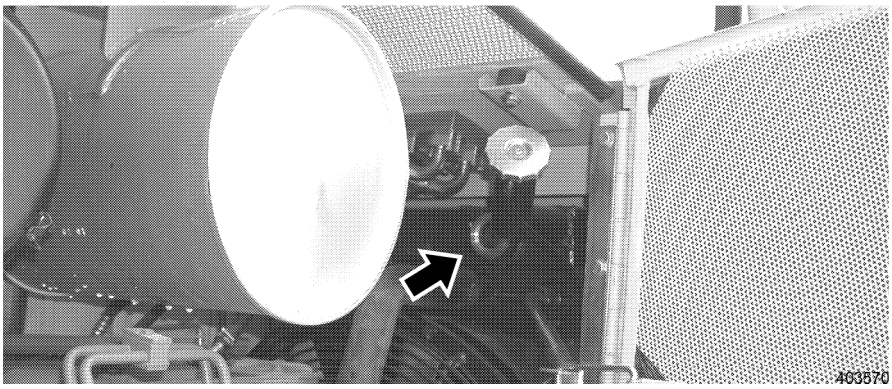
Drain valve

- Open the right engine compartment door.
- Set a container under the drain valve.
- Remove the cap on the drain valve.
- Install the drain hose (part of the tool box) onto the drain valve and drain the coolant in the container.
- Remove the drain hose and install the cap on the drain valve.



Oil cooler plate - drain plug

- Open the left engine compartment door.
- Place a suitable container under the oil cooler plate and remove the drain plug.
- Reinstall the drain plug.

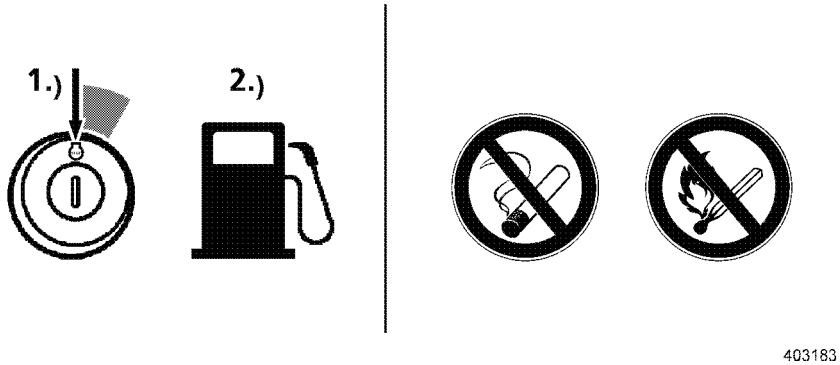


Sight gauge - coolant

Add coolant

- Add premixed coolant via the filler neck according to the "Lubrication and service fluid chart" to the MAX mark in the filler neck (see also "Add coolant").
- Install the cap on the filler neck and close off.
- Close the engine compartment doors.
- Set the heater knob to "warm". Start the Diesel engine and let it run until it is warm.
- Recheck the coolant level and correct, as necessary.

5.7 Fuel system



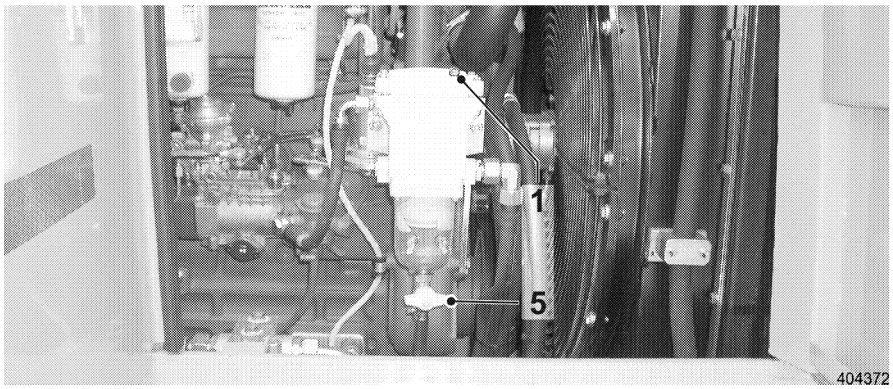
Danger of fire

Caution

! Danger of fire!
– When working on the fuel system, never smoke or allow an open flame in refueling areas.

5.7.1 Drain the fuel separator condensation

Make sure that:
– the machine is in maintenance position,
– a suitable container, which is large enough, is available.

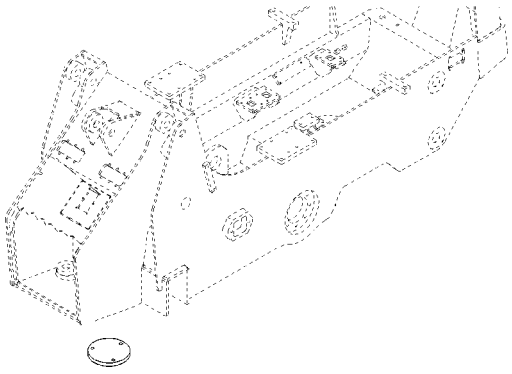


Fuel separator

- Open the bleeder screw 1.
- Open the shut off valve 5 and drain the condensation into a suitable container until clean fuel emerges.
- Close the shut off valve 5 again and close the bleeder screw 1.

5.7.2 Drain water and contaminants in the fuel tank

Make sure that:
– the machine is in maintenance position,
– a suitable container, which is large enough, is available.



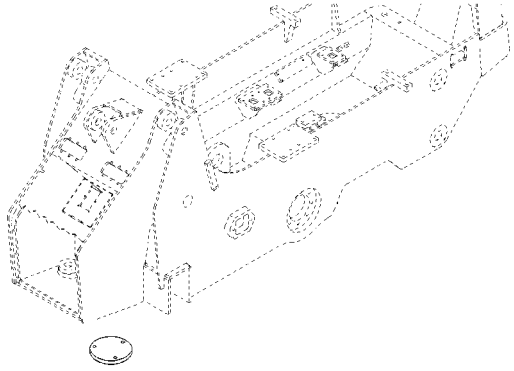
Bottom pan cover

- Remove the bottom pan cover.
- Remove the cap on the drain valve on the underside of the fuel tank.
- Install a drain hose to the shut off valve.

- Drain condensation and sediments into a suitable container until clean fuel emerges.
- Remove the drain hose and install the cap on the drain valve and tighten.
- Install the bottom pan cover.

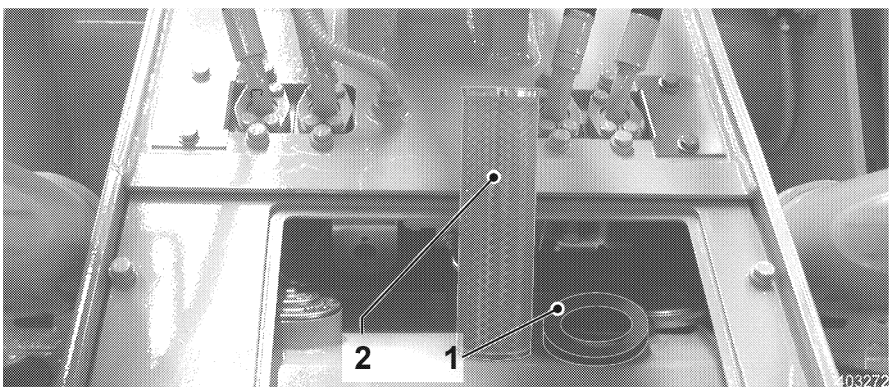
5.7.3 Empty the fuel tank

If the filter becomes dirty often, empty the fuel tank and clean it.
Make sure that:
– the machine is in maintenance position,
– a suitable container, which is large enough, is available.



Bottom pan cover

- Set a suitable container, which is large enough, under the drain valve.
- Remove the tank cover.
- Remove the bottom pan cover.
- Remove the cap on the drain valve on the underside of the Diesel fuel tank.
- Install a drain hose on the drain valve.
- Drain the fuel into a suitable container.
- Remove the drain hose and install the cap on the drain valve and tighten.
- Install the bottom pan cover.



Fuel tank - filler neck

- On the fuel filler neck, remove the rubber ring 1.

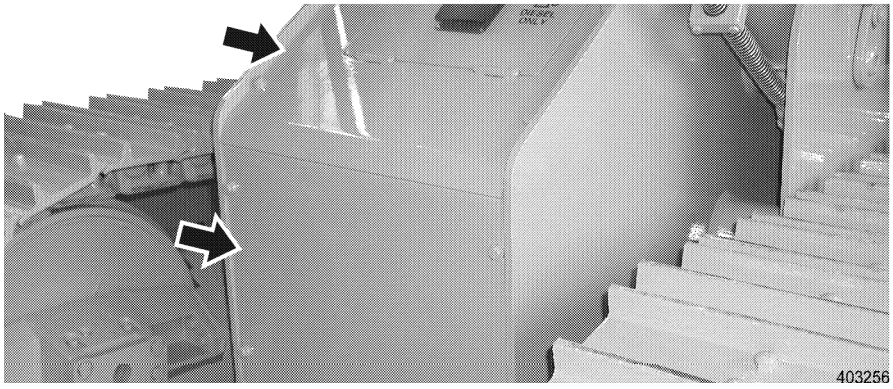
- Remove the strainer 2, check the strainer and replace it, if necessary.
- Check the fuel tank.

Troubleshooting

If the fuel tank is dirty, it must be cleaned.
If cleaning is not necessary, reinstall the strainer and rubber ring.

Clean the fuel tank

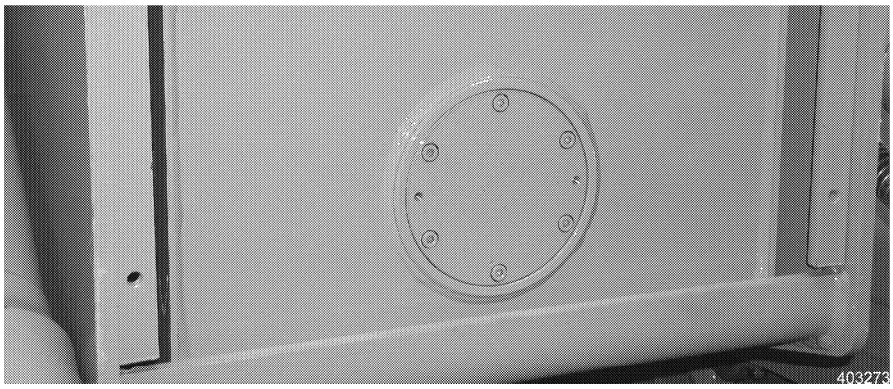
- Empty the fuel tank completely.



Covers - Fuel tank

- Remove the covers.

– Use suitable lifting device.



Cleaning cover

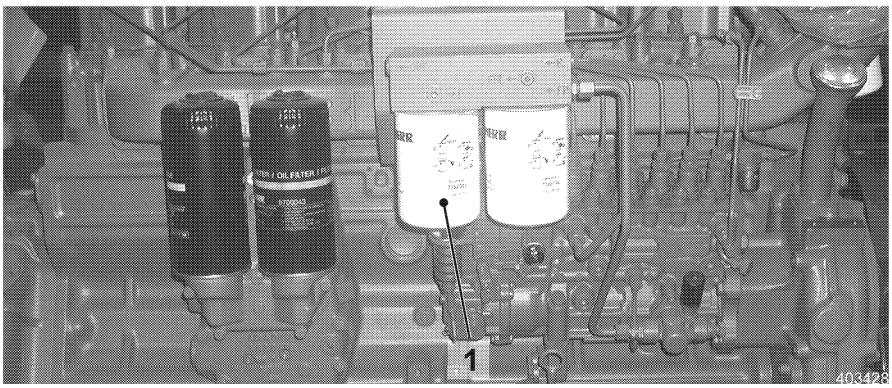
- Remove the cleaning cover.

– Check the O - ring on the cleaning cover and replace, as necessary.

- Clean the fuel tank.
- Reinstall the cleaning cover with O - ring.
- Install covers and refill the fuel tank.

5.7.4 Change the fuel filter cartridges

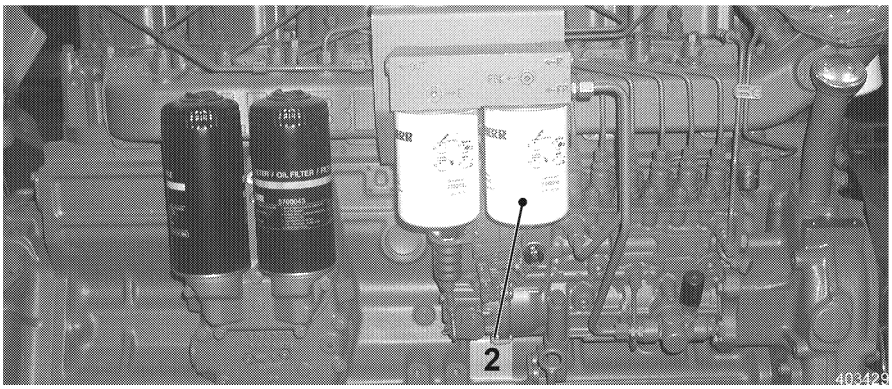
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



Fuel fine filter

Fuel fine filter

- Loosen and remove the filter cartridge 1 with a filter wrench.
- Clean the sealing surfaces on the filter console.
- Apply a thin layer of engine oil to the rubber seal rings on the new filter cartridges.
- Install the new filter cartridges on the filter console and tighten by hand.
- Bleed the fuel fine filter.



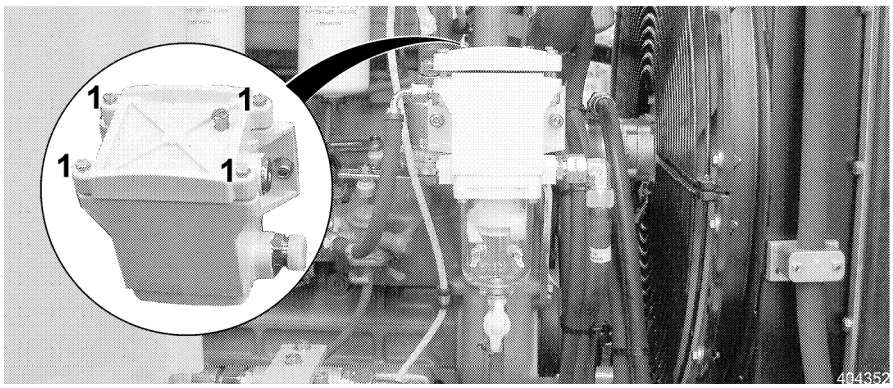
Fuel pre-filter

Fuel pre-filter

- Loosen and remove the filter cartridge 2 with a filter wrench.
- Clean the sealing surfaces on the filter console.
- Apply a thin layer of engine oil to the rubber seal rings on the new filter cartridges.
- Install the new filter cartridges on the filter console and tighten by hand.
- Bleed the fuel pre-filter.

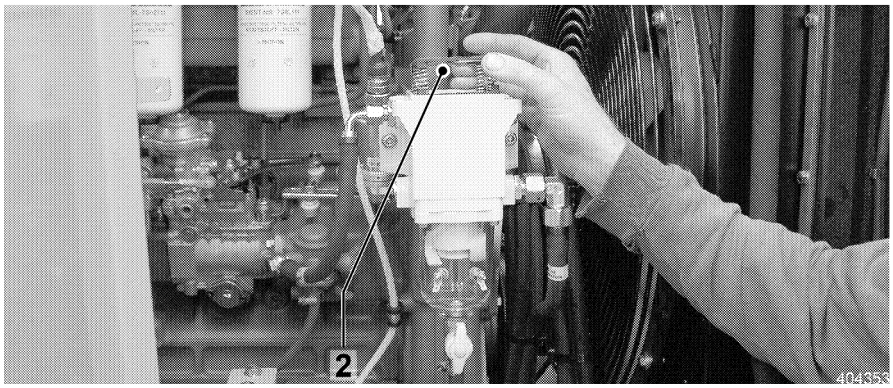
5.7.5 Clean the fuel separator

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



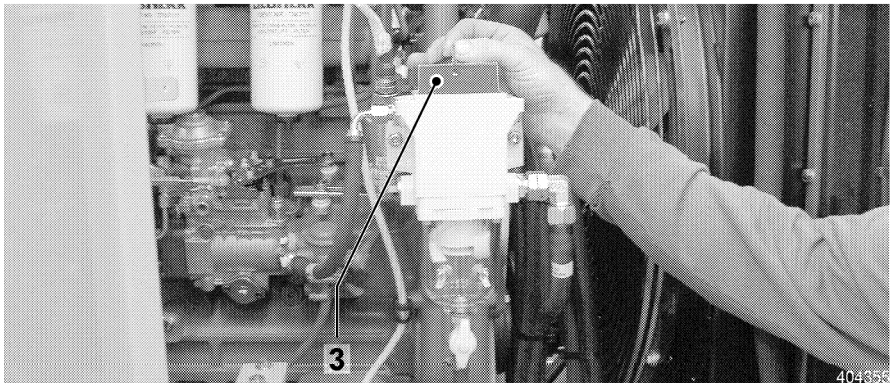
Remove the cover

- Remove screws 1 on the on the water separator.
- Set the cover with seal aside.



Remove the spring cartridge

- Remove the spring cartridge 2.



Remove the strainer

- Remove the strainer 3 and clean or replace it.
- Drain the fuel from the water separator.
- Refill the fuel water separator with clean fuel.
- Check the seal and reassemble the water separator in reverse order.

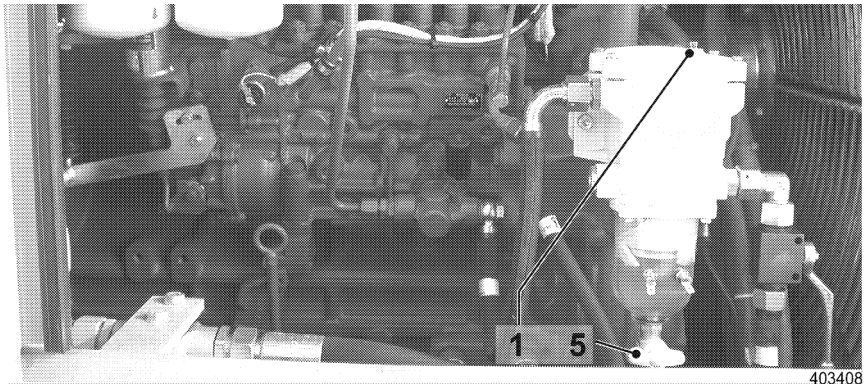
5.7.6 Bleed the fuel system

Make sure that:
– the machine is in maintenance position,

– the left engine compartment door is open.

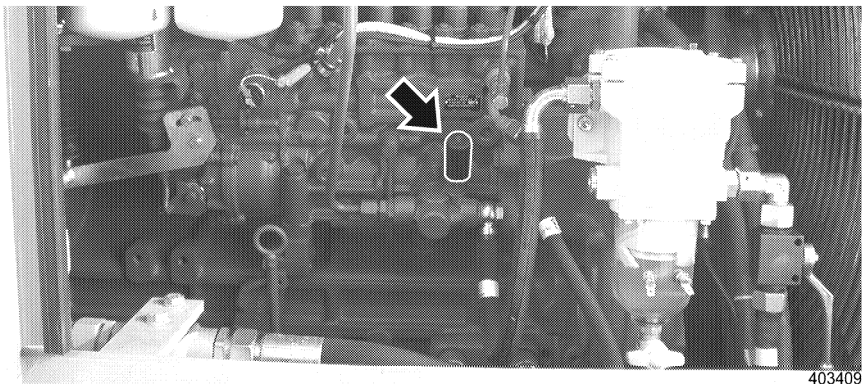
The fuel system must be bled after:

- changing the fuel filter.
- cleaning the fuel tank.
- repairs on the fuel system.
- emptying the fuel tank.



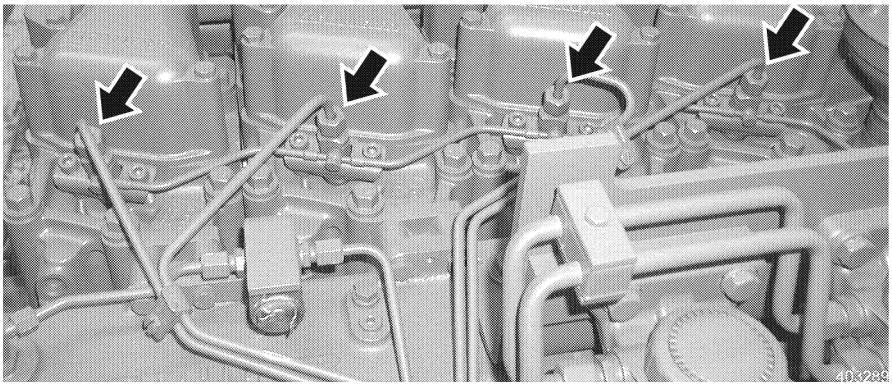
Bleeder screw fuel water separator

- Loosen the bleeder screw 1 on the fuel water separator and turn out by 2-3 threads.



Hand pump

- Actuate the hand pump until fuel without air bubbles emerges on the bleeder screw.
- Retighten the bleeder screw.



Union nuts

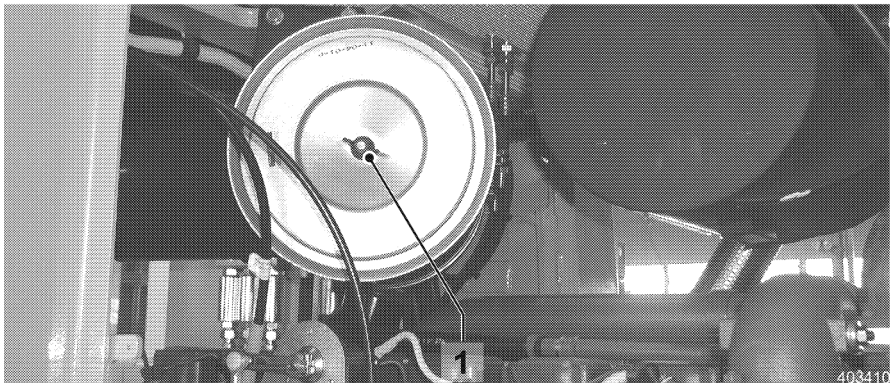
- Loosen the union nuts on the injector valves.
- Close the engine compartment doors.
- Actuate the starter switch until fuel without air bubbles emerges. Retighten the union nut.

Start the Diesel engine as described in "Control, operation". If the Diesel engine does not start, repeat the bleeding procedure.

5.8 Air filter system

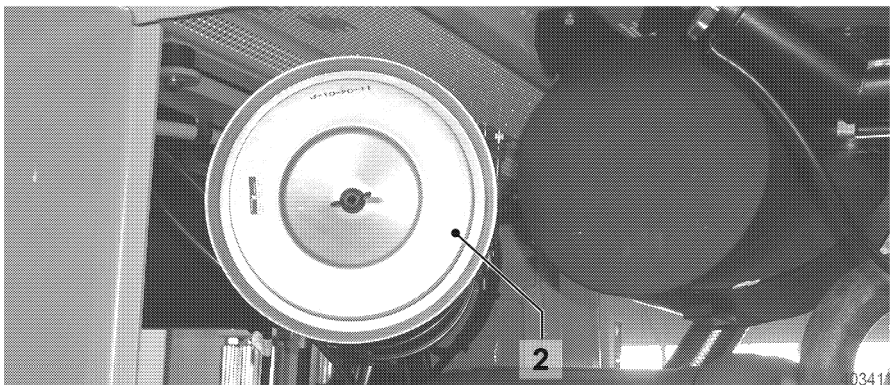
5.8.1 Clean / change the air filter

Clean or change the main element if the indicator light - air filter contamination in the instrument panel lights up or according to the change interval in the maintenance and inspection schedule.
If the indicator light - air filter contamination continues to light up after servicing the main element, then the safety element must also be changed.
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



Wing nut

- Turn the wing nut 1 on the air filter to the left to open and remove the cover with the filter.



Primary filter element

Primary filter element

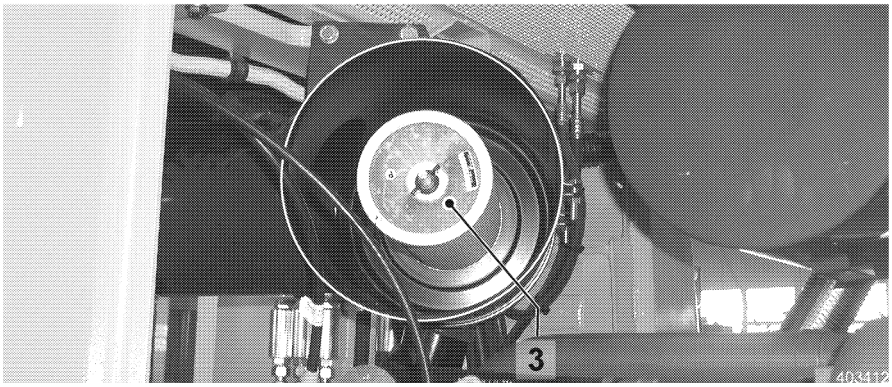
- Remove the primary filter element 2 clean or change it.

Clean the primary filter element

403283

Blow out the primary filter element

- Blow the primary filter element from the inside to the outside with dry air. Do not hit the filter, as this could damage the filter.



403412

Safety element

Safety element

- The safety element 3 should be changed after the primary filter element 2 has been changed three times or whenever the primary filter element 2 is replaced.

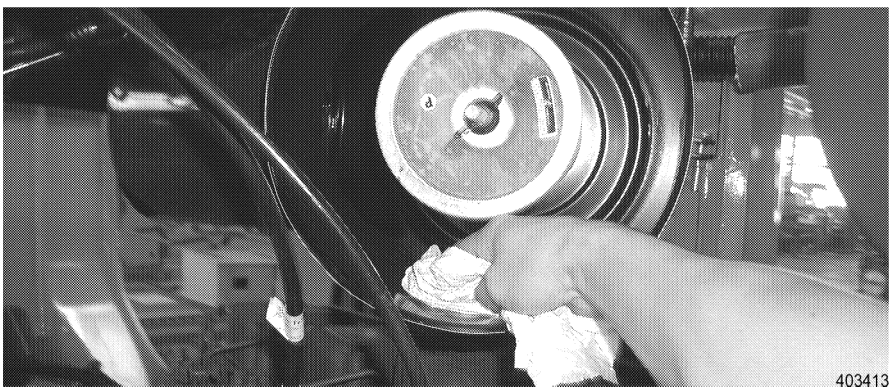
– The safety element may not be cleaned!

Caution

Danger of damage to the Diesel engines.

! NEVER operate the machine without air filter.

- Make sure that any dirt in the filter housing is removed before a new or cleaned filter element is reinserted.



403413

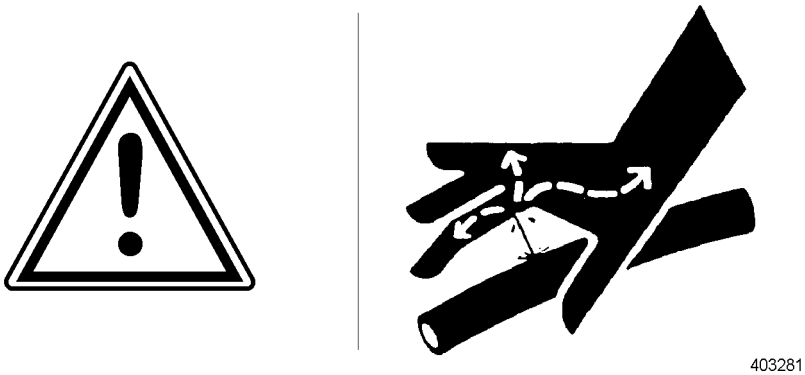
Clean the filter housing

- Wipe out the filter housing with a clean rag.

– Never use pressurized air!
– Make sure the area you work in is free of dust. Dust may not enter into the air intake line.

• Reinstall the filter element 3 and 2 and make sure it is seated properly.

5.9 Hydraulic system



403281

Hydraulic pressure

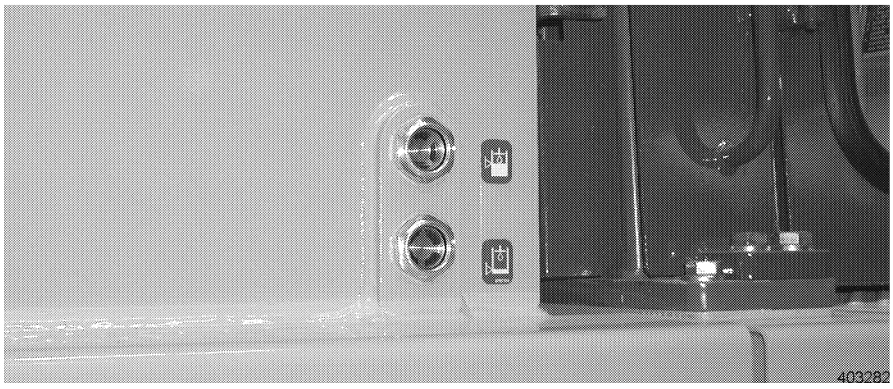
Caution

! Do not remove any hydraulic lines, hoses, connectors as long as the hydraulic system is under pressure.

Turn the engine off and actuate all functions again to release pressure in all hydraulic lines.

5.9.1 Oil level in hydraulic tank

Make sure that:
– the hydraulic oil is cold,
– the machine is in maintenance position.



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Sight gauges

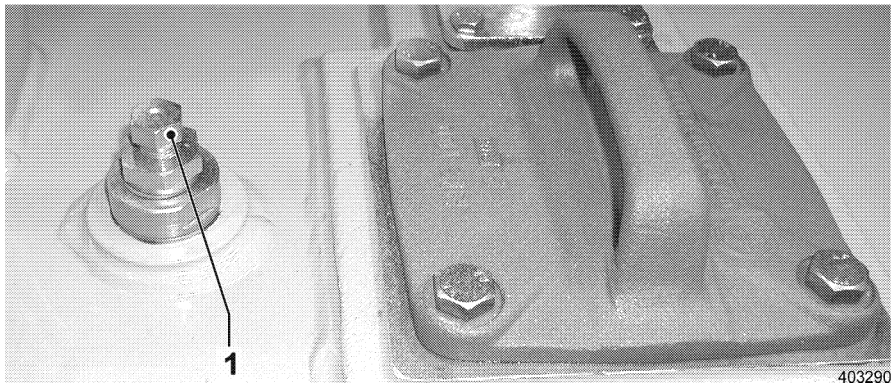
Check the oil level

• Open the right cover.

• Check the oil level on the sight gauges.

– With the hydraulic cylinders retracted, the oil level may not exceed the center of the upper sight gauge.
– With the hydraulic cylinders extended, the oil level may not fall below the center of the lower sight gauge.

• If the oil level is under the nominal level: add hydraulic oil.

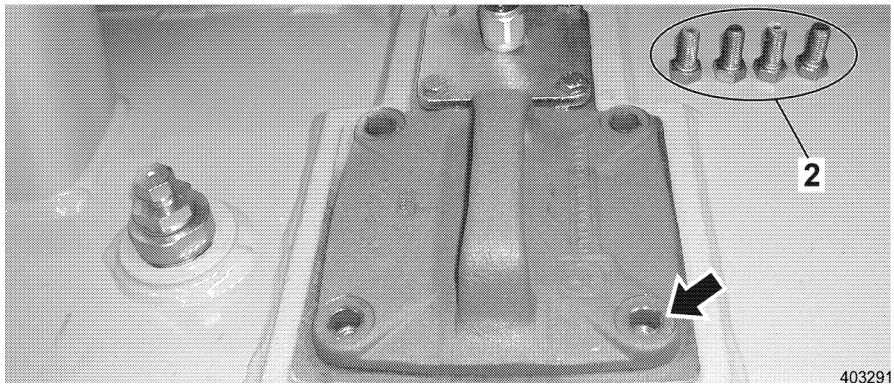


Hydraulic tank - Bleeder screw

Add hydraulic oil

• Relieve tank pressure: turn out the bleeder screw 1 on the hydraulic tank by two turns.

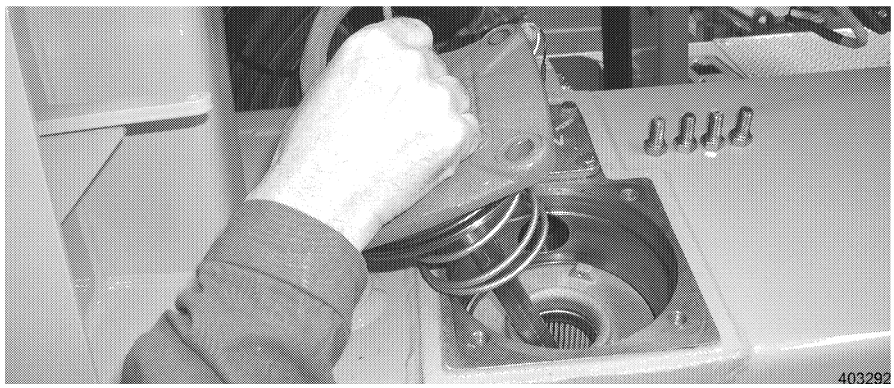
Add hydraulic oil only via the return filter.



Filter cover

• Loosen and remove the screws 2 on the filter cover.

• Remove the filter cover with the magnetic rod.



Magnetic rod

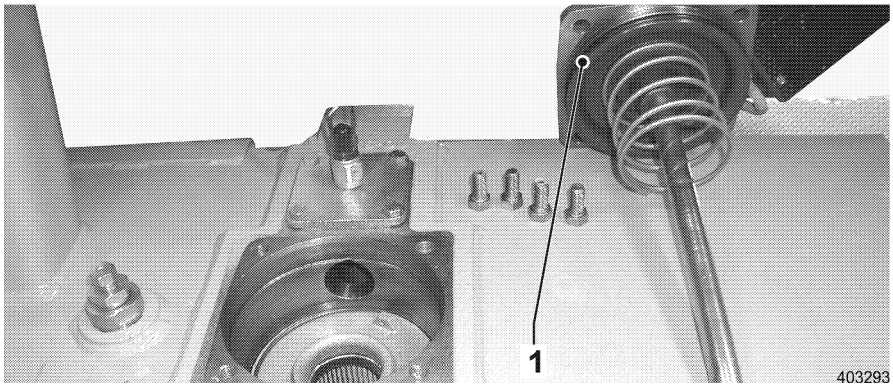
• Check the magnetic rod and clean, if necessary.

Troubleshooting

Heavy contamination or larger metallic particles on the magnetic rod or in the return filter can cause damage in the hydraulic system.

- In this case, find the cause and fix the problem in the hydraulic system.

- Add hydraulic oil via the return filter to the MAX mark 2.

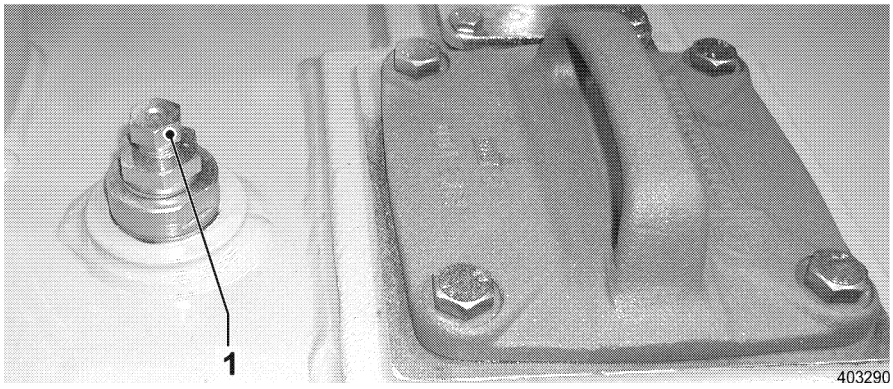


O - ring

- Check the O - ring 1 on the filter cover and replace, as necessary.
- Insert filter cover with magnetic rod and fasten with screws.
- Close the bleeder screw on the hydraulic tank.

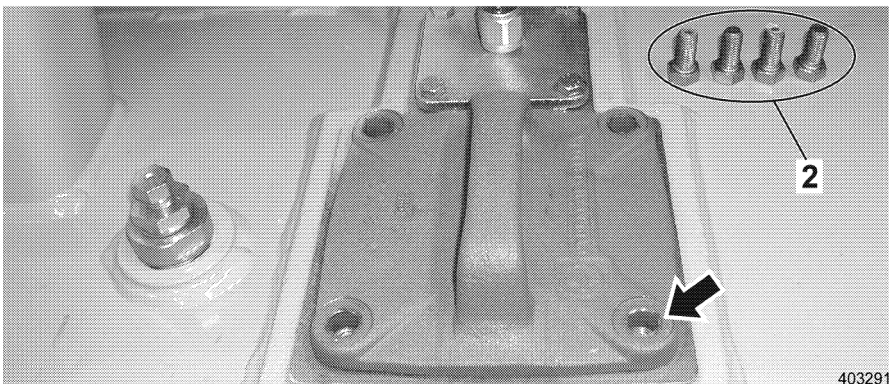
5.9.2 Clean the magnetic rod on the hydraulic tank

Make sure that:
– the machine is in maintenance position.



Bleeder screw

- Relieve the tank pressure: Back out the bleeder screw 1 on the hydraulic tank by two turns.



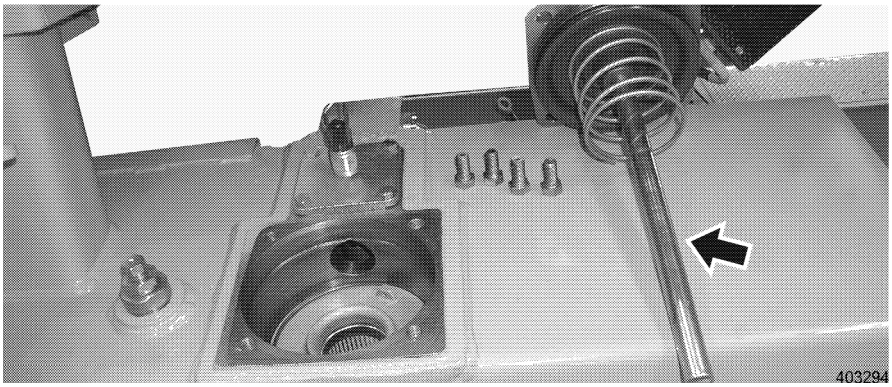
Filter cover

- Loosen the screws on the filter cover and slowly lift off the filter cover with the magnetic rod.

Troubleshooting

Heavy contamination or larger metallic particles on the magnetic rod or in the return filter can cause damage in the hydraulic system.

- In this case, find the cause and fix the problem in the hydraulic system.

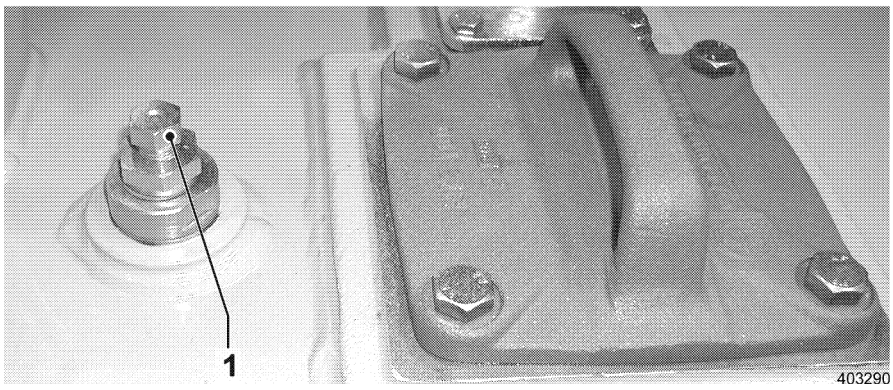


Magnetic rod

- Carefully clean the magnetic rod.
- Set the O - ring and filter cover with magnetic rod onto the housing.
- Tighten the screws on the filter cover.
- Tighten the bleeder screw 1.

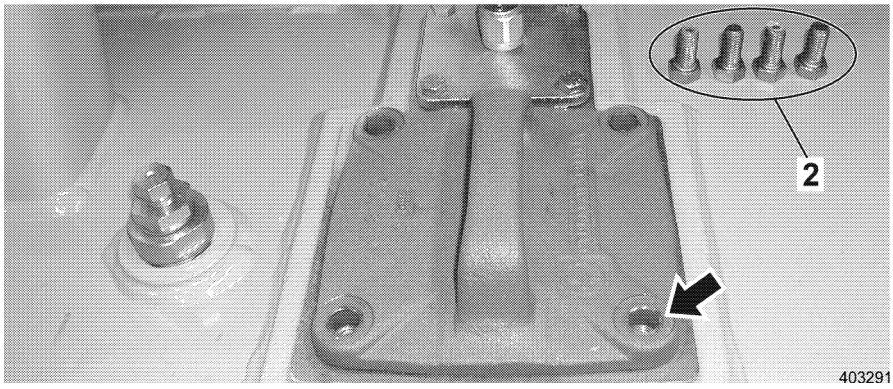
5.9.3 Change the return filter insert

The return filter must be changed, in addition to the intervals given in the Maintenance and inspection schedule if the indicator light "Return filter" lights up when the hydraulic oil is at operating temperature.
Use only Original LIEBHERR return filter insert.
Make sure that the machine is in maintenance position.
The return filter insert cannot be cleaned.



Bleeder screw

- Relieve the tank pressure: Back out the bleeder screw 1 on the hydraulic tank by two turns.



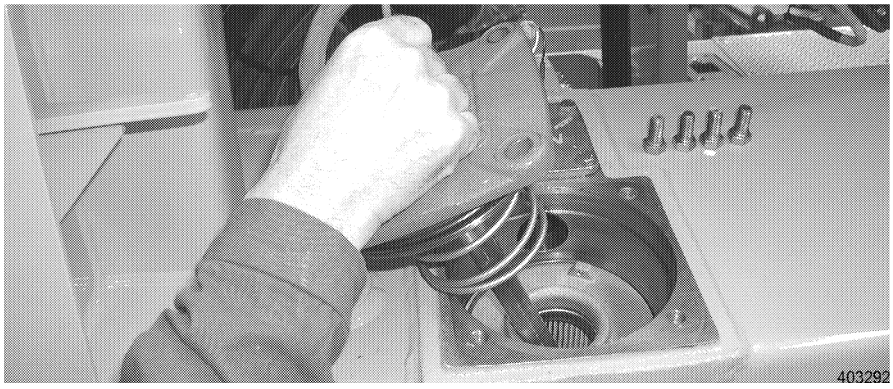
Filter cover

- Loosen the screws 2 on the filter cover and slowly lift off the filter cover with the magnetic rod.

Troubleshooting

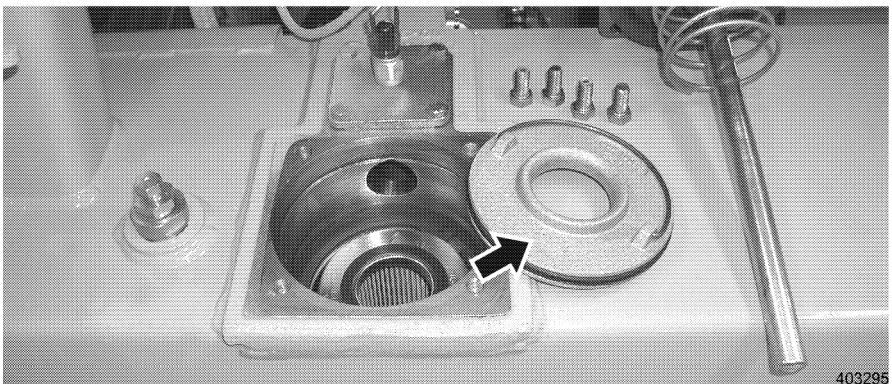
Heavy contamination or larger metallic particles on the magnetic rod or in the return filter can cause damage in the hydraulic system.

- In this case, find the cause and fix the problem in the hydraulic system.



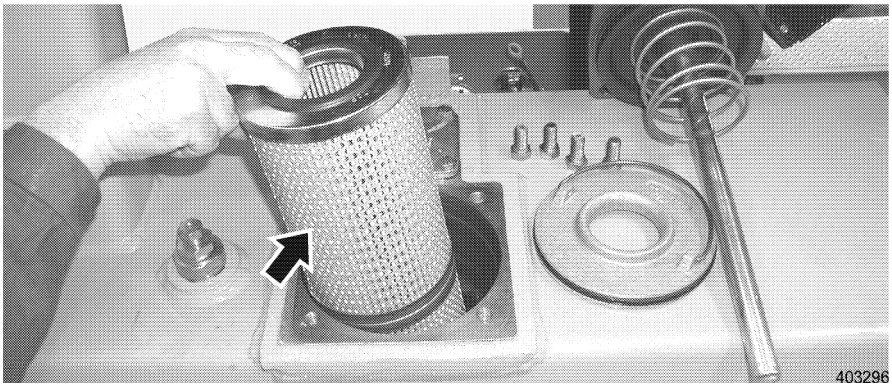
Magnetic rod

- Remove the filter cover with spring and magnetic rod.



Pressure plate

- Remove the pressure plate.

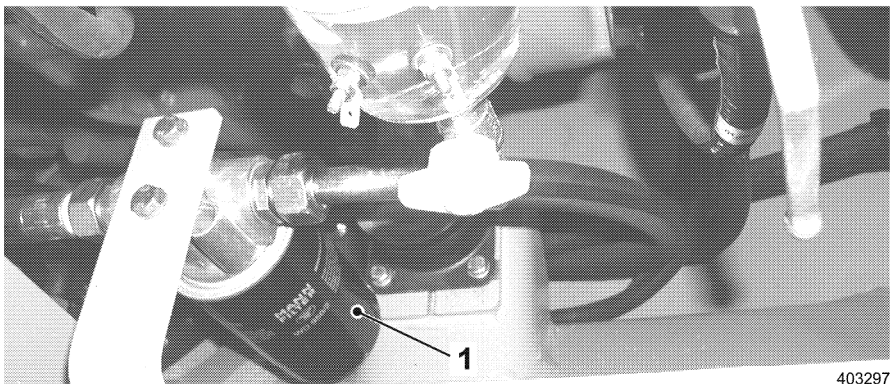


Return filter

- Remove the filter insert and dispose of it properly.
- Carefully insert a new filter insert.
- Clean the magnetic rod carefully.
- Check the O - ring on the filter cover and replace, if necessary.
- Set the filter cover with magnetic rod onto the housing.
- Tighten the screws on the filter cover.
- Tighten the bleeder screw 1.

5.9.4 Change the replenishing oil filter

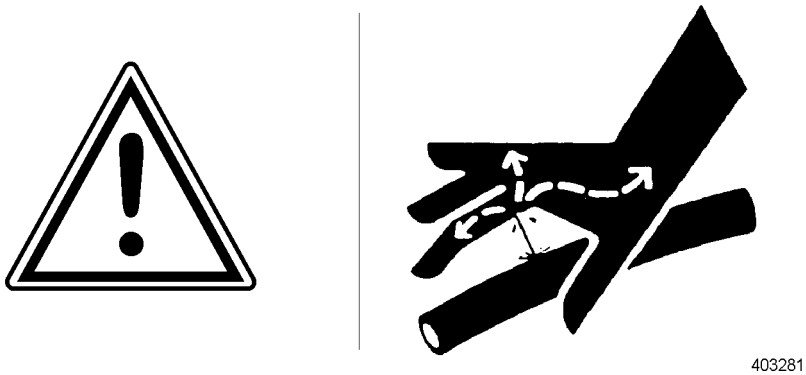
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open,
– a LIEBHERR oil filter element is available.



Replenishing oil filter

- Remove the filter element 1 with a filter wrench.
- Clean the sealing surfaces on the filter console.
- Apply a thin layer of engine oil to the rubber seal ring on the new filter element.
- Install the new filter element on the filter console and tighten by hand.

5.9.5 Check the hydraulic system for function and leaks



Hydraulic pressure

Caution

! Never check for leaks on the machine with your bare hands.
– Fluid escaping from a small hole can have enough force to penetrate the skin and cause severe injury.
– Always were protective gloves.

Make sure that:
– the machine is in maintenance position,
– the cab is raised, see "Maintenance", "Cab tilting device".

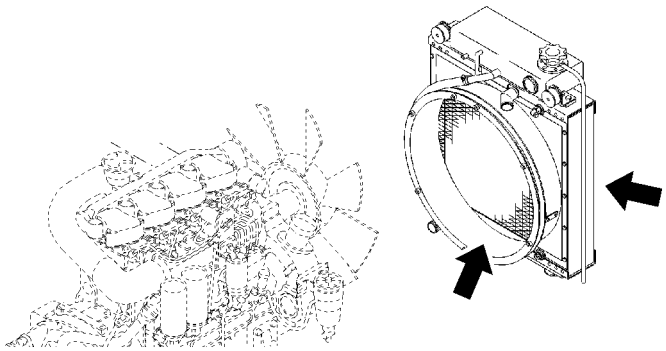
- See also "Safe maintenance of hydraulic hoses and lines".
- Check the complete hydraulic system for leaks.
- Replace defective hydraulic seals and hoses.
- Tighten loose hydraulic connections.

5.9.6 Clean the oil cooler

To ensure proper cooling function for all components, the cooler must be cleaned, as necessary. In dusty job applications, check the cooler daily and clean, as necessary.
Dirty cooler units cause overheating.
Dust and dirt can be removed from the cooling fins with water spray, steam or pressurized air. We recommend the use of pressurized air.
Make sure that:
– the machine is in maintenance position,
– the left and the right engine compartment door are open.

Caution

Be careful not to damage the cooling fins.
! Do not use hard objects or high water pressure for cleaning.



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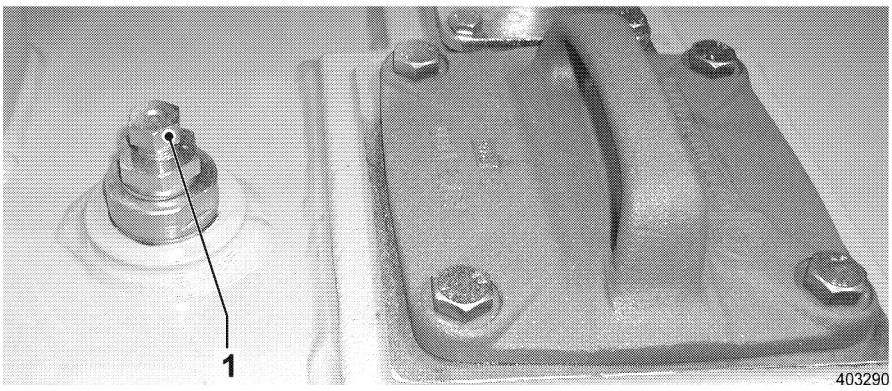
Oil cooler

- Clean cooler units with pressurized air, steam or water.
- Close the left and right engine compartment doors again.

5.9.7 Change the hydraulic oil

Make sure that:
– the machine is at operating temperature,
– the machine is in maintenance position,
– a suitable container is available,
– oil with the correct oil specification and quantity according to the data in "Lubricants and Service fluids" is available.



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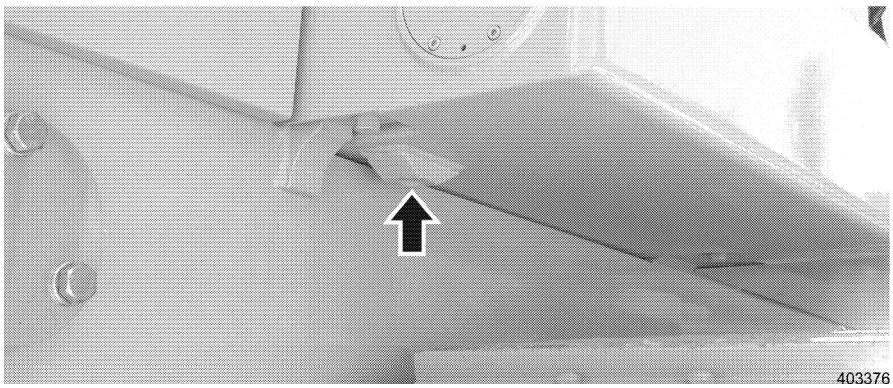
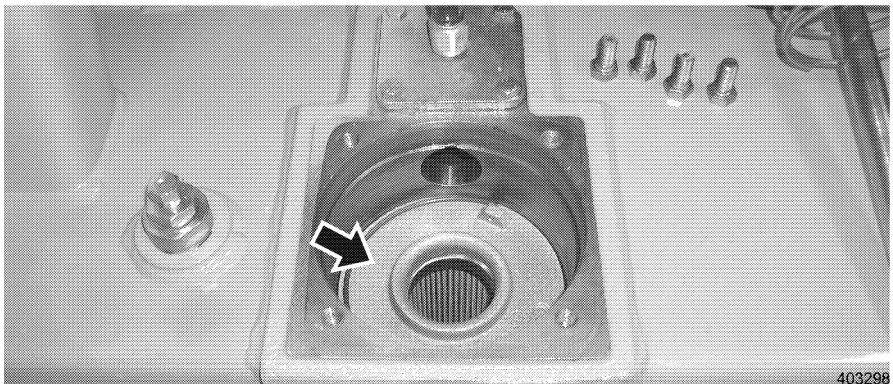
Hydraulic tank bleeder screw

- Relieve the tank pressure: Back out the bleeder screw 1 by two turns.



Hydraulic tank oil drain screw

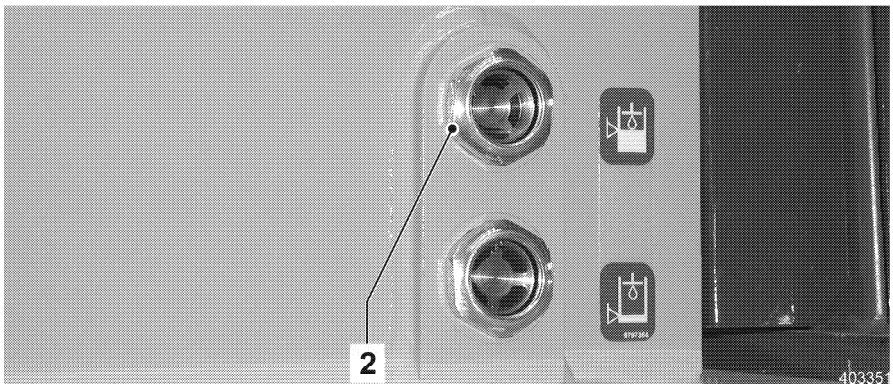
- Place a suitable container under the drain.
- Remove the plug, drain the oil and dispose of it properly.
- Reinsert the plug with seal ring.



Add hydraulic oil

Add hydraulic oil only via the return filter.

- Loosen the screws on the filter cover and slowly lift the filter cover with the magnetic rod.



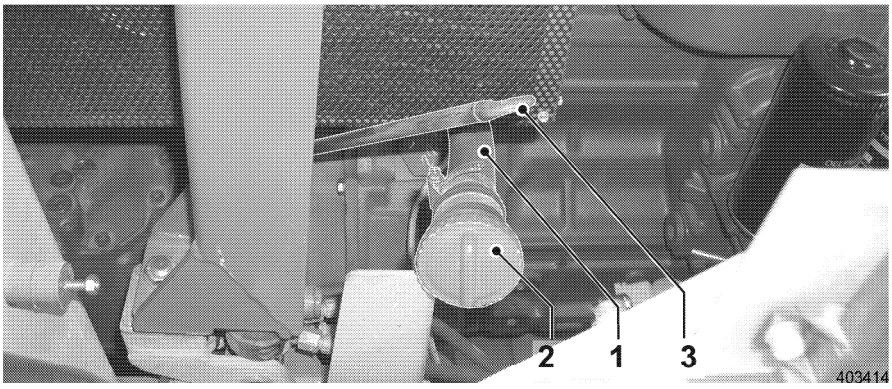
Oil level mark

- Add hydraulic oil to the oil level mark 2.
- Set the cover with spring onto the housing and tighten.
- Retighten the bleeder screw.

5.10 Splitterbox

5.10.1 Check the oil level

The dipstick 3 and the oil filler pipe 2 are in the battery compartment on the left side of the engine.
Make sure that:
– the machine is in maintenance position,
– the battery compartment door is open.



Oil filler neck - dipstick

- Pull the dipstick 3, wipe it off and reinsert it.
- Pull the dipstick 3 again and check the oil level. The oil level must be between the MIN and MAX mark.

If the oil level is too low:

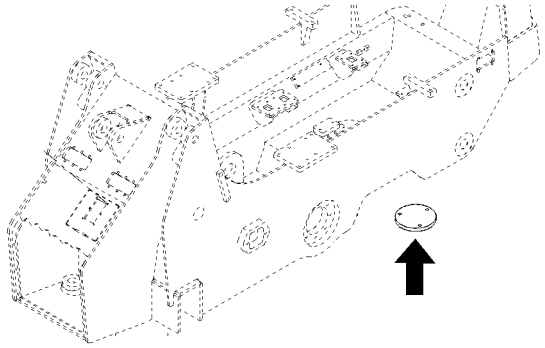
- Remove the cover 2 from the filler neck 1 and add oil.

For oil specification, see "Lubricants and Service Fluids".

- Clean the cover on the oil filler pipe and set on the oil filler pipe of the distributor gear and tighten.

5.10.2 Change the gear oil

Make sure that:
– the machine is in maintenance position,
– the battery compartment door is open,
– a suitable container and the drain hose with valve connection is available,
– the correct oil quality and quantity according to the data in the "Lubricants and Service fluids " is available.



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Oil pan cover

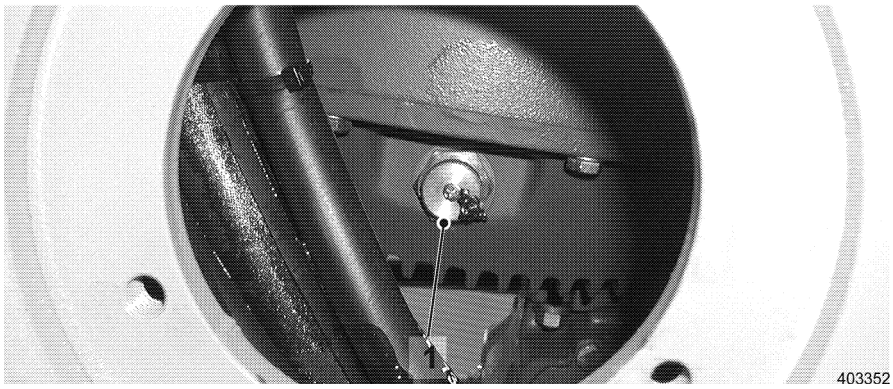
- Remove the oil pan cover.

– In case of heavy deposits in the oil pan area, the oil pans must be removed and cleaned.

Danger

! Danger of injury when removing the oil pans.
Due to space restrictions and heavy weight of the oil pans, removal is very difficult.
To remove the oil pans, use a suitable lifting device.

- Remove the cap on the oil drain valve on the oil pan.



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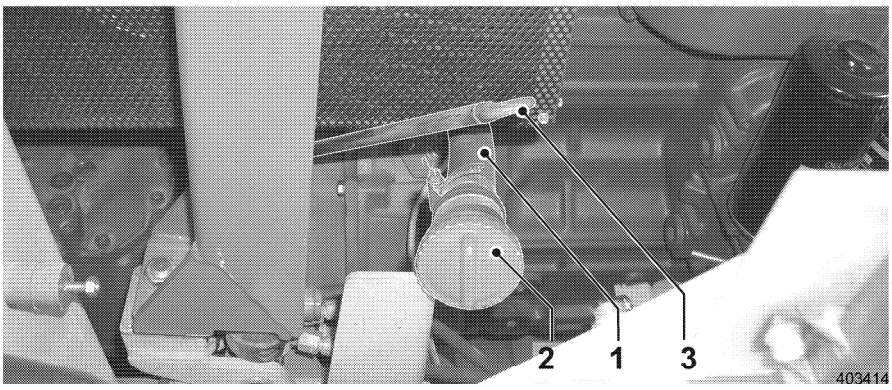
Oil drain valve

- Install the drain hose on the oil drain valve 1 and drain the oil into a suitable container.
- Remove the drain hose and install the cap on the oil drain valve. .
- Install the oil pan cover.



Oil filler neck - dipstick

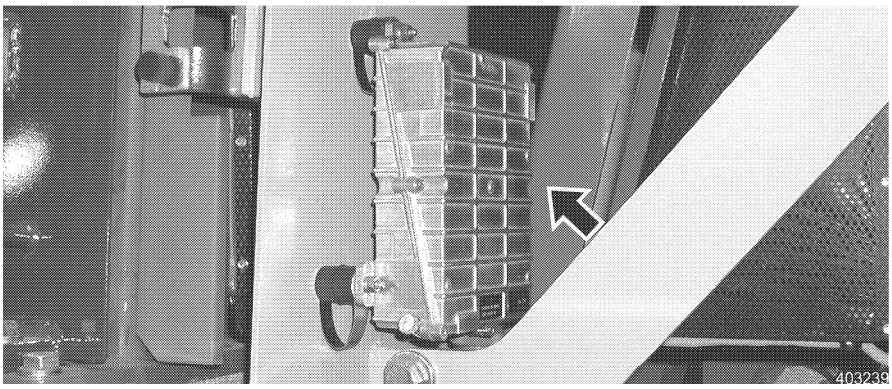
- Add new oil via the filler neck 1 to the MAX mark on the dipstick 3.
- Clean the cap 2 and reinstall it on the oil filler neck and tighten.

5.11 Electrical system

When working on the electrical system of the machine and before any welding on the machine, always disconnect the battery.

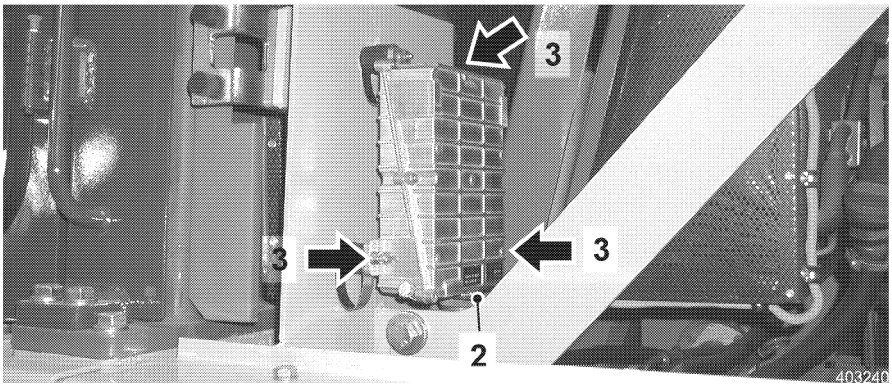
- Disconnect the negative terminal (-) first and reconnect is last.

Disconnect the battery and remove the electronic box before any arc welding on the machine.
In addition, disconnect the plug connections on the proximity switches (bucket return, hoist limit switch).



Electronic box

The electronic box is installed in the battery compartment.



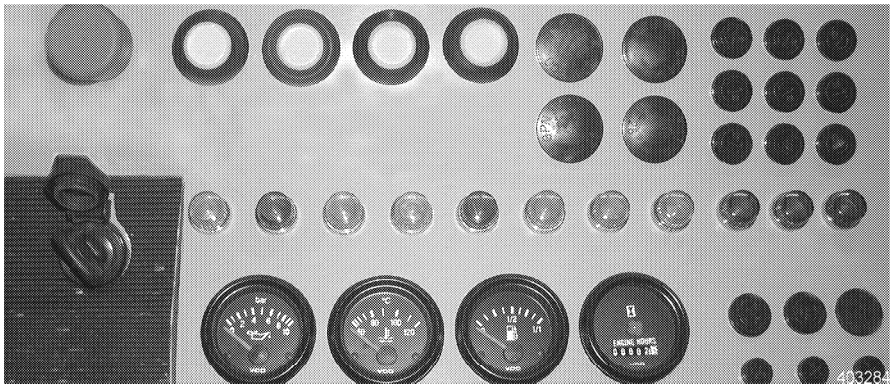
Remove the electronic box

Remove the electronic box

- Remove the cable fitting 2 on the bottom of the electronic box by turning it.
- Remove the mounting nuts 3.
- Remove the electronic box from the battery compartment.

5.11.1 Check indicator lights and illumination

For the location of lights and indicator lights on the indicator unit, see "Operation".



Illumination

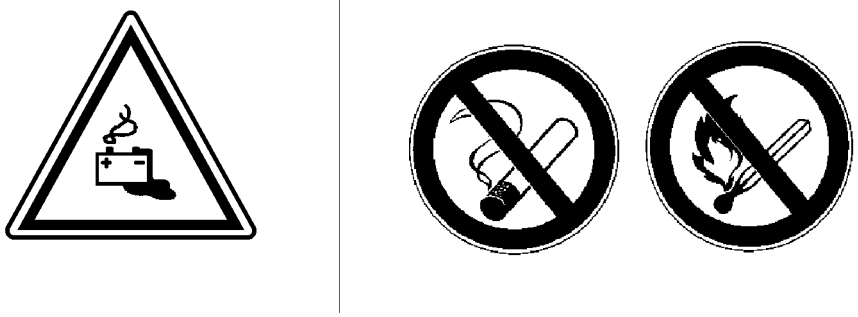
- Start the Diesel engine and check the lights and indicator lights.

5.11.2 Batteries

Batteries

Check the electrolyte level and terminals

The batteries are located in the battery compartment and can be serviced after opening the battery compartment door.
To ensure trouble fee operation of your machine, the electrical system and the batteries must always be in good condition.
Make sure that:
– the machine is in maintenance position,
– the battery compartment door is open.



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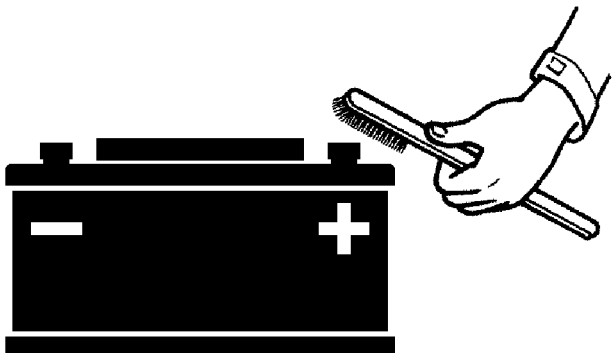
Explosive gases

Caution

Batteries discharge explosive vapors. Battery acid can cause serious injury.

! Never smoke, keep sparks and open flames away from the batteries when handling batteries, during maintenance and recharging.

– Wear protective gloves and safety glasses when handling batteries.



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Special brush for terminals

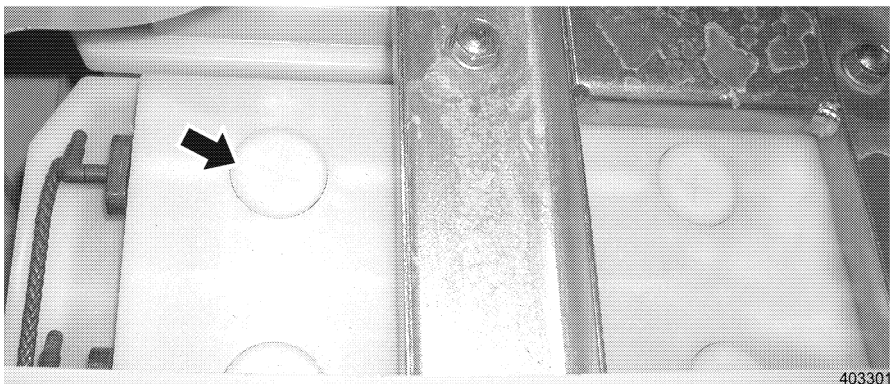
Caution

Danger of spark formation and explosion!

! Use special brush for terminals. Do not use a metal brush!

- Clean the battery surface with a clean rag.
- Tighten the battery mounts.
- Clean the terminals and cable clamps.
- To prevent loose contact, check the cable clamps to ensure they are seated tightly on the terminals and tighten, if necessary.
- Coat the battery terminals and cable clamps with acid resistant grease (such as Vaseline).

In extremely high temperatures, the acid level in the individual cells can drop, due to different gases.



Battery cells - plugs

- Open the plugs on the individual battery cells and check the electrolyte level.

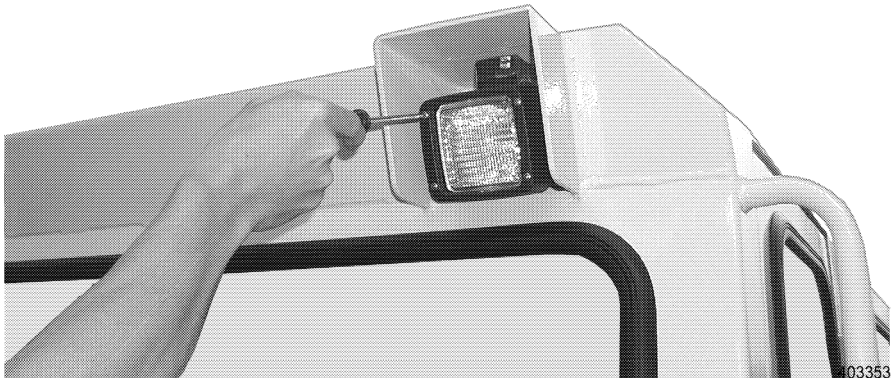
Troubleshooting

If the electrolyte level is too low:

- Add distilled water to approx. 10 mm above the plates.

5.11.3 Change bulbs

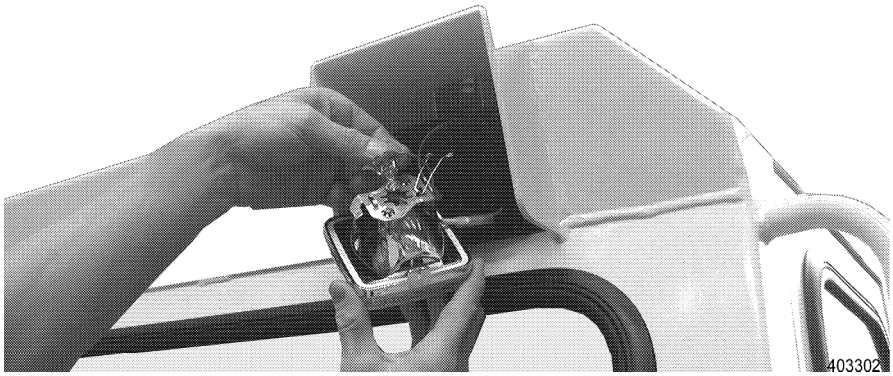
Make sure that:
– the machine is in maintenance position.



Halogen lights

Change the bulbs in the halogen lights

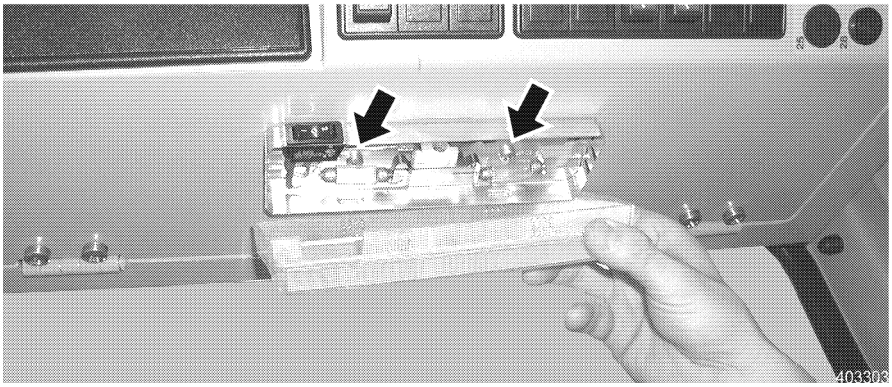
- Remove the screws on the frame of the lights.
- Remove the frame with the glass cover.



Lamp base

- Release the spring bar and pull out the lamp base.
- Remove the bulb from the base and replace with a new bulb.

– Do not touch the halogen bulb with bare fingers.



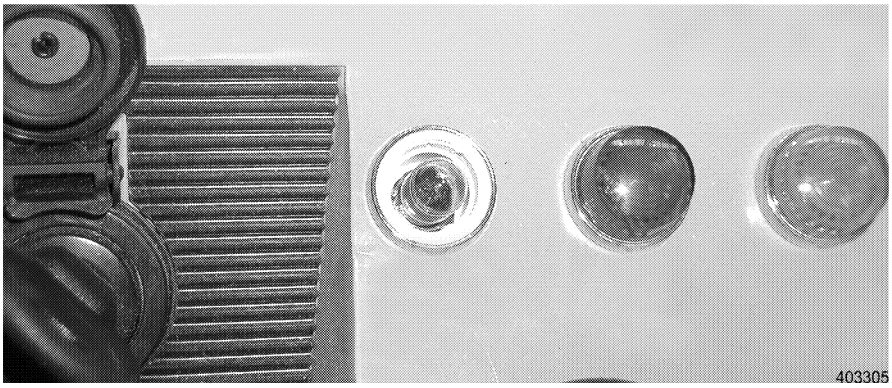
Cab interior lighting

Change the bulb for the cab interior light

- Remove the diffuser.
- Remove the bulb from the contact brackets and replace with new bulb.

– Do not touch the new bulb with bare fingers.

- Insert the bulb.
- Insert the diffuser and push up.



Indicator light

Change the bulbs in the indicator lights

- Unscrew and remove the cap of the affected indicator light.
- Turn the bulb slightly to the left, remove it from the base and change it.

– If necessary, use a short piece of hose with an inside diameter of 6-8 mm.

– Do not touch the new bulb with bare fingers.

5.12 Heating and fresh air system, air conditioning system

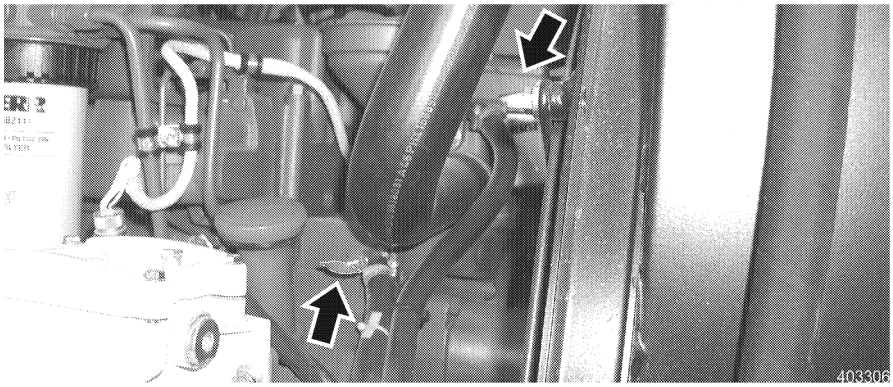
The following checks must be made regularly, but at least once a year before the start of the cold season.

5.12.1 Check the heater for function and for leaks

Check for leaks

- Check all water circuit connections for leaks.
- Check all clamps and tighten them, if necessary.

– Replace damaged hoses.

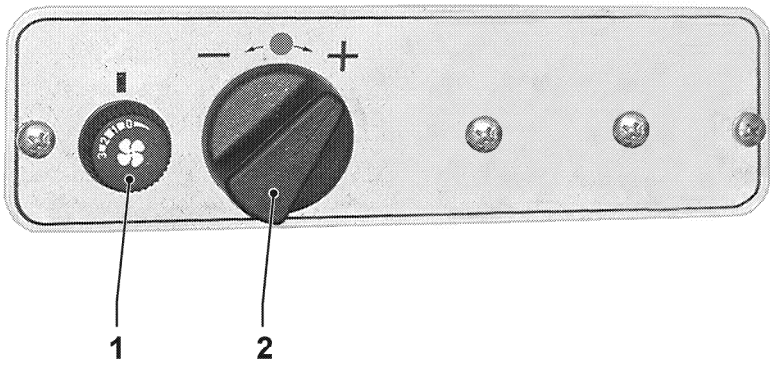


Shut off valves

During the summer months, when the heater is not used, or during maintenance or repairs, close off the shut off valves on the engine block.

- Close the shut off valve.

By closing of the shut off valves, the warm water flow to the heat exchanger is interrupted.



Heater operation

Check function

- Turn the heater on and check the function.

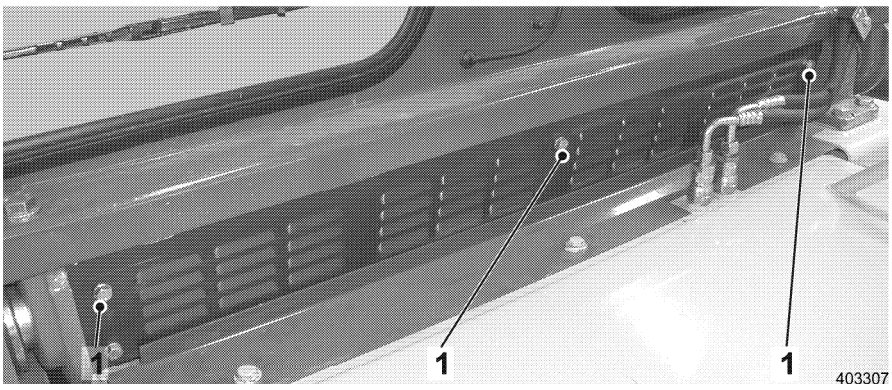
– Operate the heater to ensure that the coolant fluid contains sufficient antifreeze fluid. See "Check antifreeze and DCA-4 concentration in coolant".

5.12.2 Heater - fresh air filter

Make sure that the machine is in maintenance position.

Clean / change the fresh air filter

Access to the fresh air filter for the cab is at the rear of the operator's cab below the windshield wiper.

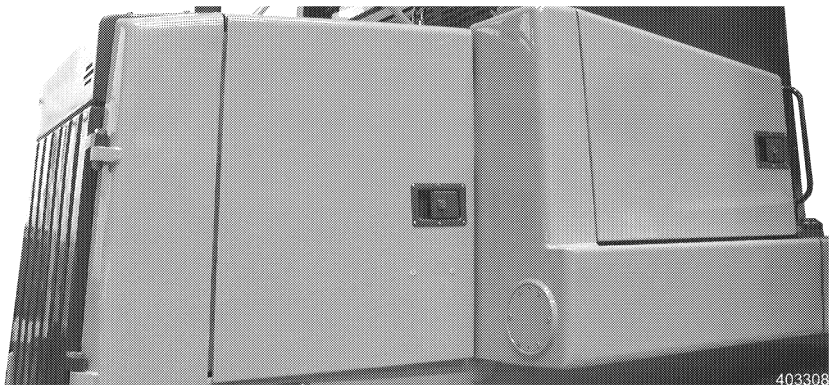


Location of cab fresh air filter

- Remove the hex head screws 1 and remove the air intake grill.
- Pull out the filter and remove.
- Clean the filter (blow out) or change, if necessary.
- Insert the cleaned or new filter.
- Reinstall the air intake grill and install with hex head screws.

5.12.3 Air conditioning system

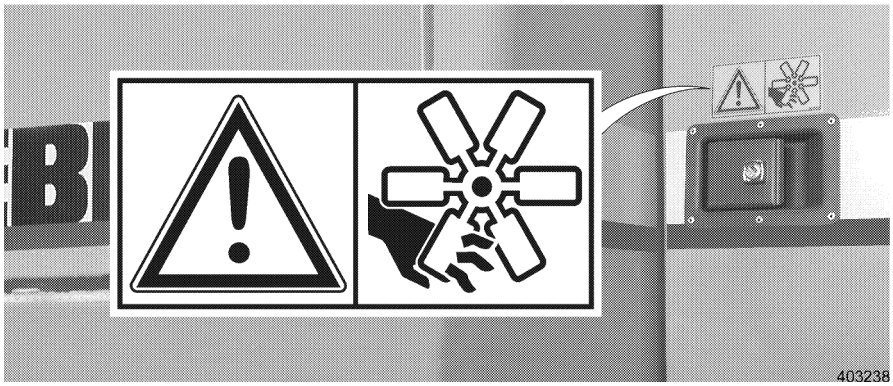
Proper function of the complete air conditioning system is only ensured if the maintenance tasks are carried out fully, properly and by especially trained personnel.
Only trained air conditioning mechanics may access and repair the cooling circuit.
The air conditioning system must be serviced once a year, before the begin of the warm season, by an authorized service center, the service must be recorded for warranty purposes.



Open the engine compartment door

Compressor mounting

- Open the right engine compartment door.
- The engine compartment door is held in this position by a gas cylinder.

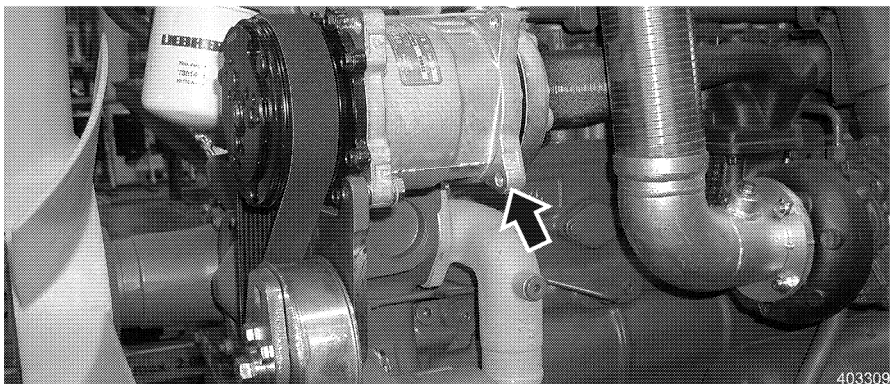


Open only if the engine is at a standstill!

Danger

Danger of injury due to rotating engine parts!
Turning and moving engine parts, such as fan blade or V-belt can cause serious injuries!

! Open the engine compartment doors only when the Diesel engine is at a standstill.

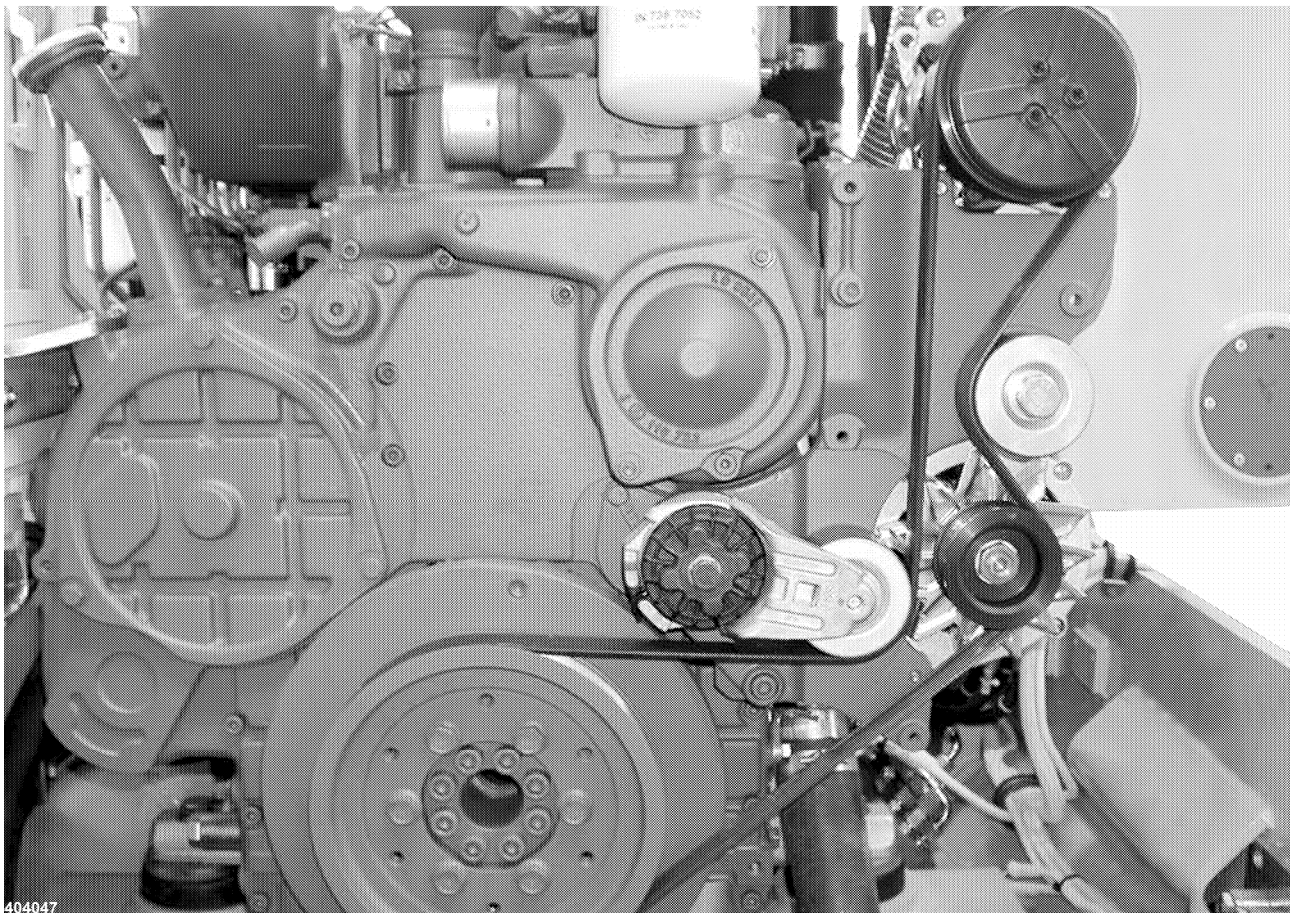


Compressor

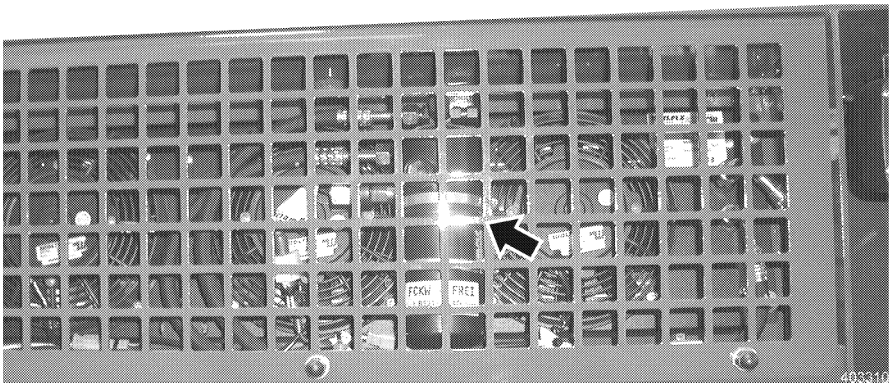
- Check the compressor carrier and compressor supports for cracks and breaks, make sure they are all present and check the screws to ensure that they are seated tightly.
- Check the compressor for leaks.
- Check the hose lines for leaks and possible chafing.

Check / change the V-belt

See "Diesel engine" and "Check / change the V-belt".



Air conditioning system - V-belt



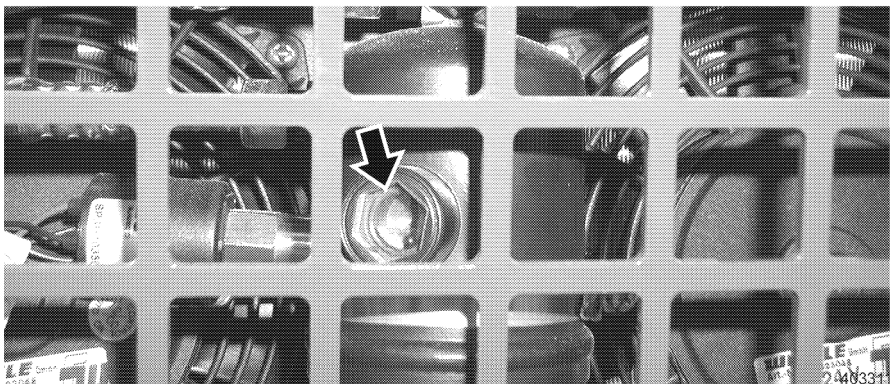
Dryer

Refrigerant and moisture content

The dryer is installed on the rear on the roof of the operator's cab in the evaporator unit and can be seen through the protective grill.

Caution

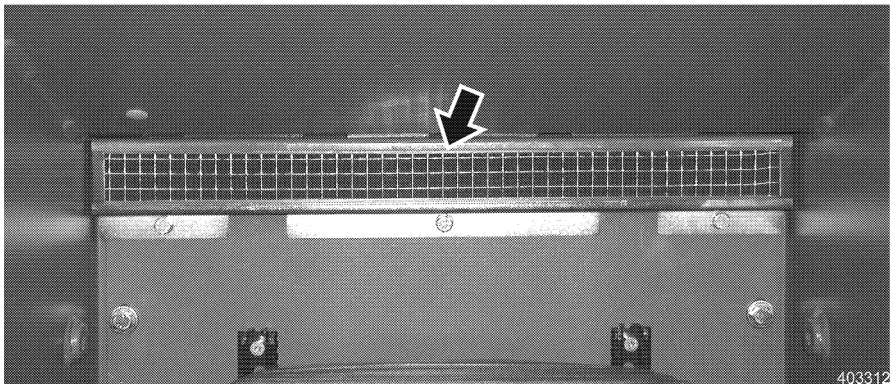
! Danger of falling!
To check, use a suitable ladder!



Indicator pearls

- Check the color of the indicator pearls.

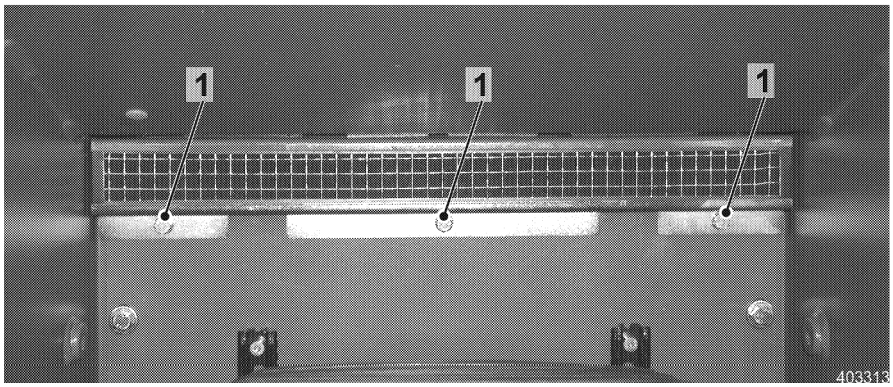
Two indicator pearls are in the sight gauge.
A white floater ball and a blue moisture indicator.
When the Diesel engine is running, the refrigerant must flow through the sight gauge of the fluid reservoir (dryer) and lift the white floater ball.
After the engine is turned off, the fluid level must fall back into the reservoir to ensure that the system is not overfilled.
If the blue ball (moisture indicator) in the sight gauge changes to red or pink, then the dryer must be replaced.
The moisture content must be checked regularly, otherwise the air conditioning system can be destroyed due to acid formation.



Air filter

Air filter

The air filter for the ventilation system is behind the operator's seat, on the floor of the cab.
The air in the cab is filtered via the air filter.



Change the air filter

Replace the air filter

- Move the complete operator's seat forward.
- Remove the hex head screws 1 on the top of the filter housing.
- Remove the retainer and remove the filter.

When inserting a new filter, make sure to align the sealing profile to the rear.

- Add the retainer and install the hex head screws.

5.13 Travel gear

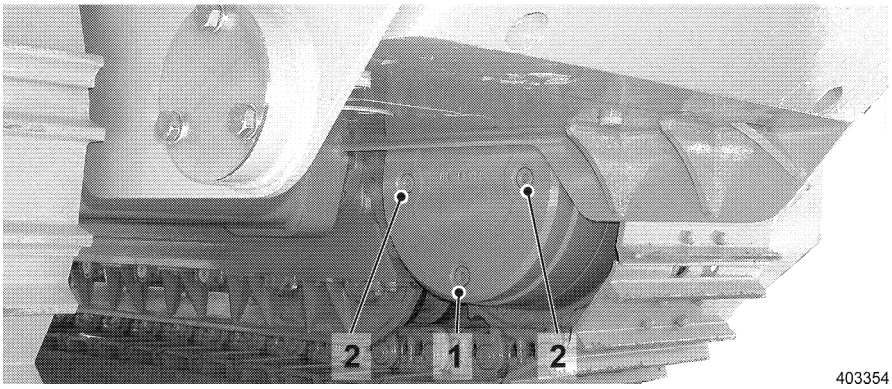
5.13.1 Check the condition of the travel gear

- Check the travel gear for leaks.
- Check the travel gear housing.

– Remove anything which have wound around the gear to prevent damage to the seals.

5.13.2 Check the oil level

Make sure that:
– the machine is in maintenance position,
– the machine is parked in such a way that the oil drain plug 1 is at the lowest point on the gear,
– a torque wrench is available.



Travel gear

- Clean the area around the oil filler plug 2.
- Turn out the oil filler plug 2 with a socket wrench.

The oil level must be at the level of the oil filler port.
If the oil level is too low:

- Add oil via the oil filler port 2.

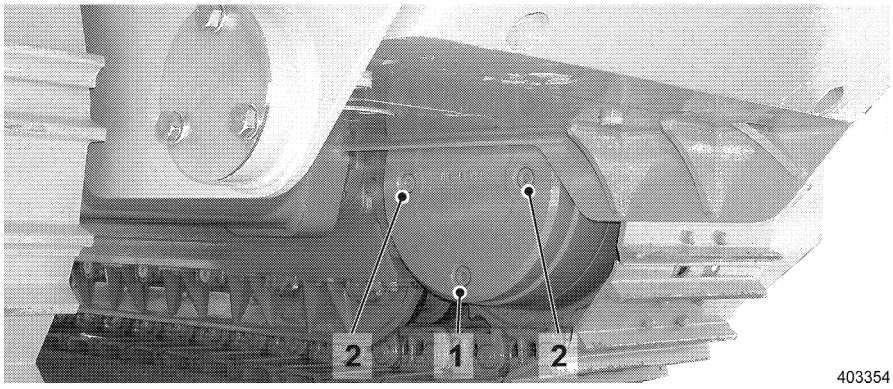
– For oil specification, see "Lubricants and Service fluids".

- Turn in the oil filler plug and torque to 160 Nm.

5.13.3 Change the gear oil

Make sure that:

– the machine is in maintenance position,
– the machine is parked in such a way that the oil drain plug is at the lowest point of the gear,
– a torque wrench is available,
– a suitable container is available,
– oil with the correct specification and quantity according to "Lubricants and Service fluids" is available.



Travel gear

- Clean the area of the oil filler and drain plug.
- Place a container under the drain plug.
- Remove the oil filler plug 2.
- Remove the oil drain plug 1.
- Drain the oil into the container.
- Check the oil for mechanical contamination.
- Clean and reinsert the oil drain plug 1.

– Note the tightening torque of 160 Nm.

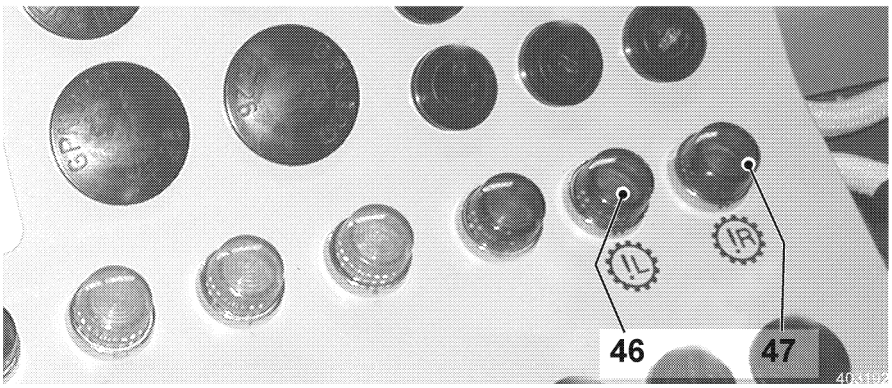
- Add oil to the lower edge of the filler port via the oil filler plug 2.
- Clean the oil filler plug 2 and reinstall.

– Note the tightening torque of 160 Nm.

5.13.4 Travel gear - Lifetime seal area

Lifetime seal area oil level

If the oil level is too low, the indicator lights "Travel gear - lifetime seal area" 46 / 47 light up in the instrument panel.



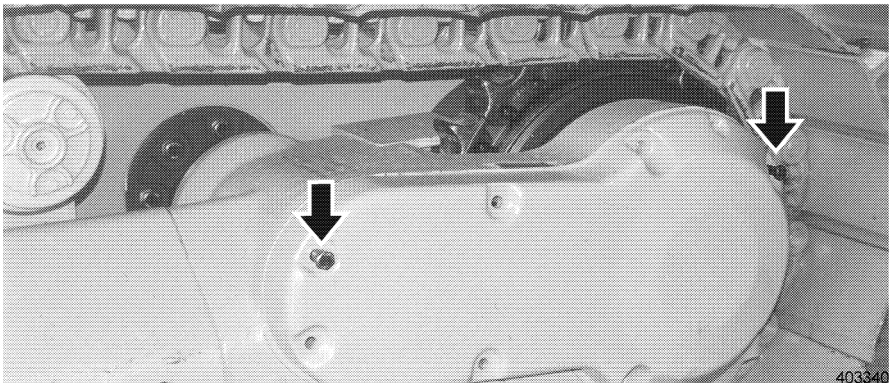
Indicator lights - lifetime seal area

Proceed as follows if the indicator light lights up:

- Turn the machine off.
- Check the travel gear externally for leaks.
- Contact Liebherr Service.
- To be able to continue work in the meantime, add oil to bring the oil level to normal level.

Change the oil in the lifetime seal area

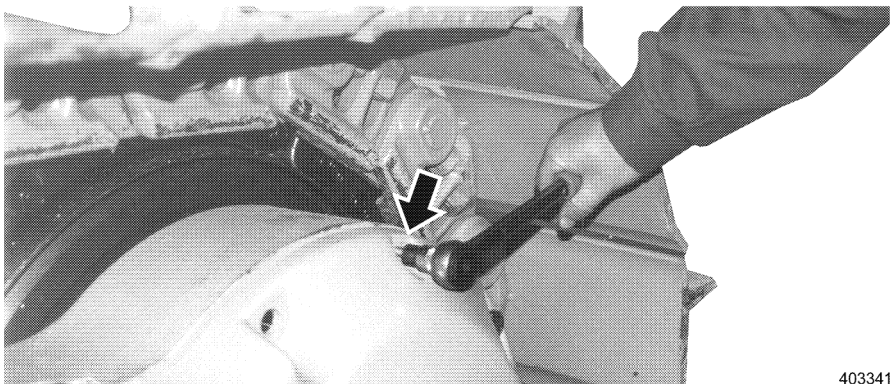
Make sure that:
– the machine is in maintenance position,
– a suitable container, the overflow hose and a filler line is available.



Gear cover

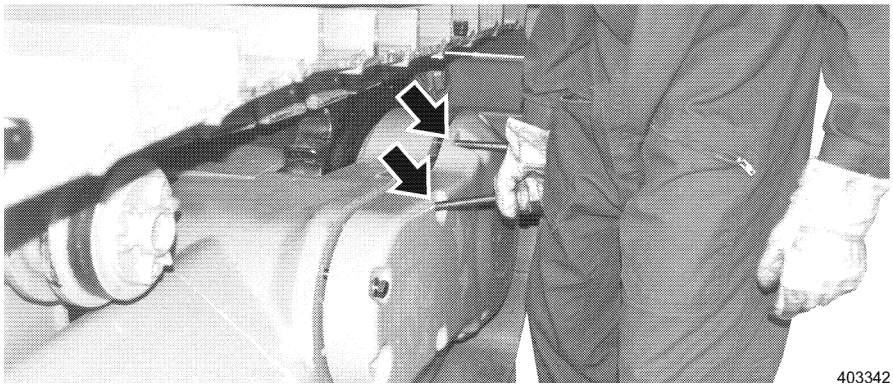
Remove the gear cover

- Release the 2 screws on the upper left and right hand side on the gear cover, remove the remaining screws.



Push off the gear cover

- To push off the gear cover, install 2 hex head screws M 8 x 40. Push off the gear cover until it is released from the sleeves.

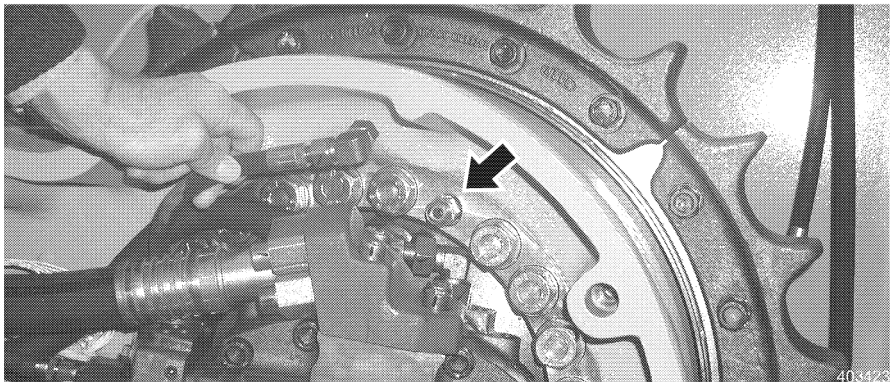


Remove the gear cover

- Insert suitable mandrels into the upper bore and remove the 2 remaining hex head screws. Place the gear cover on the ground.

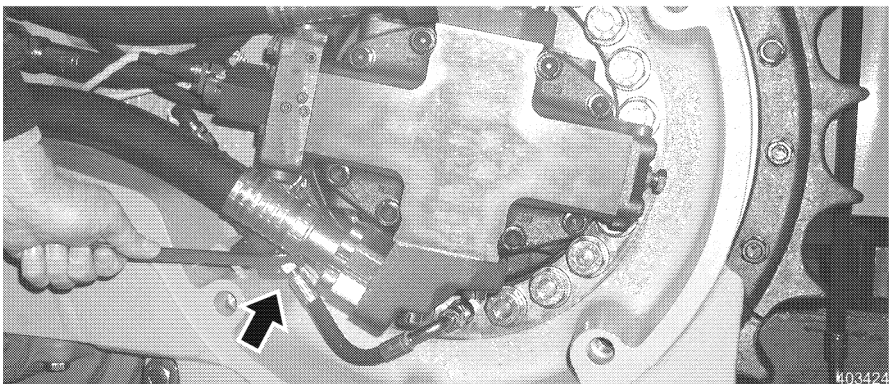
Drain the oil in the lifetime sear chamber

- Remove the electrical wire 1 on the sensor by releasing the bayonet lock.



Connection - travel gear top

- Remove the ring line on the connection - travel gear top.

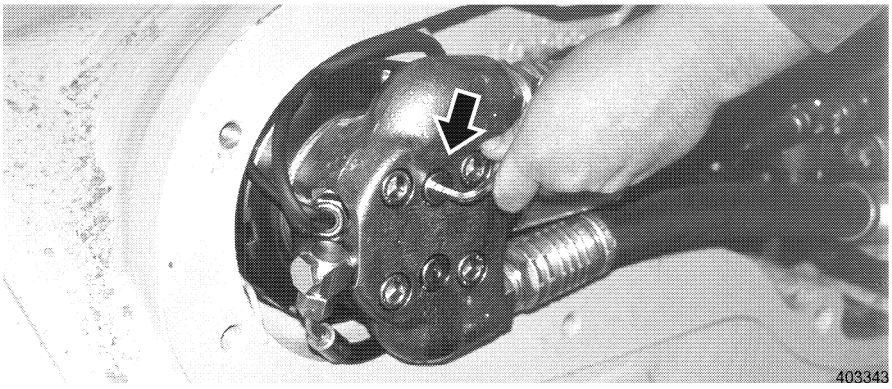


Sensor line bottom

- Remove the sensor line on the bottom. Drain the oil into a suitable container and dispose of it properly.

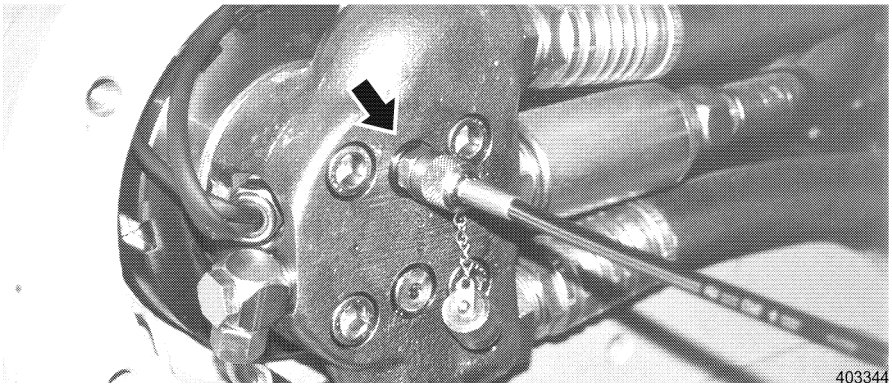
Flush the lifetime seal chamber

Before refilling, flush the lifetime seal chamber sufficiently. Any deposits in the area are removed with this flushing procedure.



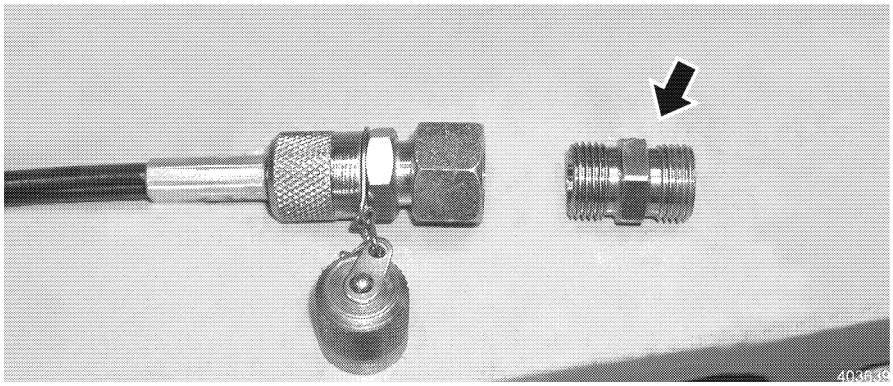
Test connection HD

- Open the plug on test connection HD.



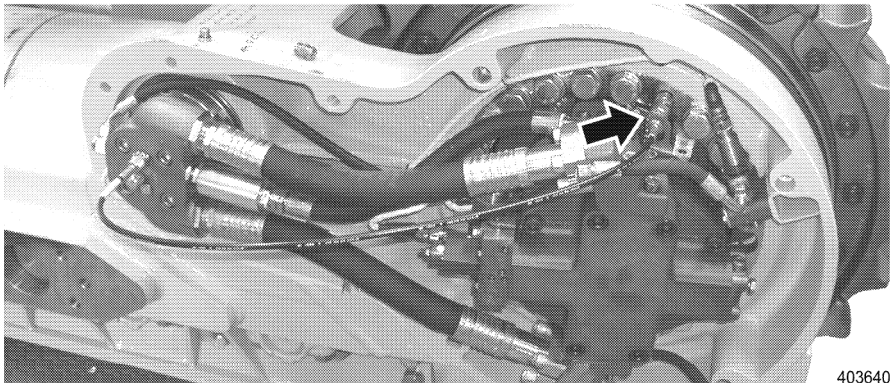
Filler line with fitting

- Install the filler line with fitting (par of the tool box).



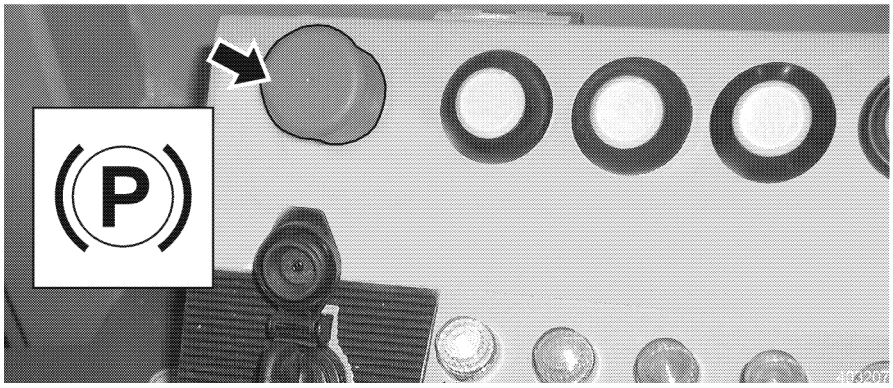
Filler line - screw fitting

- Remove the screw fitting on the filler line.



Connection - travel gear top

- Install the filler line on the connection - travel gear top.



Emergency off button

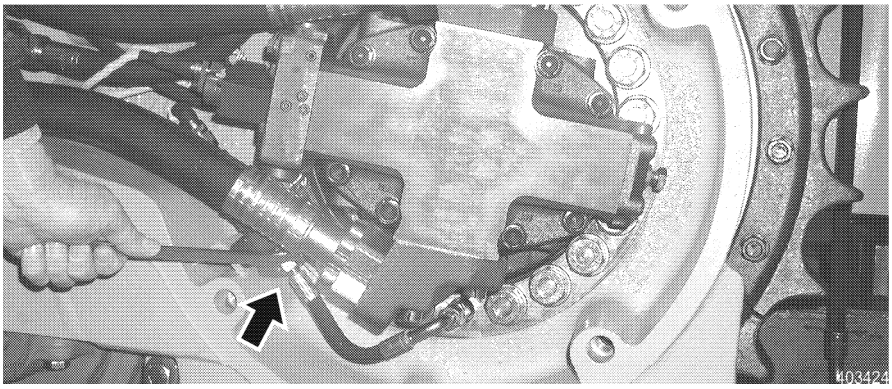
- Push the emergency off button in the instrument panel.

Caution

Danger of accidents!

! The emergency off button must be pushed down during the oil change, and the safety lever must remain in the full down position!

- Start the Diesel engine in low idle RPM. See chapter "Control, operation".
- Let the Diesel engine run until only clean oil emerges.
- Turn the Diesel engine off.
- Remove the filler line on the connection - travel gear top. On the filler line, install the previously removed screw fitting.

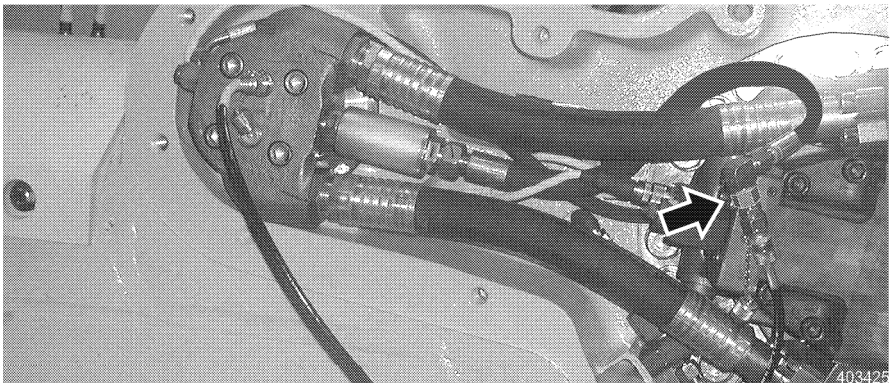


Sensor line - bottom

- Install the sensor line on the bottom.

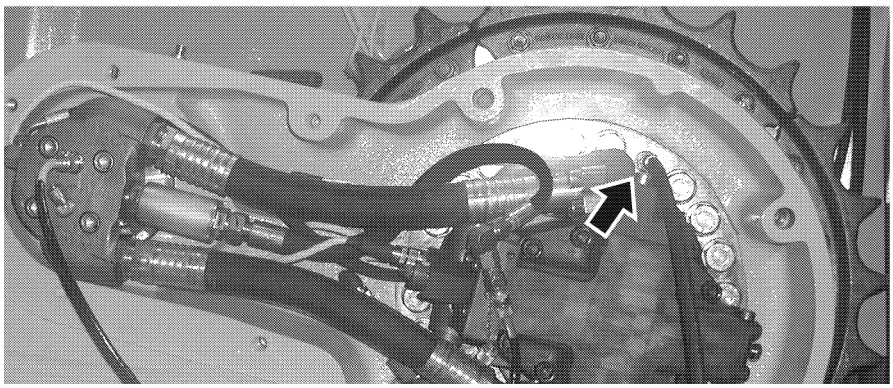
Add oil to the lifetime seal area

Drain the oil as outlined above and flush the lifetime seal chamber.



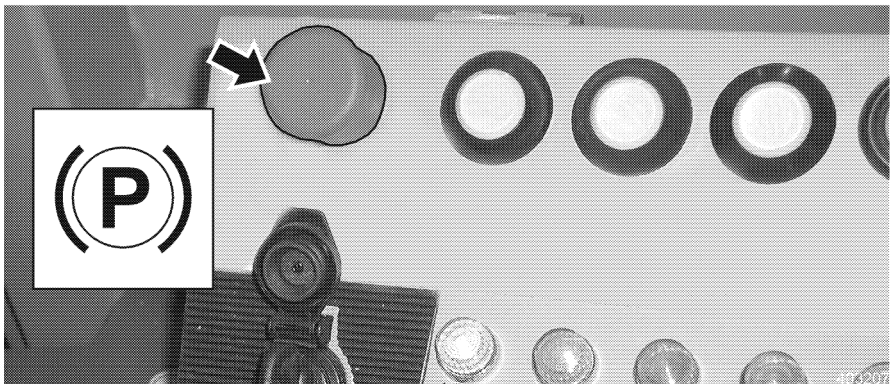
Filler line - ring line

- Connect the filler line with the ring line on top.



Connect the overflow hose

- Connect the overflow hose (part of the tool box) on the open connection - travel gear top.
- Place a suitable container under the overflow hose.



Emergency off button

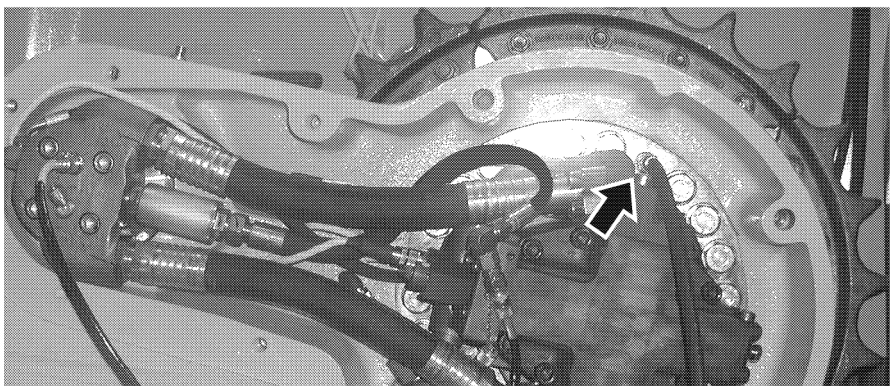
- Push the emergency off button in the instrument panel.

Caution

Danger of accidents!

! The emergency off button must be pushed down during the oil change, and the safety lever must remain in the full down position!

- Start the Diesel engine in low idle RPM. See chapter "Control, operation"



Overflow hose

- Let the Diesel engine run until approx. 1 l oil has run out through the overflow hose.

- Turn the Diesel engine off.

– Let the oil flow from the overflow hose, until no more oil emerges.

- Remove the overflow hose and the filler line.
- Connect the ring line travel gear - top.
- Connect the electrical wire to the sensor.
- Install the plug on test connection HD.
- Install the gear cover.

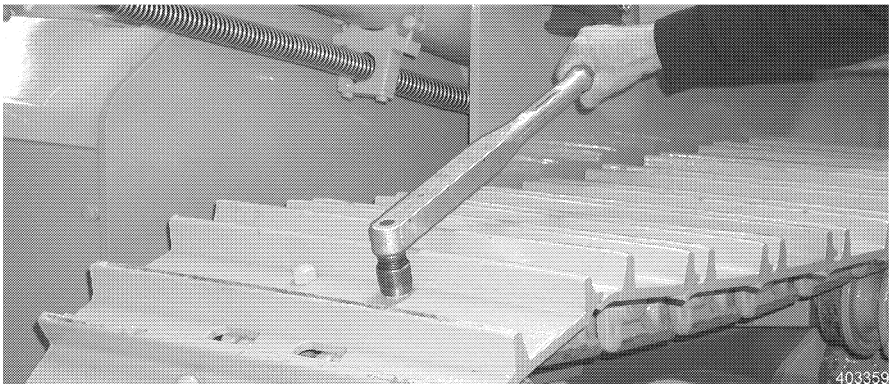
– Tighten the screws crosswise.

5.14 Track components

5.14.1 Check the screws on nuts on the track components for tight seating

Make sure that:
– the machine is in maintenance position,
– a torque wrench is available.

- Visually inspect the mounting screws on the track pads and sprocket segments to ensure they are tight.



Tightening torque

- Check the tightening torques.

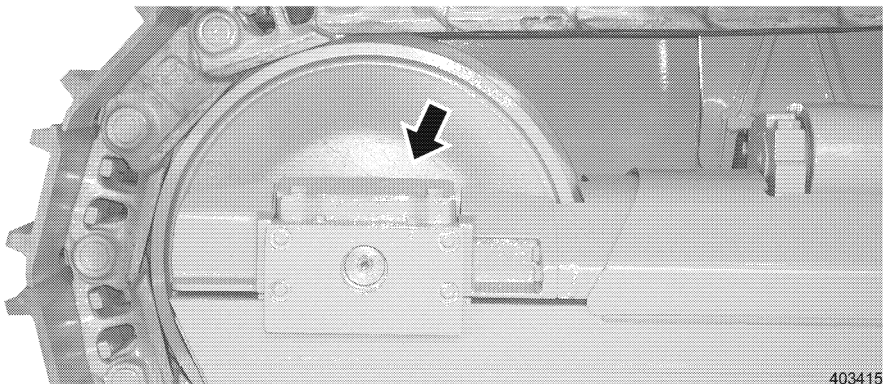
Tightening torques for track pads and sprocket segment bolts:
– 5/8" UNF: 180 Nm + 120°
– 3/4" UNF: 320 Nm + 120°
– 7/8" UNF: 350 Nm + 120°

5.14.2 Check the seal on the carrier rollers, track rollers and idlers

- Check visually.

5.14.3 Idler guides

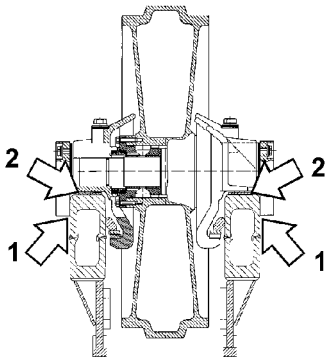
Make sure that:
– the machine is in maintenance position.



Idler guides

Check / adjust idler guides

The normal clearance between the track roller frame and the side guides is 1 - 2 mm, the height clearance of the rubber springs is approx. 3 mm. The clearance is increased due to wear of the wear bars, guide rails and plates.
When the maximum permissible value is reached, the clearance must be readjusted or the worn guide sections must be replaced.



Side - height clearance

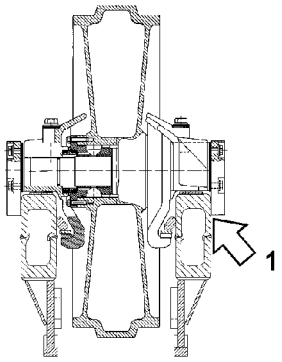
New / repair measurement
– Side clearance 1 = min. 1 - 2 mm
– Height clearance 2 = min. 3 mm

Maximum permissible clearance
– Side clearance 1 = 5 mm
– Height clearance 2 = 6 mm

Check / adjust the side clearance

• Touch the inner guide plate to the track roller frame.

– For example via "counter rotation" see "Control", "Operation".



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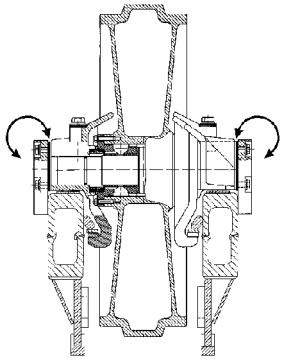
Check the side clearance

- Measure the existing clearance between the track roller frame and the outer guide plate.



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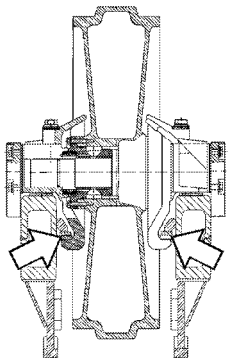
Correct the side clearance

- If the maximum permissible value is being exceeded, remove the shims on the inside and / or the outside.

– The difference between the outside and the inside shims may not be more than one shim.
– If no shims are left, then replace the guide plates.



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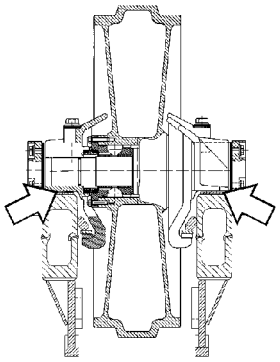
Raise the idler

Check / adjust the height clearance

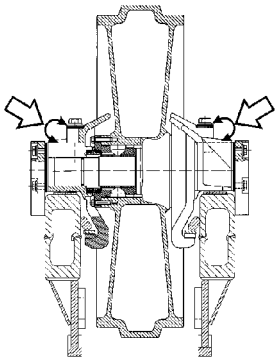
- Raise the idler by moving onto a piece of wood until the claws touch the guide rails.



403420

Check the height clearance

- Measure the clearance between the wear strips and the bearing.

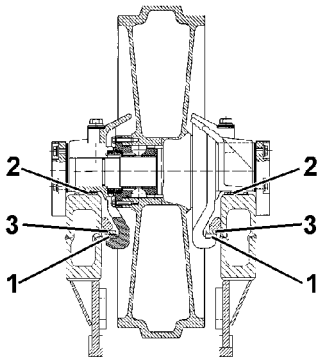


403421

Check the height clearance

- If the permissible play is being exceeded, replace the spacers under the screws and add between claws and bearings.

– Always add the same number of spacers on the inside and outside.



403422

Wear parts - idler guides

- Check the wear parts on the claws and track roller frame and replace the worn bars 1 and 2 in pairs if the maximum value is exceeded.
- When replacing the bars, check the welded on guide rails 3, replace them also if significantly worn.

5.14.4 Chain tension

Danger

The chain tensioner may only be replaced or repaired by authorized personnel.

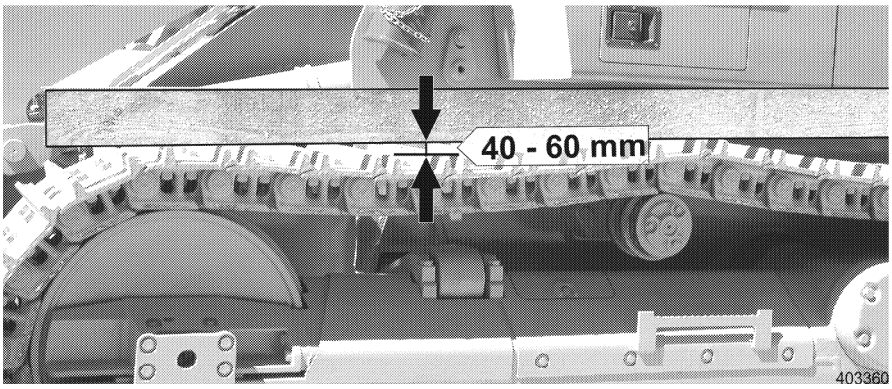
! The chain tension spring is pretensioned despite a loose chain!

Due to wear of track components, it is necessary to check the chain tension regularly and to adjust the chain tension, as necessary.
Since the material deposits on rocky terrain are less than on muddy ground, the adjustment of the chain must be made to reflect the job application.
Do not remove any material, which has built up during working hours on the tracks before checking the chain tension.

! The conditions must be identical to the working conditions!

Make sure that:

– the machine is in maintenance position,
– a measuring stick is available.

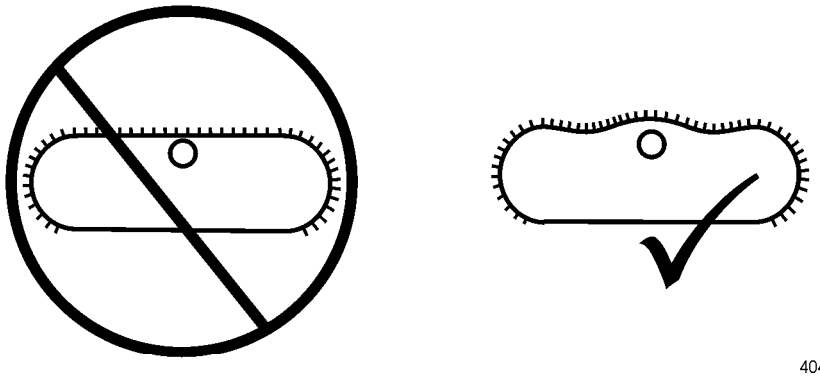


Check the chain tension

Check the chain tension

- Relieve the chain by moving the machine back and forth.
- Place the measuring stick on the area between the idler and the carrier roller.
- Measure the distance between the measuring stick – lower edge and chain bar.

– The chain is tensioned correctly for the job application if the slack between the carrier roller and the idler or gear ring is between 40 - 60 mm.



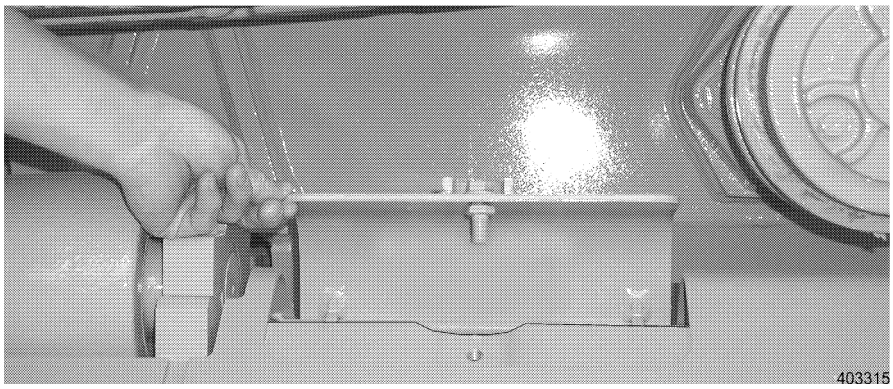
Chain tension

! An incorrectly tensioned chain will result in increased chain wear.
– Always set the chain tension to the given slack dimension, depending on the working conditions.

- Correct the chain tension, as necessary.

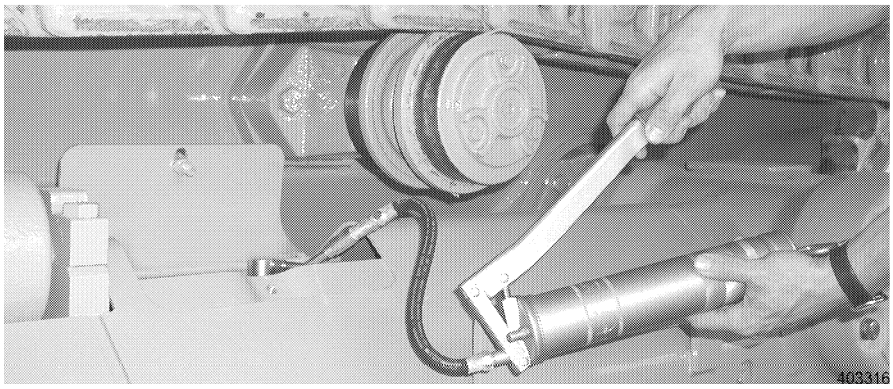
Tension the chain

Make sure that:
– the machine is in maintenance position,
– a manual grease gun with adapter for the fitting of the chain tension cylinder is available.



Cover – track roller frame

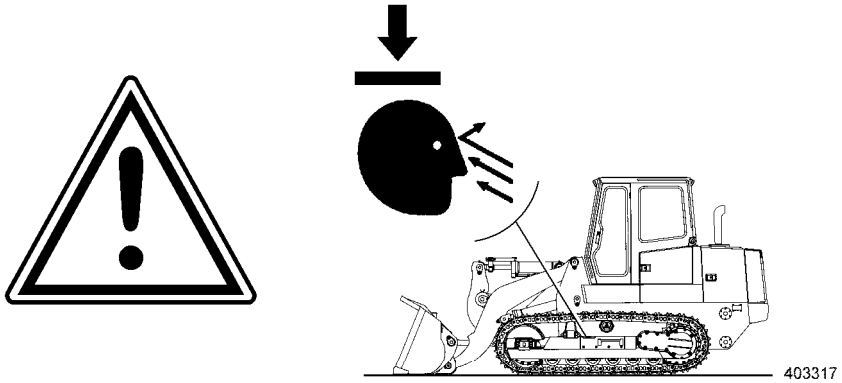
- Clean the areas next to the cover on the track roller frame.
- Loosen the hex head screw on the cover and open the cover.



Manual grease gun with adapter

- Connect the manual grease gun with the adapter to the grease fitting on the tension cylinder.
- Pump grease into the cylinder until the proper slack is reached (40-60 mm).
- Attach the cover with hex head screw.

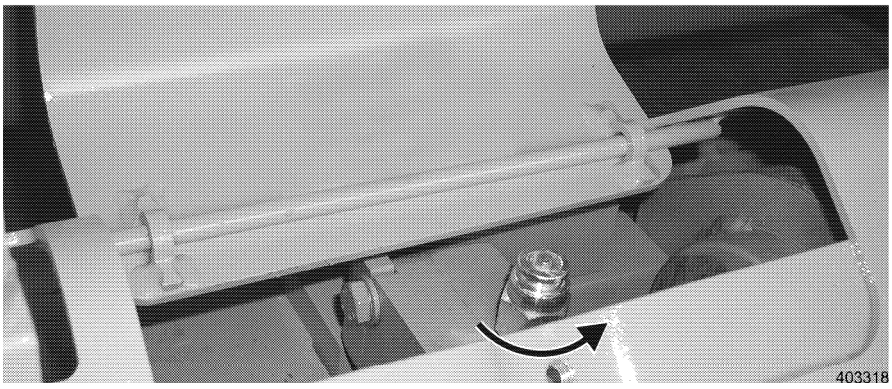
Relieve chain tension



Danger of injury

Danger

Danger of injury!
! The chain will sag and grease may squirt out.
– When relieving the chain tension, keep your head away from the track roller frame.

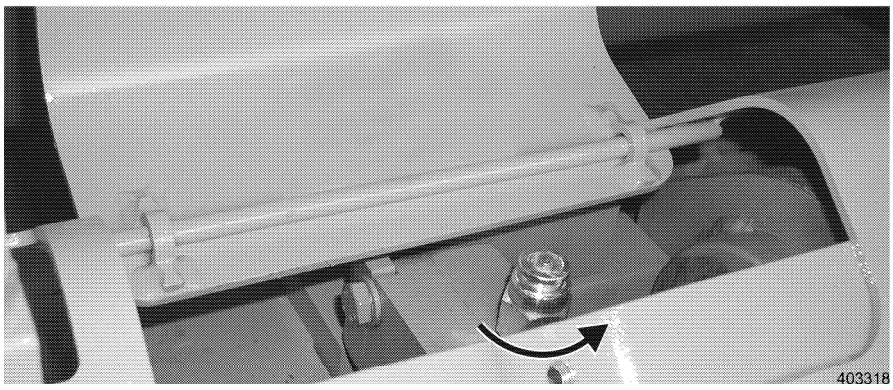


Grease fitting

- Carefully back out the grease fitting by a few turns until the grease emerges from the ring groove of the fitting.
- Tighten the grease fitting as soon as the correct chain tension is reached.
- After the adjustment procedure, move the machine back and forth and recheck the chain tension.

5.14.5 Changing the chain

Make sure that:
– a torque wrench is available,
– the necessary tools to change the chain are available.



Grease fitting

Removal of sealed chain

- Release chain tension, see above "Chain tension".

– Back out the grease fitting by a few turns.

- Slowly move the machine with the idler against a wooden block to push the idler completely closed.
- Park the machine on level ground in such a way that the master link pin is at the sprocket wheel about 1/3 between the horizontal and vertical center.

– The master link pin can be recognized by a chamfered edge or countersunk bore.

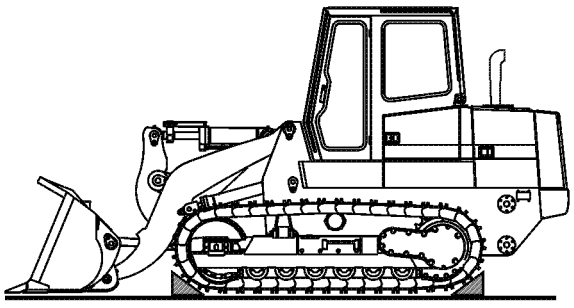
Caution

! Knocking the master pin in or out with a sledge hammer can be very dangerous due to material chipping off the pin which could cause serious injuries.

– Always wear safety glasses and protective clothing.

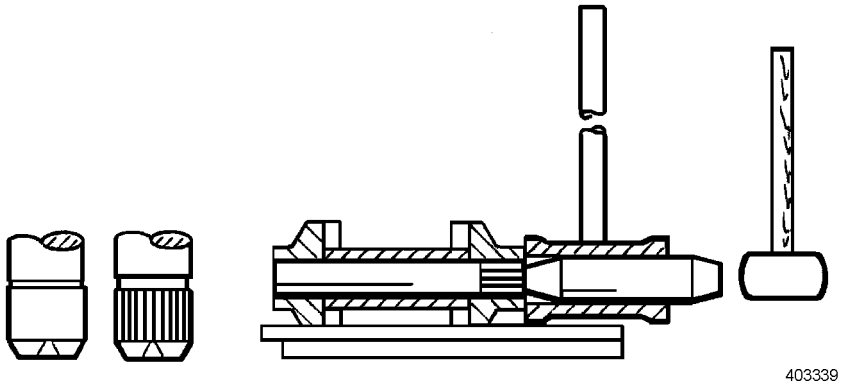
If possible, use a hydraulic press to install and remove the pin.

Knurled master pins must be pressed in from the outside to the inside and pressure out from the inside to the outside. Knurled edge on the outside!



Place a wooden block

- Secure the chain in front of the idler and behind the sprocket with a wooden block to prevent it from rolling off.



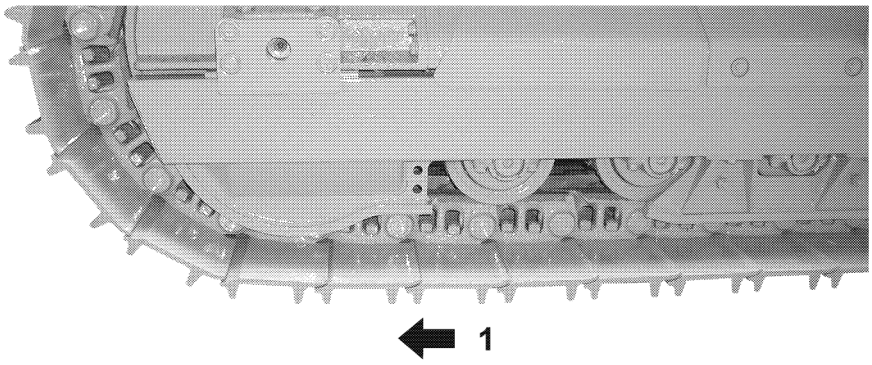
403339

Press out the chain link pins

- Press out the master pin with a pin press or with a suitable tool.

– When knocking out the master pins, support the chain link on the other side.

- Raise the attachment.
- Carefully drive the machine forward until the complete chain rests on the ground.
- Drive the machine backward on the old chain.



403369

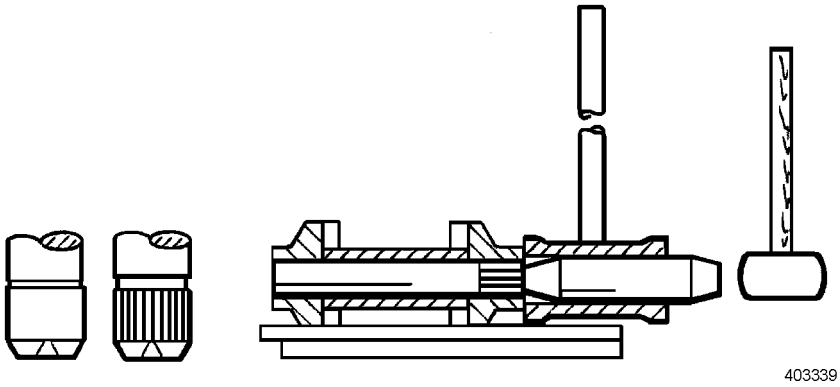
Travel direction forward

Install a sealed chain

- Place the new chain in proper direction on the ground and connect it to the old track chain with the master link pin.

– Make sure the new chain and track pads are installed in the correct direction 1 = travel direction forward.

- Align the chain to the track frame and move the machine carefully onto the new chain until you get to the end of the new chain.
- Release the new chain from the old chain and attach the end of the new chain with a wire to the sprocket wheel.
- Carefully drive the machine forward until the chain is on the sprocket on top.
- Release the wire from the chain and sprocket wheel and continue to drive forward to bring the chain over the carrier roller and idler. Stop the machine when the idler wheel approaches the last 2 track pads.

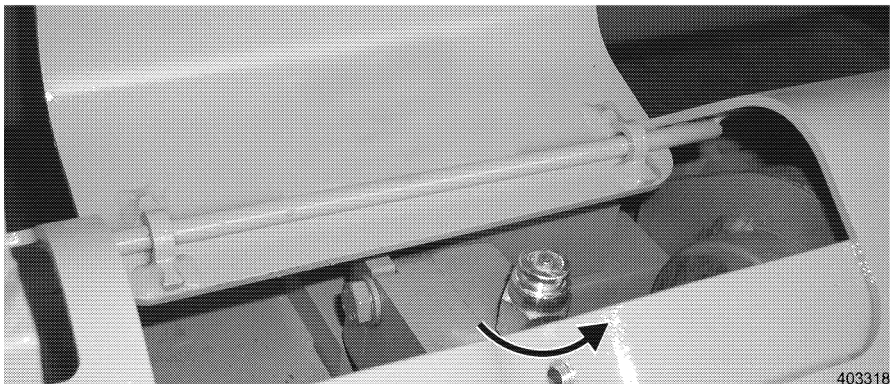


Press in the master pin

- Raise the last track pads, reinsert the spacer rings and press in or knock in the master pin from the outside to the inside.
- Tension the chain. See "Adjust chain tension".

Remove a chain with split master link

- Park the machine on firm and level ground.

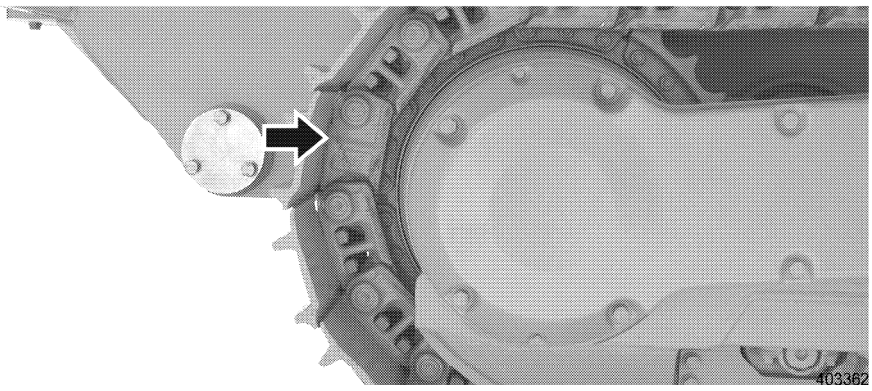


Grease fitting

- Release the chain tension. See "Adjust chain tension".

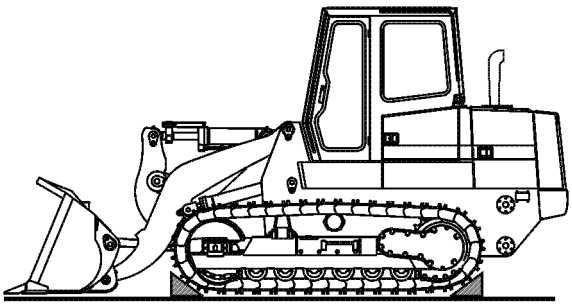
– Back out the grease fitting by a few threads.

- Slowly move the machine with the idler against a wooden block, until the idler is pushed back all the way.



Master link

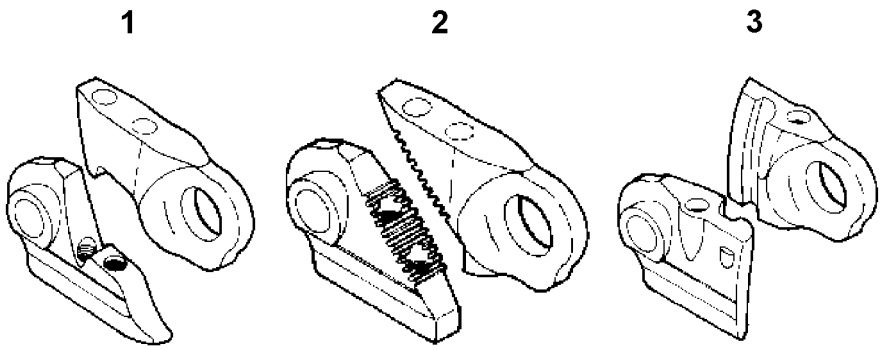
- Move and park the machine until the master link and the center of the sprocket are at the same level.



403361

Place the wooden blocks

- Secure the chain in front of the idler and behind the sprocket with a wooden block to prevent it from rolling off.
- Spray the teeth and mating area of the master link with penetrating oil to help the oil penetrate by hitting the master link lightly with a hammer.



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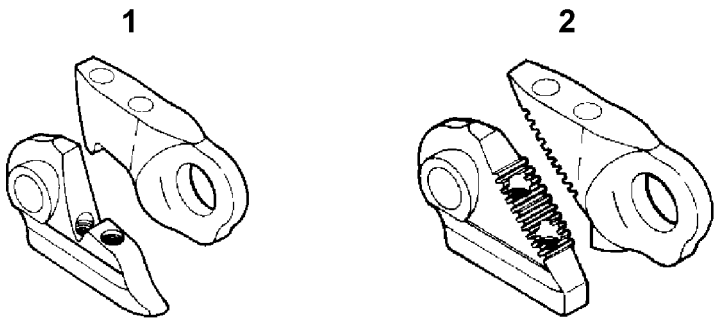
Master link manufacturers

Various chains with split master links are used in LIEBHERR machines.



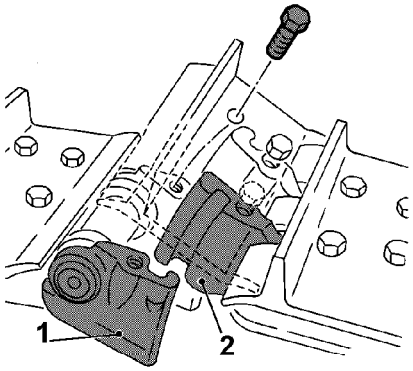
403346

Version 1 + 2

Version 1 + 2

- Unscrew the track pad bolts, remove the track pad and release and split the master link by hitting the master link lightly with a hammer.

– If necessary, apply more penetrating oil.



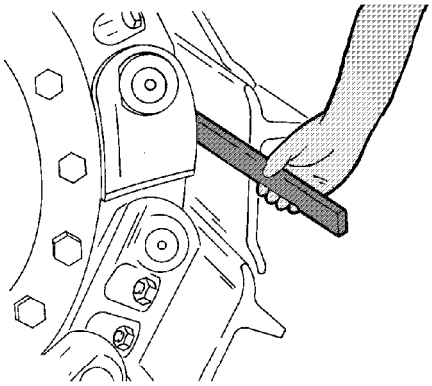
403347

Version 3

Version 3

Marks:
The pin section 1 is pressed to the pin, marked with the manufacturer's name and the track pad screws are spaced farther apart.
The bushing section 2 is pressed to the bushing, appears shorter from the outside and the track pad screws are spaced closer together.

- Remove only the track pad screws from the pin section.

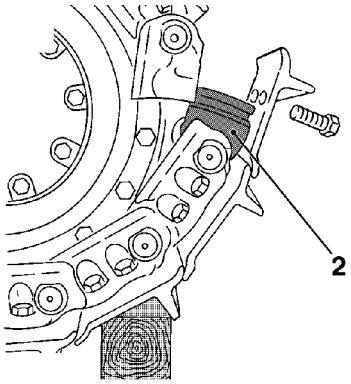


403348

Drive out the bushing section

- Use a steel wedge between the track pad and the pin section to drive out the bushing section.

– Support the drive action of the wedge by hitting the track pads lightly with a hammer.



403349

Bushing section

- Only the bushing section 2 can be turned to the outside.

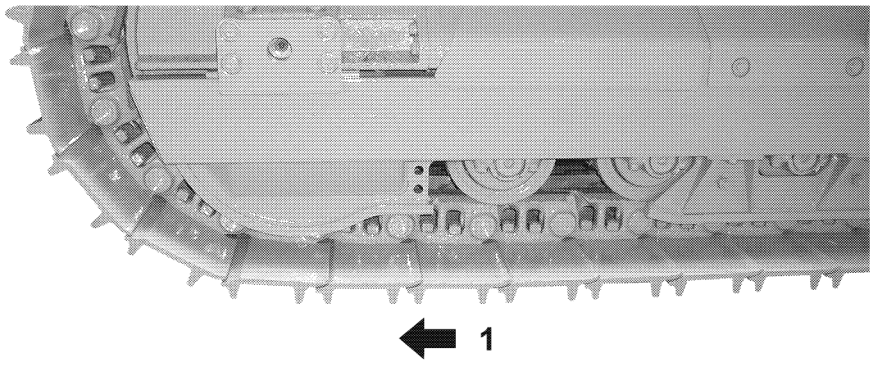
- Place down the chain by carefully driving forward.

Install a chain with split master link

Track chains with master links can be easily installed on the sprocket or idlers.

- Drive the machine back on the placed down chain.
- Make sure that the new chain is free of paint, protective grease or other material. Coat the mating surfaces lightly with grease.
- Clean the bore holes, apply Never Seize (special lubricant) or grease to the track pad bolts.

– Insert the bolts by hand.

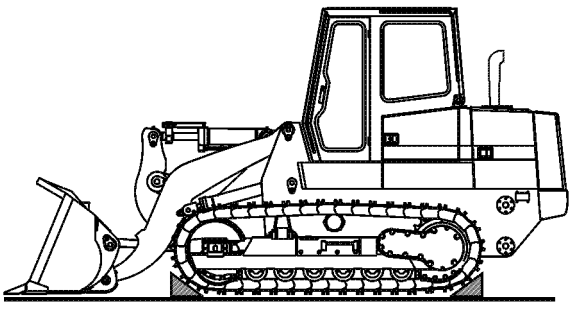


403369

Travel direction forward

Make certain that the chain is installed correctly with the track pads on the correct side (1 = travel direction forward).
On version 3, the chain bracket with the pin section must point to the sprocket, when the new chain is behind the sprocket.

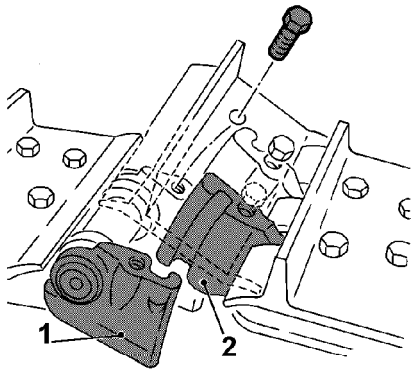
- Place the new chain on the ground and connect it with the old chain with a wire.
- Align the chain to the track roller frame and carefully move the machine forward to the end of the new chain.
- Loosen the new chain from the old one and attach the new chain with the wire to the sprocket.
- Carefully move the machine forward until the chain is on top of the sprocket.
- Release the wire from the chain and the sprocket and continue to drive forward to bring the chain over the carrier rollers and the idler. Stop the machine when the master link is at the same height as the center of the idler.



403361

Place a wooden block

- Secure the chain in front of the idler and behind the sprocket with a wooden block.
- Connect the chain links.



403347

Version 3

For chain version 3, the track pads must be installed with the bushing section before the master link is connected.

- Push the pin end toward the center of the idler, insert the bushing end and slide both parts together until the track pad makes contact. Only the bushing section can be inserted.

– DO NOT hit the mating surfaces with a hammer.

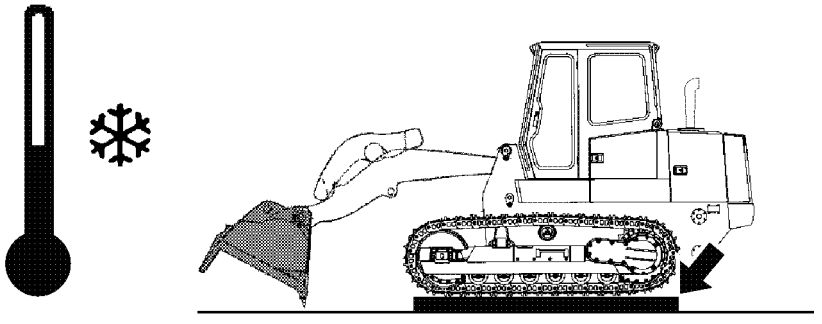
Place the track pad, insert the bolts and torque correctly.
5/8" UNF: 180 Nm + 120°
3/4" UNF: 320 Nm + 120°
7/8" UNF: 350 Nm + 120°

- Tension the chain. See "Chain tension".

5.14.6 Clean the tracks

Make sure that:
– the machine is in maintenance position.

DO NOT operate the machine, if rocks, wood or metal pieces, wires or cables are stuck in the tracks.
Dried or frozen mud as well as rocks or other foreign matter in the track sections can cause severe damage, if the machine is put in operation or if the operator tries to free the machine by force.



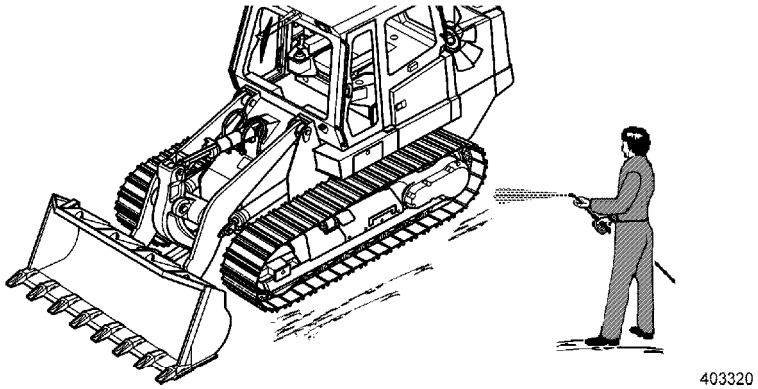
403319

Turning the machine off in freezing temperatures

If temperatures are below freezing, park the machine on wooden boards to prevent the chains from freezing to the ground.

If the machine is frozen to the ground, heat the track pads carefully to free the machine.
Never try to move a frozen machine by force, this can cause significant damage.

- Check the tracks, clean or repair as necessary.



Wet cleaning

After cleaning the machine with hot water or steam, all grease points on the machine must be re-lubricated!

- Clean the machine with steam.
- Grease all lube points on the machine.

5.14.7 Check track wear

The tracks are maintenance free, except for the wear of some parts.
Track wear increases due to improper operation or if tolerances are not observed.
Visual inspections or wear checks must be made to recognize wear in time and to be able to overhaul and continue to use these parts.
Make sure that:
– the machine is in maintenance position.

Check track component wear

- Check chains, chain guides, track pads and sprockets for wear.

5.15 Working attachment

5.15.1 Check the attachment

Make sure that:
– the machine is in maintenance position,
– a torque wrench is available.

- Check the condition of the attachment.
- Check visually for damage and wear.
- Check the mounting screws for tight seating (note tightening torques).

Make sure the machine is equipped with the proper attachment for the job.

Check wear

To prevent damage to the teeth retainers, the teeth and possibly the safety element must be replaced before the wear limit is reached.

- Check the attachment for wear, replace worn parts, if necessary.

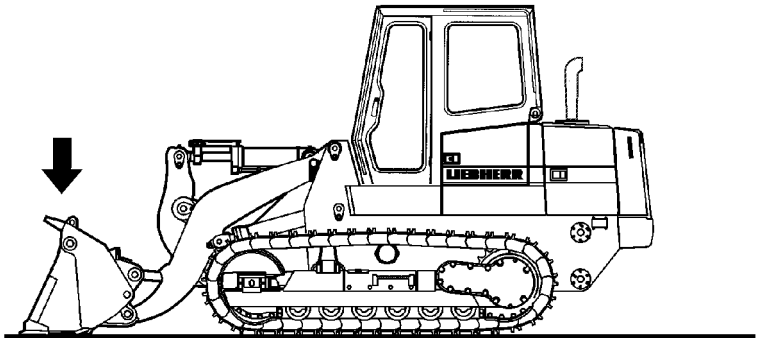
5.15.2 Replace teeth

Danger

! DO NOT work or allow work underneath or on the attachment, unless it is properly supported.
Lower the attachment to the ground and support it properly from below.

Caution

! When knocking out the safety elements, there is a danger of injury due to metal chips.
– Always wear protective clothing and safety glasses.
– Make sure there are no other persons within the danger zone.

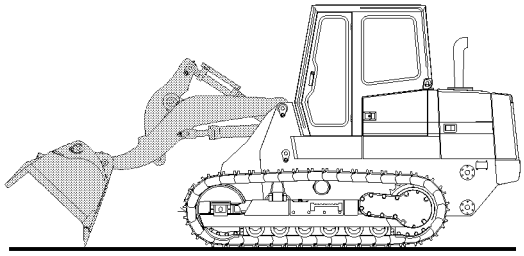


403321

Lower the attachment

- Lower the attachment to the ground.
- Knock out the safety element with a hammer and a flat iron.
- Remove the tooth.
- Clean the tooth retainer and safety element.
- Install new tooth.

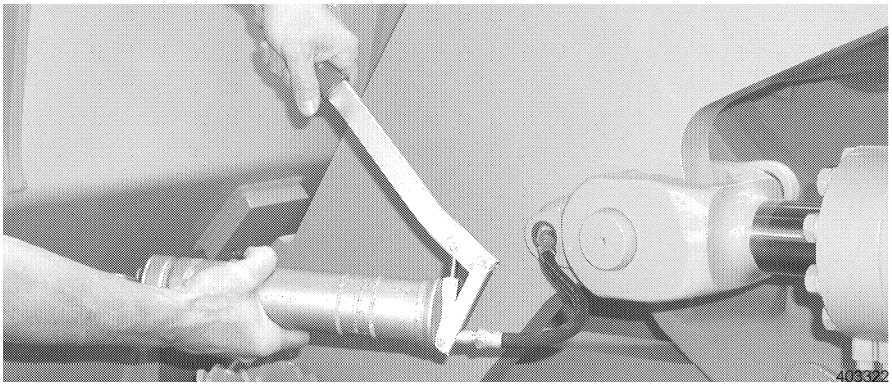
5.15.3 Lubricate the attachment bearing points



403184

Maintenance position

- Lower the attachment to maintenance position.



Lubricate the bearing points

- Lubricate all bearing points according to the lubrication schedule.

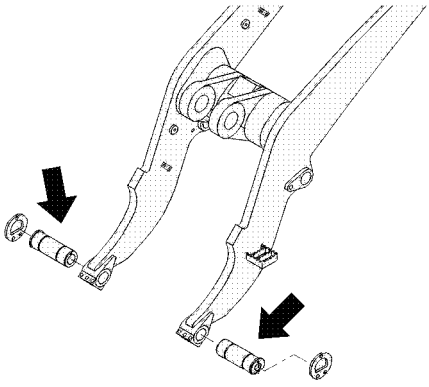
5.15.4 Check the bearing play

Pins

Radial play The radial play on all bearing points may be no more than 2 mm. If the maximum value is exceeded, then the bushings in the bearing points must be reworked.

Axial play The axial play on all bearing points except on the hydraulic cylinders, may not exceed 3 mm.
Axial play on hydraulic cylinders = maximum 5 mm.
If the play exceeds these maximum values, add shims.

Oil filled bucket pin bearings



Bucket pin bearing

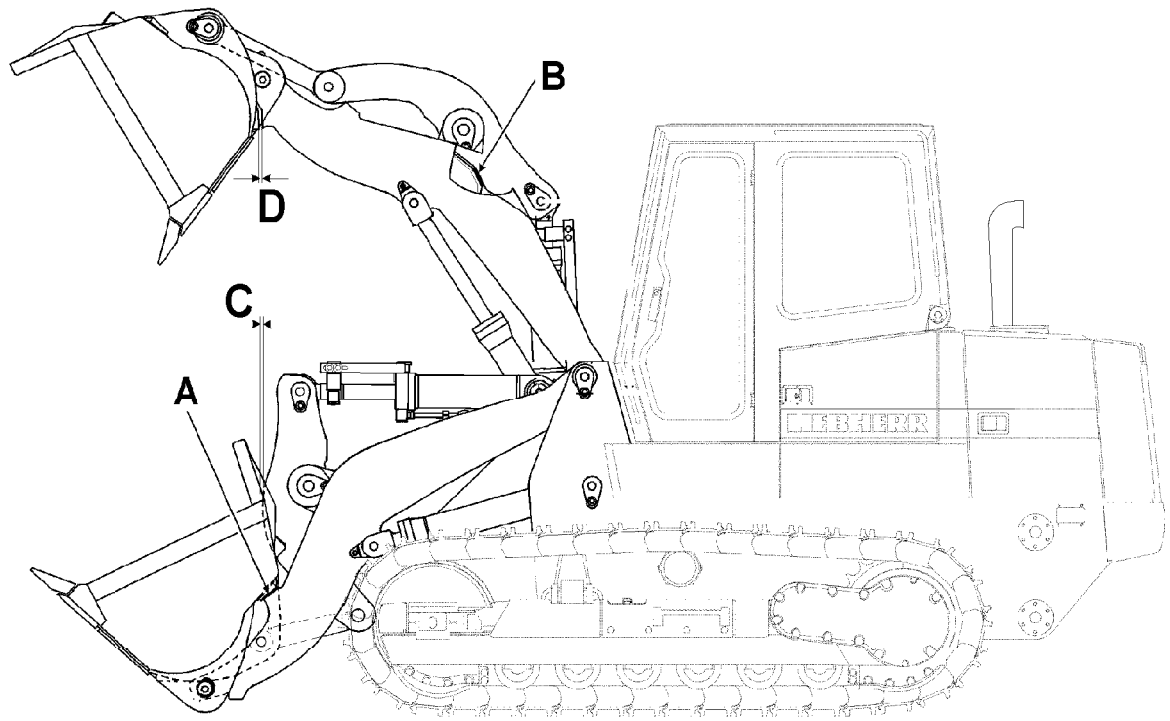
Check the bucket pin bearing for leaks, proper tightness and wear.
Replace leaky or work bucket pin bearings.

Radial play Permissible radial play until leaks or dry to no more than max. 2 mm.

5.15.5 Bucket stops

Bucket curled in

- Lower the bucket and curl it in completely.
- Park the machine properly.



403374

Bucket stops

- Measure the distance C between the bucket and the change over lever.

– The distance must be at least 20 mm.
– The bucket must evenly touch the bucket arm on both stops A.

Danger

Danger of accidents when the attachment is raised!
! Never work underneath the raised attachment.
– First support the attachment properly from below.

Bucket curled out

- Raise the bucket and curl it out completely.

The hoist limit switch must not be operating.

- Turn the Diesel engine off.

– Use a suitable ladder.
! Approach the attachment only from the side.

- The change over lever must touch stop B on the bucket arm.
- The back of the bucket may only touch stops D on the bucket arm (no load on bucket).

5.16 Total machine

5.16.1 Check the machine for external damage

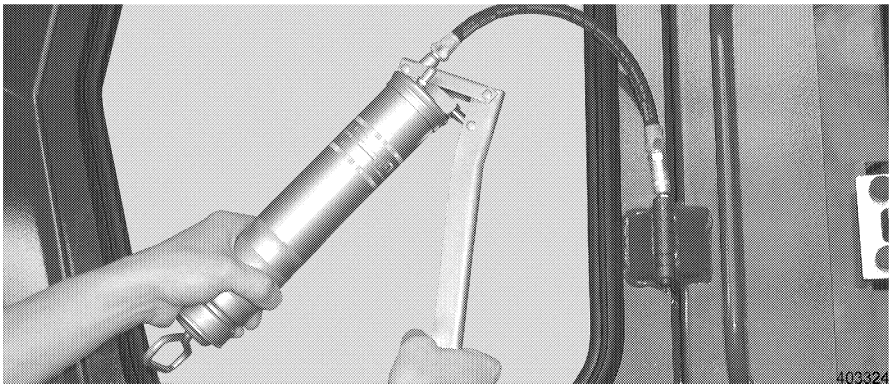
Make sure that:
– the machine is in maintenance position.

403350

Visual inspection

- Before operating the machine, check the machine for external damage, which could affect operating safety.
- Fix any safety relevant damage immediately!

5.16.2 Operator's cab - lubricate door hinges

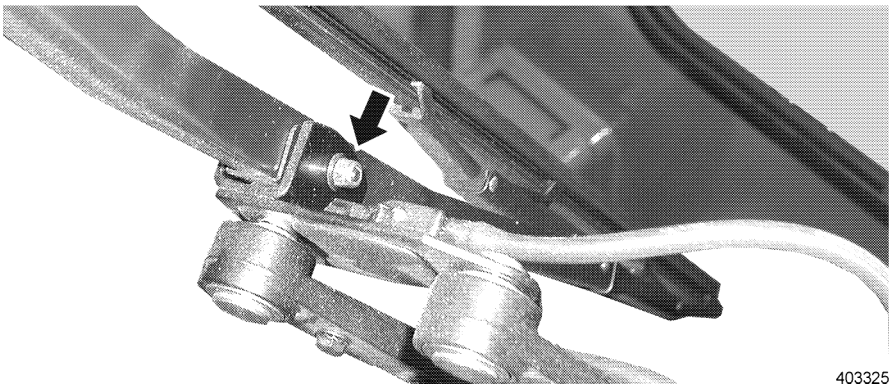


403324

Door hinges

- Lubricate door hinges with a manual grease gun.

5.16.3 Windshield wiper



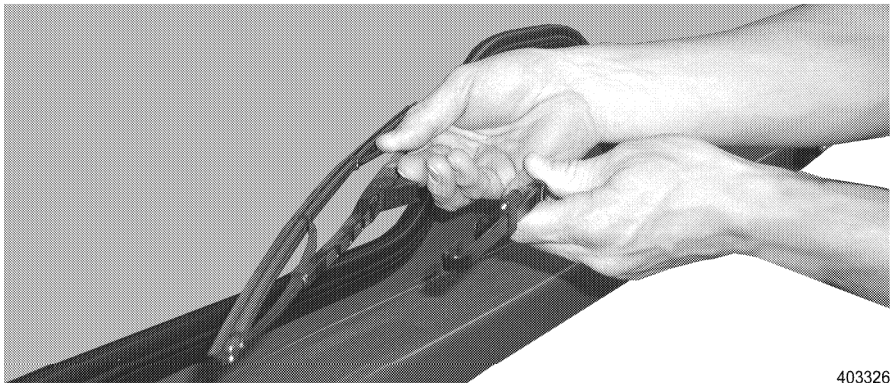
403325

Windshield wiper - front

Change the windshield wiper blade on the front

- Fold the wiper arm up.

- Remove the nut of the mounting screw.
- Remove the spring ring and washer and pull out the mounting screw.
- Remove the wiper blade and change it.



403326

Windshield wiper - rear

Change the windshield wiper blade on the rear

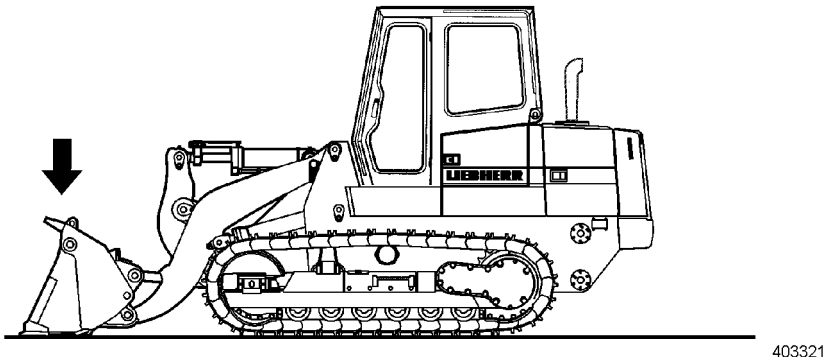
- Fold out the wiper arm.
- Push the wiper retainer, pull the wiper blade to the rear and remove.

Adjust the windshield wiper position

- Release the lock screw on the wiper arm and set the wiper blade vertically by changing the length of the guide arm.

5.16.4 Piston rod preservation

For the preservation of the piston rod, we recommend LIEBHERR anticorrosion grease CTK. See "Lubrication and Service fluids".



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Maintenance position for piston rod preservation

- The machine should be operated at least once every two weeks, according to the Operation and Maintenance Manual.

– The Diesel engine and the hydraulic system must reach operating temperature. Actuate all travel and working hydraulic functions. The piston rods must be fully retracted and extended several times. Check the oil level, lube points and electrical system.

- Park the machine in such a way, that all piston rods are retracted as much as possible in the cylinders.
- Coat exposed piston rods thickly with acid free anticorrosion grease.

If the machine is moved for transport, check the piston rods again after the machine has been loaded, since the anticorrosion grease may have been removed by the wiper rings.
If the machine is transported:

- Check the piston rods again after loading to ensure that the piston rods are sufficiently coated.

5.16.5 Taking the machine out of service

If the machine is scheduled to be stored for an extended period of time, consult your LIEBHERR Service representative.

5.17 Cab - tilting device

To replace, clean or check components between the engine compartment and the reservoir, the cab can be tilted.

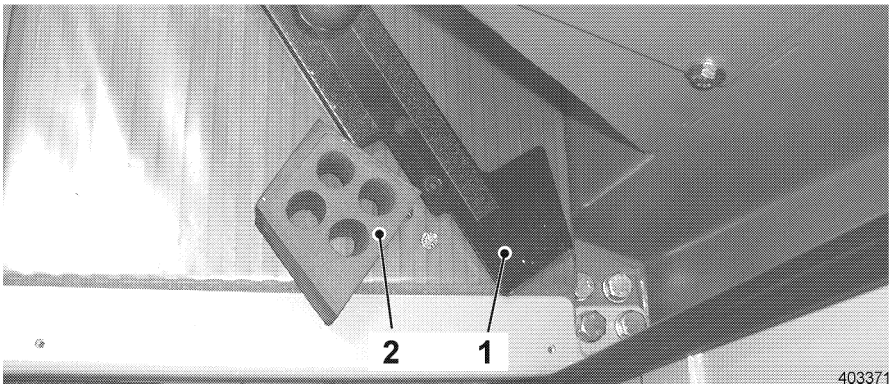
Danger

The cab may only be tilted if the machine is at a standstill!
No persons may be in the tilting range when tilting the cab either way.
No one may remain under the tilted cab unless the machine is at a standstill and the safety bar on the hydraulic cylinder is in place.

! The machine may NOT be started or driven when the cab is tilted. The safety lever must remain in the down position.

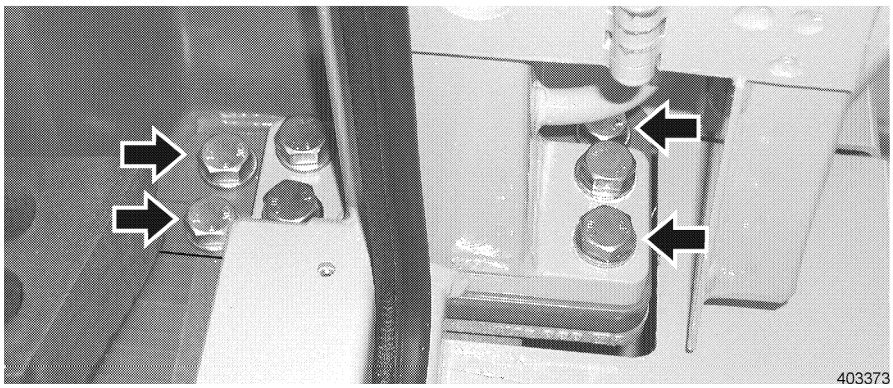
5.17.1 To raise the cab

Make sure that:
– the machine is in maintenance position,
– the extension pipe to control the hand pump is available.



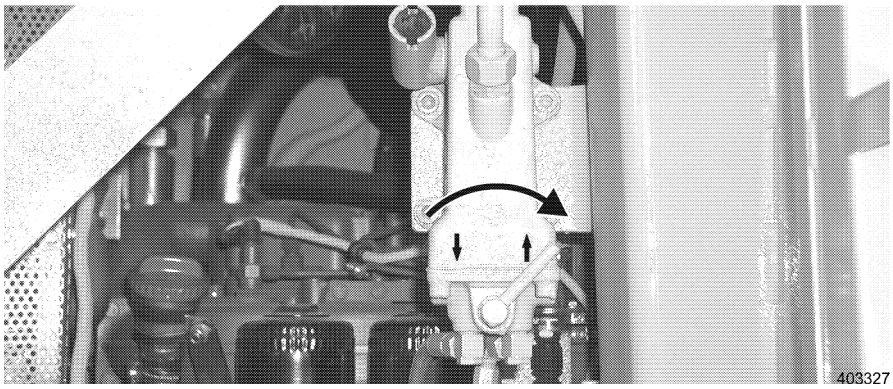
Cover plates - insulation

- Remove the cover plate 1, remove the insulation 2.



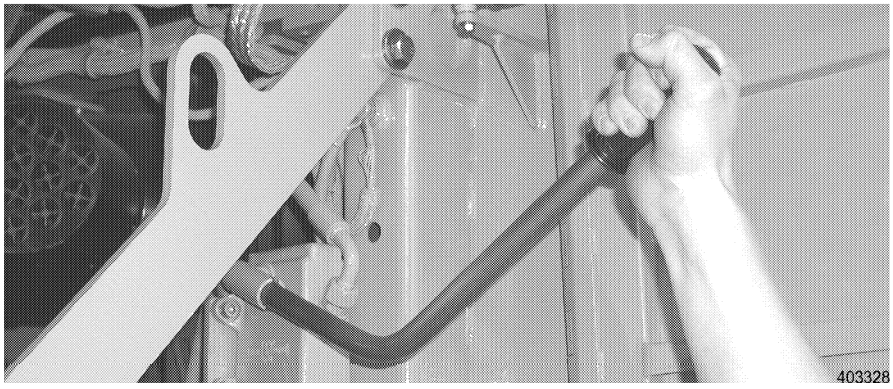
Mounting screws - cab

- Remove the 4 hex head screws on each side on the cab.
- Close both cab doors.



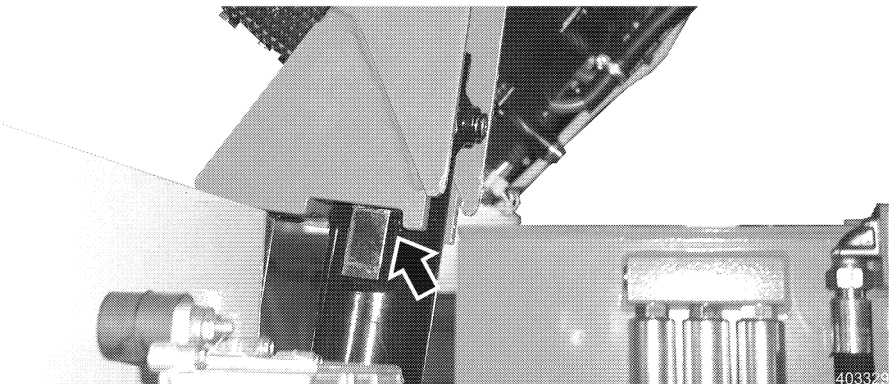
Set the hand pump to "UP"

- Set the lever on the hand pump to "UP".



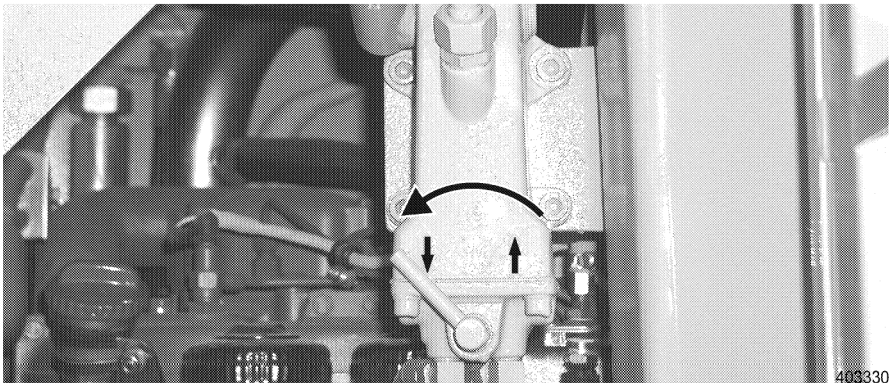
Actuate the and pump

- Insert the extension pipe into the hand pump.
- Actuate the hydraulic hand pump until the piston has reached the end position (intermediate positions are prohibited!).



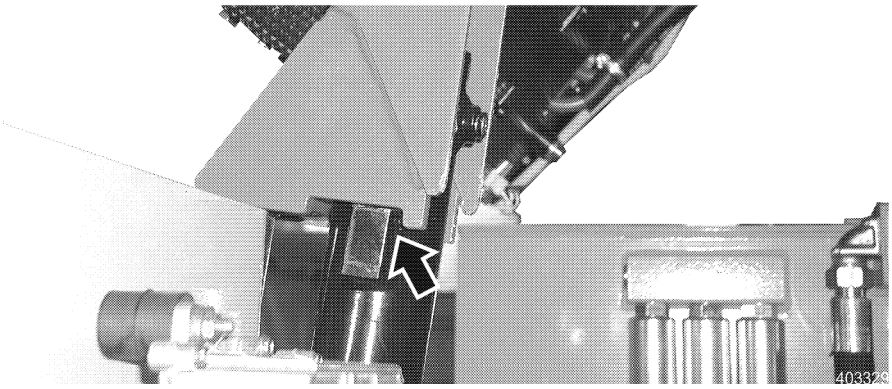
Engage the safety bar

- Engage the mechanical safety bar on the hydraulic cylinder.



Hand pump "DOWN"

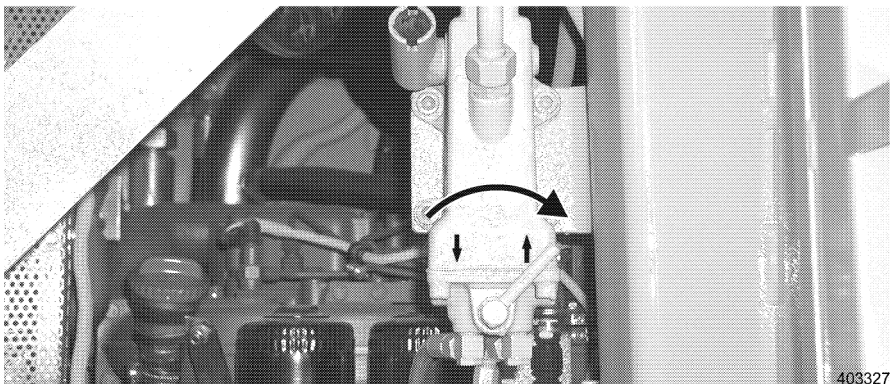
- Then set the lever on the hand pump to "DOWN".



Safety bar

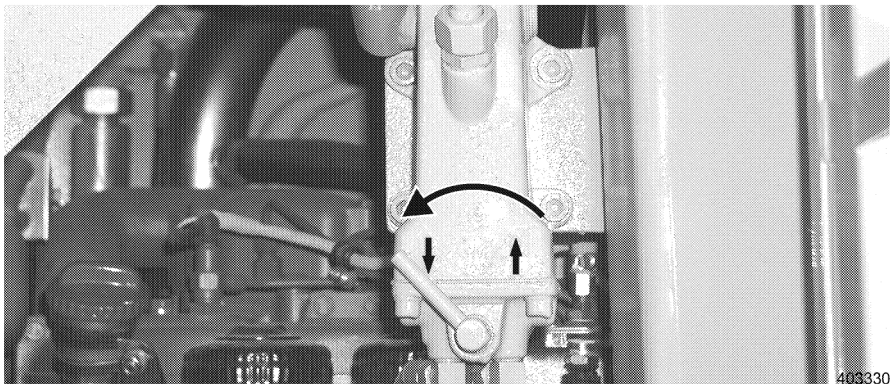
- Lower the cab by actuating the hand pump, until it is locked by the mechanical safety bar.

5.17.2 Lower the cab



Hand pump "Up"

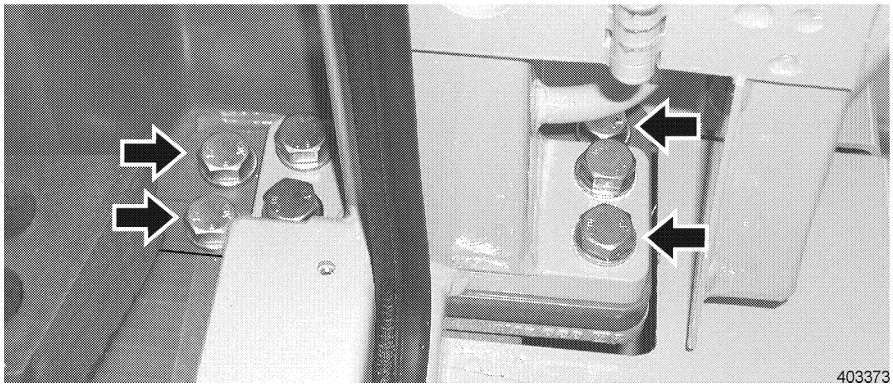
- Move the lever on the hand pump to "Up".
- Raise the cab by actuating the hydraulic hand pump.
- Disengage the mechanical safety bar.



Hand pump "down"

- Then set the lever to "down". The cab is lowered by actuating the hydraulic hand pump.

! As soon as the cab is placed on the cab bearings, the hand pump must be actuated until the pressure relief valve in the cylinder is actuated (whistling sound). This ensures that the hydraulic cylinder for the cab tilt device is completely retracted and relieved.

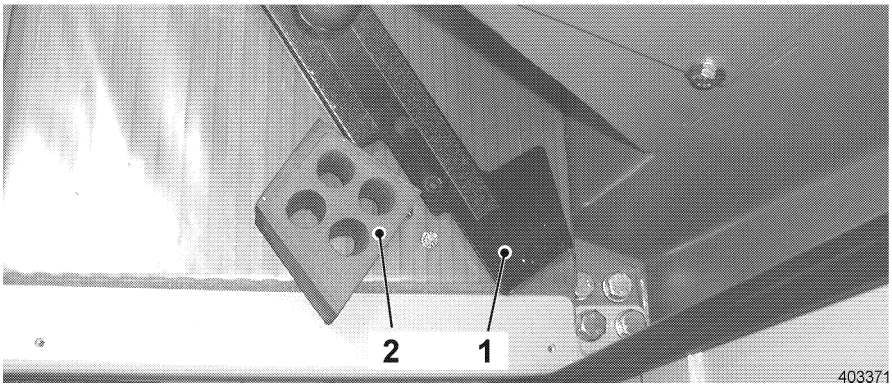


Mounting screws - cab

Danger

In any case, it is strictly prohibited to start the Diesel engine before the cab is lowered and reattached.

- Attach the cab with 4 hex head screws per side.



Covering – insulating mat

- Place the insulating mat 2, install the covering 1.

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