en

Operating Manual

Crawler Dozer
PR 724 Litronic

LIEBHERR

en

Operating Manual

Crawler dozer
PR 724 Litronic

from S/N 7697

Document identification

Id. No.: 9085024

Issue: 06/2005

Valid for: PR 724 from S/N 7697

Author: LWT / Technical Documentation Dept.

Product identification

Manufacturer: LIEBHERR Werk Telfs GMBH

Product group: Crawler dozer

Model: PR 724L / 724XL / 724LGP

Model No.: 753 / 754 / 755

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 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 of the main frame.

Noise level

Sound pressure level LpA PR 724 max. 77 dB(A) at the work station, according to ISO 6396

Sound emission level LWA PR 724 max. 109 dB(A) emitted to the surrounding area, according to guidelines 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.

Englisch LWT - TD 7/7/2005

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.

We hope you understand that LIEBHERR cannot honor warranty claims resulting from improper operation, inadequate maintenance, use of wrong and unauthorized oils, lubricants, fuels and operating fluids and / or from disregard of safety information and guidelines.

LIEBHERR reserves the right to reject any warranty claims, service contracts or agreements established by **LIEBHERR** and / or any of its dealers without prior notice if any other than Original **LIEBHERR** parts or parts sold by **LIEBHERR** are being or have been used for maintenance and repair.

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

Changes, conditions, copyright:

- We reserve the right to make changes of technical details on the machine which differ from the wording and illustrations in this manual.
- No part of this manual, technical or otherwise, may be reproduced nor copied in any form or used for competitive purposes in the market place. All rights reserved.
- 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.

To: Liebherr Werk Telfs GmbH
Hans Liebherrstraße 35
A- 6410 Telfs / Austria

Fax: 0043 5262 600 66

E-mail: info.lwt@liebherr.com

Ideas, comments (please note page number):

Overall, how would you rate this publication?

Excellent	
Very good	
Good	
Satisfactory	
Unsatisfactory	

Your information:

Machine S/N:

Company:

Name:

Address:

Telephone number:

Dealer:

Thank you very much for your assistance!

Englisch LWT - TD 7/7/2005

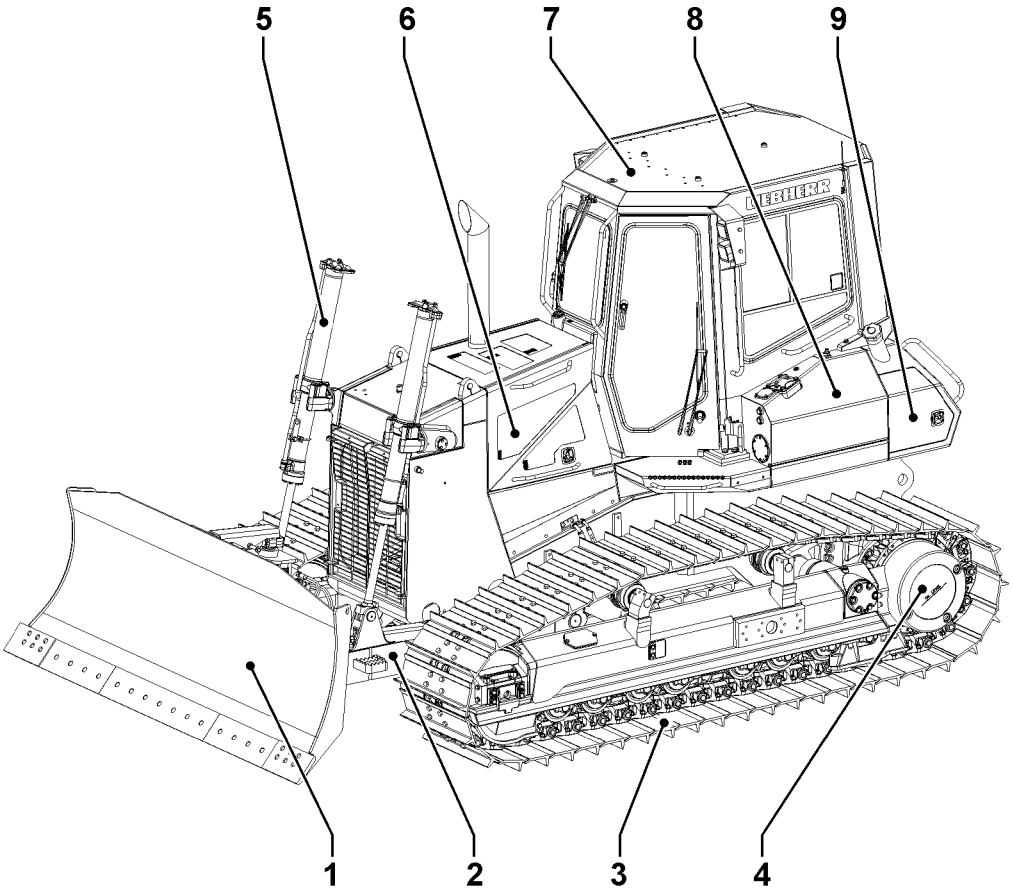
Table of contents

Englisch LWT - TD 7/7/2005

1. Product description

Design - Overview

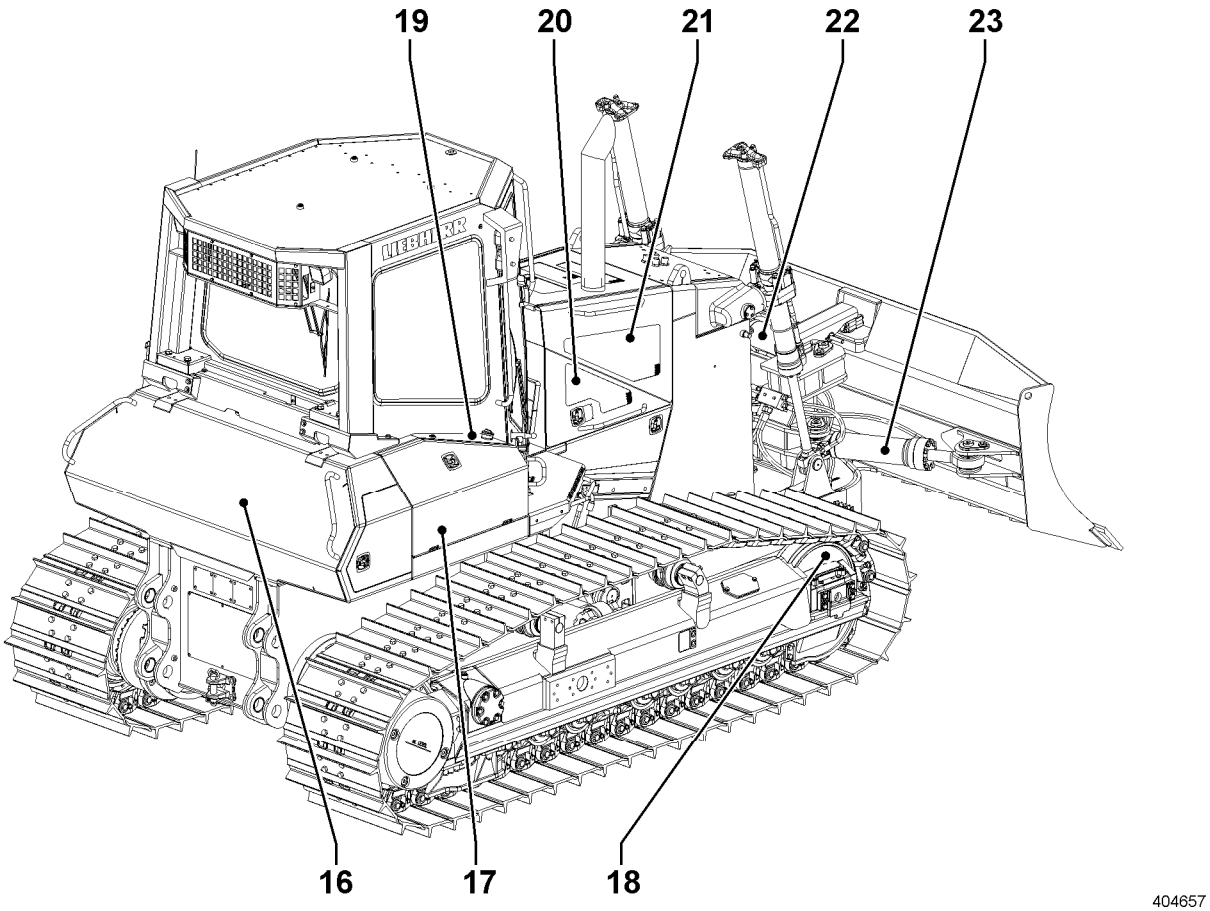
This section contains an overview of the machine and descriptions of the components shown.



Overall machine – front view

1 Dozer blade
2 Push frame
3 Track
4 Travel gear
5 Lift cylinder
6 Engine compartment door, left
7 Operator's cab
8 Hydraulic tank
9 Central electric compartment

Englisch LWT - TD 7/7/2005



Overall machine – rear view

16 Fuel tank
17 Battery compartment
18 Idler
19 Oil reservoir – seal area
20 Engine compartment door, right
21 Diesel engine with pump installation
22 Tilt cylinder
23 Angle cylinder

1.1 Technical Data

The most important technical data can be found in the enclosed technical description.

Maximum operating weight

The maximum permissible operating weight of the machine may not be exceeded to retain machine safety and operating suitability.

– If the maximum operating weight is exceeded due to special retrofit installations (for example for land clearing work), then previous written approval has to be requested from Liebherr.

- The maximum permissible operating weight of the machine is:
  PR 724L / XL / LGP = 20.000 kg

Englisch LWT - TD 7/7/2005

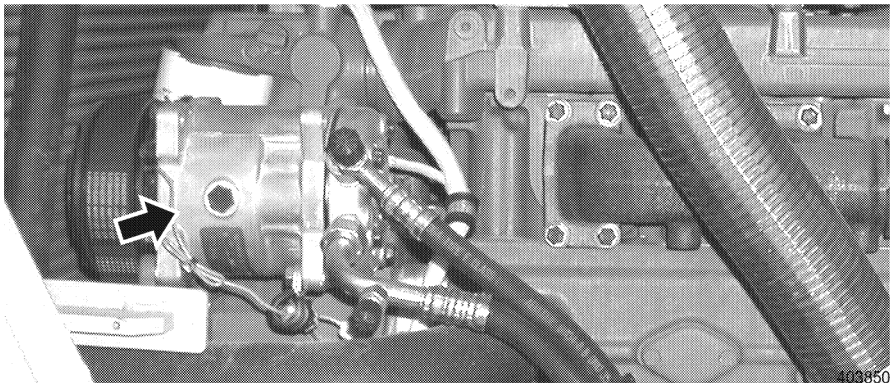
1.1.1 Air conditioning system

The especially robust heating and air conditioning system, which is installed in LIEBHERR machines, heats and cools the operator's cab.

Technical Data

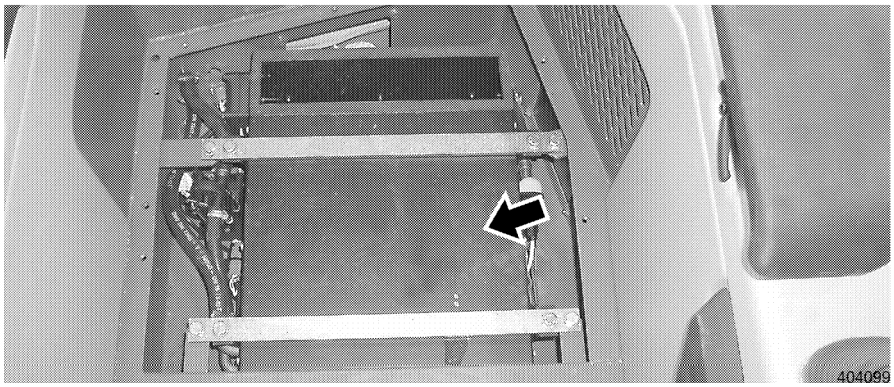
Refrigerant	R134a
Nominal voltage	24 V
Operating voltage	24 V
Blower	3-stage
Filling quantity of the complete system	Refrigerant R134a = 1600g
Oil quantity in compressor	200 ccm

Components of the air conditioning system



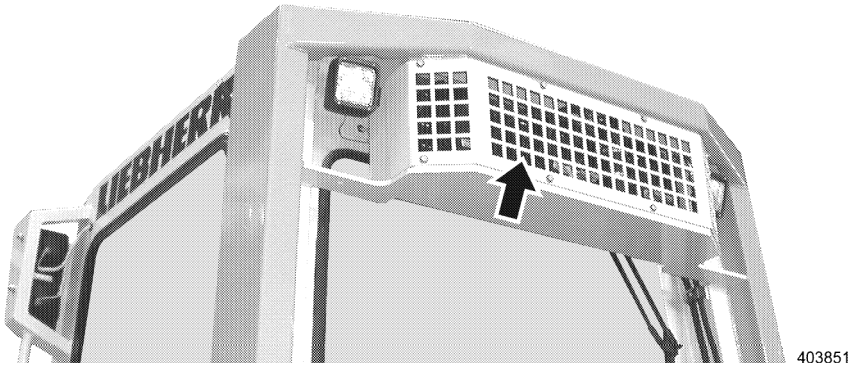
Compressor

Compressor The compressor is installed in the engine compartment.



Heating unit

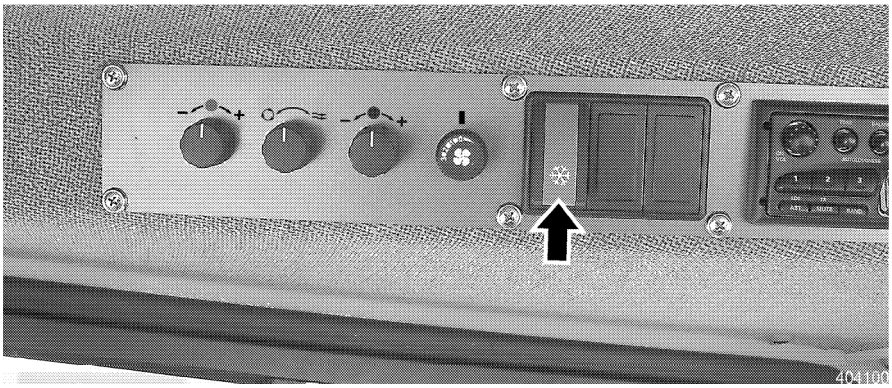
Heating unit The heating unit is installed under the seat console in the floorboard area of the operator's cab.



Evaporator unit

Evaporator unit

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



Air conditioner main switch

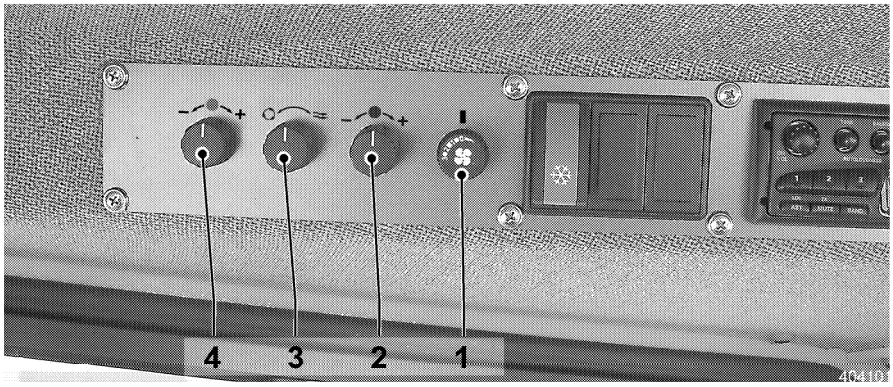
Controls for the air conditioning system

Main switch

The main switch for the air conditioning system is installed in the roof console, on the left hand side (marked with the air conditioner star).

Control element

The control element is installed in the roof console, on the left hand side.



Control element

1 Blower switch, 3-stage
2 Turn regulator - heater
3 Turn regulator / knob - air vent
4 Turn regulator / 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.

The Crawler Tractor.

PR 724
Litronic®

Engine output: 118 kW / 160 HP
Operating weight: 16,700 - 19,500 kg
36,700 - 43,000 lb

LIEBHERR

PR 724
Litronic®

Engine output: 118 kW / 160 HP
Operating weight: 16,700 - 19,500 kg / 36,700 - 43,000 lb
Blade capacity: 3.17 - 4.27 m³ / 4.15 - 5.58 cu.yd
Hydrostatic travel drive with electronic control

Performance

The Liebherr PR 724 crawler tractor combines sheer strength with innovative technology. The result: high drawbar pull and tear-out forces ensure always maximum productivity under all conditions. Whether in extremely difficult terrain or during fine levelling – the PR 724 excels in any application with its outstanding performance.

Economy

The PR 724 from Liebherr offers you clear economic benefits. A particularly service and maintenance-friendly technology reduces both down time and costs. The economical drive system guarantees high efficiency combined with low fuel consumption. For example the long-life track frame components increases long-term serviceability and, of course, economy.

Reliability

Strong and robust: Liebherr crawler tractors are designed with longevity in mind. Parts that are subjected to considerable stress are produced from high-strength. Liebherr crawler tractors are the benchmark for reliability and long life.

Comfort

The PR 724 crawler tractor offers the operator a spacious workplace with a state-of-the-art ergonomic layout and gives the operator an excellent view of the work area and blade. The single-joystick control enables the machine to be controlled sensitively and productivally.

Liebherr Diesel engine

- The intercooled turbocharger ensures full drawbar pull and power reserves in every situation.
- Environmentally sound and economical: Complies with the latest European emissions standards 97/68 EC Stage 2 and EPA Tier 2 Standards.
- Operational reliability and durability due to generously dimensioned components.

Performance

The PR 724 crawler tractor from Liebherr excels with its high performance – even under the toughest conditions and in rough terrain. The machine's key benefits include its excellent performance on any subsurface, its pushing power and short cycle times.

Optimum levelling

Long track frames
The long track frames ensure quiet and low-vibration performance.

Torsionally stiff machine design
The entire front superstructure of the machine is torsionally stiff. Strong vibrations are not transferred via either the hydraulic jack suspension or the push frame suspension. This ensures that the 6-way blade can always be optimally used.

High pushing power

High-traction power train
Thanks to optimum efficiency over the entire speed range, there is sufficient power available at any time whilst pushing.

High blade filling capacity
The optimum blade profile ensures quick and complete filling of the blade.

Quick cycle times
The combination of continuously variable speed control and high driving power ensures high pushing and ripping speeds.

Versatility

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

Large ground clearance
The machine can be easily and safely operated in rough terrain without fear of underside damage.

Low centre of gravity
The low mounting of the heavy drive components allows even the most difficult embankment work to be carried out with precision.

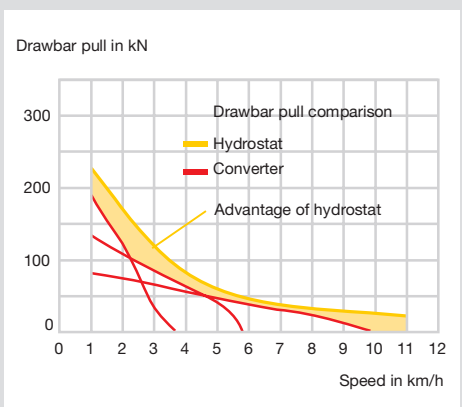
Deep wading ability
The clever layout of the drive components allows reliable operation even with high water levels.

Levelling properties

- The balanced ratio between the front attachment and the weight of the machine enables exact levelling.
- The blade, which is well forward and the inside push frame allows the operator a perfect view of the blade corners and area being levelled.

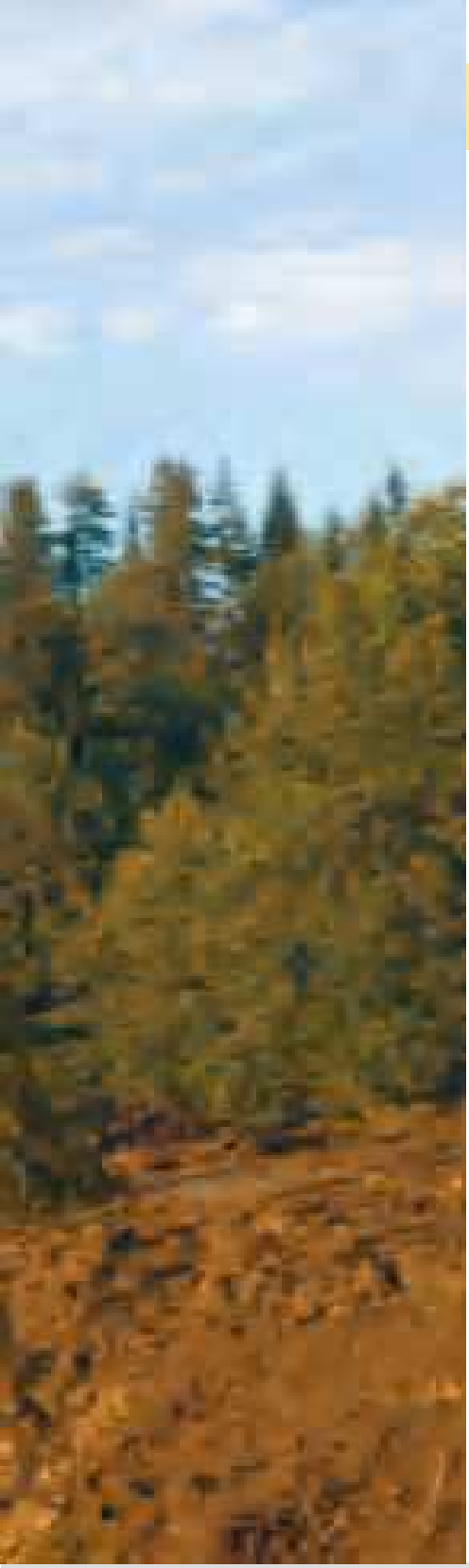
Liebherr hydrostat

- As a pioneer of the hydrostatic drive, Liebherr set the trend for this modern drive concept years ago – and now have millions of operating hours practical experience.
- Hydraulic variable-displacement pumps and engines are connected independently in two closed circuits and transfer the power of the Diesel engine to both end drives.



Efficiency/speed

- High drawbar pull in all speed ranges and low thermal load: The Liebherr hydrostat and electronic speed sensing guarantee excellent efficiency in every application.



Economy

With its low fuel and running costs, the PR 724 crawler tractor makes a big contribution to reducing costs. All service and maintenance work can be carried out within a short period of time. This greatly reduces down time and increases productivity.

Low fuel consumption

Economical drive system
The hydrostatic drive ensures optimum efficiency over the entire speed range.

Hydrostatic fan drive
The operating temperature is reached quickly as, the fan is only switched on when required.

Load Sensing hydraulics
This system only consumes the energy that is actually required by the operating equipment.

Low maintenance costs

Long maintenance intervals
The maintenance intervals are optimally geared to the individual components. Maintenance-free solutions are used in special applications.

Tilting cab and centralised service points
Both the operator and maintenance staff have quick and easy access to the important maintenance points.

High track frame service life

Large track frame components
The use of high-quality components with a large amount of usable material ensures high service life.

Use of standard track frames
In contrast to track frames with jacked-up tumblers, standard track frames are subjected to less stress within the individual track frame components – thus increasing the service life and reducing costs.

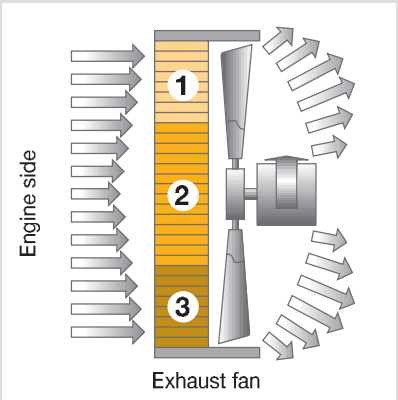
Transport width

- The 6-way blade with hinged corners does not have to be assembled and disassembled for transport. The transport width remains less than 3 metres.

Track frame

- Track frame components are designed for the toughest applications.
- With the 3 versions
  – L (long track frame – standard),
  – XL (extra long track frame – option) and
  – LGP (long and wide track frame for extremely low ground pressure – Option),

  the PR 724 can be configured for any application.



Triple-action combi cooler

- The hydrostatically driven and thermostatically controlled fan constantly adapts to the actual cooling requirement, reducing noise emissions and fuel consumption. The triple combi cooler cools the charge air (1), the water (2) and the hydraulic oil (3).
- Optional: reversible fan for the quick cleaning of the cooler and the engine compartment by blowing.

Reliability

You can rely on Liebherr performance: With its high quality and fully developed technology, the PR 724 crawler tractor offers maximum availability. With its robust cast steel components on the parts of the machine that are subjected to the most stress, the machine surpasses all requirements.

Intelligent solutions for continuous use over extended periods

Low engine speed

The fully developed engine design ensures reduced noise levels. Engine life is prolonge due to low piston speed.

Large distance between the cooler (fin spacing)

The highly efficient, large cooler allows the fin spacing to be made particularly generous. This greatly reduces the risk of blockage and subsequent overheating.

Hydrostatic fan drive

The operating temperature is controlled reliably and independently. This gives a long service life of the main components.

Automatic dust extraction

This self-cleaning function considerably lengthens the maintenance intervals of the air filter.

Ground clearance

The large ground clearance and a flat, closed underbody prevent material from accumulating and enable optimum performance and mobility even in the toughest applications such as in quarries or in forestry work.

Box-type design

- The high torsional strength of the box-type construction allows the machine's power to be used to full capacity.
- To achieve maximum stability, the machine has an extremely low centre of gravity.

Cabling

- The cabling, which is encased in resistant plastic, protects the machine's electrical equipment and electronics even in the toughest jobs.
- Liebherr cable protection prevents condensation from forming and thus reduces the risk of cable corrosion.

Intuitive single-joystick control

- Adjustment of the travel speed to the job in question: continuously variable within 3 speed ranges.

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

Inching brake pedal

- An inching brake pedal is also available as an option. In this case, in addition to the Liebherr single-joystick control, the operator can use the foot pedal to control the speed of the machine and, if necessary, apply the brakes.

1) Inching function
2) Brake function

Comfort

The comfortable cab is spacious, soundproof and has been ergonomically designed. It offers ideal conditions for productive work without tiring the operator. Excellent visibility both all around and on the sides of the blade – facilitate reliable and precise operation.

Maximum cab volume with excellent visibility conditions

Comfort cab
In the spacious, fully clad cab, the operator can fully concentrate on his work.

Generous glazing
Large, sloping doors allow a full view of the sides and corners of the blade.

ROPS/FOPS cab
Optimum all round view due to the ROPS and FOPS protection integrated in the cab.

Low sound levels

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

Low sound power level
Very low exterior sound – Liebherr crawler tractors are exemplary and easily comply with the strict legal requirements.

Simple and precise control

Liebherr single-joystick control
All driving movements can be easily controlled with only one joystick – including continuous speed selection and the “turning on the spot“ (counter rotation) function.

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.

Digital panel

- Ideally positioned in the field of view of the operator, the digital panel informs the operator about all the important machine data.

Comfortable seating and storage space

- A flexible seat that can be adjusted to the operator’s requirements with 3-way adjustable armrests creates a pleasant workspace.
- Large storage space including a 12V socket for operating a cool box are standard features.

Basic machine

Engine

Liebherr diesel engine	D 924 TI-E
Rating (ISO 9249)	118 kW / 160 HP
Rating (SAE J1349)	118 kW / 158 HP
Rated speed	1800 1/min
Displacement	6.6 l / 403 in³
Design	4-cylinder in-line engine, water-cooled, turbocharged, intercooled
Injection	Direct fuel injection with in-line injection pump, mechanical governor
Operating voltage	24 V
Alternator	DC / 55 A
Starter	5.4 kW
Batteries	12V / 110 Ah
Air cleaner	Dry-type air cleaner with 2 elements, pre-cleaner with automatic dust ejection
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: 0-4.0 km/h / 0.25 mph (4.8 km/h / 3 mph reverse) Speed range 2: 0-6.5 km/h / 4mph (7.8 km/h / 4.8 mph reverse) Speed range 3: 0-11.0 km/h / 6.8 mph
Drawbar pull at 1 km/h	227 kN
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 brake/ 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	Spur gear stage and planetary gear stage
Control	1 joystick for all travel and steering motions, counter rotation possible from every position

Track frame

	L	XL	LGP
Mount	Via separate pivot shafts and an oscillating equaliser bar		
Chains	Lubricated, track chain, tension via grease tensioner and hydraulic cylinders, single grouser pads		
Links	42	46	46
Track rollers/carrier rollers	7/2	8/2	8/2
Sprocket segments	5	5	5
Track pad width max.	610 mm 24”	610 mm 24”	914 mm 36”

Hydraulic equipment

Hydraulic system	Load sensing (demand-controlled)
Pump type	Swash plate piston pump
Pump flow max.	174 l/min / 45.9 gpm
Pressure limitation	200 bar / 2900 PSI
Control valve	2 segments, expandable to 4
Filter system	Return filter with magnetic rod in the hydraulic tank
Control	1 joystick lever for all blade functions

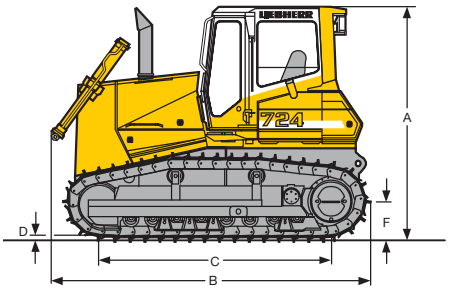
Operator’s cab

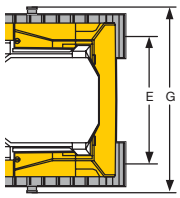
Cab	Resiliently mounted cab with enclosed positive pressure ventilation, can be tilted with the hand pump 40° to the rear. With integral ROPS Rollover Protective Structure (ISO 3471) and FOPS Falling Objects Protective Structure (ISO 3449)
Operator's seat	Fully adjustable suspended swivel seat adjustable to operator's weight
Monitoring	Comprehensive instrument panel
Sound-pressure level	77 dB (A) at the workplace (ISO 6396:1992), in accordance with EC Directive 86/662/EEC

Refill capacities

Fuel tank	365 l (96.4 gallons)
Cooling system	30 l (7.9 gallons)
Engine oil	19 l (5 gallons)
Splitter box	3.2 l (0.8 gallons)
Hydraulic tank	162 l (42.8 gallons)
Final drive, each	18.5 l (4.9 gallons)

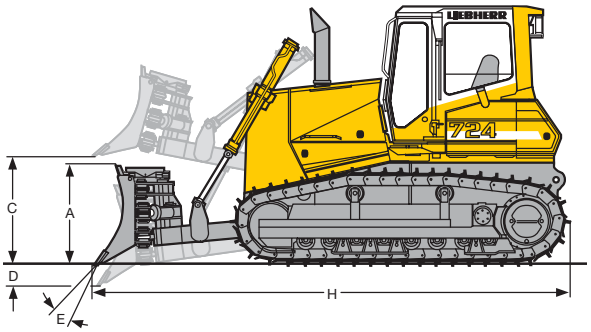
Dimensions

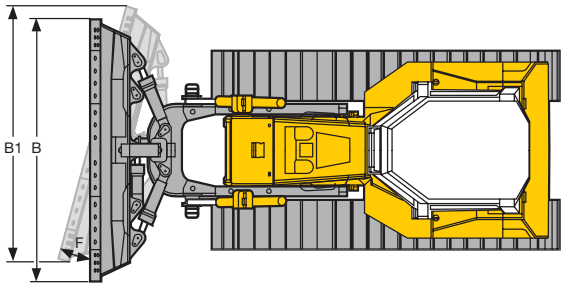




		L	XL	LGP
A Height over cab	mm	3,197	3,197	3,197
	ft-in	10’6”	10’6”	10’6”
B Overall length without attachments	mm	4,170	4,170	4,170
	ft-in	13’8”	13’8”	13’8”
C Distance idler/ sprocket centre	mm	2,830	3,210	3,210
	ft-in	9’3”	10’6”	10’6”
D Height of grousers	mm	56	56	56
	inch	2.2”	2.2”	2.2”
E Track gauge	mm	1,800	1,800	2,084
	ft-in	5’11”	5’11”	6’10”
F Ground clearance	mm	475	475	475
	inch	18.7”	18.7”	18.7”
G Width over ball head	mm	2,648	2,648	3,248
	ft-in	8’8”	8’8”	10’8”

Front attachment





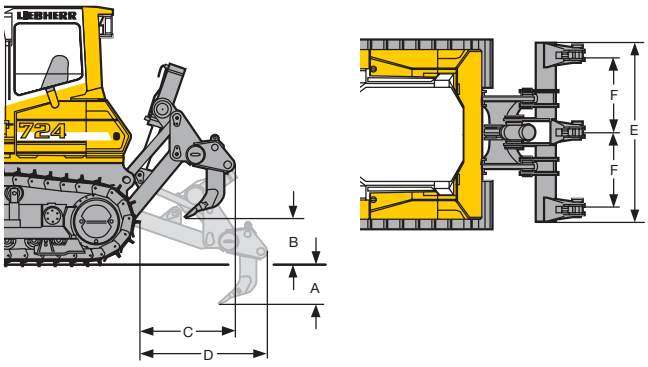
6-way-blade with inside mounted push frame		6-way blade L	6-way blade XL	6-way blade LGP
Blade capacity according to ISO 9246	m^3	3.17	3.17	3.39
	cu.yd	4.15	4.15	4.43
A Height of blade	mm	1,200	1,200	1,100
	ft-in	3'11"	3'11"	3'7"
B Width of blade	mm	3,204	3,204	3,790
	ft-in	10'6"	10'6"	12'5"
B1 Width of blade angled	mm	2,997	2,997	3,536
	ft-in	9'10"	9'10"	11'7"
C Lifting height	mm	1,177	1,135	1,118
	ft-in	3'10"	3'9"	3'8"
D Depth below ground	mm	520	497	489
	inch	20.5"	19.6"	19.3"
E Max. blade pitch		5°	5°	5°
F Angle adjustment		23°	23°	23°
G Max. blade tilt	mm	474	474	560
	inch	18.7"	18.7"	22.0"
H Overall length, blade straight	mm	5,369	5,670	5,624
	ft-in	17'7"	18'7"	18'5"
Operating weight*	kg	16,660	17,295	18,025
	lb	36,729	38,129	39,738
Ground pressure*	kg/cm^2	0.48	0.44	0.35
	PSI	6.83	6.26	4.98

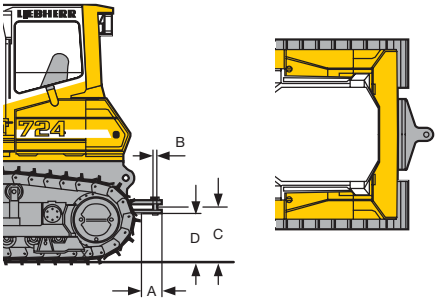
* Lubrication and operating materials, 6-way blade, operator, tracks pads 610 mm/24" (L/XL) or 812 mm/32" (LGP)

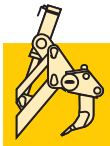
Semi-U blade and straight blade		Semi-U blade L	Semi-U blade XL	Straight blade LGP
Blade capacity according to ISO 9246	m^3	4.27	4.27	3.43
	cu.yd	5.58	5.58	4.49
A Height of blade	mm	1,250	1,250	1,100
	ft-in	4'1"	4'1"	3'7"
B Width of blade	mm	3,000	3,000	3,600
	ft-in	9'10"	9'10"	11'10"
C Lifting height	mm	1,040	992	992
	ft-in	3'5"	3'3"	3'3"
D Depth below ground	mm	444	530	530
	inch	17.5"	20.9"	20.9"
E Max. blade pitch		10°	10°	10°
Max. blade tilt	mm	639	639	618
	inch	25.2"	25.2"	24.3"
H Overall length, blade straight	mm	5,155	5,535	5,316
	ft-in	16'11"	18'2"	17'5"
Operating weight*	kg	16,765	17,280	17,830
	lb	36,960	38,096	39,308
Ground pressure*	kg/cm^2	0.48	0.44	0.35
	PSI	6.83	6.26	4.98

* Lubrication and operating materials, semi-U blade/straight blade, operator, track pads 610 mm/24" (L/XL) or 812 mm/32" (LGP)

Rear attachment







Ripper	3 shanks mm inch / ft-in
A Ripping depth (max./min.)	501/351 19.7”/13.8”
B Lifting height (max./min.)	649/499 25.6”/19.7”
C Overall length, attachment raised	1,071 3’6”
D Overall length, attachment lowered	1,428 4’8”
E Toolbar width	2,300 7’7”
F Distance between teeth	1,000 3’3”
Weight kg lb	1,490 3,284

Drawbar	rigid mm inch / ft-in
A Additional length	262 10.3”
B Socket pin diameter	45 1.8”
C Height of hoe	450 17.7”
D Ground clearance	375 14.8”
Weight kg lb	165 364

Equipment

Basic machine

	s	o
Tow switch	•	
Towing hitch rear	•	
Towing lug front	•	
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, glow plug	•	
Radiator, wide-meshed	•	
Radiator guard, heavy-duty		•
Radiator guard, hinged	•	
Liebherr diesel engine	•	
Fan, hydraulically driven	•	
Fan guard	•	
Engine cover, perforated		•
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, electronic	•	
Electronic control	•	
Travel control, 3-speed	•	
Hydrostatic travel drive	•	
Inching brake pedal		•
Emergency stop	•	
Oil cooler	•	
Final drives planetary gear	•	
Safety lever	•	

Track frame

	s	o
Track frame, 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, L design		•
Undercarriage, XL design		•
Undercarriage, LGP design		•
Track frames, oscillating	•	
Pivot shaft, separate	•	
Sprocket segments with recesses		•

Electrical system

	s	o
Starter motor 5.4 kW	•	
Working lights, front, 6 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		•

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/FOPS	•	
Rear mirror, inside	•	
Safety glass, tinted	•	
Windshield washer system with intermittent function	•	
Windshield wipers front, rear	•	
Sliding window, left	•	
Sliding window, right		•
Protective grids for windows		•
Extension, seat back		•
Sun visor	•	
Socket 12 V	•	
Hot water heating	•	

Instruments – Indicators

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

Hydraulic equipment

	s	o
Hydraulic control ripper		•
Hydraulic control winch		•
Variable flow pump, load-sensing	•	
Oil filter with strainer in hydraulic tank	•	
Blade quick drop	•	
Control block for 2 circuits	•	
Float position blade	•	
Hydraulic servo control	•	
Hydraulic tank oil level control		•

Attachments

	s	o
Mounting plate for external tools		•
Drawbar rear, rigid		•
Drawbar rear, swivelling		•
Counterweight, rear		•
Ripper 3 shanks		•
Bumper rear		•
Blade, 6-way internal		•
Blade, straight blade		•
Blade, semi-U blade		•
Winch		•
Spill plate for blade		•

S = Standard, O = Option

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.



The entire world of earthmoving equipment.




For your success with earthmoving equipment, Liebherr provides an extensive product range of hydraulic excavators, crawler tractors and -loaders, wheel loaders and dump trucks. Please, visit our website for all news as well as technical information regarding the earthmoving equipment program from Liebherr.

www.liebherr.com

Liebherr-Werk Telfs GmbH
Hans-Liebherr-Straße 35, A-6410 Telfs
☎ +43 (0)5262 600-0, Fax +43 (0)5262 600-72
www.liebherr.com, E-Mail: marketing@lwt.liebherr.com

Printed in Germany by Eberl. RG-BK-RP LWT/VM 10045480-2-02.04

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

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 dozer attachment, the machine may only be used to loosen, move and dump dirt, gravel, broken rocks or other similar material.
2. Other usage, for which this machine is not designed, such as breaking rocks, demolishing buildings, driving piles, transporting personnel, etc. is considered to be improper and unsafe use. Neither the manufacturer nor the dealer can be held responsible for any damage or accident resulting from such unauthorized use of the machine. Any risk in improperly using this machine is the sole responsibility of the user.
3. Machines used in special applications are subject to special conditions, among others, they must be equipped with the appropriate safety devices.

4. The proper and intended use also includes the strict adherence to the operating and maintenance guidelines issued in this Operation and Maintenance manual and careful adherence to the inspection and maintenance schedules and guidelines.

2.3 Decals on the machine

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

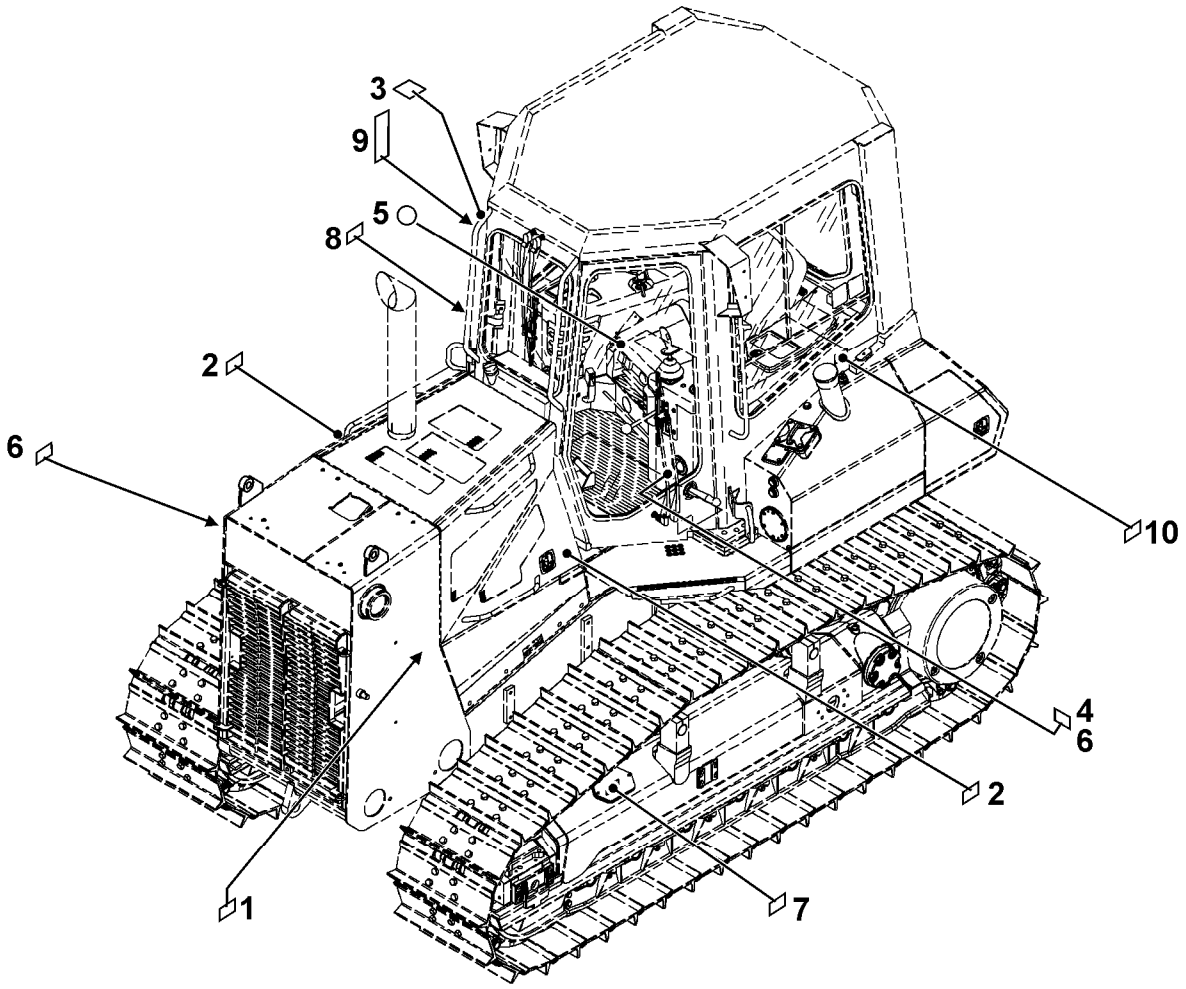
   Decal types:
   – Safety decals
   – Information decals
   – Nameplates

   Contents and location are described below.
   The order numbers are noted in the spare parts list.

2.3.1 Safety decals

1. The information noted on the safety decals must be strictly observed to prevent death or serious injury.
   The safety decals must be checked regularly to ensure they are still complete and legible.
   Missing and illegible safety decals must always be replaced immediately.

Arrangement of safety decals



404445

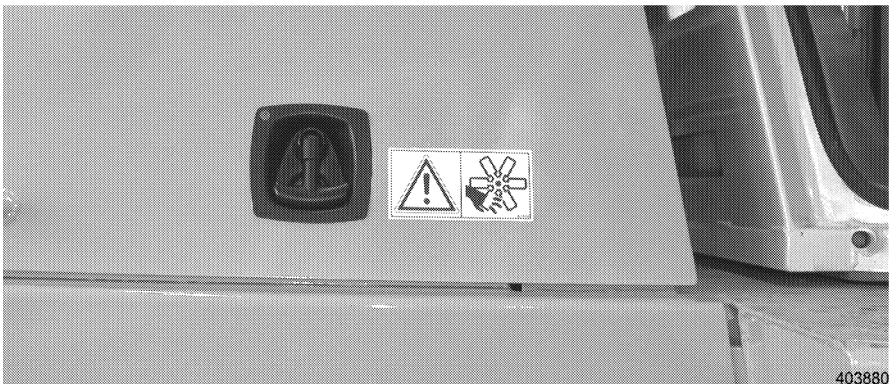
Arrangement of safety decals

1 Stop warning decal
2 Engine off decal
3 Battery decal
4 Safety lever decal
5 Safety belt decal
6 Accident prevention decal
7 Chain tension decal
8 Operator's stand tilt device decal
9 Operator's stand safety bar decal
10 Bio hydraulic oil decal

Stop warning decal

Stop warning decal

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



Engine off decal

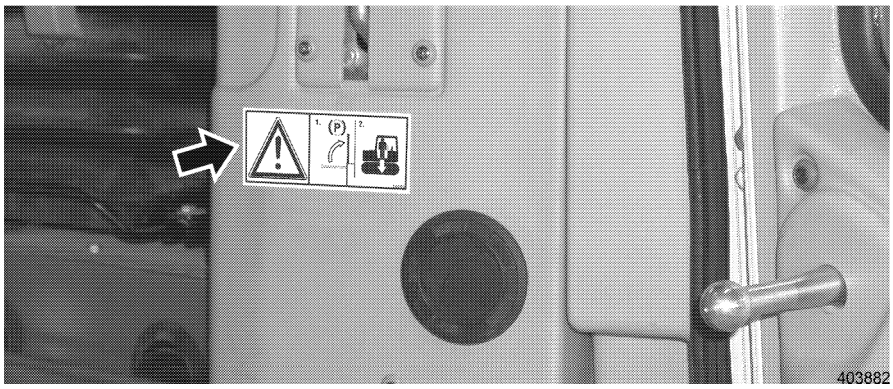
Engine off decal

The decal is installed on the left and right hand side on the engine compartment doors.
Warns that a dangerous accident which could result in severe injury could occur.
Meaning: Open only if the engine is at a standstill!

Battery decal

Battery decal

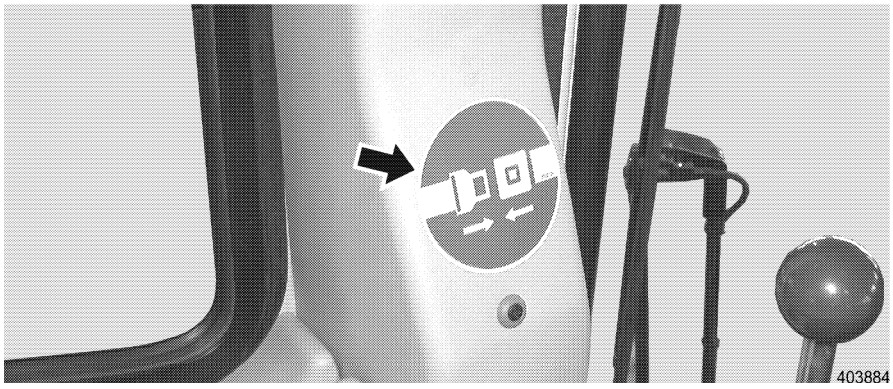
The decal is installed in the battery compartment.
Warns that a dangerous accident which could result in severe injury could occur.
Meaning: Do not smoke or have a naked flame near batteries.



Safety lever decal

Safety lever decal

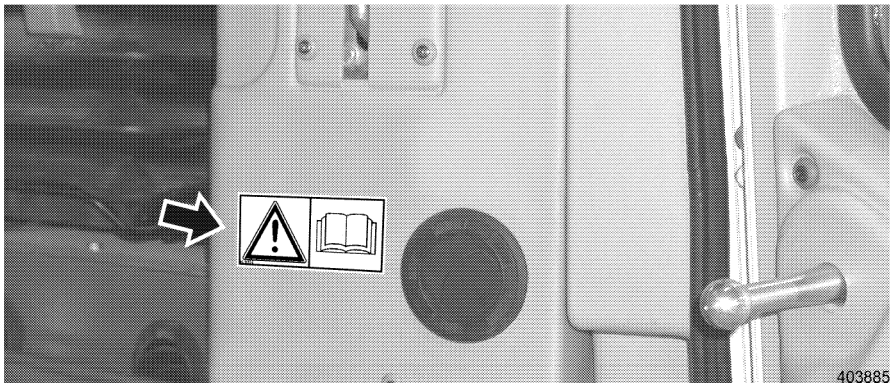
The decal is installed on the front on the operator's stand.
Warns that a dangerous accident which could result in death or severe injury could occur.
Meaning: Before leaving the cab, the safety lever must be moved up. In dangerous situations lower the attachment immediately then move the safety lever up.



Safety belt decal

Safety belt decal

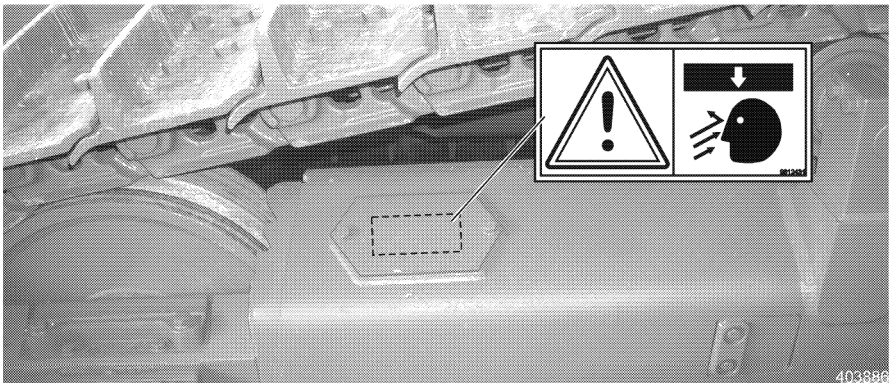
The decal is installed on the left on the operator's stand.
Notes the importance of wearing the seat belt.
Meaning: Always put on the seat belt before operating the machine.



Accident prevention decal

Accident prevention decal

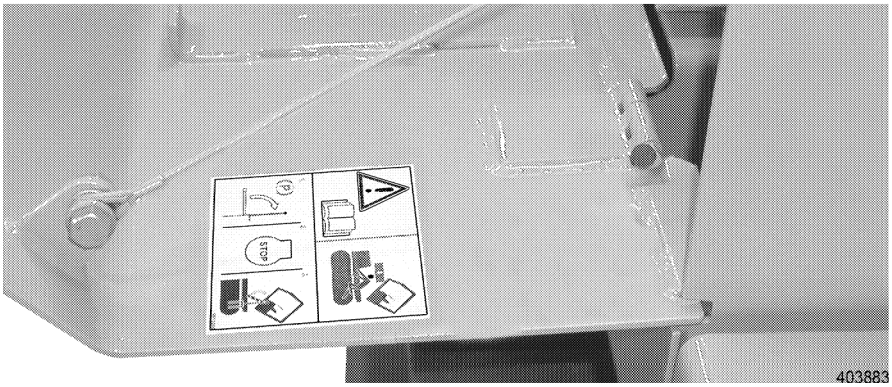
The decal is installed on the front on the operator's stand.
Indicates the importance of reading the operating manual and the safety information in order to prevent accidents occurring.
Meaning: Only operate the machine when the operating manual has been read and understood.
When operating the machine, the regulations given in the operating manual for the prevention of accidents must be followed precisely!



Chain tension decal

Chain tension decal

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

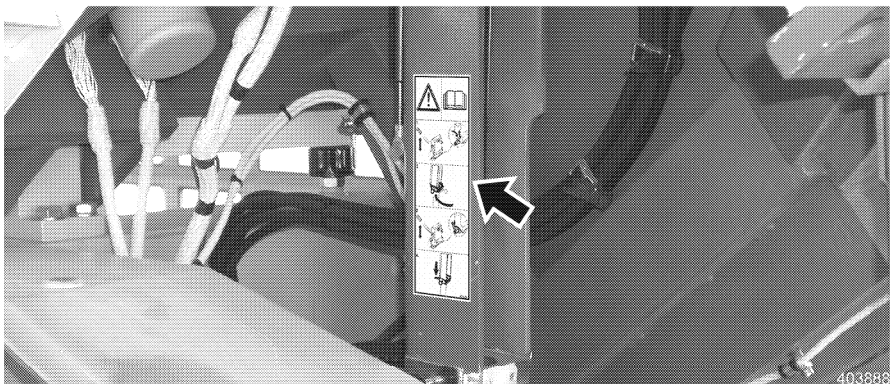


Operator's stand tilt device decal

Operator's stand tilt device decal

The decal is installed in the battery box, near the hydraulic hand pump.

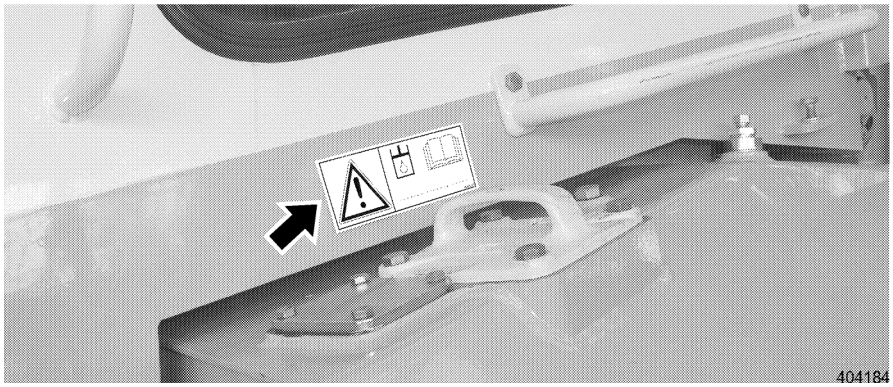
Warns that a dangerous accident which could result in death or severe injury could occur.
Meaning: Do not stand under the tilted operator's stand unless the safety bar is in place to secure the tilted cab . When the operator's stand is tilted the machine must not be started or driven. The safety lever must remain in the uppermost position (safety lever up).



Operator's stand safety bar decal

Operator's stand safety bar decal

The decal is installed on the safety bar on the operator's stand tilt cylinder.
Warns that a dangerous accident which could result in death or severe injury could occur.
Points out the correct procedure when tilting the operator's stand.
The instructions on the decal as well as in the operating manual must be strictly observed.



Bio hydraulic oil decal

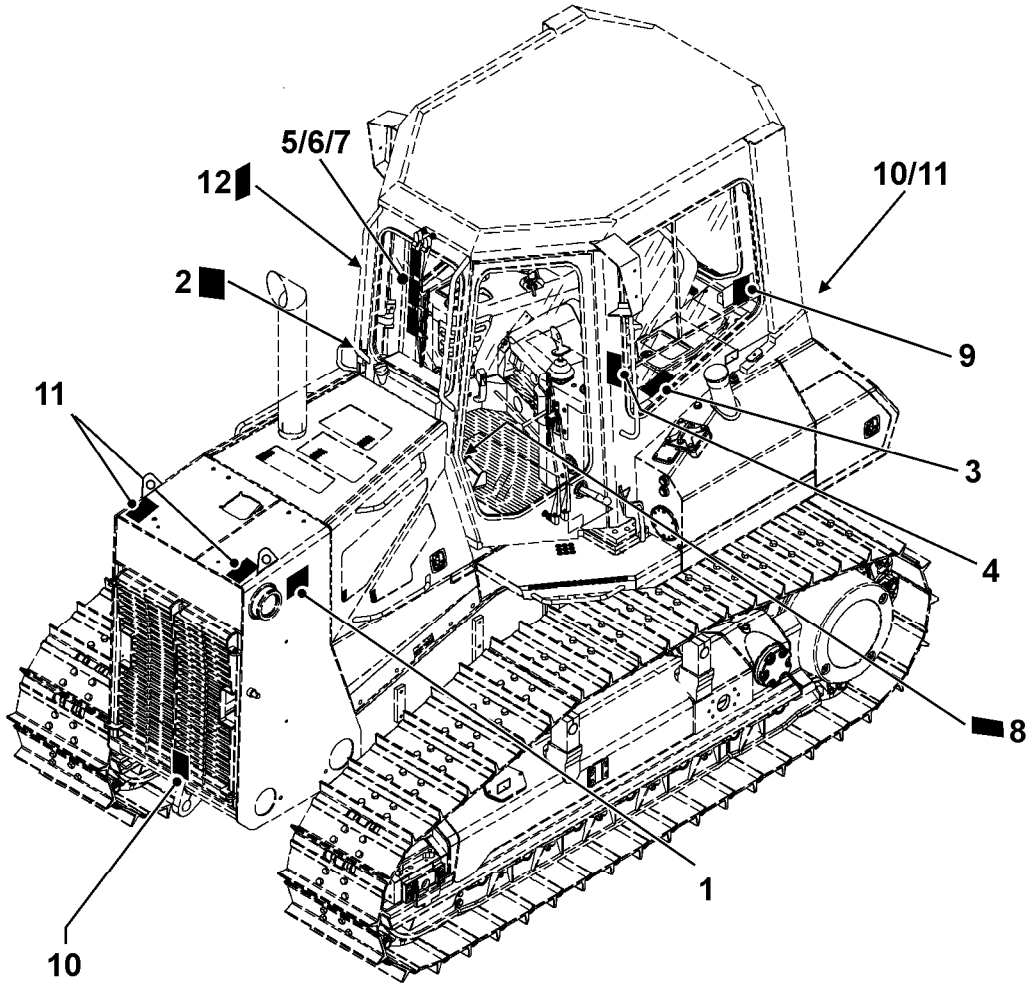
Bio hydraulic oil decal

If the hydraulic system is filled with bio oil, this decal is installed near the hydraulic tank filler fitting.
The decal denotes the type of hydraulic oil in the hydraulic tank.
Meaning: Danger of damage to the hydraulic system of the machine!
Mixing 'environmentally friendly hydraulic fluids' with 'mineral oils' causes an aggressive reaction which could result in damage to the hydraulic system.
Avoid mixing 'environmentally friendly hydraulic fluids' with 'mineral oils'.

2.3.2 Information decals

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

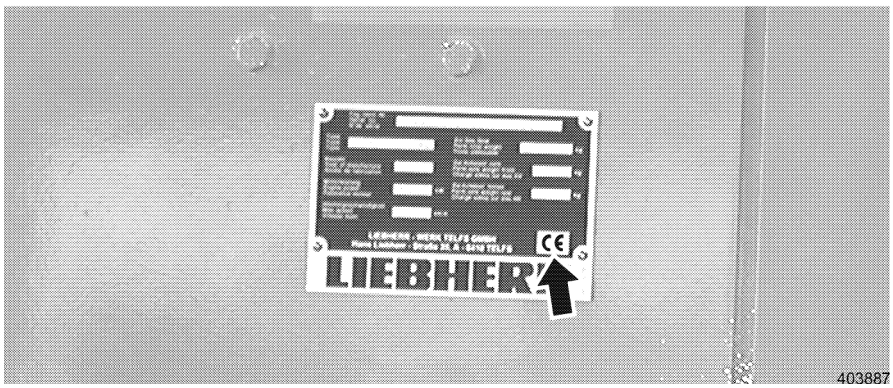
Arrangement of information decals



404446

Arrangement of information decals

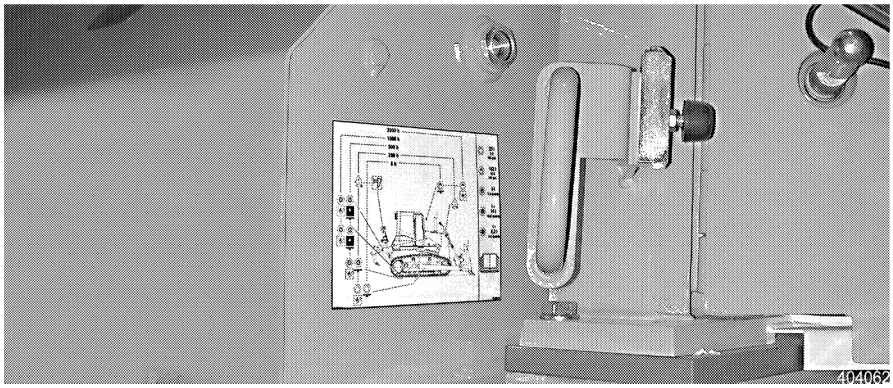
1 Nameplate/CE mark
2 Lubrication chart
3 Engine operation decal
4 Drive hydraulics decal
5 Work hydraulics decal
6 6-way blade decal
7 Rear mounted ripper decal
8 ROPS - FOPS decal
9 Sound protection decal
10 Rigging point decal
11 Stop-lift point decal
12 Emergency exit decal



CE mark

Conformity marking decal - CE

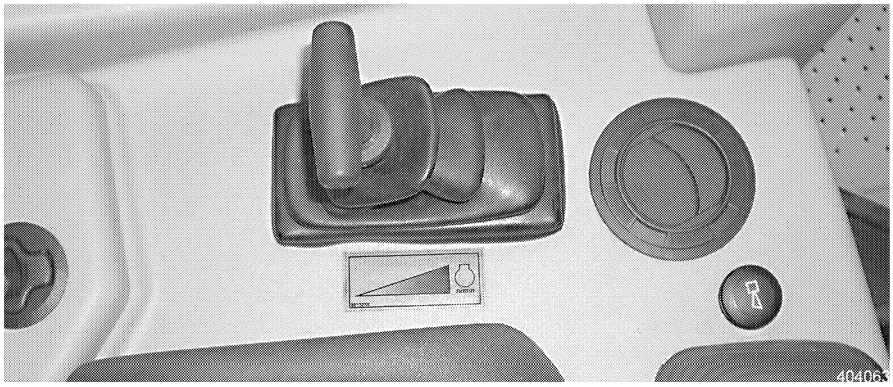
This mark is included in the nameplate on the left hand side on the main frame.
Indicates conformity with EU machine guideline regulations.



Lubrication chart decal

Lubrication chart decal

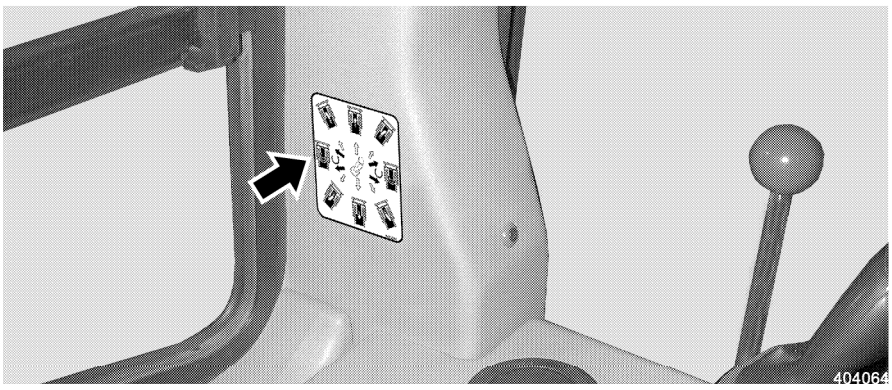
The decal is installed in the battery compartment.
The lubrication chart illustration shows all components which use oil or grease as well as the inspection and change intervals for these parts.



Engine operation decal

Engine operation decal

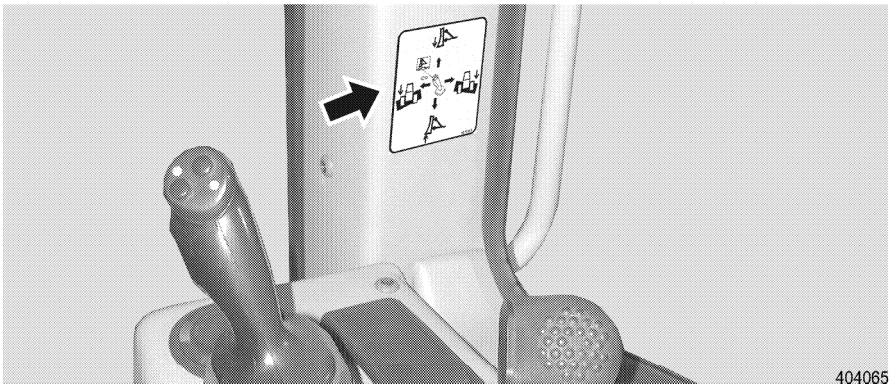
The decal is installed on the left on the operator's stand.
Shows the operation of the lever for speed adjustment.



Drive hydraulics decal

Drive hydraulics decal

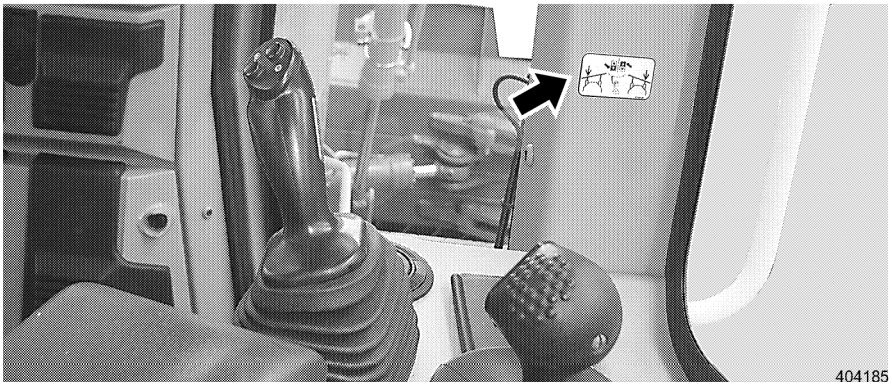
The decal is installed on the left on the operator's stand.
Shows the operation of the travel joystick for the travel functions of the machine.



Work hydraulics decal

Work hydraulics decal

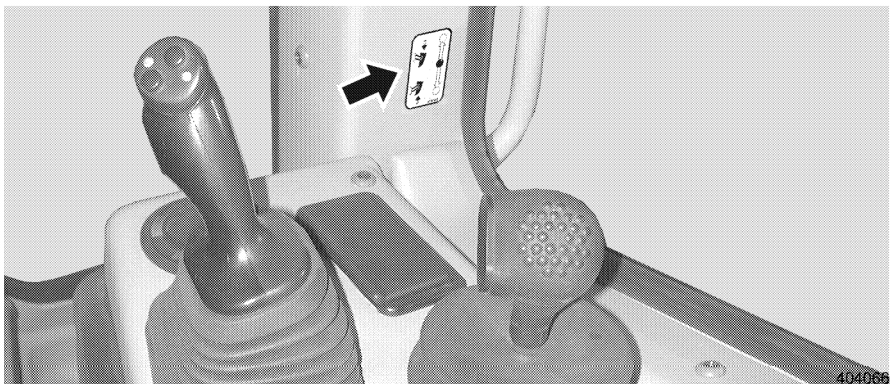
The decal is installed on the right on the operator's stand.
Shows the operation of the dozing equipment of the machine.



6-way blade decal

6-way blade decal

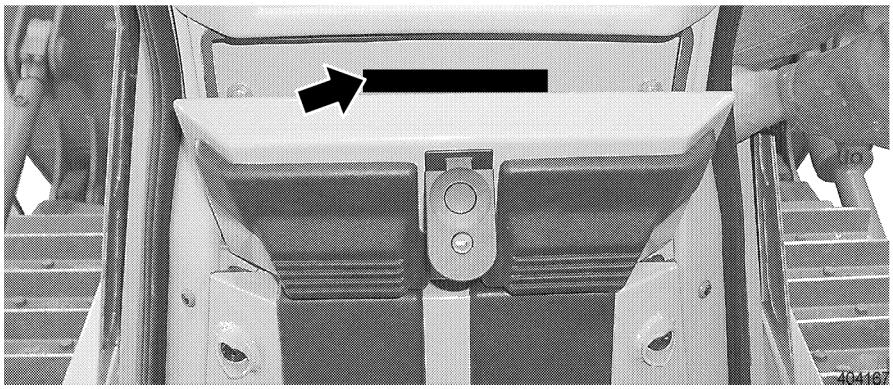
The decal is installed on the right of the operator's stand.
Shows the operation of the 6-way blade attachment of the machine.



Rear mounted ripper decal

Rear mounted ripper decal

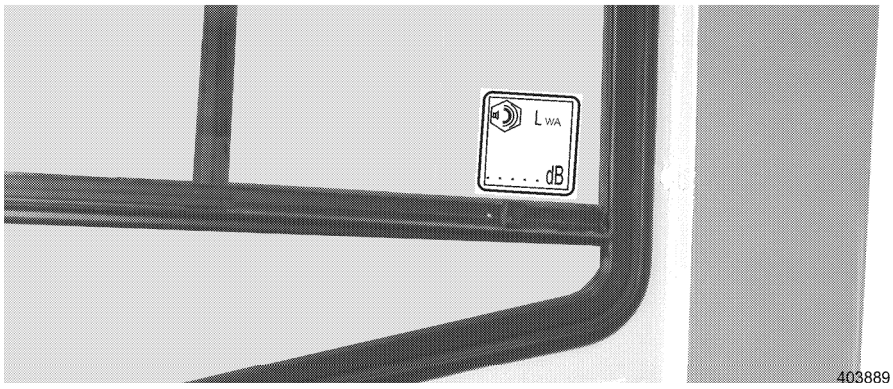
The decal is installed on the right on the operator's stand.
Shows the operation of the ripper.



ROPS - FOPS decal

ROPS - FOPS decal

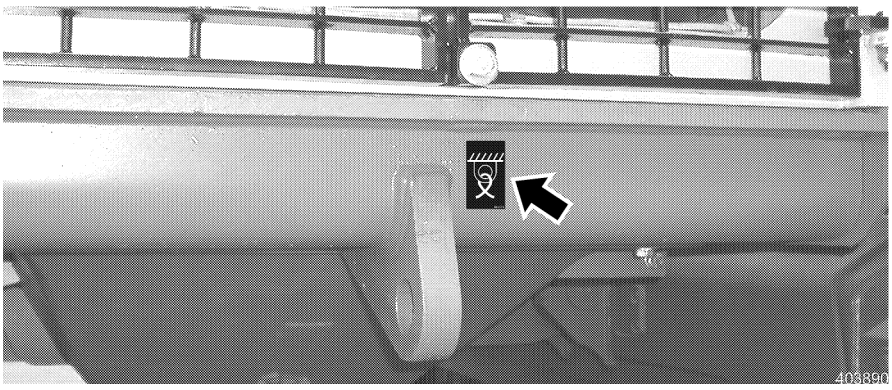
The decal is installed in the compartment for the machine documentation.
Shows the maximum load for the roll over protection structure.



Sound protection decal

Sound protection decal

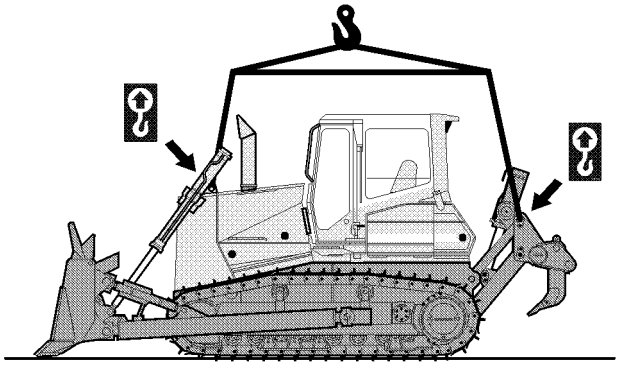
The sound emission decal is installed on the inside windowpane in the operator's cab.
LWA = Sound emission level (emitted to the surrounding area).



Rigging point decal

Rigging point decal

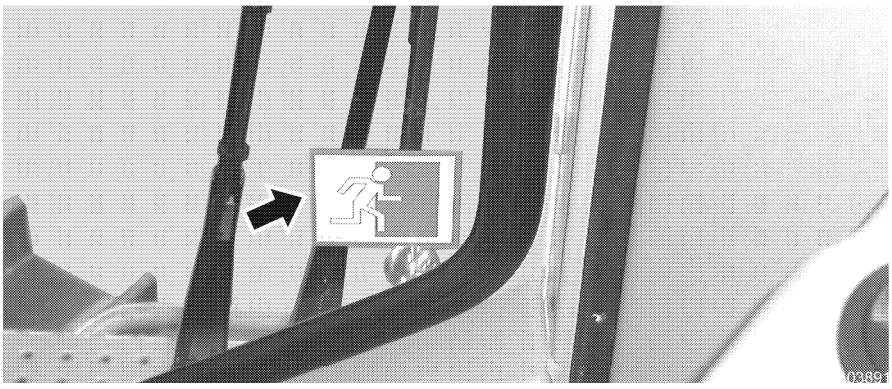
The decal is installed on the rigging points of the machine.
Shows the rigging points of the machine.



Stop-lift point decal

Stop-lift point decal

The decal is installed on the stop - lift points of the machine.
Shows the stop - lift points of the machine.



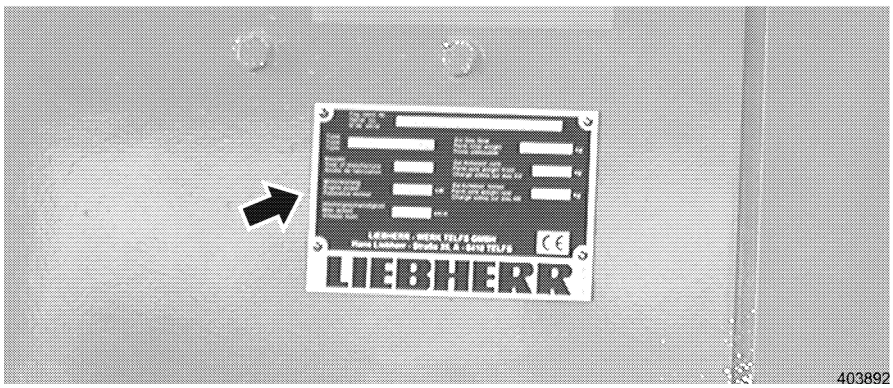
Emergency exit decal

Emergency exit decal

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

2.3.3 Nameplates

The machine and components such as the diesel engine, transmission, pumps etc. each have a nameplate. The production numbers of the components are given on the nameplates.



Machine nameplate

Machine nameplate

The decal is installed front left on the main frame.
Data noted on the nameplate:
- Type
- Vehicle Id. No.
- Permissible overall weight
- Year of construction
- Engine output
- Top speed

2.4 Safety regulations

2.4.1 General safety regulations

1. Study the Operation Manual before operating the machine.
   - Make sure that you have additional information for special attachments on your machine, that you have read it and that you understand it.
2. Allow only trained and authorized personnel to operate the machine, to maintain, service or repair it.
   - Be aware of the minimum age requirements for machine operators.
3. Allow only trained and authorized personnel to operate, set up, maintain and repair the machine, make sure all personnel have specific job assignments.
4. Determine the responsibility of the machine operator (also regarding the traffic regulations) and allow him to refuse to follow unsafe instructions given by a third party.
5. Always have an experienced person on the machine to supervise personnel still in training.
6. Periodically observe and check if all persons working on the machine observe the safety and danger notes and instructions given in the **"Operating Manual"** .
7. Wear proper work clothing when operating or working on the machine.
   - Rings, watches, bracelets and loose clothing such as ties, scarves, unbuttoned or unzipped shirts or jackets are dangerous and could cause serious injury!
   - Utilize proper safety equipment for certain tasks: safety glasses, hard hat, gloves, reflector vest, ear protection or respirator, ...
8. Consult your employer or site supervisor for specific safety equipment requirements and safety regulations on the jobsite.

9. When entering or leaving the machine, never use the safety lever, control levers or joysticks as handholds. This could cause the machine to move inadvertently, which could lead to a serious accident.
10. Never jump off the machine. Climb on and off the machine using only the steps, ladders, rails and handles provided. Use both hands for support and face the machine.
11. Keep steps, ladders, handrails and handles free of oil, grease, mud, snow and ice. These precautions will minimize the danger of slipping, stumbling or falling.
12. Make yourself familiar with the emergency exit through the right cab door.
13. If no other instructions are 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 control levers into neutral position.
    - Turn the engine off, leave the starter key in contact position.
    - Actuate the control levers several times to relieve the pressure in the system.
    - Bring all control levers into neutral position.
    - Before leaving the machine, move the safety lever up.
    - Remove the starter key.
14. Before accessing the hydraulic circuit, with the engine turned off and the starter key in contact position, actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and back pressures in the working circuits. Then relieve the pressure in the hydraulic tanks.
15. Always place the safety lever up before leaving the operator's seat.
16. Secure all loose parts on the machine.
17. Never operate a machine until you have performed a complete walk around inspection. Check if all warning decals are on the machine and are legible.
18. Observe the instructions on all danger and safety labels and decals.
19. For certain applications, the machine must be equipped with specific safety devices. Never utilize the machine if they are not installed or fully functioning.
20. Do not make any changes on the machine, add or remove items which could reduce the safety, without permission of the manufacturer. This also applies to the installation and adjustment of safety devices and valves as well as to welding on load carrying parts.

2.4.2 Crushing and burn prevention

1. Never work underneath the attachment unless it is placed on the ground or properly supported.
2. Never use damaged or insufficient load tackle (such as ropes, chains, ...). Always wear gloves when handling wire ropes.
3. When working on the attachment, never align bores with your fingers or hands. Use proper alignment tools when installing, changing or servicing attachments.

4. When the engine is running, make sure to keep objects away from the radiator fan. Rotating fans will swirl and throw out objects, which can become very dangerous and cause severe injury to yourself and others and damage the fan.
5. At or near operating temperature, the engine cooling system is hot and under pressure. Avoid contact with components containing coolant, it could cause severe burns.
6. Check the coolant level only after the cap on the expansion tank is cool enough to touch. Remove the cover carefully and slowly to relieve pressure.
7. At or near operating temperature, the engine and hydraulic oil is hot. Do not allow your skin to come into contact with hot oil or components containing hot oil.
8. Always wear safety glasses and gloves when handling batteries. Keep sparks and open flames away.
9. Never permit anyone to hand guide the attachment into position.
10. Check if the engine compartment door is held in open position by the safety strut.
    – If the function is not ensured, find the problem and remedy it immediately.
11. Make sure that all engine compartment doors and covers are closed and locked before operating the machine.
12. Never work or lay underneath the machine if it is raised with the attachment, the machine must always be properly blocked and supported.

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. Before starting to work, make sure that you area aware of any special conditions at the jobsite, as well as special regulations, federal, state and local safety requirements and warning signals. The work environment includes any obstacles in the working and traffic area, the load carrying capacity of the ground, and any necessary guard rails to protect the jobsite from close-by traffic.
2. Always keep sufficient and safe distance to overhangs, walls, drop offs and unstable ground.
3. Be especially alert in changing ground conditions, unfavorable visual conditions and changing weather.
4. Be aware of utility lines and the location of supply lines on the jobsite and work especially careful near them. If necessary, check with the appropriate agency for details.
5. Keep sufficient distance to electrical wires. When working near high voltage lines, do not get near them with the attachment.
   – 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 a high voltage wire:**
   – 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 too 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 the machine, it may become necessary to reassemble it and to bring it back to proper operating conditions.
9. Always turn on the light 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 seatbelt secured.
12. In the event the machine should tip, remain in the operator's seat with the seatbelt securely fastened. Experience has shown that it is safest 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. Never get up and leave 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. The maximum permissible drivable incline / side slope of the machine depends on the installed attachment as well as the ground conditions!

19. Avoid any working movements, which could cause the machine 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.
20. Always move slowly and carefully on rocky, rough or slippery ground or on a slope.
21. Always adapt the travel speed to the working conditions.
22. Never travel on slopes that exceed the maximum permissible gradeability of the machine.
23. Drive downhill only at low speed to prevent loss of control over the machine. The engine must be at high idle and the speed must be reduced by preselecting the low speed range. Always change to the low speed range before reaching a downhill slope, never move onto a slope and then change to the low speed range.
24. When loading a truck, the driver of the truck must leave the cab, even if the cab is FOPS protected.
25. The machine must always be equipped with the proper protective devices designed for specific purposes, especially when it is utilized in demolition work, land clearing, crane operation, etc.
26. Always have another person guide you if visibility is restricted. Always take signals from one person only.
27. Utilize only experienced personnel to attach loads and direct operators. The person giving signals must be visible to the operator or 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 up and turn the engine off, as outlined in the Operating 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 which you do not understand.

2. Any maintenance / inspection should be performed in the intervals noted in the Operating Manual.
   To perform any repairs, you must have the proper tools.
3. Maintenance work should be performed according to the chart in this Operating 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 Schedule, the remaining work should be performed only by especially trained personnel.
4. All spare parts must conform to the technical requirements set forth by the manufacturer. This is only assured by using original spare parts.
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.
8. Inform operators if any special task or maintenance work is required. Appoint one supervisory person to assure that this work has been done properly.
9. If not otherwise noted in this Operating Manual, perform all maintenance work on the machine on firm and level ground, with the engine turned off.
10. The cab may only be tilted if the machine is parked on firm and level ground and with the engine turned off! When tilting the cab, make sure that there is no one within the danger zone! Always secure the raised cab with the safety bar before working under the raised cab! The machine may **NEVER** be started or moved when the cab is raised. The safety lever must remain in the fully raised position!
11. After any maintenance and repair work, 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 underneath the machine, attach an easily visible warning sign **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 any harsh cleaning fluids. Use only lint free cleaning rags to clean the machine.
15. Never use flammable fluids to clean the machine!
16. Before any welding, cutting or grinding, clean the machine and surrounding area of dust and remove flammable fluids, assure adequate ventilation.
    – Otherwise, there is a **DANGER OF EXPLOSION!**
17. Before cleaning the machine with water, steam (high pressure cleaning) or other cleaning fluids, cover or tape all openings. Make sure no water, steam or cleaning fluid 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, the temperature sensors of the fire warning and sprinkler system do not come in contact with the hot cleaning fluid or the sprinkler system could be activated.

- After the clearing procedure, remove all covers and tape.
- After cleaning the machine, check all fuel, engine oil, and hydraulic lines for leaks, loose connections and for chafed and damaged areas.
- All problems must be remedied immediately.

18. Adhere to product safety instructions issued for handling oils, greases 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 guidelines, regulations and special instructions pertaining to the present jobsite.

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

23. The windows in the operator's cab are made of safety glass. Always replace damaged window panes immediately.
    - Only safety glass may be used for the window panes in the operator's cab.
    - Use only Original Liebherr spare parts.

24. Never try to lift heavy parts. Always use appropriate lifting devices with sufficient 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 devices, to prevent accidents.
    - Use only suitable and technically flawless lifting devices as well as tackle with sufficient load lifting capacity.
    - **Do not allow anyone to work or remain underneath the lifted 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 suited for this purpose. Do not step on any machine parts or components to get closer to the working area. Always wear safety harnesses or similar safety equipment when working higher up. Make sure all handles, steps, walkways, catwalks, ladders etc. are always free of dirt, snow and ice.

28. When working 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 with its attachment. The machine and / or its attachment must always be properly blocked and supported with wooden blocks or beams.

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

31. Only authorized, specially 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. Bring the attachment into maintenance position.

33. Only authorized, especially trained and experienced personnel may work on the hydraulic system.

34. Always wear gloves when checking for leaks. A thin stream of fluid escaping from a small hole can have enough force to penetrate the skin.

35. Do not release any hydraulic oil lines or fittings before the attachment has been lowered and the engine has been turned off. Then – with the starter key in contact position and the safety lever in operating position - actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and the back pressures in the working circuits. In addition, relieve the hydraulic tank pressure by backing out the bleeder screw.

36. Regularly check all hydraulic lines, hoses and connections for any leaks or external damage. Any defects must be repaired immediately. Any escaping fluid can cause serious injury and fire.

37. Before beginning any repairs, you must also ensure that all air pressures are relieved in any of the systems you need to gain access to. To be certain refer to the description of 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 fittings, including length and quality or type of hoses must match the requirements set forth by the manufacturer.
Use only LIEBHERR spare parts.

39. Replace hydraulic hoses and lines in regular intervals, as stated, even if no defects can be seen.

40. Work on 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 an 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 or emergency off switch in case a problem should arise. Rope the work area off 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 supply cable to the ground wire and use the grounding rod to ground these parts, such as condensers, etc.

45. Check the disconnected parts first to see if they are really voltage free, ground them and then short circuit them. Insulate neighboring voltage carrying parts.

2.4.11 Safety guidelines to be observed when welding on the machine

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

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 release any hydraulic oil lines or fittings before the attachment has been lowered and the engine has been turned off. Then – with the starter key in contact position and the safety lever in operating position - actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and the back pressures in the working circuits. In addition, relieve the hydraulic tank pressure by backing out 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 control levers into neutral position.
3. Turn the engine off, as described in the Operating Manual and place the safety lever in the up position before you leave the operator's seat.
4. Securely close all doors, covers and hoods on the machine.
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 or tackle 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 Operating 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).
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

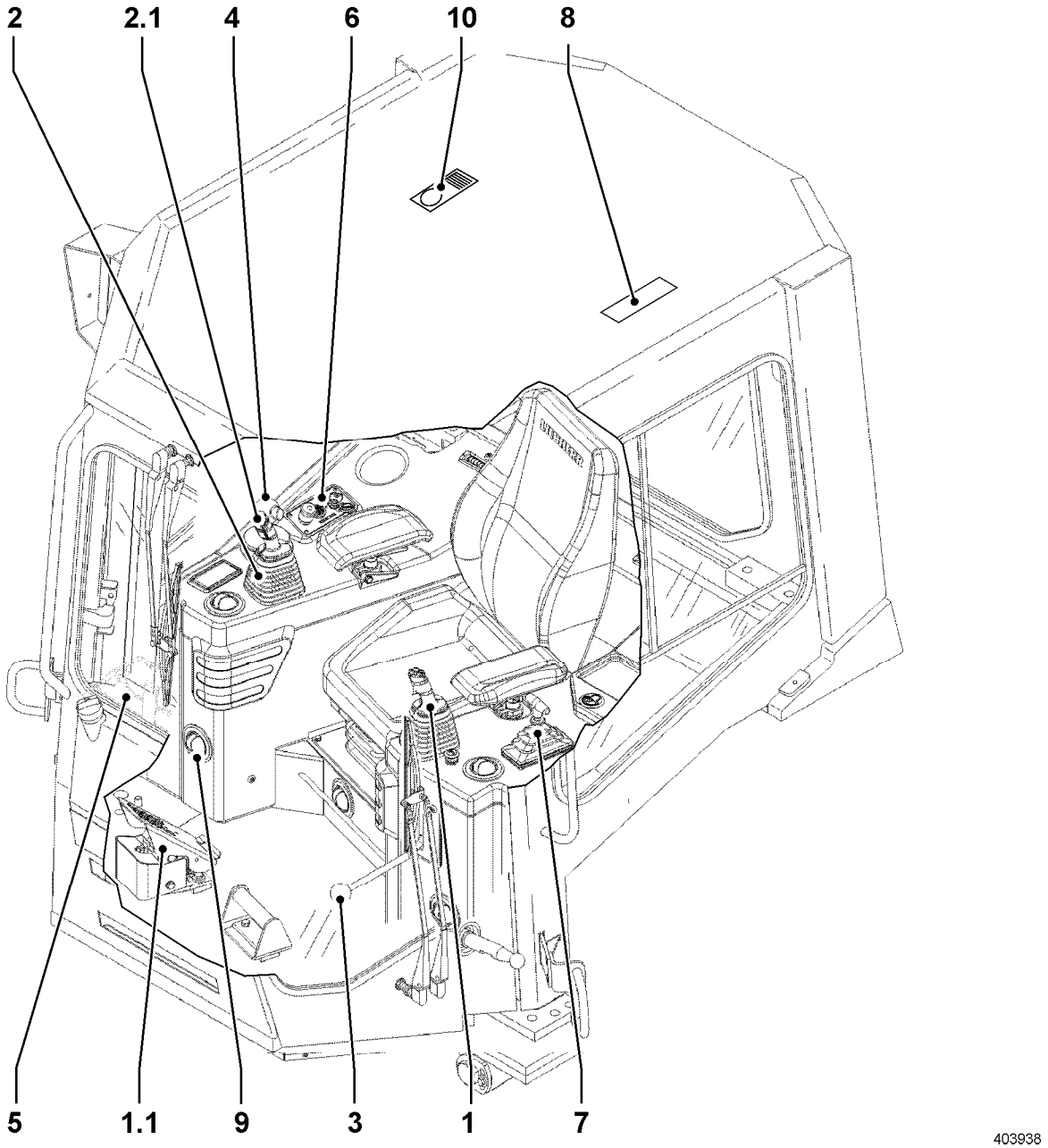
1. Attachments and installations from other sources or parts which have not been approved by LIEBHERR for installation may not be installed on the machine without prior written permission by LIEBHERR.
2. The necessary technical documentation must be forwarded to LIEBHERR.

3. Control, instrumentation

3.1 Location of controls and instrumentation

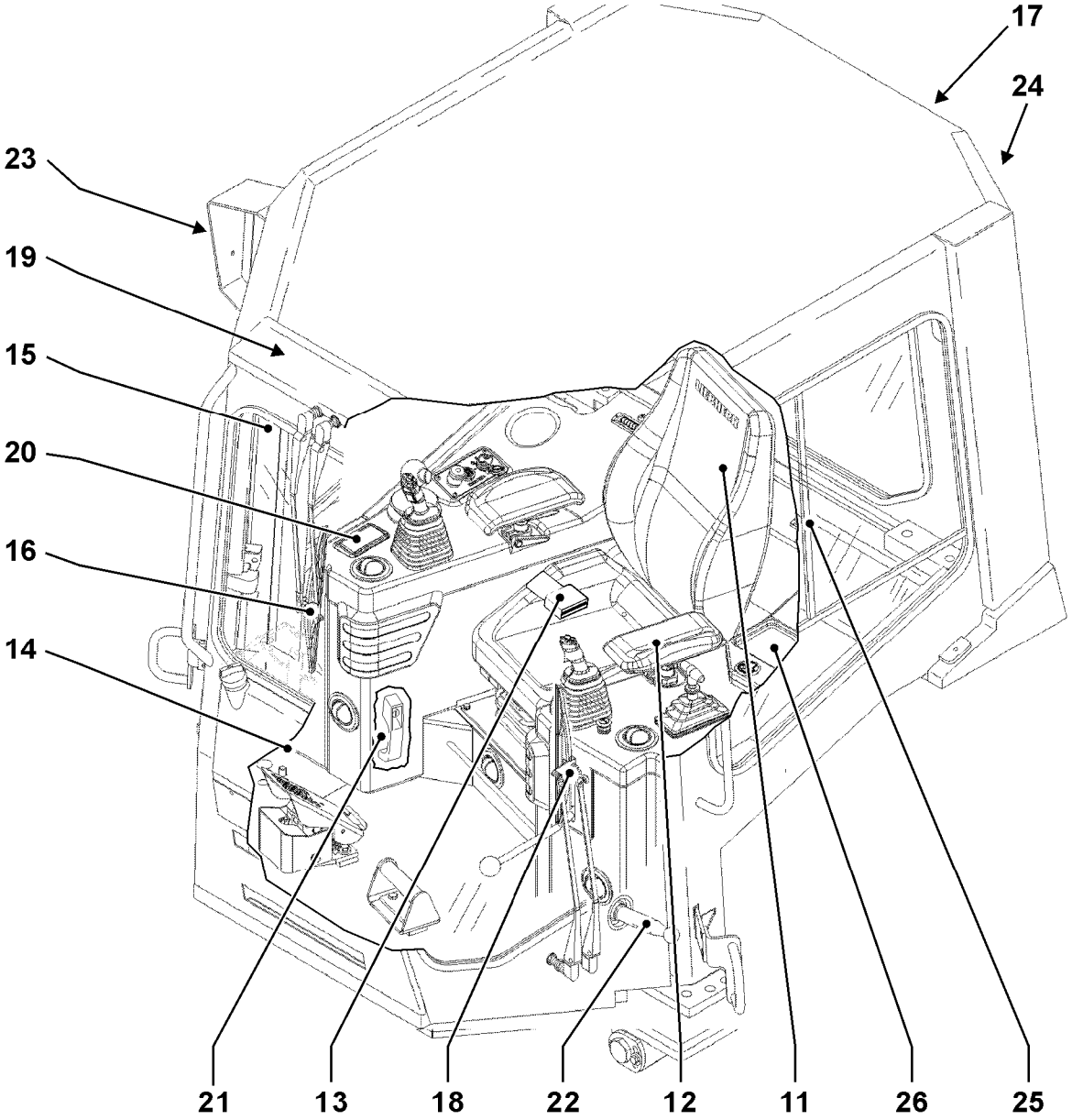
Englisch LWT - TD 7/7/2005

3.1.1 Operator's cab



Interior view - Operator's cab

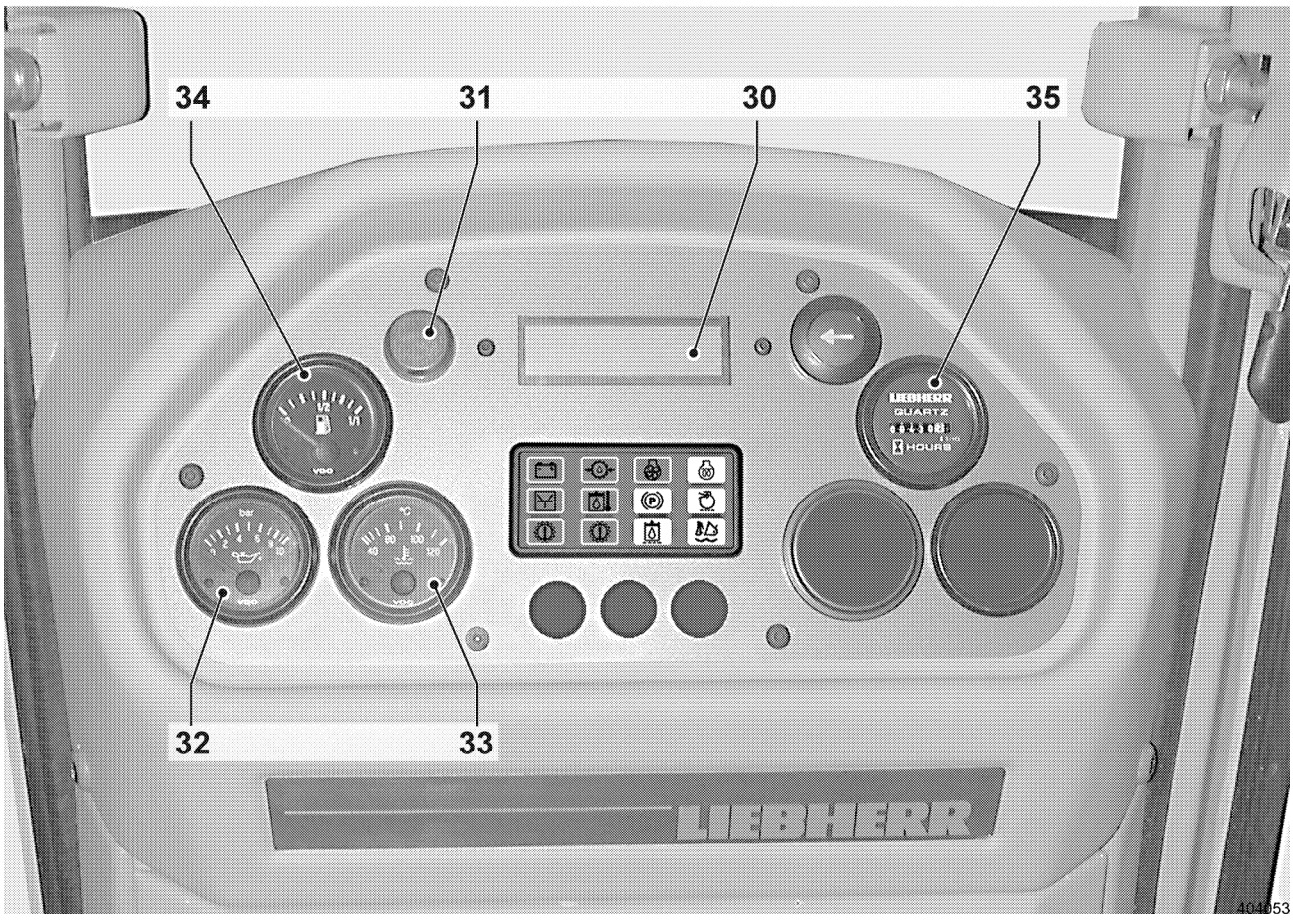
1 Travel joystick
1.1 Speed reduction pedal (Optional equipment)
2 Blade control lever
2.1 Button - float position
3 Safety lever
4 Ripper control lever
5 Instrument panel - front
6 Starter panel
7 Engine throttle control
8 Control elements - heater / air conditioning system
9 Heater vents
10 Interior light



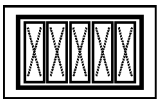
Interior view - Operator's cab

11 Operator's seat
12 Arm rests
13 Seat belt
14 Compartment to store machine documentation
15 Sun shade
16 Windshield wiper - front window
17 Windshield wiper - rear window
18 Windshield wiper - doors
19 Rear view mirror
20 Ashtray
21 Door lock
22 Door latch
23 Headlight - front
24 Headlight - rear
25 Window lock
26 Tray

3.1.2 Indicator elements on the operator's platform



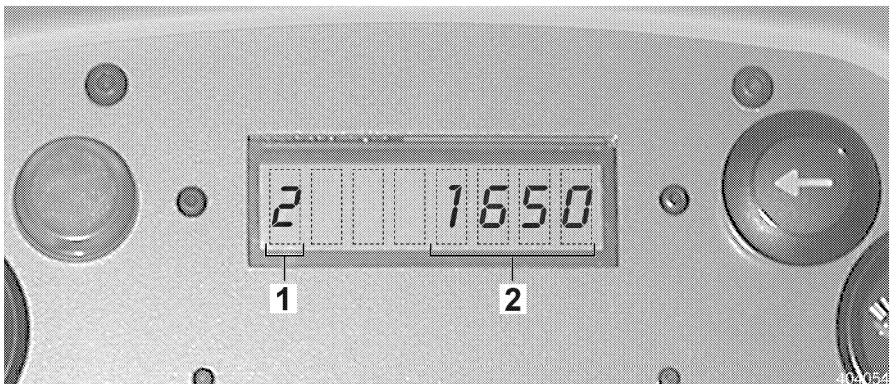
Indicator elements on the instrument panel



30 LCD displays

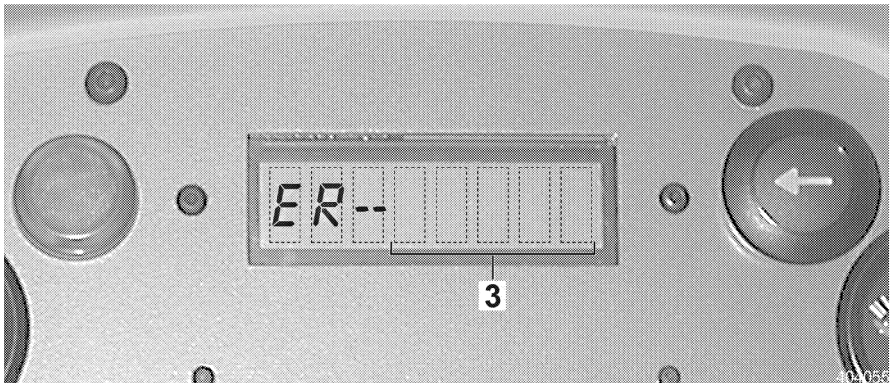
show:
- the travel speed stage,
- the Diesel engine RPM,
- the Service codes.

In case of an error, the LCD-display changes the travel speed stage as well as the engine RPM display to the Service code.
- If a Service code lights up, the machine must be taken out of service properly and put back into service. If the Service code in the LCD-display does not disappear, contact Liebherr Service immediately.



LCD-display / Travel speed - RPM

1 Display of selected travel speed stage
2 RPM display



LCD – display Service codes

3 Display Service code

If a Service code appears, the display of the speed stage display and the RPM disappears.

31 Warning light – Operator's cab

Warning light lights up / blinks:
- at increased Diesel engine coolant temperature
- in case of a drop in engine oil pressure
- in case of a drop in pump replenishing pressure
- in case of failure of the speed reduction pedal
- when ignition switch is in contact position as long as the Diesel engine is not running

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

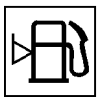
32 Engine oil pressure display

Shows the oil pressure of the Diesel engine.
The oil pressure may not fall below the following values:
At low idle RPM: 1 bar

At full load: 3.5 bar
If the engine oil pressure is below these values, turn the Diesel engine off immediately and remedy the problem (possibly change engine oil and filter).

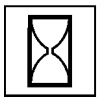
33 Coolant temperature display

Shows the coolant temperature of the Diesel engine.
If the coolant temperature is constantly above 100°C, turn the Diesel engine off and remedy the problem (e.g. clean the radiator, add coolant, check for leaks or check the water pump).



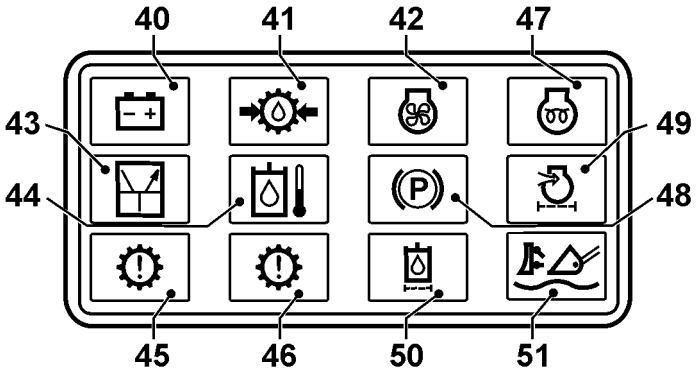
34 Fuel gauge

Shows the contents of the Diesel fuel tank.
To reduce the condensation in the tank, keep the fuel level in the tank as high as possible.

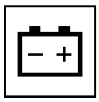


35 Hour meter

Displays the operating hours.
The hour meter is the basis for the timely adherence to the inspection schedule.

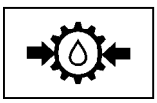


Indicator lights



40 Indicator light – battery charge

Color: red
Turns off after the Diesel engine is running.
– Lights up, for example, if the V-belt for the alternator is broken.
If the indicator light lights up, turn the Diesel engine off and remedy the problem.



41 Indicator light – pump replenishing pressure

Color: red

– Lights up in case of a drop in pump replenishing pressure
If the indicator light lights up, turn the Diesel engine off and remedy the problem.

42 Indicator light - fan control

Not assigned.

43 Indicator light - electronic

Color: red
– Lights up in case of problems in the electronic system.
In addition, a Service code is issued in the LCD display. Depending on the error the machine is switched to emergency operation and the travel drive is stopped.
If the indicator light lights up, turn the machine off and put it back into service properly. If the indicator light does not turn off or if it lights up again, contact Liebherr Service.

– Blinks if an error occurs in travel operation.
In addition, a Service code is issued in the LCD display. Depending on the error, the machine is switched to emergency operation. In that case, the machine is operational only on a limited basis.
The machine may be operated in the meantime. Contact Liebherr Service.

– Blinks in case of failure of the speed reduction pedal.
In case of failure of the speed reduction pedal, the indicator light - electronic blinks as well as the warning light - operator's cab.
The machine may be operated in the meantime. Contact Liebherr Service and repair the speed reduction pedal immediately.

44 Indicator light – hydraulic oil temperature

Color: red
– Lights up in case of excessive hydraulic oil temperature.
If the indicator light lights up, turn the machine off.
Clean the hydraulic oil cooler.

45 Indicator light travel gear – seal area, left

Color: red
– Lights up if the oil level in the seal area is too low.
– Lights up if the ignition key is in contact position for approx. 3 sec. (Self-check).
If the indicator light lights up, turn the machine off, check the travel gear externally for leaks.
Contact Liebherr Service.
– For continued operation in the meantime, bring the oil level to normal level.

46 Indicator light travel gear – seal area, right

Color: red
– Lights up if the oil level in the seal area is too low.
– Lights up if the ignition key is in contact position for approx. 3 sec. (Self-check).

If the indicator light lights up, turn the machine off, check the travel gear externally for leaks.
Contact Liebherr Service.
– For continued operation in the meantime, bring the oil level to normal level.

47 Indicator light – preheat system

Color: yellow
– Lights up if the ignition key is in preheat position for approx. 20 sec.

After the indicator light turns off, the Diesel engine can be started by turning the ignition key to starting position.

48 Indicator light – parking brake

Color: yellow
– Lights up if the parking brake is applied.
– Lights up if the safety lever is raised.
– Lights up in case of a drop of replenishing pressure.

49 Indicator light – air filter contamination

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

Perform air filter maintenance.

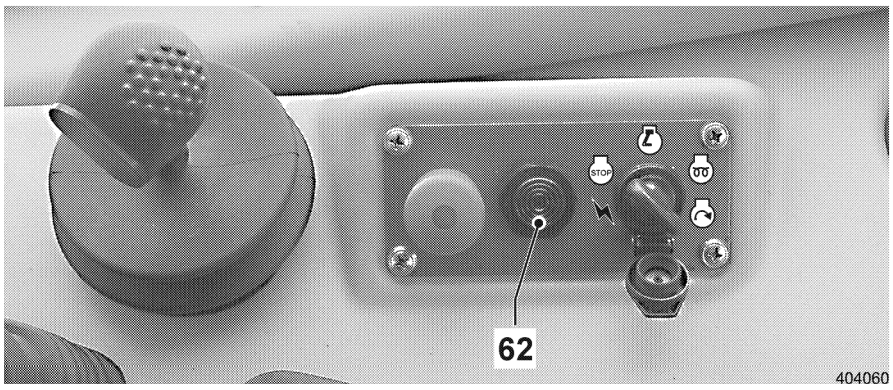
50 Indicator light – return filter

Color: yellow
– Lights up if the hydraulic oil return filter element is dirty (hydraulic oil at operating temperature).

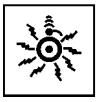
Perform hydraulic oil return filter element maintenance.

51 Indicator light – float position

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



Buzzer

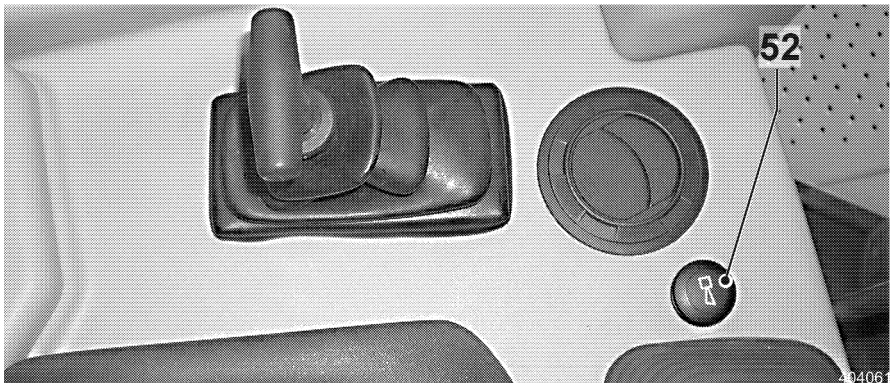


62 Buzzer

Buzzer sounds:
- at increased Diesel engine coolant temperature,
- in case of a drop in engine oil pressure
- in case of a drop in pump replenishing pressure
- if the ignition switch is in contact position for approx. 5 sec. (Self test - buzzer)

If the buzzer sounds, turn the Diesel engine off and remedy the problem.

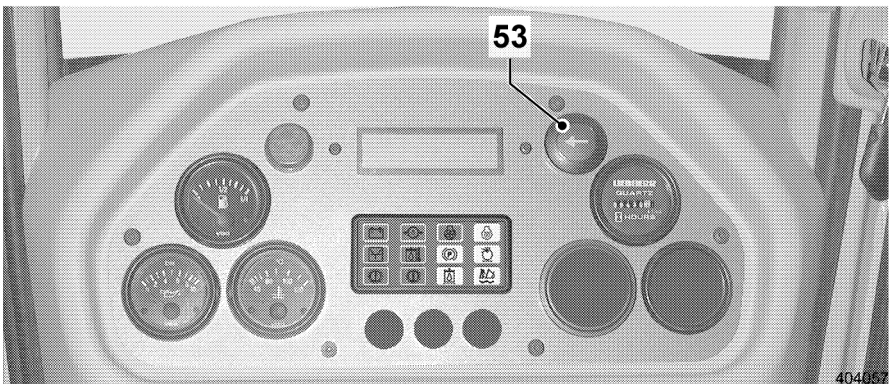
3.1.3 Control elements on the operator's seat



Horn - button

52 Horn - button

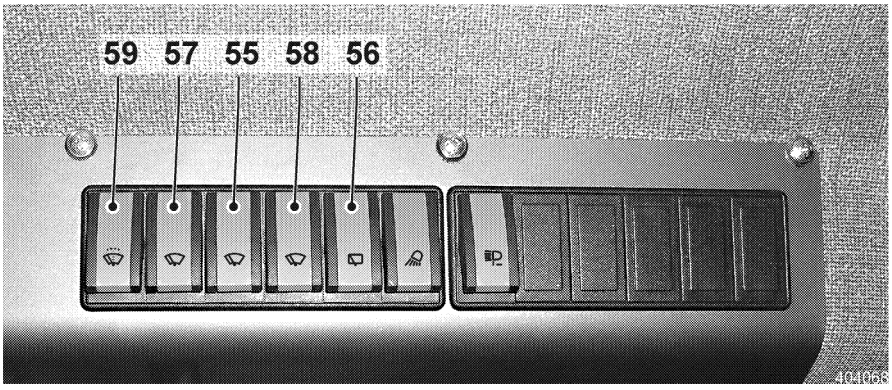
- Push the button to sound the horn.



Scroll key

53 Scroll key

– Press the scroll key, with the starter key in contact position, to call up the service codes. The service codes are shown in the LCD-display. Maximum 10 service codes are stored in the memory. The current service code moves the previous one back by one space. After 30 seconds, the indicator changes automatically to standard indication (speed stage / RPM).



Roof console - right

55 Switch - Windshield wiper, front

Turn on - off

56 Switch - Windshield wiper, rear

Turn on - off

57 Switch - Windshield wiper, left door

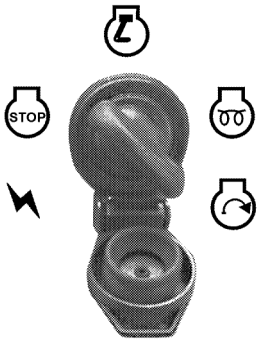
Turn on - off

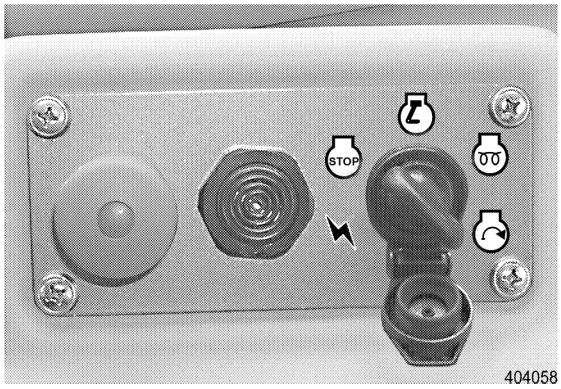
58 Switch - Windshield wiper, right door

Turn on - off

59 Switch - Windshield wiper- intermittent / washer system

Stage 1: Continuous wipe
– The windshield wiper, turned on with switches 55, 56, 57 and 58 is changed from intermittent to continuous wipe.
Stage 2: Button - windshield washer system





Starter switch

Starter switch

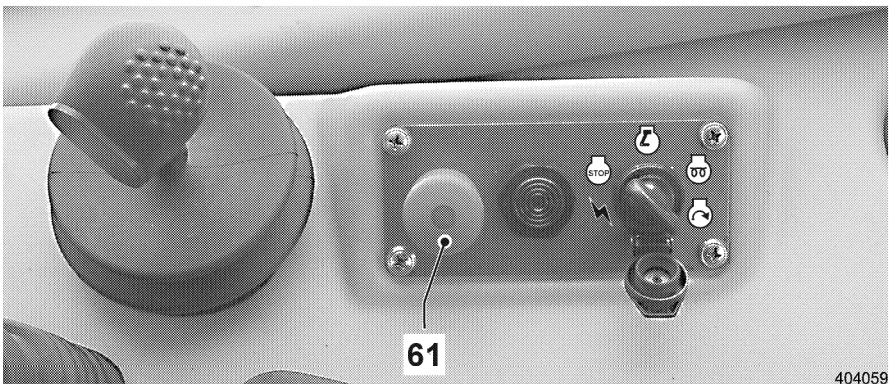
Off position

Contact position

Preglow position

Starting position

Parking position

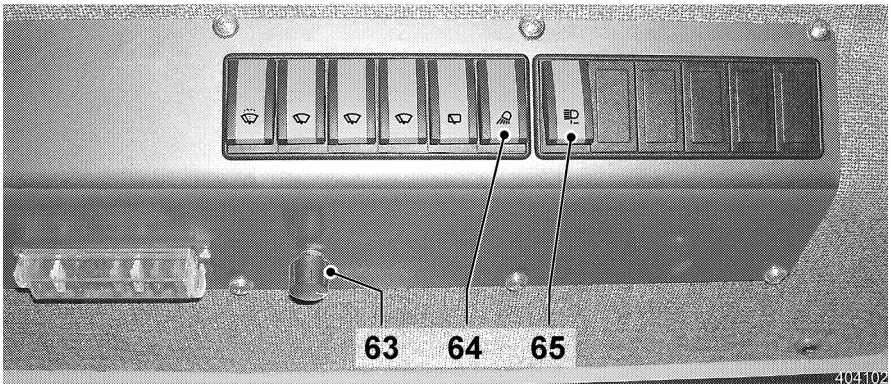


Emergency off button

61 Emergency off button

– The machine can be stopped immediately by pressing the emergency off button.

The attachment can still be operated.



Roof console - right

63 Turn regulator / knob - windshield wiper intermittent control

– Turn the knob to regulate the timing of the intermittent wipe.

64 Switch - working floodlight

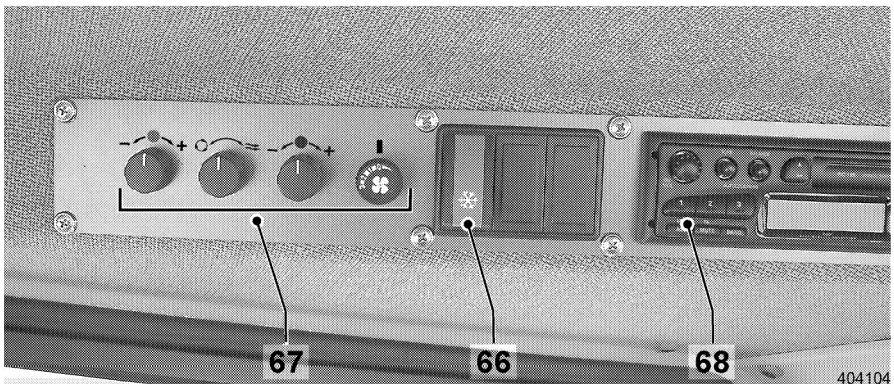
Turn on - off

Press the switch to turn the floodlight on / off.

65 Switch - added floodlight

Turn on - off

Press the switch to turn the added floodlight on / off



Roof console - left

66 Air conditioner main switch

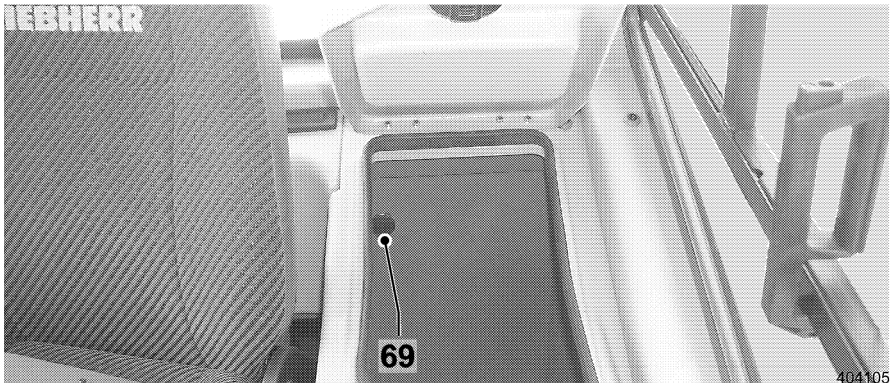
– Press to turn the air conditioner on / off.

67 Control heater / air conditioner

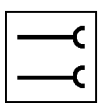
– Location of control elements. For control, refer to "Heat, ventilation" or "Air conditioning system".

68 Radio

– The operation of the radio is described in a separate radio operating manual.



Electrical socket

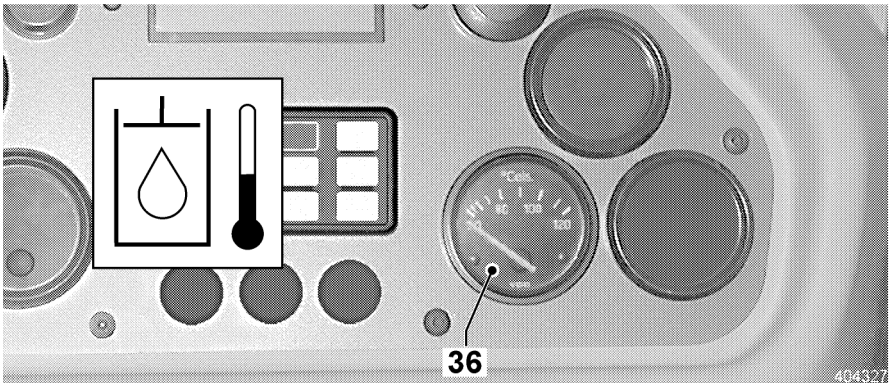


69 Electrical socket - 12 V

– The 12 V electrical socket is installed on the left hand side of the operator's seat in the tray.
– Additional electrical users (max. 10A) can be connected to the integrated 12 V electrical socket.
– Can only be used if the starter key is in contact position.

3.1.4 Hydraulic oil temperature gauge

(Special equipment)



Display – hydraulic oil temperature

36 Hydraulic oil temperature gauge

– Shows the hydraulic oil temperature of the machine.
If the oil temperature of the machine is constantly above 110°C, turn the Diesel engine off and remedy the problem (for example, clean the oil cooler).

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".

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

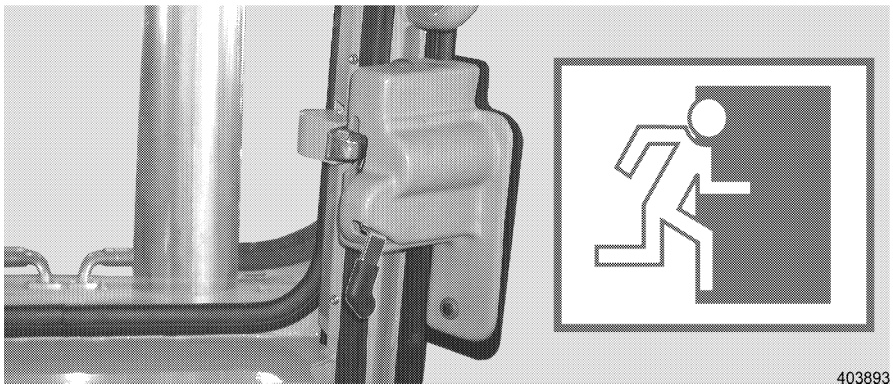
Danger of injuries due to inadvertent movement of the machine!

! 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

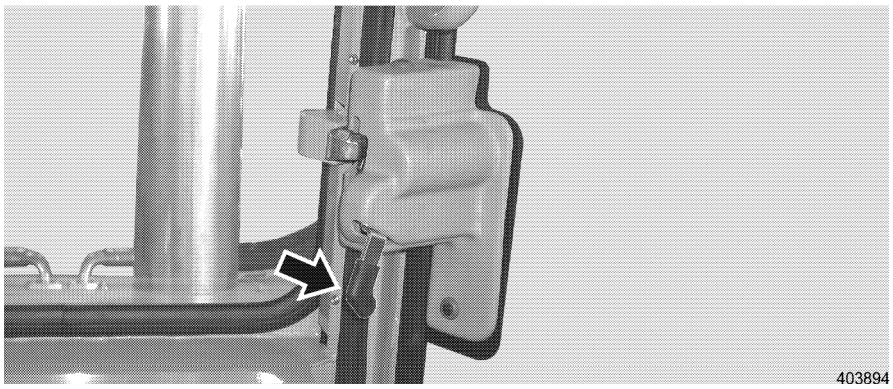
Always enter and leave the operator's cab through the left door.



Emergency exit

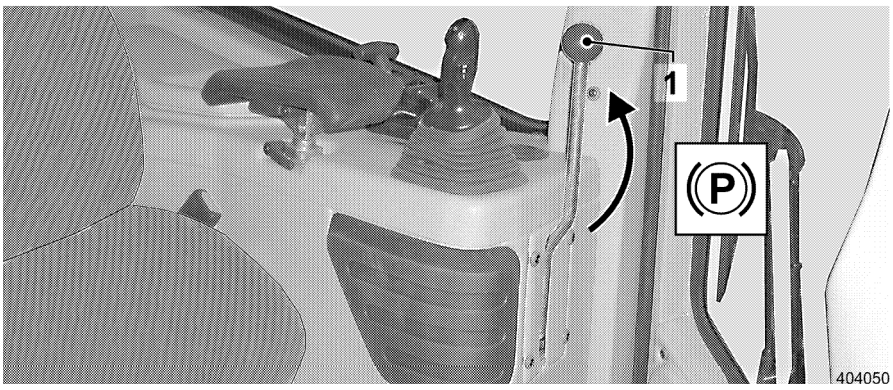
In an emergency, leave the operator's cab through the emergency exit.

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.
- To open the operator's cab door: pull the lever on the door lock upward.



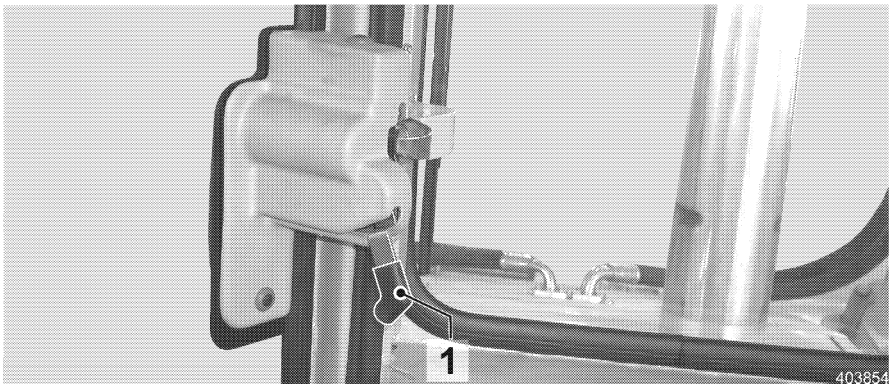
Safety lever up

- Before leaving the cab, move the safety lever 1 up.

– The indicator light - parking 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.



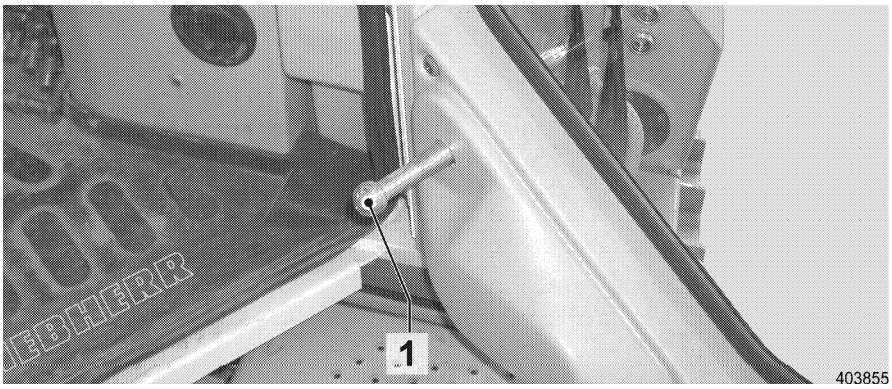
Open the operator's cab door

To open the door from the inside

- Push the lever 1 on the door lock up.

Door latch

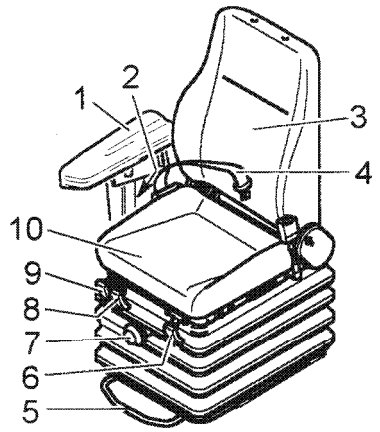
The fully opened cab doors are held in this position by the door latch 1.



Release the door latch

- To release the door latch: Push lever 1 down.

3.2.4 Operator's seat



403034

Operator's seat - main components and control elements

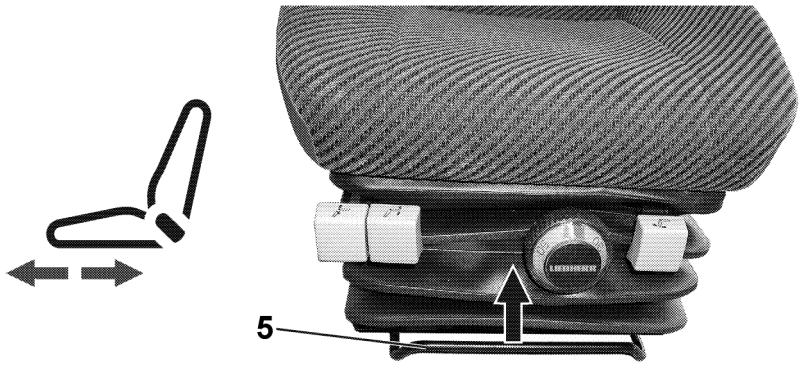
1 Armrest
2 Arm rest adjustment
3 Backrest
4 Seat belt
5 Lever - horizontal adjustment
6 Lever - backrest adjustment
7 Knob - seat suspension
8 Lever - incline adjustment forward
9 Lever - incline adjustment backward
10 Seat surface

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.



403030

Horizontal adjustment

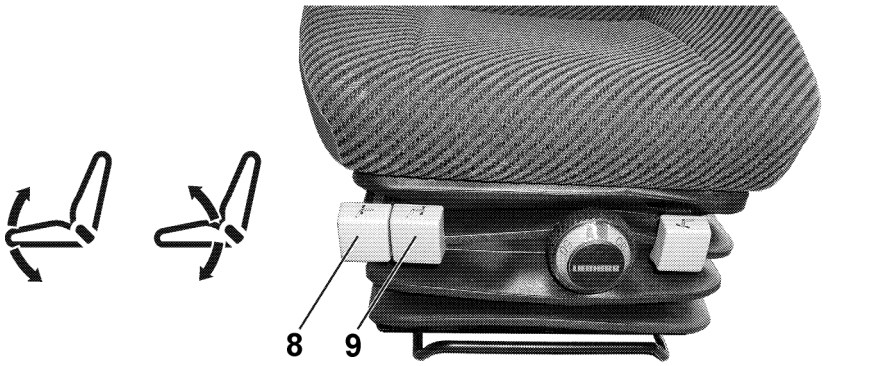
5 Lever - Horizontal adjustment

- 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

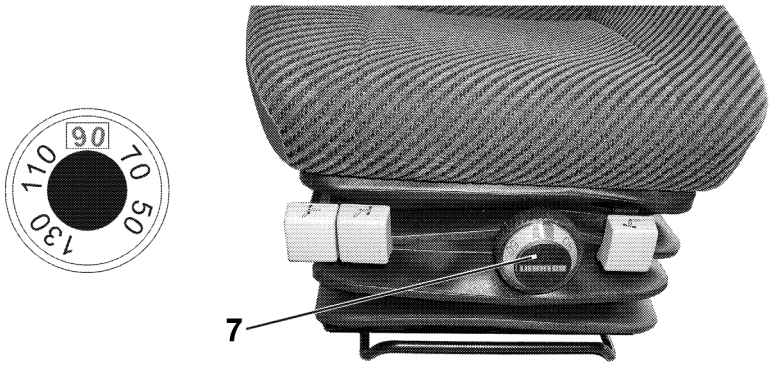
3 Lever - backrest adjustment

- 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.



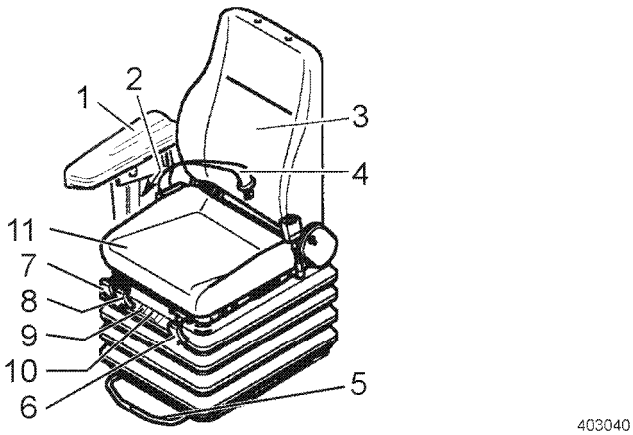
Adjustment - seat suspension

7 Knob - Seat suspension

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

3.2.5 Operator's seat - air cushioned

(Optional equipment)



Operator's seat - main components and control elements

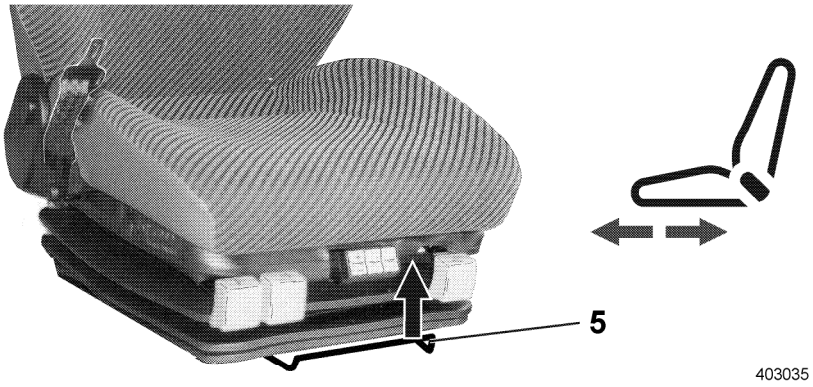
1 Armrest
2 Adjustment - armrest
3 Backrest
4 Seatbelt
5 Lever - horizontal adjustment
6 Lever - adjustment - backrest
7 Lever - incline position - front
8 Lever - incline position- rear
9 Button - seat suspension
10 Button - back support
11 Seat surface

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.



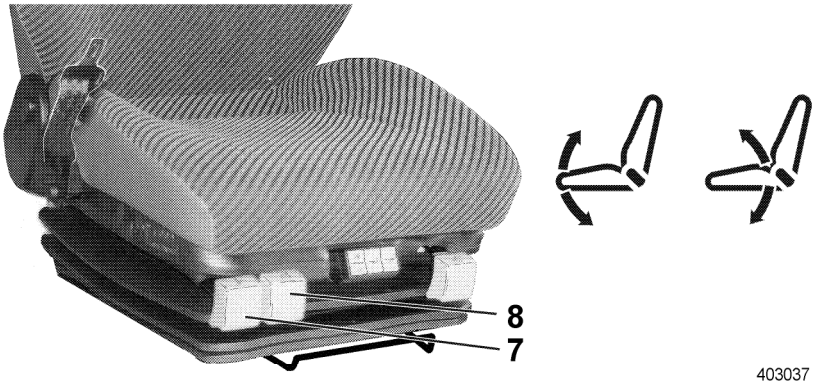
Horizontal adjustment

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.

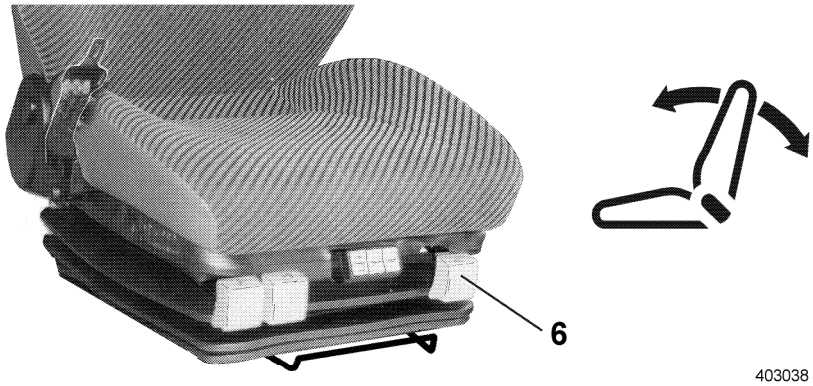
Adjustment of seat height

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.



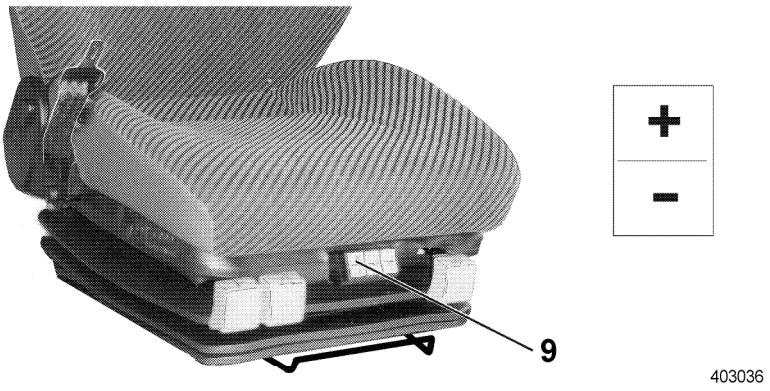
Adjustment - backrest

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.



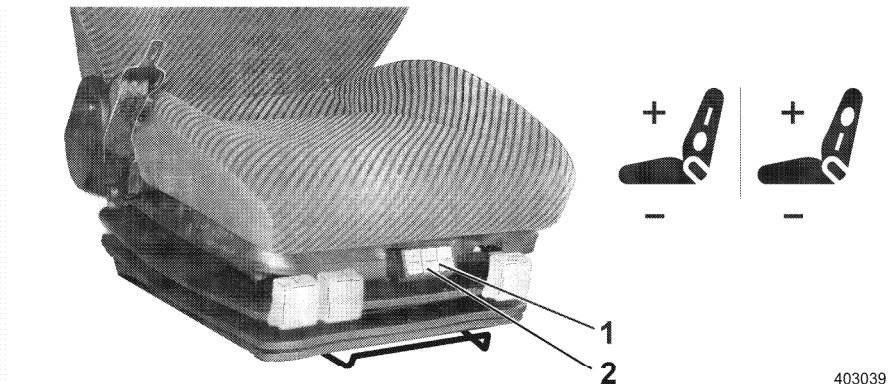
Adjustment - seat suspension

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

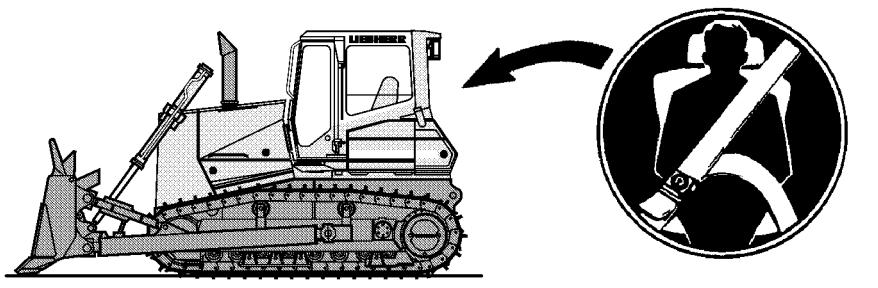
The installed seat conforms to ISO 7096.

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 Seatbelt

Observation of safety aspects
The operator's cab of the machine is equipped with a rollover 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 the 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

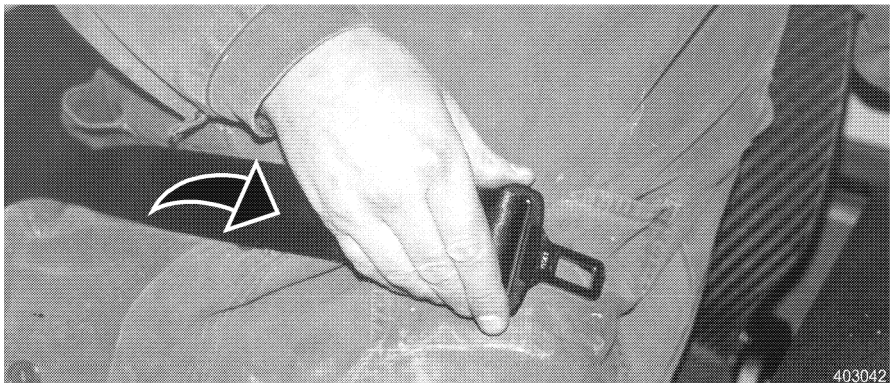
There is a danger of injuries if the seatbelt is not fastened! If the machine tips or rolls over, death or serious injury may occur if the seatbelt is not fastened!

! 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 parts immediately.
- Make sure that the seatbelt is not twisted when in use.

Place the seatbelt

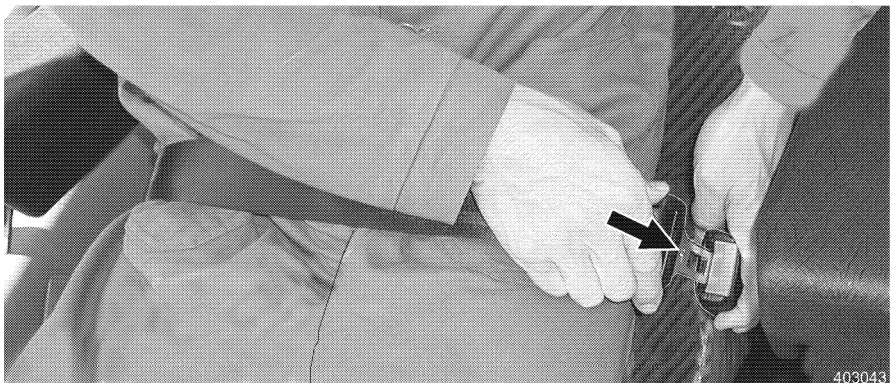
The seatbelt adjusts automatically. The length of the belt does not need to be adjusted.



Place the seatbelt

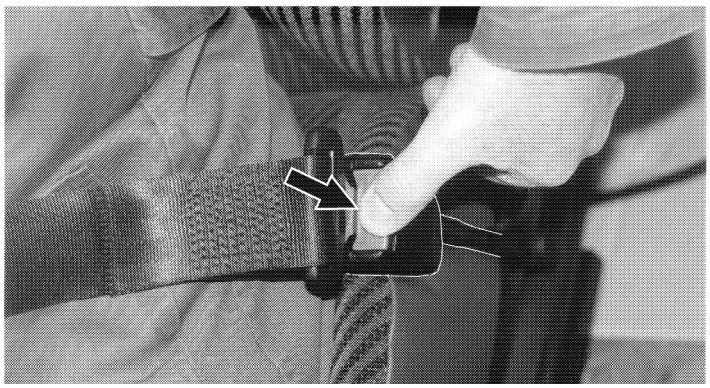
- Hold the belt with the right hand and slowly pull the belt from the housing.

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



Close the seatbelt

- Hold the snap 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.



Release the seatbelt

Release the seatbelt

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

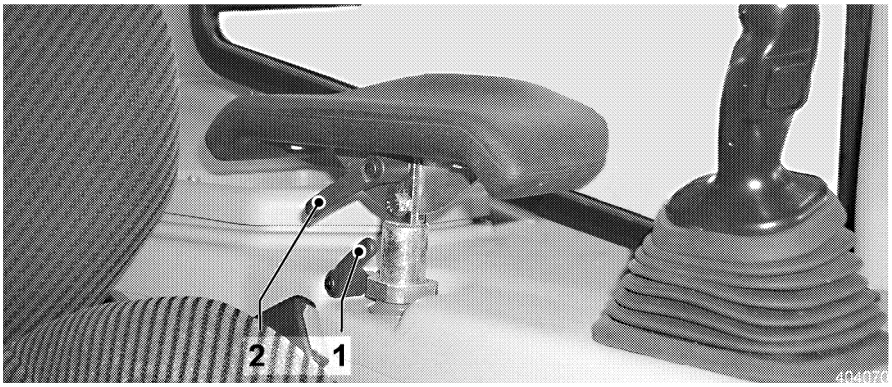
Adjustment of armrest

The height and incline of the armrest can be adjusted individually.

- Adjustment: Loosen handle 1, adjust height and incline and lock in place.

3.2.8 Armrests

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

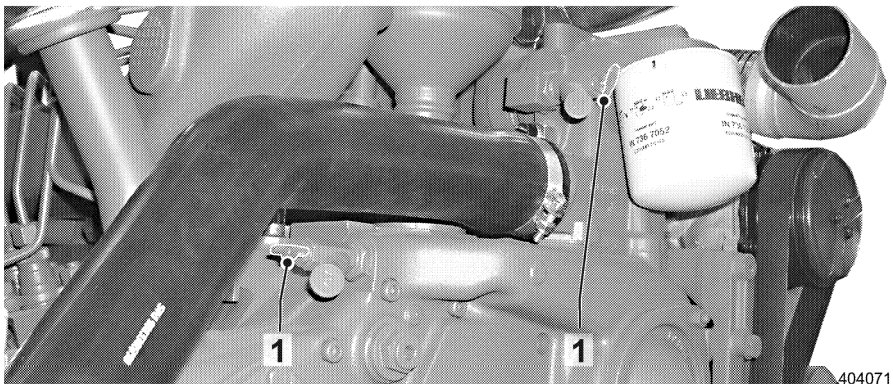


Adjustment - arm rest

- To adjust the height: loosen handle 1, set the height and the horizontal position and lock in place.
- To adjust the incline: loosen handle 2, set the incline and lock in place.

3.2.9 Heater, ventilation

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

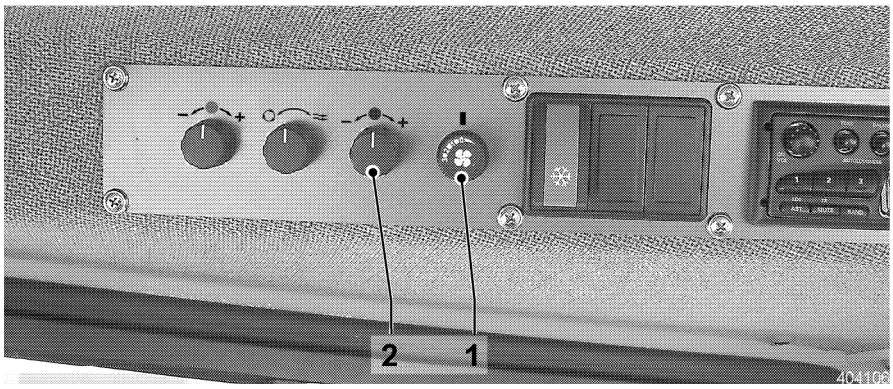


Shut off valves

The operator's cab can only be heated if the Diesel engine is at operating temperature and the shut off valves 1 are open.

Turn the heater on / off

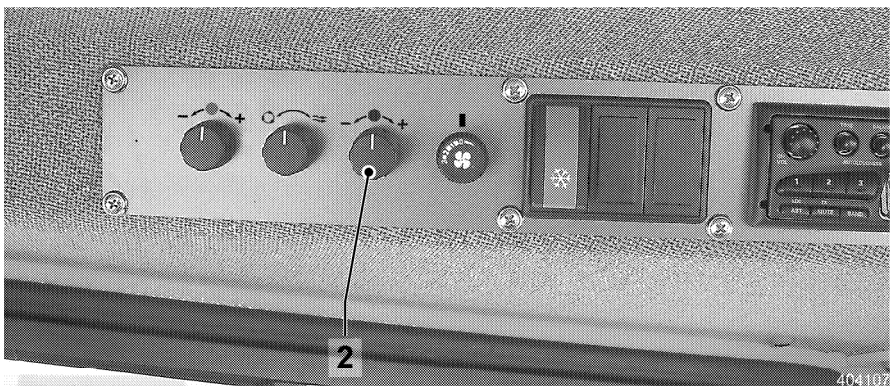
Heater control elements:
1 - Turn switch - blower
2 - Regulator knob - temperature



Heater control elements

Make sure that:
– the electrical system of the machine is turned on,
– the vents are open for the desired air flow, for example to the body, to the front window, to the rear window.

- To turn the heater on: Set the turn switch 1 to stage 1. The air flow is blown into the cab via the vents.



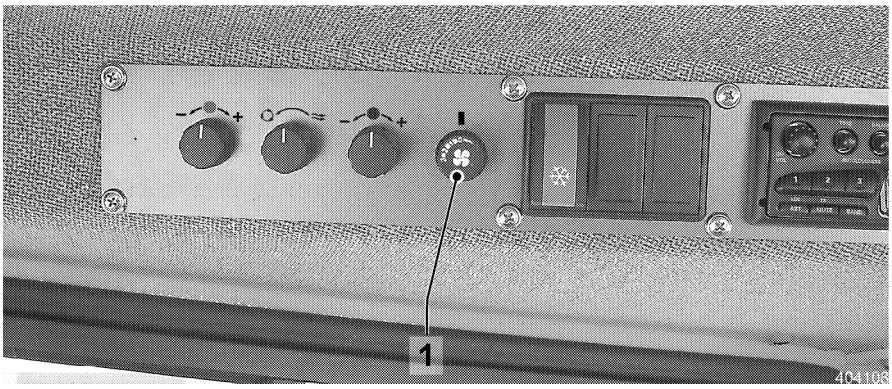
Temperature regulator

The temperature can be adjusted steplessly: Turn the knob 2 in clockwise direction for warm, in counterclockwise direction for cold.

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

Regulate the blower

The blower is turned on or off with switch 1.



Blower switch

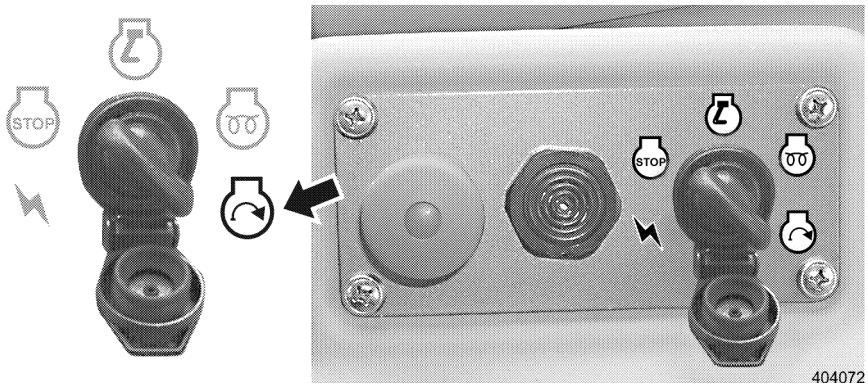
Blower stages:
Stage 0 - OFF position
Stage 1 - slight air flow
Stage 2 - medium air flow
Stage 3 - strong air flow

- Turn the switch 1 to the desired setting.

The air is blown into the cab through the vents.

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 (operate the heater and air conditioner at the same time).
Then use the heater to compensate the cooling to obtain a comfortable temperature setting and to prevent the windows from fogging up.

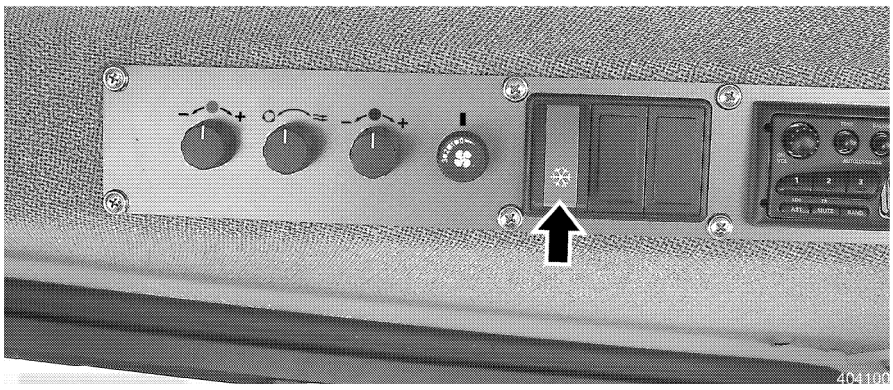


Start the Diesel engine

Turn on the air conditioning system

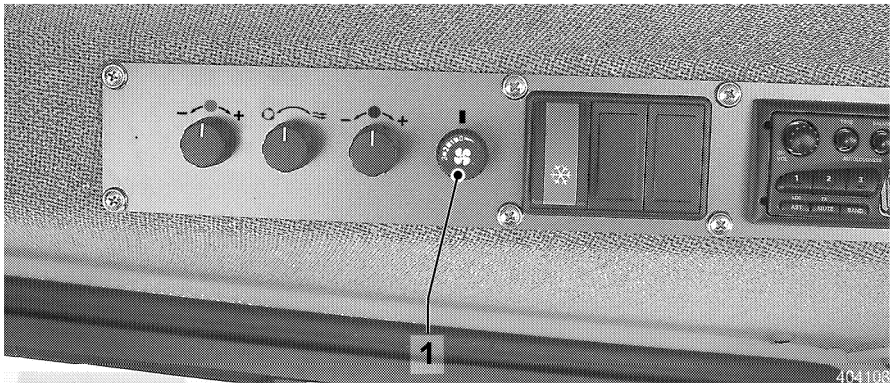
The air conditioning system can only be operated if the Diesel engine is running.

- Start the Diesel engine.



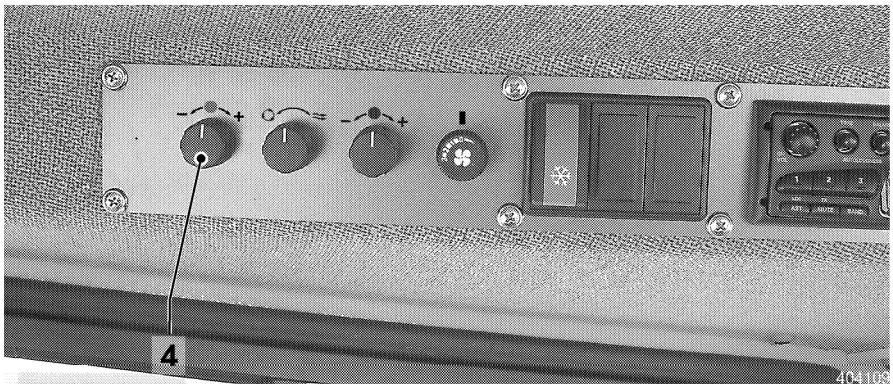
Main air conditioner switch

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



Blower switch

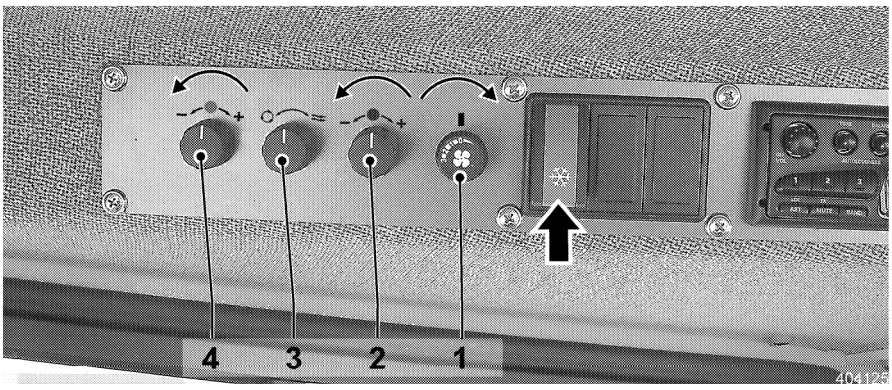
- Set the blower switch 1 at least to stage 1.



Regulating knob - air conditioning system

- Select the desired temperature with the regulating knob 4 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.



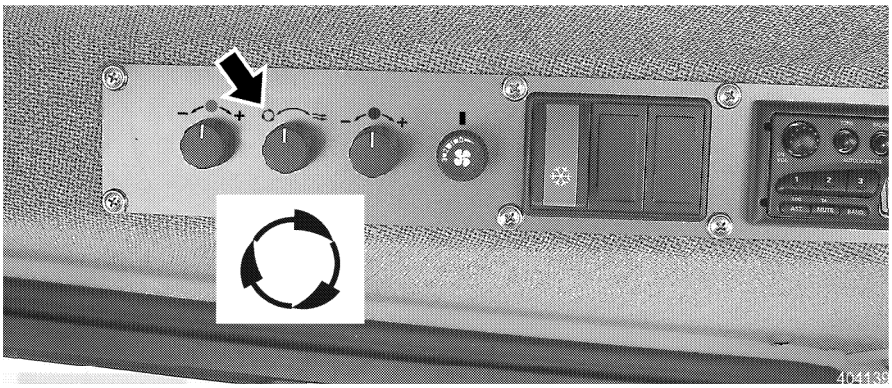
Air conditioning system - full power

Air conditioning system - full power

The greatest cooling output is reached:

- by turning the regulating knob for the air conditioning system in counterclockwise direction to the stop.
- Set the highest blower stage.
- Turn the heater off.
- Close the windows.
- Turn the regulator for the vent to switch from fresh air to air circulation.

Air circulation

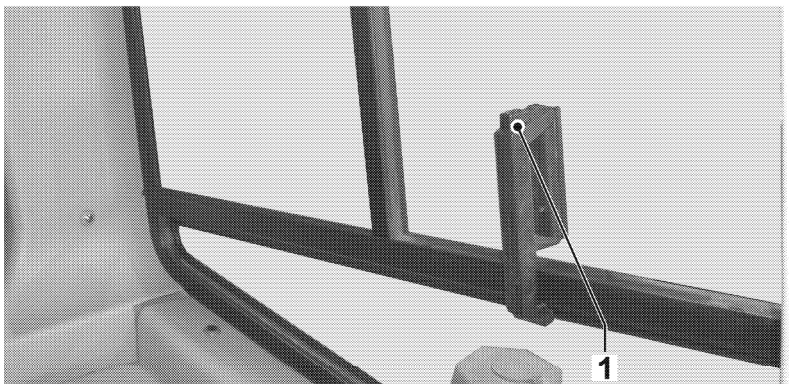


Air circulation

In air circulation, the outside air flow is shut off and the air inside the cab is circulated to avoid infiltration of contaminated outside air. Do not use this setting for an extended time period.

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.



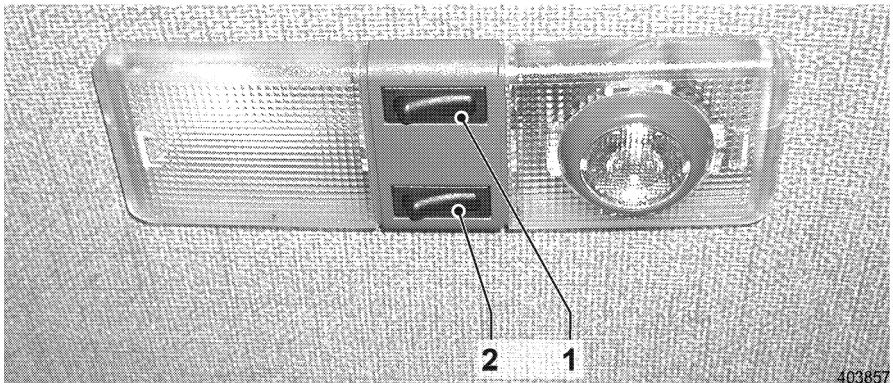
Open / close the sliding window

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

3.2.12 Cab interior light - reading lamp

Turn the light on / off

The interior light and the reading lamp are located in the roof of the operator's cab.



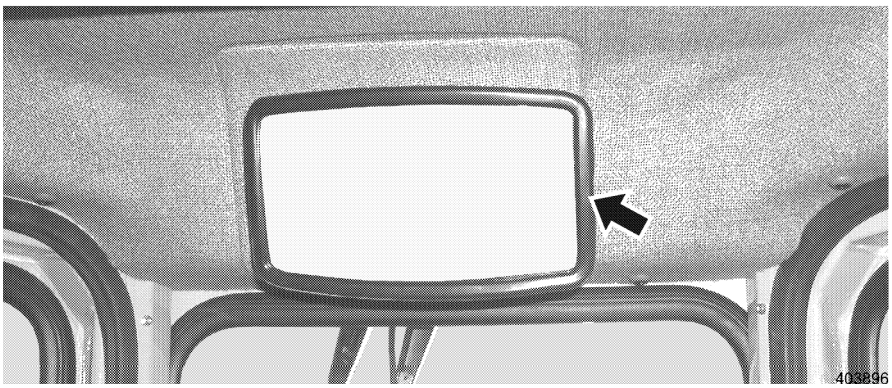
Interior light - reading lamp

- Interior light: Turn on / off with switch 1.
- Reading lamp: Turn on / off with switch 2.

3.2.13 Rear view mirror

Adjustment of mirror

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



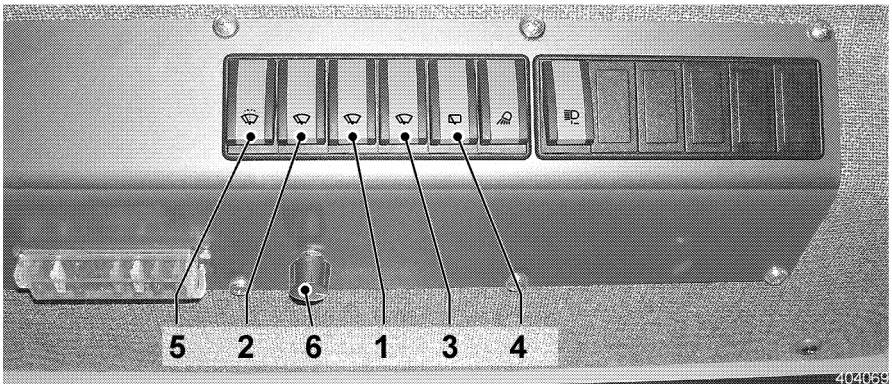
Adjustment - mirror

- Adjust the mirror before operating the machine.

3.2.14 Electric windshield wiper and washer system

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

In case of frost, before turning the windshield wipers on for the first time, check the wiper blades to ensure that they are not frozen to the window pane.

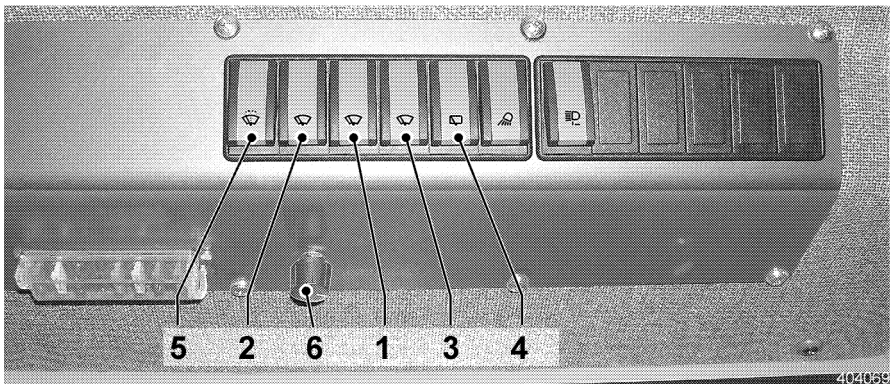


Switch windshield wiper and washer system

Operation of the windshield wiper and washer system

The windshield wiper system is actuated by switch 1, 2, 3, 4.

The windshield washer system and the intermittent control is actuated with switch 5. The timing for the intermittent wipe can be adjusted with the regulating knob 6.



Switch - windshield wiper and washer system

1 Switch - windshield wiper system - front window
2 Switch - windshield wiper system – door left
3 Switch - windshield wiper system – door right
4 Switch - windshield wiper system – rear window
5 Switch – intermittent control / windshield washer system
6 Knob – intermittent control

To wipe the window

- Press switch 1, 2, 3 pr 4. The selected windshield wiper is activated.

Intermittent / continuous wipe

Functions switch 5:
– Switch pressed on top: intermittent wipe
– Switch in center position: continuous wipe
– Switch pressed on the bottom: wipe / wash function

- Windshield wiper continuous wipe: Set switch 5 to stage 1 (center position). The windshield wiper which had been turned on with switch 1, 2, 3 or 4 is switched over from intermittent wipe to continuous wipe.

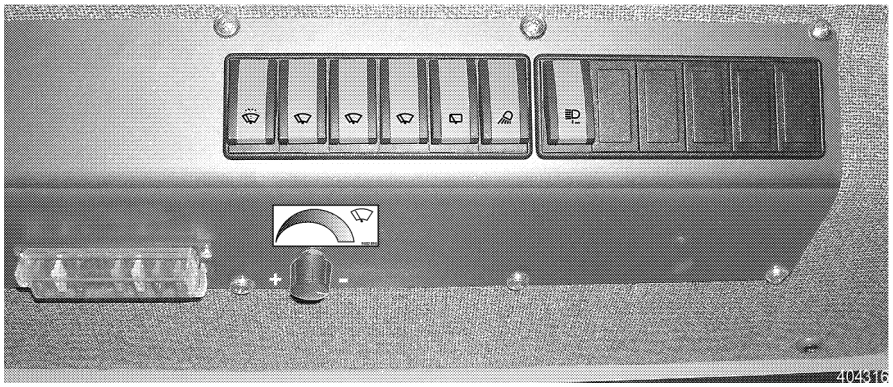
To wash the window

- Press switch 5 and hold it down.

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

Timing for intermittent wipe

The time intervals for intermittent wipe can be infinitely adjusted with the knob 6.



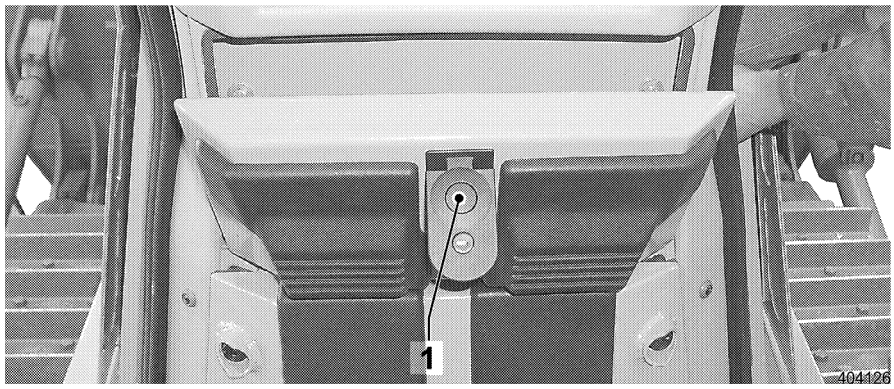
Knob – intermittent wipe

– Turn the knob to the right: short interval for wipe.
– Turn the knob to the left: long interval for wipe.

• Adjust the knob 6 to the desired time interval.

3.2.15 Compartment for documentation

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



Compartment

Open the compartment for the machine documentation

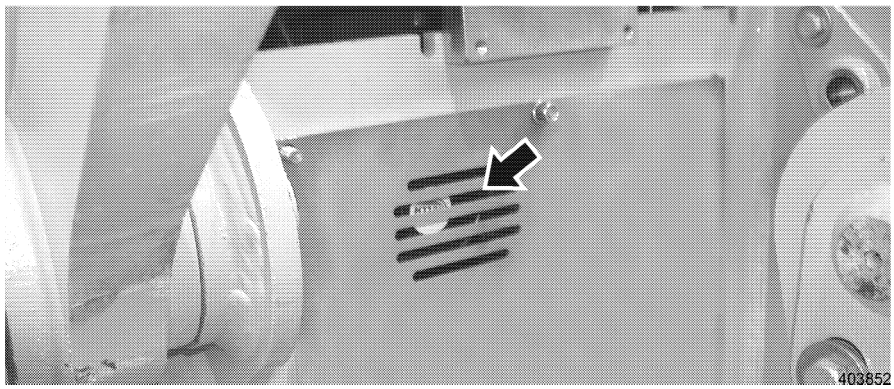
• Push the button 1 on the lock and open the cover.

The Operating manual for the machine should always be available in the compartment.

The Operating Manual is part of the machine!

3.2.16 Back up alarm

(Optional equipment)

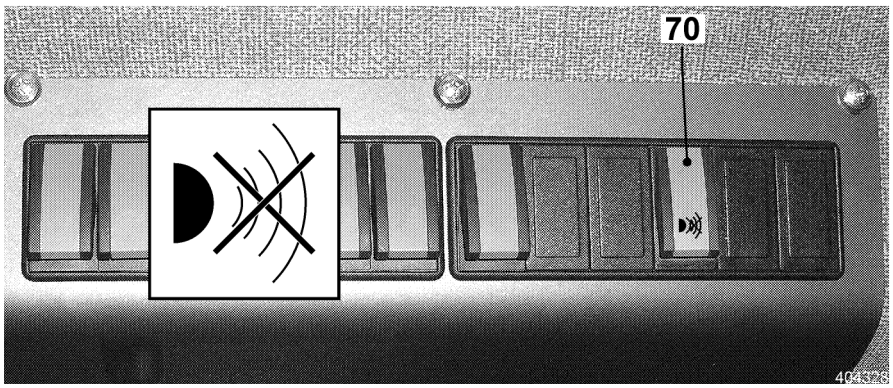


Back up alarm

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

3.2.17 Backup warning device - disengageable

(Special equipment)



Switch - backup warning device

70 Backup warning device, disengageable

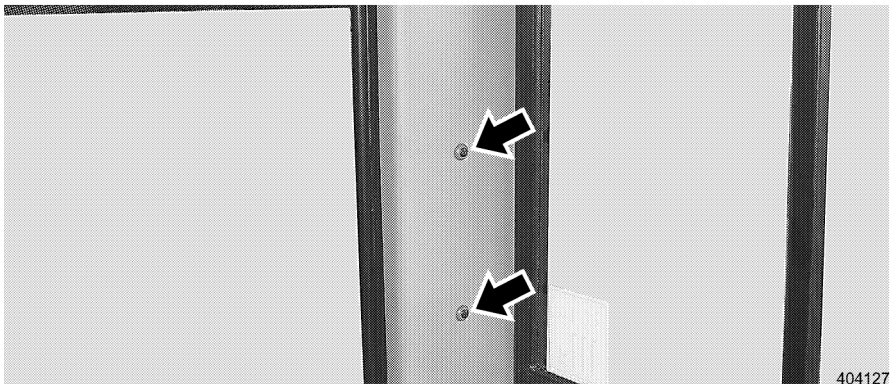
The acoustical signal of the "backup warning device" can be turned off by pressing switch 70 on the right roof console.

– The backup warning device is a safety device to warn personnel in the vicinity acoustically as soon as the machine drives backwards.

! The backup warning device should be turned off only in exceptional cases.

3.2.18 Fire extinguisher

(Optional equipment)



Location of fire extinguisher

Location of fire extinguisher

A mounting location is available for retrofit installation of a fire extinguishers on the left hand side behind the operator's seat.

- Contact your Liebherr dealer to order the fire extinguisher installation kit.

3.2.19 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.

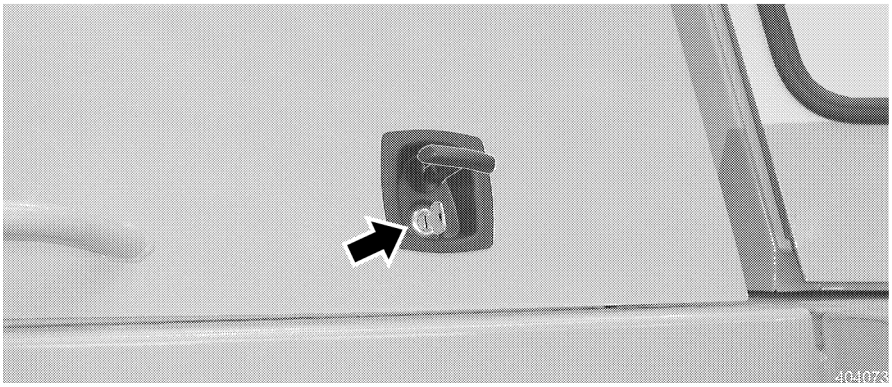
3.3 Operation

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

Operating position

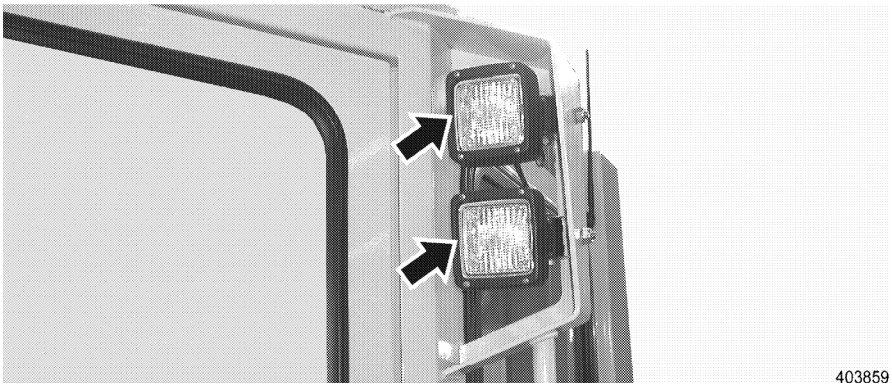
To bring the machine in operating position, proceed as follows.



Lock the doors

Close all service doors, compartments and hoods

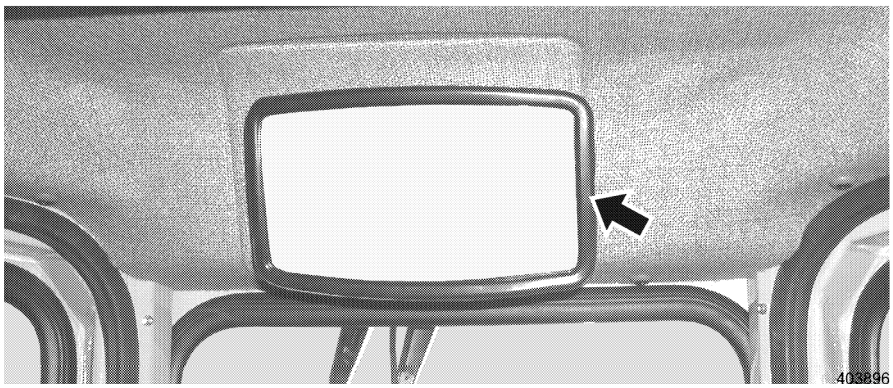
- Close all service doors, compartments and hoods and lock, if possible.



Adjustment of floodlights

Check the lighting system

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

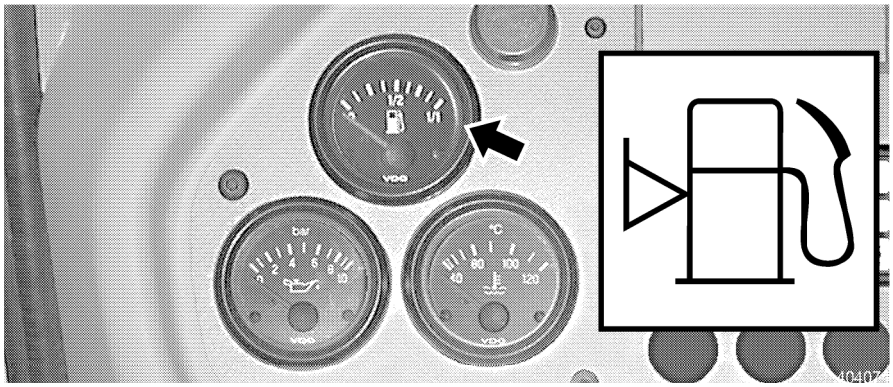


Rear view mirror

Adjust the rear view mirror

- Adjust the rear view mirror.

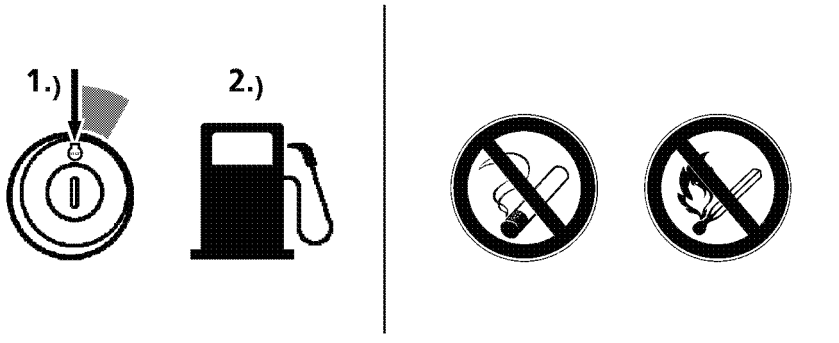
Add Diesel fuel



Fuel gauge

Fuel gauge

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

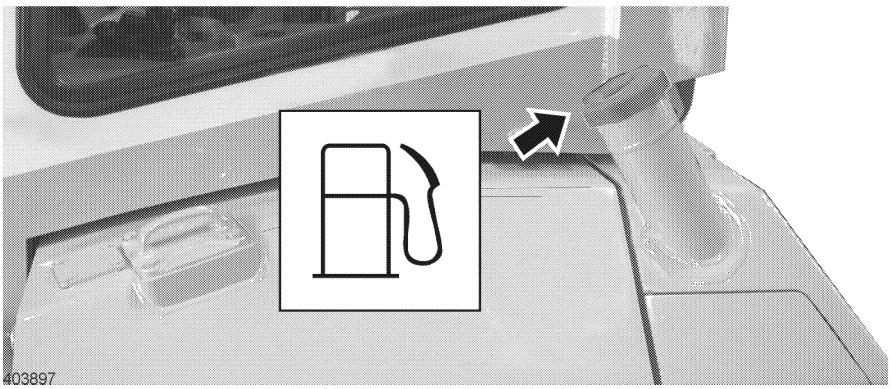


Refueling safety

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.



Tank cover

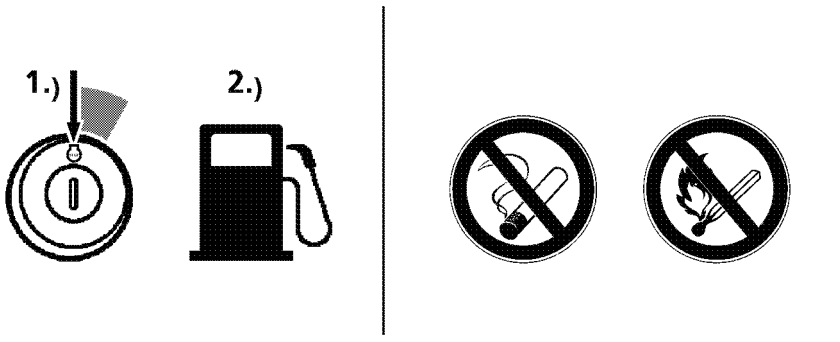
- Remove the tank cover.
- Add only clean Diesel fuel.

– 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.

Add Diesel fuel with a refueling pump

Optional equipment

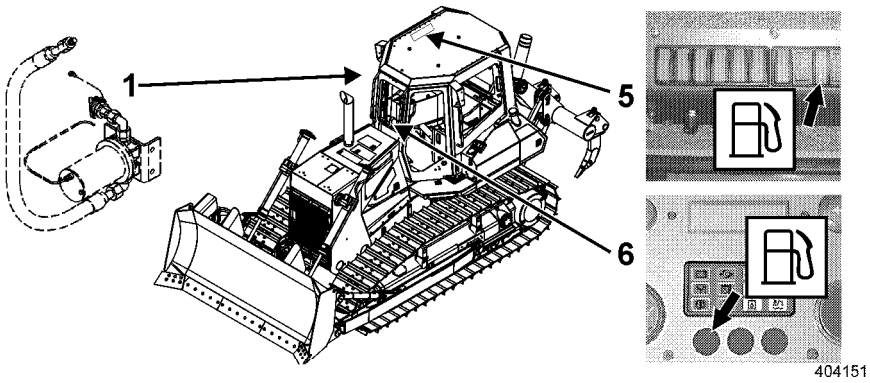


Refueling safety

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.



Location of refueling pump

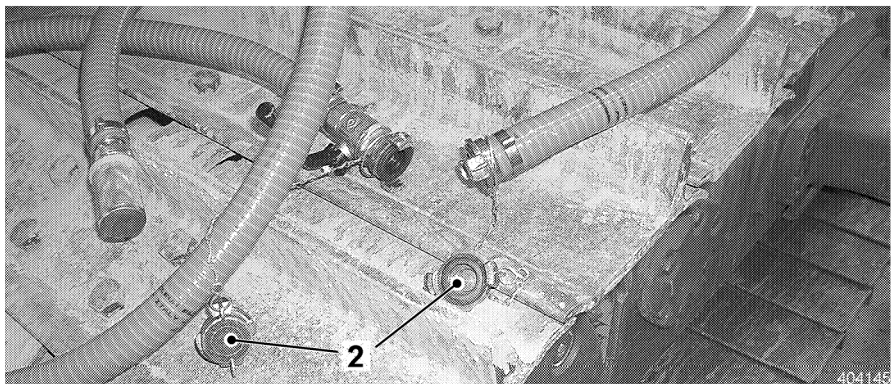
The refueling pump 1 is installed in the compartment on the right hand side of the machine. The refueling pump is turned on or off via the switch 5 in the roof console.
When the refueling pump is turned on, the indicator light 6 on the front instrument panel lights up.

! Turn the refueling pump only on for the refueling procedure.

Access - refueling pump

Refueling procedure

- Open the door 1 on the right rear.



Blind couplings

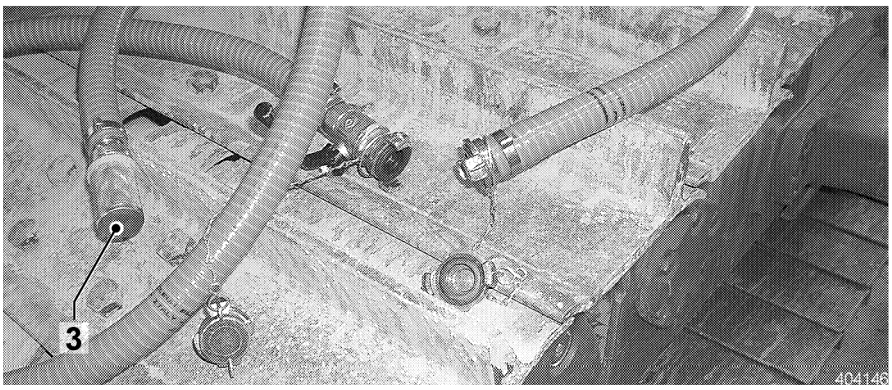
- Remove the blind couplings 2 on the connection on the refueling pump and on the suction hose.
- Connect the suction hose with the hose of the refueling pump.

Caution

Danger of damage to the refueling pump!

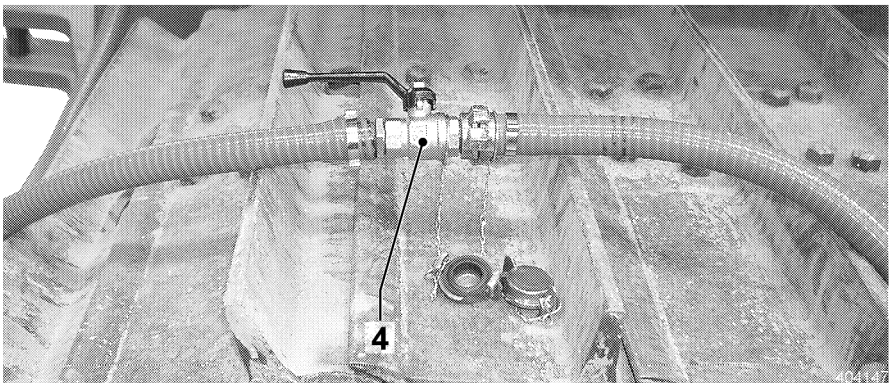
! Never refuel without the strainer on the suction hose.

– The strainer protects the refueling pump from drawing in foreign particles and contaminants.



Strainer

- Insert the suction hose with the installed strainer 3 into the fuel barrel.



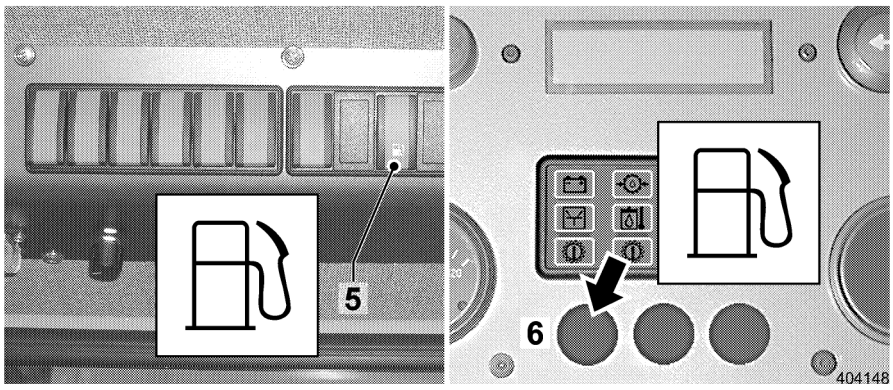
Ball cock

- Open the ball cock 4 on the hose of the refueling pump.

– The ball cock prevents the Diesel fuel from running out of the refueling pump.

! Make sure the ball cock is open before turning on the refueling pump!

- Set the starter switch to contact position.

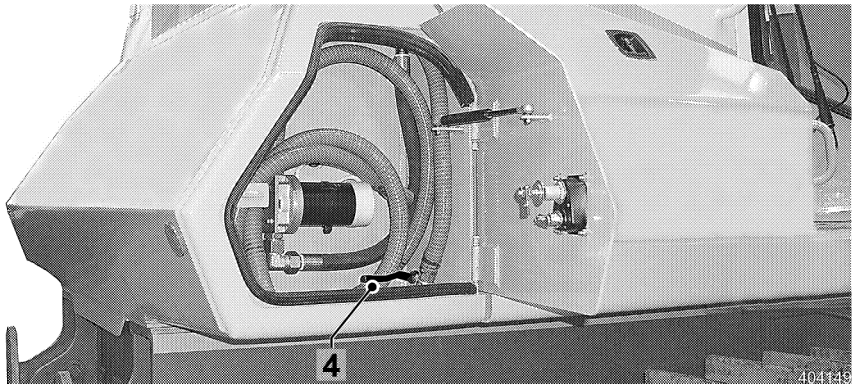


Switch - refueling pump

- Turn on the refueling pump with switch 5, on the right hand side in the roof console.

– When the refueling pump is turned on, the indicator light 6 on the front in the instrument panel lights up.

As soon as the fuel tank is full, the fuel level sensor automatically turns the refueling pump off.
The refueling procedure can be interrupted by turning off the switch 5.



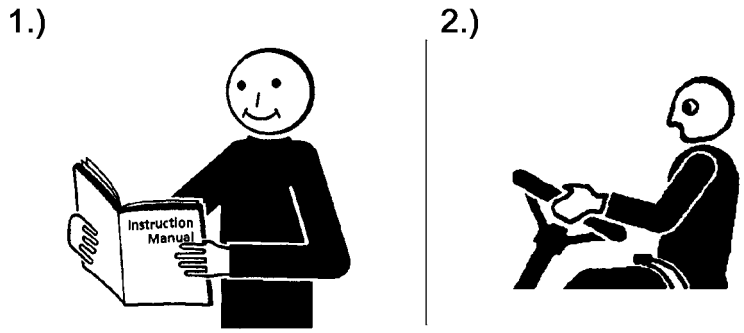
Ball cock

- After the refueling procedure, close the ball cock 4 on the refueling pump.
- Disconnect the suction hose and the refueling hose on the couplings and close off with the blind couplings.

3.3.2 Machine operation in low ambient temperatures

Your machine can be operated without additional special equipment to an ambient temperature of -22°C .
If the ambient temperatures remain constantly below -22°C, then special equipment should be installed to ensure proper operation.
When using the machine below -22°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!

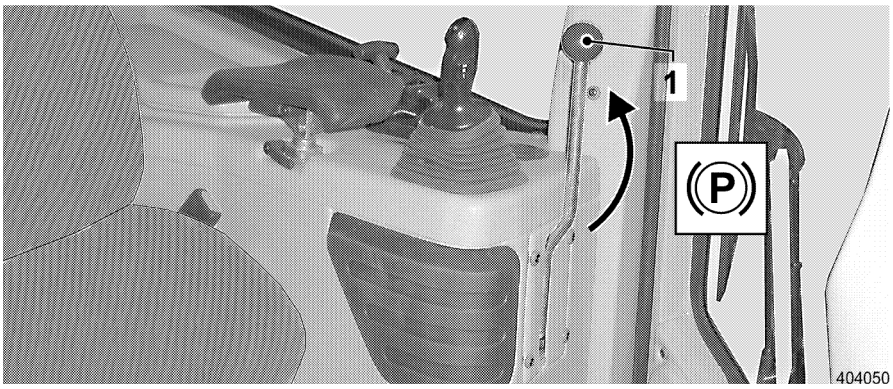
Notes for machine travel drive:
– The machine is equipped with a hydrostatic travel drive.
– The Diesel engine cannot be started by pushing or towing the machine.

Preparations before starting

Before starting the machine, the following preparations must be made.
First 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 up position.
– If the engine can be started with the safety lever in any other position, then this defect must be remedied.

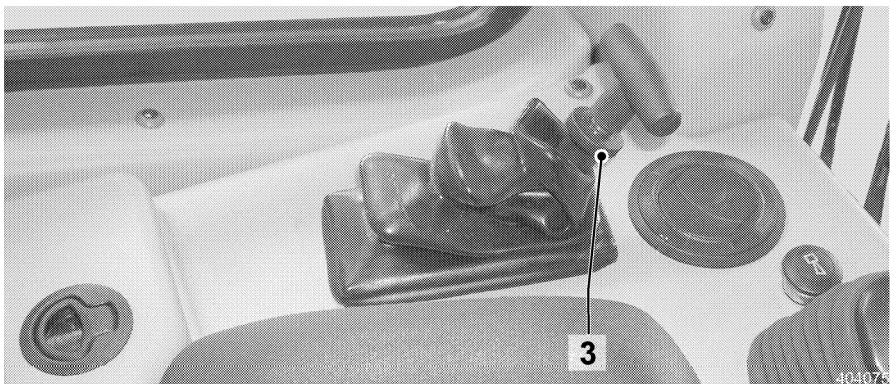


Safety lever up

- Move the safety lever 1 up.

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.

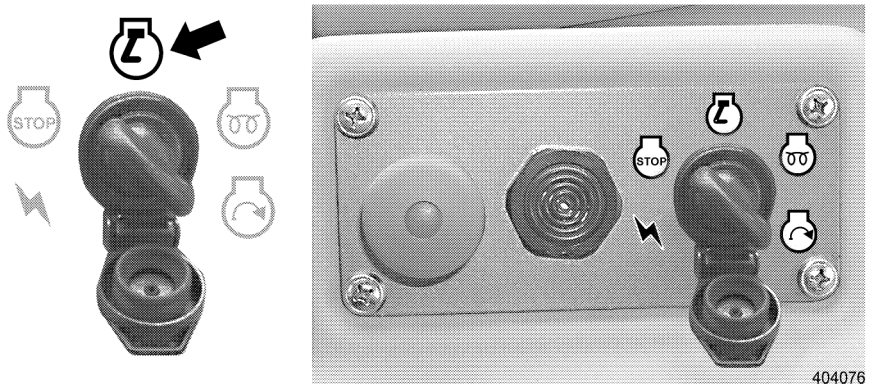
– Push the throttle control lever forward. Lift the knob 3 to move the throttle control lever.

! After the starting procedure, set the throttle control lever immediately to idle and let the Diesel engine warm up before subjecting it to a full load. Do not put a full load on a cold Diesel engine.

Starting procedure

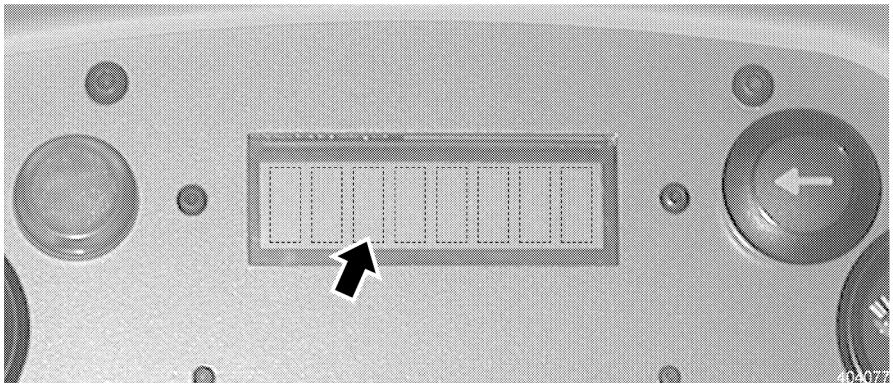
Test - indicator lights

When the starter key is in contact position, the indicator lights, the on board electronic and the control electronic are being tested.



Starter switch – contact position

- Set the starter key to contact position.



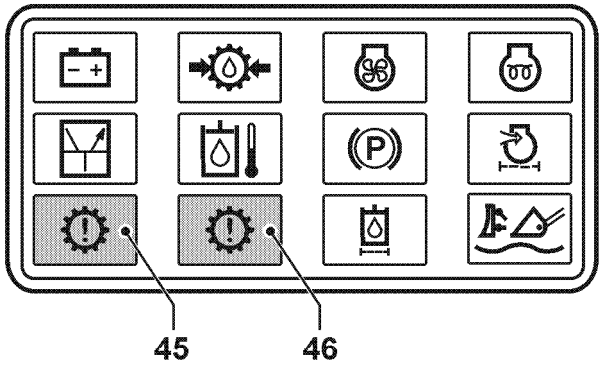
LCD display

LCD display

For the test of the on board electronic, the following initialization messages will appear in the LCD display, in order:
- INIT OK
- RAM OK
- PROM OK
- FRAM OK
- 0 __ 0

Indicator lights

The following indicator lights light up only for a short time (for a duration of 2.5 – 3 seconds).

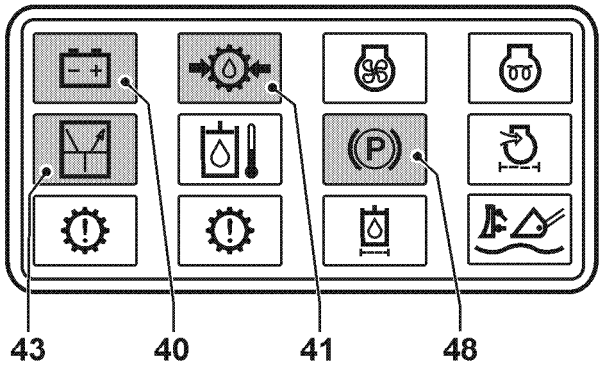


403942

Indicator lights

45 Indicator light - Lifetime seal area left
46 Indicator light - Lifetime seal area right

The following indicator lights must still light up:



403943

Indicator lights

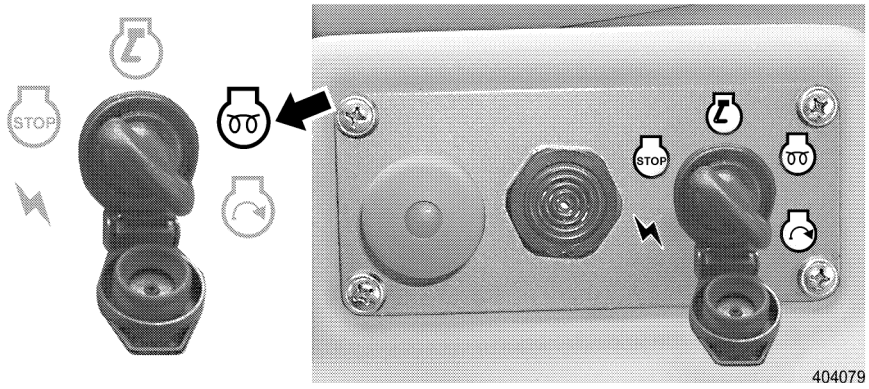
31 Warning light – operator's cab
40 Indicator light – battery charge
41 Indicator light – replenishing oil pressure
43 Indicator light - electronic
48 Indicator light – travel brake

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 at operating temperature!

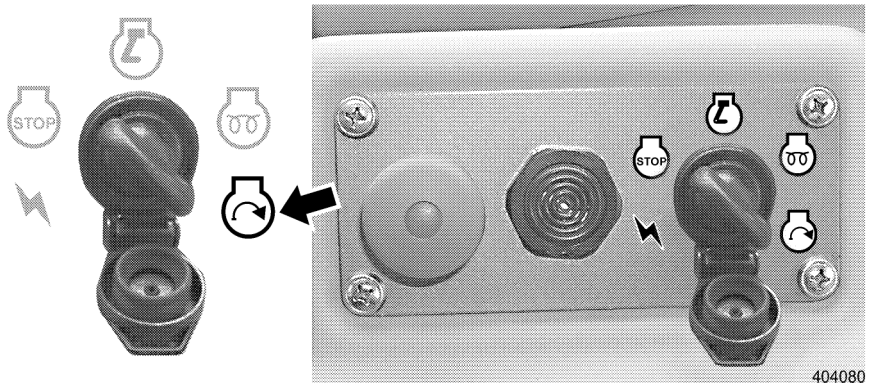


Starter switch – preglow position

Start the engine

- Wait until the indicator light – preglow system turns off. After the indicator light turns off, the preglow time has ended.

– 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:

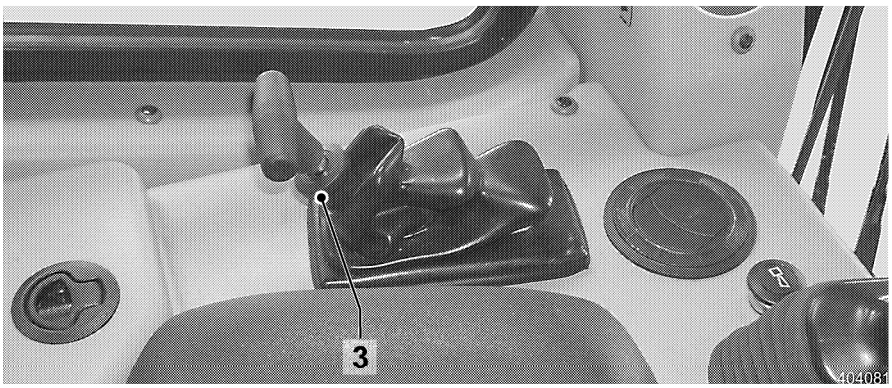
- Return the starter switch to zero position.

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 starter switch returns to the operating position by itself.

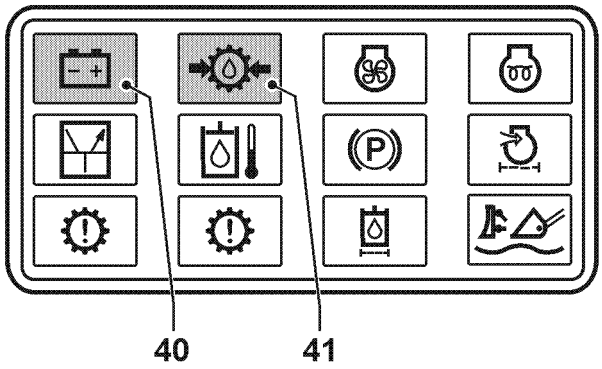


Throttle control lever - low idle

- Set the engine RPM with the throttle control lever to low idle.

– Pull the throttle control lever to the rear.
– Pull the knob 3 to move the throttle control lever.
– Do not put a full load on the engine until it is at operating temperature.

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



Indicator lights turn off

31 Warning light – operator's cab
40 Indicator light – battery charge
41 Indicator light – replenishing oil pressure

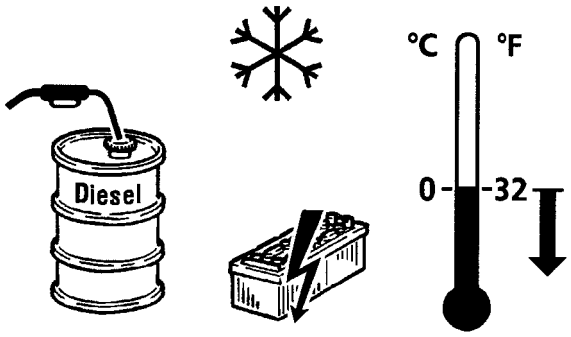
Troubleshooting

The indicator lights do not turn off?

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

Procedures to start the engine at low ambient temperatures

The following procedures improve the starting behavior in low ambient temperatures.



403046

Winter operation

Preparations:
– Check the battery charge, recharge the battery if necessary.
– Use winter fuel. See "Lubricants and service fluids" – Winter operation.

Danger

There is a danger of 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.

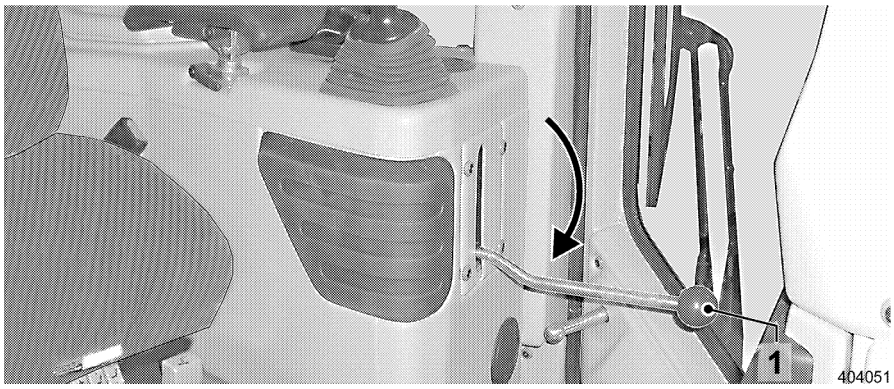
- The listed preparations to start the Diesel engine in low temperatures must be carried out.

! After the starting procedure, move the throttle control lever immediately to low idle and let the Diesel engine warm up before subjecting it to a full engine load. Do not put a full engine load on a cold Diesel engine.

3.3.4 Travel operation

Preparations for travel operation

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



404051

Safety lever down

- Move the safety lever 1 down.

Self check – electronic system

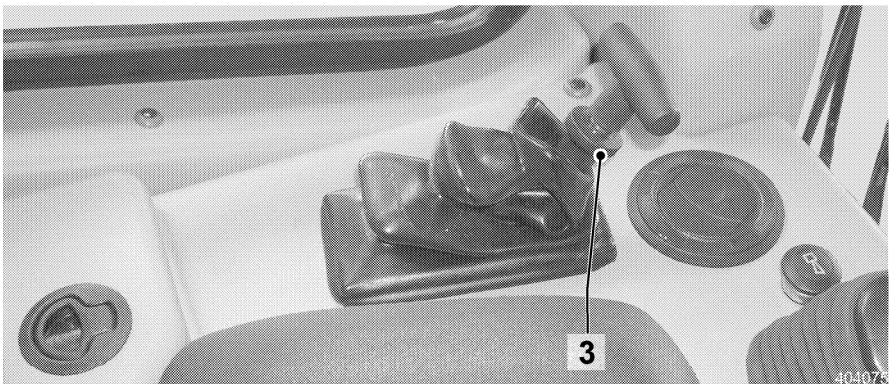
- After approx. 3 seconds, the indicator light - electronic lights up momentarily.

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

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 cylinders to stop.



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.

The machine is now ready to travel.

Preselection of speed ranges

The machine is equipped with a rocker switch in the instrument panel to preselect the travel speed. By changing over to positions "II" or "I", the full travel speed can be reduced. The selected travel speed range is shown in the LCD - display. The speed ranges can also be selected during travel.

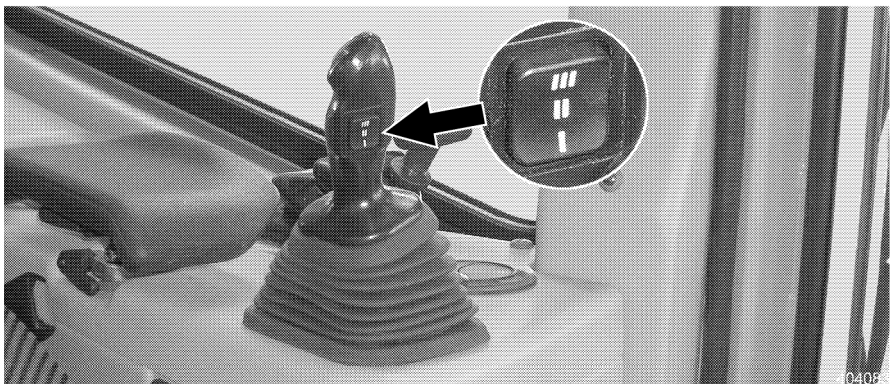
When switching back from the full travel speed range, the machine is hydrostatically slowed down.

404082

Low speed range

Caution

If the machine is constantly used in heavy dozing operation and on slopes, then switch to the low speed range "Position I".



Rocker switch – speed ranges

Selectable speed ranges

Full speed range

- Press the rocker switch on top - Position "III".

– Speed 0 - 11 km/hr.

Medium speed range

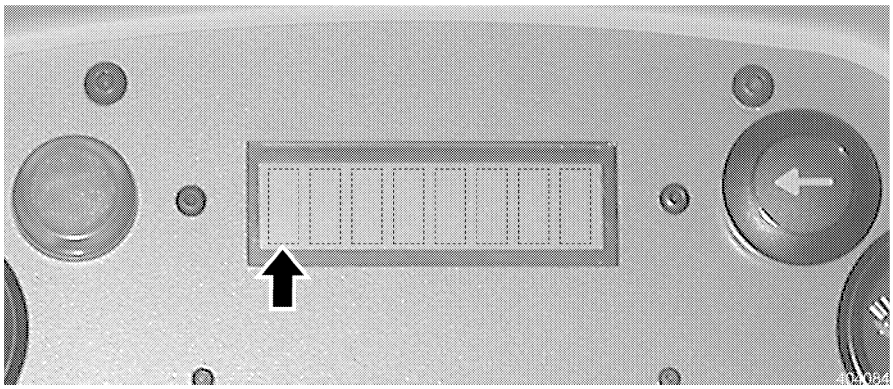
- Rocker switch in center position - Position "II".

– Speed 0 – 7.8 km/hr.

Low speed range

- Press rocker switch on the bottom - Position "I".

– Speed 0 – 4.5 km/hr.



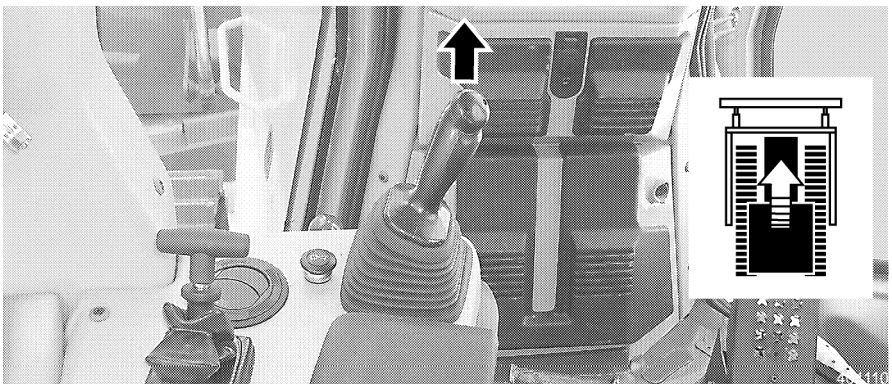
Display – speed ranges

The selected speed range is shown in the LCD - display.

– 3 = full speed range
– 2 = medium speed range
– 1 = low speed range

3.3.5 Travel

Straight travel



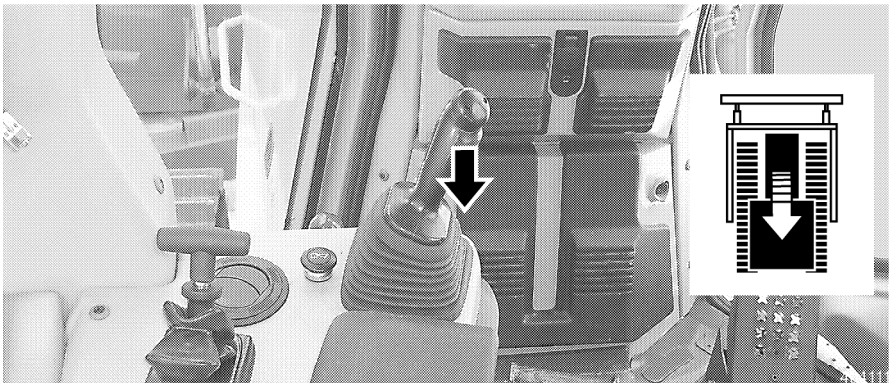
Forward travel

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

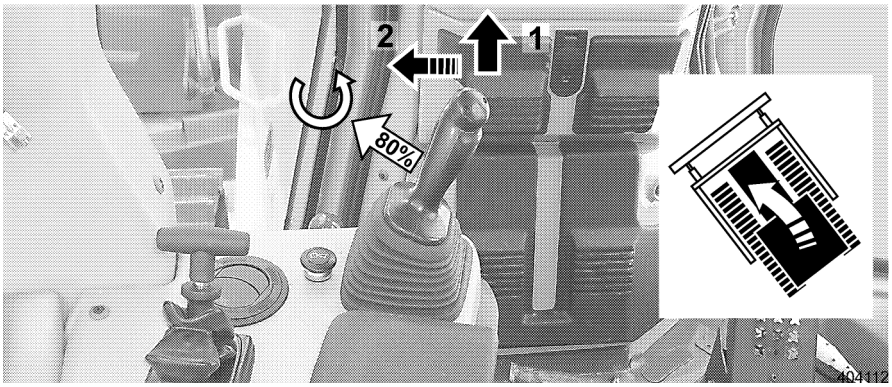
- Slowly pull the travel joystick back.

– 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.



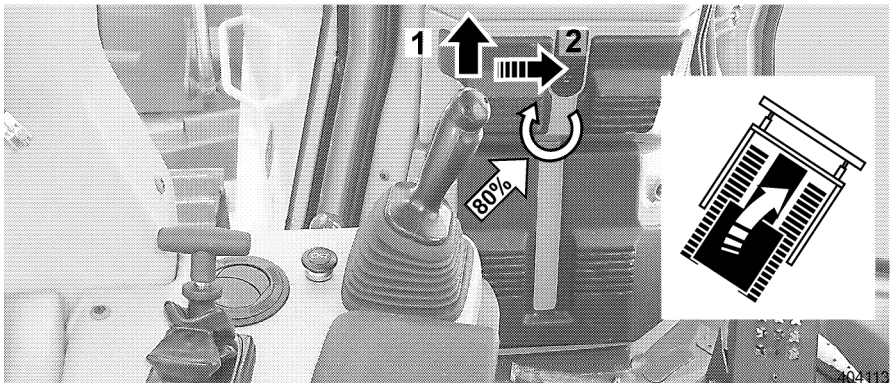
Left hand turn

Left hand turn

- Deflect the travel joystick to the front and push it to the left.

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

The further the travel joystick is pushed to the left, the tighter the curve.
If the joystick is deflected by 80%, the chain in the inside of the curve stops and the outer chain continues to turn at the preselected speed.
From 80 % deflection on, the chain in the inside of the curve turns in opposite direction to the chain on the outside of the curve. The further the travel joystick is deflected, the quicker the chain on the inside of the curve will turn.



Right hand turn

Right hand turn

• Deflect the travel joystick to the front and push it to the right.

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

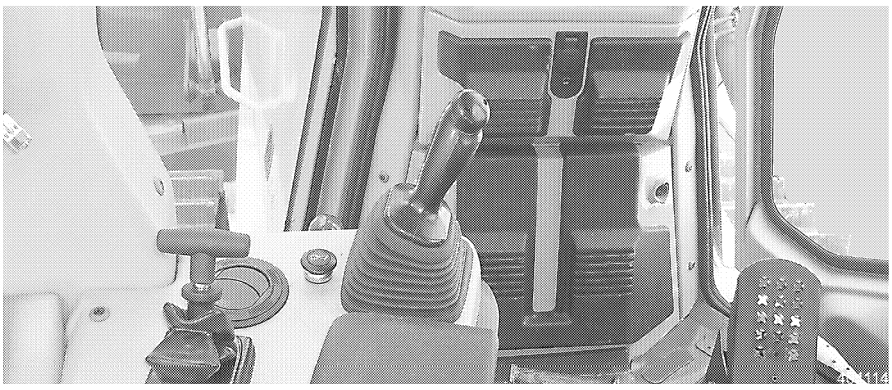
The further the travel joystick is pushed to the right, the tighter the curve.
If the joystick is deflected by 80%, the chain in the inside of the curve stops and the outer chain continues to turn at the preselected speed.
From 80 % deflection on, the chain in the inside of the curve turns in opposite direction to the chain on the outside of the curve. The further the travel joystick is deflected, the quicker the chain on the inside of the curve will turn.

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 too fast will cause the machine to stop suddenly and abruptly.
! Always wear the seatbelt before operating the machine!

Speed reduction pedal (Optional equipment)

Braking with the speed reduction pedal

Press down the speed reduction pedal to reduce the speed set with the travel joystick to a standstill.

Caution

If the speed reduction 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.

Speed reduction pedal

- Press down the speed reduction pedal.

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

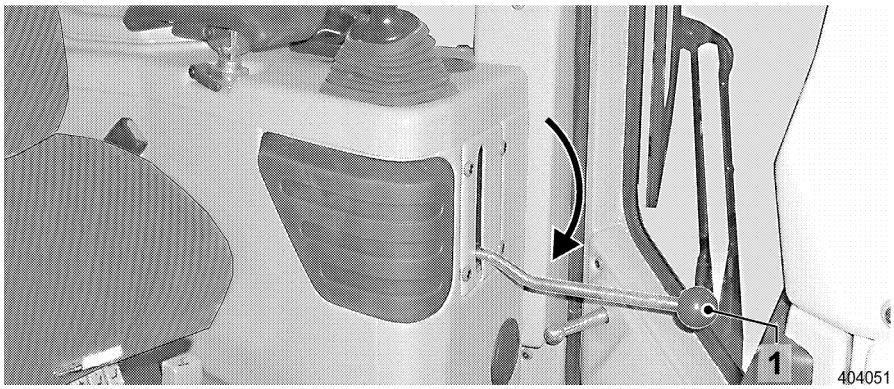
Caution

Danger of accidents due to carelessly slowing down the machine!
If the speed reduction pedal is pushed down all the way, the machine will stop abruptly.
– Always wear the seatbelt before operating the machine.

Parking brake

Activate the parking brake

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



Safety lever down

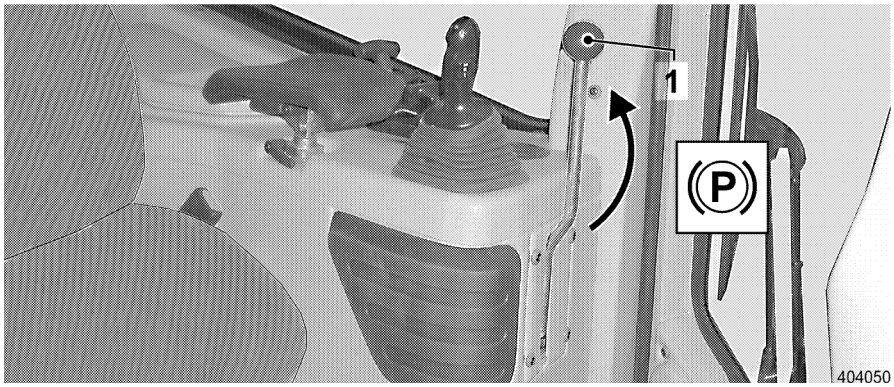
Release the parking brake

When the Diesel engine is running:

- move the safety lever 1 down.
- deflect the travel joystick.

Turn the machine off

When the Diesel engine is turned off, the safety lever 1 must always be in the fully raised (up) position.



Safety lever up

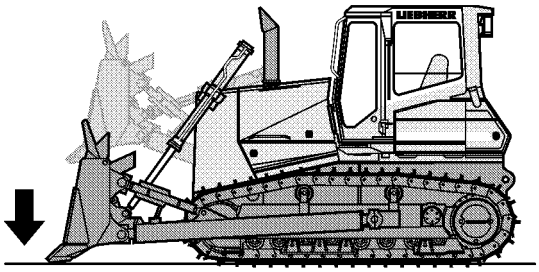
- Move the safety lever 1 up.

If the Diesel engine is inadvertently turned off, bring the travel joystick into neutral position and the safety lever in the fully raised (up) 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

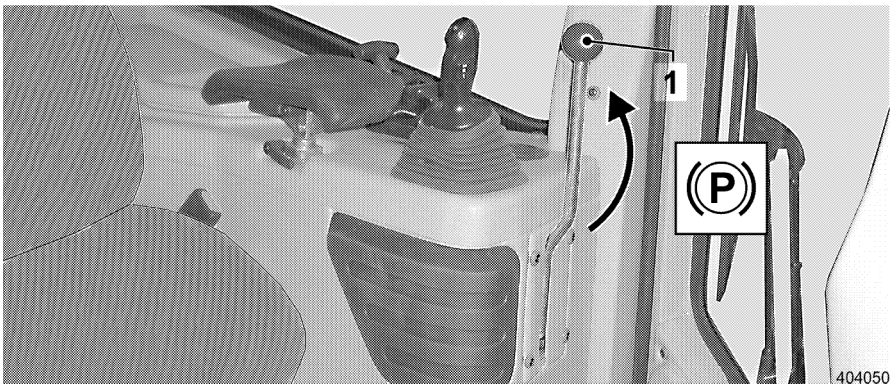


404010

Lower the working attachment

- Lower the working attachment.

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



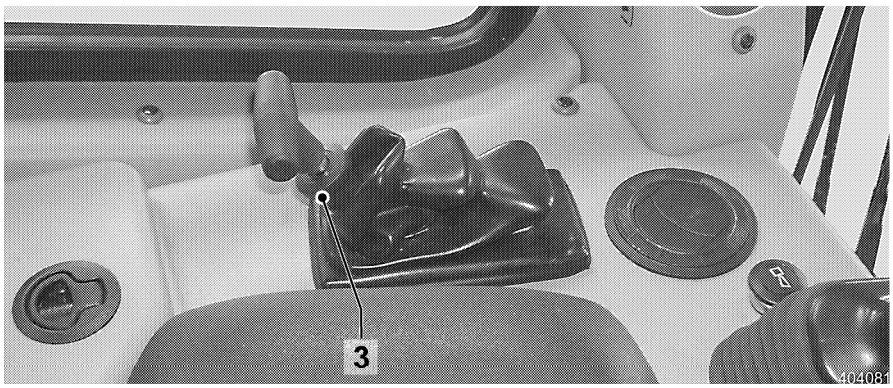
Safety lever up

- Move the safety lever up.

– The indicator light - parking brake lights up.

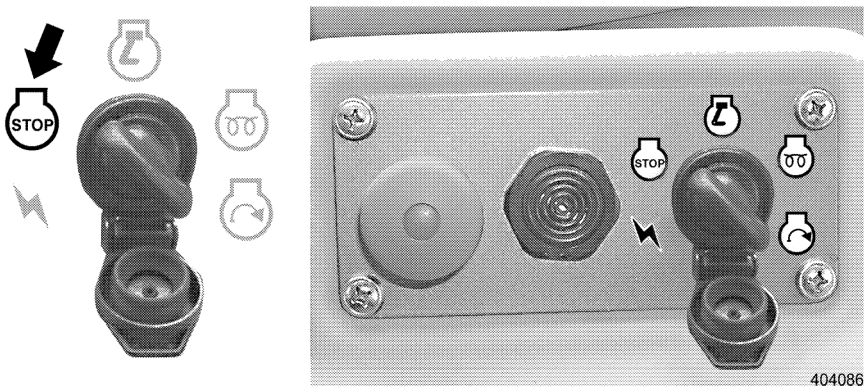
Turn the Diesel engine off

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 floodlights, windshield wipers, ...) before turning off the starter switch.



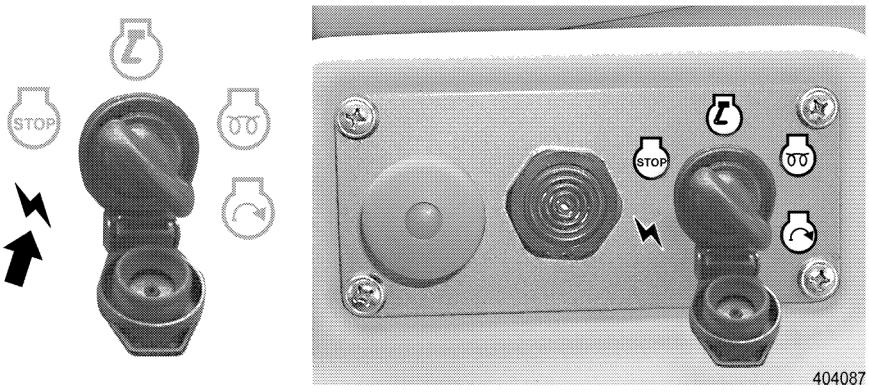
Starter switch - Off position

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

– All indicator lights turn off.
– In the LCD indicator, "SHUTDOWN" will appear for approx. 3 seconds.

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

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 off position and pull it off.

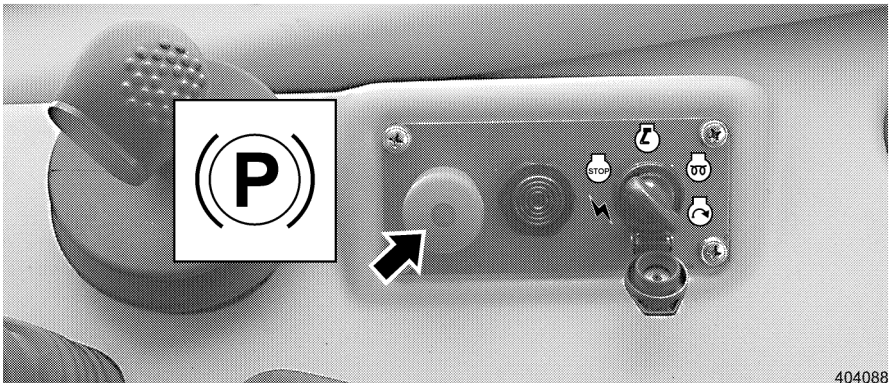
Emergency off button

Caution

An accident can occur if the machine stops suddenly.
The machine stops suddenly.
! Always wear the seatbelt before operating the machine.

Stop the travel drive

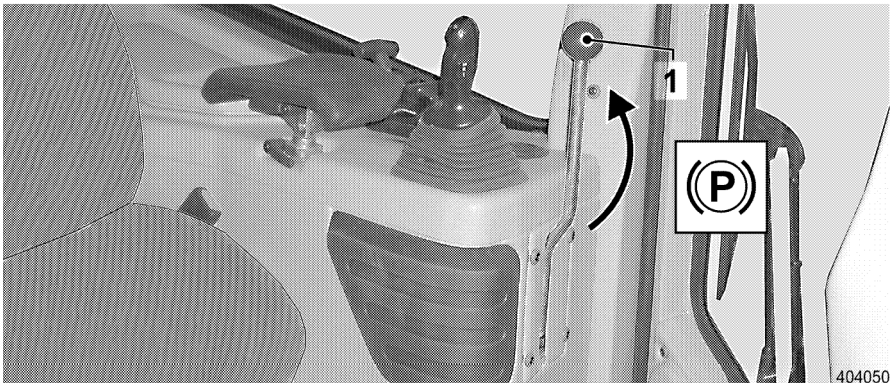
In dangerous or emergencies, the machine can be stopped by pressing the emergency off button.



Emergency off button

- Press the emergency off button

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



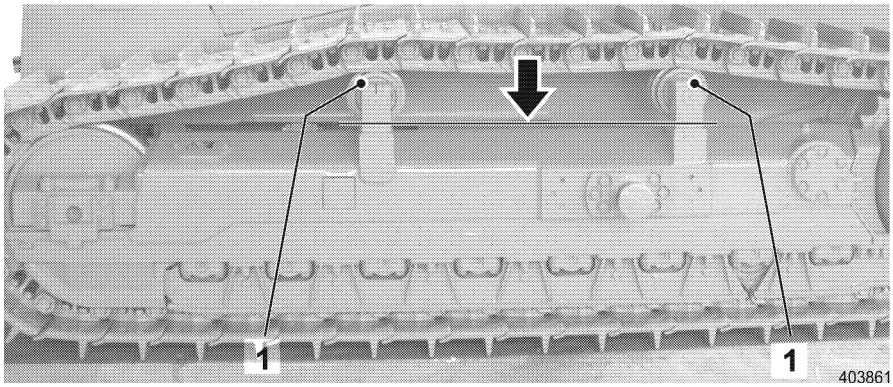
Safety lever up

To continue travel operation

- Move the travel joystick to neutral position.
- Move the safety lever 1 in the fully raised (up) position.

- Lift the emergency off button until it engages.
- Move the safety lever down.
- 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.

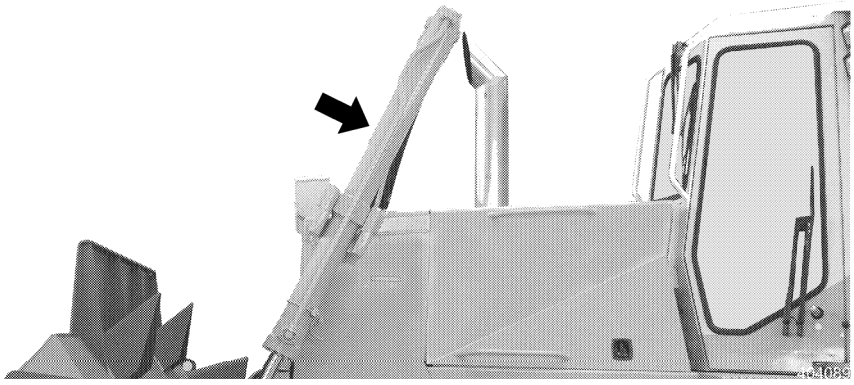
Never exceed the maximum fording depth (lower edge of carrier roller).

3.3.9 Working with the attachment

Danger

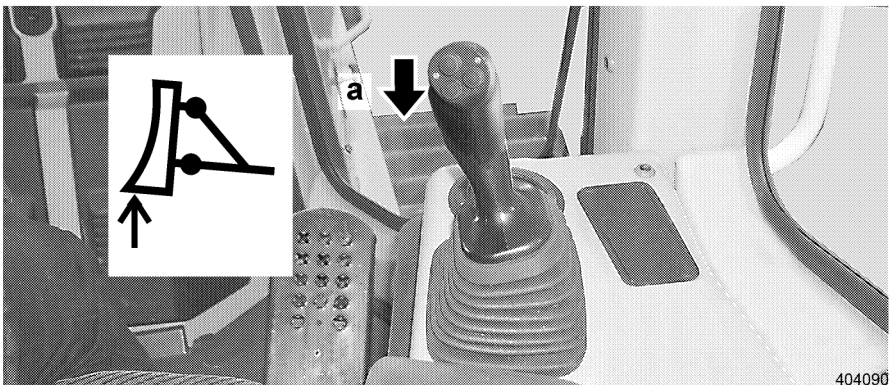
Danger of accidents due to raised attachment.
! Never work under the raised working attachment!
– Always support the working attachment properly from below or place it on the ground.

Actuate the lift cylinders



Lift cylinders

The dozer blade is raised or lowered with the lift cylinders.
Depending on the lever deflection, the dozer blade is brought to the desired working height at different speeds.
When the blade control lever is released, it returns by itself to neutral position. The attachment remains in the adjusted working height.

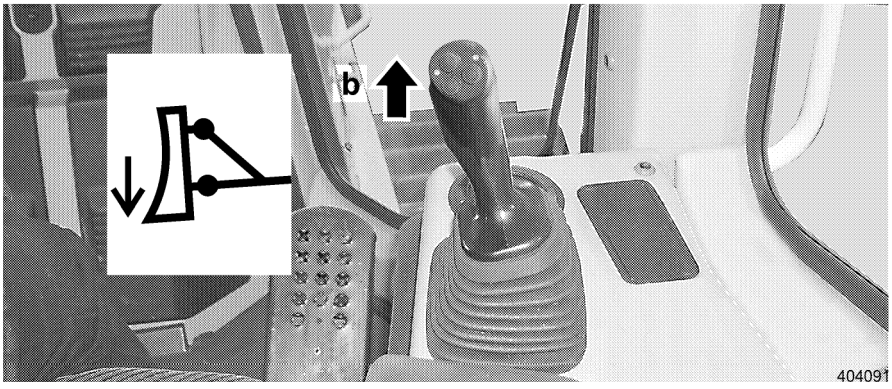


Lift the dozer blade

Lift the dozer blade

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

– The dozer blade is raised.



Lower the dozer blade

Lower the dozer blade

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

– The dozer blade is lowered.

Lower the dozer blade in an emergency

In case of failure of the Diesel engine or the hydraulic, the dozer blade can be lowered by deflecting the blade control lever in direction – b -.
The safety lever must be in the lowest position.

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

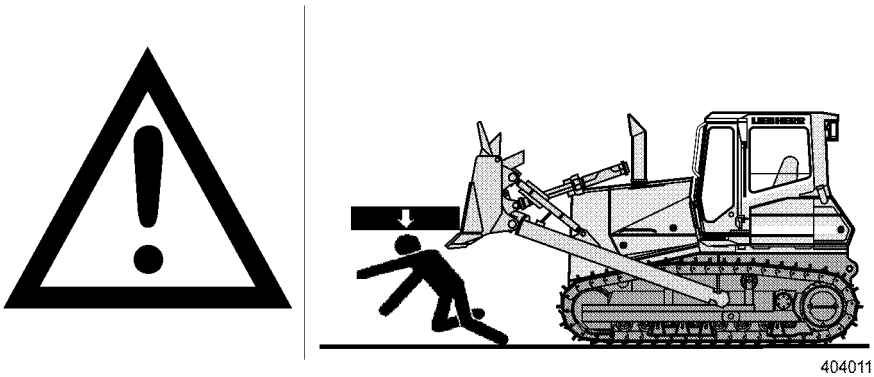
Caution

In dangerous situations, immediately lower the working attachment, then move the safety lever up.

Actuate the float position

The float position makes it possible to place the working attachment with its own weight on the ground and allow it to move freely over unlevel ground.

– Use this function only when driving the machine in reverse, to smooth out the ground.



404011

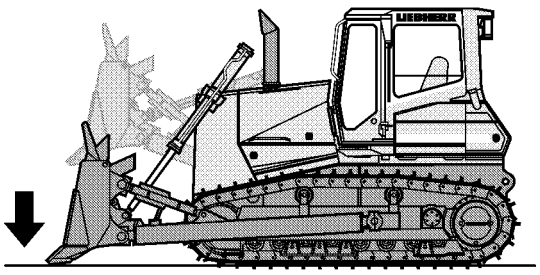
Danger situation

Danger

Danger of accident due to quick dropping attachment!
By activating the float position, the raised attachment drops quickly and cannot be slowed down!
Persons below the raised attachment are crushed!

! It is prohibited for anyone to remain within the danger zone of the machine!

Do not activate the function for the float position when the attachment is raised!

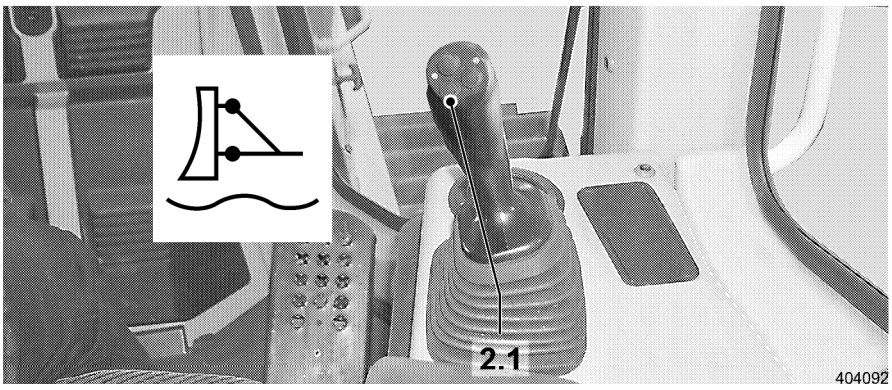


404010

Lower the working attachment

Actuate the float position

- Lower the dozer blade to the ground.



Button – float position

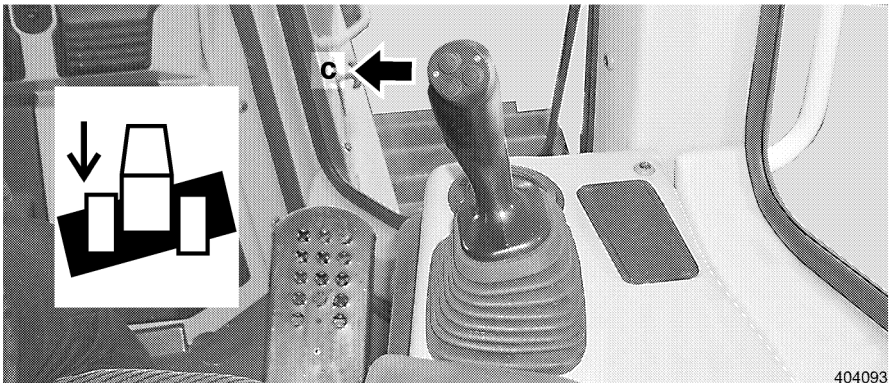
- Press the button 2.1 on the blade control lever and deflect the blade control lever in direction "down".

– The float position function is thereby activated.

By pressing the button again, the float position function is turned off again.

Actuate the tilt cylinder

The dozer blade can be tilted to the left or right with the tilt cylinder.
Depending on the lever deflection, the dozer blade is tilted to the desired side at different speeds.
When the blade control lever is released, it returns by itself to neutral position. The preselected incline of the dozer blade remains.

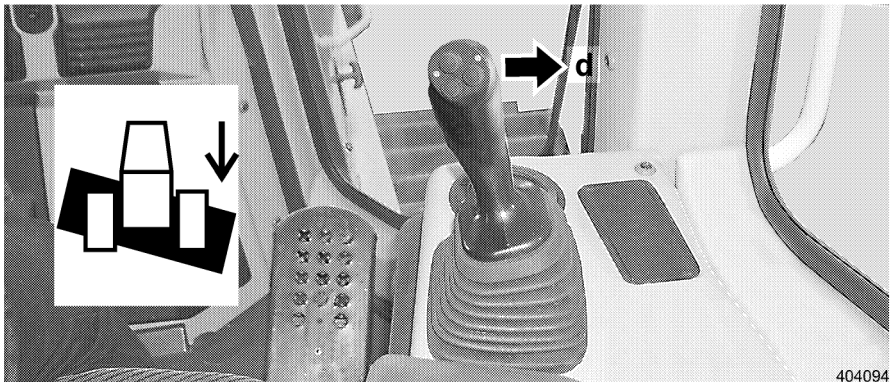


Tilt the dozer blade to the left

Tilt the dozer blade to the left

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

– The dozer blade is tilted to the left.



Tilt the dozer blade to the right

Tilt the dozer blade to the right

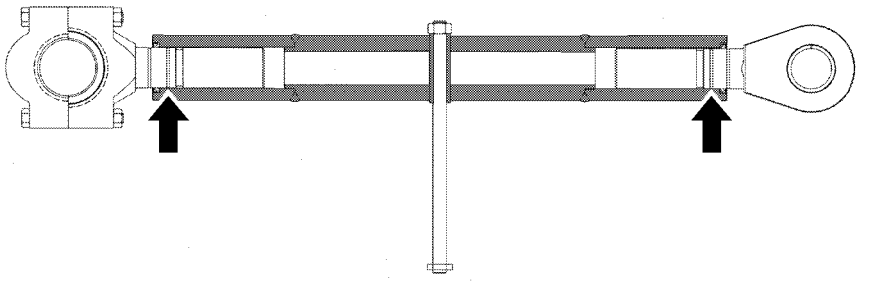
Push the blade control lever to the right in direction - d -.
The dozer blade is tilted to the right.

Cutting angle adjustment - mechanical

The cutting angle of the blade can be matched to the corresponding ground conditions by changing the length of the screw jack.

Caution

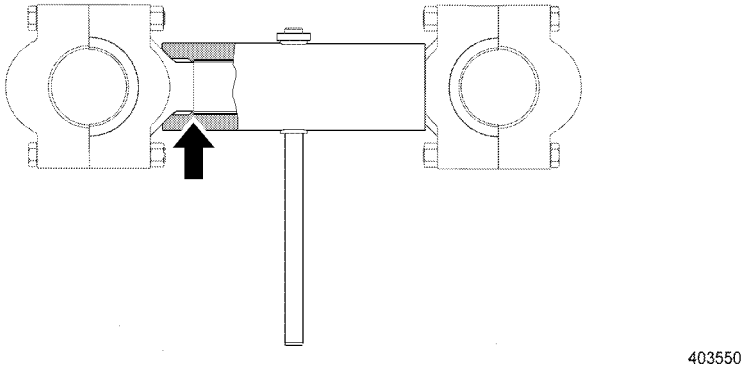
! Danger of damage of the attachment!
The screw jack may not be turned out further than to the max. mark.
– Adjust the screw jack according to the following instructions.



Straight blade screw jack – max. mark

Straight blade

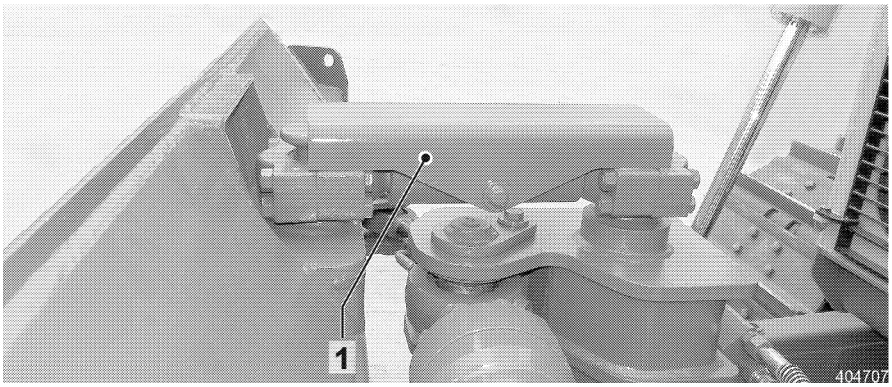
Turn the screw jack out no further than to the point where the inner mark becomes visible.



6-way blade screw jack – max. mark

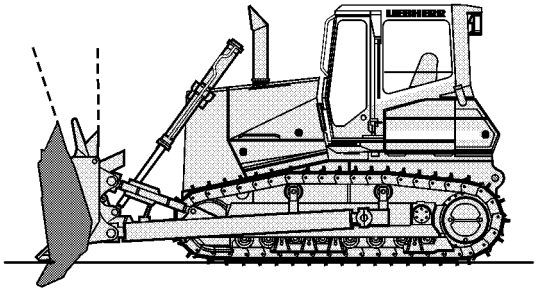
6-way blade

Turn the screw jack out no further than to the point where the start of the threads becomes visible on both screw jacks.



Screw jack 6-way blade

- To change the cutting angle at the 6-way blade, the cover 2 must be removed.
- Remove the spring pin and pull out the adjustment lever.
- Remove the cover and adjust the cutting angle with the adjustment lever as described below.

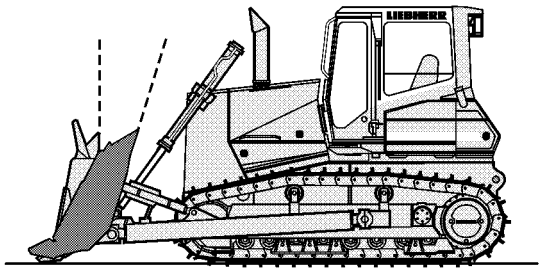


Steep cutting angle

Steep cutting angle

For hard ground, set a steep cutting angle.

- Turn the screw jack in counterclockwise direction until the desired blade incline is reached.



Flat cutting angle

Flat cutting angle

For soft ground, set a flat cutting angle.

- Turn the screw jack in clockwise direction until the desired blade incline is reached.
- After the adjustment procedure, lock the adjustment lever on the push frame.

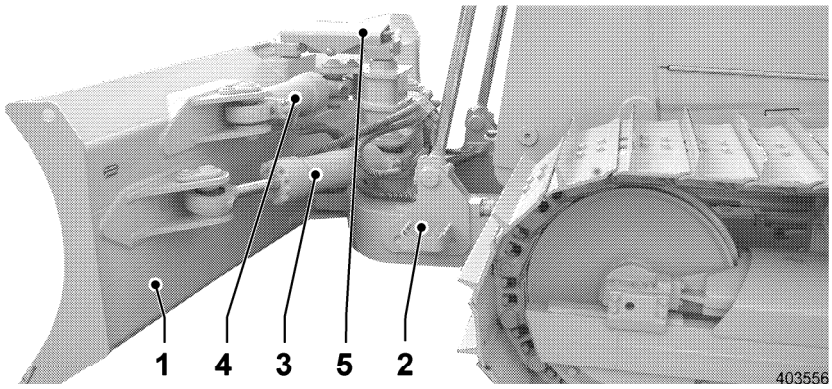
The dozer blade is tilted by changing the blade incline. Align the dozer blade again parallel to the ground with the tilt cylinder.

3.3.10 Working with optional attachments

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

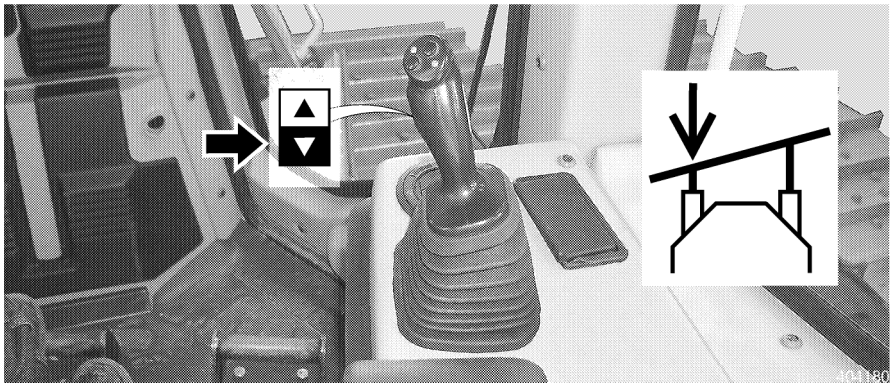
Operation of the 6 - way blade

To angle the 6-way blade, press the button on the blade control lever. To move material to the side, the blade can be moved hydraulically to the left and right by 23°. The blade can be angled even under load.



6 - way blade

1 6 - way blade
2 Push frame
3 Angle cylinder
4 Tilt cylinder
5 Pull rod

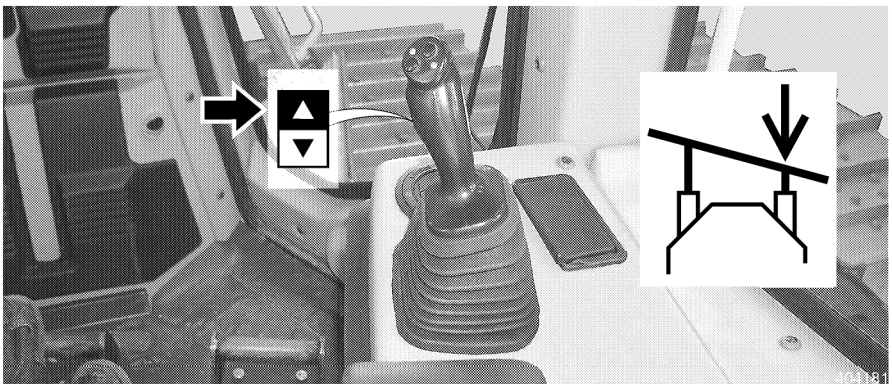


Angle the 6 - way blade to the left

Angle the 6 - way blade to the left

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

– The 6 - way blade is angled to the left.



Angle the 6 - way blade to the right

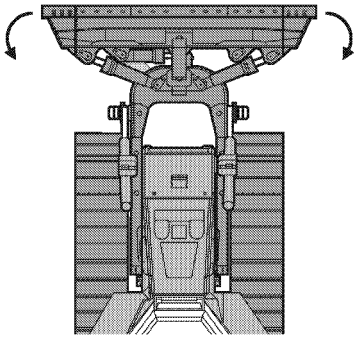
Angle the 6 - way blade to the right

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

– The 6 - way blade is angled to the right.

3.3.11 6 - way blade with fold-in corners

(Option)



404373

Function – Fold-in corners

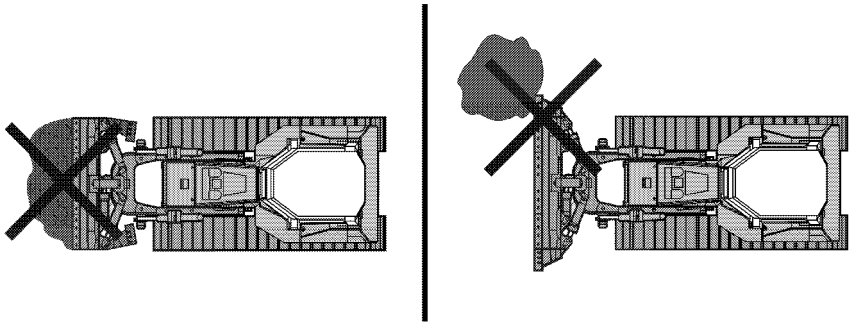
The 6 - way blade is equipped with a folding mechanism, which makes it possible to swing both corners via a swivel joint by 90° to the rear.

Application range

The folding mechanism is suitable:
– to simplify transport of the machine with installed 6 - way blade,
– to slowly drive through narrow passages.

Caution

! The folding mechanism is NOT suited:
– to work with the blade in open condition (corners turned to the rear),
– to carry out work requiring pointed pressure or impact on the outer edges.

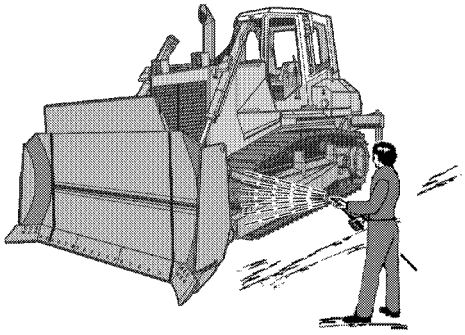


404370

Danger of damage

Caution

! Danger of damage of the attachment!
– Nonobservance of this application requirement could cause damage to the attachment or result in complete operating failure.
– Observe the application recommendations.

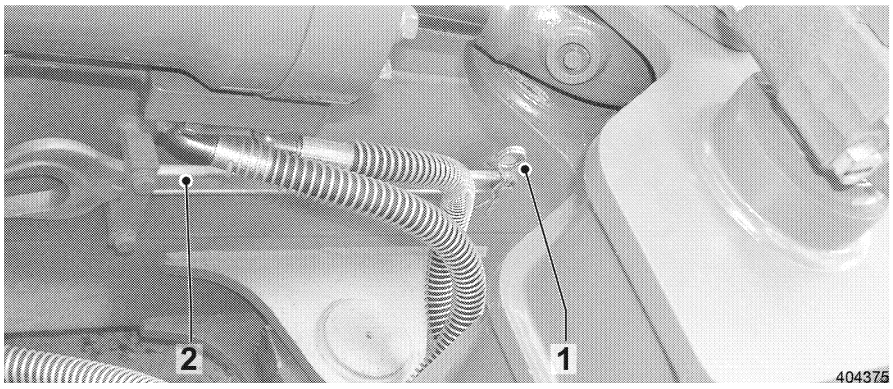


404374

Clean the attachment

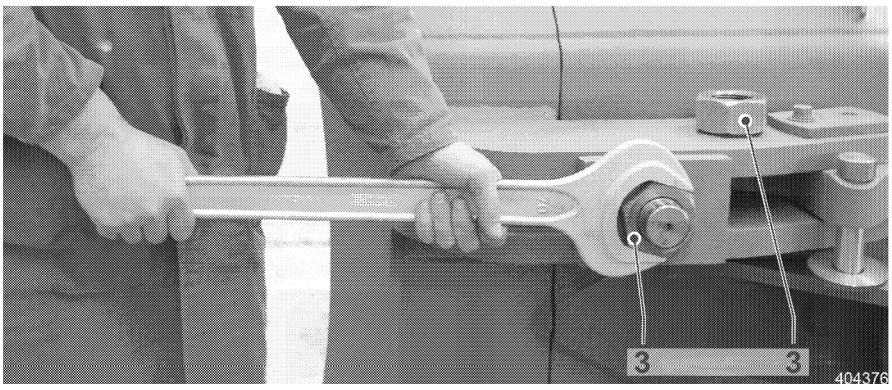
Swing back the blade corners (transport position)

- Clean the blade and the folding mechanism thoroughly.
- Lift the blade approx. 5 cm above the ground.
- Park the machine properly.



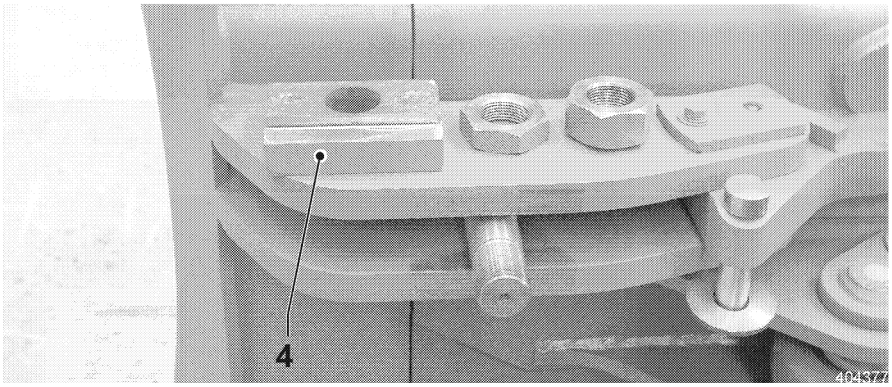
Remove the open-end wrench

- Remove the spring retainer 1 and remove the open-end wrench 2 from the retainer on the back of the blade.



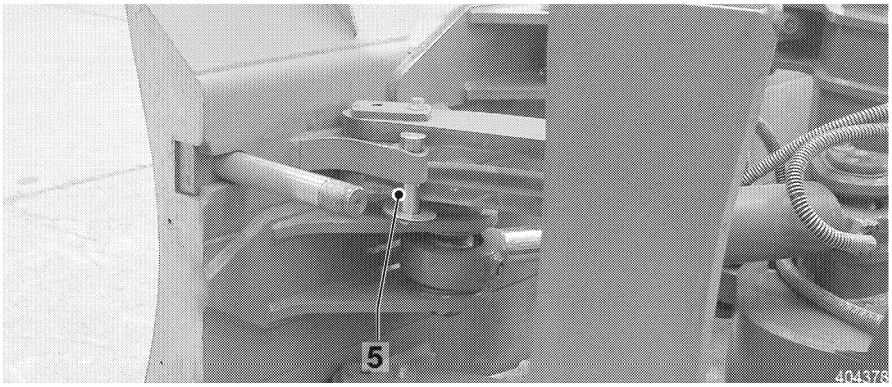
Remove the hex nuts

- Release and remove the hex nuts 3 on the tie rod bolts with the open-end wrench.



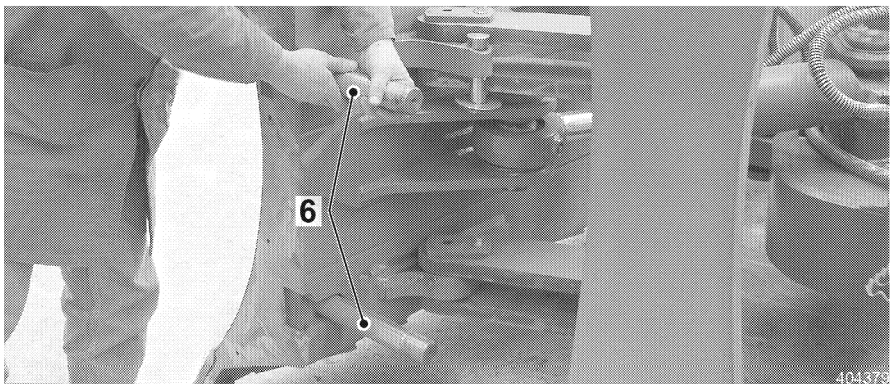
Retaining block

- Remove the retaining block 4.



Install the retaining pin

- Remove the retaining pin 5, swing the blade corner back and reinstall the previously removed retaining pin 5.



Tie rod bolt

- Remove the tie rod bolt 6 from the blade.

– The tie rod bolts must be removed when the blade corners are folded back and properly stored.

- Repeat the folding procedure on the opposite side of the corner of the blade.
- To bring the blade into working position, proceed in reverse order.

! Before starting to work, always check if the blade corners are properly locked.

Caution

! Danger of damage to the attachment and the machine.
– Never turn or tilt the blade if the blade corners are folded back.

Check the folding mechanism

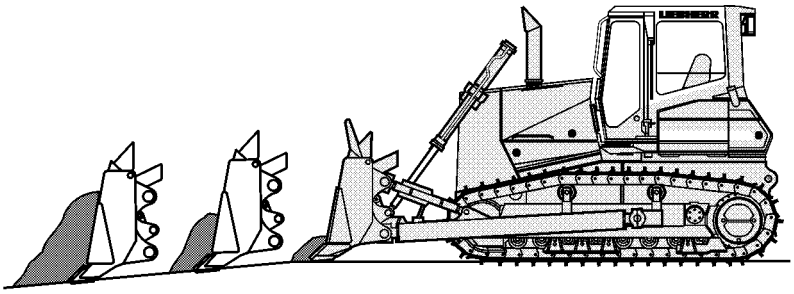
Check the folding mechanism one a week for wear or damage.
– Fix any defects immediately.

3.4 General operating methods

Routine operating methods are described in this section.

3.4.1 Dozing

To doze and push material, various methods can be selected, depending on the ground conditions.

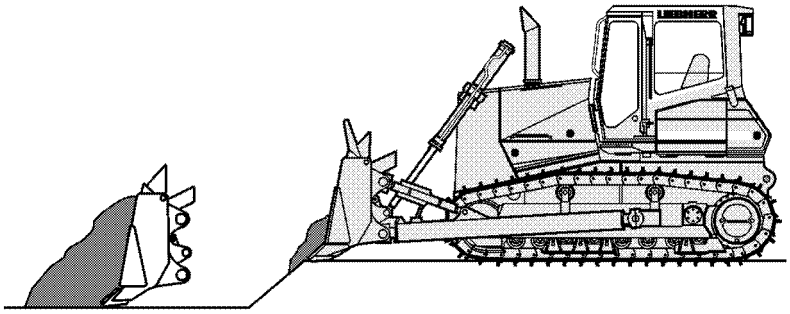


403865

Increasing blade volume

Increasing blade volume

To increase blade volume, material is added over the total dozing distance.
This method is normally used successfully when working with heavy, dense ground.



403866

To doze with a full blade

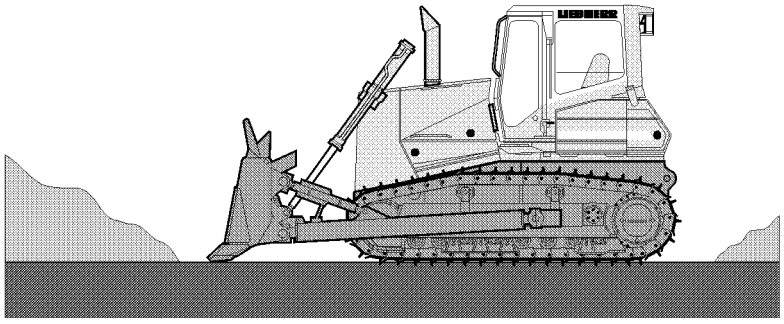
To doze with a full blade

This method is used when working with loose ground, resulting in maximum output while retaining the dozing track.

- The dozer blade is filled at the start of the pushing distance.

– If you feel the chain is starting to slip, lift the blade slightly.

3.4.2 Fine grading



403867

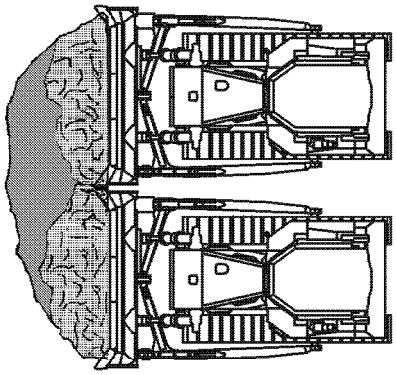
Initial surface for fine grading

Initial surface

To establish a fine grade, start out with an even platform, which should be at least as long as the tracks of the machine, and at the same level as the desired surface.
Starting from this initial surface, the necessary material can be added for the desired fine grade.
To remove the machine tracks, use the blade float position to regrade.

– For fine grading, straight blade corners for the attachment are available.

3.4.3 Operating several machines



403868

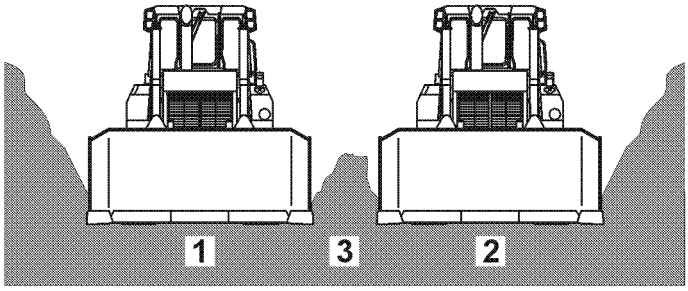
Parallel operation of two machines

Parallel operation

If two crawler dozers are used simultaneously to doze larger quantities of loose material, we recommend to run them in parallel operation.

- Guide the machines side by side, with the dozer blades as close to each other as possible.

– This technique significantly increases the total output.



403869

Dozing in a path

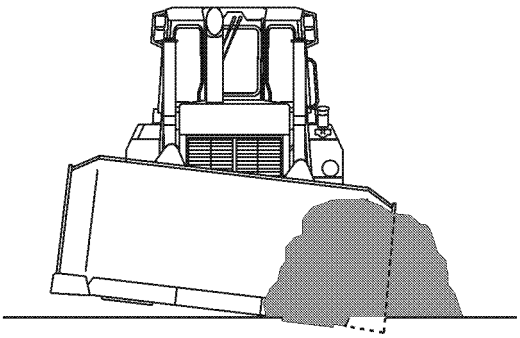
Dozing in a path

This method is predominantly used for transporting large volume of material over a long distance.

- To start a path, push the first blade volume about 10 - 20 m along the preset path. Move the dozer back, fill the blade again and push it to the end of the path, together with the material, which was already moved during the first run.

– By using this procedure, little material will fall from the blade to the side and blade volume will be significantly increased per operation.

3.4.4 Establishing or cutting trenches



403870

Pulling a trench

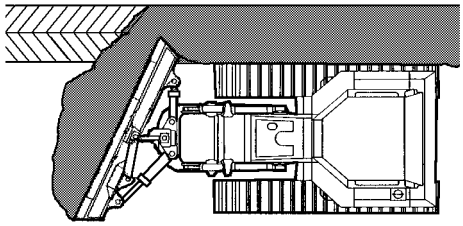
Pulling a trench

- To establish a trench, fully tilt the blade in the desired direction. See: "Working with the attachment".
- Set the lowered blade edge into the ground along the center of the trench and cut direction of the trench.

Continue this procedure until the required depth and angle are reached.

- Set the blade horizontal and clean up the edges of the trench.

Deep trenches are usually dug vertically to the trench line after the initial cut.



403012

Back filling a trench

Back filling a trench

Depending on the blade attachment, different methods can be used:

- With a straight blade attachment, fill the material at an angle to the trench direction.

For a more efficient way, use a tilt angle blade attachment.

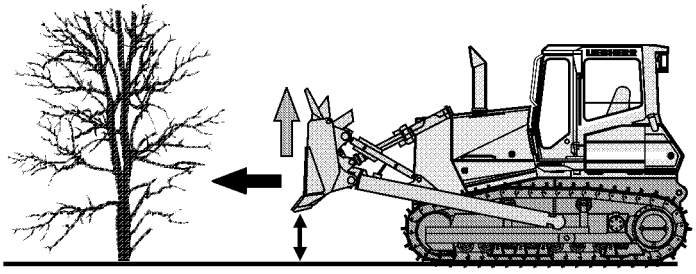
- Set the blade at an angle to the trench an fill the trench by moving along in direction of the trench.

When using a 6- way blade attachment, both methods described above can be used to full advantage, when pulling a trench as well as when back filling a trench.

3.4.5 Land clearing operation

Removing hedges to medium sized trees

- Pull hedges from the ground by pushing them with the blade approx. 5 to 10 cm (2 to 5 inches) from the ground level and moving forward.
- Slightly lift the blade to allow the soil to fall from the roots.

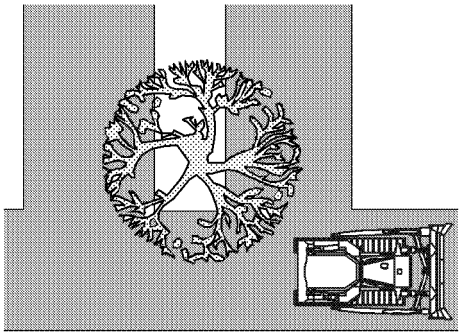


403874

Push tree over

High hedges and medium sized trees

- Hold the blade at a height of approx. 30-40 cm (12 to 16 inches) and push over. Continue to raise the blade while moving forward.



403875

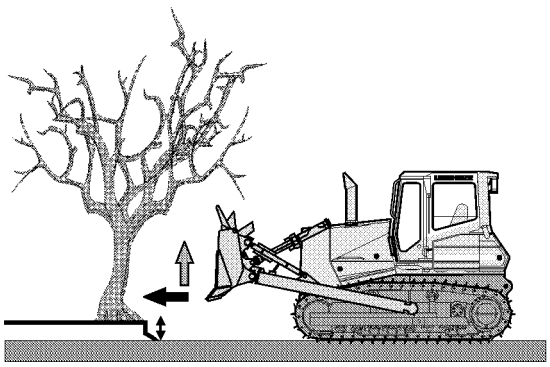
Cut the roots

Felling trees

- Clean the surrounding area.
- Cut the tree roots opposite and parallel to the desired drop direction with the blade.

Caution

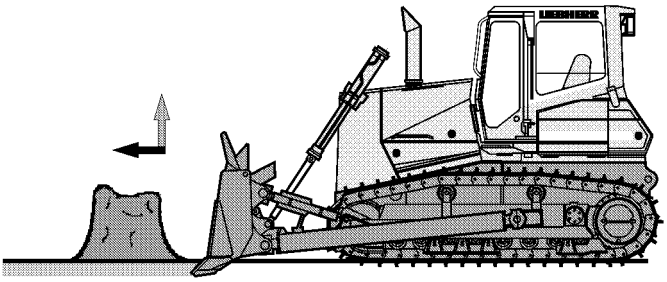
Danger of accidents due to falling trees.
! As soon as the tree starts to fall, move back immediately!
! Do not move on top of the root system of the falling tree.



403871

Felling tree

- Slowly move forward in the direction you want the tree to fall, with the blade raised.



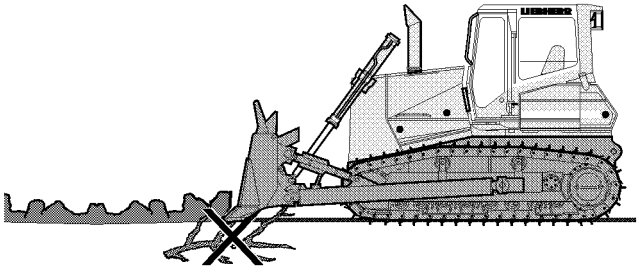
403876

Remove the tree stump

Remove tree stumps

- Move towards the tree stump with the blade below ground level and rip it from the ground by moving forward, while slowly raising the blade at the same time.

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



403877

Covering removed material

Covering removed material

- Bury removed material as far as possible below ground level.

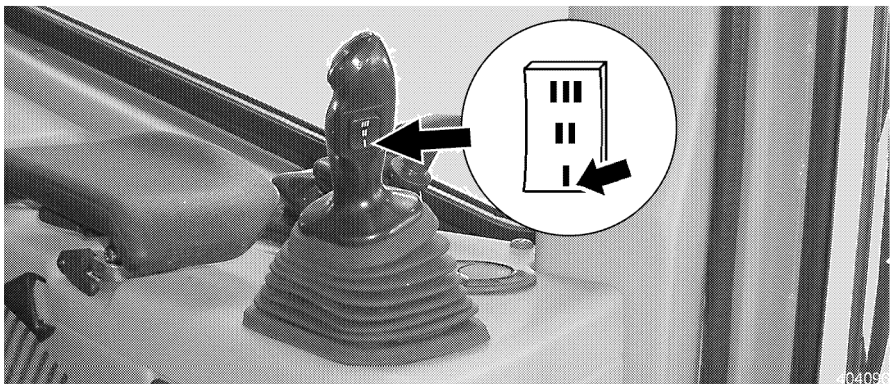
If branches and roots are too close to the surface, any parts sticking out can be ripped to the surface again when grading.

Working area

The following applies:
Generally, the working area should be established as even as possible for efficiency and ease of machine operation.

3.4.6 Ripper operation

Use the ripper attachment only while moving in low speed range.

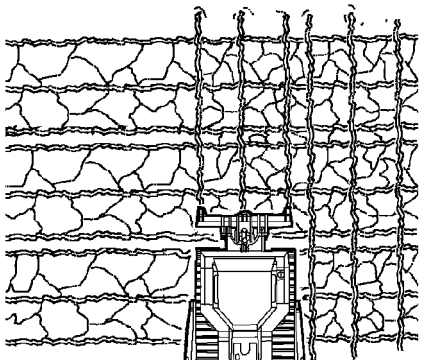


Turn on low speed range

- Move the rocker switch to position "I", low speed range.

– The selected speed range is shown in the LCD display.

For multi-tooth rippers, it is most often more advantageous to install more ripper teeth than to increase the travel speed.
For difficult to rip material or material which breaks up into large pieces, use only a single tooth ripper.
For easy to rip material and material which breaks up into small pieces, use a multi-tooth ripper with two or three teeth.
During ripper operation, make sure that both track chains make full ground contact at all times. If necessary, prepare the terrain in advance.
Generally, the ground should be ripped as deep as possible. If the ground is stratified (built up in layers), it is preferable to rip the ground in layers. In that case, it might be necessary to rip the same path several times to obtain the desired depth.
The ripping distance depends on the desired size of the ground material.



403018

Crosswise ripping

In some cases, it might be necessary to rip crosswise.
When working on a slope, always rip moving downhill.

Caution

Do not turn the machine or move in reverse when the ripper attachment is still in the ground.
! Due to high rotational stress, the teeth could be damaged.

- Check the ripper teeth often for wear and damage.

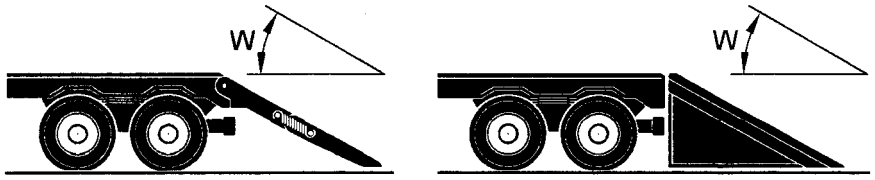
3.4.7 Transporting the machine

Transporting the machine by truck or rail.

Before driving onto the loading surface

Before driving onto the loading surface, proceed as follows.

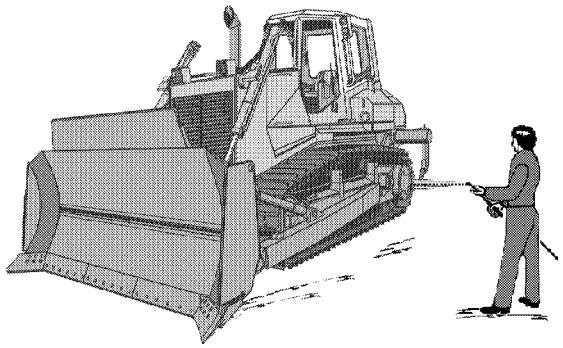
If necessary, remove part of the machine attachment for transport.
– Have suitable tension cables or chains available for rigging.



403048

Ramp incline

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



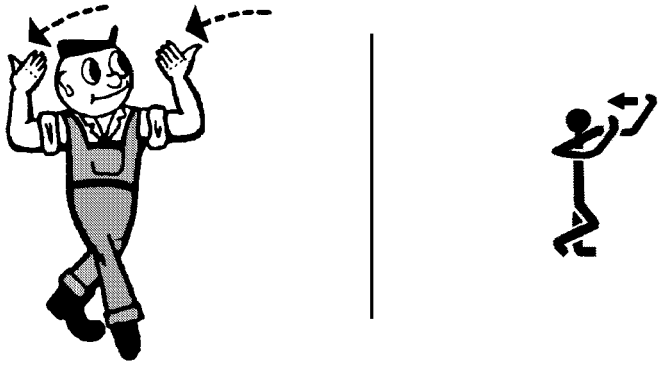
404138

Wet cleaning

Remove all ice or mud from the tracks before driving onto the ramp.

Driving onto the loading surface

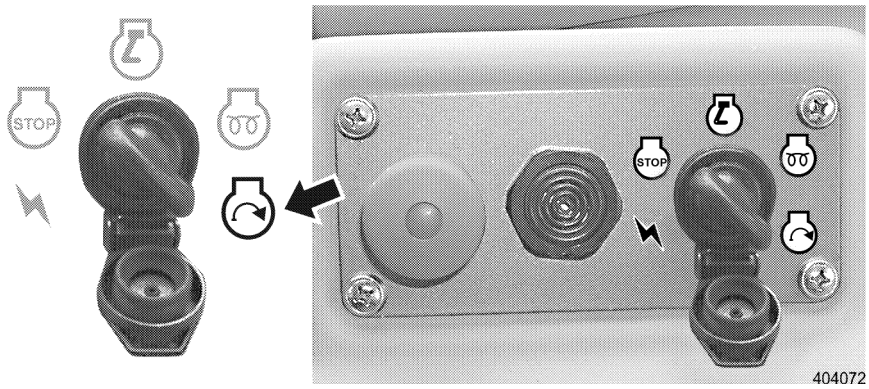
For detailed description, see "Control, operation". Have another person guide you when driving onto the loading surface!
Make sure that a guide is available to signal the machine driver.



403050

Guide

Any person, which functions as guide must be positioned to the side of the machine!

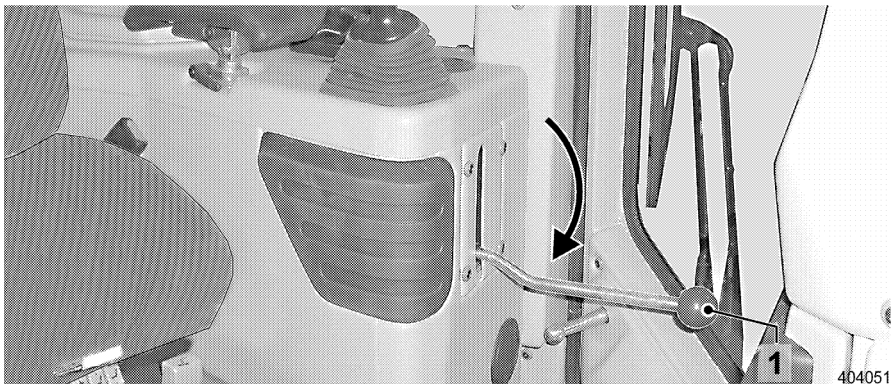


404072

Start the Diesel engine

- Start the Diesel engine.

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



404051

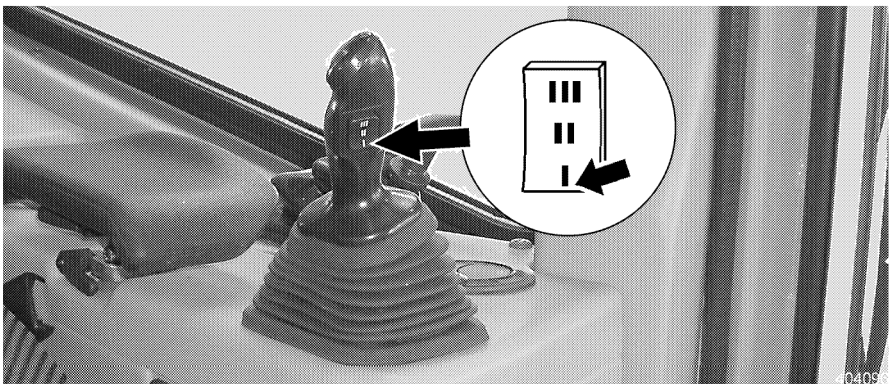
Safety lever down

- Move the safety lever 1 down.

Danger

Danger of accidents due to careless driving!
Careless driving can endanger the loading personnel, the guide as well as the driver of the machine.
! Always drive carefully when loading the machine!

Drive up the ramp only in low speed range, position "I" !



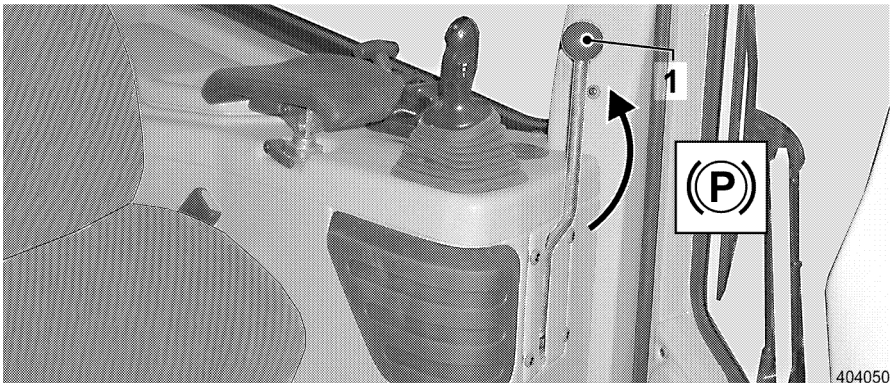
Low speed range

- Select low speed range: Set the rocker switch to position "I".
- Start driving the machine carefully.

For detailed description, see "Control, operation".

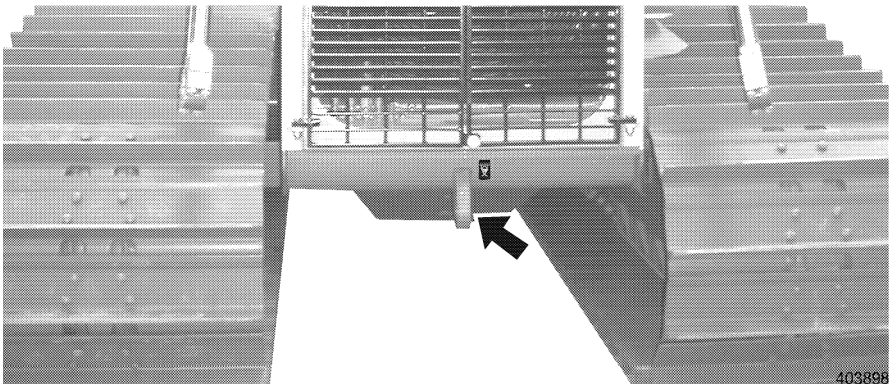
After driving onto the loading surface

- Stop the machine.
- Lower the attachment and set down the attachment level with the loading surface.

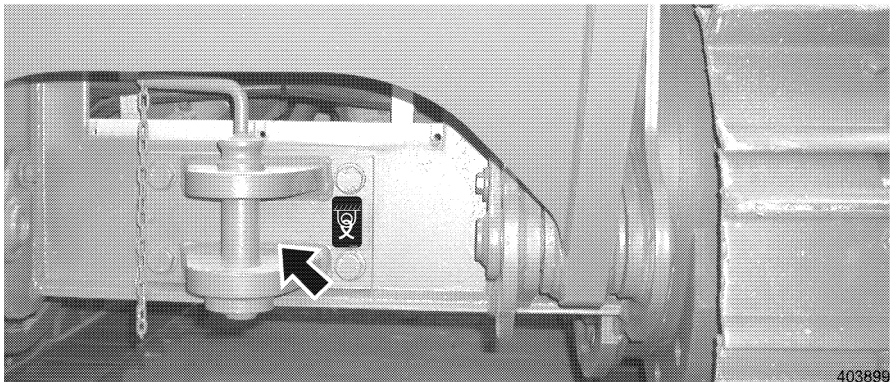


Safety lever up

- Then move the safety lever 1 up.
- Turn the Diesel engine off.
- Close and lock all doors and covers on the machine.



Rigging point - front



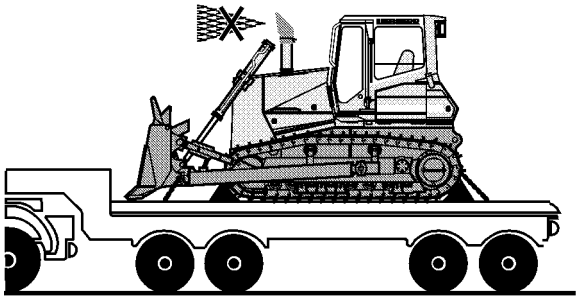
Rigging point - rear

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

If the machine is positioned against the transport direction for transport, then the wind can enter through the exhaust opening of the smoke stack.
The wind can turn the turbocharger of the Diesel engine.
To prevent damage to the turbocharger, proceed as follows.
This is especially important for rail transport, because the travel direction is not known in advance!

Caution

Danger of damage to the turbocharger due to external influences!
Air infiltration through the smoke stack can cause to turbocharger of the Diesel engine to turn.
If the engine is not running, the turbocharger is not lubricated.
Without lubrication, the turbocharger will be damaged.
! Prevent air infiltration into the smoke stack!



Cover the smoke stack

- To cover the smoke stack, always step on the machine only via the step and select a secure standing position.
- Cover the smoke stack opening with wind proof and slip resistant material.

3.4.8 Loading the machine with a crane

For any loading procedure, make sure to observe all applicable accident prevention guidelines!
See "Safety guidelines when loading the machine with the crane".
Before loading the machine with the crane, the following preparations must be made.
Preparations:
– Bring all control levers into neutral position.
– Move the safety lever up.
– Turn the Diesel engine off.
– Close and lock all doors and covers 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 cables.

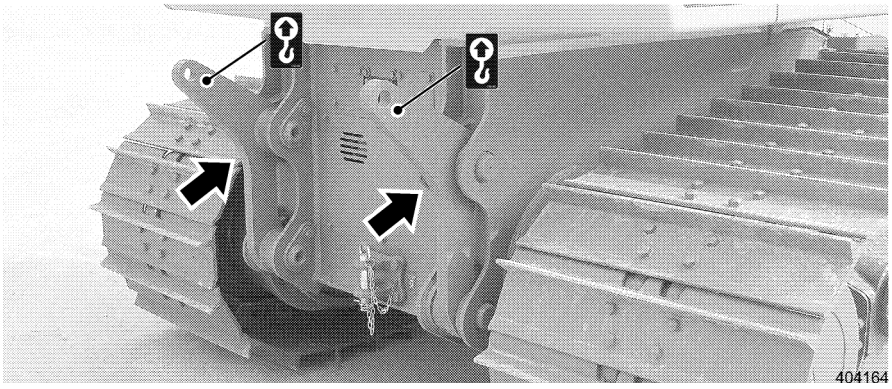
Danger

Danger of accidents due to suspended / falling load!
! It is not permitted for any person or persons to be under the raised machine.

Machine without rear attachment

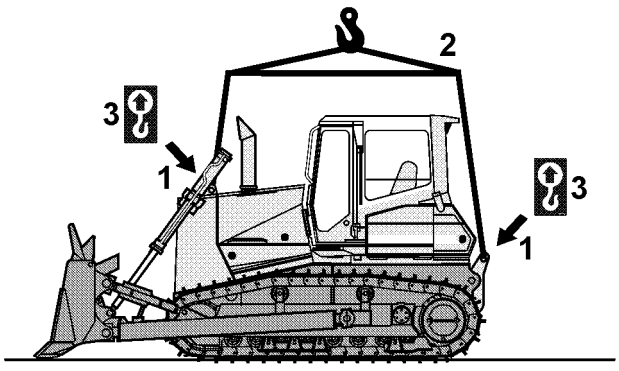
For loading with a crane, the following equipment is required:

– Crane hooks, rear: Available as additional equipment. Liebherr Id. No.: PR 724 - 9184508, PR734 - 9183433.
– Tackle device / bar 2
The machine is equipped with lifting hooks on the front side, as standard equipment.



Crane hooks, rear

• Install the crane hooks on the rear

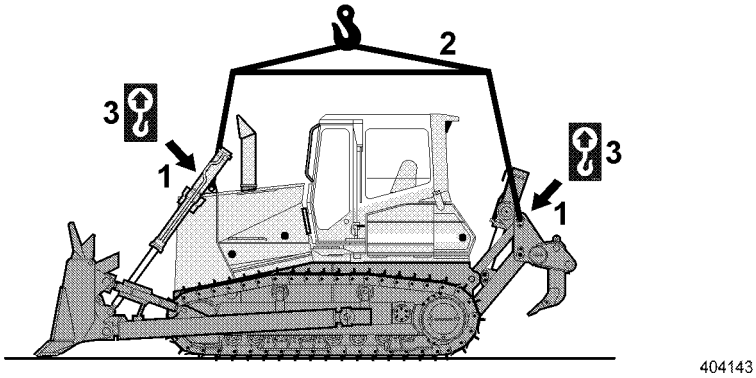


Location - lifting points

- Attach the tackle 2 on the intended lifting points 1 on the machine.
  – The lifting point locations are marked with decals 3.
- Carefully lift the machine and load.

Machine with rear attachment

For loading with a crane, the following equipment is required:
– Tackle device / bar 2
The machine is equipped with lifting hooks on the front side, as standard equipment.
If your machine is equipped with a rear attachment (ripper, ballast weight, ...), then eyehooks are installed on the attachment to lift the machine.
These eyehooks are marked with decal 3.



Location - lifting points

- Before loading with a crane, raise the rear attachment (only ripper).
- Attach the tackle to the intended tackle and lifting points on the machine.
- Carefully lift the machine 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 up.
– 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

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

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 problematic, it is always the responsibility of the operator.
Damage or accidents, which occur when towing the machine, 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 can cause severe injuries or death!
! Before releasing the brakes for towing, make sure the machine is secured to prevent it from rolling off!

- Observe all safety guidelines and the following recommendations when towing the machine.

– Keep the angle of the towing cable in relation to the machine to a minimum. The angle should never exceed 30° from the machine length axle.
– Start or move the machine out slowly and evenly. Uneven movements of the machine can overload or snap the towing cable or the rod.
– When towing the 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 adequate to keep both machines under control. If necessary, add a machine of the same size to the rear for braking purposes.

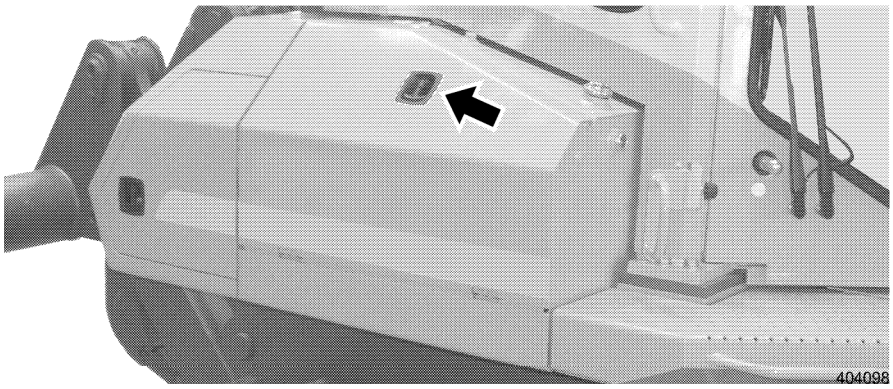
Towing

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

Prepare the machine for towing

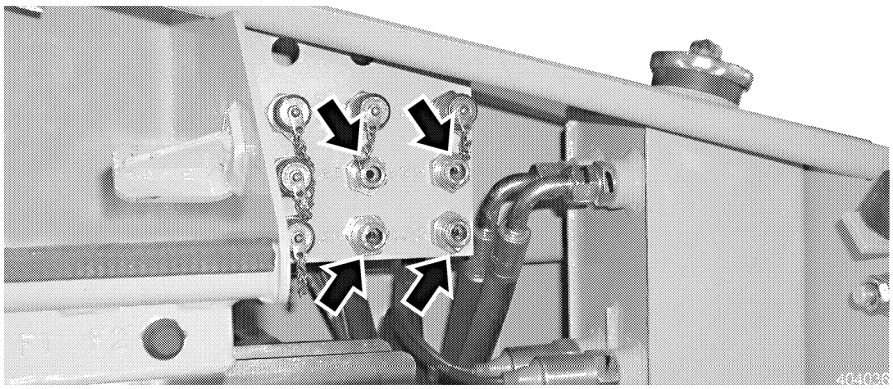
To be able to tow the machine, the hydrostatic drive must be short circuited and the parking brake must be released.

! The machine can only be towed if the electrical system is fully functioning.



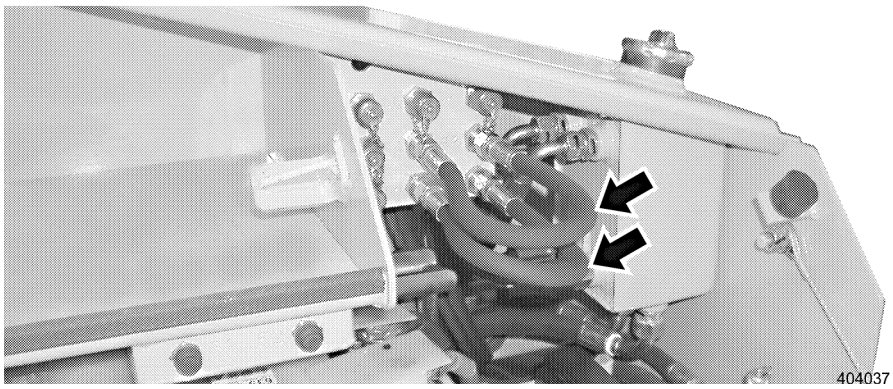
Open the battery compartment door

- Open the battery compartment door



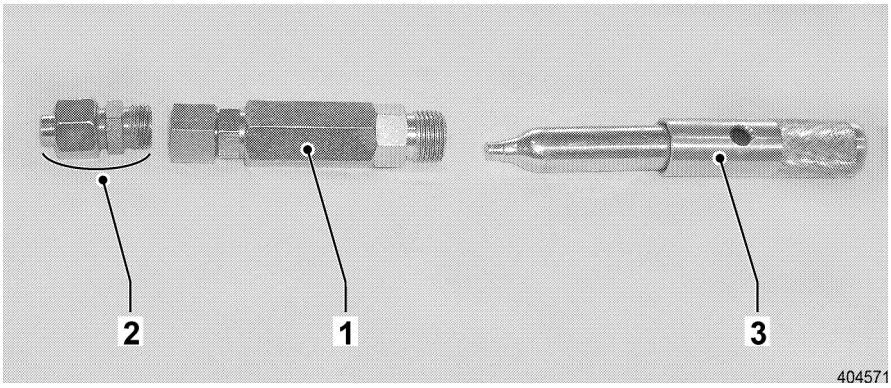
Remove the test fittings

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



Short circuit the connections

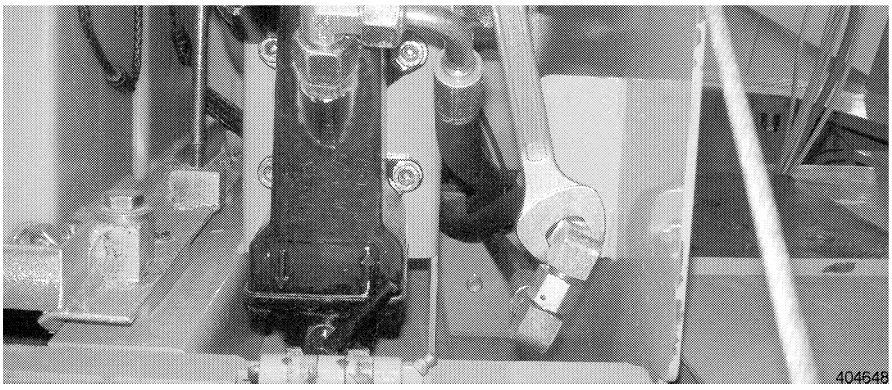
- Short circuit the connections "ML1-ML2" and "MR1-MR2" with the hydraulic lines.



Brake adapter

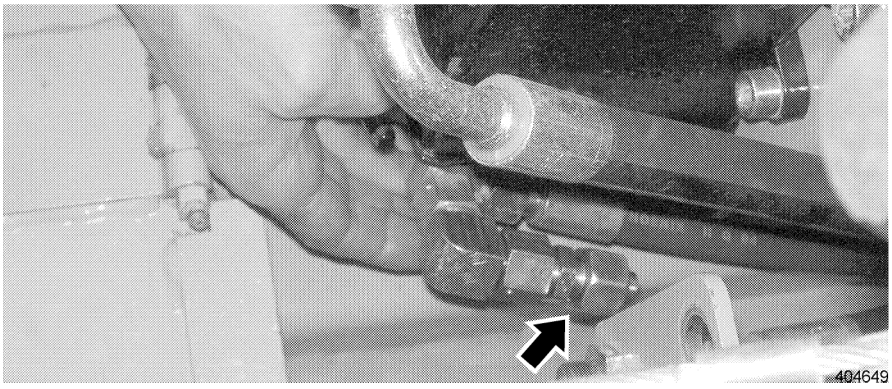
1 Brake adapter
2 Fittings
3 Cartridge holder

- Remove the brake adapter 1 from the tool box.
- Remove fittings 2 with union nut and cap from the brake adapter.



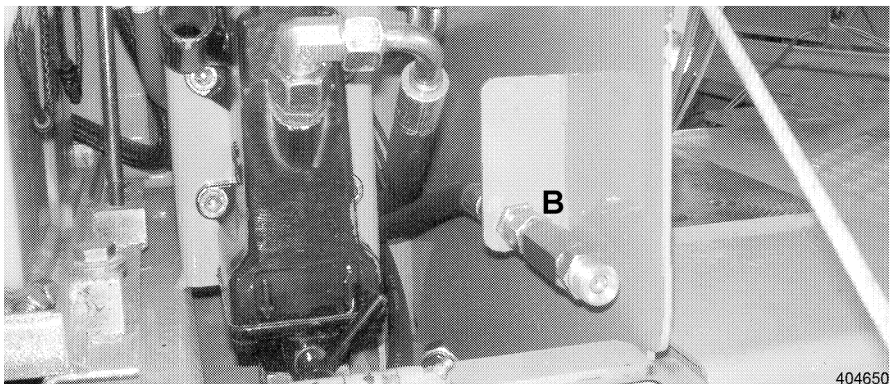
Remove the hose

- Remove the hose from connection "B".



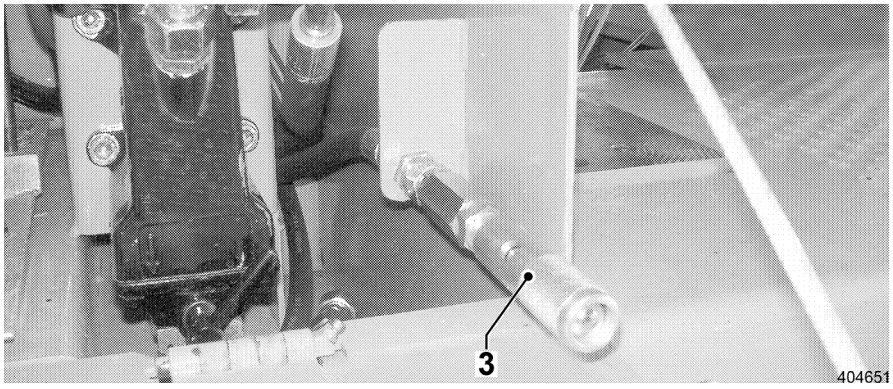
Close off the hose

- Close off the hose with the fitting 2 of the brake adapter.



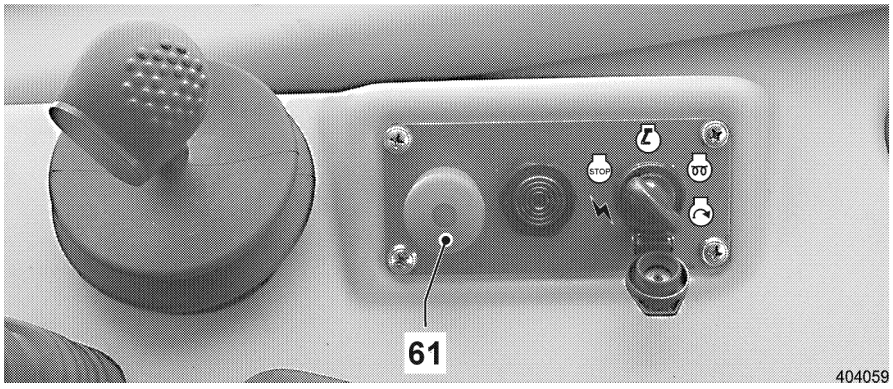
Connect the brake adapter

- Remove the brake adapter 1 from the cartridge holder 3 and connection on connection "B".



Install the cartridge holder

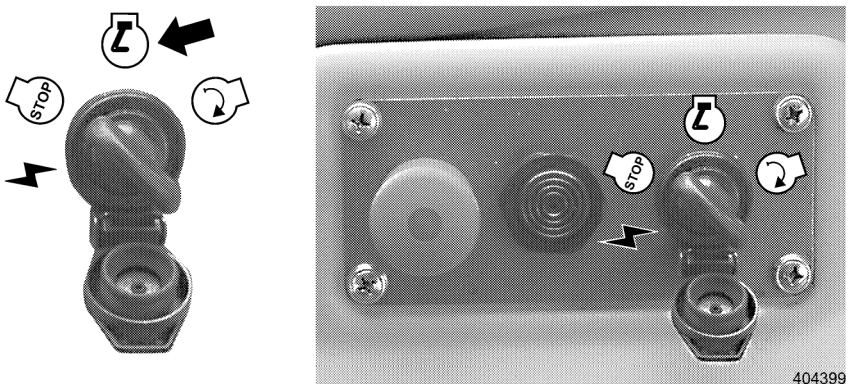
- Insert a new air pressure cartridge into the cartridge holder 3 and install the cartridge holder on the brake adapter.
- Close the battery compartment door.



Emergency off button raised

- Check the position of the emergency off button 61.

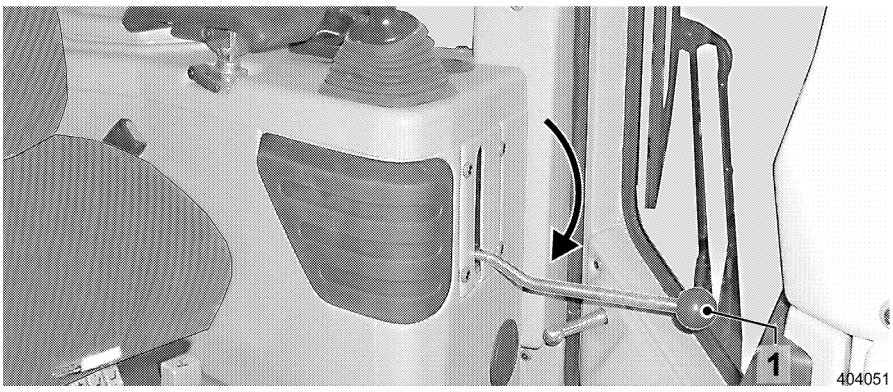
– For the towing procedure, the emergency off button must be in operating position (Emergency off button raised).



Starter switch – Contact position

- Set the starter switch to contact position

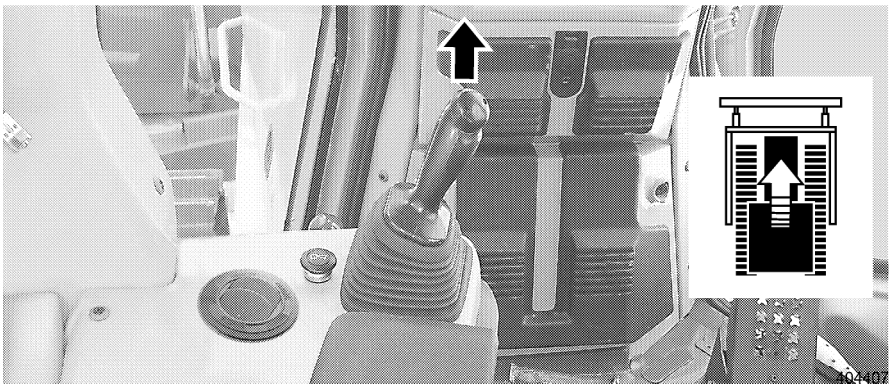
The following indicator lights light up:
– Indicator light – travel brake
– Indicator light – pump replenishing pressure
– Charge indicator light
– Indicator light – electronic problem



Safety lever down

- Move the safety lever down.

– Indicator light – travel brake lights up.



Forward travel

- Deflect the travel joystick to the front.

– By deflecting the travel joystick, the parking brake is released.
– Indicator light – travel brake turns off.

Danger

The machine has no brakes.
– Carry out the towing procedure by observing all safety guidelines.

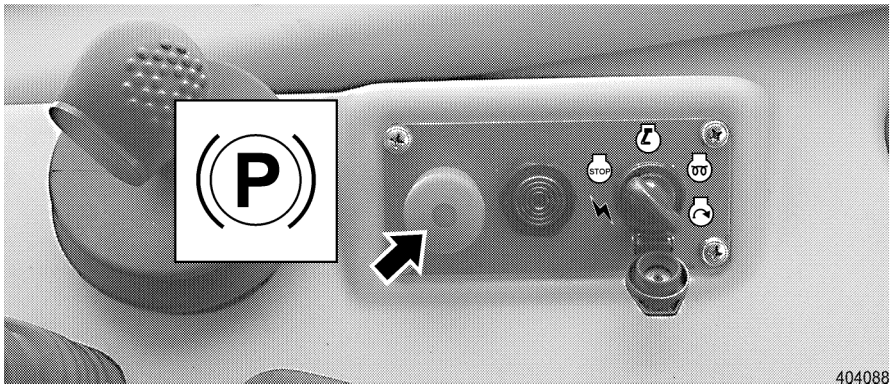
Stop the machine

To be able to stop the machine, you can:

- move the travel joystick to neutral position.
- press the emergency off button.
- move the safety lever up.
- turn the ignition off.

Caution

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



Press the emergency off button

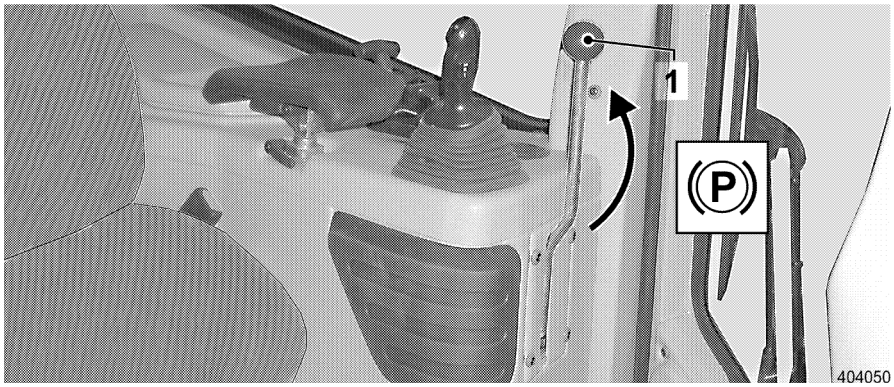
- Press the emergency off button

– The parking brake is applied.

To continue towing, raise the emergency off button and repeat the towing mode.

If the indicator light – travel brake does not turn off, then the towing procedure must be repeated from the point where the air pressure cartridge was inserted.

– The pressure in the system is not sufficient to vent the brake.



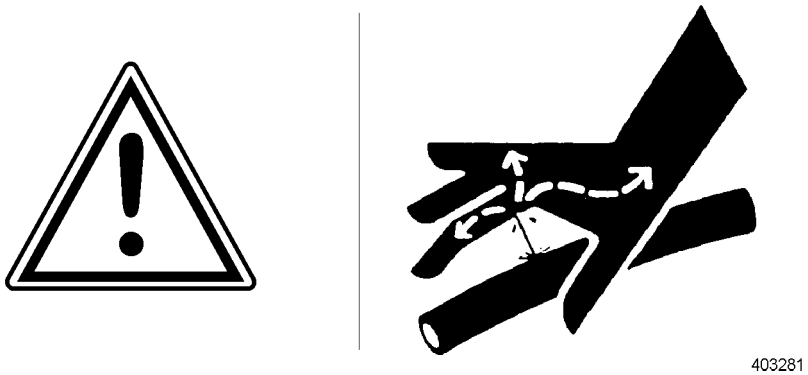
Safety lever up

After the towing procedure

- Move the travel joystick to neutral position.

– The parking brake is applied.

– Indicator light – travel brake must light up.
- Press the emergency off button.
- Move the safety lever up.
- Turn the ignition off.



403281

Hydraulic pressure

Caution

! Before removing the brake adapter, relieve the hydraulic pressure in the system.
– Relieve the pressure in the hydraulic system by moving the travel joystick several times in forward and reverse direction.
– Carefully remove the brake adapter.

Danger

Before putting the machine back into service, check if the parts installed for the towing procedure have been removed again and the machine has been returned to its original series condition.

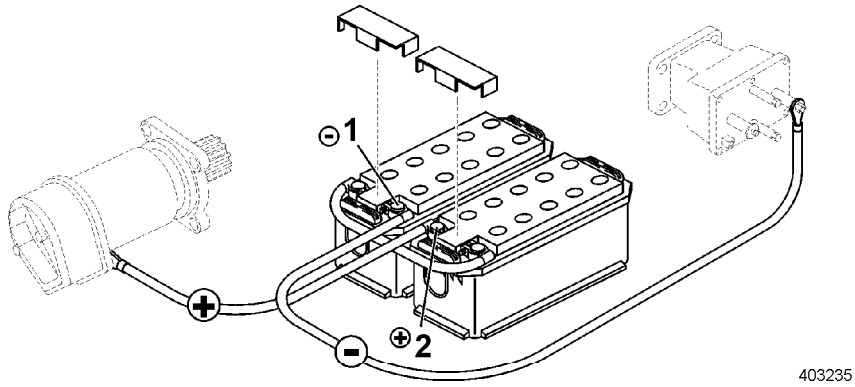
3.6.2 Auxiliary starting procedure

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.

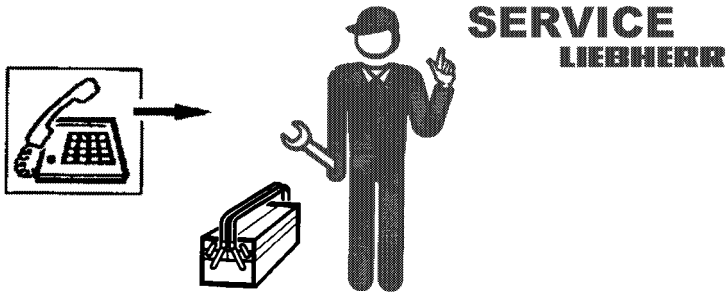
For that reason, always read the corresponding section in the Operating Manual if a problem occurs.

– 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.



403052

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.

Englisch LWT - TD 7/7/2005

4.1 Problems and remedy

Diesel engine and fuel system

Problem / error	Cause	Remedy
The engine does not start	The safety lever is in lowest position	Move safety lever up
	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 Operating Manual
	Starter does not operate	Check the line connections
	Starter does not operate	Overhaul the starter or change the starter ring (Inst)
	Battery power is low	Recharge / replace
Engine starts but stops again or runs unevenly	Fuel tank is 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 main 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 the 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 do not work	Change thermostats
	Radiator is dirty	Clean radiator
Engine oil pressure is insufficient **NOTE:** Turn the engine off immediately!	Oil level is 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 exhaust system / repair

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 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 uppermost position or emergency off switch is pressed	Move the safety lever down / pull the emergency off switch
No reaction when actuating the blade up function	Blade float position is turned on	Turn off blade 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, replace, if necessary or reseal (only by authorized 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 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 blower is not running	No power supply	Check fuse and check wires / fix if defective
	Blower motor is defective	Change blower motor
Insufficient fresh air in operator's cab	Fresh air filter is dirty	Clean air intake openings, replace fresh air filter

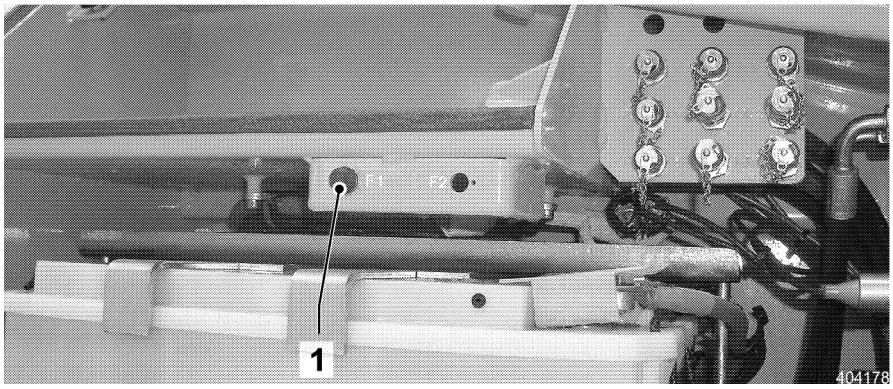
Working attachment

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 the fuse

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



Fuse in battery compartment

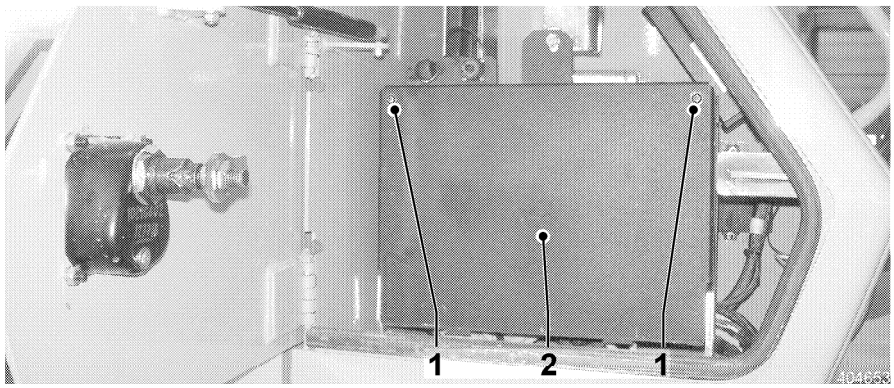
Main fuse

The main fuse 1 (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 pressing the push button on the safety fuse.

Fuses in central electric housing

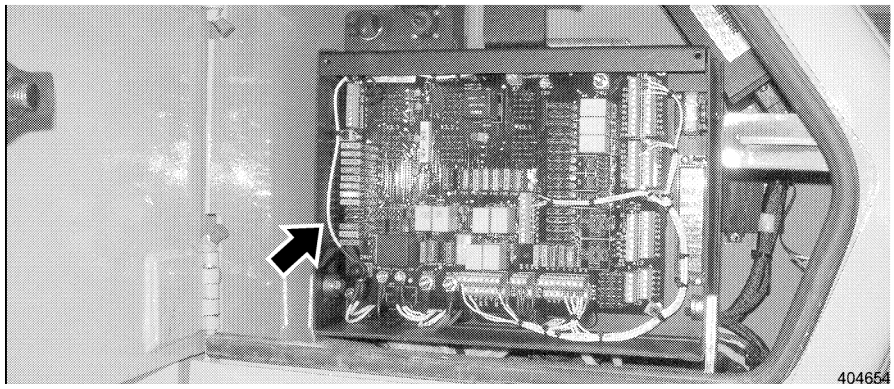
The additional fuses are located in the central electric housing on the left rear in the compartment.



Central electric housing

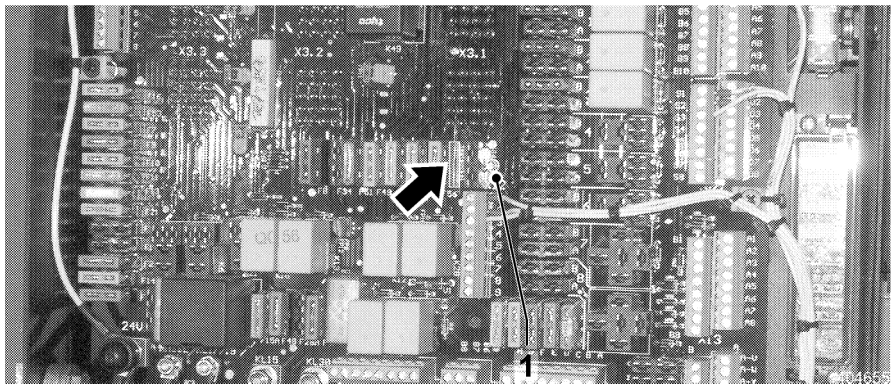
Access to the fuses is provided after removing the screws and the cover.

- Remove screws 1 and remove cover 2.



Central electric housing - fuses

- 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).



Test base

Fuse tester

A possibly defective fuse can be checked on the fuse test base.

- Push the fuse on the test base.

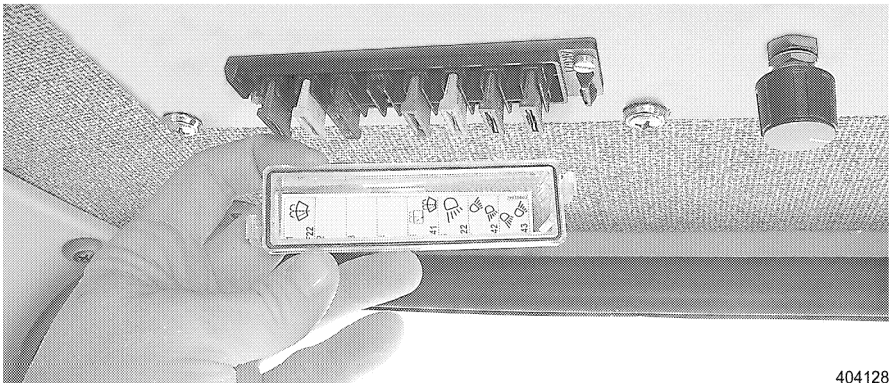
If the fuse is not defective, the bulb 1 on the test base lights up. Otherwise, change the defective fuse.

Fuse listing in central electric housing

SI = Special installation

Fuse	Value	Unit	Description / function
F 3	15	A	Flame glow plug and flame start valve
F 6	20	A	Shut off solenoid
F 7	5	A	Display panel Cab 24V
F 8	7.5	A	Safety lever
F 9	10	A	Electrical socket
F 10	5	A	Display instruments and warning light
F 11	3	A	Horn button
F 13	2	A	Fan control
F 14	5	A	Solenoid valve quick drop
F 15.a	3	A	Solenoid valve float position
F 15.b	3	A	Solenoid valve float position ripper (SI)
F 16	5	A	Supply thumb and finger button WH sensor, various SI
F 19	20	A	Air conditioning system (SI)
F 20.a	10	A	Heater
F 20.b	10	A	Auxiliary heater (SI)
F 21	5	A	Operator's seat, air cushioned, seat heater (SI)
F 23	7.5	A	Headlight low beam front (SI)
F 24	7.5	A	Headlight high beam (SI)
F 25	7.5	A	Headlight – fuel tank (SI)
F 27	20	A	Refueling pump (SI)
F 28.a	3	A	Back up warning device (SI)
F 28.b	3	A	Back up warning device, switchable (SI)
F 29	3	A	Hydraulic oil level check (SI)
F 30	3	A	Shift release rear winch (SI)
F 31	16	A	Fuel water separator heatable (SI)
F 32	3	A	Coolant level check (SI)
F 33	3	A	Cutting angle adjustment (SI)
F 35	30	A	Cab
F 37	5	A	Auxiliary heater (SI)
F 38	15	A	Auxiliary heater (SI)
F 39	3	A	KBI Cold start (SI)
F 45	3	A	Cab interior lighting
F 46	10	A	Terminal X 18 (24V)
F 47	10	A	Terminal X 18 (30)
F 48	10	A	Terminal X 18 (15)
F 49	5	A	Transformer
F 50	5	A	Beacon (SI)
F 52	3	A	Supply E-Box direct
F 53	3	A	Control motors Heater / air conditioner
F 55	3	A	Evaluation electronic Terminal 15
F 56	5	A	Evaluation electronic Terminal 30
F 59	3	A	Solenoid valve close 6-way blade (SI)
F 60	3	A	Solenoid valve open 6-way blade (SI)

F 61	1	A	Safety lever
F 62	3	A	Fuse K13
F 63	3	A	Fuse only for passage to K7
F 64	10	A	Transformer 12V (Installation loosely in wiring harness)
F 73	1	A	Reversible fan (SI)
F 74	5	A	Reversible fan (SI)
F 78	3	A	Ultra quick drop (SI)
F 80	7.5	A	Back-up alarm optically (SI)



Fuses in roof console

Fuse listing in roof console

The fuses in the roof console can be changed after removing the cover.

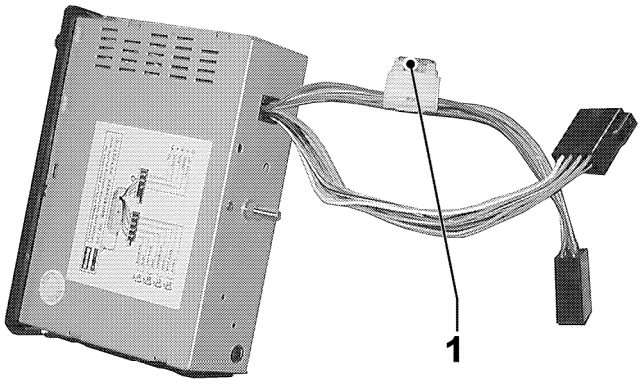
- Remove the cover and change the defective fuse.

Fuse listing in the roof console

Fuse	Value	Unit	Description / function
F 22	15	A	Headlight cab front
F 40	7.5	A	Wiper doors
F 41	7.5	A	Wiper front and rear
F 42	7.5	A	Headlight left front, left rear
F 43	7.5	A	Headlight right front, right rear
F 51	8	A	Additional headlight rear (SI)
F 54	3	A	Poti control motors heater / air conditioner

Fuse Radio

The radio is secured with a separate fuse in the wiring harness.



404161

Radio fuse

- If the radio is not functioning, remove the radio and check fuse 1 or change it.

Fuse	Value	Unit	Description / function
F 71	5	A	Radio

5. Maintenance

Englisch LWT - TD 7/7/2005

5.1 Maintenance and inspection schedule

Maintenance / inspection at operating hours							Work to be performed	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 expert personnel** ■ First and only interval ● Repeat interval **OM - Operating Manual** **SM - Service Manual** **Hrs. - Operating hours**	
							Diesel engine	
❍	❍	❍	❍	●	●	●	Check oil level and oil pressure	OM
❍	❍	❍	❍	●	●	●	Check coolant level	OM
	❍	❍	❍	●	●	●	Check engine, cooling system and pan for contamination, clean	OM
	❍	❍	❍	●	●	●	Check fuel water separator / empty as necessary	OM
		❍	❍	●	●	●	Fuel tank, drain condensation and sediments - 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	OM
❍				●	●	●	Check oil, cooling and fuel system for leaks and condition	OM
❍				■	●	●	Check intake and exhaust system - mounting and leaks	OM
				■	●	●	Check mounting tightness of engine brackets	OM
				■	●	●	Check / adjust engine RPM	
				●	●	●	Replace fuel prefilter - filter insert	OM
					●	●	Check / adjust valve play - with cold engine	
					●	●	Check and service control for injection pump	OM
					●	●	Change fuel fine filter elements	OM
					●	●	Grease gear ring on flywheel	
					●	●	Check flame glow system - before start of cold season	
					●	●	Take oil sample and send it for analysis	OM
							Replace air filter inserts - as necessary / annually	OM
							Replace oil separator - every 2 years	OM
							Replace coolant with antifreeze and DCA4 - every 2 years	OM
							Check / adjust fuel injectors - as necessary / every 3000 hrs.	

Maintenance / Inspection at operating hours							Work to be performed	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 expert personnel** ■ First and only interval ● Repeat interval **OM - Operating manual** **SM - Service manual** **Hrs. - Operating hours**	
Hydraulic system								
❍	❍	❍	❍	●	●	●	Check oil level in hydraulic tank	OM
❍	❑	❑		●	●	●	Clean magnetic rod (also after repairs) - up to 50 hrs. daily	OM
				●	●	●	Hydraulic tank - drain condensation and sediments - at least every 6 months - weekly when using "environmentally friendly hydraulic oils"	OM
				●	●	●	Check / clean oil cooler for contamination	OM
				●	●	●	Replace filter insert for replenishing circuit	OM
				■	●	●	Replace main return filter insert or immediately if indicator light lights up	OM
❍				■	●	●	Check working and travel hydraulic system for function and leaks, check hose routing for chafings	OM
				■	●	●	Check / adjust all hydraulic pressures according to adjustment check list	
				■	●	●	Check mountings and fittings for tight seating	OM
					●	●	Check all replenishing circuit return filter inserts for deposits	OM
					●	●	Take oil sample before oil change and send it for analysis	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 every 2 years	OM
Electrical system								
❍	❍	❍	❍	●	●	●	Check system function, incl. indicators and gauges	OM
❍				●	●	●	Check electrolyte level in battery - at least 1x annually	OM
				■	●	●	Clean / check / grease battery connections	OM
				■	●	●	Check cable routings and connections	OM
				■	●	●	Check / adjust control system of travel drive according to adjustment check list	
					●	●	Check battery charge - before start of cold season	

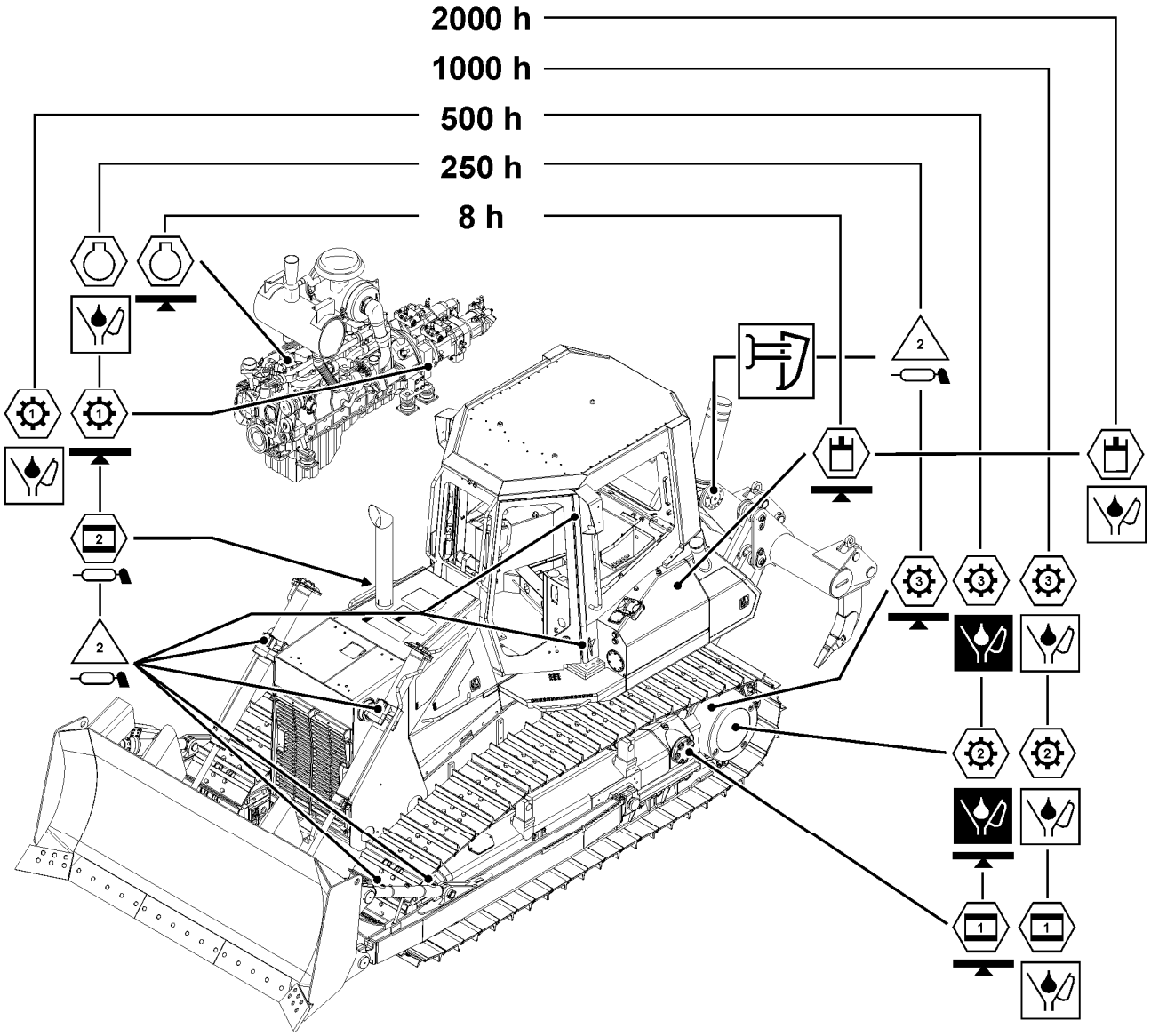
Maintenance / inspection at operating hours							Work to be performed	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	**by maintenance personnel** ❑ First and only interval ❍ Repeat interval **by authorized expert personnel** ■ First and only interval ● Repeat interval **OM - Operating manual** **SM - Service manual** **Hrs. - Operating hours**	
Heater / ventilation								
❍				●	●	●	Check system for function and leaks - at least every 3 months	OM
				●	●	●	Check refrigerant level and moisture indicator - at least every 3 months	OM
							Replace fresh air filter and air circulation filter - as necessary	OM
							Air conditioning system - Service by expert personnel 1x annually	
Travel gear								
❍			❍	●	●	●	Check oil level - sealing chamber - at least 1x annually	OM
❍				●	●	●	Check oil level - clean magnetic plug	OM
				■	●	●	Check fittings for tight seating	OM
				■	●	●	Replace gear oil [1] - clean magnetic plug - at least every 4 years	OM
				■	●	●	Replace lube oil in sealing chamber / flush sealing chamber - at least every 4 years	OM
					●	●	Take oil sample and send it for analysis	OM
Track components								
		❑	❑	●	●	●	Check mounting screws and nuts of track components, especially track pad and sprocket segment screws for tight seating	OM
		❑		●	●	●	Check carrier rollers, track rollers and idlers for leaks	OM
			❑	●	●	●	Check oil level in support axle bearings	OM
			❍	●	●	●	Lubricate center oscillating axle bearing - Shorten the interval as necessary	OM
				●	●	●	Check / adjust idler guides, replace parts as necessary	OM
❍							Adjust chain tension to suit application - as necessary	OM
							Clean tracks - as necessary	OM
							Check for track wear - as necessary	

Maintenance / inspection at operating hours							Work to be performed	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 expert personnel** ■ First and only interval ● Repeat interval **OM - Operating manual** **SM - Service manual** **Hrs. - Operating hours**	
Working attachment								
❍	❍	❍	❍	●	●	●	Check cutting edges, corners and ripper teeth for wear - make sure attachment is suited for application	OM
❍		❑		●	●	●	Check blade center position and mounting of bracket - and at every installation	OM
				●	●	●	Check all bearing points for play / wear	OM
		❑		●	●	●	Check screws, nuts and pin retainers for tight seating	OM
				●	●	●	Check attachment for damage	OM
General								
❍			❍	●	●	●	Lubricate all lube points according to lubrication chart - Shorten interval as necessary	OM
❍				●	●	●	Check complete machine for proper maintenance and condition	OM
❍							Explain machine literature, especially the Operating manual / Safety guidelines to operator	OM

1) For oil specification and viscosity, see "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

Axle bearing

Oscillating axle bearing

Lube points

Hinges

h **Intervals in operating hours**

Check oil level

First oil change

Oil change

Lubricate

Englisch LWT - TD 7/7/2005

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 Lubricants and service fluid specification, quantities

The quantities given in the lubricant and service fluid chart are only standard values:
– In each case, the dipstick or the level marks are applicable.

Each time the lubricant or service fluid is changed or refilled, the level in the relevant unit must be checked.

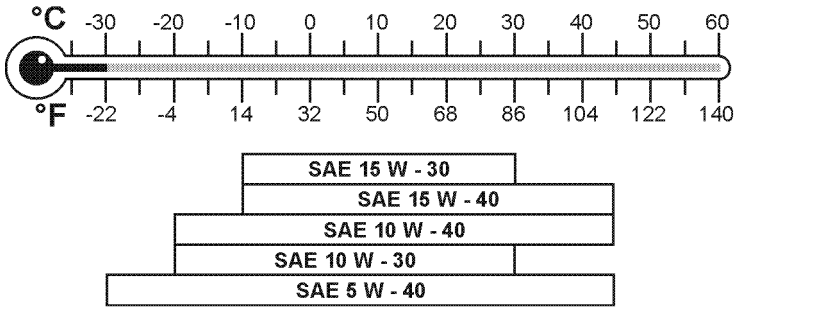
Specifications

Legend:

API = American Petroleum Institute
ACEA (CCMC) = Association des Constructeurs Européens de l'Automobile
SAE = Society of Automotive Engineers

Diesel engine

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 lube oil viscosity occurs in accordance with the SAE classification (Society of Automotive Engineers).
The determining factor for the correct selection of the SAE classification is the ambient temperature.
The selection of the SAE classification provides no information about the quality of a lube oil.
Too high viscosity can cause problems when starting, too low viscosity can jeopardize lubricating efficiency.
The temperature ranges shown in the graphic are guidelines and can be exceeded or undershot in the short term.

Lube oil - change intervals

Change intervals
- First oil and filter change when using initial fill oil: See "Maintenance and inspection schedule".
- Oil change intervals depend on climate zone, sulphur content in fuel and oil quality, as noted in the chart.

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

Aggravating circumstances

Various factors or difficult applications can change the maintenance interval:
Aggravating circumstances or difficult applications are:
- frequent cold starts
- sulphur content in fuel above 0.5%
- ambient temperature below -10°C

If aggravating circumstances or difficult applications are given, the oil change interval noted in the "Maintenance and inspection schedule" must be carried out in accordance with the following chart. (hrs. = operating hours)

Outside temperature	Sulphur content in fuel	E4, E5	CI-4, CH-4
Temperature normal to -10 °C	to 0.5 % over 0.5 %	500 hrs 250 hrs	250 hrs 125 hrs
under -10 °C	to 0.5 % over 0.5 %	250 hrs 125 hrs	125 hrs --

Fuel system

Quantity	Service fluids	Specification
365 l (96.4 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.
Further fuel specifications only after consultation with diesel engine development LIEBHERR Machines Bulle S.A.

Sulphur content in diesel fuel

In DIN EN 590, a maximum of 350 mg/kg = max. 0.035 weight per cent sulphur content is permitted.
"Low sulphur" diesel fuels with a sulphur content below / less than 0.05 % are only suitable if lubricity is guaranteed by the addition of additives . The diesel fuel lubricity must, according to the HFRR (60) test, be a maximum of 460 µm. [lubricity corrected "wear scar diameter" (1.4) at 60°C]

With diesel fuels with a sulphur content above / more than 0.5 weight per cent the oil change intervals should be halved.

Diesel fuels with a sulphur content above / more than 1 % are not permitted.
Approval can be given dependent on diesel engine lube oil quality!
The fuel standard ASTM D 975 does not envisage that fuels are required to pass a lubricity test. Written confirmation from the fuel supplier should be obtained. The addition of additives should be carried out by the supplier in his capacity as the party responsible for fuel quality. We do not recommend that our customers add secondary lubricity additives .
A cetane number of at least 45 is required for fuels according to ASTM D975 . A cetane number above 50 is preferable, particularly at temperatures lower than 0°C or 32°F.

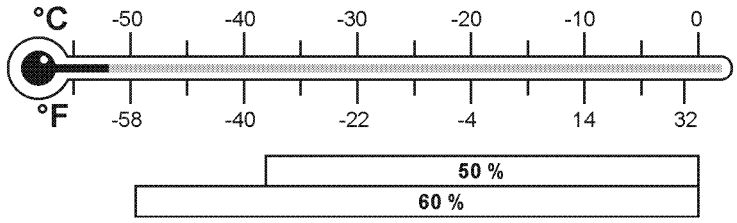
Diesel fuel at low temperatures (winter operation)

When outside temperatures are dropping, diesel fuel expels paraffin crystals which increase the flow resistance in the fuel filter to the point where sufficient fuel supply to the diesel engine is no longer guaranteed.
In a moderate environment, cold flow properties up to:
0°C from 15.04. - 30.09.
-10°C from 01.10. - 15.11./1.3. 14.04.
-20°C from 16.11. - 29.02.
are guaranteed in accordance with DIN EN 590.
If the cold flow properties of the diesel fuel are insufficient or outside temperatures are lower than -20°C, we recommend the use of fuel filter heating.

Other approved diesel fuels:
Diesel fuel in accordance with DIN EN 590 with up to 5 % vol. FAME* in accordance with DRAFT prEN 14214 (formerly: DIN 51606)
* FAME fatty acid methyl ester (EU standard generic term)

Cooling system

Quantity	Service fluids	Specification
30 l (7.9 US gal.)	Corrosion inhibitor / antifreeze fluids	For corrosion inhibitor / antifreeze fluids, refer to chart



403117

Percentage (%) of corrosion inhibitor / antifreeze fluid

Coolant with DCA4

(DCA4 = Diesel Coolant Additives)
The cooling system must contain at least 50 % corrosion inhibitor / antifreeze fluid all year. This corresponds to an antifreeze protection to approx. -37°C. In the event of loss of coolant, it must be ensured that the 50 percent by volume is not undershot.

Caution

Danger of damage to the diesel engine!
! Too much corrosion inhibitor / antifreeze would reduce the cooling efficiency which in turn could damage the diesel engine.
– Do not use more than 60% corrosion inhibitor / antifreeze fluid.

The mixture ratio of corrosion inhibitor / antifreeze must be checked as part of the maintenance routine and corrected if necessary.
The DCA4 concentration must be between 0.3 and 0.8 units per litre.
The test kit CC2602 M by Fleetguard is recommended for testing.
Change the coolant at least once every 2 years.

Fresh water guidelines

To prepare the coolant, use clean water which is not too hard. Often, but not always, drinking water fulfils these requirements. The following are not suitable: seawater, brackish water, brine and industrial waster water.

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/dm3
Sulphate ion content: max. 80 mg/dm3

Refilling the cooling system

Before adding new coolant, check the cooling system for cleanliness and flush, if necessary.
When adding new coolant or refilling the cooling system after repair work, DCA4 in liquid form must also be added in addition to the DCA4 concentration contained in the water filters to the corrosion inhibitor / antifreeze fluid (see chart).

– Premix the coolant in a suitable container.

Mixture ratio

Machine type	Quantity	Proportion of water	Proportion of corrosion inhibitor / antifreeze fluid	Proportion of liquid DCA
PR 724	approx. 30 l	14.5 l	14.5 l	1.4 l

Use of DCA4 without corrosion inhibitor / antifreeze fluid

In **exceptional cases** and at constant ambient temperatures above freezing, for example in tropical climates, where demonstrably no approved corrosion inhibitor / antifreeze is available, water and DCA4 may be used as coolant.
To be able to protect the cooling system from corrosion:
– approximately twice the amount of DCA4 in comparison to the mixture ratio of corrosion inhibitor / antifreeze must be used.
– the DCA4 concentration must be between 0.6 - 1.06 units per litre.
Check the DCA 4 concentration during regular maintenance and correct if necessary.
The coolant must be changed once a year.

Caution

When using water and DCA4, no coolant improver (anti-corrosion oils) may be used.

Disposal of corrosion inhibitors / antifreeze fluids

Handle non-diluted corrosion inhibitors / antifreeze fluids as hazardous waste. When disposing of used cooling liquids (mixed with water), observe applicable local authority regulations.

Approved anti-corrosion / antifreeze fluids

Brand	Manufacturer
Agip Antifreeze Plus	Agip Petroli S.p.A Rome Italy
Agip Langzeit-Frostschutz	Autol Werke Gmbh., Würzburg / Germany
Antigel DB 486	Sotragal SA, St. Priest/France
Aral Kühler Frostschutz A	Aral AG, Bochum / Germany
Avia Frostschutz APN (G48-00)	Deutsche Avia - Mineralöl Gmbh., Munich / Germany
BP anti-frost X 2270 A	Deutsche BP AG, Hamburg / Germany
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 / Germany
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 / Germany
Esso Kühlerfrostschutz	Esso AG, Hamburg / Germany
Fricofin	Fuchs Mineralölwerke GmbH., Mannheim / Germany
Frostschutz Motorex (G 48-00)	Bucher+Cie, Langenthal / Switzerland
Frostschutz 500	Mobil Oil AG, Hamburg / Germany
Glacelf Auto Supra	Total
Glycoshell AF 405	Shell
Glycoshell N	Shell
Glysantin (G 48-00)	BASF AG, Ludwigshafen / Germany
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 / Germany
Total Antigel S-MB 486	Total Deutschland GmbH., Düsseldorf / Germany
Total Frostfrei	Total Deutschland GmbH., Düsseldorf / Germany
Veedol Antifreeze O	Deutsche Veedol GmbH., Hamburg / Germany
Wintershall Kühlerschutz	Wintershall Mineralöl GmbH., Düsseldorf / Germany

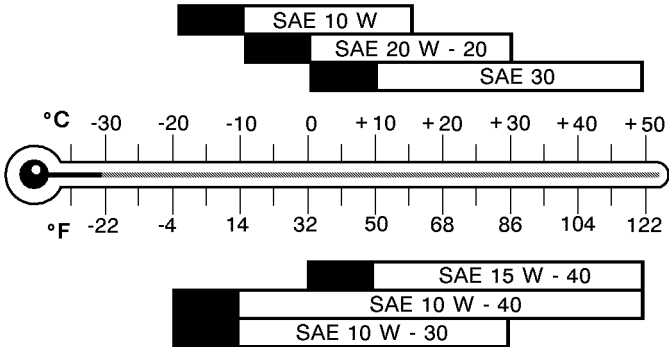
Approved premixed anti-corrosion / antifreeze fluids
Corrosion inhibitors / antifreeze fluids for diesel engine cooling systems in mixing ratio 50:50 (PREMIX)

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 Pre-diluted 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

Hydraulics

Quantity	Service fluids	Specification
Hydraulic tank 162 l (43 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
Hydraulic system approx. 232 l (61.3 US gal.)		

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 selection of the SAE classification is the ambient temperature.
The temperature ranges shown in the following chart are guidelines. If a machine is operated within the black temperature range the following warm up procedure must be carried out.



Temperature dependent selection of SAE classification

Warm-up procedure

1. For temperatures to 10°C below the indicated limit: (black range)
– Only adjust the diesel engine to approx. 1/2 speed after starting. Carefully actuate the working hydraulics. Actuate the hydraulic cylinders and move to stop for a short time. After approx. 5 minutes, carefully actuate the travel hydraulics too. The warm up procedure takes approx. 10 minutes.
2. At even lower temperatures:
– Before starting the diesel engine, preheat the hydraulic oil container then carry out warm up in accordance with Point 1.

① Transfer box

Quantity	Service fluids	Specification
3 l (3.3 quarts)	Transmission 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

② Travel gear

Quantity	Service fluids	Specification
PR 724 L/XL 2 x 18.5 l (19.5 quarts)	Transmission oil, viscosity per SAE SAE 85 W 140 EP	API GL-5 and MIL-L-2105 B,C or D
PR 724 LGP 2 x 24 l (6.3 US gal.)	Transmission oil, viscosity per SAE SAE 85 W 140 EP	API GL-5 and MIL-L-2105 B,C or D

③ Travel gear axial face seal

Quantity	Service fluids	Specification
6 l (6.3 quarts)	Hydraulic oil, viscosity per SAE See Hydraulic system (use the same oil quality and viscosity as for the hydraulic system.)	

Axle bearing

Quantity	Service fluids	Specification
2 x 4 l (4.2 quarts)	Hydraulic oil, viscosity per SAE See Hydraulic system (use the same oil quality and viscosity as for the hydraulic system.)	

Self-aligning bridge bearing

	Service fluids	Specification
	Lubricating grease, viscosity per SAE The grease must consist of a lithium complex and have a four ball tester value of at least 2300 N in accordance with DIN 51350 or ASTM D 2596.	Pressure gun grease KP2k, consistency 2 of NLGI grade per DIN 51818 and DIN 51825 or EP 2 per NF-T-60 132

Lube points on attachments, chain tensioner and door hinges

	Service fluids	Specification
	Lubricating grease, viscosity per SAE The grease must consist of a lithium complex and have a four ball tester value of at least 2300 N in accordance with DIN 51350 or ASTM D 2596.	Pressure gun grease KP2k, consistency 2 of NLGI grade per DIN 51818 and DIN 51825 or EP 2 per NF-T-60 132

Hinges and joints

	Service fluids	
	Engine oil, viscosity per SAE	

Windscreen washer system

Quantity	Service fluids	
9.5 l (10 quarts)	Commercially available windshield cleaning fluid	

Rubber seals on doors and trim panels

	Service fluids	
	Silicon spray or talcum powder	

Corrosion protection

	Service fluids	
	Anti-corrosion grease To protect exposed piston rods, paint with a thick layer of acid-free anti-corrosion grease .	LIEBHERR - anti corrosion 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 Scheduled oil diagnostics - Analysis

Oil is subjected to various influences. Temperatures, pressures, non-oily fluids, most dust, friction particles, water and air contaminate the oil and break down its properties, which in turn can increase the risk of damage over time for the hydraulic system, Diesel engine and gear.
Unplanned repairs and downtime can be prevented by regularly taking oil samples, which show the condition of your machine.
For this procedure, always take oil samples and perform oil analysis in certain intervals.

Advantages

- You will learn everything about the condition of your machine.
- Impending damage is discovered in time.
- Unplanned repairs and downtime are prevented.
- The oil can be changed at the correct point in time (only Hydraulic system).
- You relieve the environment because less used oil is disposed of (only Hydraulic system).

Oil change interval

Oil change intervals can only be extended for the hydraulic oil, if oil samples are taken!

Oil sample intervals

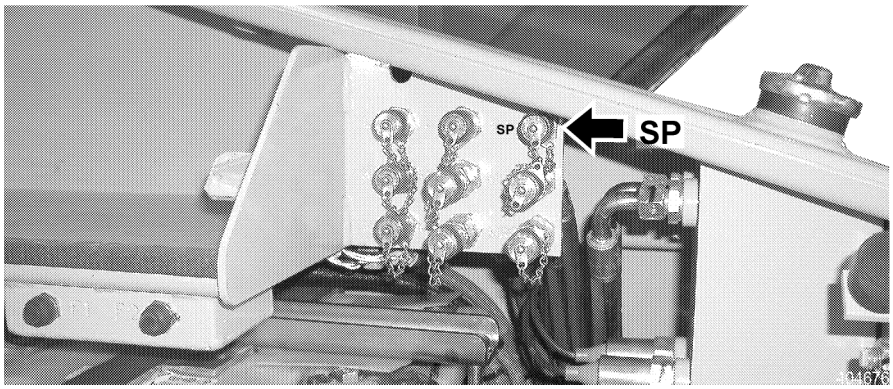
According to the data in the Maintenance and Inspection schedule.

Taking oil samples

Take the oil sample:
– Shortly after shutting down the machine – at that time dirt and wear particles are still floating and any water in the system has not yet settled.

– At operating temperature - warm oil can be removed quicker.
– Always in the same manner and at the same location.
– Never from the filter.
– Not shortly after an oil change or after large amounts of oil have been added.
– Only in a clean and dry container.
– With the manual suction pump, dip the hose approx. in the center of the oil volume.

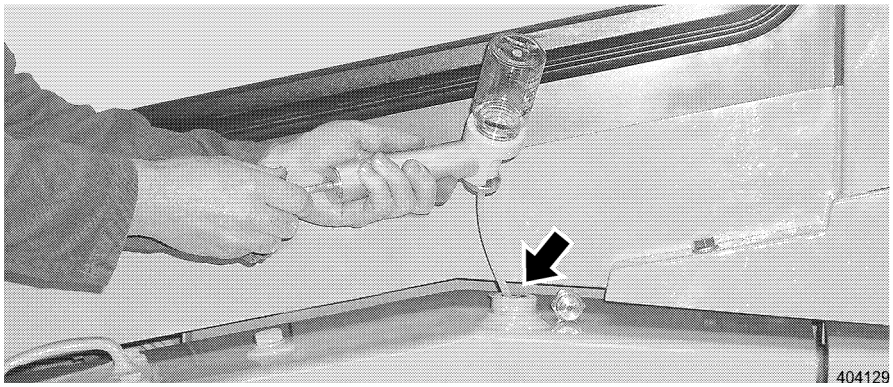
Locations to take sample



SP - connection

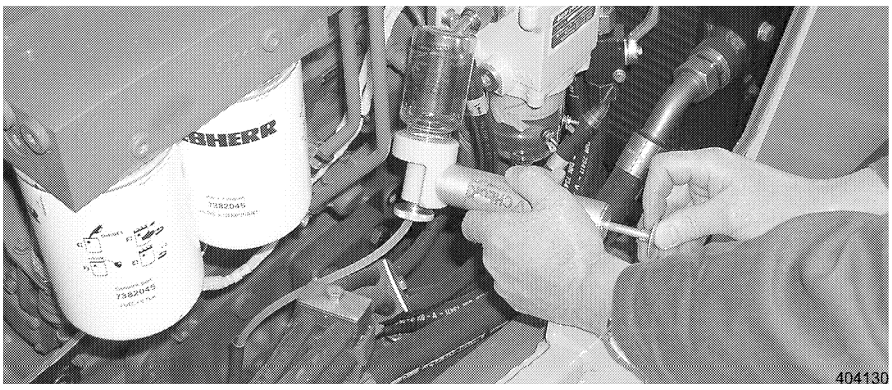
Hydraulic system

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



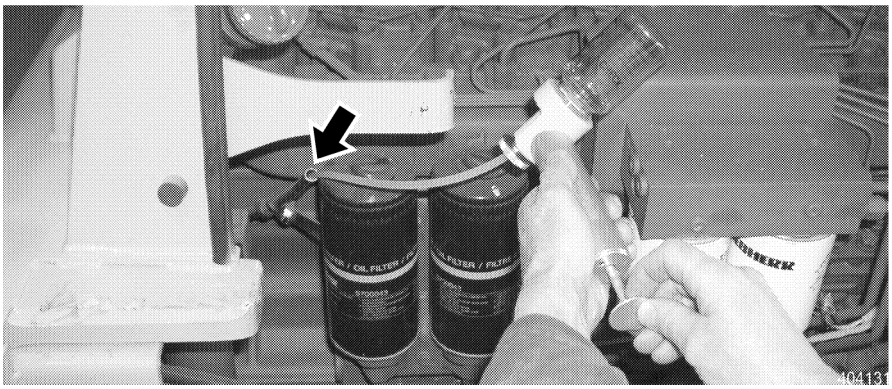
Breather screw

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



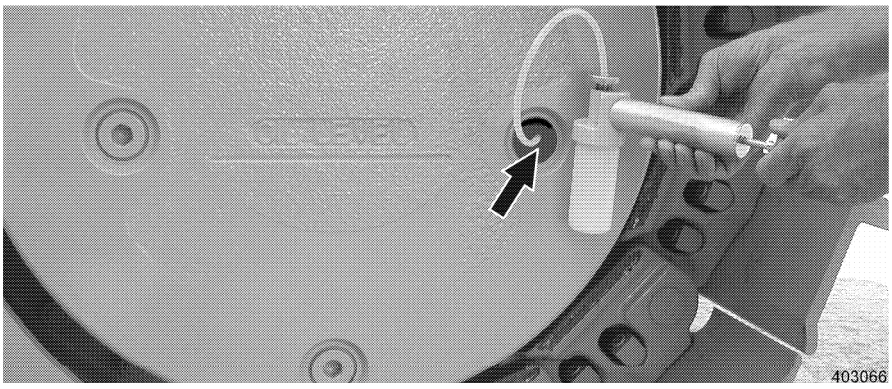
Dipstick tube

Diesel engine a) With manual suction pump via dipstick tube or
b) take oil sample during oil change from discharging oil flow.



Dipstick tube

Splitterbox a) With manual suction pump via dipstick tube or
b) take oil sample during oil change from discharging oil flow.



Oil filler port

Travel gear With manual suction pump via oil filler port

Oil analysis

An oil analysis should include at least the following data:

Method	Determination of
Atom emissions spectroscopy (AES)	Wear metals, additives, contaminants iron, chromium, tin, aluminum, nickel, Copper, lead, molybdenum, silver, silicium, callum, calcium, magnesium, borax, zinc, phosphorus, barium
FT Infrared spectroscopy (FT-IR),	Oil condition and contaminants Oil oxidation, glycol, water, nitrates, fuel, carbon
Viscosity	Viscosity test – viscosity at 40°C and 100°C, viscosity index Notation about lubricity and mixture
Analex PQ-Index	Magnetic metallic particles Notation about quantity of total magnetic metallic particles in the oil, which are larger than 5 microns

Liebherr recommends having the oil analysis completed at "Wear Check". A set, which includes sample bottles, hose, sample documentation and mailing pouches 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 hand pump to take the samples is required and can be ordered separately. (Id. No.: 81 45 666).

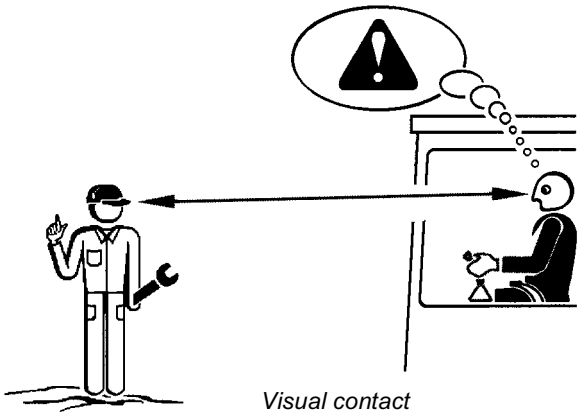
5.4 Preparations for maintenance

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

403061

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.

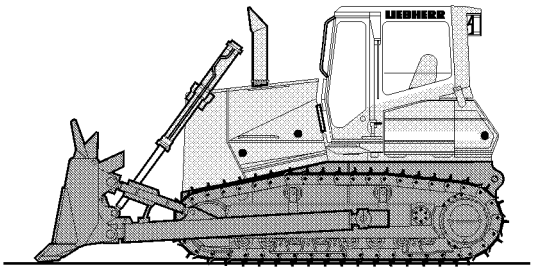
- Alert the operator before stepping into the danger zone of the machine!

5.4.1 Maintenance position

Preparations for maintenance
Allows access to individual maintenance points.

Maintenance position

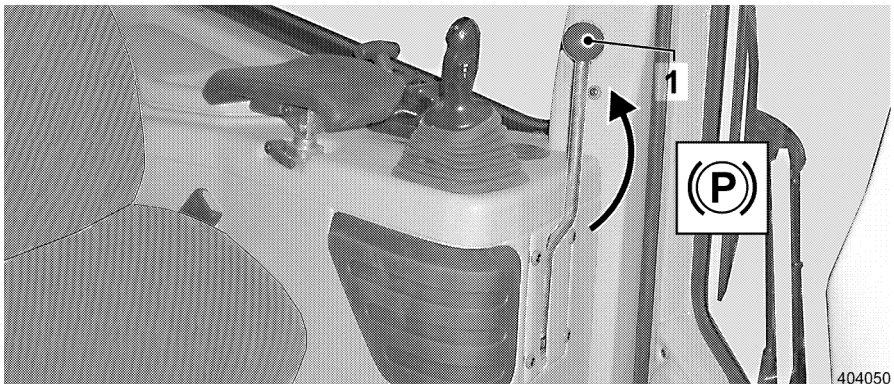
To bring the machine into maintenance position, proceed as follows.
For detailed description of the individual procedures, see "Control, operation".



404008

Maintenance position

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



Safety lever up

- Move the safety lever up.
- Turn the Diesel engine off.
- Remove 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:

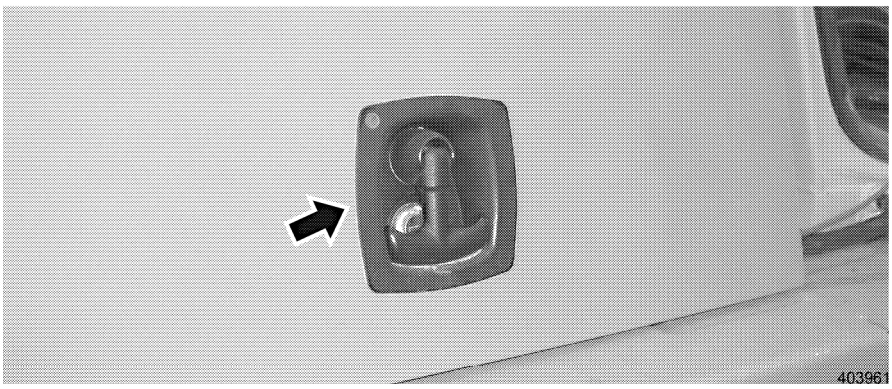
– Diesel engine
– Cooling system
– Air filter
– Splitterbox

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.

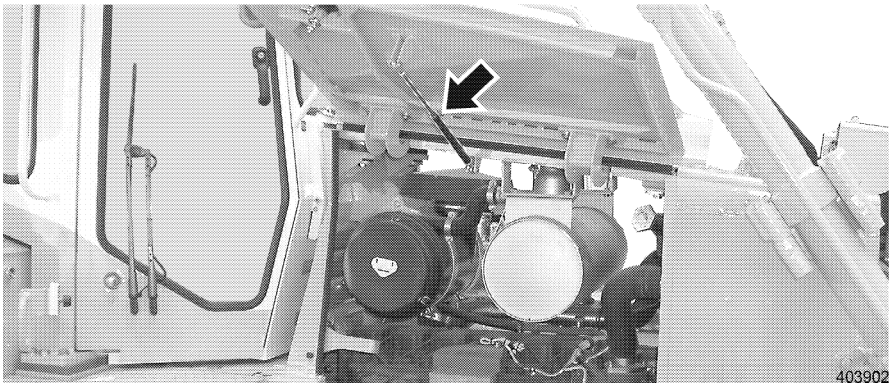


Open the engine compartment door

- Open the lock with a key.
- Open the door all the way with the handle.

– Fold the door handle out, turn by 90° and open the door.

- The engine compartment door is held in this position by a gas cylinder.



Gas cylinder

Caution

Danger of injury if the engine compartment door falls and closes!

! Check if the complete door is held in open position by the gas cylinder.

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

5.4.2 Electrical system

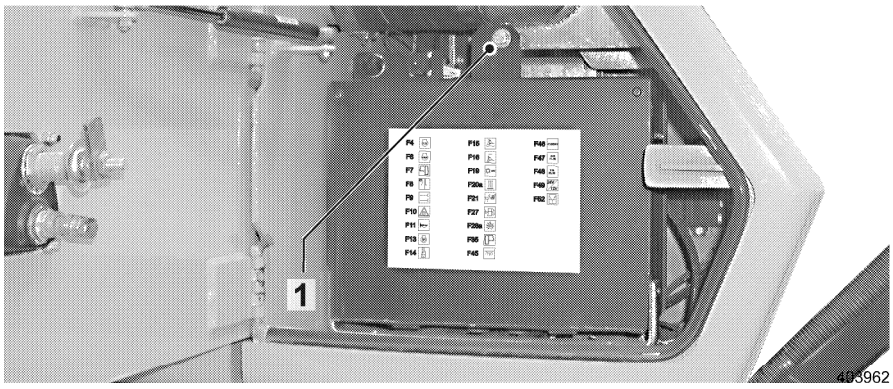
When working on the electrical system of the machine and before any welding on the machine, always disconnect the battery.

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

Disconnect the battery and remove the electronic boxes before any arc welding on the machine.

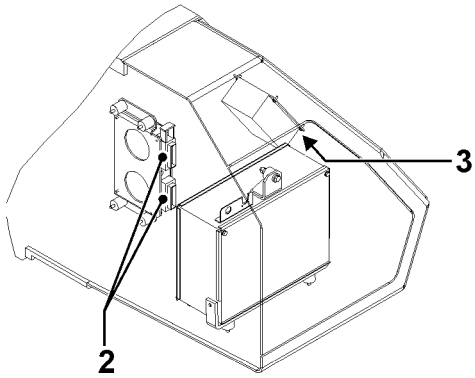
Electronic boxes

The electronic boxes are installed in the central electric housing.
Fold the central electric housing out to gain access to the electronic boxes.



Central electric housing

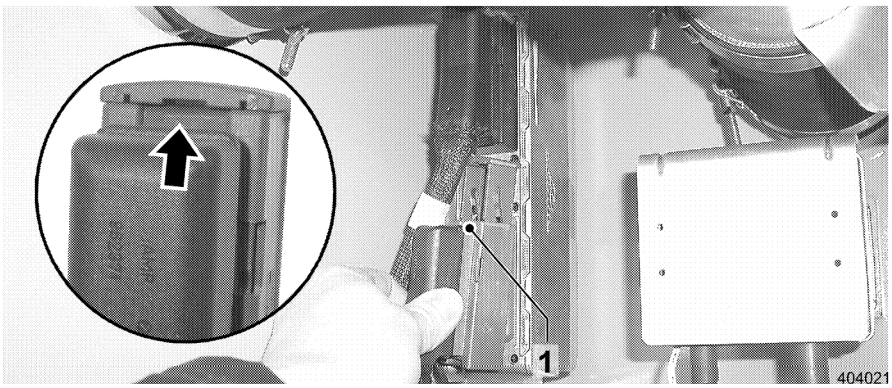
- Turn out the screw 1 on top in the central electrical housing.
- Fold the central electric housing forward.



Electronic boxes

Disconnect the electronic boxes

- Unplug the plugs 2 and 3 from the electronic boxes.



Unplug the plug

- With a screw driver in the recess, push the plug lock 1 upward and unplug the plugs.

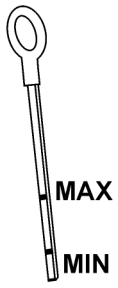
Caution

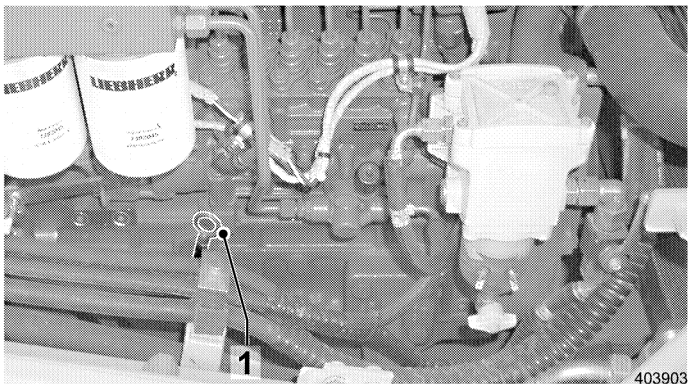
! When reconnecting the plugs, make sure they are inserted into the correct connection as well as locked.
– Due to the plug coding, the plugs cannot be mixed-up.

5.5 Diesel engine

5.5.1 Check the engine oil level

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



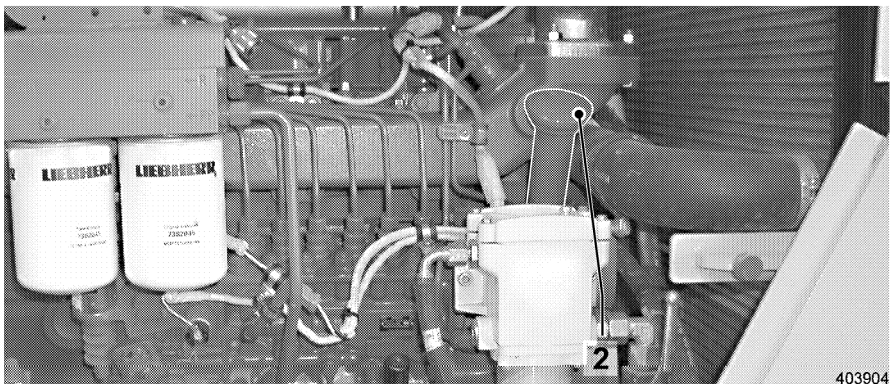


Dipstick

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.



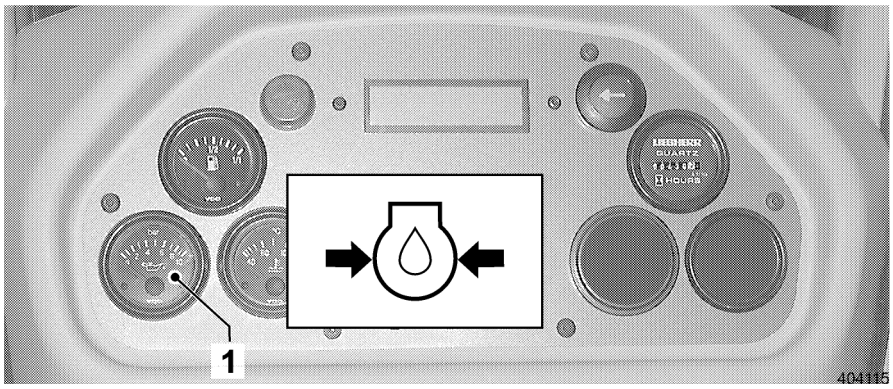
Add oil

If the oil level is too low:

- Remove the oil filler 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.

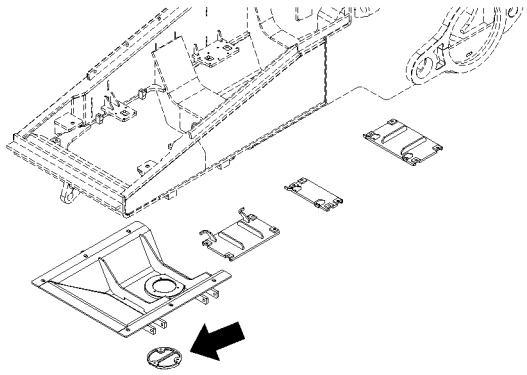
Caution

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 right 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.



404134

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.

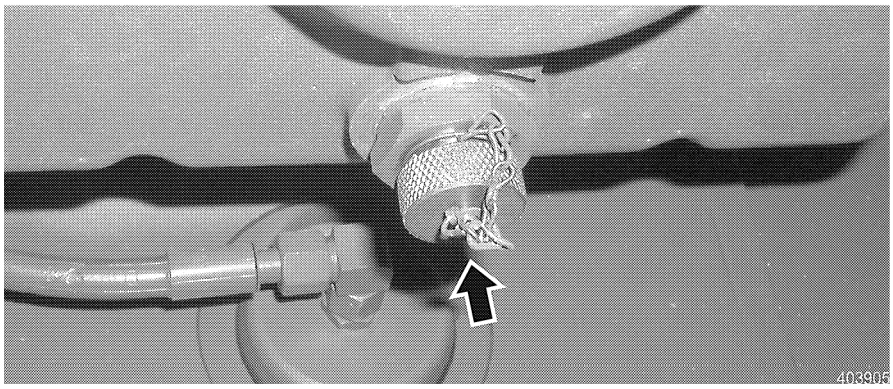
Danger

! 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.



Oil drain valve

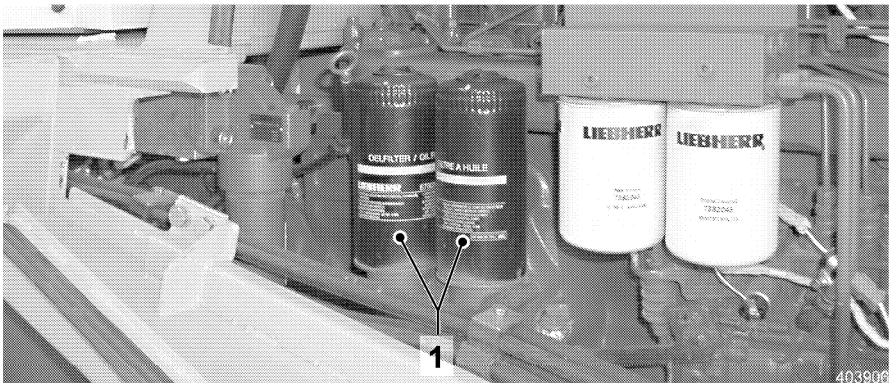
- Attach the oil drain hose to the oil drain valve and drain the oil in a suitable container.
- Remove the oil drain hose and install the cap on the oil drain valve.
- Remove the oil pan cover.

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.

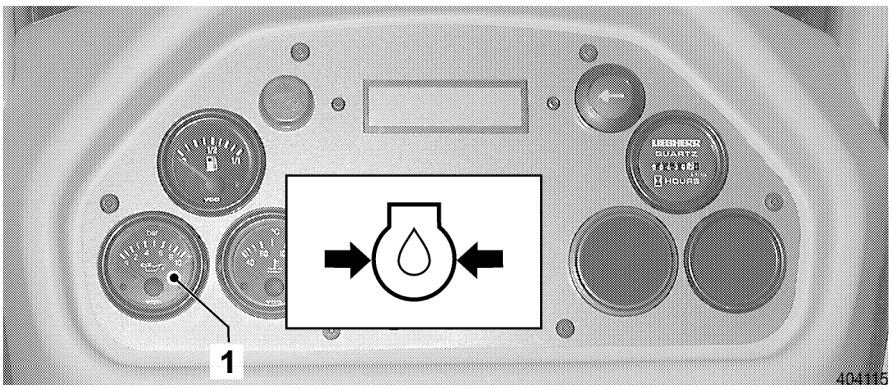
5.5.5 Change the lube oil filter

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



Filter element

- 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.

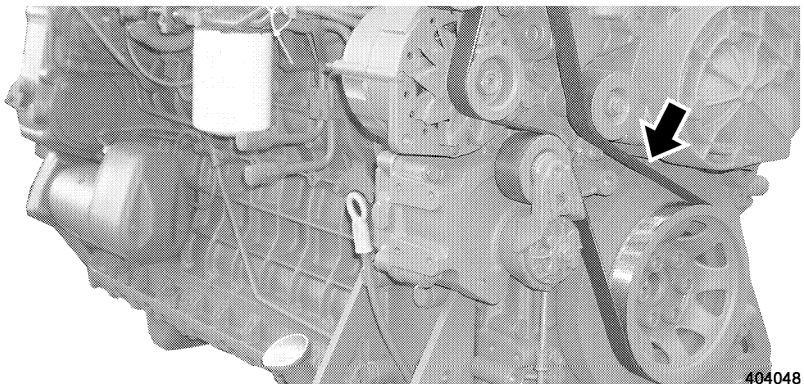


Engine oil pressure gauge

- 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 is self-tensioning and maintenance free. Only the V-belt and the tension pulleys have to be checked for damage and wear.
Access is possible from the left side of the engine.
Always replace torn or damaged belts with new belts.
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.

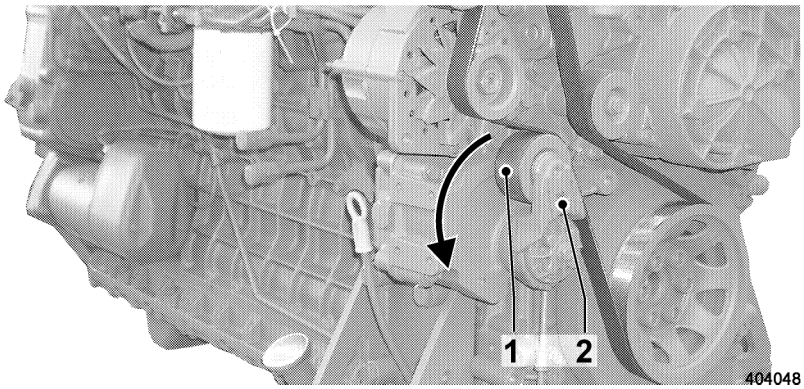


V-belt

Check the V-belt location

- Check the V-belt for cracks or damage.
- Check the belt pulleys and the tension pulley for proper condition and play (for example wear of V-belts, damage of tension pulley).

– If any parts are damaged, replace them immediately!



Change the V-belt

Change the V-belt

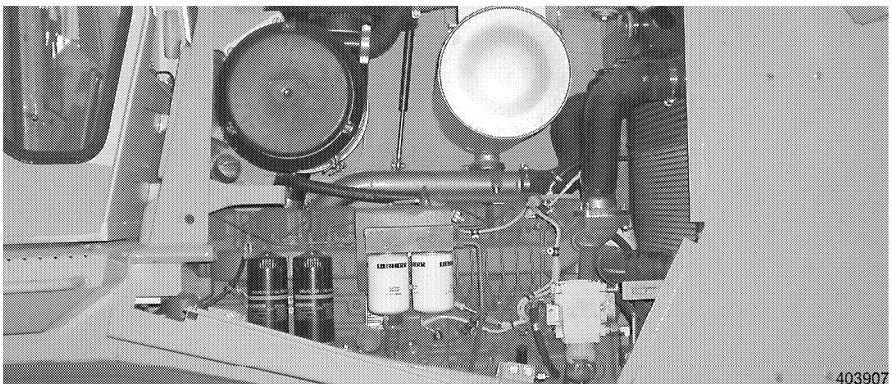
- Insert a ratchet according to DIN 3122 D 12,5 (1/2") into the square hole 1 of the tensioning device 2.
- Swing the tensioning device 2 against the spring force in counterclockwise direction to the stop and remove the V-belt.
- Check the pulleys and the tension pulley for proper condition and play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

– If any parts are damaged, replace them immediately.

- Place the new V-belt with the tensioning device 2 swung back, on each pulley and the tension pulley.
- Return the tensioning device 2 again into 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.

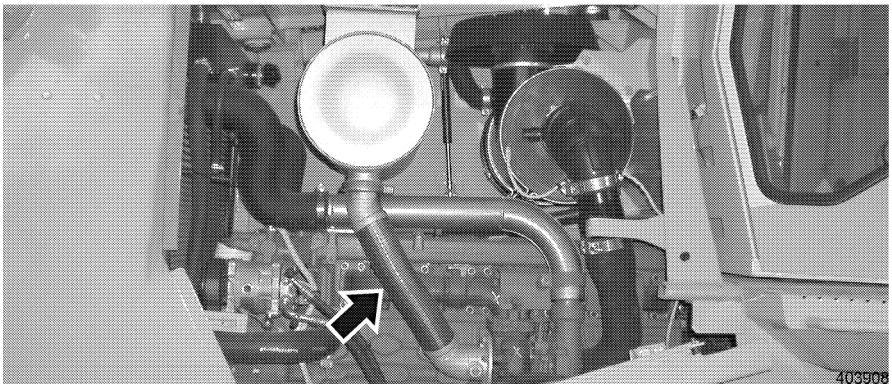


Diesel engine area

- Check the complete engine area for condition and leaks.
  – Check the fuel lines especially careful.
- Replace damaged seals immediately.

5.5.8 Check mounting of intake and exhaust lines

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



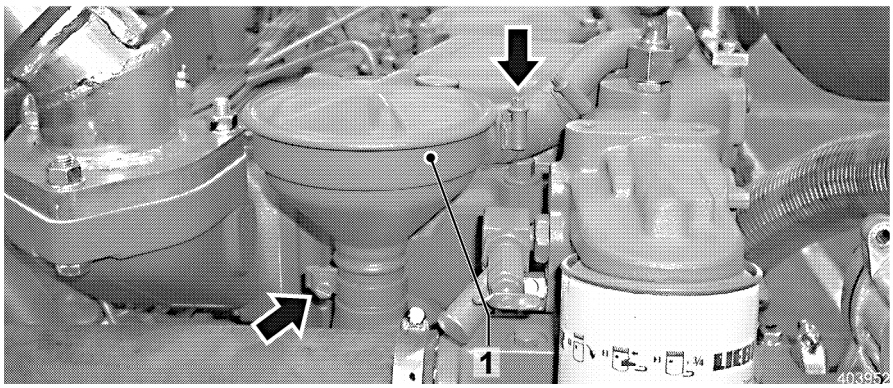
Intake / exhaust lines

- Check the intake lines between turbo charger, charge air 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 vapors emerge from the bleeder bore on the cover.
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



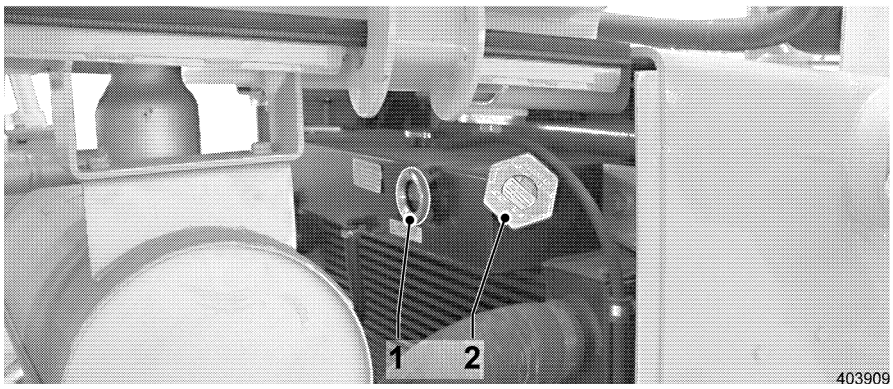
Oil separator

- 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 to the filler neck is provided after opening the right engine compartment door.
Make sure that:
– the machine is in maintenance position,
– the right 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".

403276

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 hot.

Add coolant

- Open the right engine compartment door.
- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open.

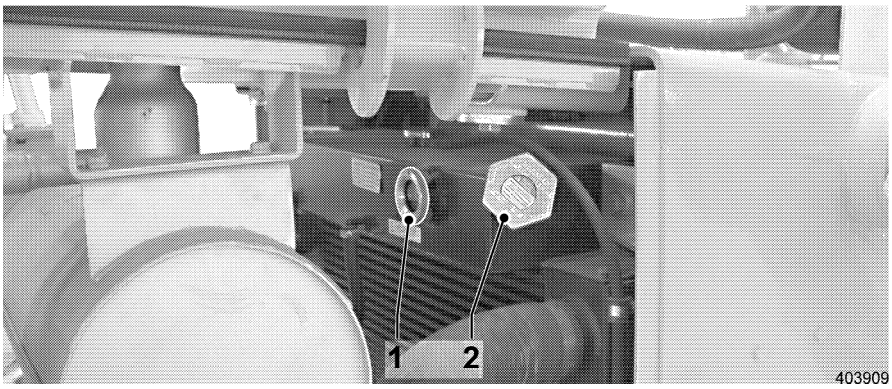
Caution

! Avoid skin contact with the coolant!

! Observe the 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.



403909

Add coolant

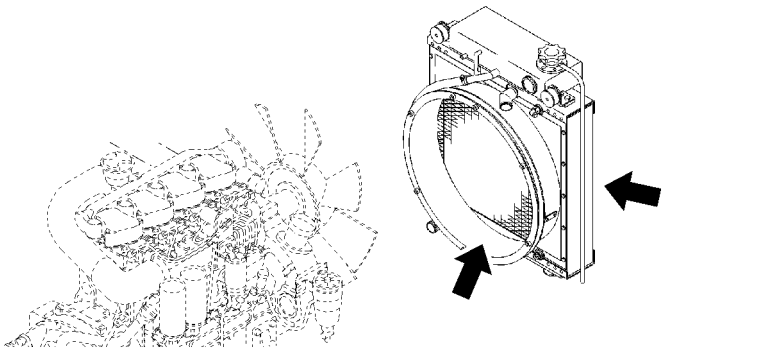
- Add coolant to the center of the inspection port 1.
- Install the cap 2 on the filler neck and tighten.

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 an acoustical and 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.



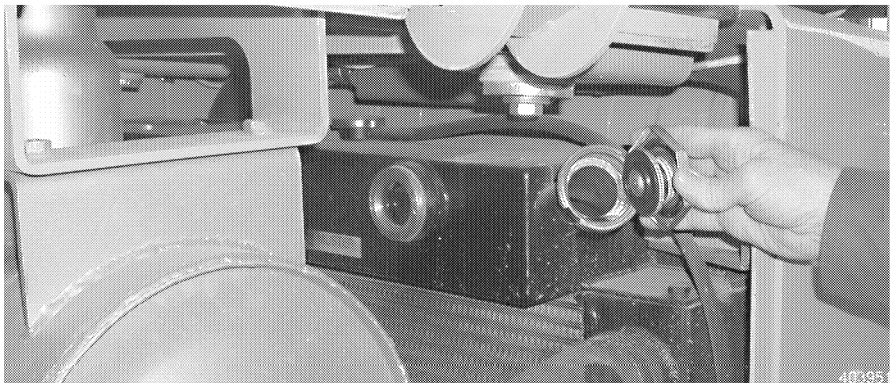
403270

Cooler

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

5.6.3 Check the cooling system

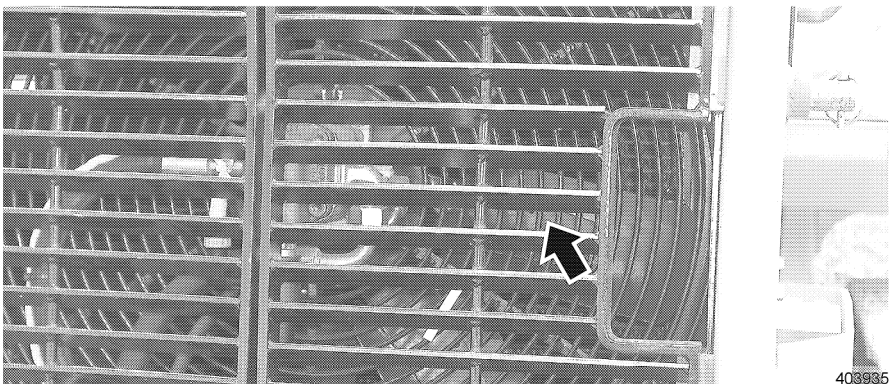
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



Cover

Check the radiator cover

- Check the radiator cover for leaks.



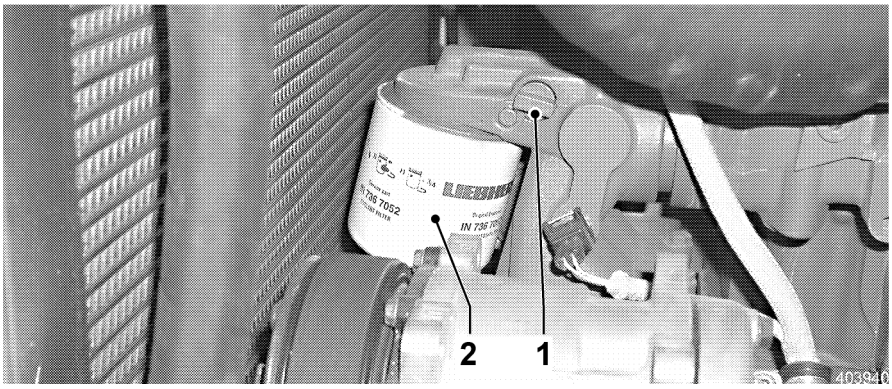
Fan

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 left 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 then in vertical position).

- Loosen the water filter 2 with a filter wrench and remove.
- Clean the sealing surfaces of 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

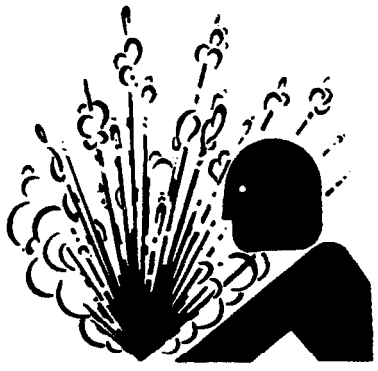
Danger of scalding due to splashing coolant!
! Open the cap on the filler neck 1 only if the engine is cooled off - the coolant temperature gauge on the segment field of the indicator unit should be in the lower third of the segment field.

- Carefully open the cap on the filler neck.
- 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").



403276

Danger of scalding

Caution

Danger of scalding due to splashing coolant!

! The cooling system is hot and under pressure at or near operating temperature.

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

! Open the cap on the expansion tank only if it has cooled off to the point where you can touch it. Then turn the cover carefully to relieve the pressure.

! Never add coolant when the engine is hot!

Drain the coolant

- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open it all the way.

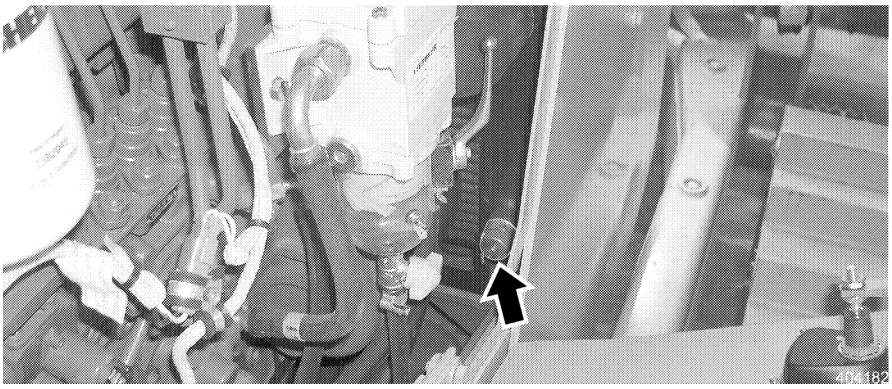
Caution

! Avoid skin contact with coolant!

! Observe the manufacturer's instructions.

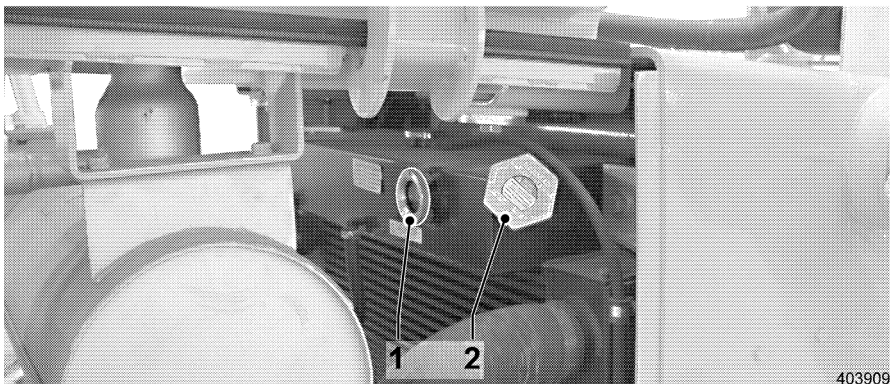
– When mixing coolant, always wear rubber gloves and safety glasses.

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



Drain valve

- Open the right engine compartment door.
- Place the container under the drain valve.
- Remove the cap on the drain valve.
- Install the drain hose (part of the tool box) to the drain valve and drain the coolant into the container.
- Remove the drain hose and install the cap on the drain valve.

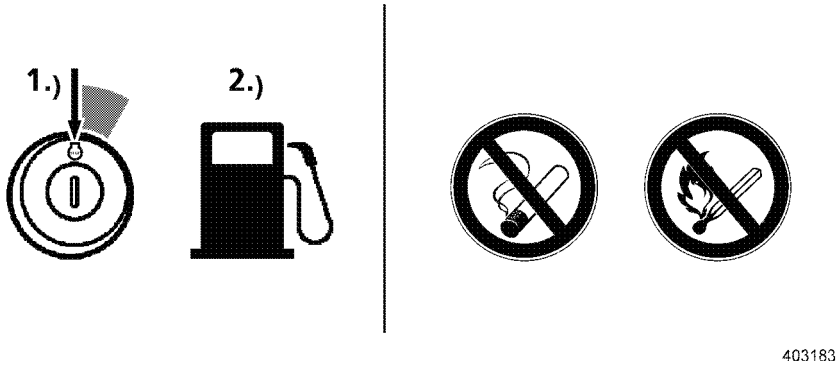


Add coolant

Add coolant

- Add premixed coolant via the filler neck according to the "Lubricant and Service fluid chart" until it reaches the center of sight gauge 1.
- Install the cooler cap 2 on the filler neck and close.
- Close the engine compartment door.
- Set the heater knob to "warm". Start the Diesel engine and let the engine run until it is warm.
- Recheck the coolant level and correct, as necessary.

5.7 Fuel system



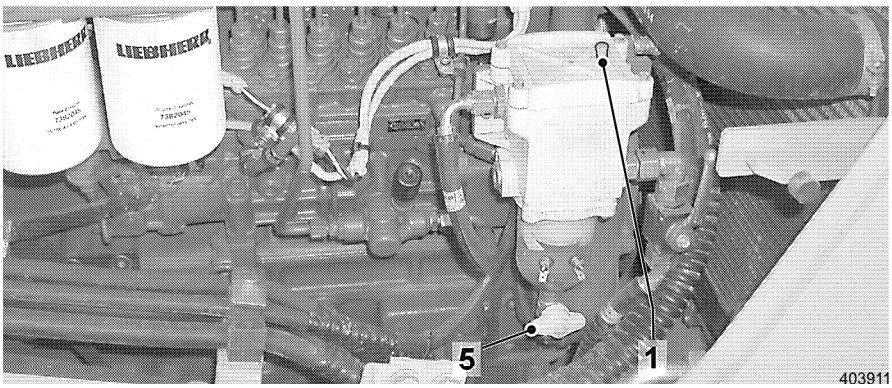
Danger of fire

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.

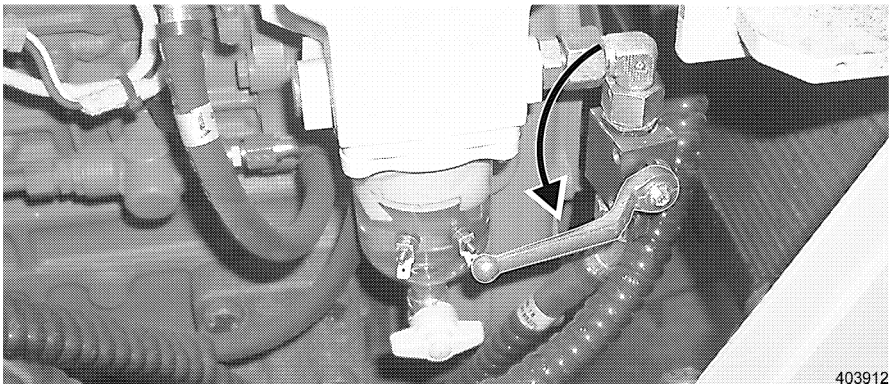


Fuel separator

- 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.



Fuel system - shut off valve

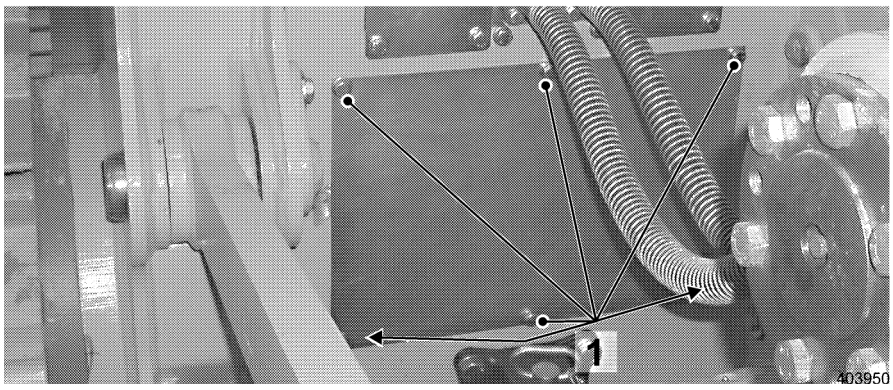
The shut off valve is accessible via the right engine compartment door.

- Close the fuel system shut off valve.

Remove the cover plate on the rear of the machine for access to the drain valve.

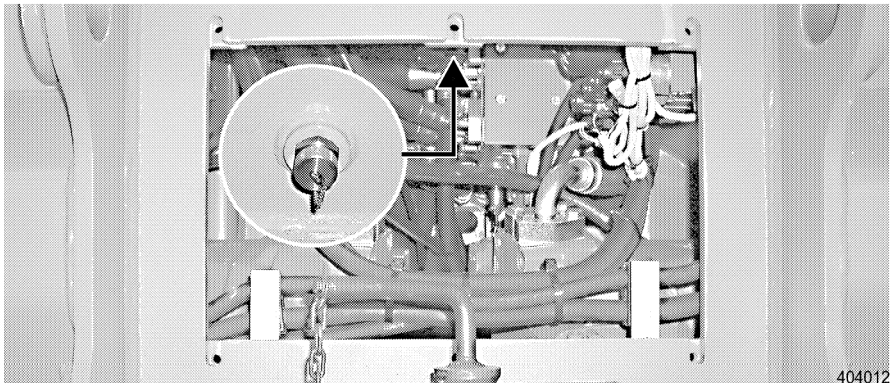
Danger

Danger of accidents if the attachment is raised.
! Never work under the raised attachment.
– Always support the attachment properly or lower it to the ground.



Cover plate

- Remove the hex head screws 1 and remove the cover plate.

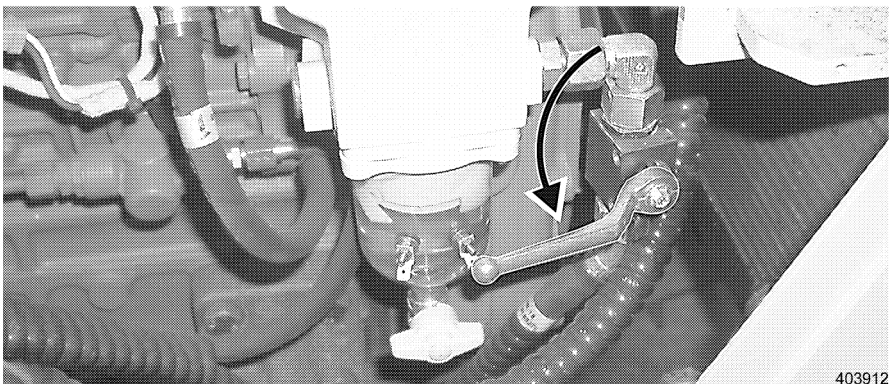


Shut off valve - fuel tank

- Remove the cap on the drain valve on the underside of the fuel tank.
- Install a drain hose to the drain valve.
- Drain the condensation and sediments into a suitable container until clean fuel emerges.
- Remove the drain hose, install the cap on the drain valve and tighten.
- Reinstall the cover plate with the hex head screws.
- Open the shut off valve - fuel system.

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.



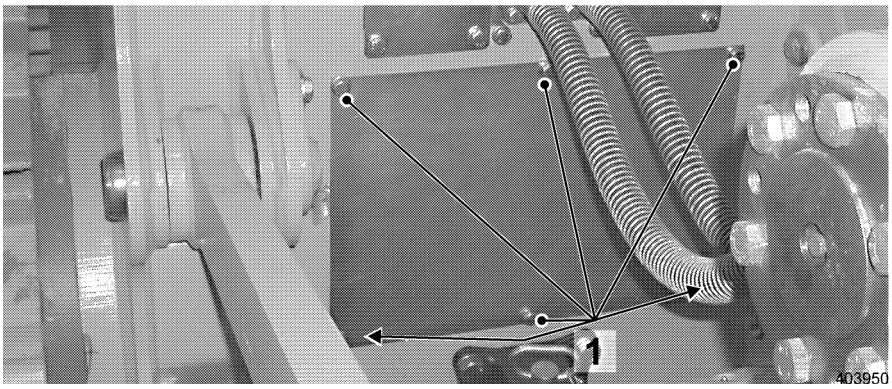
Fuel system - shut off valve

- Close the shut off valve for the fuel system.
- Remove the tank cover.

Remove the cover plate on the rear of the machine for access to the drain valve.

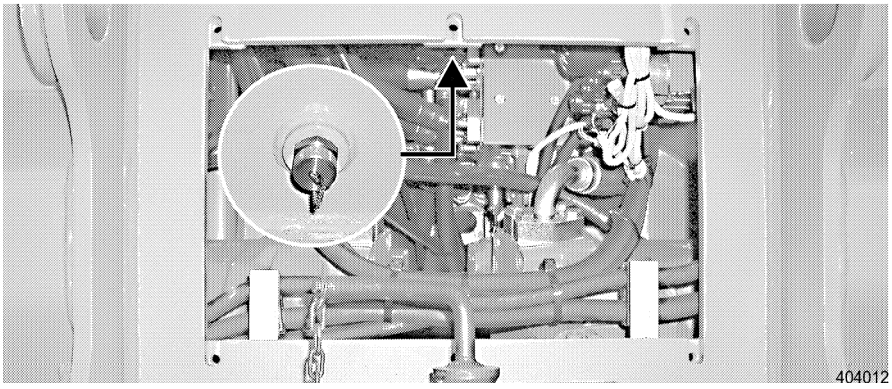
Danger

Danger of accidents if the attachment is raised.
! Never work under the raised attachment.
– Always support the attachment properly or lower it to the ground.



Cover plate

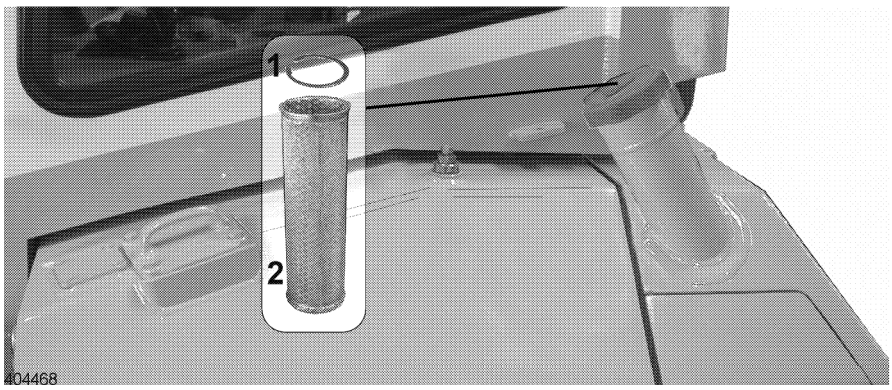
- Remove the hex head screws 1 and remove the cover plate.



Drain valve - fuel tank

- Remove the cap on the drain vale on the underside of the Fuel tank.
- Place a container, which is large enough, under the drain valve.

- Install the drain hose on the drain valve.
- Drain the fuel into the container.
- Remove the drain hose and install the cap on the drain valve and tighten.
- Reinstall the cover plate with the hex head screws.



Fuel tank - filler neck

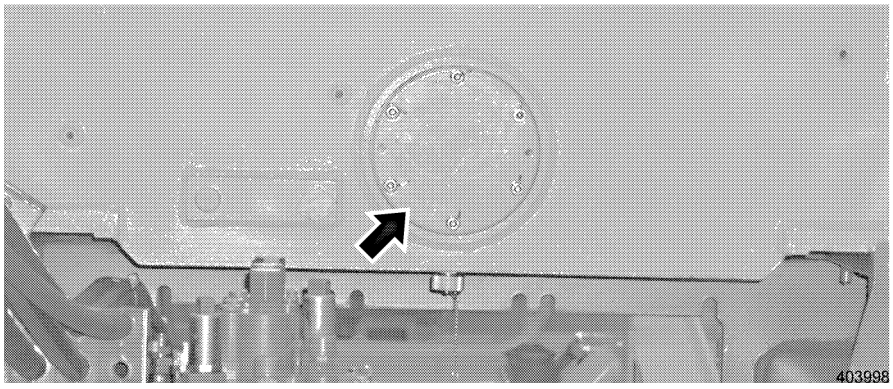
- On the fuel filler neck, remove the ring 1.
- Remove the strainer 2, check the strainer and replace it, if necessary.
- Check the fuel tank.

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.



Cleaning cover

- Raise the cab as described before.

– Access to the cleaning cover is only possible if the cab is raised.

- Remove the cleaning cover.

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

- Clean the fuel tank.
- Install the cleaning cover with O-ring.
- Refill the fuel tank.
- Open the shut off valve - fuel system.

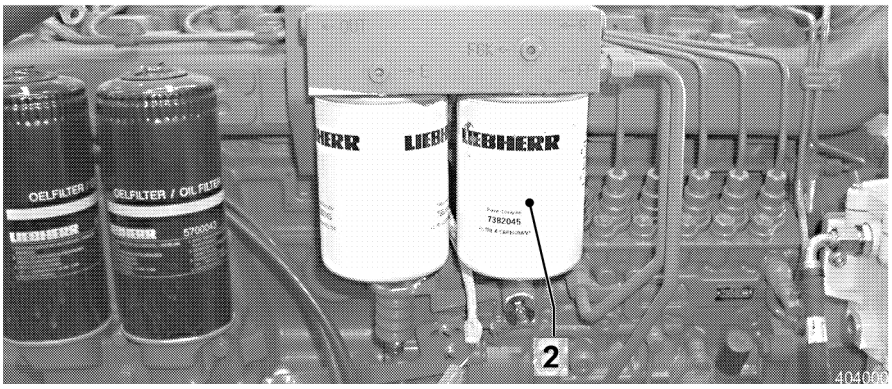
5.7.4 Change the fuel filter elements

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

Fuel fine filter

Fuel fine filter

- Close the shut off valve - fuel system.
- Loosen the filter cartridge 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 the new filter element to the filter console and tighten by hand.
- Open the fuel system shut off valve and bleed the fuel fine filter.



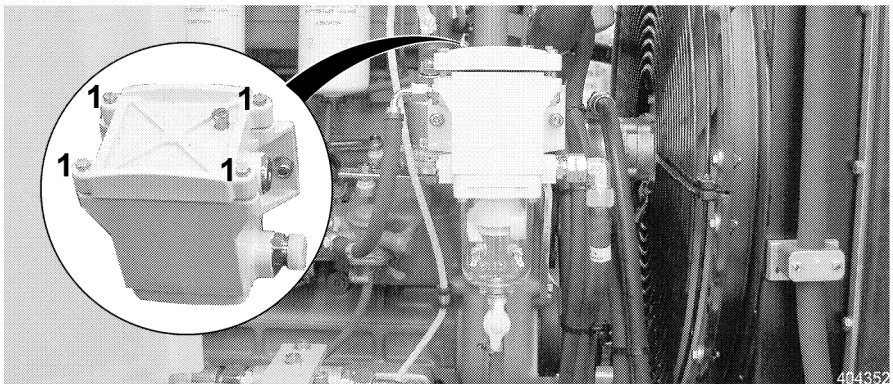
Fuel pre-filter

Fuel pre-filter

- Close the fuel system shut off valve.
- Loosen the filter cartridge 2 with a filter wrench and remove.
- Clean the sealing surface on the filter console.
- Apply a thin layer of engine oil to the rubber seal rings on the new filter elements.
- Install the new filter element to the filter console and tighten by hand.
- Open the fuel system shut off valve and bleed the fuel pre-filter.

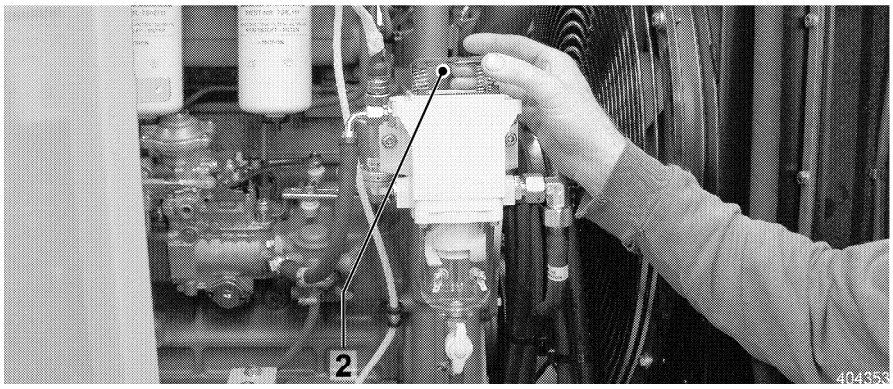
5.7.5 Clean the fuel separator

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



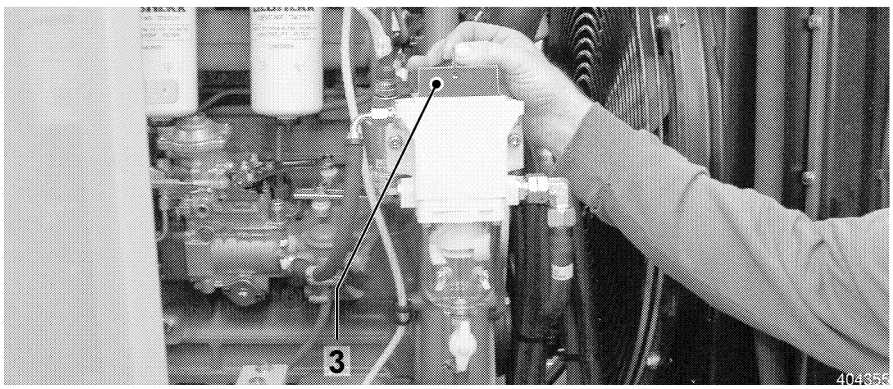
Remove the cover

- 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

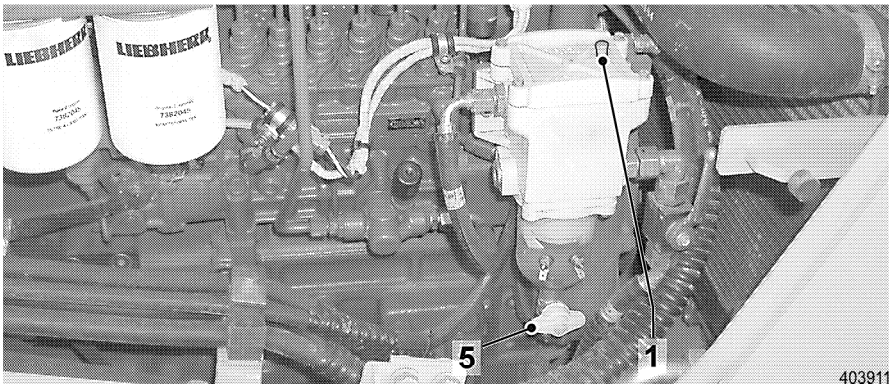
- Remove the strainer 3 and clean or replace it.
- Drain the fuel from the water separator.
- Refill the fuel water separator with clean fuel.

- Check the seal and reassemble the water separator in reverse order.

5.7.6 Bleed the fuel system

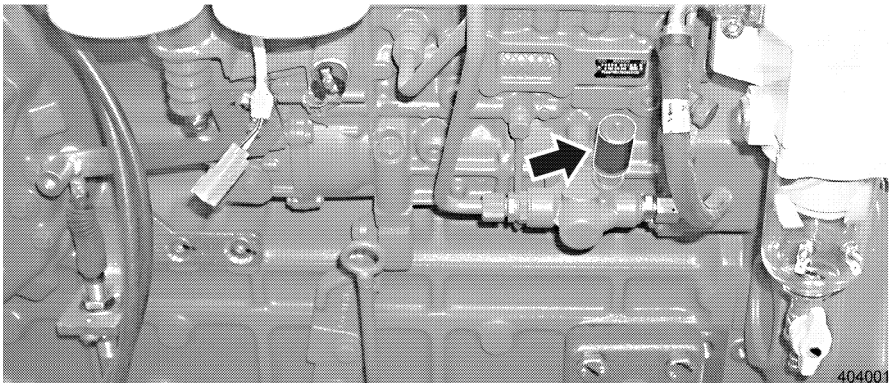
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.
The fuel system must be bled after:

- changing the fuel filter.
- cleaning the fuel tank.
- repairing the fuel system.
- emptying the fuel tank.



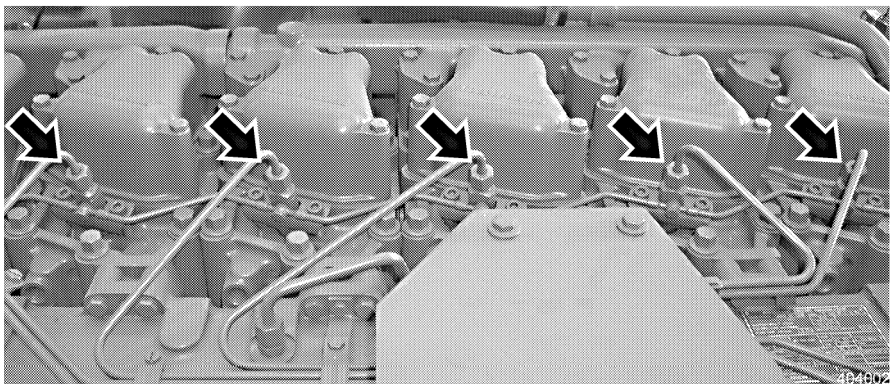
Bleeder screw - fuel water separator

- Loosen the bleeder screw 1 on the fuel water separator by 2-3 turns.



Hand pump

- Actuate the hand pump until fuel free of air bubbles emerges on the bleeder screw 1.
- Retighten the bleeder screw 1.



Union nuts

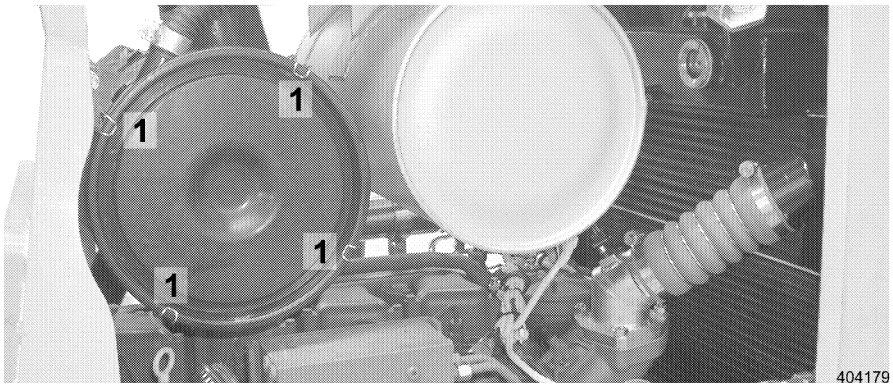
- Loosen the union nuts on the fuel injector valves.
- Close the engine compartment doors.
- Actuate the starter switch until fuel without air bubbles emerges. Retighten the union nut.

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

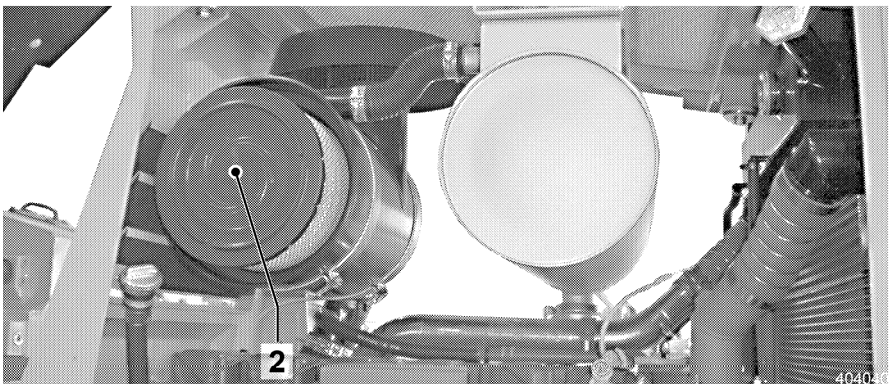
5.8.1 Clean / change the air filter

Clean or change the primary 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 primary element, then the safety element must also be changed.
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



Mounting clamps

- Open the mounting clamps 1 on the service cover and remove the cover.



Primary filter element

Primary filter element

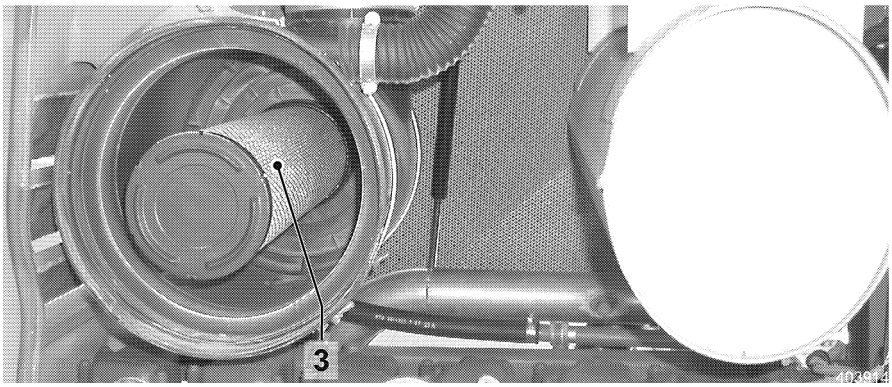
- Remove the primary filter element 2, clean or change it.

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.



Safety element

Safety element

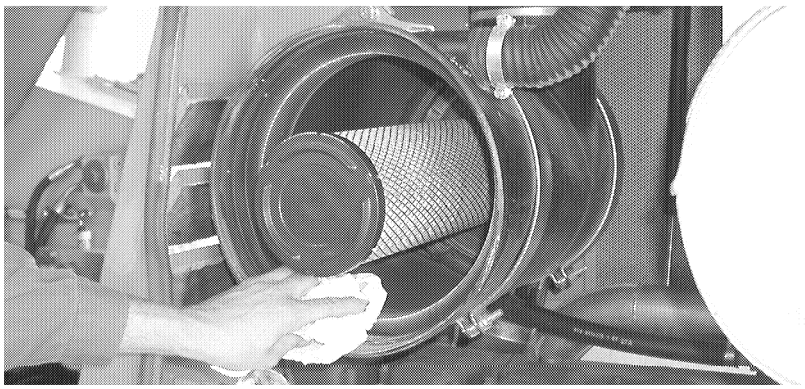
- The safety element 3 should be changed after the primary filter element 2 has been changed three times or whenever the primary filter element 2 is replaced.

– The safety element may not be cleaned!

Caution

Danger of damage to the Diesel engine.
! NEVER operate the machine without the air filter.

- Make sure that any dirt in the filter housing is removed before a new or cleaned filter element is reinserted.



Clean the filter housing

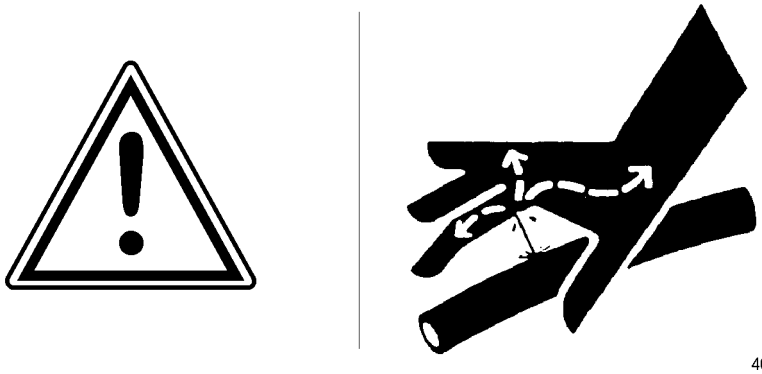
Clean the filter housing

- 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 elements 3 and 2, make sure they are seated correctly.
- Clean the service cover and install on the filter housing. The cover must be seated all the way on the filter housing before the mounting clamps 1 can be closed easily.
- Close the mounting clamps 1.

5.9 Hydraulic system



Hydraulic pressure

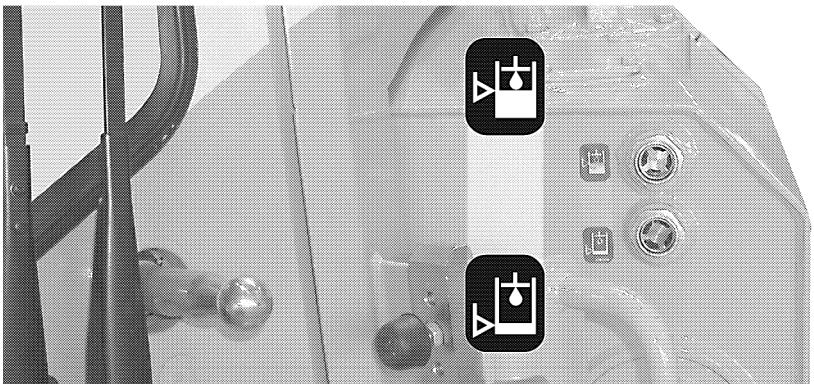
Caution

! 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.



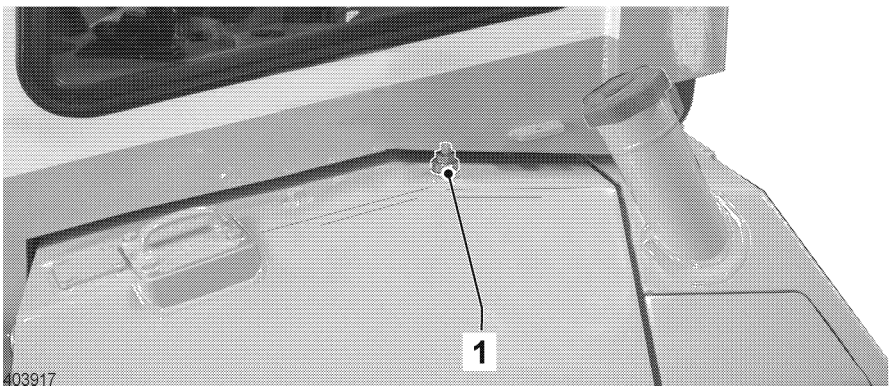
Sight gauges

Check the oil level

- 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.

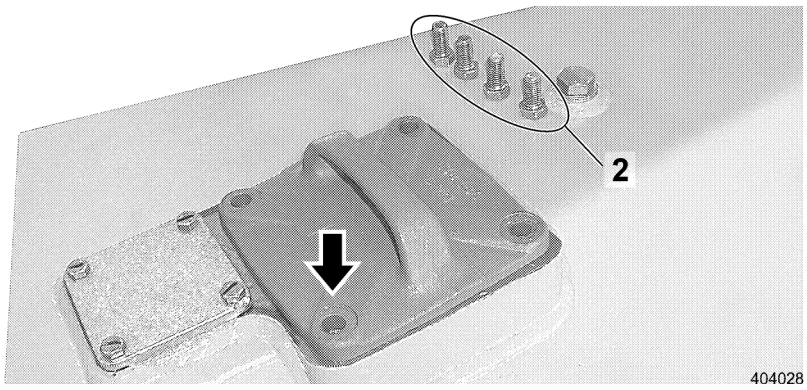


Hydraulic tank - bleeder screw

Add hydraulic oil

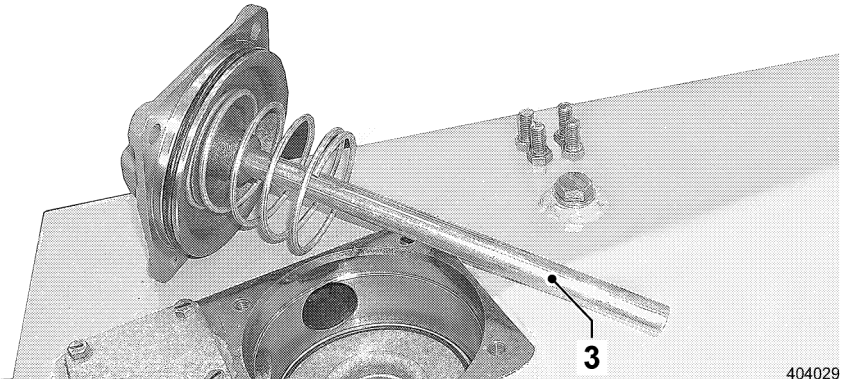
- Relieve tank pressure: turn out the bleeder screw 1 on the hydraulic tank by two turns.

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

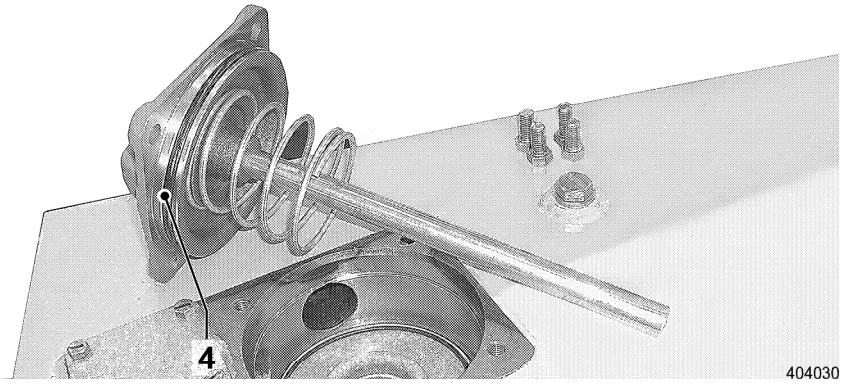
- Check the magnetic rod 3 and clean, if necessary.

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.



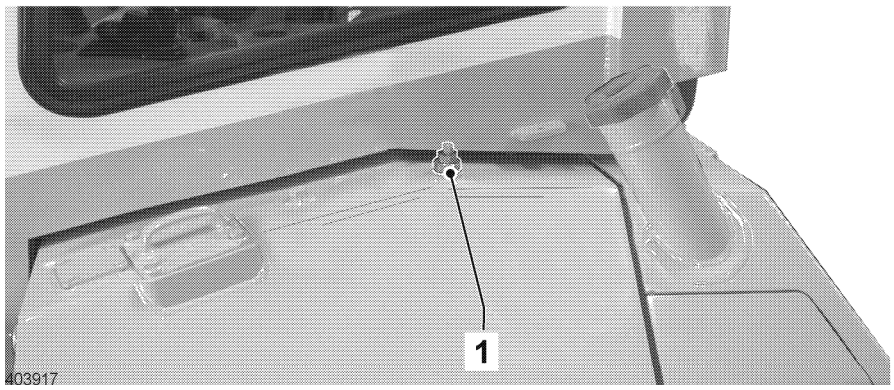
O-ring

- Check the O-ring 4 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.

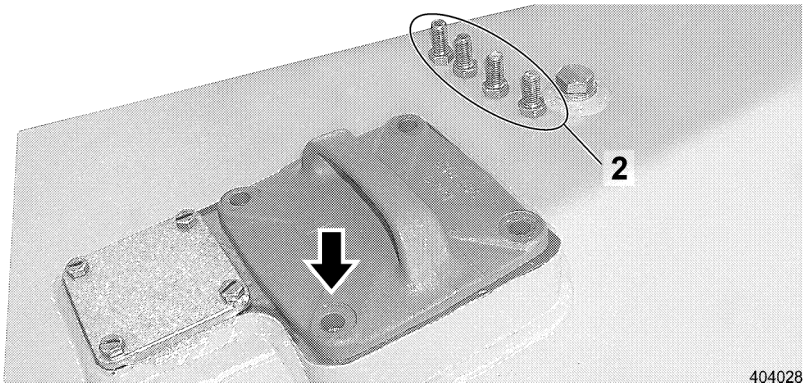
5.9.2 Clean the magnetic rod on the hydraulic tank

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.



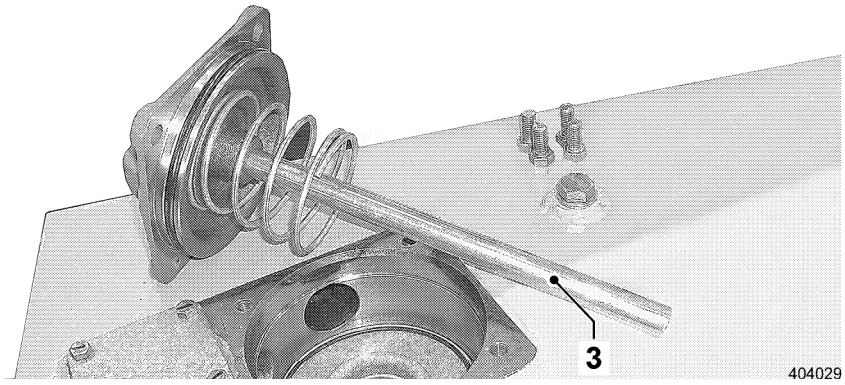
Filter cover

- Loosen the screws 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 can point to damage in the hydraulic system.

- In this case, find the problem and fix the damage in the hydraulic system.

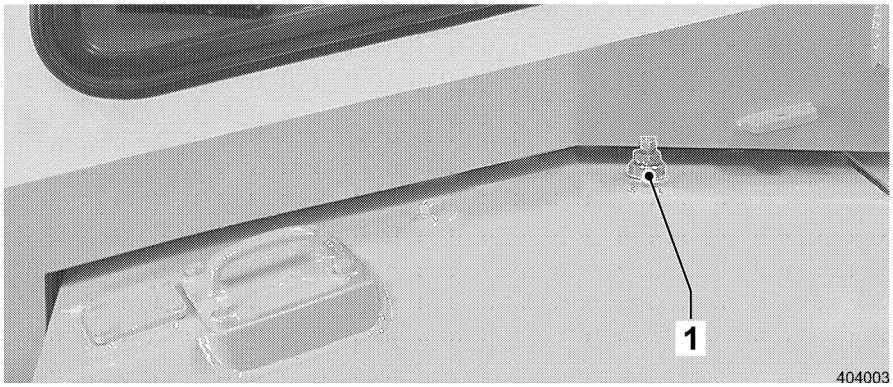


Magnetic rod

- Carefully clean the magnetic rod 3.
- 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 on the hydraulic tank.

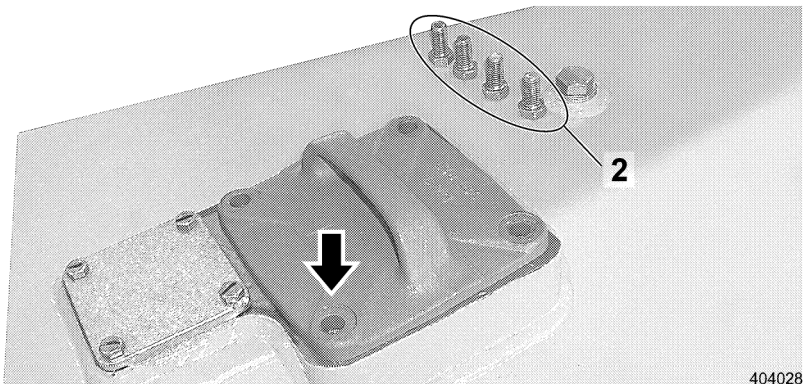
5.9.3 Change the return filter insert

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.



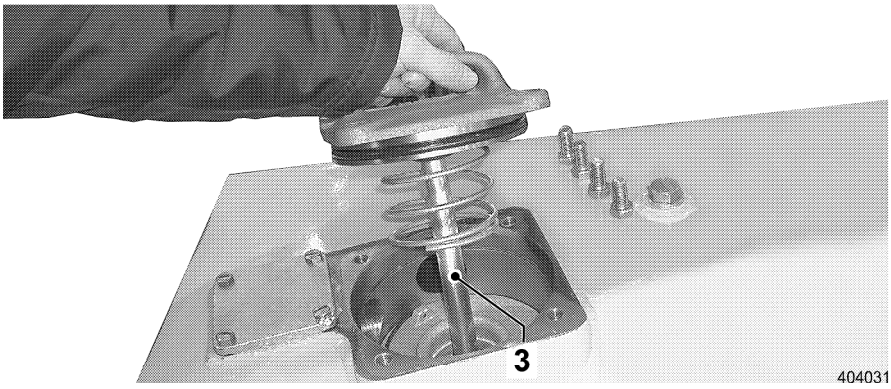
Filter cover

- Loosen the screws 2 on the filter cover and slowly lift off the filter cover with the magnetic rod.

Troubleshooting

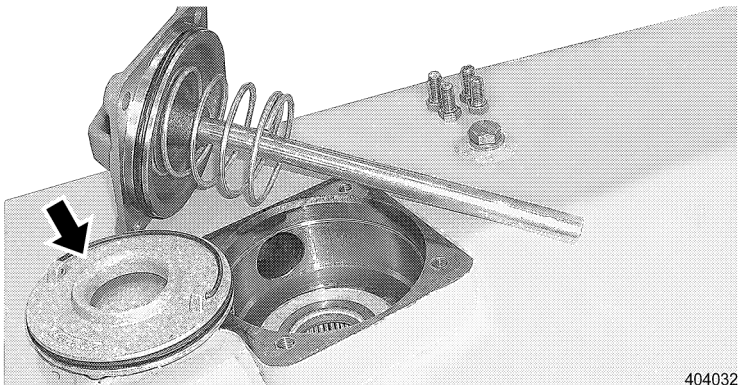
Heavy contamination or larger metallic particles on the magnetic rod can point to damage in the hydraulic system.

- In this case, find the problem and fix the damage in the hydraulic system.



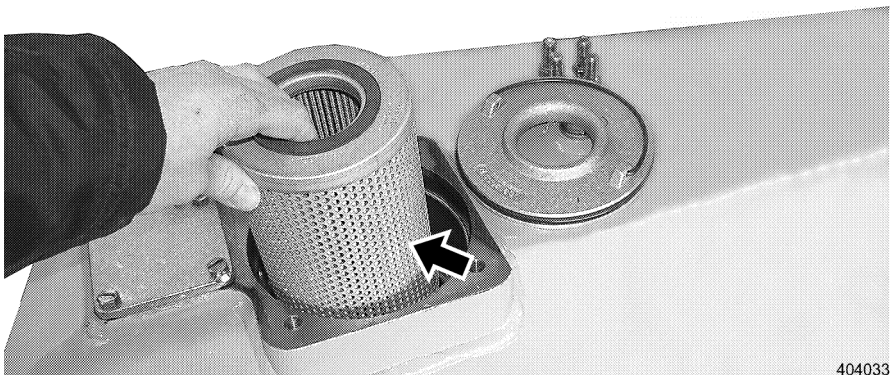
Magnetic rod

- Remove the filter cover with spring and magnetic rod 3.



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.

5.9.4 Change the replenishing oil filter

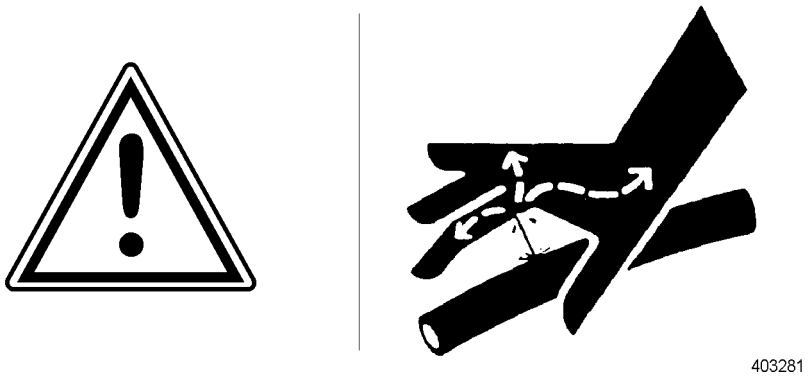
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open,
– a LIEBHERR oil filter element is available.

Replenishing oil filter

- Remove the filter element 1 with a filter wrench and dispose of it properly.
- Clean the threads and the sealing surfaces on the filter console.
- Apply a thin layer of engine oil to the threads and the sealing surface on the filter as well as to the seal rings on the new filter element.
- Set the filter element onto the receptacle.
- Tighten the filter housing all the way and then back out by 1/4 turn.

! The sealing action is not improved by tightening it more!

5.9.5 Check the hydraulic system for function and leaks



403281

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".

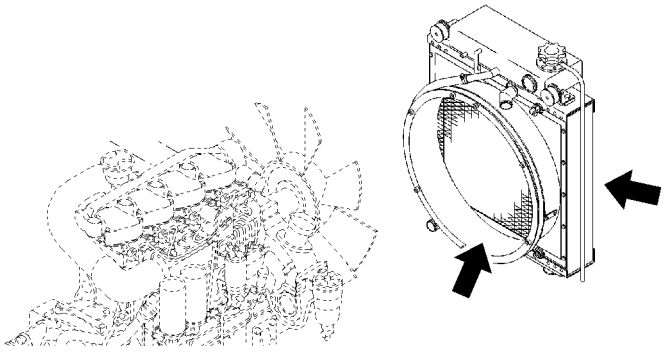
- See also "Safe maintenance of hydraulic hoses and lines".
- Check the complete hydraulic system for leaks.
- Replace defective hydraulic seals and hoses.
- Tighten loose hydraulic connections.

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 doors are open.

Caution

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



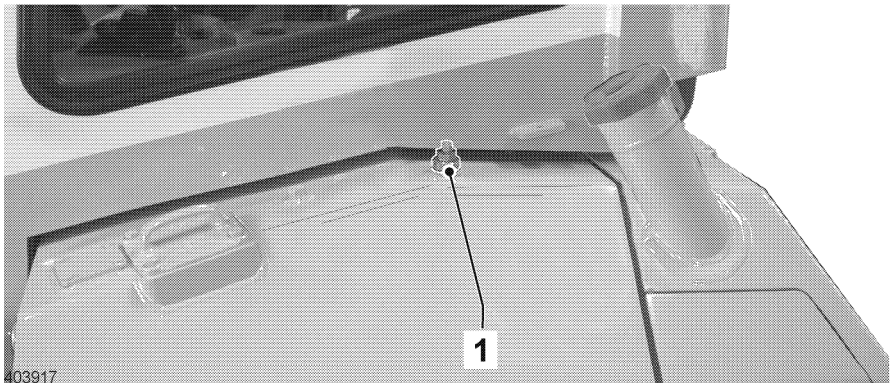
403270

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

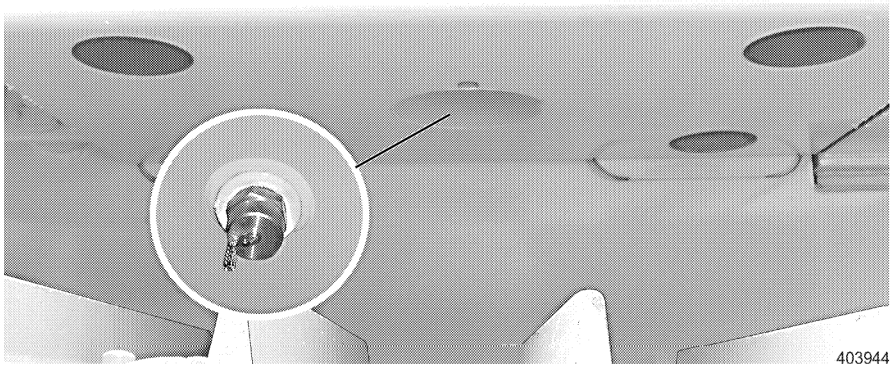
Make sure that:
– the machine is at operating temperature,
– the machine is in maintenance position,
– a suitable container is available,
– oil with the correct oil specification and quantity according to the data in "Lubricants and Service fluids " is available.



403917

Hydraulic tank bleeder screw

- Relieve the tank pressure: Back out the bleeder screw 1 by two turns.

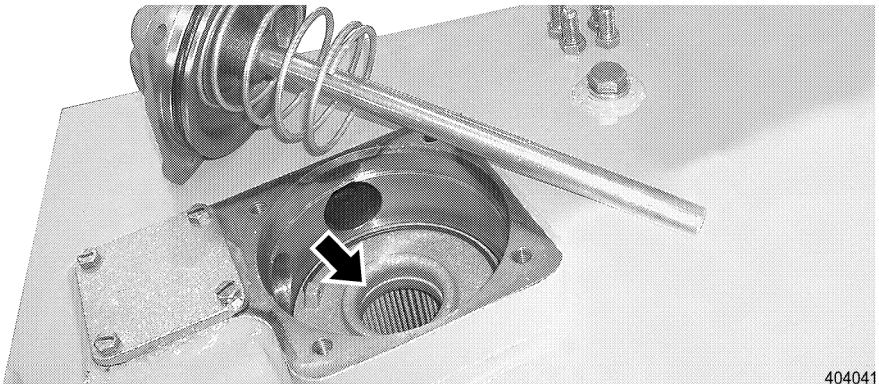


403944

Hydraulic tank oil drain valve

- Remove the cap on the drain valve on the underside of the hydraulic tank.

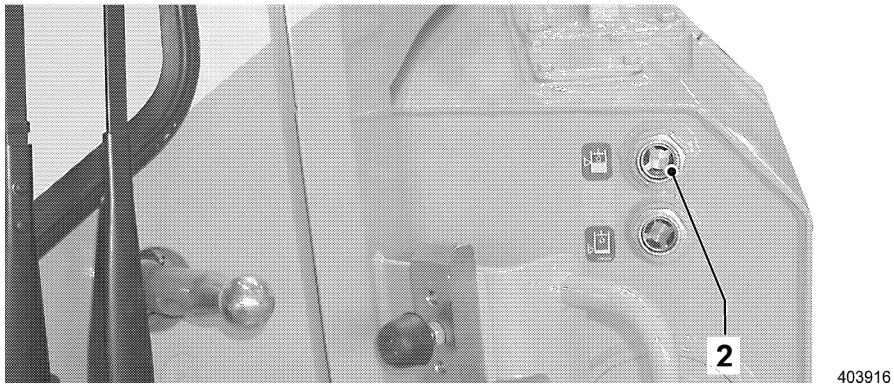
- Install the drain hose to the drain valve.
- Drain the hydraulic oil into a suitable container.
- Remove the drain hose and install the cap on the drain valve and tighten.



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.



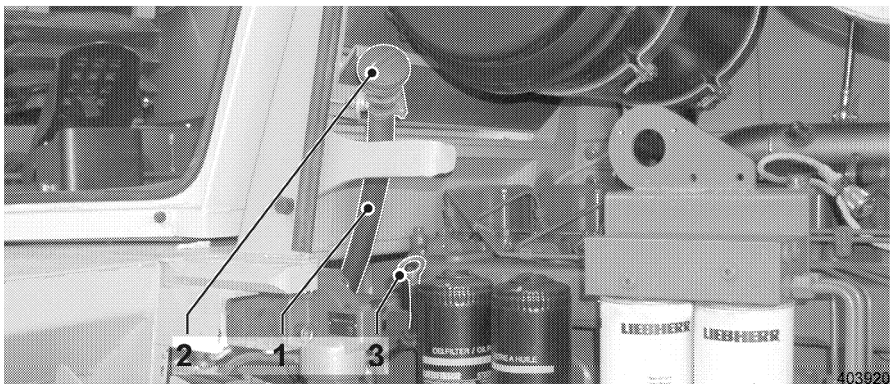
Oil level mark

- Add hydraulic oil to the oil level mark 2.
- Install the cover with spring onto the housing and tighten.
- Tighten the bleeder screw.

5.10 Splitterbox

5.10.1 Check the oil level

The dipstick 3 and the oil filler tube 2 are in the engine compartment on the right hand side of the engine.
Make sure that:
– the machine is in maintenance position,
– the engine compartment door is open.



Oil filler neck - dipstick

- Pull out the dipstick 3, wipe it off and reinsert it.
- Pull the dipstick 3 out again and check the oil level. The oil level must be between the MIN and MAX mark.

If the oil level is too low:

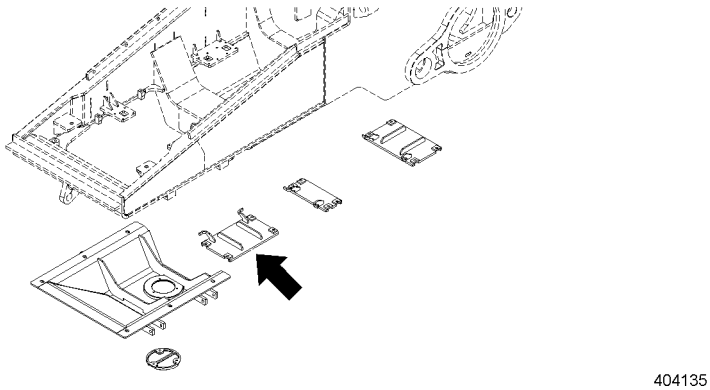
- Remove the oil filler cap 2 from the oil filler tube 1 and add oil.

For oil quality, see "Lubricants and Service fluids".

- Clean the cap on the oil filler tube and set the oil filler tube on the splitterbox and tighten.

5.10.2 Change the gear oil

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



Oil pan cover

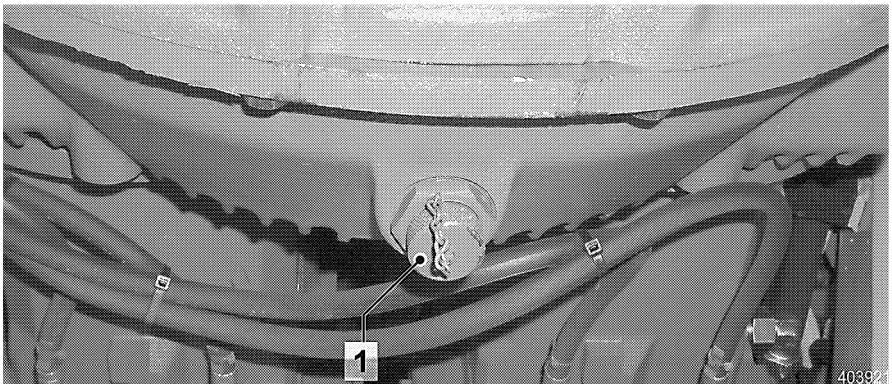
- Remove the oil pan cover.

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

Danger

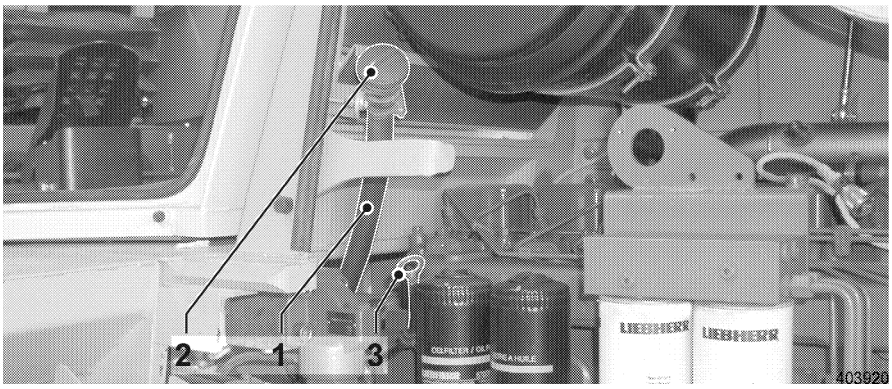
! Danger of injury when removing the oil pans.
Due to space restrictions and heavy weight of the oil pans, removal is very difficult.
To remove the oil pans, use a suitable lifting device.

- Remove the cap 2 on the oil filler tube.
- Remove the cap on the oil drain valve on the oil pan.



Oil drain valve

- Install the oil drain hose on the oil drain valve 1 and drain the oil into a suitable container.
- Remove the oil 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 to the MAX mark on the dipstick.
- Clean the filler cap, set it on the filler neck and tighten.

5.11 Electrical system

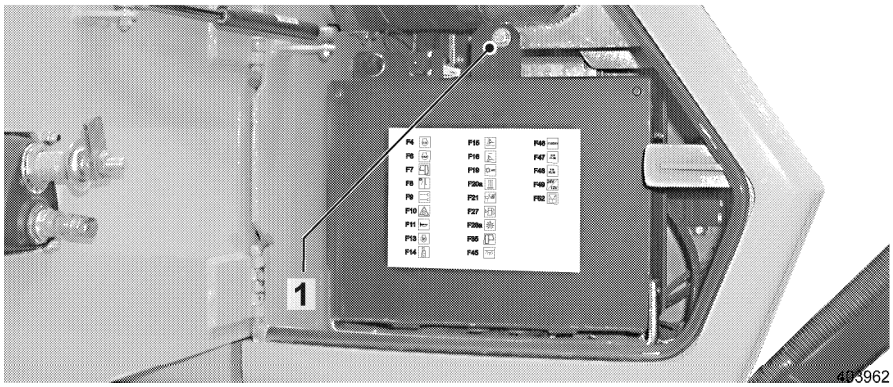
When working on the electrical system of the machine and before any welding on the machine, always disconnect the battery.

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

Disconnect the battery and remove the electronic boxes before any arc welding on the machine.

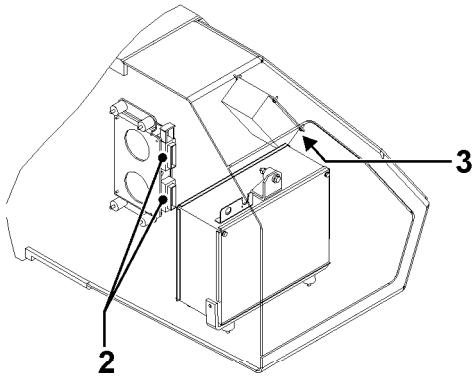
Electronic boxes The electronic boxes are installed in the central electric housing.

Fold the central electric housing out to gain access to the electronic boxes.



Central electric housing

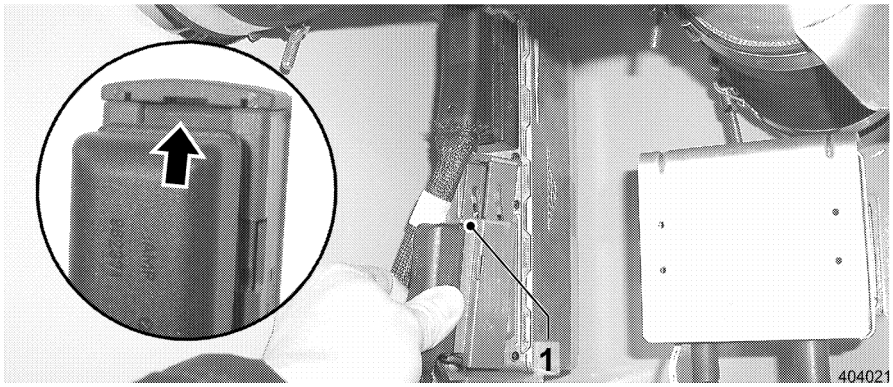
- Turn out the screw 1 on top in the central electrical housing.
- Fold the central electric housing forward.



Electronic boxes

Disconnect the electronic boxes

- Unplug the plugs 2 and 3 from the electronic boxes.



Unplug the plug

- With a screw driver in the recess, push the plug lock 1 upward and unplug the plugs.

Caution

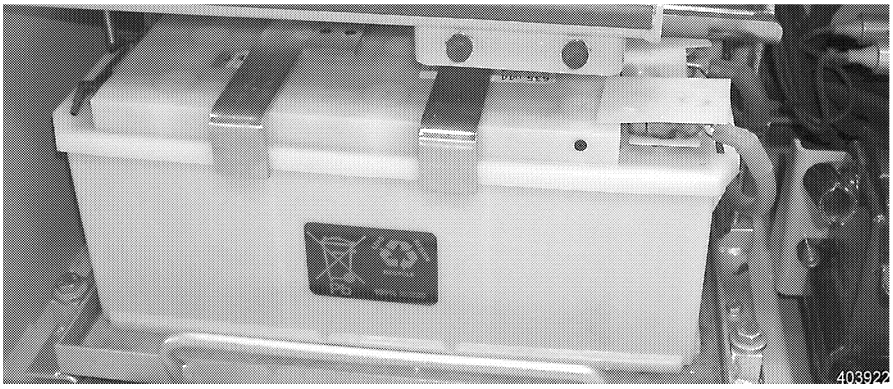
! When reconnecting the plugs, make sure they are inserted into the correct connection as well as locked.
– Due to the plug coding, the plugs cannot be mixed-up.

5.11.1 Check the indicator lights and illumination

For the location of the lights and the indicator lights on the indicator unit, see chapter "Operation".

- Start the Diesel engine and check the lights and indicator lights to ensure they work.

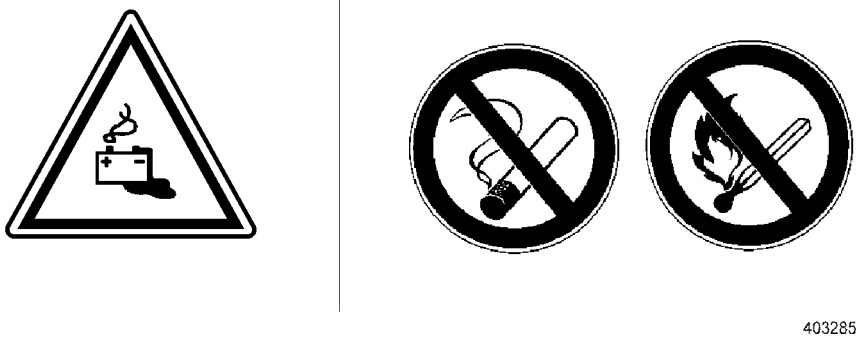
5.11.2 Batteries



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.
For better access, the battery pan can be pulled out after removing the mounting screws.
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.



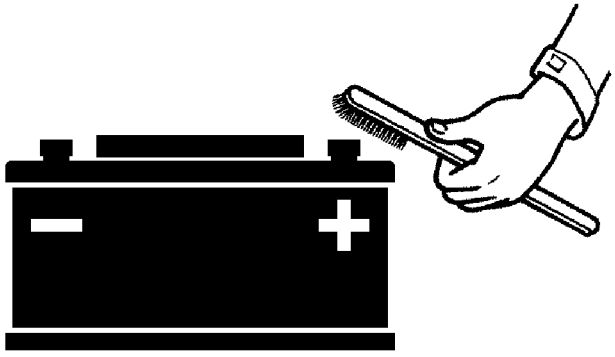
Explosive vapors

Caution

Batteries discharge explosive vapors. Battery acid has severe caustic properties and can cause severe 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.



403286

Special brush for terminals

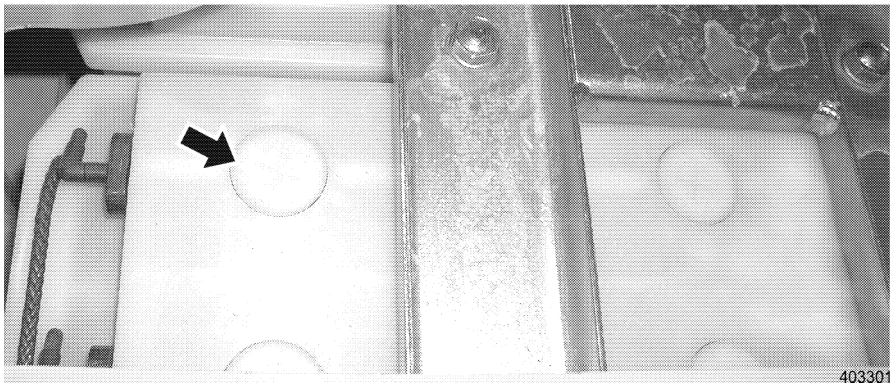
Caution

Danger of spark formation and explosion!

! Use the special brush to clean the terminals.

- 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.



403301

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 the bulbs

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

Halogen lights

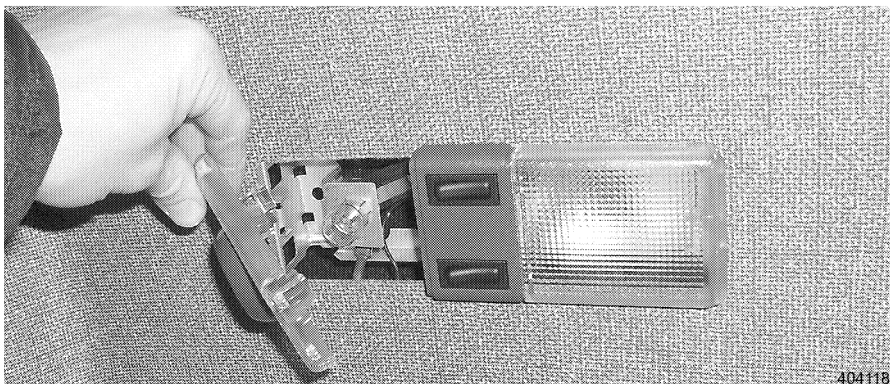
Change the halogen bulbs in the halogen lights

- 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.



Interior lighting / reading light

Change the bulb

- Remove the diffuser.
- Remove the bulb from the base and replace with new bulb.

– Do not touch the new bulb with bare fingers.

- Insert the new bulb.
- Insert the diffuser and push up.

5.12 Heating and fresh air system, air conditioning system

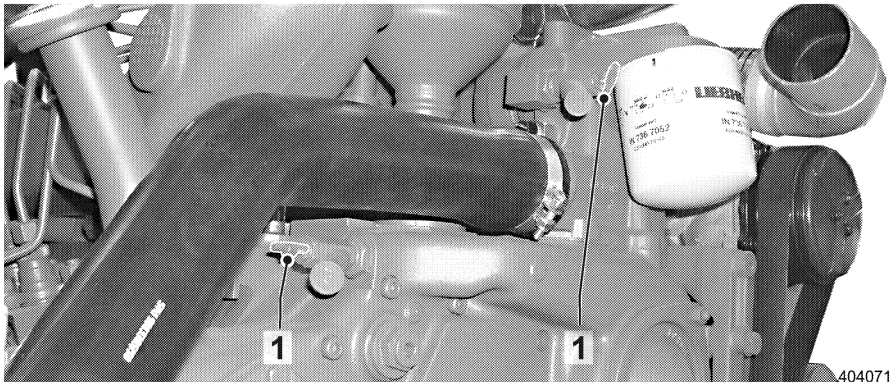
The following checks must be made regularly, but at least once a year before the start of the cold season.

5.12.1 Check the heater for function and leaks

Check for leaks

- Check all water circuit connections for leaks.
- Check all clamps and tighten them, if necessary.

– Replace damaged hoses.

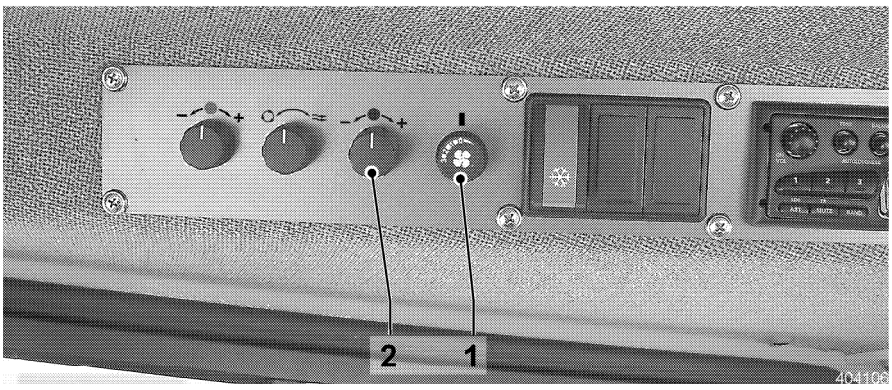


Shut off valves

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.

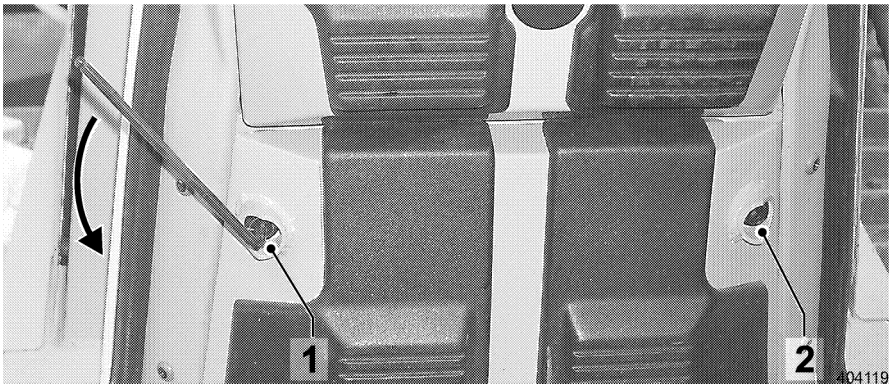
– Operate the heater to ensure that the coolant fluid contains sufficient antifreeze fluid. See "Check antifreeze and DCA-4 concentration in coolant".

5.12.2 Heater - fresh air filter

Make sure that the machine is in maintenance position.

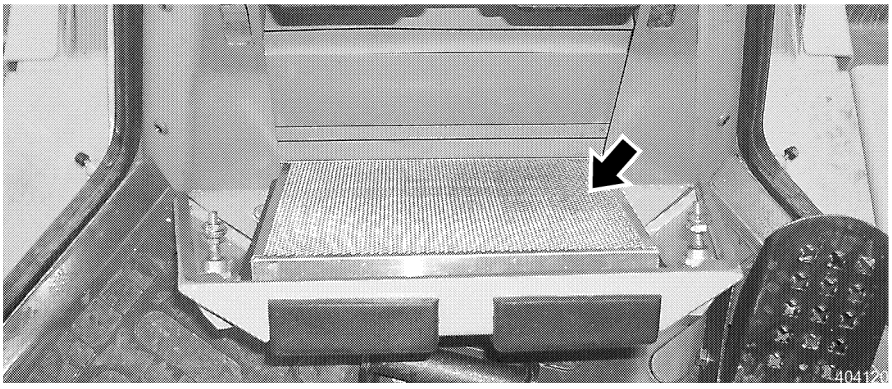
Clean / change the fresh air filter

Access to the fresh air filter for the cab is at the front in the operator's cab, below the compartment for the machine documentation.



Locks

- Use a socket wrench to open locks 1 and 2.



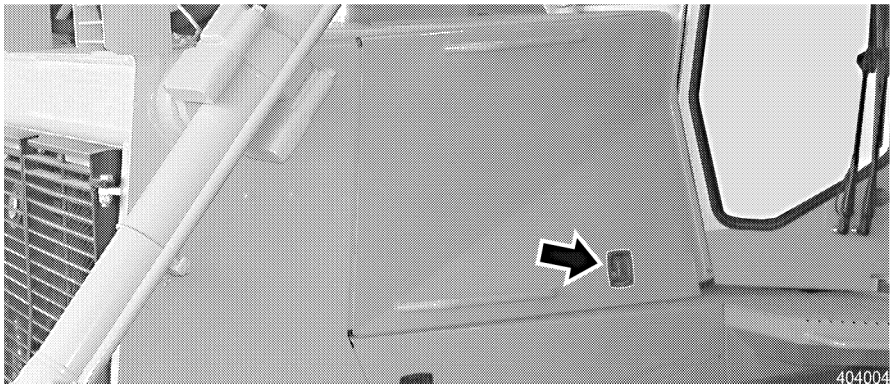
Location of cab fresh air filter

- Fold the cover back.

- Pull out the filter and remove.
- Clean the filter (blow out) or change, as necessary.
- Reinsert the cleaned or new filter.
- Fold the cover up and lock with the quick locks.

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 coolant 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

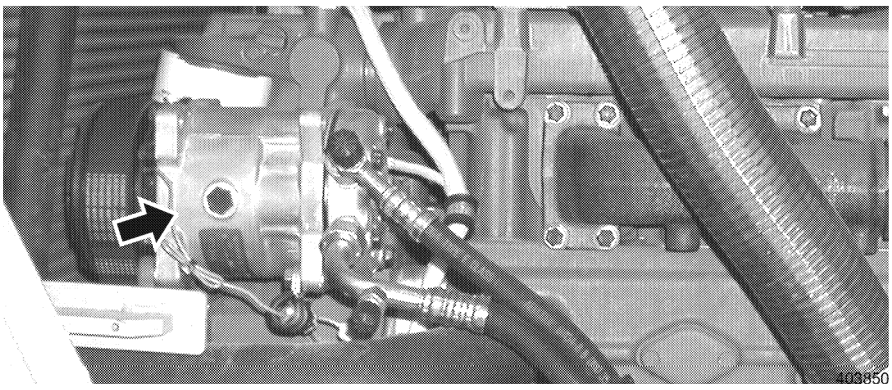
Compressor mounting

- Open the left engine compartment door.

Open only if the engine is at a standstill!

Danger

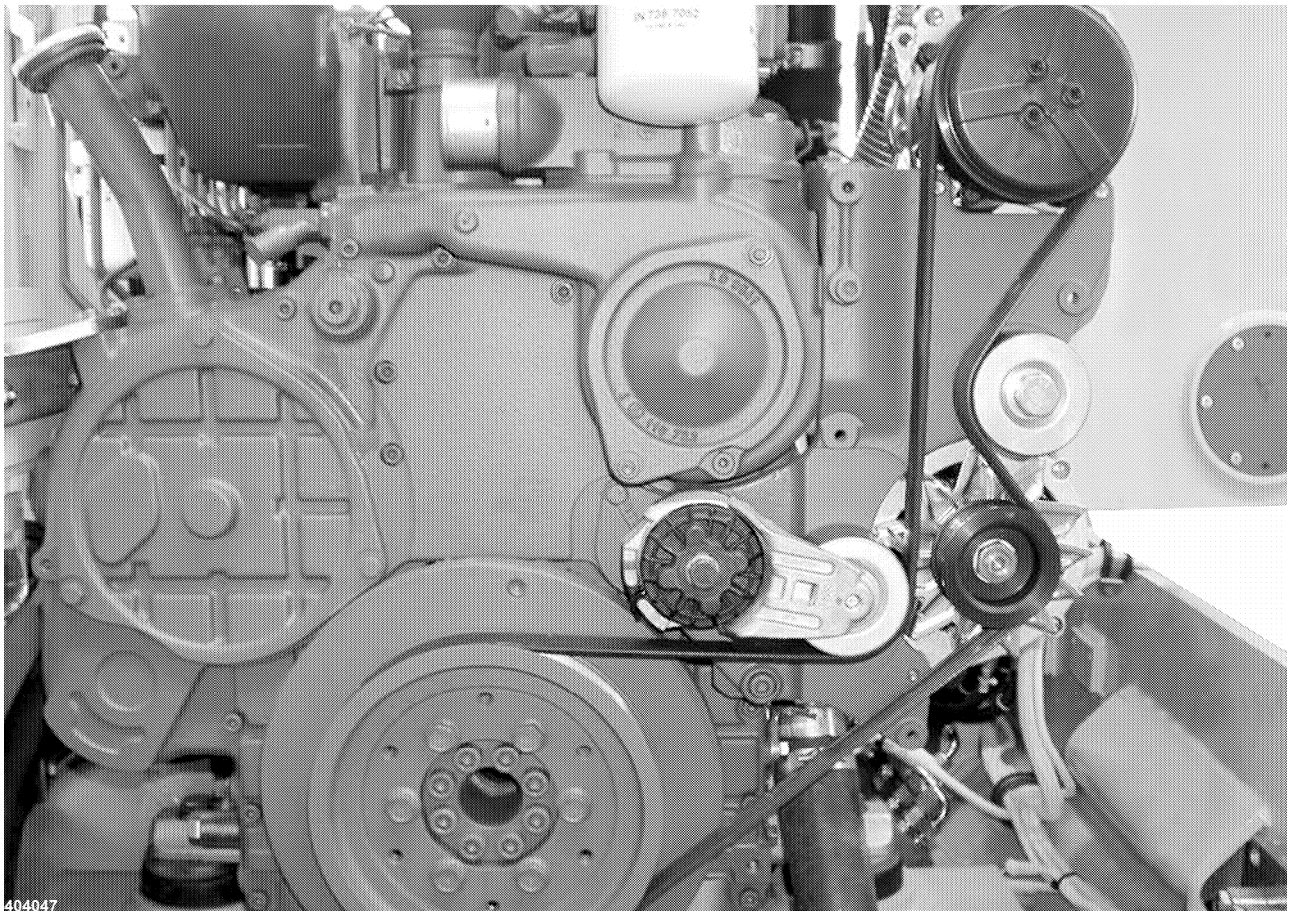
Danger of injury due to rotating engine parts!
Turning and moving engine parts, such as fan blade or V-belt can cause serious injuries!
! Open the engine compartment doors only when the engine is at a standstill.



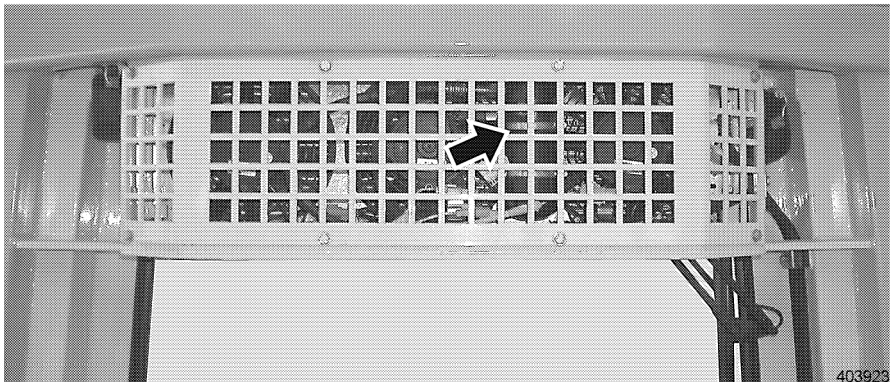
Compressor

- 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 paragraph "Diesel engine", "Check / change V-belt".



Air conditioning system V-belt



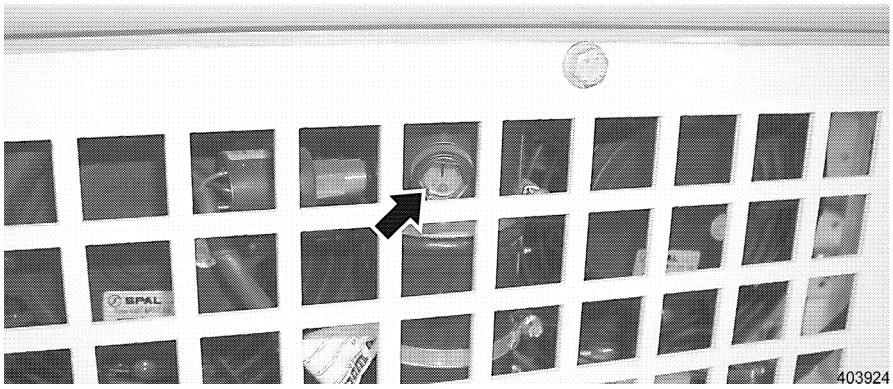
Dryer

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

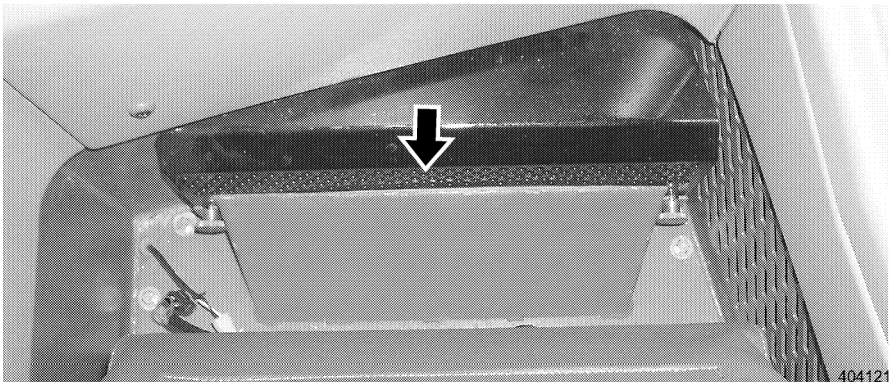
! Danger of falling!
To check, use a suitable ladder!



Indicator pearls

- Check the color of the indicator pearls.

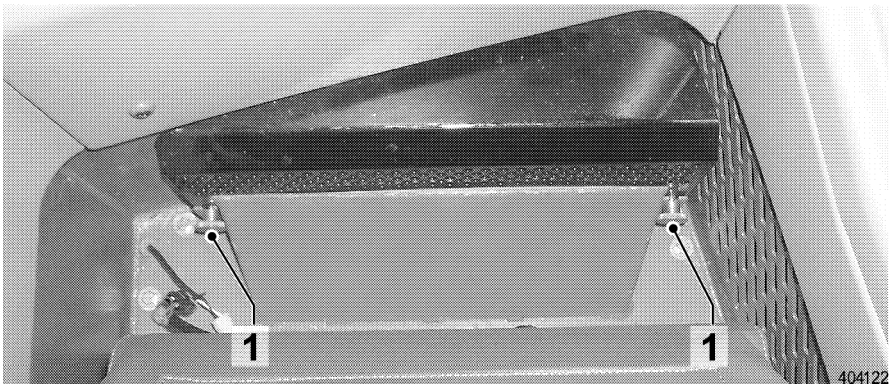
Two indicator pearls are in the sight gauge.
A white floater ball and a blue moisture indicator.
When the Diesel engine is running, the refrigerant must flow through the sight gauge of the fluid reservoir (dryer) and lift the white floater ball.
After the engine is turned off, the fluid level must fall 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

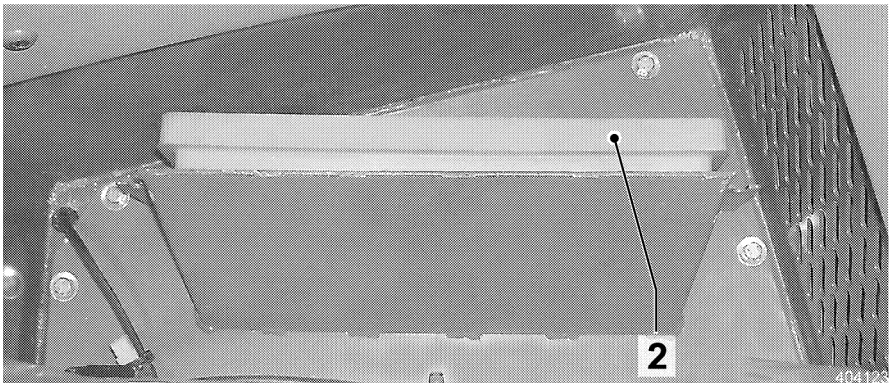
The air filter for the ventilation system is behind the operator's seat, on the floor of the cab.
The air in the cab is filtered via the air filter.



Change the air filter

Replace the air filter

- Move the complete operator's seat to the front.
- Loosen the grooved screws 1 on the upper side of the filter housing.



Air filter

- Remove the cover and remove the filter 2.

When inserting a new filter, make sure to align the sealing profile to the front.

- Add the cover and tighten the grooved screws.

5.13 Travel gear

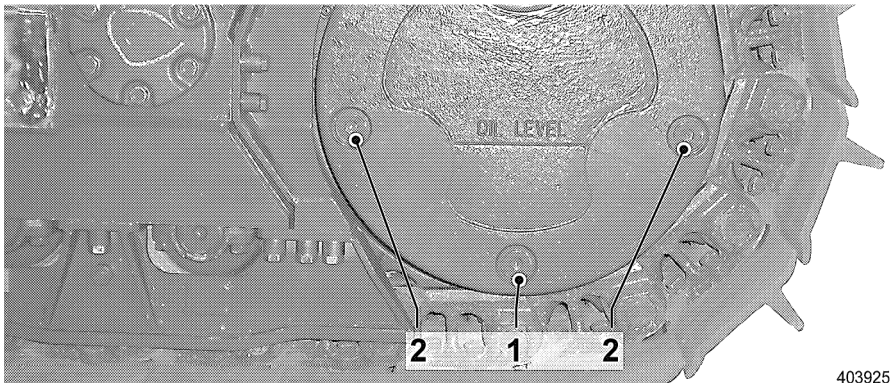
5.13.1 Check the condition of the travel gear

- 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:

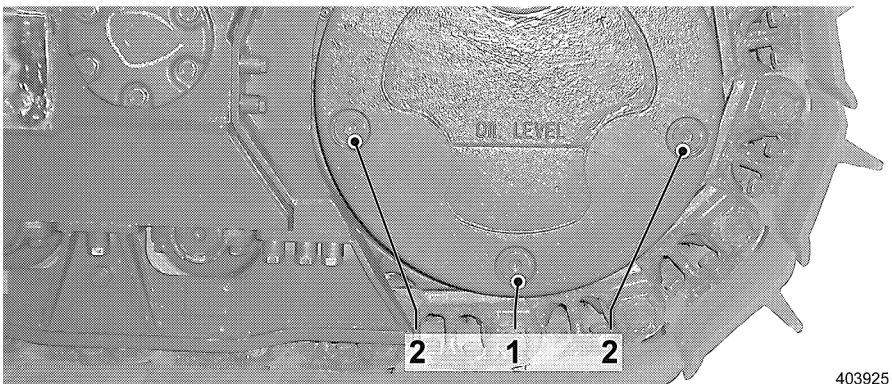
- Add oil via the oil filler port 2.

– 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.

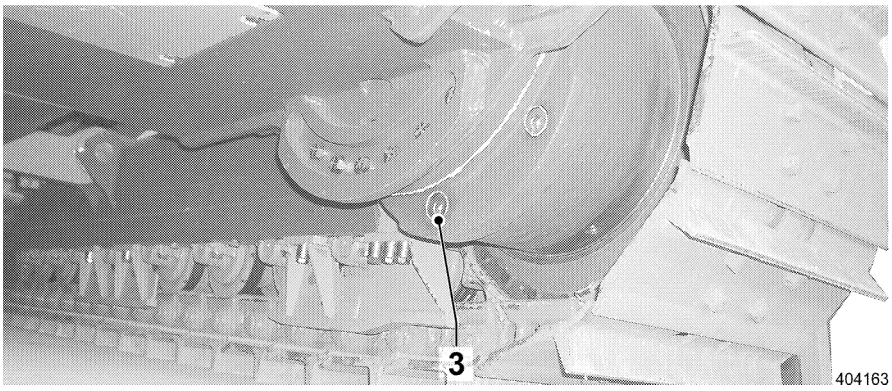


Travel gear

- 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!

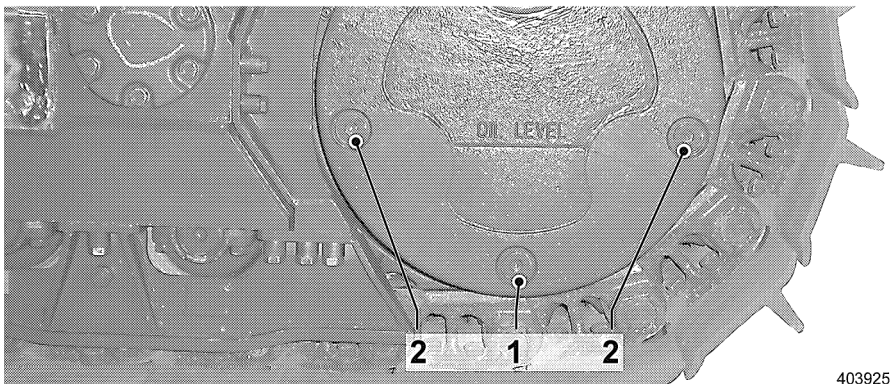
To drain the gear oil completely from the gear, the oil must also be drained from the inside of the gear.



Travel gear - inside

- Clean the area around the oil drain plug 3.
- Place a container under the oil drain plug 3.
- Turn out the oil drain plug 3.
- Let the oil drain into the container.
- Check the oil for mechanical contaminants.
- Clean the oil drain plug 3 and reinstall.

– Note the tightening torque of 160 Nm!



Travel gear

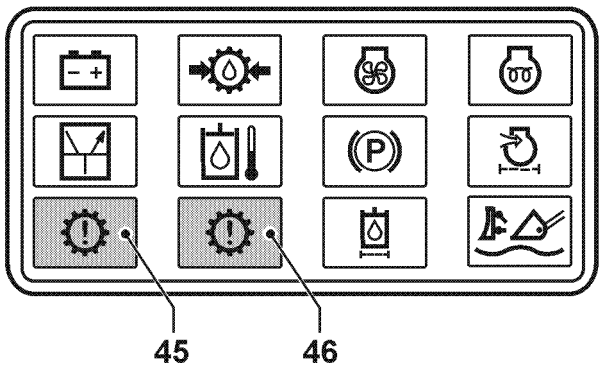
- Add oil to the lower edge of the filler port via the oil filler plug 2.
- Clean the oil filler plug 2 and reinstall.

– Note the tightening torque of 160 Nm!

5.13.4 Travel gear - Lifetime seal area

Oil level - Lifetime seal area

If the oil level is too low, the indicator lights "Travel gear - Lifetime seal area" 45 or 46 light up in the instrument panel.



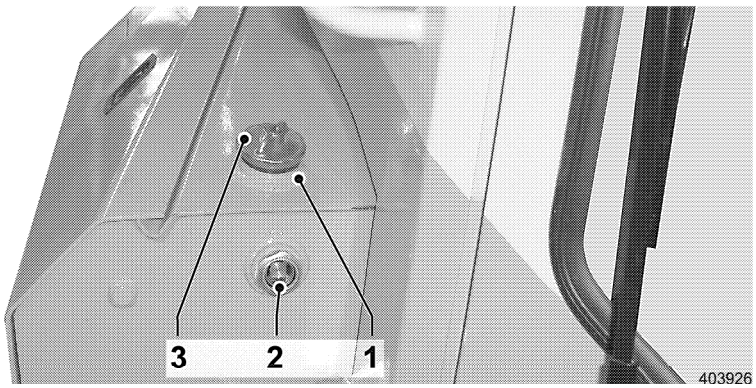
Indicator lights Travel gear - Lifetime seal area

Procedure in case an indicator light lights up:

- Turn the machine off.
- Check the affected travel gear externally for leaks.
- Contact Liebherr Service.
- To continue operation in the meantime, bring the oil level to normal level.

Monitoring the oil level in the Lifetime seal area

- Park the machine on level ground.



Lifetime seal area - oil reservoir

The oil reservoir 1 is installed on the right hand side in the battery compartment.

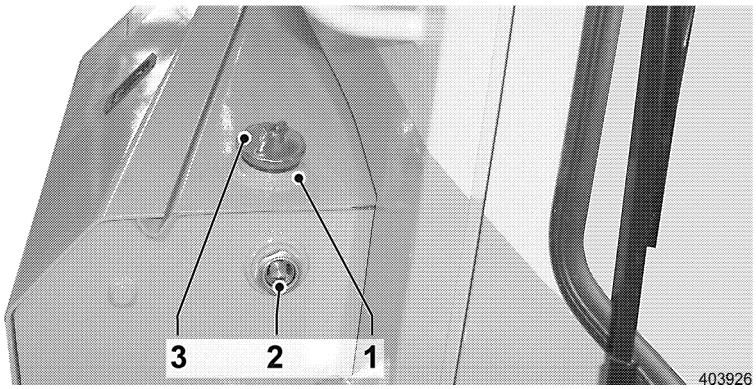
- Check the oil level on the sight gauge 2. The oil must be visible in the center of the sight gauge.

– If necessary, add oil according to the lubrication and service fluid specification.

Changing the oil in the Lifetime seal area

Make sure that:
– the machine is in maintenance position,
– two appropriate containers are available,
– the correct oil quality and quantity is available, as noted in chapter "Lubricants and service fluids".

The oil reservoir is installed on the right hand side in the battery compartment.



Lifetime seal area - oil reservoir

- Remove cover 3 on the oil reservoir.
- Set the containers under the drain plugs on the travel gears.

Drain plug - Lifetime seal area

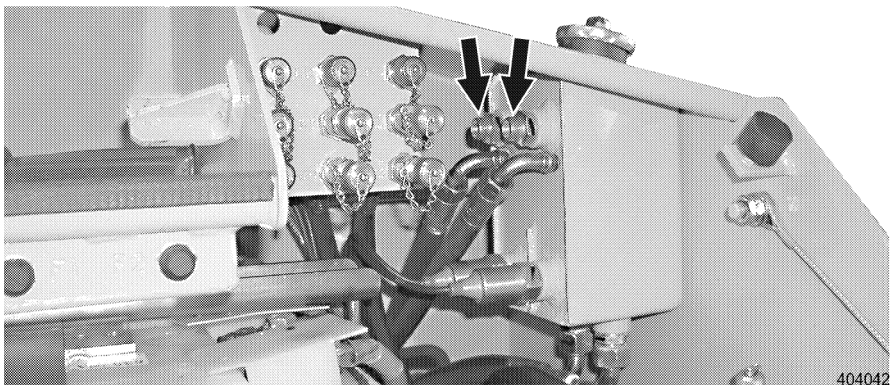
- Remove the drain plug 1 on the underside of the travel gear.
- Let the oil drain into the container and dispose of it properly.
- Repeat the drain procedure on the second travel gear.

Flushing the Lifetime seal area

Before refilling, always flush the Lifetime seal area sufficiently. Any sediment will be removed from the Lifetime seal area during the flushing procedure.

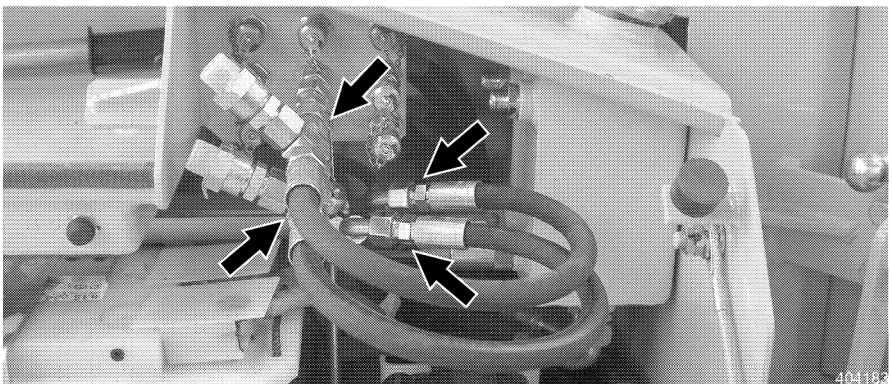
Drain plug - Lifetime seal area

- Check if both containers are positioned below the drain plugs - Lifetime seal area and if the drain plugs are open.



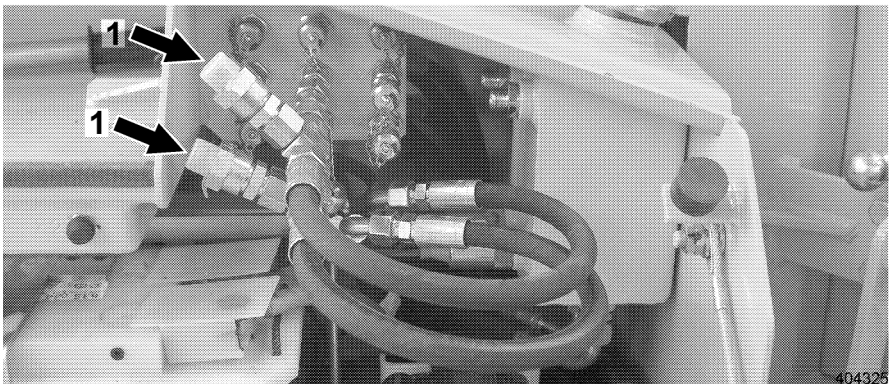
Unscrew the bleeder lines

- On the oil reservoir in the battery compartment, remove both bleeder lines from the screw fitting.



Connect the flush lines

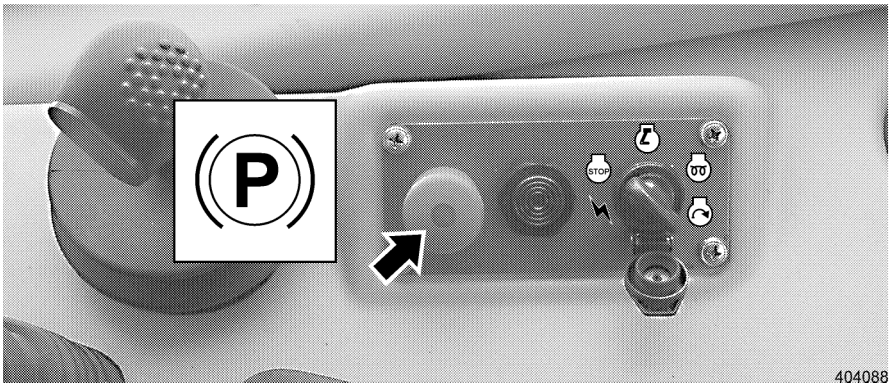
- Install the flush lines (part of the tool box) on the bleeder lines.
- Unscrew the protective caps on the connections ML1 AND MR1 and connect the flush lines to the ML1 AND MR1 connections.



Pressure relief valve - flush lines

The flush lines are provided with a pressure relief valve 1. If the outlet of the Lifetime seal area is blocked, the pressure relief valve indicates overpressure from 1 bar.

- In this case, clean the drain bores and continue the flushing procedure.



Emergency off button

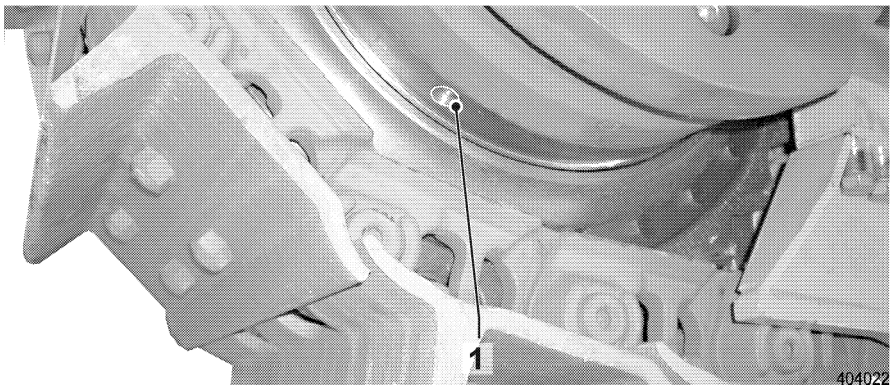
- Press the emergency off button on the instrument panel.
- Close the engine compartment doors.

Caution

Risk of accident!

! During the oil change, the emergency off button must remain pressed and the safety lever must remain in the uppermost position!

- Start the diesel engine in low idle RPM. See chapter "Control, operation".
- Let the diesel engine run until only clean oil emerges at the drain plugs.
- Turn the diesel engine off.



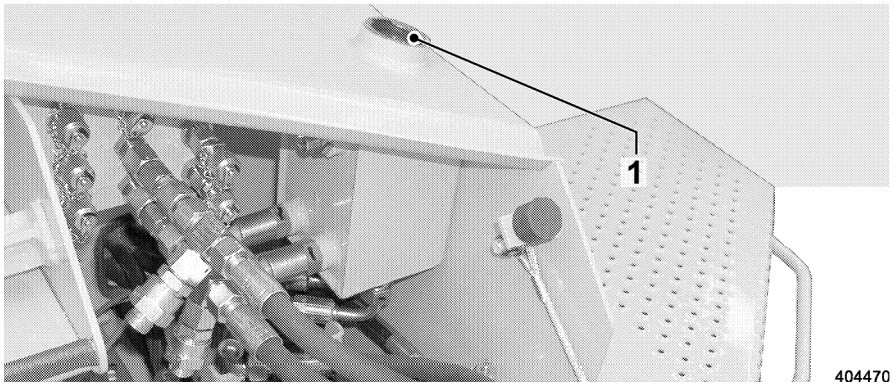
Drain plugs - Lifetime seal area

- Attach and tighten the left and right drain plugs 1 (40 Nm).

Adding oil to the Lifetime seal area

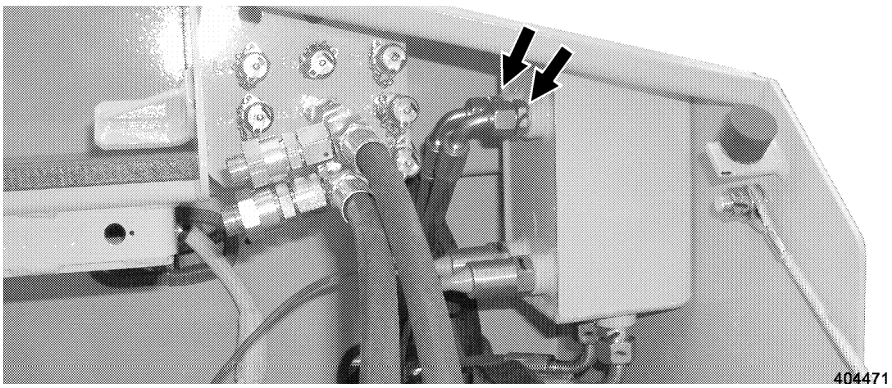
Drain the oil first as described above and flush the Lifetime seal area.

– Attach and tighten the left and right drain plug (40 Nm).
- Start the diesel engine in low idle RPM. See chapter "Control, operation".
– The Lifetime seal area is filled with oil via the bleeder line.



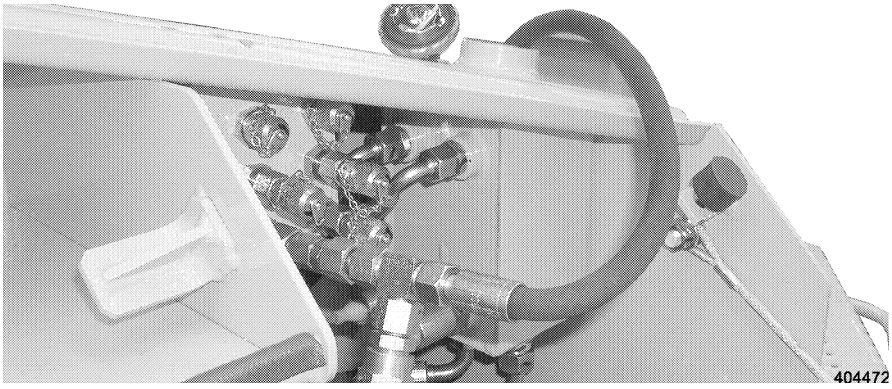
Lifetime seal area oil reservoir

- Monitor the interior of the container through the filler aperture 1 and as soon as the oil level is seen to rise turn the diesel engine off.



Attaching bleeder lines

- Unscrew the flush lines from the bleeder lines and remount the bleeder lines correctly.



Filling the oil reservoir

- Unscrew a flush line from connection M1, holding the second flush line over the filler aperture in the reservoir.
- Restarting the diesel engine in low idle RPM and allowing it to run until the reservoir is filled to the lower edge of the filler aperture = overfilling.
- Turn the diesel engine off.

– Remove the remaining flush line, close M1 connections with the protective caps.

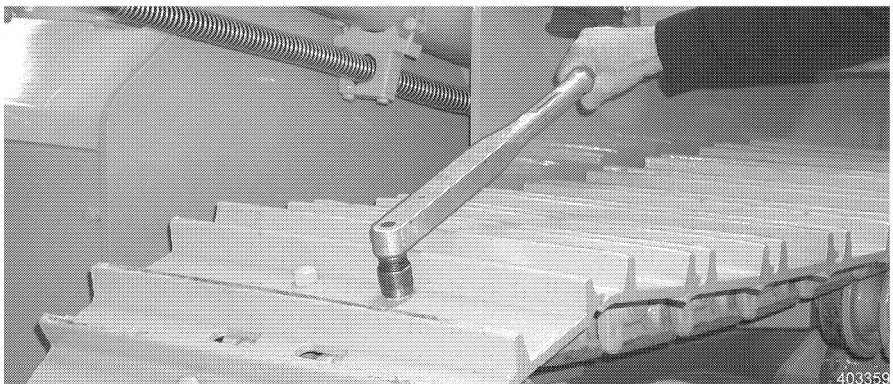
- Check the oil level in the hydraulic tank and add oil if necessary.
- Operate the machine for a short time and check the oil level again.

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.

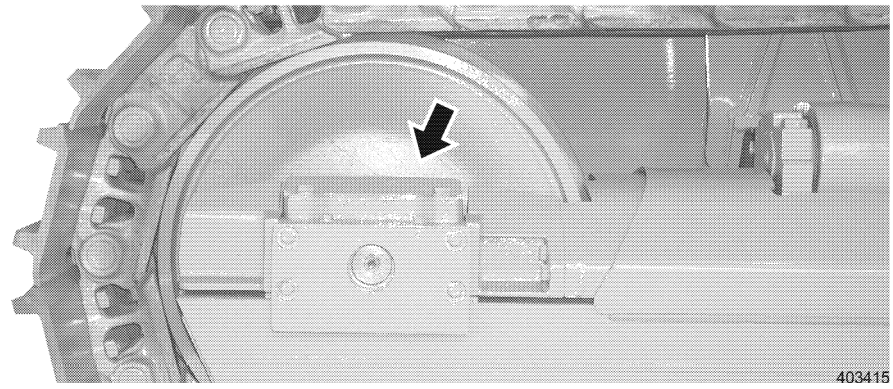
Tightening torques for track pads and sprocket segment bolts:
– 5/8" UNF: 180 Nm + 120°
– 3/4" UNF: 270 Nm + 120°
– 7/8" UNF: 400 Nm + 120°

5.14.2 Check the seal on the carrier rollers, track rollers and idlers

- Check visually.

5.14.3 Idler guide

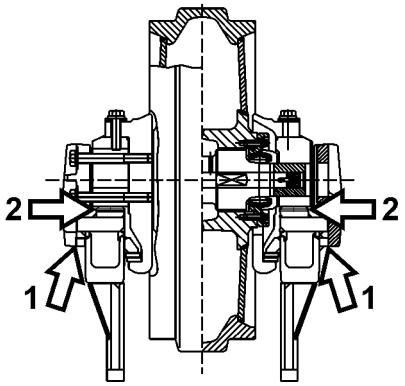
Make sure that:
– the machine is in maintenance position.



Idler guide

Check / adjust the 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.



403928

Side - height clearance

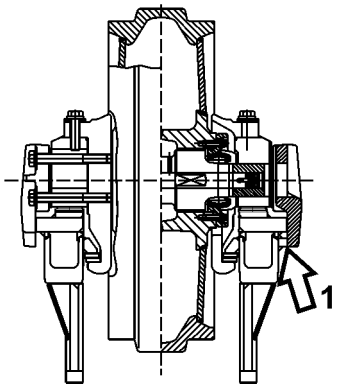
New / repair measurement
- Side clearance 1 = min. 1 - 2 mm
- Height clearance 2 = min. 3 mm

Maximum permissible play
- 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.

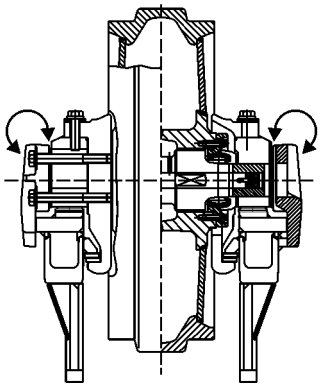
– For example by turning (80% joystick deflection), see also "Control", "Operation".



403929

Check the side clearance

- Measure the existing clearance between the track roller frame and the outer guide plate.

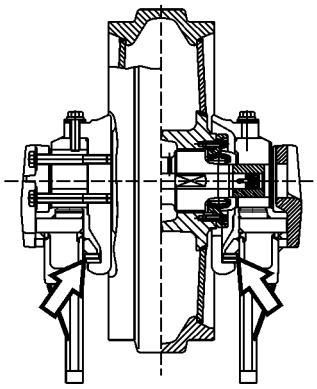


403930

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.

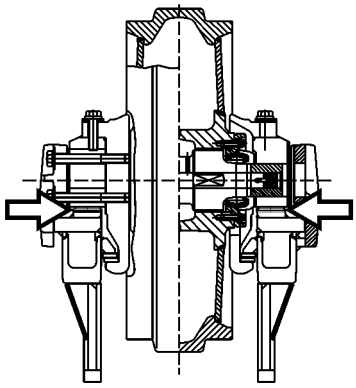


403931

Raise the idler

Check / adjust the height clearance

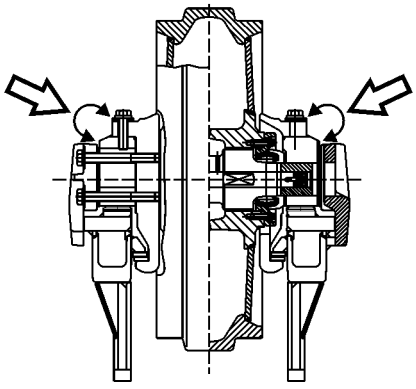
- Raise the idler by moving onto a piece of wood (height of the wooden block = max. 200 mm) until the claws touch the guide rails.



403932

Check the height clearance

- Measure the clearance between the wear strips and the bearing.

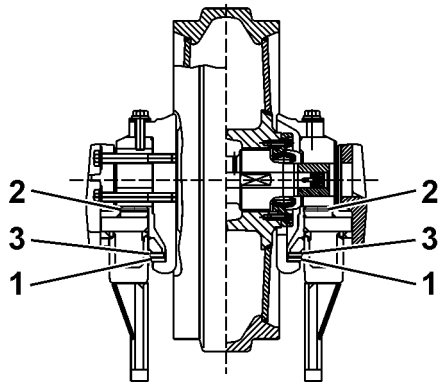


403933

Correct the height clearance

- If the permissible play is being exceeded, remove the shims under the screw and add between the claws and bearings.

– The same number of shims must always be added on the inside and the outside.



Wear parts - idler guide

- Check the wear parts on the claws and the track roller frame and if the permissible values are exceeded, replace worn strips 1 and 2 as a set.
- When replacing the strips, check the welded-on guide rails 3, if they are worn, replace them also.

5.14.4 Chain tension

Danger

The chain tensioner may only be replaced or repaired by authorized specialist personnel.

! The chain tension spring is pretensioned, even if the chain tension is relieved!

Wear on the running gear makes it necessary to check the chain tension regularly and retension the chain if necessary.
Since the build-up of material on rocky surfaces, for example, is less than on cohesive surfaces, the chain must also be adjusted to suit the conditions of use.
Material which has built up on the running gear parts during work may not be removed before checking the chain tension.

! The conditions must be identical to the conditions of use!

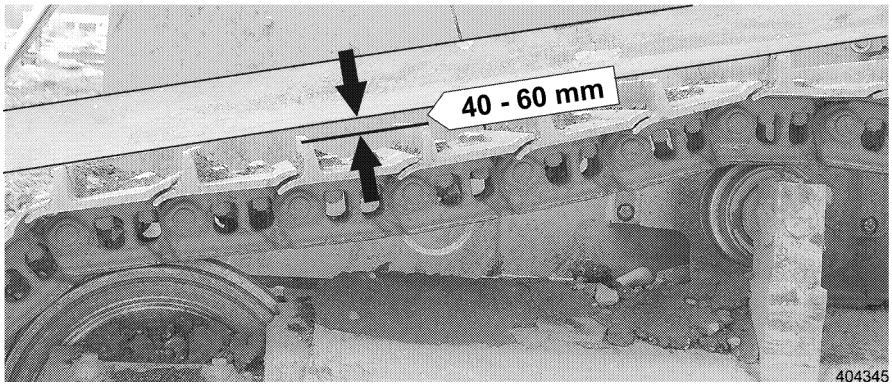
Caution

! Chains which are too tightly tensioned increase the build-up of dirt and wear.

Heavy dirt build-up and tooth wear cause the running gear chains to skip.
Frequent skipping of the chains can cause subsequent damage to the drive train.

– Clean running gears regularly and check tooth profile wear.
– If the tooth profile wear has extended over the tooth tips the tooth segments should be replaced.

Make sure that:
– the machine is in maintenance position,
– a measuring stick is available.

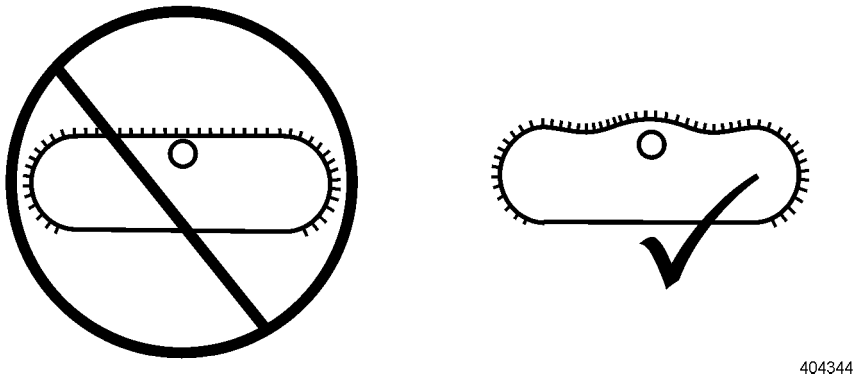


Monitoring the chain tension

Monitoring chain tension

- Relieve the chain by moving the machine back and forth.
- Place the measuring stick in the area between the idler and the carrier roller.
- Measure the distance between the lower edge of the measuring stick and the chain bar.

– The chain is tensioned correctly for the job application if the slack between the carrier roller and the idler or sprocket is between 40 - 60 mm.



Chain tension

! An incorrectly tensioned chain results in high chain wear.

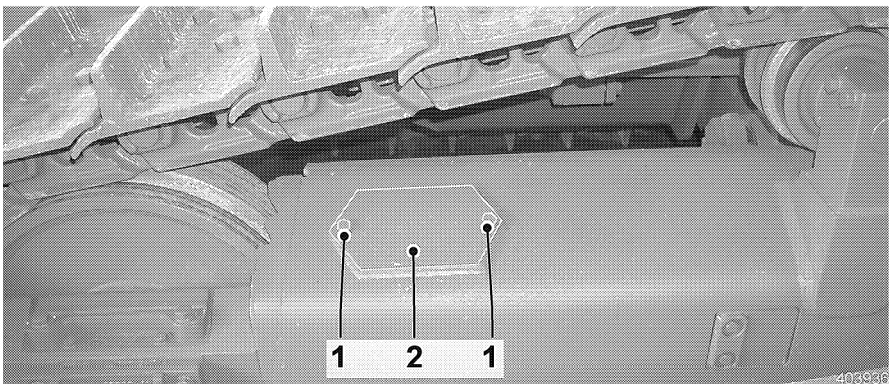
– The chain tension must always be set to the given slack dimension for the job application.

- Correct the chain tension as necessary.

Tensioning the chain

Make sure that:

– the machine is in maintenance position,
– the lever-type grease gun for the chain tension spring fitting is available.



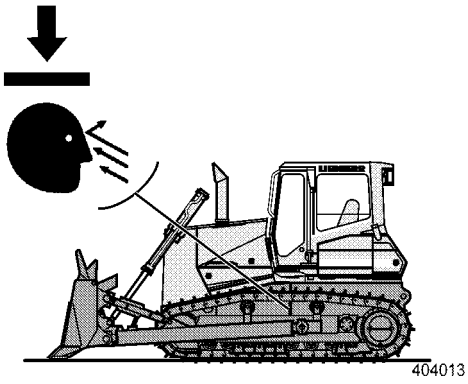
Cover - track roller frame

- Clean the surfaces in the area of the cover on the track roller frame.
- Remove the hex head screws 1 on the cover and remove the cover 2.

Lever-type grease gun

- Connect the lever-type grease gun on the grease fitting of the clamping cylinder.
- Pump in grease until the proper slack dimension (40 - 60 mm) is reached.
- Attach the cover with hex head screws.

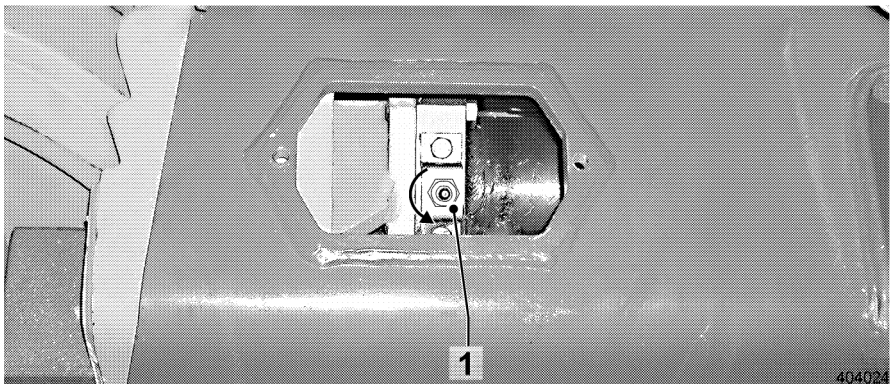
Relieving the chain tension



Risk of injury

Danger

Risk of injury!
! The chain will sag and grease can squirt out.
– When relieving the chain tension, keep your head clear of the track roller frame.

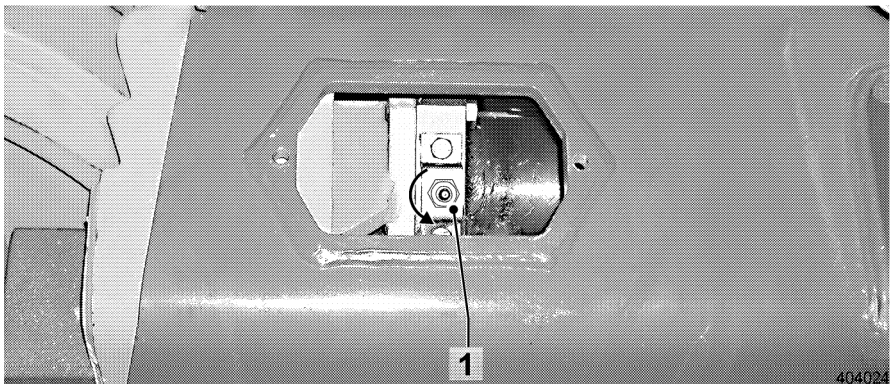


Grease fitting

- Carefully unscrew grease fitting 1 by a few threads until the grease oozes out of the fitting's snap ring groove.
- Tighten grease fitting 1 as soon as the desired chain tension has been obtained.
- After adjusting, move the machine forwards and backwards and check the chain tension once more.

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 - release chain tension

Removal of sealed chain

- Tension the chains. See "Chain tension".
– Back out the grease fitting 1 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.

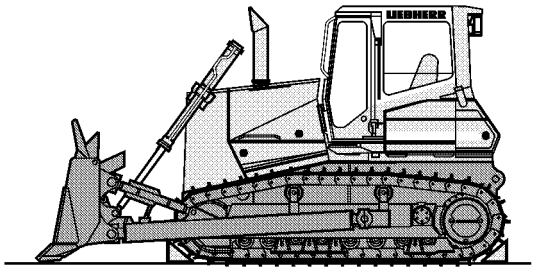
Caution

! 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.

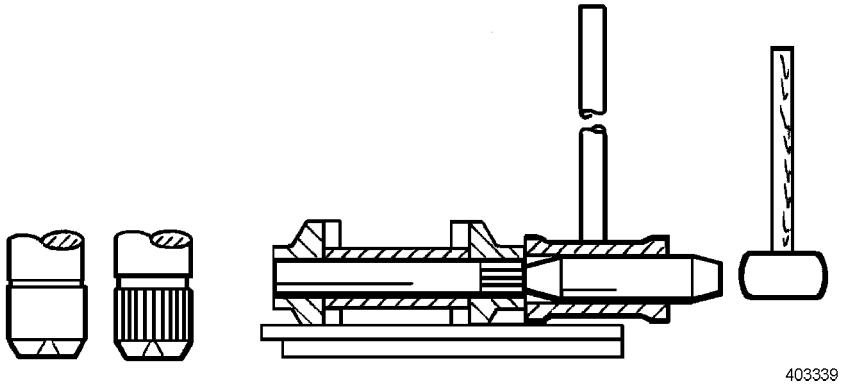
Knurled master pins must be pressed in from the outside to the inside and pressed out from the inside to the outside. Knurled edge on the outside!



404014

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.



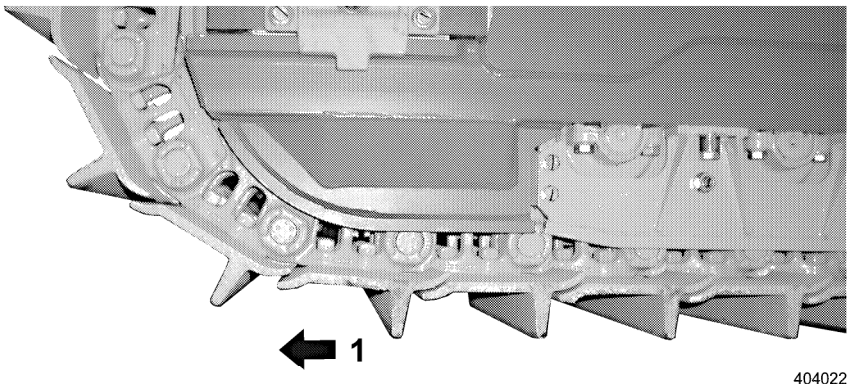
403339

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.



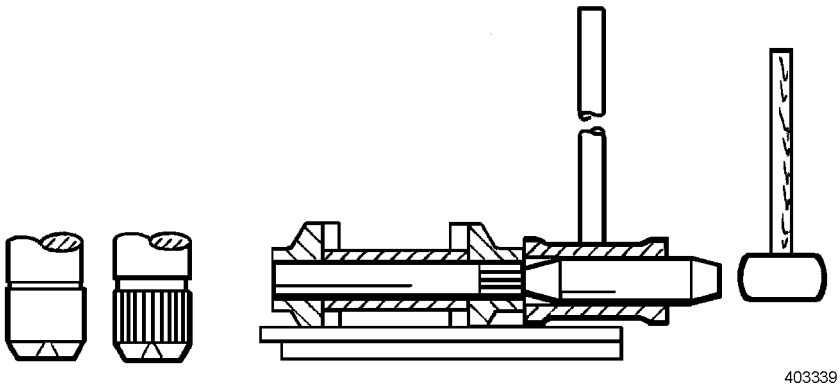
Travel direction forward

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.

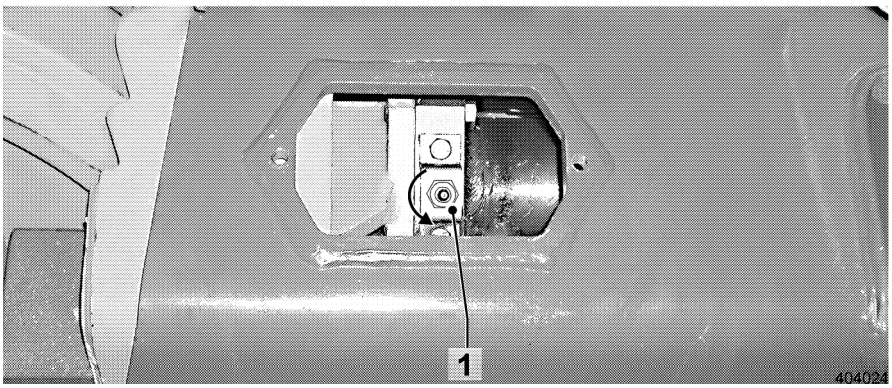


Press in the master pin

- 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.

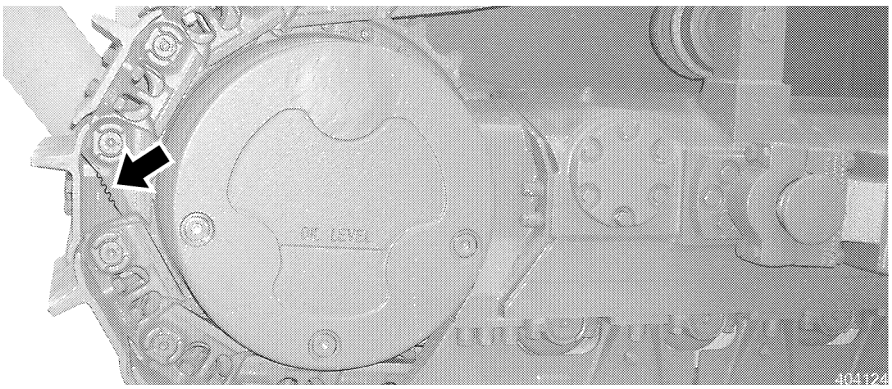


Grease fitting - release chain tension

- Release the chain tension. See "Adjust chain tension".

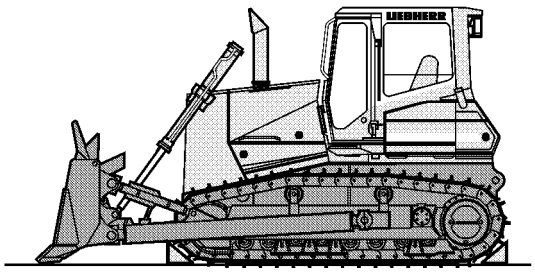
– Back out the grease fitting 1 by a few threads.

- 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.

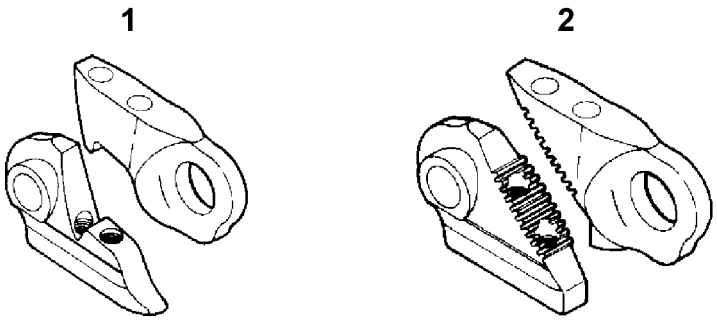


404014

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.

Various chains with split master links are used in LIEBHERR machines.



Master link brands

- 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.

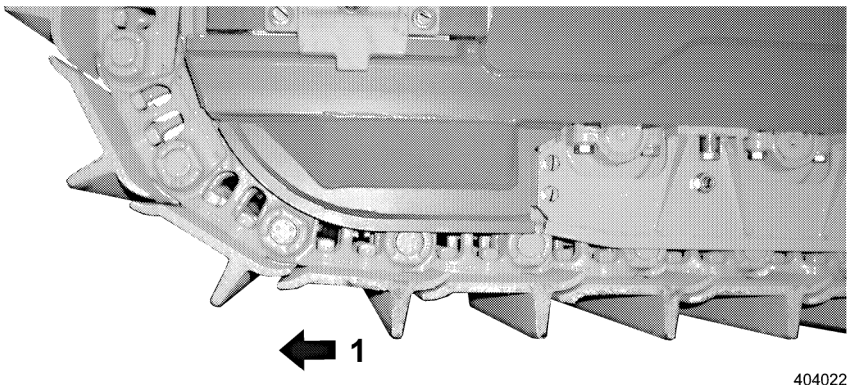
- Place the chain on the ground by carefully driving forward.

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 end of 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.

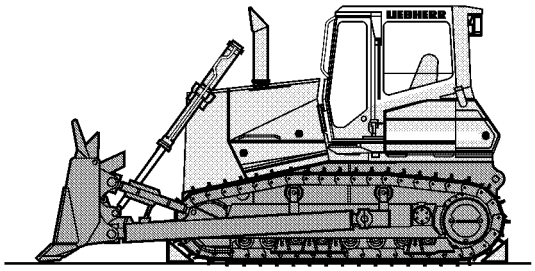
– The bolts must be inserted by hand.



Travel direction forward

Make certain that the chain is installed correctly with the track pads on the correct side (1 = travel direction forward).

- 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.



404014

Place a wooden block

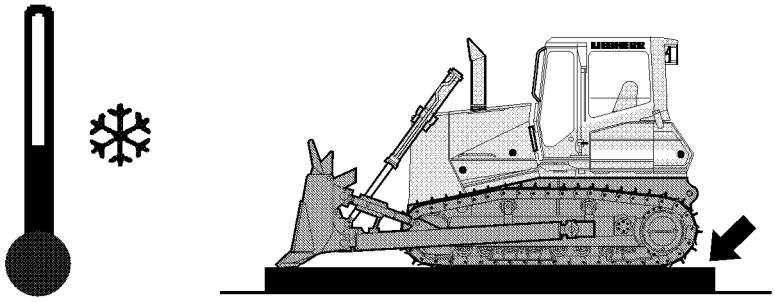
- Secure the chain in front of the idler and behind the sprocket with a wooden block.
- Connect the chain links.

– 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: 270 Nm + 120°
7/8" UNF: 400 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.

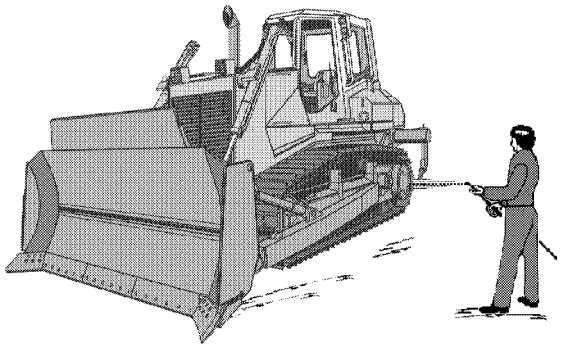


404015

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.



404138

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.

5.14.8 Lubricate the oscillating axle bearing

The center oscillating axle bearing is equipped with a grease fitting and can be lubricated according to the data in the Maintenance and Inspection schedule.

Lube point - oscillating axle bearing

- Open the right engine compartment door.
- Grease the lube point 1 with the manual grease gun.

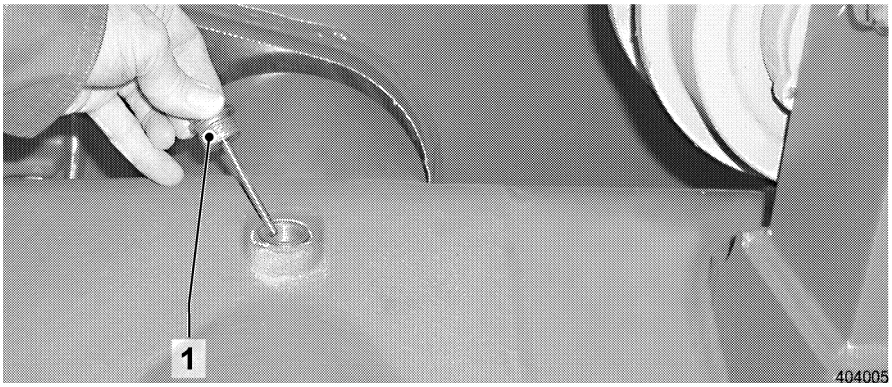
5.14.9 Axle bearing - oil filling

The left and right axle bearings are filled with oil. Check or change the oil according to the instructions in the Maintenance and Inspection Schedule.

Make sure that:
– the machine is in maintenance position.
– the correct amount of oil with the correct specification is available, according to the data given in "Lubricants and Service fluids".

Check the oil level

- Clean the area around the oil level inspection plug.



Oil level inspection plug

- Remove the oil level inspection plug 1.

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

If the oil level is too low:

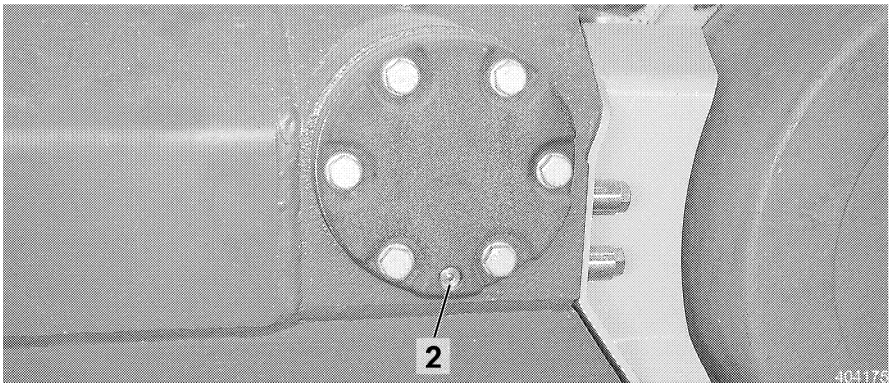
- add oil via the oil level control bore.

For oil specification, see chapter "Lubricants and Service fluids".

- Reinstall the oil level inspection plug and check the oil level at the second axle bearing.

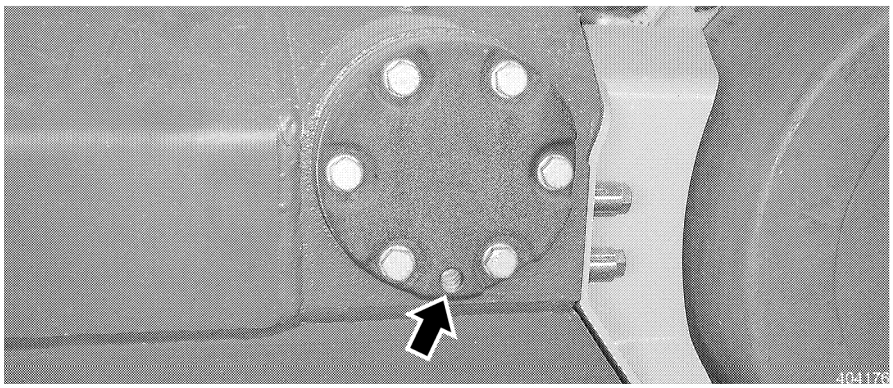
Change the oil

- Clean the area around the oil level inspection plug.
- Remove the oil level inspection plug.
- Place a suitable container under the drain plug.



Drain plug

- Remove the drain plug 2 on the axle bearing cover.



Oil drain bore

- Let the oil flow into the container via the oil drain bore.
- Check the seal on the drain plug 2 and replace it, if necessary.
- Reinstall the drain plug 2.
- Fill the axle bearing with oil via the oil level control bore.
- Reinstall the oil level control plug 1.

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.
- Visually check for damage and wear.
- Check the mounting screws for tight seating (note the tightening torques).

Make sure the machine is equipped with the proper attachment for the job.

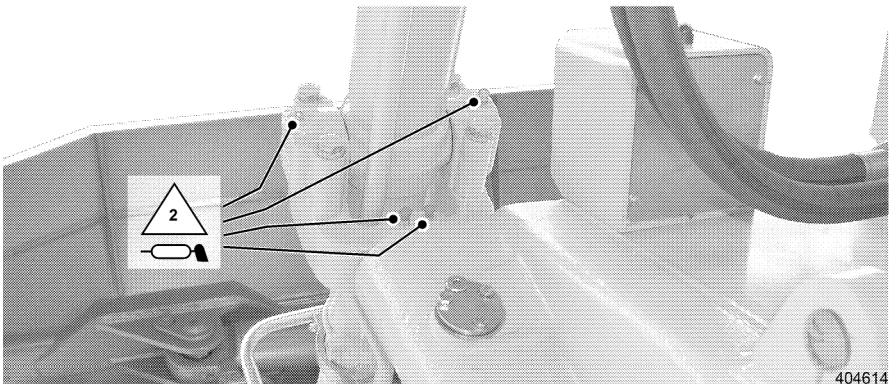
Check for wear

To prevent damage to the blade or tooth retainers, the cutting edges must be replaced before the wear limit is reached.

- Check the attachment for wear, replace worn parts, if necessary.

5.15.2 Lift cylinder bearing

The lift cylinders are connected via a rotatable fork with the main frame of the machine.
These bearing points are filled with special grease.



Lift cylinder bearing

- Grease the bearing points with the manual grease gun.

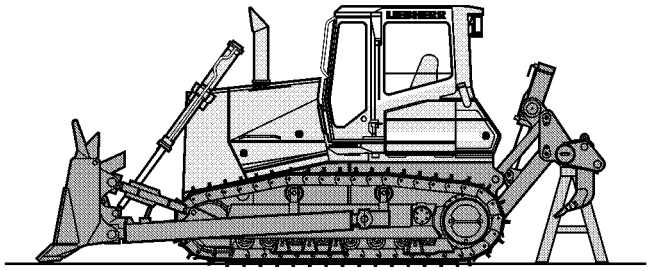
5.15.3 Replace the ripper teeth

Danger

! Never work under the raised attachment if it is not properly supported.
Lower the attachment to the ground or support it properly from below.

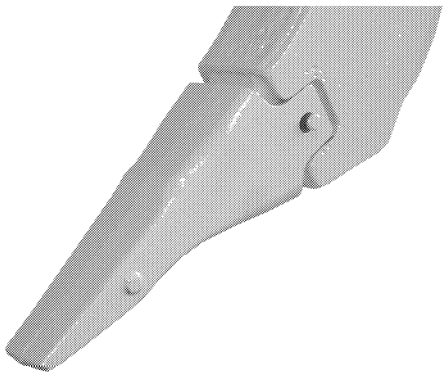
Caution

! When knocking out the safety elements, there is a danger of injury due to material chipping off.
– Wear safety glasses and protective clothing.
– Make sure no personnel is within the danger zone.



Support the ripper

- Support the ripper properly from below.



403615

Ripper - tooth

- Knock out the safety pin with a hammer and punch.
- Remove the tooth.
- Clean the tooth adapter and safety pin.
- Install new ripper tooth.

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.

Blade attachment

To check the bearing plays, the blade system must be fully actuated.

Maximum permissible bearing plays

Push frame linkage on travel gear and blade: max. 4 mm.

Linkage pull rod, tilt and angle cylinder: max. 3.5 mm.

5.16 Total machine

5.16.1 Check the machine for external damage

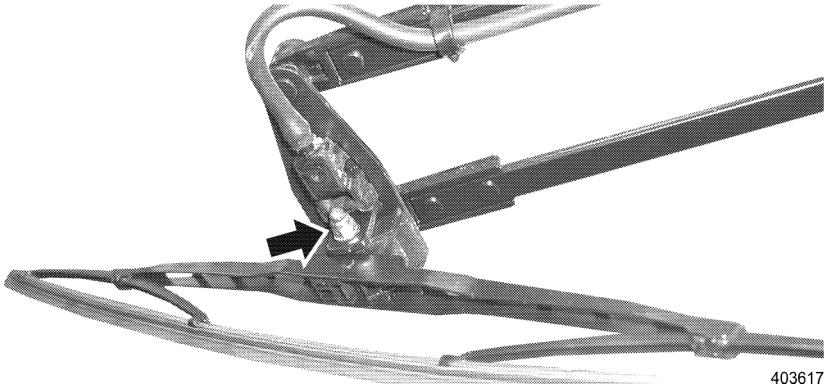
Make sure that:
– the machine is in maintenance position.

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 Windshield wiper



403617

Windshield wiper

Change the windshield wiper blade

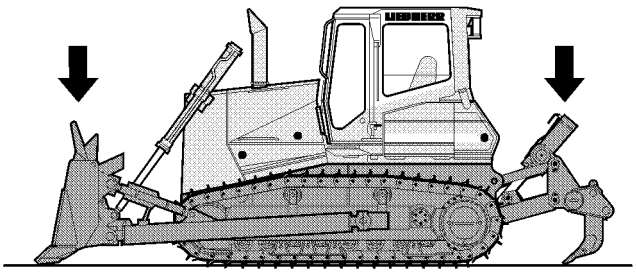
- Fold the wiper arm up.
- Remove the nut of the mounting screw.
- Remove the spring ring and washer and pull out the mounting screw.
- Remove the wiper blade and change it.

Correct the windshield wiper position

- Loosen the lock screw on the windshield wiper arm and set it vertically by changing the length of the guide arm for the wiper blade.

5.16.3 Piston rod preservation

For the preservation of the piston rod, we recommend LIEBHERR anticorrosion grease CTK. See "Lubrication and Service fluids".



404016

Maintenance position for piston rod preservation

- The machine should be operated at least once every two weeks, according to the Operating 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.

5.16.4 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.

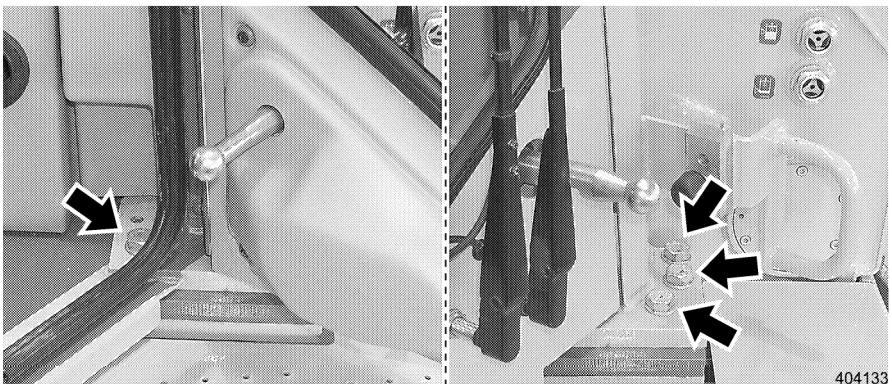
Danger

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 uppermost position.

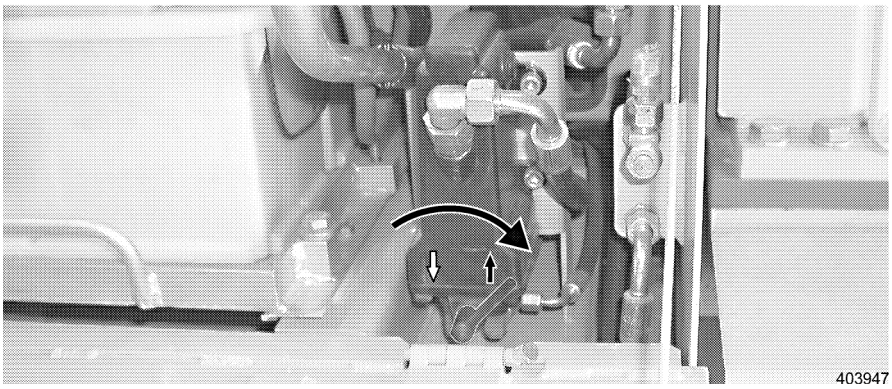
5.17.1 To raise the cab

Make sure that:
– the machine is in maintenance position,
– the extension pipe to control the hand pump is available.



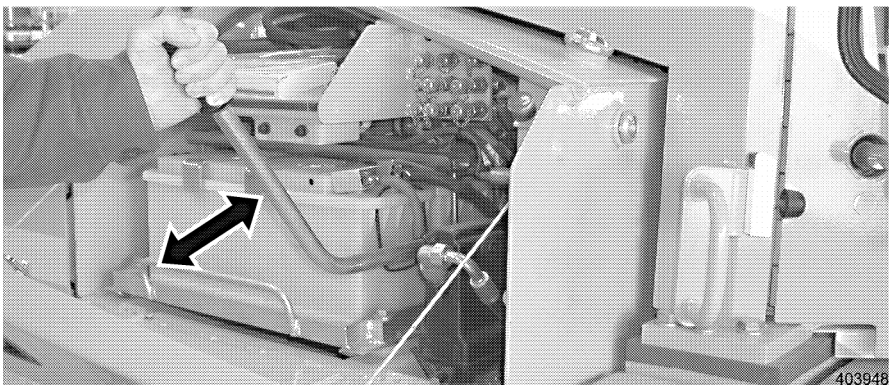
Mounting screws - cab

- Remove 4 hex head screws per side from the cab.
- Close both cab doors.
- Open the battery compartment door.



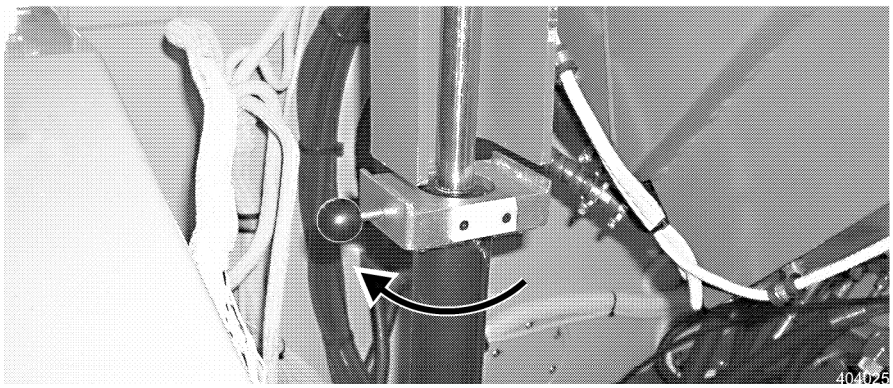
Hand pump "up"

- Set the lever on the hand pump to "up" .



Actuate the hand pump

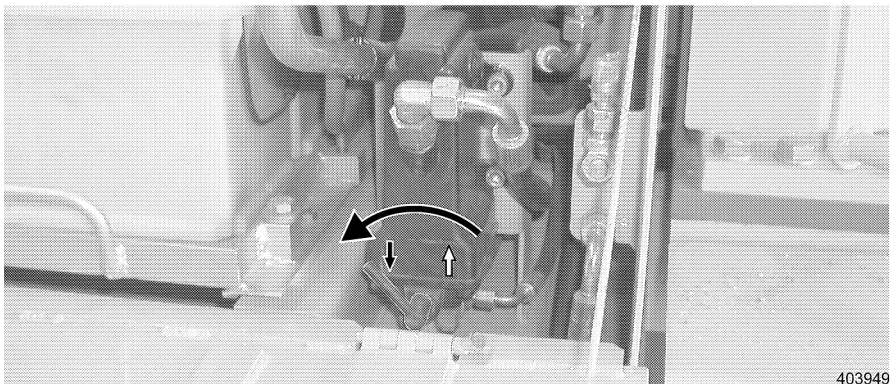
- Insert the extension pipe into the hand pump.
- Actuate the hydraulic hand pump until the piston has reached the end position (intermediate positions are prohibited!).



Turn the support plate by 90°

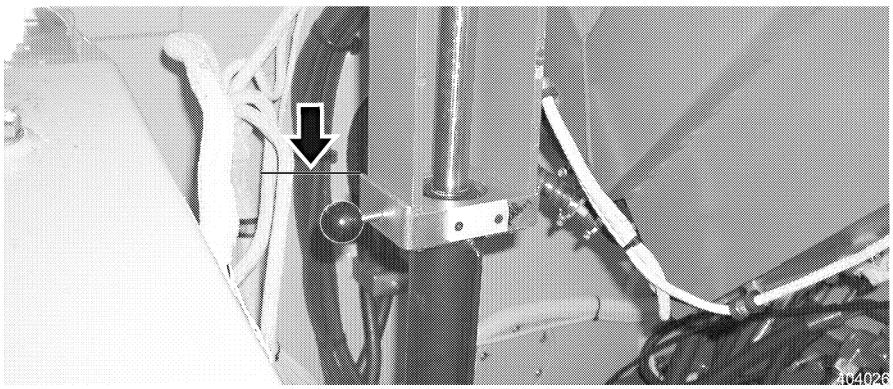
- Turn the mechanical support plate on the hydraulic cylinder in clockwise direction by 90°.

– The handle of the support plate is then horizontal to the travel direction of the machine.



Hand pump "down"

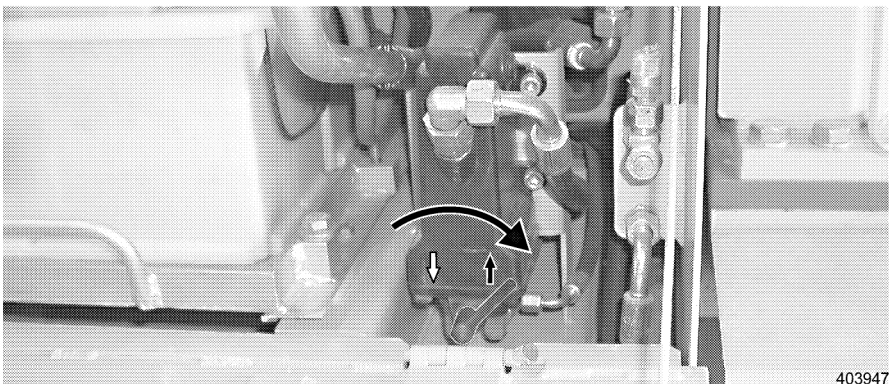
- Then set the lever on the hand pump to "down".



Safety bar

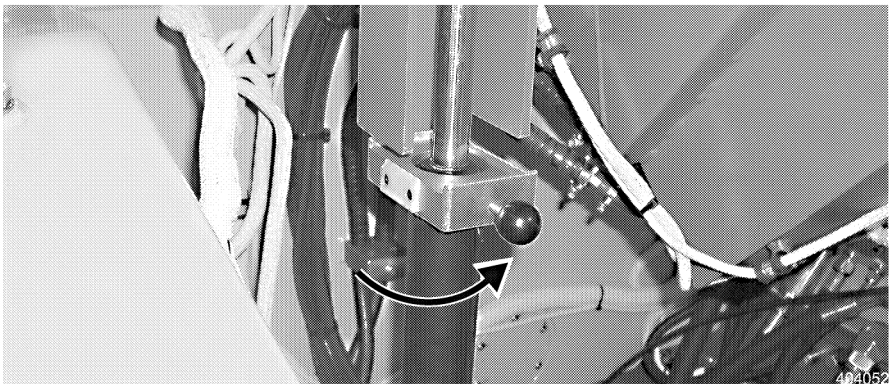
- Lower the cab by actuating the hand pump, until it is locked by the mechanical safety bar on the support plate.

5.17.2 Lower the cab



Hand pump "Up"

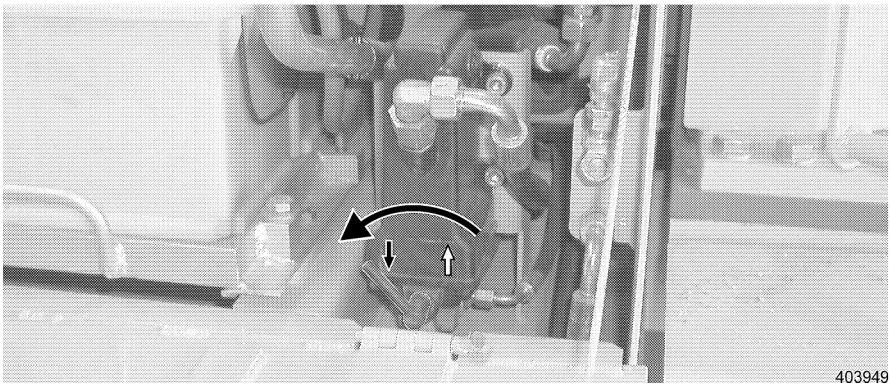
- Set the lever on the hand pump to "Up".
- Raise the cab by actuating the hydraulic hand pump.



Turn the support plate by 90°

- Release the safety support with a slight thumb pressure and turn the support plate on the handle in counterclockwise direction by 90°, to the front.

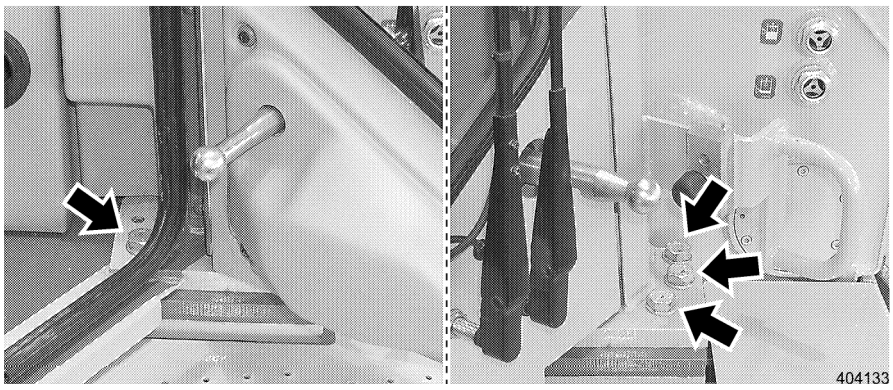
– The handle on the support plate is then positioned in travel direction on the front.



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.

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

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

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

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